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GREEN, LIVABLE, AND RESILIENT CITIES, SERBIA:

STRENGTHENING SUSTAINABLE AND RESILIENT URBAN DEVELOPMENT

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GREEN, LIVABLE, AND RESILIENT CITIES, SERBIA:
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COWI

Front page photograph: Central Sombor (Photo by Sara Ramezani)

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ABBREVIATIONS

AFD	French Development Agency
C3S	Copernicus Climate Change Service
CEB	Central Europe and Baltic
CMIP6	Coupled Model Intercomparison Project Phase 6
CO_2	Carbon Dioxide
COP26	26th UN Climate Change Conference of the Parties
DRA	Disaster Risk Assessment
DRR	Disaster Risk Reduction
EBRD	European Bank for Reconstruction and Development
EC	European Commission
ECA	Europe and Central Asia
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GHG	Green House Gas
GHSL	Global Human Settlement Layer
GIS	Geographic Information System
GUP	General Urban Plans
GVA	Gross Value Added
HIS	Institute for Housing and Urban Development Studies of Erasmus University Rotterdam
HWMI	Heatwave Magnitude Index
ICT	Information and Communications Technology
IDP	Internally Displaced People
LQ	Location Quotient
LSG	Local Self-Government units
MCTI	The Ministry for Construction, Transport, and Infrastructure of the Republic of Serbia
MSW	Municipal Solid Waste
NDVI	Normalized Difference Vegetation Index
NO_2	Nitrogen dioxide
NRW	Nonrevenue Water
PHP	Public Health Plan
PM	Particulate Matter
PM10	$PM < 10~\mu m$
PM2	$PM < 2.5~\mu m$
PPP	Public-Private Partnership
PUC	Public Utility Company
RCP	Representative Concentration Pathway
RGA	Republic Geodetic Authority
RSD	Serbian Dinar
SFR	Socialist Federal Republic (of Yugoslavia)
SILC	Statistics on Income and Living Conditions
SME	Small and Medium-sized Enterprise
SMOD	GHSL Settlement Model Grid
SO_2	Sulphur dioxide
SOE	State-owned Enterprises
SSA	Serbia Stabilization and Association Agreement
SSP2	Shared Socioeconomic Pathway 2
SUDS	Sustainable Urban Development Strategy
TOA	Top-of-Atmosphere
UHI	Urban Heat Island
UNFCCC	United Nations Framework Convention on Climate Change
WB	World Bank
WHO	World Health Organization

Acknowledgements

Executive Summary

This report addresses knowledge gaps related to green and climate-smart urban and spatial development through analytical work on the system of cities in Serbia, with the aim of extending the knowledge base and policy dialogue toward more inclusive, sustainable, resilient, and green urban development, including in lagging regions.

The report presents analysis and findings on the following topics: the urbanization process and the urban system that has been a consequence of urbanization; urban demography, incorporating migration and poverty; economic development; spatial development; and environmental performance.

It provides an analysis of the Serbian urban system and its component areas based on the Degree of Urbanization methodology developed by the European Commission's Global Human Settlement Layer (GHSL) which shows how the story of Serbian urbanization differs in key aspects from the information available from official sources of data, such as the national census and other official statistics.

Urbanization and Urban Demography

- Although the official statistical data shows that the urbanization level in Serbia is relatively low at 59.4 percent, the use of Degree of Urbanization data shows that 64.3 percent of the total population of Serbia lives in urban areas (cities, towns, and suburban/peri-urban settlements). This figure demonstrates that there is less variation between Serbia's urbanization level and comparable Western Balkans and Central Europe and Baltic regional countries.
- A mismatch between official data from Serbian statistics and global datasets: settlements that are classified as urban by the official Serbian definitions are not detected as such when using global data for analysis, and vice-versa. This has implications for urban development policies at both national and local levels.
- There are also discrepancies in the population sizes of individual cities. The analysis undertaken for this report shows that cities in Serbia are on average larger than the official statistics show. Secondary cities, such as Novi Sad and Niš, have around 20 percent larger populations than the official figures.
- Cities in Serbia are also more densely populated than official data shows. The analysis of actual built-up areas, instead of official Serbian definitions and boundaries, reveals that the average population densities in cities are over 5,500 people per km^2.
- Overall, the population of Serbia is aging and declining, in both urban and rural areas. The aging of the population is manifested by a low and steadily declining number of young people (in 2020, people under 15 were only 14.3 percent of the total population) and working-age population (65.2 percent), and an increasing share of elderly in the total population (21.1 percent).
- Only three cities have experienced population growth since 2011 (Belgrade, Novi Sad, and Novi Pazar), and only two had a significant longer-term growth, namely Novi Pazar (32 percent since 2002) and Novi Sad (21.3 percent). These cities also attract the most internal migration. Novi Sad, Novi Pazar, and Belgrade have among the highest shares of the young population among all city LSGs. Novi Sad and Novi Pazar also have high shares of the working-age population, compared to the rest of the country. Novi Pazar has the youngest population of all cities in Serbia, with a 35.3 median age in 2020 (average male/female).

- Cities are aging, with the average median age of the population in 28 cities being 43.43 years, and with only one city having the average age of less than 40 years (Novi Pazar - 35.3 years). Aging of the population is not evenly spatially distributed, with the largest share of the elderly and the lowest share of the working-age population in South and East Serbia, and in border areas.
- Population is growing mostly in suburban areas that surround urban centers, while central parts are mainly shrinking or stagnating. Informal settlements are in those fringe, suburban areas of cities that are growing. Substandard settlements, inhabited almost exclusively by the Roma population, represent pockets of absolute poverty, and can be considered slums. They are mostly small in area and are scattered throughout built-up city areas.

Economic Development

- The analysis of economic trends shows that Serbia's economy is spatially uneven in large consequence of macro-economic shocks since the 1990s, which caused rapid deindustrialization. Smaller cities have borne a disproportionate impact of deindustrialization as investments and well-paid jobs are concentrated in the two largest cities of Belgrade and Novi Sad. However, since 2014 there are indications of economic renewal and reindustrialization based on manufacturing jobs and output.
- Serbia has a shortage of secondary cities. Only four cities in Serbia could be classified as secondary cities: Novi Sad, Niš, Kragujevac, Subotica. Only Novi Sad and Niš, and a series of smaller cities, conform to the rank-size rule. Belgrade is larger and the remaining two secondary cities (Kragujevac and Subotica) are smaller than anticipated by the rank-size rule. Novi Pazar is the only city that could potentially grow to the size that could correspond to the rank-size rule in the foreseeable future, based on the population growth trends in the last two censuses.
- Spatial imbalances could be improving due to these new investments in manufacturing - some lagging cities are creating jobs faster than Belgrade and Novi Sad and closing the gap in terms of wages.
- New jobs are being created in the relatively higher-technology and higher-wage sectors faster than those that were previously lost in deindustrialization during the 1990s.
- Still, the renewal process is uneven, as manufacturing clusters are concentrated along the main transport corridors. There has been significant recent investment in these transport corridors, particularly in the south of the country along the Pan-European Corridor X, and there are indications that this investment is correlated with investment and job creation in manufacturing. In contrast, cities not located on the main transport corridors are generally creating fewer jobs.

Spatial Development

- The growth of built-up areas does not correspond to either population size or growth. Serbian cities are increasing construction densities in inner city areas while population growth occurs in suburban areas. Population densities are decreasing in all except two cities (Novi Pazar and Novi Sad). The expansion of built-up areas of cities is much less efficient than in any comparator country.
- This may indicate that the expansion of cities is largely unguided by planning. In terms of land consumption, the actual built-up areas of cities are denser than shown in General Urban Plans (GUP). Analysis of urban land consumption in the 12 largest cities shows that GUPs zone on average 670 m^2 of construction land per capita, while actual built-up areas of cities use 197 m^2.
- Local governments tend to zone much more land in GUPs than cities use, which indicates inefficient urban land policies. On average, cities in Serbia zone close to 3.2 times more land for

construction than their built-up areas really occupy - Belgrade zoned 2.7 times more land for construction than its bult-up area occupies, Novi Sad 1.5 times, Niš 9.2 times more, Kragujevac 2.7, Novi Pazar 3.3 times, to name some examples.

- Boundaries of GUPs are often aligned with outdated administrative boundaries of urban settlements, therefore not matching the actual built-up areas of cities. In some cities, the boundaries of GUPs do not cover the whole built-up area, limiting the effectiveness of plans.

Environmental Performance and Urban Resilience

- Serbian cities have undergone significant changes in land uses and urban footprints in the past decades. Most of the cities have a declining population but are expanding their built-up areas, which results in decreasing densities. The least dense cities have experienced the most substantial loss of density. Still, more than 30 percent of the population resides in areas with high levels of greenery, compared to 20 percent in comparator cities.
- Limited guidance and development control over the expansion of built-up areas of cities increases disaster risks. Many cities in Serbia are exposed to critical flood risks, and in most the expansion of built-up areas has occurred slightly more in flood-prone zones than in areas not under flood risk.
- Seismic risk in cities is increased by the large number of buildings that do not conform to seismic building codes. These are primarily informally constructed buildings, but also those built before 1960s before introduction of seismic building codes, and buildings that are not adequately maintained. Cities with the highest seismic risk – Kragujevac, Čačak and Kraljevo – have a high share of informal buildings.
- Air pollution in Serbian cities has been a major environmental issue over the past years. Particle matter pollution is particularly high, with all cities showing years with PM10 pollution levels above EU standards with no clear improving trend, and current values of PM2.5 clearly above EU standards. The transport sector is responsible for most particle matter emissions. Population density also plays a role in air pollution, with the densest cities having the highest particle matter pollution.
- The rising temperatures during summer months have resulted in an increased occurrence of heat waves. Both air pollution and heat waves are aggravated by spatial development patterns in cities: the densest cities have the highest particle matter pollution, and construction densities in central parts of cities create heat island effects, additionally increasing the impact of heat waves.
- While Serbian cities generally perform similarly (or slightly better) to the comparator cities regarding service provision, wastewater treatment is deficient. No data is available at the city level, but at the national level, the wastewater treatment rate is below 10 percent. There is a disparity in water service provision between primary, secondary and medium-sized cities, with all medium-sized cities having less than 80 percent coverage. Non-revenue water is high in all cities, and extremely high (above 50 percent) in the cities of Novi Pazar, Valjevo, and Čačak.
- The average coverage of municipal waste collection is 87.4 percent with almost all municipal solid waste that is collected landfilled. It is estimated that 20 to 30 percent of the total generated municipal waste ends up in illegal dump sites. Although still well below the EU average per capita, the amount of generated municipal and household waste is increasing, but only about 15 percent of waste is recycled.

In line with the findings above, policy recommendations are clustered by wider topics (*spatial-economic and urban development, urban planning, and environment performance and resilience*) and categorized

along the 3C framework recommended in the World Bank's *Urbanization and Territorial Review: Western Balkans and Croatia*: concentrate, connect and capacitate.

- *Concentrate* - resources on leading city regions to drive national growth and support secondary cities to become growth centers that expand opportunities to their hinterland.
- *Connect* - people and places to opportunities, by developing competitive tradable sectors to leverage the comparative advantages and cities and regions, integrating enterprises into local, regional, and global markets, and delivering high-quality public services to citizens regardless of where they live.
- *Capacitate* – national and local governments by strengthening financial and technical expertise and improving local planning, coordination, and governance, while investing to raise human capital to ensure that citizens can take full advantage of their potential.

Spatial-economic and urban development policies should adjust to the key dynamics of urbanization

- *Concentrate: Focus investments on cities with the potential to drive economic development* - Serbia has two leading cities that between them contribute half of the country's total economic output, Belgrade (42 percent) and Novi Sad (8 percent), with their economies oriented towards tradable knowledge-intensive services, concentrating 60 percent of jobs and more than three-quarters (78 percent) of output in these sectors. These cities will continue to drive economic development – and should be enabled and strengthened to do so. Further concentration and co-location of knowledge-intensive sectors will improve productivity as these sectors benefit especially from spillovers and access to skilled labor.
- *Connect: Leverage investments in connective infrastructure* - there is increasingly evidence that the largest, fastest growing/slowest shrinking and those that are creating jobs at the fastest rates are generally located on or near Corridor X. Serbia should leverage investments in the improved connectivity to develop a system of secondary city growth poles that are attractive to investors in export-oriented/tradable sectors, notably manufacturing and ancillary trade and logistics functions, along the primary Corridor X, and development of secondary transport network to connect remaining cities with the primary Corridor X.
- *Capacitate: Revise classification of urban settlements to better match urbanization trends* - there is a necessity to revise the classification of urban settlements and to adjust it to urbanization trends that occurred in recent decades and hence provide more accurate inputs to national-level policies, such as SUDS or the National Spatial Plan, as well as to local-level urban policy and planning.
- *Capacitate: Address uneven development with a differentiated spatial-economic policy approach* - instead of the spatially neutral policies implemented to date, Serbia should respond to prevailing socio-economic, spatial, and environmental challenges by a differentiated spatial-economic policy approach, to plan for and actively manage spatial disparities while recognizing and managing the impacts of an overall declining population.
- *Capacitate: Focus national-level policies on managing the impacts of demographic decline* - the great majority of cities in Serbia are undoubtedly shrinking and aging, and this process seems irreversible in the medium term. The topic of shrinking cities and managing impacts of the decline is not adequately addressed in urban development planning documents, such as the SUDS or the National Spatial Plan.

Urban planning should reflect the realities of spatial development

- *Concentrate: Adjust GUP boundaries to built-up areas of cities* - boundaries of General Urban Plans (GUPs) should be revised to cover the real, continuous urban built-up areas of cities. Since many cities have seen their built-up areas outgrowing the administrative boundaries of urban settlements, GUPs do not always encompass all built-up areas and hence face limitations in providing inclusive strategic planning. Central city areas are often well-considered, but analysis and planning are limited for peripheral zones, both suburbs and peri-urban areas, which in turn tend to develop more spontaneously.

- *Concentrate: Adapt GUPs and other planning documents to population decline* - shrinking cities should adapt to population decline in their GUPs and other planning documents. In many cases, local urban policies (GUPs, Spatial Plans, and others) are drafted overlooking the statistical evidence of a constantly shrinking population. In some cases where this key dynamic is acknowledged, adaptation to the shrinking population is not reflected in planning objectives.

- *Connect: Coordinate urban development planning with neighboring LSGs* - cities whose built-up areas transgress LSG boundaries should coordinate their urban planning with neighboring LSGs. In larger cities such as Novi Sad or Belgrade, it is often the case that continuous urban built-up areas transgress even the boundaries of LSGs, which places parts of urban areas under the jurisdictions of other local governments. In such cases, it would be beneficial that the local plans and strategies are developed in coordination with neighboring LSGs.

- *Capacitate: Further develop institutions and mechanisms to better regulate land use and urban development in a market-oriented environment* - the planning system should be further adjusted to the market-oriented environment. Current policy and legislative frameworks still strongly rely on previously developed techniques and instruments that are less effective in the current conditions, specifically in urban land planning and regulation of land and housing markets.

- *Capacitate: Acknowledge and address peripheral development* - cities should acknowledge and address unregulated spatial extension in peripheral areas, whether suburban or peri-urban. Both national and local urban development policy documents and plans do not consider such expansion sufficiently and do not provide concrete measures to manage it.

- *Capacitate: Develop more multi-faceted policies towards informal construction* - current policies towards informal construction put accent on the legal dimensions of informal construction, while not fully considering the social, economic, spatial, or environmental aspects of the challenge. Additionally, the current legalization process treats all informal builders in the same way, not making a distinction between those that build out of necessity and those who are driven by opportunistic or speculative motives.

Urban planning should improve environmental performance of cities

- *Cities should enhance and coordinate their urban development and disaster risk reduction strategies and plans.* This can be done through several measures: *Capacitate* - implementing measures to mitigate the heat island effect; *Capacitate* - adoption of nature-based solutions for disaster risk reduction: *Connect* - coordination of cities' urban planning and development with disaster risk reduction; and C*apacitate* - regularization of informal settlements to improve climate change adaptation in these neglected zones.

- *Air quality is a major health issue in Serbian cities and must be tackled.* Improving air quality can be addressed in urban and national policies by *Capacitate* - investment in the improvement of energy efficiency; C*onnect* - development of sustainable urban mobility; and *Capacitate* - improvement of the air quality monitoring.

- *Environmental services need to be improved.* At the national level, *Capacitate* - coordination of relevant policy documents and institutions are necessary to improve water services; and *Capacitate* - the implementation of the cost recovery principle in water provision. At the local level, *Connect* - cooperation of neighboring LSGs should be enhanced to improve solid waste treatment and remediate informal landfills.

Introduction

This document is the report output of the project "Green, Livable, and Resilient Cities in Serbia: Strengthening Sustainable and Resilient Urban Development." The project is funded by the World Bank in partnership with the Swiss Government's State Secretariat for Economic Affairs (SECO) SURGE Fund. It provides support to the Government of Serbia (GoS), and specifically the Ministry of Construction, Transport, and Infrastructure (MCTI) in its implementation of the Sustainable Urban Development Strategy (SUDS), approved in June 2019, and its associated Action Plan.

The project addresses knowledge gaps related to green and climate-smart urban and spatial development through analytical work on the system of cities in Serbia, with the aim of extending the knowledge base and policy dialogue toward more inclusive, sustainable, resilient, and green urban development, including in lagging regions.

The objective of the analytical work presented here is to provide a national-level diagnostic of Serbian urbanization and urban development, though quantitative and qualitative methods, utilizing the requisite data. The goal is to develop an enhanced evidence base for the evaluation of policy options for urban and spatial development in Serbia.

This report presents an integrated perspective on the trends, trajectory and performance of the Serbian urban system and its constituent components (in terms of city/town categories) in four dimensions: urbanization and urban demography, spatial development, economic development, and environmental performance. It gives a comprehensive analysis of urban development dynamics and identifies existing and projected trends and challenges in urban areas in Serbia.

The first chapter of the report provides an overview of urbanization and urban demography. The conceptions of "cities" and "urban settlements" in the Serbian administrative, legal and policy framework are contrasted with those definitions derived from the Degree of Urbanization methodology developed by the European Commission's Global Human Settlement Layer (GHSL) and analyze the implications of these definitions for the urbanization process. By synthesizing data sources, a more accurate depiction of urbanization in the country is developed. The chapter then analyzes urban demographic trends, migration, and poverty.

The second chapter investigates economic development trends, and the contribution of urban areas to economic development in Serbia. The chapter includes an assessment of the evolution of overall spatial economic development of Serbia. It discusses the spatial impacts of the transition to a market economy that have left Serbia with a spatial economy that dominated by Belgrade and Novi Sad, as well as presenting recent evidence of economic renewal and a revival of manufacturing and service functions in the spatial division of labor, that is potentially driving some cities and towns, located on major transport corridors, to catch up.

The third chapter describes the patterns of urban spatial development, exploring changes in the built-up areas of cities and towns. The analysis examines built-up areas in cities and compares them with demographic trends, to explore trends in spatial development. Evidence of suburbanization, social inequalities in cities, and a depiction of informal settlements as intra-urban pockets of poverty are highlighted. Finally, data on urban land consumption and built-up densities based on the mapping of actual built-up areas are presented and contrasted these to the areas of urban land zoned by General Urban Plans (GUP).

The fourth chapter evaluates the environmental performance of urban centers in Serbia. It explores how urbanization, spatial and economic development trends, analyzed in previous chapters, impact the environment. The environmental performance analysis focuses on land use and green areas, disaster risks (flooding, seismic risk, and heat waves), air quality, and the provision of environmental services (water supply, sanitation, and solid waste management) as the main challenges regarding environmental, climate change, and disaster risk management.

The fifth chapter summarizes key urban development challenges in Serbia based on the preceding analysis and suggests policy recommendations to address them. Based on the research findings presented in the report, these recommendations are made to support MCTI and other actors to put Serbia's cities and towns on to a greener, more sustainable, resilient, and productive pathway.

CHAPTER 1
Urbanization and Urban Demography

1   Urbanization and Urban Demography

This chapter presents an analysis of urbanization and urban demographic trends in Serbia: demographic trends at the national level and in urban areas, including urbanization, migration patterns and urban poverty.

The conceptions of *cities* and *urban settlements* in the national administrative, legal and policy framework, are contrasted with internationally harmonized definitions derived from the Degree of Urbanization methodology developed by the European Commission's Global Human Settlement Layer (GHSL). By identifying divergences and further synthesizing data sources, a more accurate depiction of urbanization in the country is provided, with potential implications for urban policy and urban planning.

The prevailing demographic trends are unpacked: Serbia is depopulating, which is driven by outward migration and low birth rates. Most cities are shrinking, but at the same time, the urbanization level is slowly increasing because of rural areas depopulating faster than their urban counterparts. Cities are still attracting new migration from rural areas, and there is migration between cities in the urban system and its hierarchy – people are migrating from smaller cities and towns to Belgrade and selected secondary cities. Young, working age and the higher educated population is moving to cities.

1.1   Urbanization trends in Serbia

Measuring urbanization levels and urban population densities based on the official Serbian definitions of cities and urban settlements shows that Serbia's urbanization level is low when compared to countries in the Western Balkans and Central Europe and Baltics regions. However, the use of the internationally harmonized definition of urban areas suggests a more nuanced situation: the urbanization level of Serbia in fact shows less variation from comparator countries than typically understood.

The low population densities identified in Serbia's cities in many cases also result from the official definition of cities used in Serbia. An analysis of built-up areas of cities, combining the data from the GHSL and official Serbian statistics, shows that Serbian cities are in fact more densely populated than is conventionally presented.

> **BOX 1: Definitions and size classes**
>
> **Cities:** Local Self Government (LSG) units that by the Law on Territorial Organization of Serbia have a city rank are considered *cities* (28 in total).
>
> **City population**: As a rule, for individual city populations the *population in continuous urban built-up areas* is used. Exemptions are made only for analyses that could not be done at the continuous built-up areas level due to the absence of data or for the purpose of making international comparisons. In such cases, other scales are used – LSG level, urban settlement level, or GHSL urban center level. The exact scale and term used is indicated in each part of the analysis.

Categories of cities: cities that have an official city status in Serbian legislation are categorized according to the population in their *continuous bult-up areas* as:

- **Primary city:** over one million people (Belgrade)
- **Secondary cities:** over 100,000 people
- **Medium-sized cities:** between 50,000 and 100,000 people
- **Small cities:** below 50,000 people which have an official city status in Serbian legislation
- **Towns:** Other urban areas below 50,000 population that do not have an official city status

1.1.1   Serbia's urbanization levels

An urbanization level is usually measured as the share of the total population of a country that lives in urban settlements or centers, with these typically identified as cities and towns of varied sizes. Official definitions and criteria to delineate cities and towns (as urban areas) vary significantly across countries, often making resulting data on urban populations difficult to compare – e.g., what is defined as an urban settlement in one country would not fall within urban areas according to the criteria applied by other countries.[1]

The territory of the Republic of Serbia is divided into Local Self-Government units (LSGs) as lowest-level government units. LSGs are categorized as a city or municipality, which is regulated by the Law on Territorial Organization.[2] Based on this Law, there are 28 cities. This includes the City of Belgrade, which also has the status of an administrative region. The remaining LSGs are categorized as municipalities.

For comparison, the numbers of the lowest level administrative subdivisions (equivalents to Serbia's LSGs) in European countries of similar surface area and/or population to Serbia are Austria's 2,100 municipalities, Czech Republic's 6,258 municipalities, Netherland's 390 municipalities, Belgium's 589 municipalities, and Hungary's 3,201 cities, towns, and villages.[3]

Each LSG in Serbia is divided into settlements, which are categorized as "urban" or "other". Based on the official classification of urban settlements in Serbia, the urbanization level of Serbia is well below the European Union (EU) average of 75 percent, and near the bottom of the list when compared to other countries in the Western Balkans (WB) and Central Europe and Baltic (CEB) regions (see Figure 1-1).[4] According to the most recent 2011 Census, Serbia had an urbanization level of 59.4 percent. A more recent estimated level shows a small increase to a little over 60 percent in 2021.[5]

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[1] For differences in definitions of cities and towns across countries: United *Nations 2012. World Urbanization Prospects 2011.* and *United Nations 2019. World Urbanization Prospects 2018.*

[2] According to the *Law on Local Self-Governments* (*Official Gazette of the RS, No 29/2007, 83/2014 - dr. zakon, 101/2016 - dr. zakon, 47/2018 i 111/2021 - dr. zakon)* cities have more jurisdictions and greater autonomy in decision-making, administrative organization of their territories and fiscal matters than municipalities.

[3] CCRE-CEMR, 2016. *Local and Regional Governments in Europe: Structures and Competences*. https://www.ccre.org/img/uploads/piecesjointe/filename/CEMR_structures_and_competences_2016_EN.pdf

[4] World Bank Data, Urbanization levels 2020 (calculated as the percentage of total population living in urban areas): https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS?locations=EU, accessed on 22 March 2022.

[5] Statistical Office of Serbia: Census 2011 and annual survey for 2021.

Figure 1-1 Urbanization levels in Serbia and comparable countries

Urban population (percentage of total population)
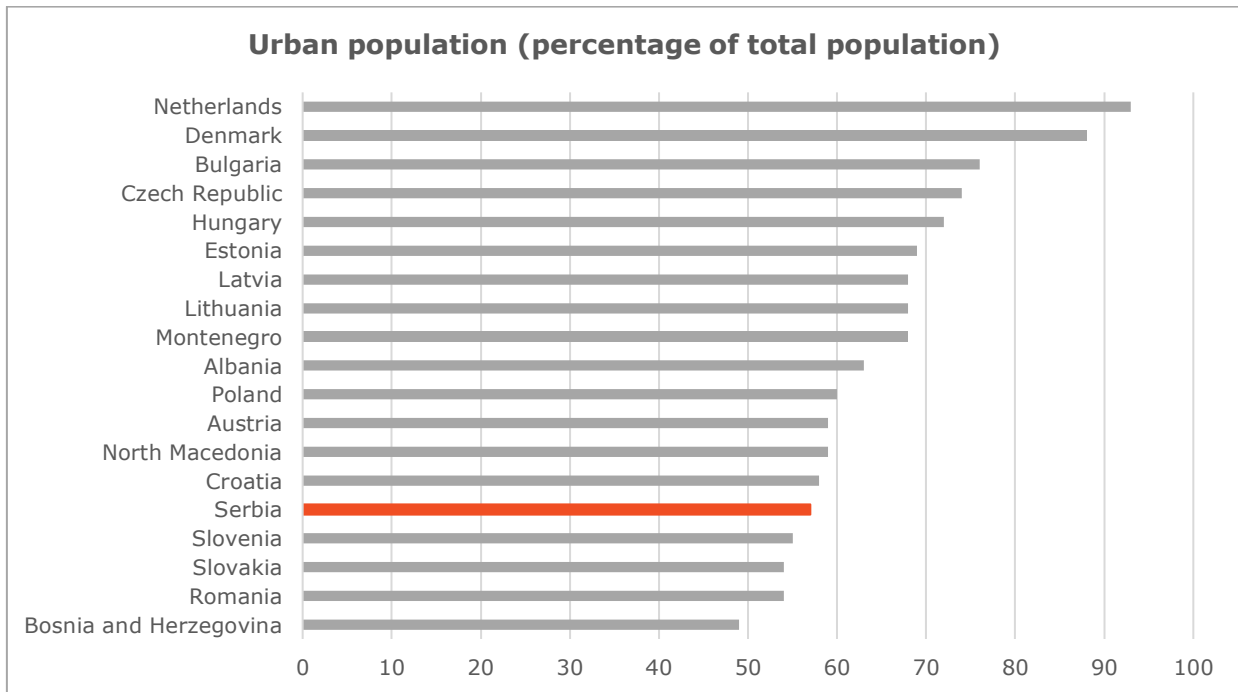
Urbanization level is measured as a percentage of the total population living in urban areas as they are defined in official definitions of cities and urban settlements in each country.

Source: World Bank Data 2020

To overcome difficulties in comparing urbanization trends in different countries, an internationally harmonized methodology for the categorization of settlements was recently developed. The Degree of Urbanization (DoU) approach, seen in Box 2 below, measures urbanization in a country without reference to administrative boundaries and the official definitions of cities and urban areas, focusing instead on the analysis of built-up areas and population densities. [6] It thus provides a more accurate and internationally comparable picture of urbanization.

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[6] European Commission, *GHSL Degree of Urbanization:* https://ghsl.jrc.ec.europa.eu/degurba.php

The Degree of Urbanization is adopted by six international organizations, It classifies the entire territory of a country along the urban-rural continuum by combining population size and population density thresholds to capture the full settlement hierarchy. One km2 grid cells are classified based on population density, contiguity, and population size.

Box 2: The GHSL Degree of Urbanization methodology

The Degree of Urbanization methodology is now utilized globally by the European Commission's Global Human Settlement Layer (GHSL). It classifies the entire territory of a country along the *urban-rural continuum.* Based on population size and density thresholds, a full settlement hierarchy is established, as seen below in Table 1-1 in the terms of the GHSL Settlement Types.

Table 1-1: GHSL Degree of Urbanization settlement types

Cluster	Degree of Urbanization	GHSL Settlement Types
	Urban Center (High Density Cluster)	**City**
	Dense Urban Cluster	**Town**
	Semi-dense Urban Cluster	
	Suburban or Peri-urban Cluster	**Suburb**
	Rural Cluster	**Village**
	Low Density Rural	**Dispersed Rural Area**
	Very Low Density	

Source: European Commission, GHSL Degree of Urbanization - settlement types:
https://ghsl.jrc.ec.europa.eu/degurbaDefinitions.php

The GHSL Settlement Types have been assigned to create the Degree of Urbanization classes: *Urban Center*, *Urban Cluster*, and *Rural Cluster*.[1] These classes in summary are described as:

- The (high density) *Urban Center* - consists of contiguous grid cells with a high density of at least 1,500 inhabitants per km² and a population of at least 50,000.

- The (dense and semi-dense) *Urban Cluster* - consists of contiguous grid cells with a density of at least 300 inhabitants per km² and a population of at least 5,000 in the cluster. An urban cluster can be a town (dense or semi-dense) or a suburban or per-urban area.

- The *Rural Cluster* - villages that do not belong to an urban center or urban cluster; most of these will have a density below 300 inhabitants per km².

Using these categories, the urbanization level of a country can be calculated based on the population living in urban areas – urban centers (cities) and urban clusters (towns) and suburbs and peri-urban areas.

In Serbia, 31.3 percent of the population lives in *Cities (Urban Centers)*, and 33 percent lives in *Towns and Suburbs (Urban Clusters)*. Therefore, according to the GHSL Degree of Urbanization, the urbanization level of Serbia is 64.3 percent, as opposed to the 60 percent figure in official Serbian statistics. This can be compared to other European countries (Figure 1-2).

It can be concluded that the official categorization of settlements as urban or rural in Serbia underestimates the share of the urban population, while in some other countries the official picture shows significantly higher figures than the internationally harmonized GHSL methodology – e.g., Denmark officially has an urbanization level of 88 percent, while the GHSL shows around 62 percent,[7]

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[7] In Denmark, official categorization of settlements considers all localities with 200 residents or more as urban. United Nations 2019. *World Urbanization Prospects 2018* (p. 86)

Bulgaria officially has 76 percent, and in GHSL only 56 percent, Czech Republic has 74 percent officially compared to 59 percent, to use a few cases (compare the data in Figure 1-1 and Figure 1-2).

In conclusion, when the internationally harmonized methodology of classification of urban areas is applied to Serbia and comparator countries, the urbanization level in Serbia shows less variation than is typically understood.

Figure 1-2 Share of the total population living in urban centers, urban clusters and rural grid cells in Serbia and comparable countries

GHSL DEGREE OF URBANIZATION
POPULATION LIVING IN URBAN CENTERS, URBAN CLUSTERS AND RURAL CLUSTERS (PERCENTAGE OF TOTAL POPULATION)

Country	Urban centers	Urban clusters	Rural grid cells
NETHERLANDS	46.6	35.72	17.69
NORTH MACEDONIA	39.32	33.15	27.53
MONTENEGRO	15.31	54.05	30.64
BOSNIA AND HERZEGOVINA	19.97	49.36	30.67
LITHUANIA	33.31	34.18	32.51
ALBANIA	39.73	25.84	34.43
LATVIA	34.79	29.9	35.3
SERBIA	31.33	32.99	35.68
ESTONIA	33.11	29.79	37.1
HUNGARY	26.99	35.21	37.8
DENMARK	29.2	32.86	37.95
POLAND	27.58	32.61	39.81
CZECH REPUBLIC	22.04	36.62	41.34
AUSTRIA	30.9	26.64	42.46
CROATIA	28.15	29.13	42.73
BULGARIA	26.56	29.47	43.97
ROMANIA	29.86	25.1	45.03
SLOVAKIA	14.98	36.92	48.1
SLOVENIA	16.12	33.88	50

■ Urban centers   ■ Urban clusters   ■ Rural grid cells

Source: European Commission, GHSL Degree of Urbanization – country factsheets:
https://ghsl.jrc.ec.europa.eu/CFS.php

1.1.2   Population densities

Unlike many other countries, an LSG in the Serbian official administrative categorization represents not a settlement itself but a much larger area that typically includes an urbanized core surrounded by extensive rural areas. Typically, each LSG has one *central urban settlement* (the administrative seat of a city or municipality) and a network of peripheral and rural settlements surrounding it.

In consequence, official population data for cities in the Serbian Census and other statistical sources are presented in two ways: the city population provides data on the population of the whole territory of the LSG, which includes both *urban* settlements and *rural* hinterlands, and the population of the urban settlement is considered as the population of the *core city*. As a result, the city population, as presented in the census, shows very low population densities (see the example of Novi Pazar in Figure 1-3).

In the reports and literature on Serbia and other Western Balkans countries with similar administrative definitions, resulting population density estimations are typically interpreted as being amongst the lowest in the world.[8]

Figure 1-3: A typical example of a city LSG in Serbia (Novi Pazar) and population figures from the official administrative divisions

Novi Pazar
- City population (blue): 100,410 (Census 2011).
- Urban settlement population (red): 66,527 (Census 2011).
- Urban settlement population density: 4,341 people/km^2
- City population density: 135.32 people/km².

Legend:
- Builtup area (2018)
- Municipality Novi Pazar
- Urban settlements
- Rural settlements
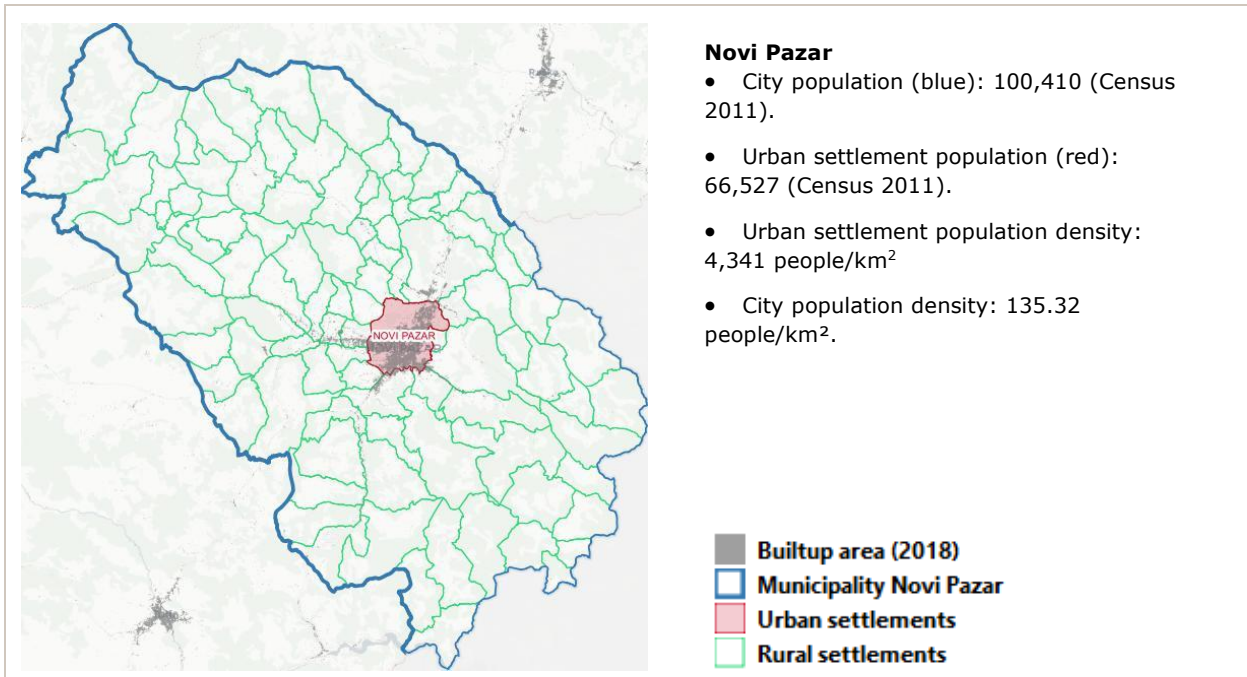
Source: Population figures – Census 2011; Boundaries – Republic Geodetic Authority, register of territorial units

In contrast to population density figures that result from the administrative LSG boundaries or urban settlements boundaries, the population density measured based on the actual built-up area of a city shows that the population densities in Serbian cities are higher. Using the GHSL Degree of Urbanization method enables identifying actual, continuous urban built-up areas of cities by observing Urban Centers and all Urban Clusters (dense urban, semi-dense urban, suburban, and peri-urban clusters) directly attached to them. Extraction of the population data from the official Census enables the calculation of the population numbers in these continuous urban built-up areas, and the use of the GHS Built-S2 dataset 2018 enables the calculation of the surface of continuous built-up areas (see Figure 1-4).

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[8] The World Bank, 2019. *Western Balkans and Croatia: Urbanization & Territorial Overview 2019* (pp. 73-74) - population densities of Western Balkans cities of only 1,683 people per km^2 are held to be the second lowest in the world, after North America's cities with 942 people per km^2.

Figure 1-4: Defining the continuous urban built-up area of Novi Pazar
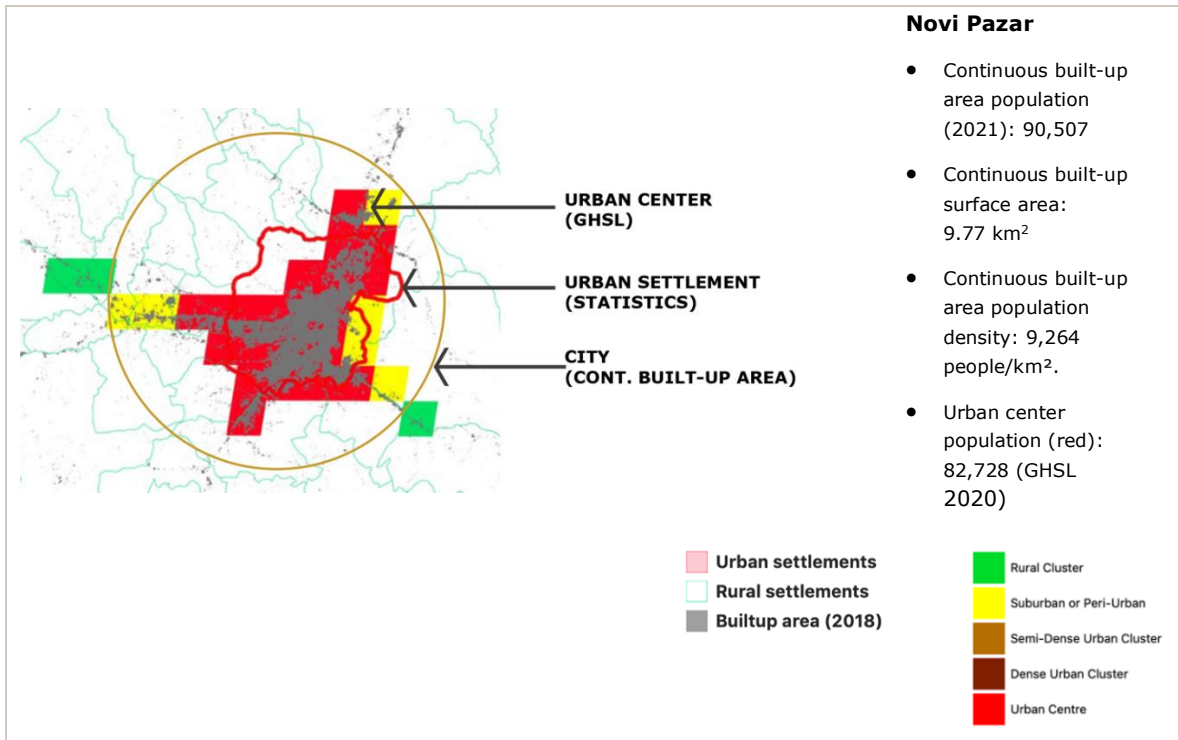
The continuous urban built-up area is determined by using GHSL Degree of Urbanization (Urban Center, Urban Clusters, and Suburban or Peri-Urban Clusters), Built-up global datasets and official administrative boundaries of settlements. Population figures are then derived from the official statistics aggregated at the level of settlements, from the Republic Statistical Office.

Source: COWI

Resulting population densities show that Serbian cities are in fact more densely populated than it is conventionally presented: the continuous urban built-up areas of the twelve largest cities in Serbia have an average population density of over 5,500 people per km² (Table 1-2).

To conclude, the apparent very low population densities in Serbian cities mostly result from the official delineation of cities used in Serbia. If, instead of administrative boundaries, the population of actual built-up areas of cities is observed, Serbian cities are in fact more densely populated than it is conventionally presented.

Table 1-2: Continuous built-up areas of the 12 largest cities in Serbia

CITY	Population in continuous built-up area 2021	Built-up area 2018 (km²)	Pop. density in the continuous built-up area
Belgrade	1,399,752	187.03	7,485
Novi Sad	356,825	69.45	5,138
Nis	219,855	29.11	7,553
Kragujevac	147,222	26.04	5,654
Subotica	100,645	29.70	3,389
Novi Pazar	90,507	9.77	9,264
Pancevo	80,203	19.36	4,143
Cacak	74,952	17.20	4,358
Krusevac	73,766	13.93	5,295
Kraljevo	72,037	12.61	5,713
Zrenjanin	70,400	20.98	3,356
Leskovac	69,309	13.43	5,161
AVERAGE	**229,623**	**37**	**5,542**

Source: COWI

1.1.3 Urban populations

In most cases, the population of urban settlements in city LSGs, as they are defined in the Serbian official statistical classification of settlements, undercounts the real population sizes of cities. Very often, both boundaries and classification of settlements are outdated, as the cities' built-up areas have outgrown the boundaries of an urban settlement. Thus, the population of an urban settlement presented in official statistics shows a lower number than the actual city population (as the population of the whole continuous built-up area of a city). There are also cases where parts of continuous urban built-up areas are in settlements that are not classified as urban, therefore the population of those are counted as a rural population in the official statistics.

When the whole continuous urban built-up area is observed (*urban centers* and all *urban clusters* directly attached to them, as explained on Figure 1-4 and in Appendix A in more detail), the populations of most of the cities in Serbia, especially secondary cities, are larger than the official statistics show. Secondary cities, such as Novi Sad and Niš, have around 20 percent larger populations in their continuous urban built-up areas than official figures show. Overall, the population of the

analyzed cities[9] is around 7 percent larger (i.e., 210,000 people) than the official statistics demonstrate. The average size of cities in Serbia is 126,203 people, or 77,220 not counting Belgrade (see Table 1-3).

The total number of cities, according to the GHSL classification of settlements, is smaller than the number of cities as defined by the legal and administrative system in Serbia. When the classification of urban areas defined by the GHSL is used, Serbia has 13 cities (urban centers), as opposed to 28 cities defined in Serbian legislation (i.e., LSGs with the city rank).[10] The rest of the 28 city LSGs are dense urban clusters, or towns, in the GHSL classification of settlements (see Box 2).

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[9] The *Law on Territorial Organization* defines 28 cities as seen above, including Belgrade. However, data for the City of Užice from the Census was not available (apparently as a result of errors in the census database), so the analysis of continuous built-up areas is conducted here for only 27 cities.

[10] Detailed list of Serbia urban (cities) according to the GHSL Degree of Urbanization: https://ghsl.jrc.ec.europa.eu/cl.php?wcw=208

Table 1-3: Population of 27 cities in Serbia

City	Population in continuous built-up area (2011)	Population in urban settlement statistics (2011)	Settlement Type according to the GHSL	Population in continuous built-up area (2021)
Belgrade	1,359,621	1,344,844	Urban Centre (City)	1,399,752
Novi Sad	336,760	277,522	Urban Centre (City)	356,825
Niš	225,252	187,544	Urban Centre (City)	219,855
Kragujevac	150,835	150,835	Urban Centre (City)	147,222
Subotica	105,681	105,681	Urban Centre (City)	100,645
Pančevo	83,676	90,776	Urban Centre (City)	80,203
Novi Pazar	83,450	66,527	Urban Centre (City)	90,507
Kraljevo	82,338	68,749	Urban Centre (City)	75,470
Čačak	81,996	73,331	Urban Centre (City)	76,673
Kruševac	80,593	58,745	Urban Centre (City)	73,766
Zrenjanin	76,511	76,511	Urban Centre (City)	70,400
Leskovac	76,234	65,289	Urban Centre (City)	69,309
Valjevo	58,932	59,073	Urban Centre (City)	54,653
Šabac	73,023	53,919	Dense urban cluster	68,350
Smederevo	69,603	64,175	Dense urban cluster	64,677
Vranje	55,783	60,485	Dense urban cluster	52,810
Sremska Mitrovica	54,013	37,751	Dense urban cluster	49,930
Jagodina	50,121	37,282	Dense urban cluster	47,520
Sombor	47,623	47,623	Dense urban cluster	42,288
Požarevac	44,183	53,752	Dense urban cluster	41,238
Pirot	43,143	57,807	Dense urban cluster	39,200
Zaječar	38,165	38,165	Dense urban cluster	33,169
Kikinda	38,065	38,065	Dense urban cluster	33,702
Vršac	36,040	36,040	Dense urban cluster	33,251
Bor	34,160	34,160	Dense urban cluster	30,484
Loznica	33,880	24,363	Dense urban cluster	31,189
Prokuplje	27,333	27,333	Dense urban cluster	24,390
AVERAGE	**127,667**	**119,856**		**126,203**
AVERAGE (no Belgrade)	**80,284**	**72,750**		**77,220**

Population in continuous urban built-up areas' show population in all urban clusters (as GHSL defines them: urban centers, dense urban, semi-dense urban and suburban and peri-urban clusters) directly attached to each other; 'Population in urban settlements as classified by Serbian statistics 2011' shows the population figures of urban settlements of cities as it is reported in official statistics in Serbia; 'Settlement type according to the GHSL' shows how the built-up area of each city is classified by the GHSL.

Source: COWI

The population of Serbian cities is also declining. Measured at the level of continuous urban built-up areas, only Belgrade, Novi Sad and Novi Pazar experienced population growth in the 10 years from 2011 to 2021 (Table 1-4). Measured in the longer period, from 2002 to 2021, Niš (about 3.4 percent), Kragujevac and Kraljevo also saw a slight population growth. All other cities are diminishing in population.

Table 1-4: Population in continuous urban built-up areas of cities 2002, 2011 and 2021

CITY	POPULATION IN CITIES (Continuous urban built-up areas)			Change 2011-2021	Change 2002-2021
	2021	**2011**	**2002**		
BELGRADE	1,399,752	1,359,621	1,281,194	3.0%	9.25%
NOVI SAD	356,825	336,760	294,039	6.0%	21.35%
NIŠ	219,855	225,252	212,543	-2.4%	3.44%
KRAGUJEVAC	147,222	150,835	146,373	-2.4%	0.58%
SUBOTICA	100,645	105,681	107,726	-4.8%	-6.57%
PANČEVO	80,203	83,676	84,702	-4.2%	-5.31%
NOVI PAZAR	90,507	83,450	68,561	8.5%	32.01%
KRALJEVO	75,470	82,338	74,820	-8.3%	0.87%
ČAČAK	76,673	81,996	80,919	-6.5%	-5.25%
KRUŠEVAC	73,766	80,593	77,540	-8.5%	-4.87%
ZRENJANIN	70,400	76,511	79,773	-8.0%	-11.75%
LESKOVAC	69,309	76,234	78,910	-9.1%	-12.17%
ŠABAC	68,350	73,023	73,536	-6.4%	-7.05%
SMEDEREVO	64,677	69,603	67,725	-7.1%	-4.50%
VALJEVO	54,653	58,932	61,035	-7.3%	-10.46%
VRANJE	52,810	55,783	55,628	-5.3%	-5.07%
SREMSKA MITROVICA	49,930	54,013	55,752	-7.6%	-10.44%
JAGODINA	47,520	50,121	47,310	-5.2%	0.44%
SOMBOR	42,288	47,623	51,471	-11.2%	-17.84%
POŽAREVAC	41,238	44,183	41,736	-6.7%	-1.19%
PIROT	39,200	43,143	45,089	-9.1%	-13.06%
ZAJEČAR	33,169	38,165	39,491	-13.1%	-16.01%
KIKINDA	33,702	38,065	41,861	-11.5%	-19.49%
VRŠAC	33,251	36,040	36,623	-7.7%	-9.21%
BOR	30,484	34,160	39,387	-10.8%	-22.60%
LOZNICA	31,189	33,880	35,082	-7.9%	-11.10%
PROKUPLJE	24,390	27,333	27,673	-10.8%	-11.86%
TOTAL	**3,407,478**	**3,447,014**	**3,306,499**	**-1.1%**	**3.05%**

Source: COWI

While the overall *urbanization level* - the share of the total population of Serbia living in urban areas - is growing, it is only because of rural areas depopulating faster than urban. The decline of the population in urban areas is reflected in the *urbanization rate* - the annual percentage change of the urban population. The urbanization rate of Serbia has had negative values since 2010. In 2021 it was -0.4 percent, compared to the EU average of +0.2 percent. Observed in the long run, the urbanization rate is steadily decreasing - from 4.1 percent in 1961, 3.1 percent in 1971, 0.8 percent in 1991 and 0.2 percent in 2001 (Figure 1-5).

Figure 1-5: Urbanization rate for Serbia 1990 to 2020

Serbia - Urban population growth 1990 - 2020 (annual percentage)
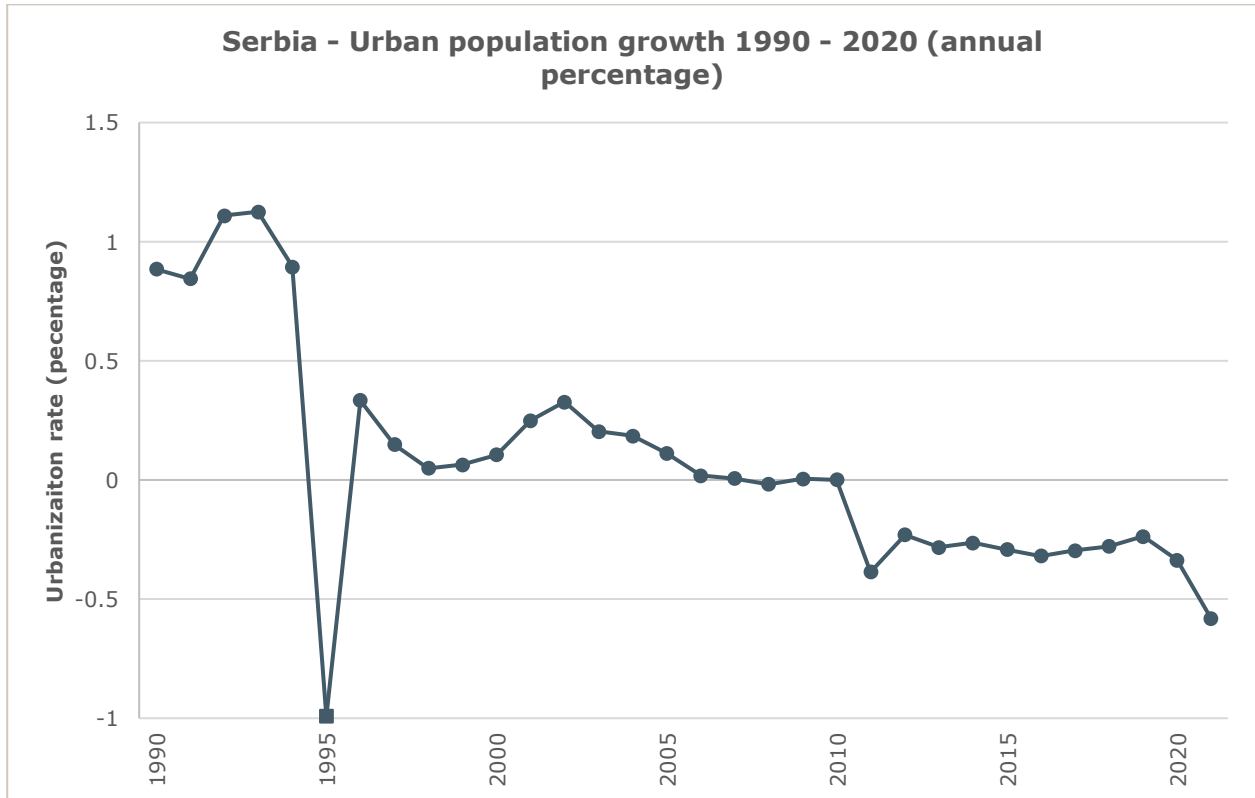
Source: World Bank Data

Box 3: Novi Pazar – an exception to general Serbian urban development trends

The city of Novi Pazar represents a unique case in Serbia's urban system.

Based on the official data from the Statistical Office of Serbia from the 2011 Census, Novi Pazar had 100,410 inhabitants in the LSG area, and 66,527 in the urban settlement area. This places it among medium-sized cities in Serbia's urban system (i.e., cities with the population between 50,000 and 100,000).

Analysis of the population based on the *continuous urban built-up area* (for methodology, see Appendix A), shows that Novi Pazar has a population of 90,507 which makes it the fifth largest city in Serbia. As the fastest growing city in Serbia with a 32 percent increase in population since 2002, it will soon become a secondary city (with over 100,000 people). This is occurring despite

Novi Pazar situation as a border city disconnected from the main transport corridors in Serbia where, as a rule, most urban development takes place. Novi Pazar is not incorporated in the national rail network, the network of secondary roads connecting it with its closer and wider surroundings is underdeveloped, and it is poorly connected to international airports in Belgrade and Niš.[11]

In demographic terms, Novi Pazar also stands out from other cities in Serbia. It has by far the youngest population (35.3 years) and is the only city in Serbia with the average age under 40. In addition, Novi Pazar has a high birth rate (14.8 permille in 2020) and a positive natural increase rate of 4.4 permille.[12]

In terms of spatial development, Novi Pazar is densifying. As this may be mostly due to the geographic characteristics of its location – as a mountainous area with a little space for expansion – it is the city with the highest population density in Serbia, measured both based on the official urban settlement boundaries (4,341 people/km^2) and on the continuous urban built-up area (9,264 people/km²).

Although the built-up area of Novi Pazar is spreading in suburban areas along the main roads, as observed in other cities, the population in its central areas is growing at the same rate as in suburbs, which is not observed in other cities which experienced population growth since 2002.

Population growth rates at the level of settlements in Novi Pazar (2002-2011)
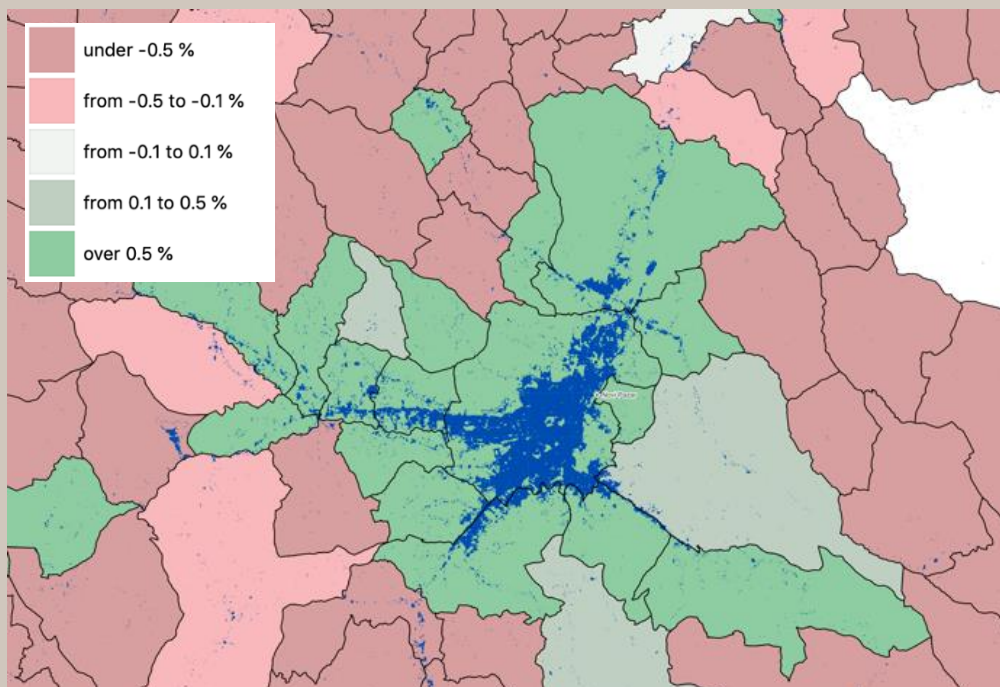
Source: COWI (using the data from the Statistical Office of the Republic of Serbia)

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[11] Tošić, D and Nevenić, M. 2006. *Settlement Network of Novi Pazar Municipality – Present State and Development Tendencies.* Bulletin of the Serbian Geographical Society, Tome 86 No. 1.

[12] Statistical Office of the Republic of Serbia 2020. *Statistical Release No. 180*

This positive demographic development is occurring despite Novi Pazar economically lagging other cities. It does not offer high salaries, or jobs in high-technology, knowledge intensive industries, as observed in other growing cities.

Novi Pazar is the cultural center of the Bosniak population, and in consequence attracts migrants from surrounding rural areas which are permanently losing population: people from the Novi Pazar LSG consisting of 99 settlements, as well as from neighboring LSGs Tutin and Sjenica are migrating to Novi Pazar. The literature shows that since the early 1960s, even though the population of the LSG grew constantly, there is an imbalance between the city and the remaining settlements. Most rural settlements in the LSG have shrunk, while the city itself and suburban settlements attached to it have grown.[13] This trend continues today. Regarding migration, since the 1971 Census, the city itself has attracted migrants, but other settlements in the LSG have a negative migratory balance.

Beyond its role as a growth center for its LSG and a wider functional area, Novi Pazar is a center of regional significance, influencing central parts of southeastern Serbia, the northern parts of Kosovo and the northeastern parts of Montenegro. This, and the other urbanization, demographic and socio-economic trends described above would contend that Novi Pazar has a higher importance in the Serbia's urban system than it is given in the official planning documents and the territorial-administrative organization of Serbia.

1.2   Urban population decline: low birth rates and outward migration

1.2.1   Aging cities

The overall population of Serbia is aging and declining. According to the statistical data for 2020,[14] the share of persons aged 65 and over was 21.1 percent (up from 19.17 percent in 2016), and 14.3 percent of those under the age of 15 (a slight decline from 14.4 percent in 2016). The share of the working-age population in the total population in 2020 was 65.2 percent (down from 66.43 percent in 2016), 66.99 percent of the male population and 63.1 percent of females.[15]

The urban population is aging, although less so than the rural population. The population of urban settlements (as they are defined in the official statistics in Serbia) is younger than the population of rural settlements, with the median age of urban residents at 42.4, and rural at 45.1 (average male/female). The migratory pattern is the main factor influencing the age structure between urban and rural settlements – the younger population is moving to urban settlements, both cities and towns.[16]

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[13] All according to: Tošić, D and Nevenić, M., 2006.

[14] Statistical Office of the Republic of Serbia, 2020. *Demographic Yearbook*.

[15] Statistical Office of the Republic of Serbia, 2020. *Demographic Yearbook*.

[16] Statistical Office of the Republic of Serbia, 2021. *Statistical Release No. 187 – Statistics of Population.*

In terms of age distribution, the median age in cities is also steadily increasing (see Figure 1-6). In 2020, by far the youngest population could be found in Novi Pazar, with a median age of 35.3 years, followed by Novi Sad with a median age of 41 years. The Belgrade region has the third youngest population, with a median age of 42.5. The average median age of the population in 28 cities is 43.43, very slightly above the national average. Twelve cities have a median age lower than the national average of 43.4. Three cities with the oldest population - Sombor, Pirot and Zaječar - are all border cities.

Figure 1-6: Average age in 28 cities LSG in Serbia from 2016 to 2020
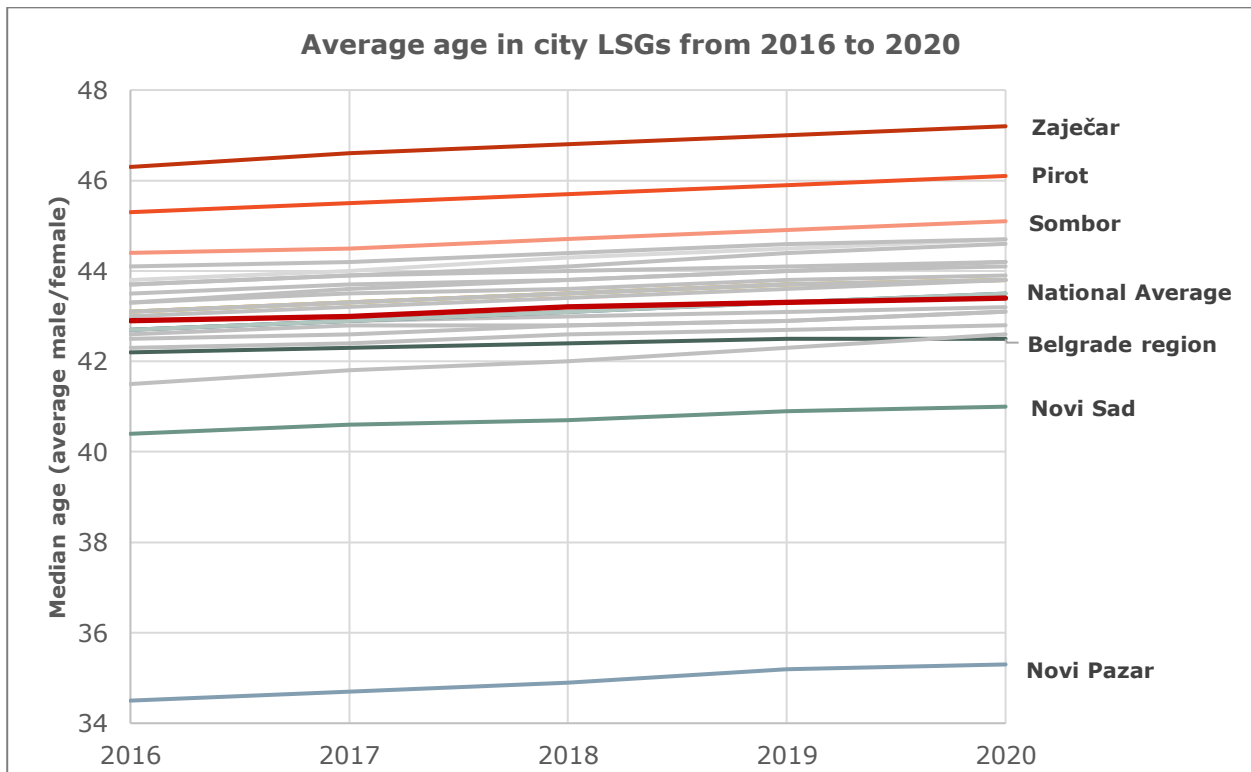
Source: Statistical Office of the Republic of Serbia

Based on the annual surveys conducted by the Statistical Office of Serbia, the depopulation trend continued in 2020, with a negative growth rate of -6,7 percent (equivalent to more than 55,000 people). The birth rate in 2020 was 8.9 per 1,000, the mortality rate was 16.9 per 1,000.[17]

Only three LSGs in Serbia had a positive natural increase rate in 2020, out of which there was only one city, Novi Pazar (4.4 permille).[18] Novi Pazar has a young population (a median age of 35.3) and a high birth rate (14.8 permille in 2020), compared to other cities in Serbia.

Cities are also losing their working-age population. The share of the working-age population (between 15 and 64 years) is decreasing in all parts of Serbia. Data on the working-age population from the

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[17] Statistical Office of the Republic of Serbia, 2020. *Demographic Yearbook*. Available at: https://www.stat.gov.rs/en-us/oblasti/stanovnistvo/demografski-indikatori/

[18] Statistical Office of the Republic of Serbia, 2020. *Statistical Release No. 180*

Statistical Office of Serbia is available at the level of districts (see Figure 1-7).[19] The data shows that Pčinja district (the city of Vranje) has the largest share of working-age population at 68.9 percent. South Bačka district (the city of Novi Sad) has the second-highest share of working-age population, at 66 percent. Districts neighboring South Bačka and the city of Novi Sad, namely North Bačka (the city of Subotica) and Srem (the city of Sremska Mitrovica, have 66.4 percent and 65.98 percent respectively.

The districts with the lowest level of working-age population are all located in South and East Serbia. Zaječar district has the lowest share, 59.9 percent. Pirot, Braničevo (city of Požarevac), Toplica (city of Prokuplje), Bor, Pomoravlje (city of Jagodina) and Rasina (city of Kruševac) districts all have between 62 and 63 percent of the work-age population, out of which only Pomoravlje and Rasina districts do not belong to the South-East of Serbia.

Emigration from Serbia to abroad particularly includes the qualified and high-educated young part of the population, which has a negative impact on the labor force supply and economic development.[20] This is a change compared to earlier periods, where unskilled workers unable to find work in Serbia, emigrated to support their families at home through remittances. A survey from 2016 found that one-third of Serbian students plan to go abroad after graduation, and 50 percent of these do not expect to return.[21]

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[19] Statistical Office of the Republic of Serbia, Open Data. *Population by age groups, absolute value and share in the total population 2020*: https://data.stat.gov.rs/Home/Result/180107?languageCode=en-US

[20] Economic Migration Strategy of the Republic of Serbia for the period 2021-2027.

[21] Rašević, M., 2016. *Migration and development in Serbia.* International Organisation for Migration (IOM), Belgrade.

Figure 1-7: Share of the working age population in the total population, by district

Share of the work-age population 2017 to 2020
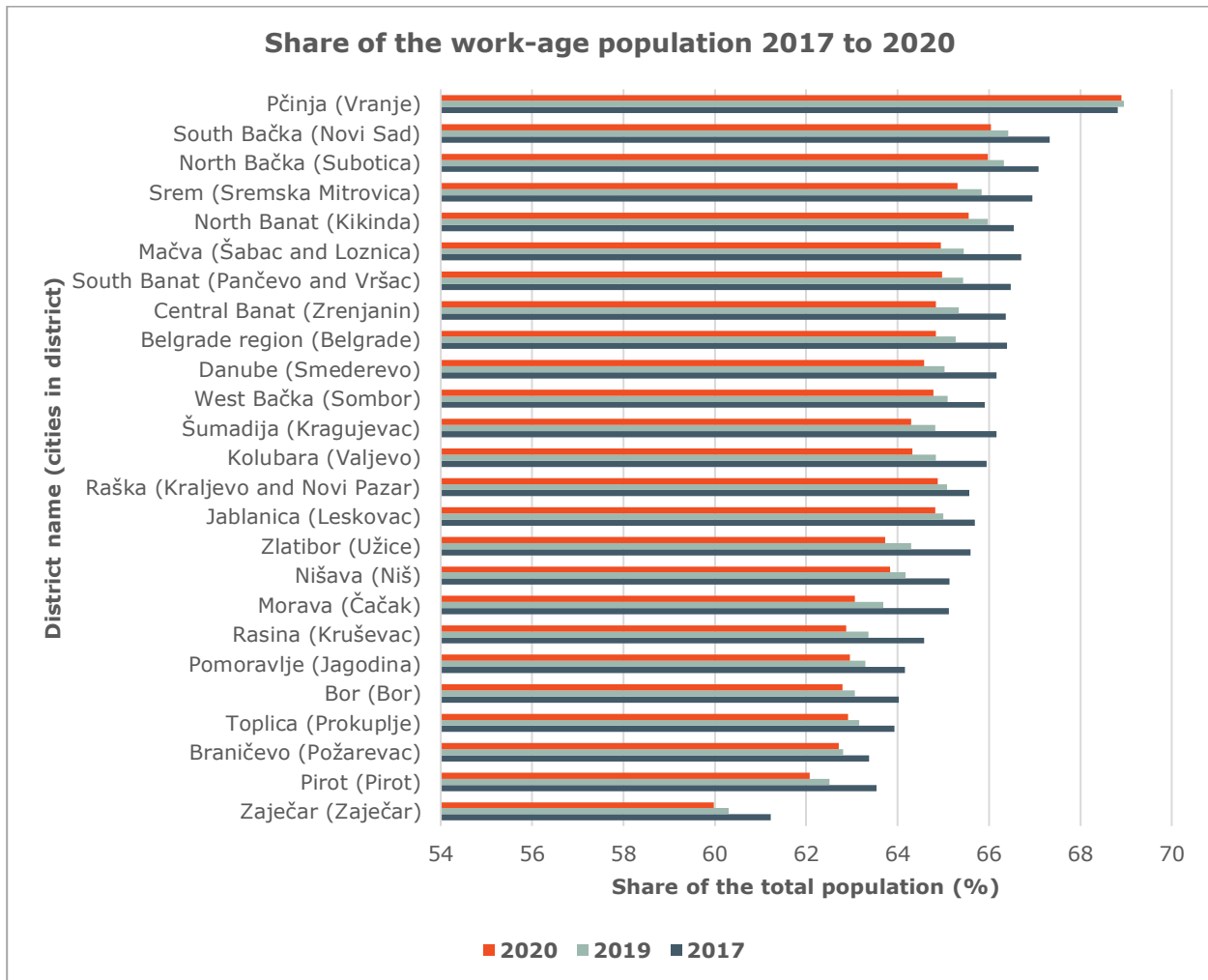
Source: Statistical Office of the Republic of Serbia

1.2.2   Migration to larger cities

The main factor impacting population growth in the three growing cities (Belgrade, Novi Sad and Novi Pazar) is internal migration into these cities. In concordance with the observed demographic trends, the data for 2020 from the Statistical Office of the Republic of Serbia[22] shows that internal migration happens mostly in several large cities: Belgrade, Novi Sad, Novi Pazar, Niš, Pančevo and Subotica.

The Life in Transition survey[23] found that internal labor migration can be an important force for raising incomes: about 40 percent of Serbians are willing to relocate within Serbia to find work while less than 20 percent are interested in relocating abroad, and about 40 percent do not wish to relocate. This

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[22] Statistical Office of the Republic of Serbia – open data, internal migrations:
https://data.stat.gov.rs/Home/Result/180602?languageCode=sr-Latn

[23] EBRD, 2016. *Life in Transition Survey* https://litsonline-ebrd.com/index.htm, accessed 22 March 2022

shows, according to the survey, an above-average willingness to move, which is higher, for example, than in Moldova and North Macedonia, but lower than in Albania.

The main barriers to internal mobility are unaffordable housing and access to information on jobs[24]. Underdeveloped housing markets and liquidity constraints seem to be the most important barriers: In Serbia, only one percent of respondents to the 2016 European Quality of Life Survey[25] stated that they live in rented accommodation.

With a positive internal migration rate of about +4 percent per year, Belgrade is the city attracting the most internal migration. Districts with the highest negative balance are border districts in the South (Pčinje, - 5 percent), West (Zlatibor, -4 percent), and East (Bor, -4 percent).

Among the 20 larger cities only five show a positive internal migration balance since 2018: Belgrade, Novi Sad, Niš, Pančevo, Subotica, and Novi Pazar (Figure 1-8). In 2020, as migration was affected by the COVID-19 pandemic, it is thus difficult to identify clear dynamics in the internal migration between 2012 and 2020, with the exceptions of Niš which has become increasingly popular for internal migrants since 2012, Pančevo which has shown increased attractivity from 2016 to 2020, and Kragujevac which displays a decreasing migration from 2012 to 2020.

The migrants to the three most attractive cities are young (15-34 years), with the group 24-35 as the predominant group in Belgrade and Novi Sad. In Niš, migrants in the 15-24 age group are as numerous as the 24-35 age group. In cities like Pančevo, the migrant profile is more balanced across age and gender, while the decreasing balance in Kragujevac can be explained by the decreased migration of young people, particularly women.

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[24] World Bank Group, 2018. *Migration and Remittances, Recent developments and Outlook.* https://openknowledge.worldbank.org/handle/10986/29777

[25] : EBRD, 2016. *Life in Transition Survey*. https://litsonline-ebrd.com/index.htm, accessed 22 March 2022

Figure 1-8: Internal migration balance statistics in cities at LSG level

Source: Statistical Office of the Republic of Serbia, 2022, https://data.stat.gov.rs
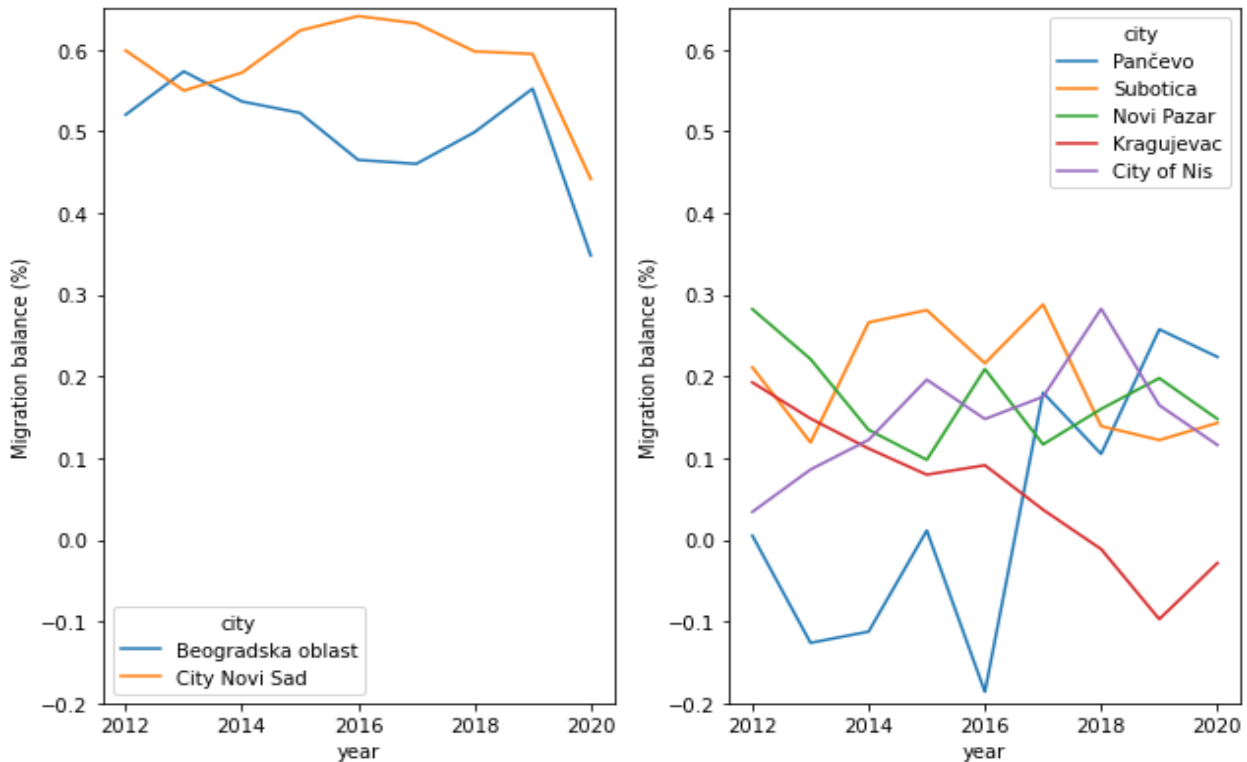
1.3   Conclusion

Serbia is more urbanized than can be concluded from analyzing official statistical data, which measures the share of urban population based on the official definitions of cities and urban settlements. This indicates that Serbia with an urban population of 60 percent is less urbanized than most comparator countries in the Western Balkans and Central Europe and Baltics regions. However, the use of the internationally harmonized definition of urban areas – GHSL Degree of Urbanization - shows a more nuanced picture: the urbanization level of Serbia measured this way is 64.3 percent and shows much less variation from comparator countries than it is typically understood.

Population densities in cities are also higher. The use of official Serbian definitions and administrative boundaries of cities results in low population densities in cities. The analysis of actual built-up areas of cities shows that Serbian cities are in fact more densely populated than it is conventionally presented. In the twelve largest cities, average population density in built-up areas is over 5,500 people per km².

Cities in Serbia also are larger than the official statistics show. In most cases, the population of urban settlements in the city LSGs, as they are defined in the Serbian official statistical classification of settlements, undercounts the real population sizes of cities. Measuring the population in continuous built-up areas of cities, ignoring administrative boundaries, shows that the most of cities have larger population than the official statistics show. This is especially true for secondary cities, such as Novi Sad and Niš, which have 20 percent larger populations in their continuous urban built-up areas than official figures show.

However, city populations are nonetheless shrinking. Since 2011, only three cities experienced population growth, namely Belgrade, Novi Sad and Novi Pazar. The urbanization level of Serbia – a share of total population living in urban areas – is steadily growing but is it only due to rural areas depopulating faster than urban areas. This is reflected in the urbanization rate of Serbia – an annual percentage change of the population living in urban areas – which has had a negative value since 2010.

The main reasons for depopulation are outward migration and the aging of the population. Emigration from Serbia to abroad includes especially the qualified and high-educated young part of the population, which has a negative impact on labor force supply and economic development. the population of cities in Serbia is aging, with the average median age of the population in 28 cities being 43.43 years, and with only one city having the average age of less than 40 years, Novi Pazar at 35.3 years.

Internal migration occurs mostly to several large cities - Belgrade, Novi Sad, Novi Pazar, Niš, Pančevo and Subotica, and is the main factor impacting population growth in the three cities that have experienced population growth since 2011 (Belgrade, Novi Sad and Novi Pazar).

CHAPTER 2
Serbia's Urban System and the Space Economy

2   Serbia's Urban System and the Space Economy

This chapter includes an assessment of the evolution of the overall spatial-economic development of Serbia. The contribution of the system of cities in Serbia to economic development is examined. The impacts of the transition to a market economy and structural adjustments over the last 20 years that have resulted in unevenness in the spatial economy and division of labor, dominated by Belgrade and Novi Sad are considered.

Comparative analysis of the economic performance of cities is then presented which identifies trends in their performance in terms of output, job creation and wages. Evidence is shown of recent economic renewal that is driving economic development in some cities and towns that are located on major transport corridors, and that will potentially allow catching up and decreasing the gap in jobs and wages with the leading economic centers, Belgrade and Novi Sad.

2.1   The economic context post-1990

Serbia has faced considerable challenges in its transition following the breakup of Socialist Federative Republic of Yugoslavia in the 1990s. These have had, and continue to have, a significant impact on Serbia's economic geography and its urban system. The economy experienced a period of significant upheaval and decline lasting from 1991 to 2000, starting with the disruption of established economic ties and production networks and the loss of key markets, which was then compounded by the consequences of economic sanctions. GDP fell by more than 50 percent between 1990 and 1993 (from $40bn to $17bn) with the economy remaining in recession for much of the 1990s as industrial production fell by more than 60 percent between 1990 and 1995 and unemployment rose, standing officially at 24 percent in 2000.[26]

In parallel with economic decline, Serbia also faced demographic decline: the population of Serbia decreased from 7,822,795 at the 1991 census to 7,498,001 by the 2002 census. The primary driver of this decline was outward migration, though the birth rate also declined. Migration was particularly concentrated among younger, educated, and skilled workers, leading to an increasingly aging population which consequently impacted productivity, and further constrained economic growth.

The economic situation stabilized in 2000 with the lifting of sanctions. A series of economic reforms followed that were designed to accelerate the transition from a centrally planned to a market economy, with mixed results. The privatization of state-owned enterprises (SOEs) and liberalization of domestic markets, combined with the lifting of sanctions on trade, accelerated the process of deindustrialization as some factories closed while others experienced job losses because of efficiency drives. Unemployment continued to rise, peaking at 913,000, 43 percent, in 2006. By one estimate, more than 600,000 industrial jobs were lost between 1990 and 2009.[27]

Serbia's hesitant economic recovery experienced a subsequent setback with the global financial crisis and recession of 2008, In the wake of this crisis, several reforms were adopted that have had a significant impact on steering the economy towards greater growth and stability. Moreover, in December 2009, Serbia formally applied for accession to the EU, followed by the entry into force of the EU-Serbia Stabilization and Association Agreement (SSA) in September 2013 (signed in 2008),

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[26] National Bank of Serbia Statistics: https://nbs.rs/en/drugi-nivo-navigacije/statistika/
[27] Vujošević, M., Zeković, S. and Maričić, T., 2012. *Post socialist transition and spatial development of Serbia.* Available at: https://core.ac.uk/download/pdf/300492283.pdf

including provisions for free trade with the EU. The consequence of these reforms has been a structural transformation in Serbia's economy, driven by increased integration with, and inflows of investment from, the EU.

The reforms have arrested the decline in the manufacturing sector, and Serbia has started to reindustrialize with new manufacturing jobs created on aggregate every year since 2015. Between 2014 and 2021, manufacturing employment increased by 34 percent to reach 493,413 (see Figure 2-1). As a share of total employment, manufacturing increased from 15.9 percent in 2014 to 18.7 percent in 2020, though its GDP share fell during this period from 15.0 percent to 13.3 percent according to official statistics.

Increased manufacturing employment has not impacted evenly across sub-sectors. Jobs were lost at a faster rate in low technology (e.g., textiles, wearing apparel) and low-medium technology sectors (e.g., basic metals, non-metallic mineral products), while some medium-high technology sectors (e.g., automotive, electrical equipment) have gained jobs in aggregate over the past two decades (see Figure 2-1). This is a direct consequence of Serbia's continued integration with the EU as significant new investments have been made in EU value chains, especially in the automotive and electronics sectors.

Figure 2-1: Manufacturing employment in Serbia by technology level, 2000-2021
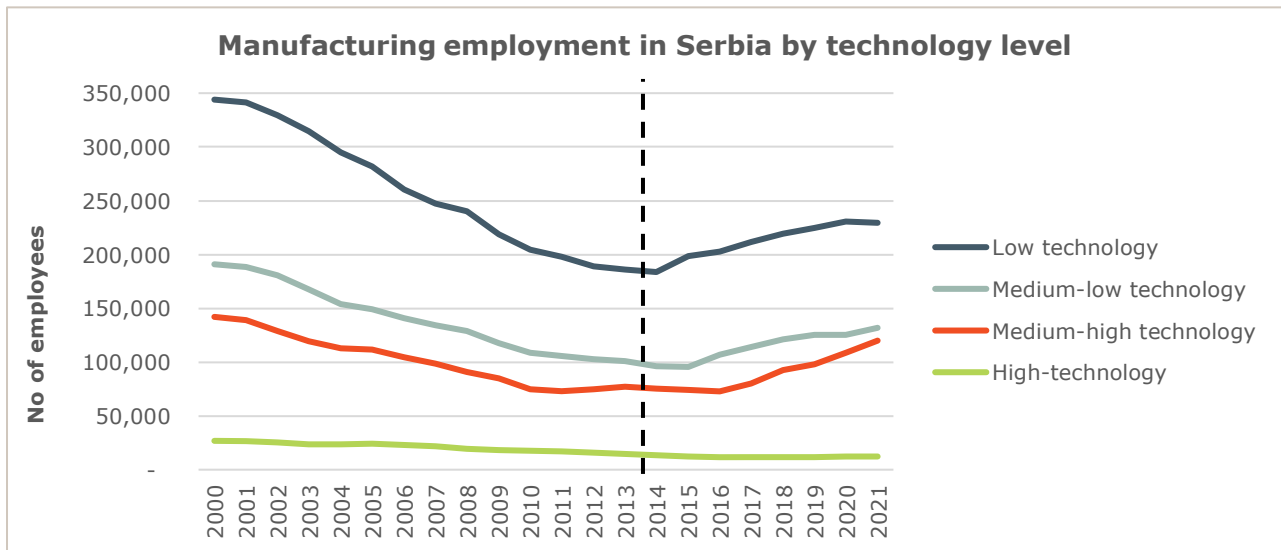
Source: Definitions of manufacturing technology level are taken from Eurostat
https://ec.europa.eu/eurostat/cache/metadata/Annexes/htec_esms_an3.pdf

Figure 2-2: Employment in selected manufacturing subsectors, 2000-2021
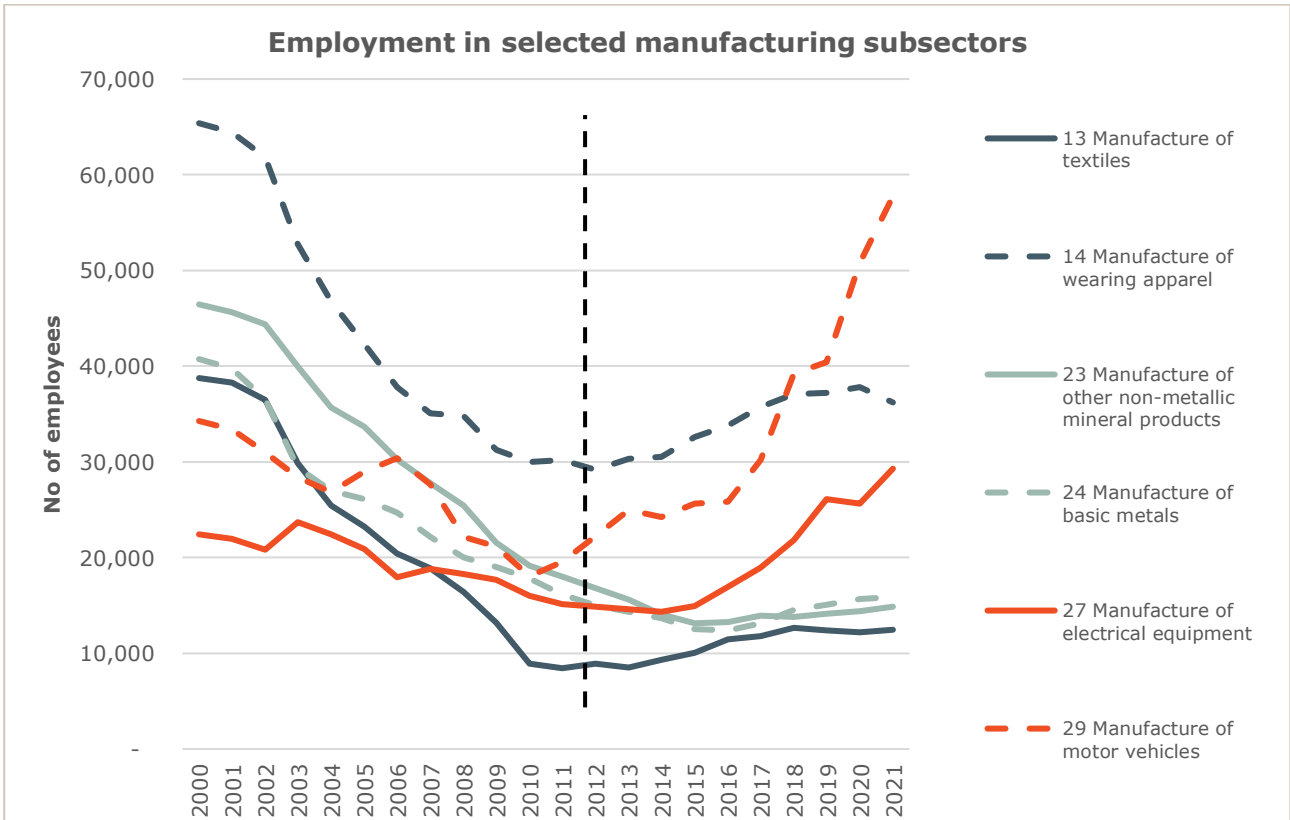
Blue = low technology; grey = medium-low technology; red = medium-high technology

Source: Statistical Office of the Republic of Serbia

Services sectors, in comparison, did not experience the same decline as manufacturing post-2000 (see Figure 2-3), with jobs in tradable knowledge-intensive services increasing steadily over this period, and accelerating in recent years. This has been driven by investments in ICT services, including outsourcing, and software development.

Figure 2-3 Service sector employment in Serbia by knowledge level, 2000-2021

<div align="right">
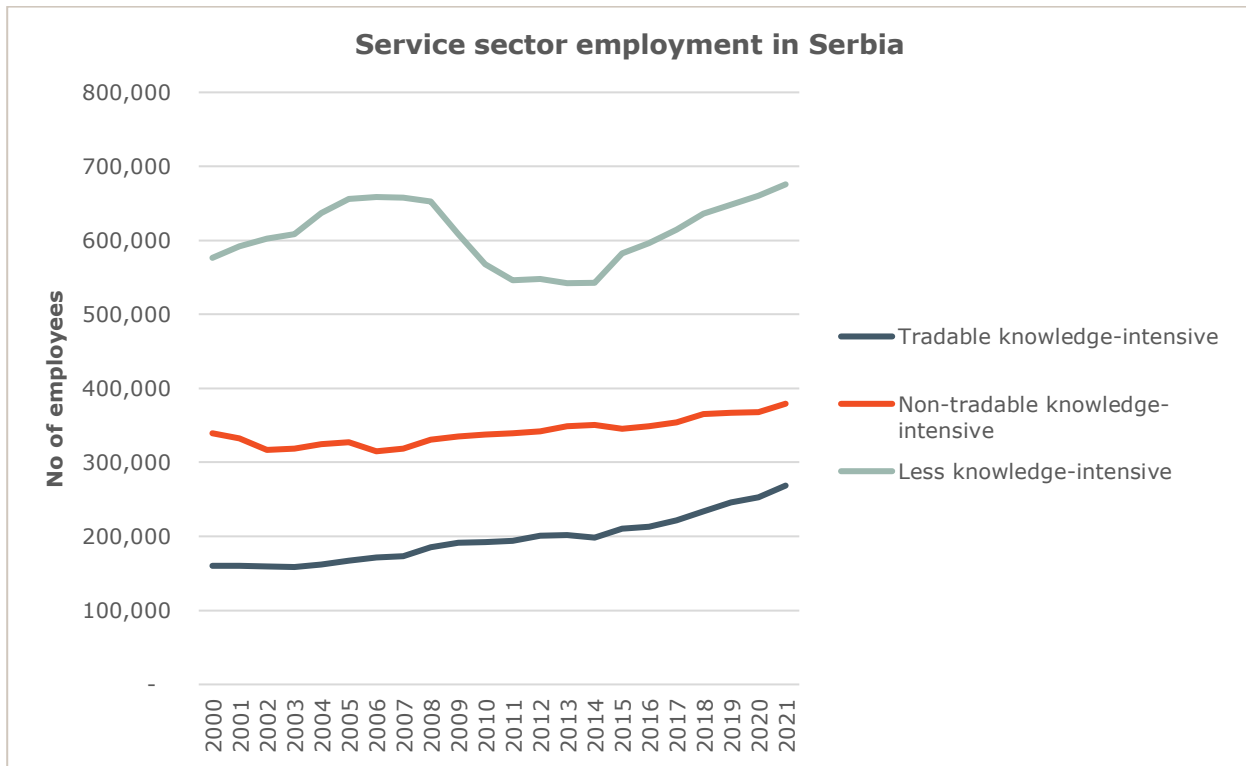
Source: Statistical Office of the Republic of Serbia

</div>

In summary, Serbia's economy has experienced several transitional challenges following the breakup of Yugoslavia in the 1990s, commencing with a collapse in economic output during a decade of recession lasting until 2000. This was followed by a transitional period where market-oriented reforms stabilized the economy but could not stop the decline of the manufacturing sector and continued job losses.

A further series of reforms, including the start of the formal EU accession process, and initiated from 2009 onwards, have been more successful in catalyzing FDI and creating jobs, leading to the rejuvenation of the manufacturing sector and growth in tradable services such as ICT. The overall impact of these factors has been significant job losses, a decline in incomes, as well as a restructuring of the economy towards more advanced (higher technology and knowledge) sectors.

2.2   Serbia's contemporary urban system

2.2.1 The urban hierarchy

Ongoing demographic decline, driven by outward migration and a decade of economic collapse, followed by continued upheaval in the transition to a market economy and a recent tentative recovery have had a profound effect on the urban system. City populations are shrinking, as seen above – except for the largest city and capital, Belgrade, the second largest and capital of the Autonomous Province of Vojvodina, Novi Sad, and Novi Pazar the cultural center of the Bosniak population – and the overall population is becoming more concentrated in the largest cities.

The Rank-size rule indicates that city populations tend to follow a regular distribution with a straight-line relationship between the log population size of a city and its rank. According to this rule, the second-largest city is expected to have a population of half the size of the largest city, the third-largest city would have a population of one-third of the largest city, and so on. This also results in a smaller number of large cities and a larger number of smaller cities.

Figure 2-4 shows how Serbian cities are placed in relation to the rank-size rule. The deviations from the straight line indicate a disproportionate urban hierarchy. The further a city is above or below the line, the more disproportionate its population size is in the hierarchical system of cities within the country.

Figure 2-4: *Rank size rule for Serbian cities*
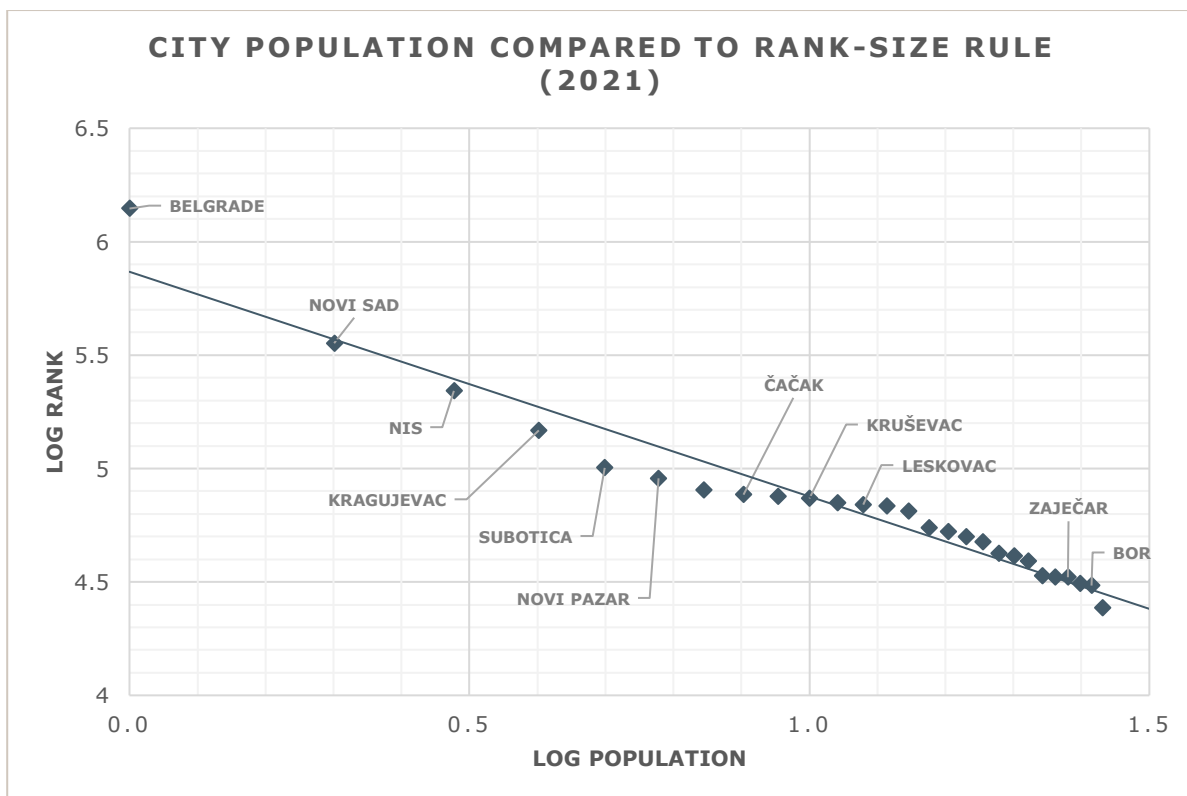
Population 2021 data based on continuous built-up areas.

Source: COWI

The Rank-size rule shows that Serbia has a small number of secondary cities, with a population in the core urban areas of 100,000 inhabitants or more: Novi Sad, Niš, Kragujevac, and Subotica. [28] Only Novi Sad and Niš, and a series of smallest cities have the size which is anticipated by the rank-size rule. Belgrade is larger and the remaining two secondary cities (Kragujevac and Subotica) are smaller than anticipated by the rank-size rule.

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[28] Roberts, B., 2014. *Managing the System of Secondary Cities.* Brussels, Cities Alliance - defines secondary cities as those that are not primary, nor are likely to be small cities with the population of less than 100,000, but everything in-between. UN-Habitat, 1996. *The Management of Secondary Cities in Southeast Asia* - defines secondary cities as urban areas with the population of between 100,000 and 500,000.

This characteristic is also noted in the draft National Spatial Plan of Serbia which describes the settlement network in Serbia as dominated by small urban centers and a shortage of secondary cities that would support the more balanced development of Serbia's urban system.[29]

Extrapolating based on the demographic trends over the past decades, Kragujevac, Subotica, Pančevo and Čačak are not likely to reach the population numbers that comply with the rank-size rule. Novi Pazar is the only city that could potentially grow to the size that could conform to the rank-size rule in the foreseeable future, based on the population growth trends in the last two censuses.

Imbalances in the rank-size of Serbian cities originate in changes in state boundaries in the 1990s. The analysis of urban systems in Serbia and the Socialist Federal Republic (SFR) of Yugoslavia showed that the urban system of former Yugoslavia conformed to the rank-size rule.[30] Along with Belgrade, the cities of Zagreb (Croatia), Skopje (North Macedonia), Sarajevo (Bosnia and Herzegovina), Ljubljana (Slovenia) and Podgorica (Montenegro), as capitals and administrative, economic, and cultural centers of the former Yugoslav republics, were amongst the largest cities. Novi Sad and Niš were regional centers and the only real secondary cities in Serbia. With the breakup of Yugoslavia, cities such as Kragujevac and Subotica were simply not large enough to take the role of secondary cities in Serbia.

2.2.2   Cities, towns, and economic contribution

Serbia's cities are nonetheless critical to economic development. Belgrade and the larger, thriving secondary cities concentrate resources and skills that facilitate economic development through economies of scale and scope – in short, agglomeration economies. Overall, the 28 cities are home to 50 percent of the population but contribute 75 percent of GVA and 76 percent of the total jobs, while workers in these cities earn on average 13 percent more than those in the rest of the country. Moreover, as seen above since around 2014, these cities have started to create new jobs, despite their declining populations, particularly in advanced manufacturing, but also in high-value tradable services such as ICT.

Serbia's urban system is dominated by Belgrade and, to a lesser extent, Novi Sad. When considered further in economic terms, the primacy of Belgrade is even more apparent, with the capital generating 42 percent of national GVA and contributing 35 percent of jobs, with just 20 percent of the population. The share of GVA increased in recent years from a 2015 figure of 39 percent, while GVA per capita, already the highest of any city except the mining town of Bor, increased at a faster rate than the national average.[31] Figure 2-5 shows the population, GVA and employment contribution percentage share by city size.

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[29] Draft Spatial Plan of the Republic of Serbia 2021-2035 (pp. 66-70)

[30] Živanović, Z., Tošić, B., Nikolić, T. and Gatarić, D., 2019. *Urban System in Serbia: The Factor in the Planning of Balanced Regional Development.* Sustainability 2019, *11,* 41-68.

[31] Bor is the location of one of the largest copper smelter and copper refinery in Europe, contributing significantly to GDP/GVA

Figure 2-5:Population, GVA and employment contribution percentage share by city size 2020
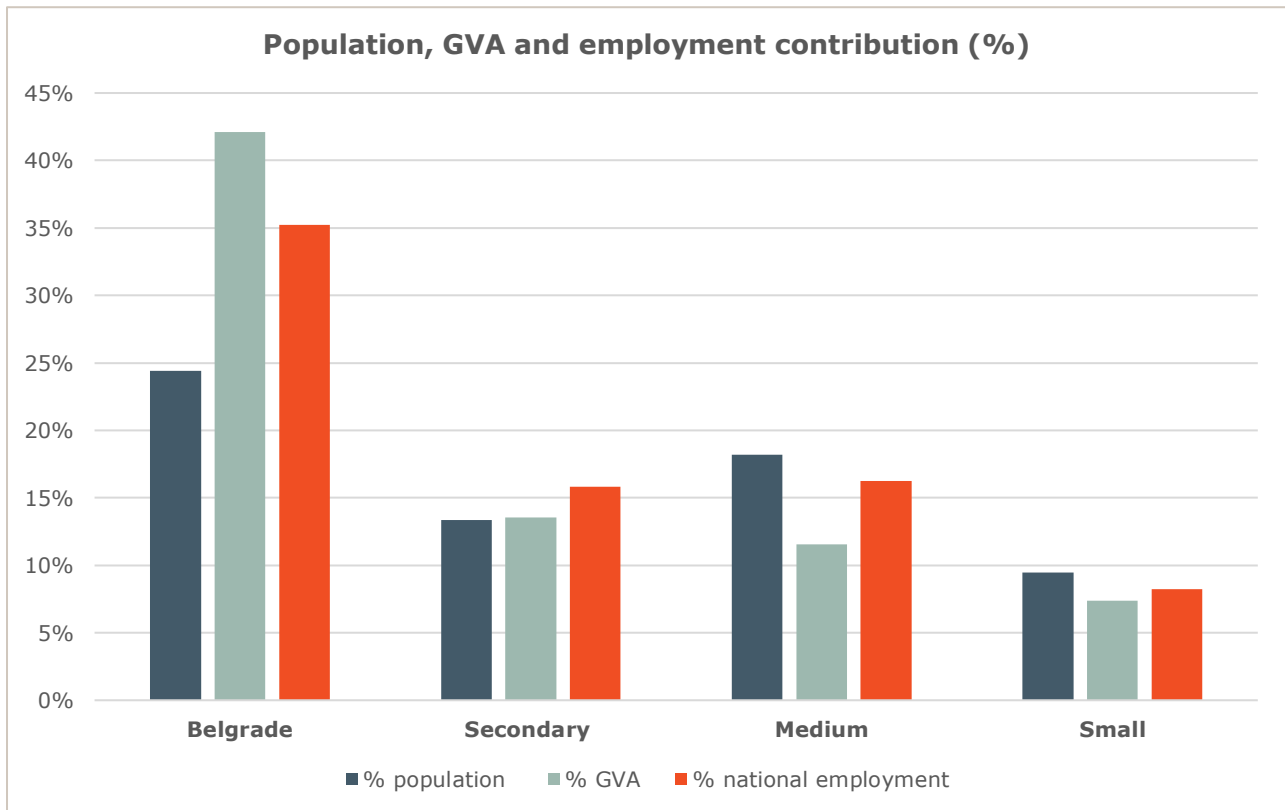
Source: Statistical Office of the Republic of Serbia

Belgrade concentrates the majority of jobs in tradable knowledge-intensive sectors[32] – e.g., financial services, ICT, professional, scientific and technical services – which are more productive and pay higher wages than most jobs in the manufacturing and other service sectors (see Figure 2-6). Belgrade concentrates 54 percent of knowledge-intensive tradable services jobs, with 49 percent of new jobs created in these sectors between 2015-2020 located there.

In terms of output, the concentration is even higher with 68 percent of the total GVA for these sectors generated in Belgrade. Belgrade is also more specialized in tradable knowledge-intensive sectors, as demonstrated by the higher location quotient (LQ)[33] score (see Figure 2-7), and has a relatively smaller manufacturing base, with less than 15 percent of the total manufacturing jobs located here. Consequently, wages are higher in Belgrade than in any other city in Serbia, 24 percent higher than the national average.

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[32] Definitions of knowledge intensity level are taken from Eurostat, tradable and non-tradable categorisation by author following standard definition (i.e. tradable services are those that can be traded internationally) https://ec.europa.eu/eurostat/cache/metadata/Annexes/htec_esms_an3.pdf

[33] A location quotient (LQ) is an analytical statistic that measures a region's industrial specialization relative to a larger geographic unit (usually the nation). An LQ is computed as an industry's share of a regional total for some economic statistic (in this case employment)

Figure 2-6: Wages as a percentage of Serbia's average for manufacturing (blue) and services (red)

Wages per sector (as percentage of average)
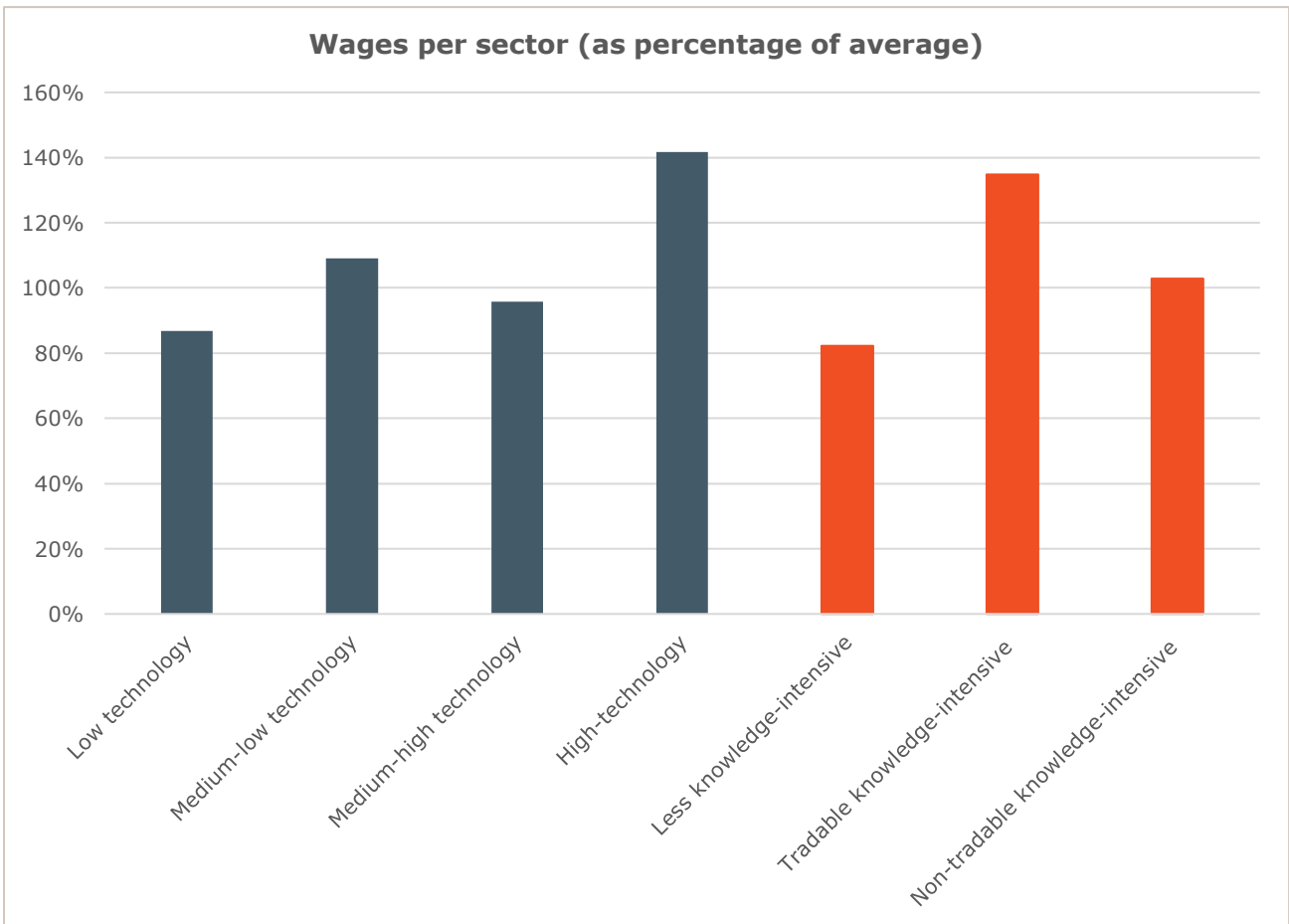
Source: Statistical Office of the Republic of Serbia

Novi Sad, the second largest city, has a similar service-oriented economy and performance and can be considered to play a similar role in the urban system, though at a significantly smaller scale, with a population of less than a quarter and a GVA of less than a fifth that of Belgrade. Like Belgrade, the economy of Novi Sad is relatively specialized in the service sector, particularly tradable knowledge-intensive services, with an LQ of 1.56, and a low manufacturing LQ of 0.69 – like Belgrade.

Novi Sad also has the highest concentration of businesses per capita (0.10), second highest jobs per capita after Belgrade (0.36), high levels of investment per capita (e.g., the highest of any city in 2019), fourth highest GVA per capita (after Bor, Belgrade, and Pančevo), and comparable wages (89 percent of Belgrade).

The remainder of Serbia's cities are primarily oriented towards manufacturing, with a few notable exceptions, namely Bor and Zaječar (both oriented towards mining), Požarevac (electricity generation) and Novi Pazar – of these, all except Novi Pazar are small cities with a population of less than 50,000. Serbia remains an industrialized economy, despite the recent decline, and manufacturing jobs are distributed across the country, and in all city sizes, as a legacy of Serbia's former centrally planned economy.

Figure 2-7: Location Quotients aggregated key sectors, 2020

LQ	Manufacturing	Less knowledge-intensive services	Tradable knowledge-intensive services	Non-tradable knowledge-intensive services	Agriculture	Mining
Belgrade	0.43	1.21	1.59	1.09	0.34	1.10
Secondary	1.21	0.98	1.03	1.00	0.46	0.24
Medium	1.42	0.90	0.62	0.96	0.74	0.53
Small	1.28	0.83	0.60	1.09	1.34	1.98

Source: Statistical Office of the Republic of Serbia

Significant disparities exist, however, in the urban economic system. Though the economy has begun to recover, as seen above, the previous period of decline and job losses affected the manufacturing sector acutely. Those cities more oriented towards manufacturing declined, while larger cities with a greater services base – Belgrade and Novi Sad especially, but also the secondary cities of Niš and Kragujevac – were more resilient.

City-level data is not available prior to 2010, but the data from 2010 shows that by this time unemployment had risen to 41 percent in small cities compared to just 17 percent in Belgrade, while wages also lagged behind (see Figure 2-8). The recent period (starting from around 2014) has seen a resurgence in the manufacturing sector, combined with the continued growth of the services sectors and the economy generally. This development has resulted in declining unemployment and rising wages in all cities, but the overall trend – that the smaller the city, the higher on average the unemployment and the lower the wages – persists.

Figure 2-8: Average wages, total employment, and unemployment rate by city size, 2010-2020

	Average wage [USD]			Total employment			Unemployment [%]		
	2010	2020	Change	2010	2020	Change	2010	2020	Change
National	444	565	27 %	1,355,00	2,149,099	59 %	35	19	-47
Rural	347	458	32 %	320,000	524,978	64 %	49	30	-40
Urban	413	524	27 %	1,035,000	1,624,121	57 %	29	14	-51
Belgrade	552	699	26 %	469,000	756,724	61 %	17	8	-53
Secondary	429	559	31 %	217,000	340,528	57 %	31	15	-53
Medium	402	496	23 %	222,000	349,696	58 %	39	21	-46
Small	406	526	29 %	127,000	177,173	40 %	41	23	-44

Source: Statistical Office of the Republic of Serbia

More significant still is the regional disparity: cities in the south of the country (Southern and Eastern and Šumadija and Western regions) have lower productivity, wages, and employment than those in the north (Belgrade and Vojvodina). This north-south divide persists, but there is some limited evidence that the gap is narrowing, at least for some cities, as evidenced by the faster wage growth, particularly in Šumadija and Western Serbia, the poorest region (see Figure 2-9). The trends towards convergence and divergence (or catching up and lagging) in the economic performance of cities, and their drivers are explored in more depth in the next section.

Figure 2-9: *Average wages, total employment and unemployment rate average for cities in each region, 2010-2020*

	Average wage [USD]			Total employment			Unemployment [%]		
	2010	2020	Change	2010	2020	Change	2010	2020	Change
National	444	565	27 %	1,355,00	2,149,099	59 %	35	19	-47
Rural	347	458	32 %	320,000	524,978	64 %	49	30	-40
Urban	413	524	27 %	1,035,000	1,624,121	57 %	29	14	-51
Belgrade	552	699	26 %	469,000	756,724	61 %	17	8	-53
Vojvodina	449	547	22 %	228,000	336,708	48 %	32	15	-54
Southern and Eastern Serbia	403	527	31 %	159,000	239,721	51 %	41	23	-45
Šumadija and Western Serbia	379	485	28 %	179,000	290,968	63 %	42	24	-43

Source: Statistical Office of the Republic of Serbia

To summarize, Serbia's urban system can be characterized by the following:

- A high degree of primacy, with Belgrade concentrating almost a fifth of the total population (20 percent), more than a third (34 percent) of the urban population, and two-thirds (66 percent) of the population of the four largest cities.

- An even higher degree of economic primacy, with Belgrade generating 42 percent of national GVA and contributing 35 percent of jobs, including more than half (54 percent) of jobs in the high-wage tradable services sectors.

- A "second city" in Novi Sad that has a similar economic profile and performance to Belgrade, but at a substantially smaller scale, a quarter (25 percent) the size of Belgrade. Novi Sad also plays an important administrative function as the capital of the autonomous Vojvodina region.

- A system of industrial cities, primarily oriented towards manufacturing that, with a few notable exceptions, are shrinking in population having experienced more than two decades of economic decline and deindustrialization (from around 1990 to 2014).

- From 2014 onwards, a process of economic renewal has begun, creating net manufacturing jobs rather than losing them every year since.

- An increasing concentration of the population towards larger cities (Belgrade, secondary and larger medium cities), in the context of an overall declining population.

- A spatial divide can be characterized as "north-south" with the cities in the north of the country being generally wealthier and performing better than those in the south. With some evidence, however, this divide is narrowing – at least for some cities – a trend which is now explored.

2.3   Current trends in the regional distribution of economic activity

As explained above, the legacy of Serbia's transition from a centrally planned to a market-oriented economy has left a pattern that counterposes economic concentration and dispersion - uneven spatial-economic development - across the urban system. A rapid decline and loss of jobs in traditional sectors, primarily manufacturing (for SFR Yugoslavia's domestic market and export to non-aligned and Eastern Bloc countries), was followed by a reorienting of the economy first towards private enterprise and markets and then towards integration into global and EU value chains, accompanied by FDI into broadly two areas: knowledge-intensive tradable services (especially ICT and professional services); medium-high technology manufacturing (especially automotive supply chains, including automotive electronics, and "white goods"/electrical appliances).

Understanding the timing, location and drivers of these investments is critical to understand the current urban system, performance of cities and future evolution (see Figure 2-10).

Figure 2-10: Timeline of the main phases of economic transition in Serbia since 1990
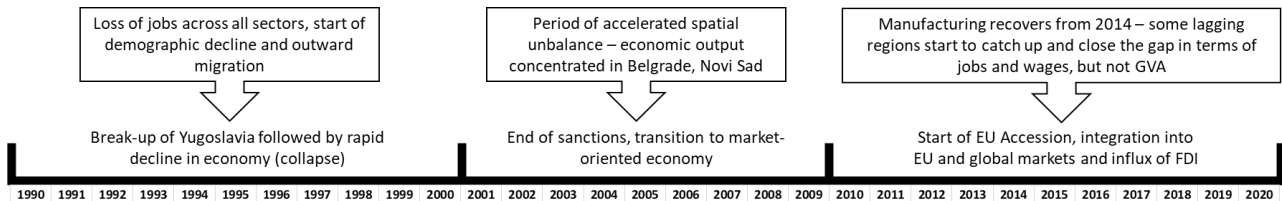
Source: COWI

2.3.1   Concentration and dispersion

To close the gap between the leading cities, Belgrade and Novi Sad, and the rest, it will be necessary to raise the productivity of other sectors, particularly manufacturing, or to attract investment and create jobs in knowledge-intensive tradable services in the other cities.

As it stands, however, jobs and investment in knowledge-intensive tradable services continue to be concentrated in these two cities, with 49 percent of new jobs between 2015-2020 created in Belgrade and a further 13 percent in Novi Sad (see Figure 2-11). This trend is likely to continue as knowledge-intensive services benefit significantly from knowledge and technology spillovers as well as access to large and concentrated pools of skilled labor – as these sectors become increasingly concentrated in a location, the competitive position of that location increases leading to further clustering of investment and firms. Spillover effects are highly spatially concentrated and can be effective at distances as low as 1km. [34]

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[34] https://www.centreforcities.org/reader/building-northern-powerhouse-lessons-rhine-ruhr-randstad/introduction/

Figure 2-11: Growth in tradable services employment by district 2015-2020

Growth in tradable services employment in Serbia (2015 - 2020)
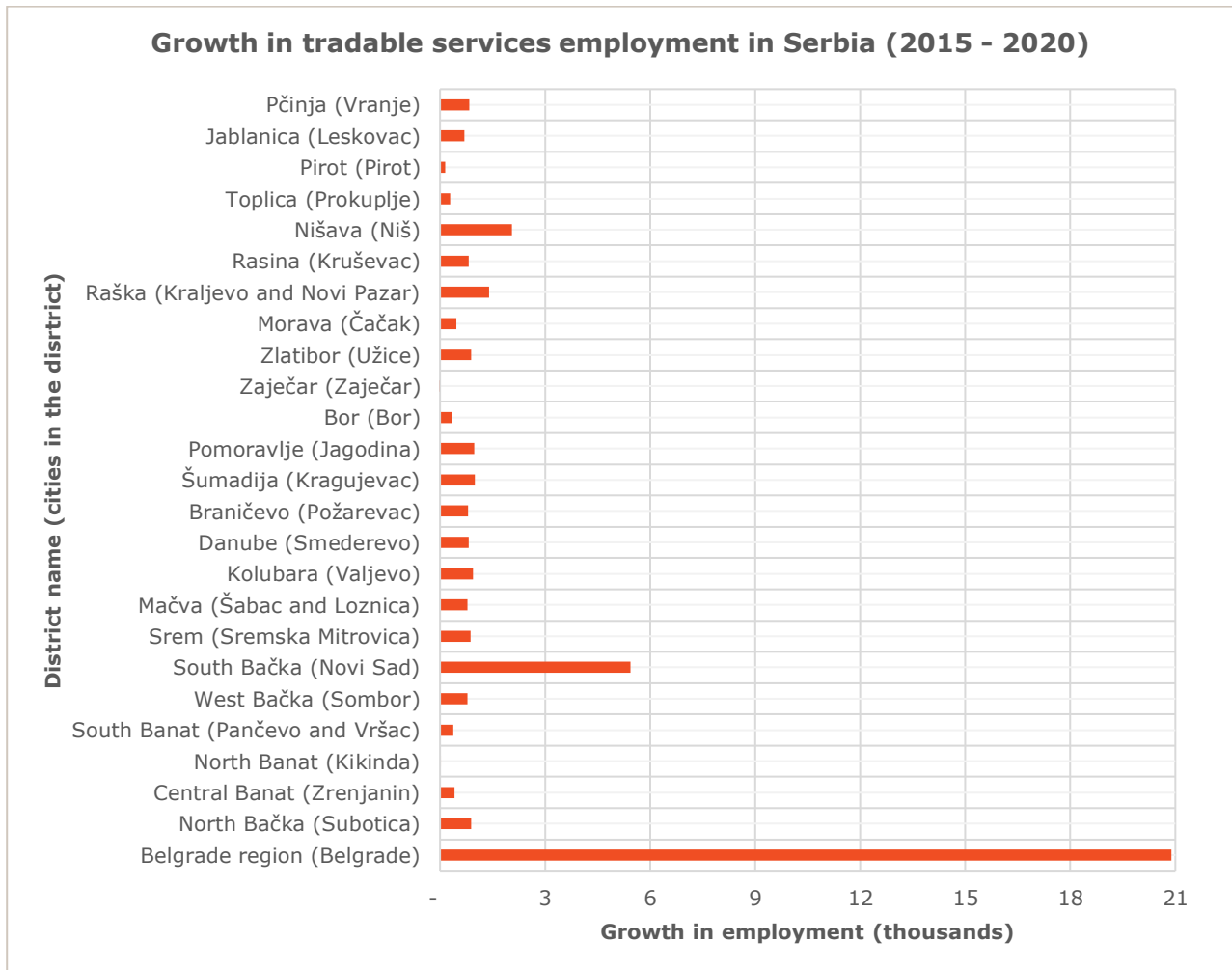
Manufacturing jobs, in contrast, are distributed across the country, with most Serbia's cities oriented towards manufacturing, which generally accounts for around a third of total employment, with a few notable exceptions (Novi Pazar, Bor, Zaječar, Požarevac). These industrial cities, particularly those located in the south of the country, experienced the most severe economic decline and worst levels of unemployment as the manufacturing sector declined.

Now, however, the recent renewal of the manufacturing sector is driving a tentative recovery in some of these industrial cities. New manufacturing jobs, though not distributed uniformly, are being created across the country, with indications that some lagging districts are catching up and new clusters emerging (Figure 2-12). The South and East Serbia region had the fewest manufacturing jobs in 2010 (62,988) but has seen the largest increase of 74 percent (to 109,825) between 2010 and 2020. Vojvodina and Šumadija and Western Serbia regions performed similarly growing by 61 percent (from 92,579 in 2010 to 148,714 in 2020) and 60 percent (from 92,187 in 2010 to 147,099 in 2020) respectively. In contrast, Belgrade experienced a decline in manufacturing employment of -5 percent between 2010 (64,042) and 2015 (61,016) before recovering to grow slightly by 15 percent from 2015 to 2020 (70,401).

Figure 2-12: Change in manufacturing employment by district

Change in manufacturing employment in Serbia
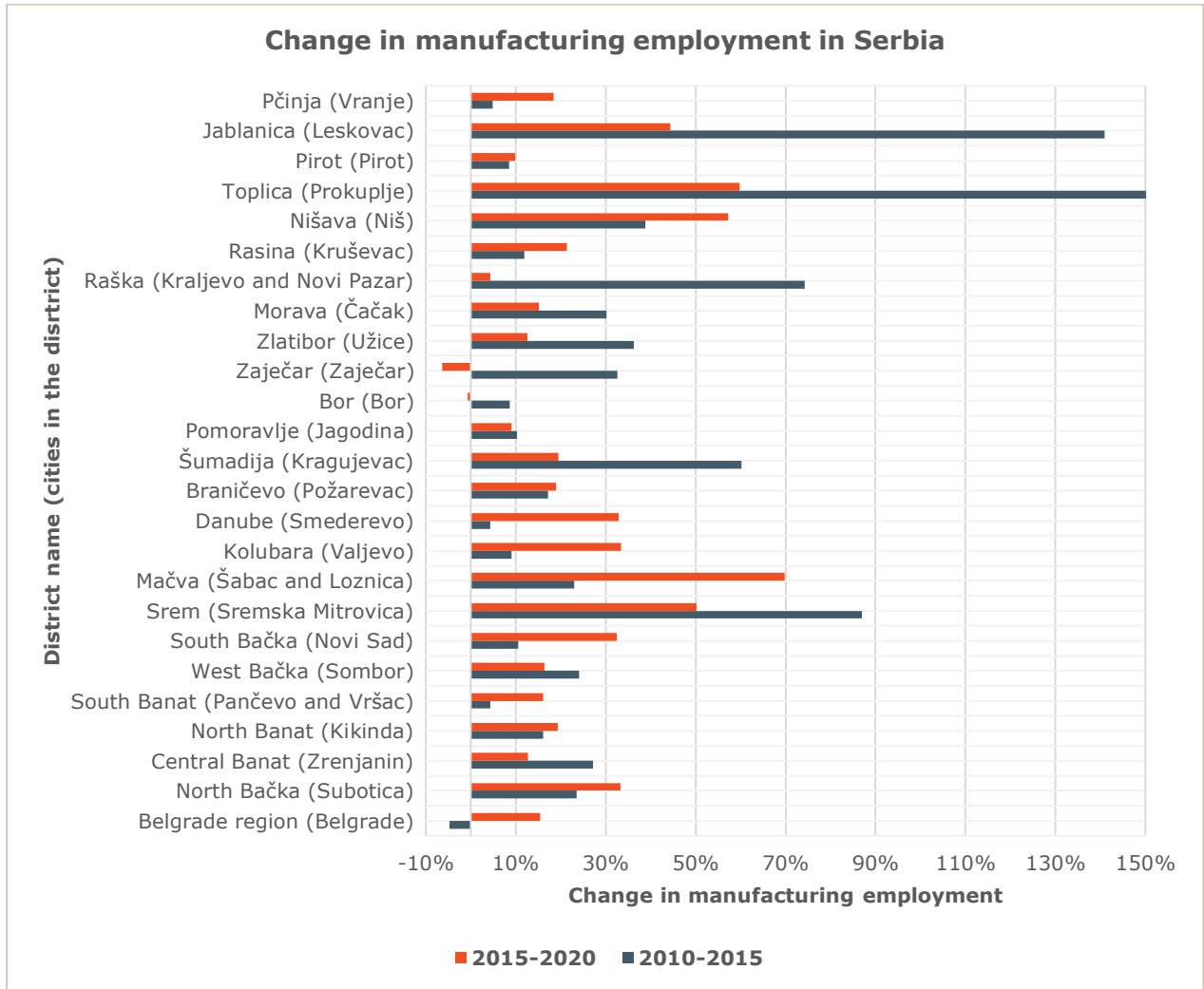
Source: Statistical Office of the Republic of Serbia

Lagging districts are closing the gap in terms of wages, driven by the recovery of the manufacturing sector, as those with the lowest average wages in 2010 increased the most by 2020. This narrowing of the wage gap is linked to reindustrialization, with a greater increase in manufacturing jobs over the same period positively correlated with faster wage rises. Wages in higher-technology manufacturing are higher than those in lower-technology sectors and it is these subsectors in which jobs are primarily being created (Figure 2-13).

Figure 2-13: Growth in wages by district

Growth in wages in Serbia

Legend: ■ 2015–2020   ■ 2010–2015

Districts (top to bottom): Pčinja (Vranje), Jablanica (Leskovac), Pirot (Pirot), Toplica (Prokuplje), Nišava (Niš), Rasina (Kruševac), Raška (Kraljevo and Novi Pazar), Morava (Čačak), Zlatibor (Užice), Zaječar (Zaječar), Bor (Bor), Pomoravlje (Jagodina), Šumadija (Kragujevac), Braničevo (Požarevac), Danube (Smederevo), Kolubara (Valjevo), Mačva (Šabac and Loznica), Srem (Sremska Mitrovica), South Bačka (Novi Sad), West Bačka (Sombor), South Banat (Pančevo and Vršac), North Banat (Kikinda), Central Banat (Zrenjanin), North Bačka (Subotica), Belgrade region (Belgrade)

Y-axis: District name (cities in the district)
X-axis: Growth in wages (0% to 50%)

Source: Statistical Office of the Republic of Serbia

Investment into new manufacturing has been even more concentrated than job creation (Figure 2-14). Vojvodina region attracted 43 percent of investment in manufacturing fixed assets between 2010 and 2020, Šumadija and Western region followed with 30 percent, primarily driven by significant investment into Kragujevac around 2012 with the reopening of the FCA Serbia automotive factory, by far the largest single manufacturing investment Belgrade had the lowest share with 11 percent, followed by South and East Serbia with 16 percent, though the gap is closing with investment growing fastest in this region (from 13 percent in 2010-2014 to 19 percent in 2015-2020).

Figure 2-14: Investment in fixed manufacturing assets by district

Investment in fixed manufacturing assests in Serbia
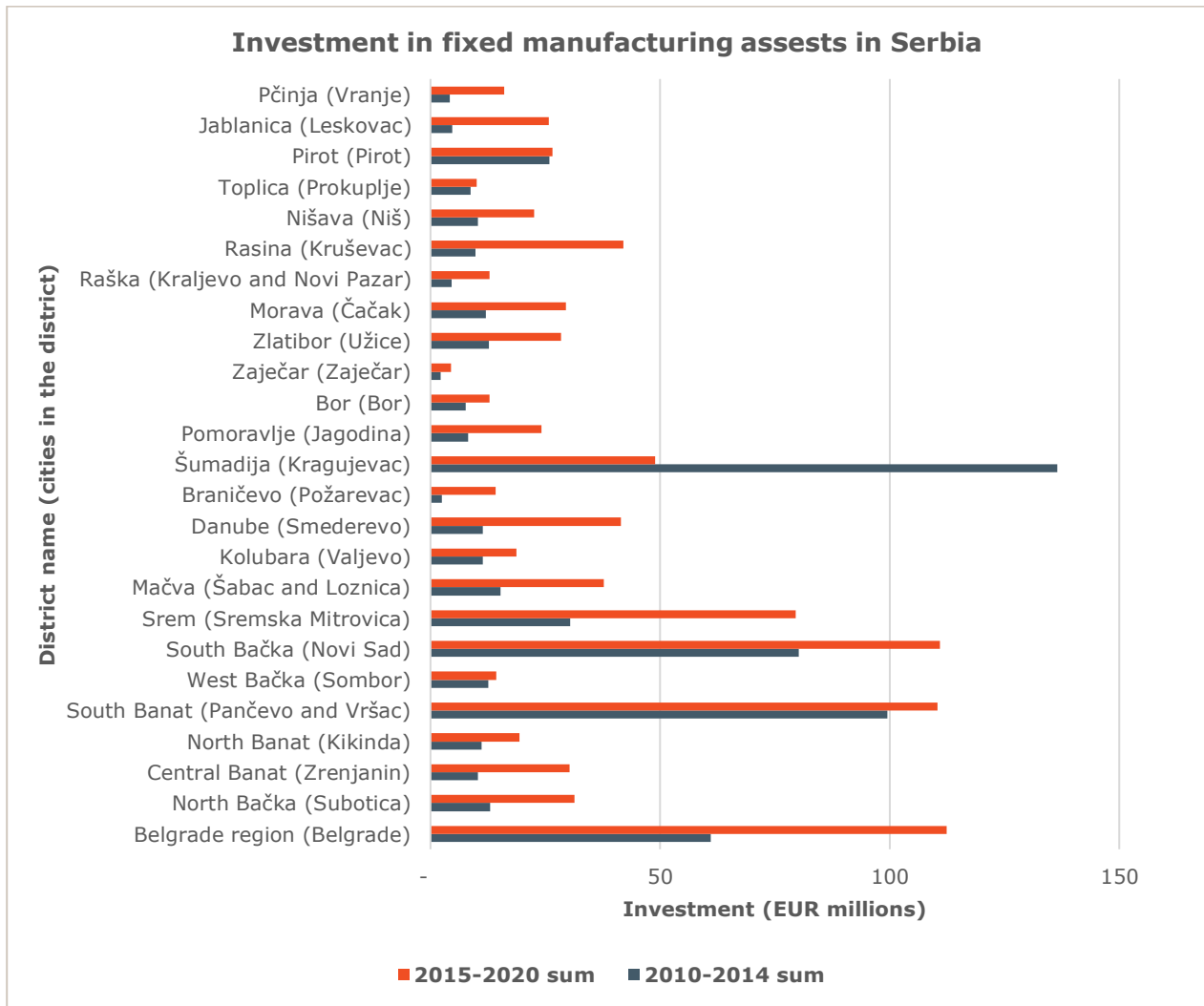
Source: Statistical Office of the Republic of Serbia

Though the evidence is mixed, there are therefore some indications that some cities are starting to catch up and close the gap with Belgrade and Novi Sad, driven by the recent recovery and new investment into the manufacturing sector. This is particularly evident in cities located in south-east of the country (such as Vranje, Leskovac, Prokuplje, Pirot), central Serbia (e.g., Kragujevac, Kruševac) and Vojvodina (e.g., Sremska Mitrovica, Subotica, Zrenjanin).

These cities are predominantly located along Serbia's Corridor X, which has seen significant recent investments. Recent extensions of Corridor X highway from Niš towards south (to the border with North Macedonia) and east (to the border with Bulgaria) have cut journey times between Belgrade and cities in the south and south-east such as Vranje or Pirot from around 4 to around 2.5 hours, thus also improving

access to wider EU markets. The majority (50 percent) of industrial land is located within 25km of Corridor X as the majority of the country's Free Zones.[35]

2.4   Conclusion

Serbia's cities are critical to its economic development. Serbia's 28 cities are home to around 60 percent of the population, but 76 percent of the total jobs, while workers in these cities earn on average 13 percent more than those in the rest of the country.

Cities are creating jobs despite their declining populations. Recently, new jobs are being created in higher-value manufacturing and services, and unemployment has halved from around 20 percent in 2015 to around 10 percent in 2020, though the demographic decline and emigration both continue.

Serbia's spatial economy is unbalanced, with investment and well-paid jobs concentrated in the two largest cities of Belgrade and Novi Sad. This is a consequence of several well-documented macroeconomic shocks from the 1990s onwards which caused a rapid deindustrialization that disproportionately impacted smaller cities more oriented towards manufacturing.

Spatial balance is *improving*, however, with some previously lagging cities creating jobs faster than Belgrade and Novi Sad and closing the gap in terms of wages, driven by new investment in manufacturing. Recently, from around 2014 onwards, Serbia has begun a process of economic renewal and is reindustrializing, creating net manufacturing jobs rather than losing them every year since. Moreover, these new jobs are typically in relatively higher-technology/higher-wage sectors than those which were lost.

The economic renewal process is uneven, with new manufacturing activities predominantly located along the primary transport corridors. There has been significant recent investment in these transport corridors, particularly in the south of the country along the *Pan-European Corridor X*, and there are indications that this investment, in roads and in industrial facilities, is correlated with investment and job creation in manufacturing. In contrast, cities not located on the main transport corridors are, in general, creating fewer jobs.

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[35] Serbia first signed a commitment to develop the Pan-European Corridor X with the EU in 2001. The corridor runs from Austria to Greece, passing through Serbia from north to south, forming the backbone of Serbia's transport network. The European Bank for Reconstruction and Development (EBRD) provided initial financing for the upgrade of sections of the road to a multi-lane expressway (EUR 85m in 2004 and EUR 200m in 2007) with further financing support from China Exim Bank, European Investment Bank (EIB) and Turkish Exim Bank.

CHAPTER 3
Spatial and Land Use Development

3   Spatial and Land Use Development

Shrinking urban populations observed across most cities in Serbia stand in contradiction to a pattern of pervasive spatial expansion, with urban and land use procedures and regulations often inadvertently facilitating rather than moderating urban sprawl.

While cities generally foster a compact city model by increasing construction densities in inner city areas, population is moving to suburbs which are mostly growing spontaneously. With growing housing-related costs, moving to informal settlements in suburban areas is seen by many as an alternative housing option, which leads to social and spatial segregation within cities.

Boundaries of General Urban Plans (GUPs) in most cases do not match actual built-up areas of cities. On one hand, they do not include parts of built-up areas that transgress administrative boundaries of urban settlements and LSGs and are thus disenabled to guide the development of cities' peripheral areas. On the other hand, GUPs continue to zone large areas of natural and agricultural land as construction land. Although the actual built-up areas of Serbia's cities do not consume more construction land per capita than cities from comparative countries, the per capita area of construction land as zoned by GUPs is among the highest in Europe.

3.1   Patterns of spatial development

Over the last decades, Serbian cities have generally aimed to foster a compact city concept for their spatial development in GUPs and other planning documents. For example, the current GUP of Belgrade has inner-city development and the creation of a compact city as one of the main long-term strategic principles of spatial development, which is retained from previous plans since 1985.[36] Similarly, in the GUP of Novi Sad, the rational use of land and prevention of spatial expansion are stressed as the main spatial development postulates and are equally preserved from the previous GUP. [37]

Guided by urban plans, construction densities in inner city areas are increasing as new high-rise developments emerge in locations previously occupied by low-rise residential housing, or in the inner-city locations of former industrial complexes. However, growing property prices in central city areas are pushing many families to the suburbs, which are growing spontaneously.

In Belgrade, an analysis found that with the privatization of land and housing and market liberalization over the last two decades, the highest rates of new residential construction occurred in central city areas and in suburban areas which were particularly attractive to middle-class families. This was also driven by the uneven development of road infrastructure, which is disproportionately more developed in central city areas than suburbs, and which makes the former more attractive for developers and buyers, and disincentivizes suburban housing development. In 2015 in Belgrade, newly built housing units in central city areas amounted to 4.7 per 1,000 residents, while the development in suburban areas was only

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[36] *General Urban Plan of Belgrade 2016 to 2021* (p. 19). Available at: http://www.beoland.com/wp-content/uploads/planovi/gup-beograda/SL_11_2016.pdf

[37] *General Urban Plan of Novi Sad until 2030* (p 47). Available at: http://www.nsurbanizam.rs/sites/default/files/1828%20GUP%20Novog%20Sada%20do%202030_SL_list.pdf

between 0.7 and 1.0.[38] Similar trends can be observed in most of the cities. Essentially, since the 1990s there has been very little planned, medium- or large-scale development of new residential suburbs.

However, this did not prevent the spread of the built-up area into suburbs. In parallel with the increase of construction densities in inner-city areas, spontaneous (i.e., unauthorized, informal) housing was developing in suburban areas which, being remote and lacking a road network, were unattractive especially for developers and their market of upper- and middle-income households. Many lower income households were driven towards such suburban areas by cheaper property values.[39] Initially starting during the 1960s, informal construction in suburbs accelerated during the 1990s with a large influx of refugees and Internally Displaced People (IDP). The growth of informal construction continues today.

This kind of city development, with a compact city and a spreading urban periphery, arguably offers housing opportunities both to better-off residents of the city and to poorer residents and migrants. [40] At the same time, unplanned spatial expansion can incur significant costs in terms of infrastructure and service provision, transport, and in terms of environmental impact.

According to the SUDS, urban settlements in Serbia today are characterized by a compact urban core on one hand, and a sprawling urban built-up area in peripheral, peri-urban zones and suburban settlements, along the main roads.[41]

3.1.1   Urban expansion

The analysis of continuous built-up areas shows that in total, built-up areas of the 27 analyzed cities occupy 601 km^2 with a total population of 3,401,713, and an average population density of close to 5,000 people per km^2. Half (49.6 percent) of the total population of Serbia lives in these cities, which occupy only 0.8 percent of the total surface area of Serbia.

It is apparent, however, that the built-up areas of all cities are growing although the population is declining in many cases. Although providing a somewhat limited picture of suburban dynamics in cities, the GHSL Urban Center Database still provides cross country comparisons on the spread of built-up areas of cities (using the *urban centers* category) since it applies the same methodology for mapping urban areas globally.

It shows that Serbian cities (*urban centers*) are expanding less efficiently than comparable cities from other countries, as urban density decreases (see Figure 3-1). GHSL shows that Novi Pazar and Novi Sad are the only exceptions, with the former increasing density, and the latter stagnating. The rest of the cities in Serbia have instead increased in built-up area cover while the population declines, suggesting an inefficient use of urban space and an increase in space-extensive urban forms.

The difference in densification is especially evident when primary cities are compared: from 2000 to 2015 Belgrade have increased its built-up area by 11 percent and decreased population density by 11 percent, while Budapest, Sofia, Tirana, and Baku increased their densities by 10, 5, 52 and 22 percent

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[38] All according to: Slaev, A. et al., 2018. *Suburbanization and sprawl in post-socialist Belgrade and Sofia*. In: European Planning Studies 2018

[39] Ibid.

[40] Ibid.

[41] Ibid.

respectively. Within secondary and medium cities, figures in comparator countries show less regularities in terms of densification, with some cities densifying and some decreasing in density. However, it is noticeable that the increase in built-up areas is generally higher in Serbian secondary and medium-sized cities than in comparator cities in other countries (Figure 3-1).

Figure 3-1: Built-up area growth and population density change in cities in Serbia and comparator countries

Country	City	Built area growth 2000 - 2015 (%)	Density change 2000 - 2015 (%)
Serbia	Belgrade	11%	-11%
Serbia	Novi Sad	13%	0%
Serbia	Nis	4%	-6%
Serbia	Kragujevac	7%	-13%
Serbia	Novi Pazar	5%	14%
Serbia	Subotica	6%	-24%
Serbia	Cacak	5%	-15%
Serbia	Krusevac	3%	-13%
Serbia	Kraljevo	9%	-12%
Serbia	Zrenjanin	3%	-22%
Serbia	Pancevo	6%	-21%
Serbia	Valjevo	3%	-20%
Serbia	Leskovac	3%	-23%
Albania	Tirana	10%	52%
Albania	Shkoder	5%	-9%
Azerbaijan	Baku	4%	22%
Azerbaijan	Lankaran	9%	3%
Bulgaria	Sofia	8%	5%
Bulgaria	Plovdiv	4%	-12%
Bulgaria	Burgas	3%	-8%
Bulgaria	Stara Zagora	4%	-22%
Croatia	Zagreb	4%	-2%
Croatia	Split	1%	-1%
Croatia	Osijek	3%	-15%
Georgia	Tbilisi	2%	1%
Georgia	Batumi	2%	13%
Georgia	Kutaisi	1%	-27%
Hungary	Budapest	4%	10%
Hungary	Debrecen	8%	27%
Hungary	Szeged	4%	-14%
Slovakia	Bratislava	3%	-11%
Slovakia	Kosice	2%	-1%

Comparator cities are chosen from the Western Balkans and Central Europe and Baltics regions.

Source: GHSL Urban Center Database

3.1.2 Suburbanization

Built-up area growth is seen in suburban zones extending along the main transport routes leading into central city areas. The space between central cities and former satellite suburban settlements and towns is also seeing infill, thus drawing together centers and surrounding (former) suburbs into one continuous urban area.

Until the 1990s, urban plans in Serbia envisioned the growth of cities and the development of their built environments by the formation of medium or low-density residential suburbs, physically detached from their core cities – so-called "satellite" settlements. For example, the GUP of Belgrade from 1972 (so-called *Belgrade 2000,* which was valid until 2003) planned "leapfrog" development, fostering the creation

of new satellite suburbs, or the suburbanization of existing villages around Belgrade, that would be connected by transport infrastructure with the central parts of the city. [42]

However, since then the space between the central city and those suburbs saw a measure of consolidation. This development mostly occurred along the transport corridors connecting (former) suburbs and the central city, as seen in northwest Belgrade (Figure 3-2). The same pattern of the expansion of the built-up area can be seen in Novi Sad, where the principal development has occurred in the western parts of the city, via the infill of land between the central city and former satellite suburbs and villages, also along the main roads (Figure 3-3).

Figure 3-2 Built-up area changes in the northwest parts of Belgrade
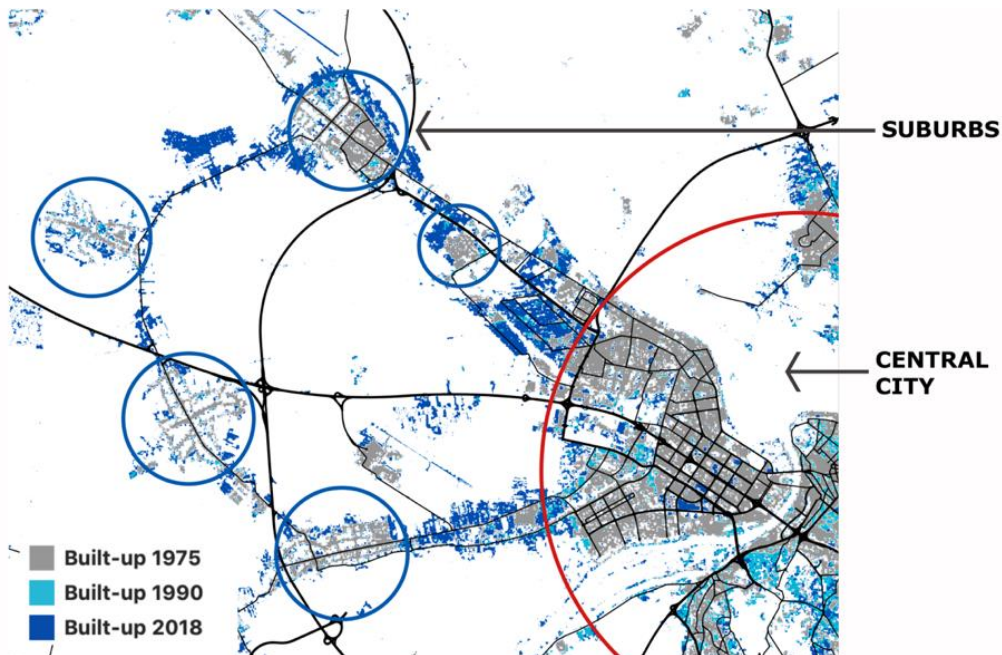
Source: COWI

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[42] GUP Belgrade 1972: *Belgrade 2000.* In: Urban Planning Institute of Belgrade 2018. *70 Years of Urban Planning Institute of Belgrade, Book 2: Plans.*

Figure 3-3 Built-up area changes in the west parts of Novi Sad
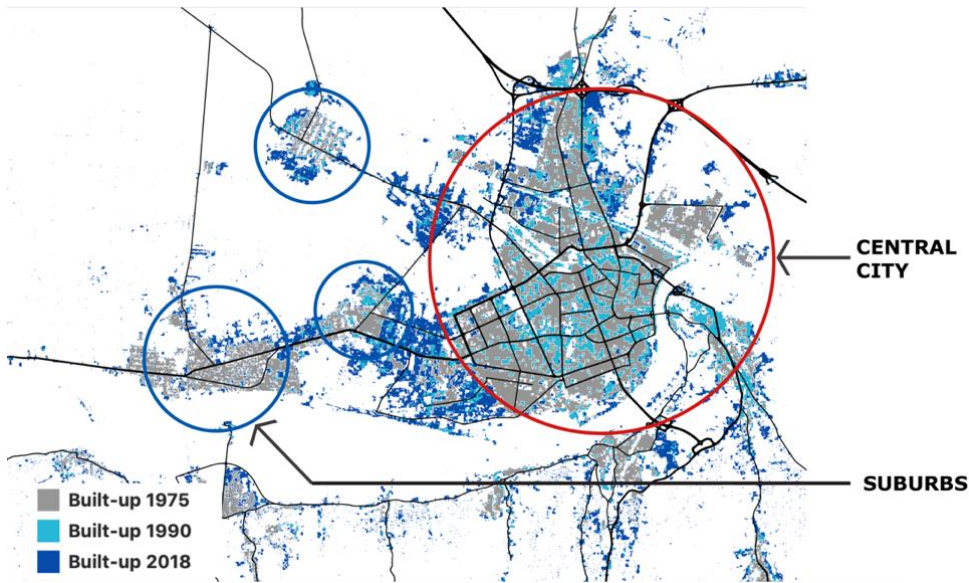
At the same time, population growth in cities is mostly taking place in suburban areas. Figure 3-4 exemplifies this, using the Belgrade administrative region as an example. The migratory balance in the Belgrade administrative region also reveals an ongoing suburbanization trend: suburban areas have positive migration balances while data shows that people are moving out of the central parts of Belgrade.

Figure 3-4: Suburbanization in Belgrade administrative region
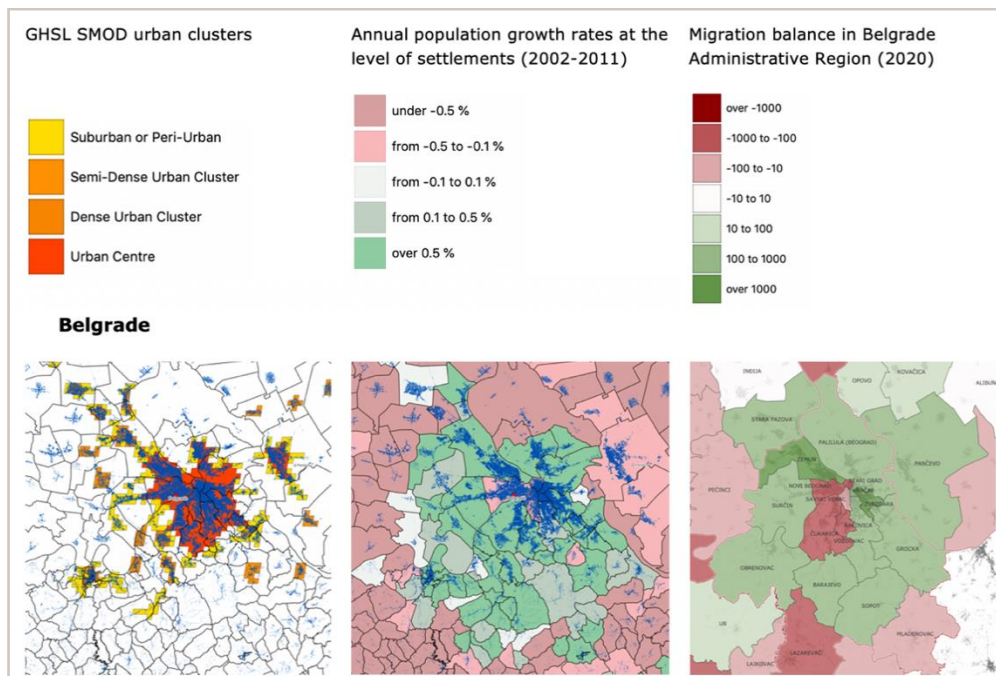
Suburbanization is seen through the population change patterns and migration balance: suburban areas are growing while central city areas are shrinking.

Analysis of demographic development inside the built-up areas of cities suggests that in all growing cities, population growth occurs in suburban areas that surround urban centers. An analysis of the four cities that experienced population growth in the 2002 to 2021 period (Belgrade, Novi Sad, Niš and Novi Pazar) establishes that in all of them the population is growing in suburban areas. Aside from Novi Sad and Novi Pazar, the central parts of cities are declining or stagnating.[43]

Figure 3-5: Evidence of suburbanization in three growing cities seen through population change patterns.
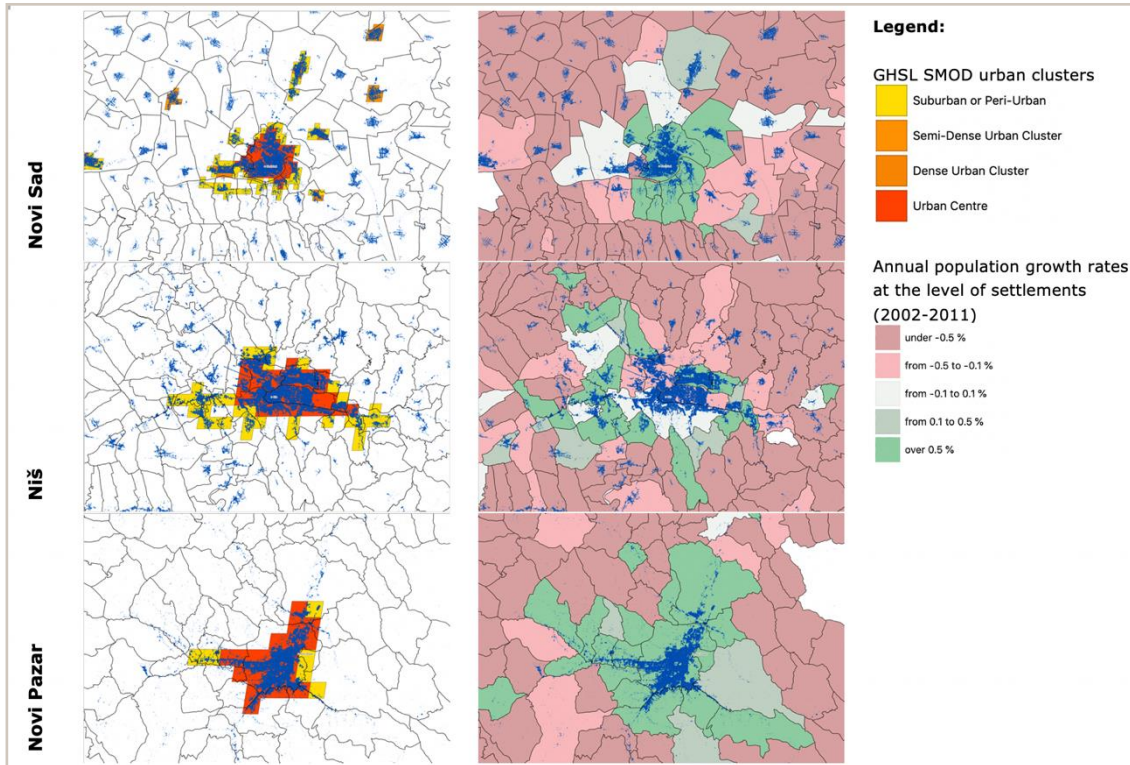
Source: COWI

3.1.3 Informal settlements

The largest spatial expansion in Serbian cities occurred between 1990 and 2000, although cities continued to expand afterwards. Most expansion is and was characterized by informal settlements, which intensified in that early period and is still ongoing, as shown in studies on informal construction in Serbia.[44] The limited population growth in cities in Serbia mostly occurs in these areas.

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[43] For estimating population growth trends inside cities (at the level of settlements) the Census 2002 and 2011 data were used, since more recent data from the Statistical Office annual surveys is not available at that level (data from annual surveys is only available at the level of LSGs).

[44] Milic V., Petovar, K. and Colic R., 2004. *Illegal construction: genesis and perspectives for the problem solution*. In: *The national report on the problem of informal settlements in Serbia*. Stability Pact of South-Eastern Europe; Conference, Vienna.

Macura, V., Petovar, K. and Vujović S., 1997. *Siromašna područja Beograda: prikaz stanja i mogućnosti poboljšanja uslova življenja (Poor Areas of Belgrade: assessment of the current situation and possibilities for improving the living conditions).* Institut za arhitekturu i urbanizam Srbije (IAUS), Beograd.

Informal settlements in Serbia differ from those in other parts of the world, in that they were typically not developed because of extreme poverty and are not associated with impoverished housing units made of diverse materials. Buildings in informal settlements in Serbia are solid, mostly the homes of middle or lower-middle-income families which have been built without building permits and which often do not conform to urban plans, zoning, and regulations.[45] The Ministry of Construction, Transport and Infrastructure has registered over two million illegally constructed buildings in Serbia, about half of which are housing.[46]

Informal settlements are not a new phenomenon. Already in the 1960s, industrial workers were building informally in fringe, peri-urban areas of cities. Studies conducted in the 1980s showed that over 98 percent of residents of informal settlements were migrants from rural areas and that between 70 and 90 percent of these worked in industry.[47] These new urban dwellers were becoming employed and moving into the cities with their families but were not able to obtain housing through the official socialist housing system. The only option was to construct houses illegally, mostly on state-owned land on the outskirts of cities (see Box 4).

During the 1990s, informal construction significantly increased [48] as the majority of an estimated 750,000 refugees and IDPs from the wars in the former Yugoslavia settled in informal settlements.[49] Three major waves of refugees and IDPs occurred during the 1990s, with people from Croatia, Bosnia and Herzegovina and Kosovo. Without other housing options, most refugees constructed houses in illegal settlements in cities.[50]

Box 4: Locations of Informal Settlements
Research on informal construction in Serbia shows that informal settlements are mostly formed in peripheral or fringe urban areas on illegally converted agricultural land in the proximity of major roads.[51] In these locations, the possibility to connect to public transport infrastructures is greatest, which thus provides the best access to the rest of the city.

Mapping of informal settlements in Belgrade revealed the extent of informal construction and its locations within the city's built-up area. The first detailed mapping of informal settlements was done for the development of the General Urban Plan of Belgrade in 2003. The GUP zoned these areas as housing, to enable their regularization and legalization. It was calculated that 43.3 percent of all

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[45] Grubović, Lj., 2006. *Belgrade in Transition: an analysis of illegal building in a post-socialist city.* PhD Thesis, London School of Economics and Political Science, London.

[46] Ministry of Construction, Transport and Infrastructure, 2021. *Database of illegally constructed buildings.*

[47] Saveljić, B., 1988. *Beogradska favela: nastanak i razvoj Kaluđerice (Belgrade favela: the formation and development of Kaludjerica settlement).* Kultura, Beograd.

[48] Milić V., Petovar, K. and Čolić R., 2004. *Illegal construction: genesis and perspectives for the problem solution, in: The National report on the problem of informal settlements in Serbia*. Stability Pact of South-Eastern Europe Conference, Vienna.

[49] UNHCR Serbia: https://www.unhcr.org/serbia.html, accessed 23 March 2022.

[50] Pihler, V., 2007. *Towards Upgrading of Informal Settlements in Serbia: Assumptions on Future of Veternik*. In: Vitrano, R. M., 2007. *Scenarios of Illegal Building: Strategies of building and town recovery*. (pp. 436-447) Available at: https://www.academia.edu/7911884/Towards_Upgrading_of_Informal_Settlements_in_Serbia_Assumptions_O

[51] Macura, V., Petovar, K. and Vujovic S., 1997. *Siromašna područja Beograda: prikaz stanja i mogućnosti poboljšanja uslova življenja (Poor Areas of Belgrade: assessment of current situation and possibilities for improving the living conditions)*. Institut za arhitekturu i urbanizam Srbije (IAUS), Beograd.

urban land zoned for housing in Belgrade in 2003 was occupied by informal construction and that 74 percent of this was built on land that was, at the moment of construction, zoned as agricultural land. Mapping of informal settlements in Belgrade was done again for the new GUP which is currently under development.

The analysis of changes in built-up areas of cities shows that the largest expansion since 1990 occurred in these areas and that a significant part of the expansion corresponds with zones of informal settlements, as seen in Figure 3-6.

Studies in Novi Sad also showed that the zones where informal settlements were identified correspond to zones with the largest expansion of the built-up area. [52]

Figure 3-6: Zones of informal settlements in Belgrade (Left, black color). Changes in the built-up area in Belgrade from 1990 to 2018 (Right)
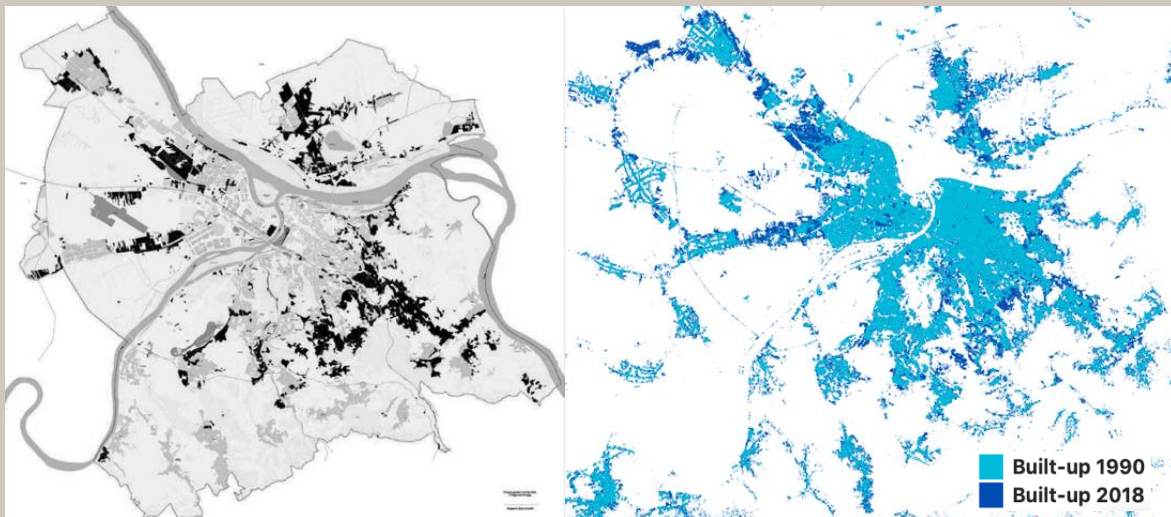
Source: Draft GUP Belgrade from 2021 (left map) and GHS built-up 2018 (right map)

3.2   Social and spatial inequalities

The main reason for the population growth in suburban areas of cities can be ascribed to people moving out of the central parts of cities to mostly informal suburbs due to the growing housing costs.

Although housing markets are booming in terms of number of housing units sold annually, growing prices of apartments and total annual turnover on housing markets, there are indications that only a small share of people solve their housing issues by purchasing apartments. Census data show that in most

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[52] Pihler, V., 2007. *Towards Upgrading of Informal Settlements in Serbia: Assumptions on Future of Veternik.* In: Vitrano, R. M. 2007. *Scenarios of Illegal Building: Strategies of building and town recovery* (pp. 436-447). Available at:

https://www.academia.edu/7911884/Towards_Upgrading_of_Informal_Settlements_in_Serbia_Assumptions_On_Future_of_Veternik

cities there is a housing oversupply – more housing units than registered households. Analysis from the MCTI shows that most households in Serbia do not have incomes that would enable them to purchase an apartment on the market. Despite this, prices of housing are growing.

The private rental housing sector is unregulated, with contracts not being validated, and neither tenants nor landlords having legal protection. This discourages families to regard rental housing as a longer-term solution.

Housing-related expenses, especially heating and electricity, represent the highest burden for households. There is a large gap in the share of disposable income that is spent on housing between the lowest- and the highest-income groups.

Social inequalities manifest in the spatial segregation in cities, with inner city areas gradually depopulating and population moving to mostly informal suburbs.

3.2.1   Informal construction as an alternative housing strategy

Housing policy in Serbia went through a transition in the last decades: from an almost completely state-controlled public system of housing provision and distribution to a market-based system. As a result of the mass privatization of public housing stock in the first half of the 1990s, today 90 percent of total housing stock is in private and only 0.78 percent in public ownership. Out of the remainder, 0.82 percent is in other forms of ownership (shared and cooperatives) and ownership was not possible to determine for the remaining 8 percent.[53] It is evident that the percentage of housing units in private ownership is higher in urban areas (92 percent) than in rural (89 percent).[54] According to Eurostat data, the owner-occupied rate in Serbia in 2020 was 86 percent, which is significantly higher than the EU average of 69.7 percent.[55]

Although the influx of refugees and IDPs ceased after 2000, informal settlements continued to grow. Lower and lower-middle-income households have continued to move into the informal suburban settlements over the last 20 years. Previous research found that informal construction represents an alternative housing strategy for many people in Serbia due to the lack of affordable housing in cities and absence of the government-subsidized housing [56] Despite high rates of owner-occupied housing units, the Serbian housing cost overburden rate is above the EU average (Figure 3-7), which implies that utility costs are high relative to average household incomes.

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[53] National Housing Strategy 2020 to 2030 – Draft. Available at:
https://www.mgsi.gov.rs/sites/default/files/Nacionalna%20stambena%20strategija_NACRT_0.pdf

[54] Statistical Office of the Republic of Serbia, 2011. *Census Atlas.*

[55] Eurostat, Distribution of the population by tenure status:
https://ec.europa.eu/eurostat/databrowser/view/ilc_lvho02/default/table?lang=en

[56] Petrić, J., Bajić, T. and Danilović-Hristić, N., 2018. *Urban sprawl of informal settlements in Belgrade, Serbia - Models for standardization and reflections on recovery.* 4th ISUF International Conference. Bari, September 26th-28th 2018. Proceedings U+D Editions, 2019 (793-801).

Figure 3-7: Housing indicators in cities for Serbia and EU-average

Source: Eurostat - *https://ec.europa.eu/eurostat/databrowser/view/tessi174/default/table?lang=en*
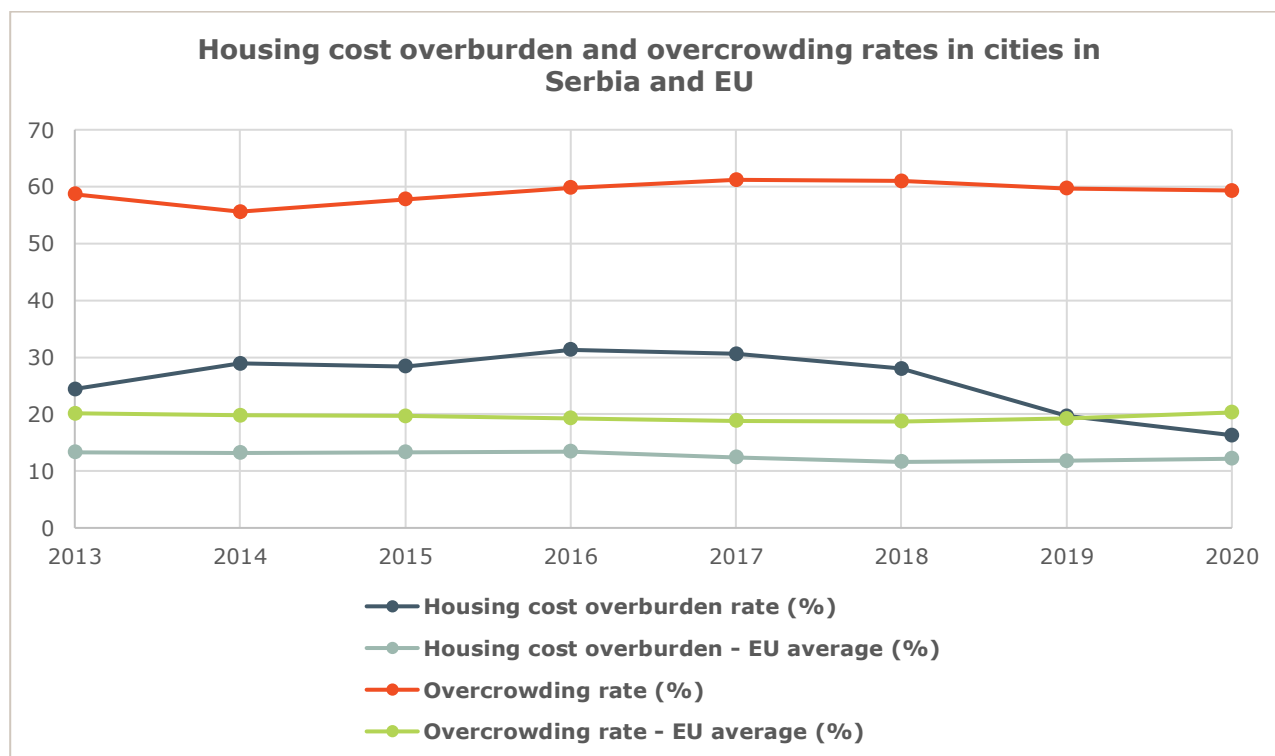
In the absence of affordable, subsidized housing, virtually the only option for an average household is to purchase an apartment on the market. On a calculation made in 2017, the Draft National Housing Strategy emphasizes that the price of purchasing an average apartment in cash was equal to 10.5 average annual household incomes and equal to 14 average household incomes for purchase with a bank loan. Similar unaffordability metrics apply to renting apartments on the market.[57]

MCTI estimates that between 80 and 90 percent of the population potentially qualify for some form of housing support (Figure 3-8). The estimates were based on average household expenditures, which provide a more accurate picture than official household incomes. Real household incomes are partly unreported and not reflected in the official statistics.

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[57] All according to: National Housing Strategy 2020 to 2030 - Draft, pp. 41-45.

Figure 3-8: Ratio of average household expenditures per deciles and household income limits for different types of housing support
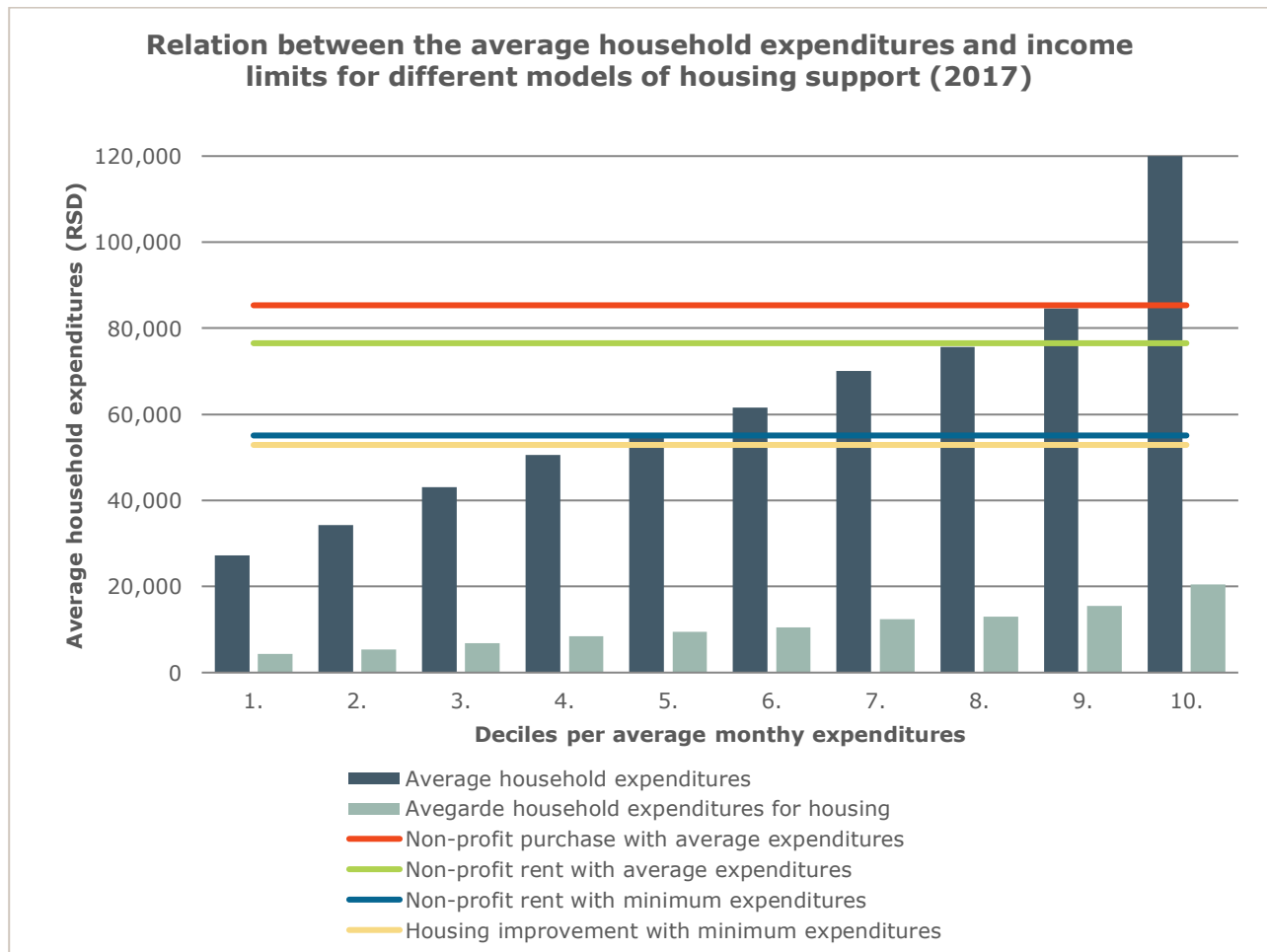
Average household expenditures were used as more accurate, since incomes are often unreported and not shown in official statistics. Income limits for different types of housing support are based on the Law on Housing from 2016.

Source: Draft National Housing Strategy 2022-2032

There are indications that the housing market in Serbian cities, and notably Belgrade, is focused on speculative purchases and investments, with limited impact on actual housing needs and affordability for many households. The Republic Geodetic Authority of the Republic of Serbia (RGA) publishes annual reports on property markets that show that the housing markets in Serbian cities are continuously increasing in terms of the number of units sold, housing prices and total annual turnover. The total turnover of the housing market in 2020 was over EUR 2.3 billion, out of which EUR 1.4 billion was in Belgrade (62 percent).[58] The Annual Report on the State of Property Market in 2020 found that 40 percent of apartment transactions were in Belgrade, followed by Novi Sad, Čajetina (Zlatibor mountain), Kragujevac, Subotica, Pančevo, Niš and Kruševac.

In general, apartment purchases in Serbia are done in foreign currencies and for cash – 95 percent of transactions were made in Euros, and 67 percent of apartments were paid in cash while only 33 percent were bought through bank loans in 2020, although cash transactions saw a slight decrease from previous

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[58] Republic Geodetic Authority, 2021. *The Annual Report on the State of Property Market in 2020.*

years (74 percent in 2018, 72 percent in 2019). Additionally, it is estimated that only 5 percent of the Serbian population is buying apartments on the market.[59] The purchases made are typically in foreign currencies, without bank loans, and the small estimated share of the population that purchase apartments, indicate that the great majority of buyers are not the people who are solving their housing needs on the market, but that purchases are made by those who possess significant savings, as an investment.

At the same time, there are indications of a significant housing oversupply. In cities and nationally, there are more housing units than registered households. Based on 2011 Census data, there were around 3.01 million housing units for permanent residence. This is an increase of 9.4 percent nationally and 15.4 percent in urban areas, compared to the 2002 census. Only 2.43 million housing units were permanently inhabited, which means that there are 589,715 uninhabited housing units for permanent residence.[60] Table 3-1 provides the numbers of housing units and numbers of households in several large cities in Serbia, showing that in all, the total number of housing units is significantly higher than the total number of households.

Table 3-1: Numbers of housing units and households in larger cities in Serbia

CITY	No. of Housing Units	No. of Households	No. of Unoccupied Housing Units	Difference between No. of Units and No. of Households
Belgrade	579,924	507,076	90,270	**72,848**
Novi Sad	137,460	99,553	26,692	**37,907**
Niš	85,738	66,971	15,635	**18,767**
Novi Pazar	17,679	15,821	4,965	**1,858**
Subotica	47,129	40,480	6,464	**6,649**

Source: Data from 2011 Census

In addition to being unaffordable, the private rental housing market is largely unregulated, with contracts not being validated and neither tenants nor landlords thus having legal protection. According to *The Annual Report on the State of Property Market in 2017* (the last annual report that provides data on the private rental housing market)*,* out of all contracts in that year, only 0.3 percent were contracts related to the rental of different types of properties, including housing units. For that reason, rental housing is for many regarded as a temporary option and not a long-term solution. Many international observers see the regulation of the rental housing sector as a key instrument for improving the housing policy for the urban poor.[61]

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[59] N1 Internet Portal, 07/02/2019. An interview with CBRE's Investments Director: "Only 5 percent of Citizens buy Properties in Serbia". http://rs.n1info.com/Biznis/a458549/Nekretnine-u-Srbiji-kupuje-pet-odsto-gradjana.html (last access on 07/01/2022)

[60] National Housing Strategy 2022-2032 (Draft)

[61] UN HABITAT, 2003. *Rental Housing: An Essential Option for the Urban Poor in Developing Countries.*

3.2.2   Housing-related expenses

The EU-SILC[62] survey for Serbia showed that 28.2 percent of households in Serbia were spending more than 40 percent of their disposable incomes on housing in 2016, compared to 11.1 percent in EU-28 countries (see Figure 3-9). When only the population at risk of poverty in Serbia is analyzed, 71.6 percent were spending over 40 percent of their incomes on housing.

According to the draft National Housing Strategy, out of the total housing-related expenses, households spend the most on heating and electricity, some 73 percent on average. A large share of expenses for heating, and its constant increase, indicates unsustainable use of energy in residential buildings. Energy-related poverty is also closely linked to the low energy efficiency of the housing stock (MCTI, 2018).[63] This, combined with underperforming heating systems and high fuel and district heating costs can represent high expenses relative to the available household incomes. Improvement of energy efficiency in the housing sector is therefore among the key challenges for sustainability in Serbia.

More than half of households that are at risk of poverty were in debt for communal services. Around 16 percent of households in Serbia lived in deprived housing units – overcrowded housing (more than half of households in Serbia) or lacking toilet or bathroom facilities. Additionally, 13.3 percent of the population in Serbia was unable to keep their homes sufficiently warm (which is a decrease from 18.3 percent in 2013), compared to the EU-28 average of 8.7 percent.[64]

The lowest-income households live in substandard settlements, facing social, economic and housing deprivation. Substandard settlements are characterized by a very low quality of housing units and the absence of basic infrastructure services (water and sanitation). These settlements are almost exclusively inhabited by Roma population (see Box 5).

Analysis of housing costs done for the SUDS found that there is a gap in the affordability of housing between the lowest-income group which on average spends 74.1 percent of disposable income on housing-related costs and the highest-income group which spends only 2.5 percent.[65]

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[62] Eurostat, 2018. *Living Conditions in Europe.* https://ec.europa.eu/eurostat/web/products-statistical-books/-/KS-DZ-18-001

[63] Ministry of Construction, Transport and Infrastructure, 2018. *Sustainable Urban Development Strategy of the Republic of Serbia until 2030.*

[64] Ibid.

[65] *Sustainable Urban Development Strategy of the Republic of Serbia until 2030 – Survey on incomes and housing conditions,* done in accordance to Eurostat methodology, dividing population into five income groups (20 percent in each group) in accordance to average household income.

Figure 3-9: Housing cost overburden rate by settlement type

Source: EU-SILC survey - https://ec.europa.eu/eurostat/databrowser/view/tessi165/default/table?lang=en
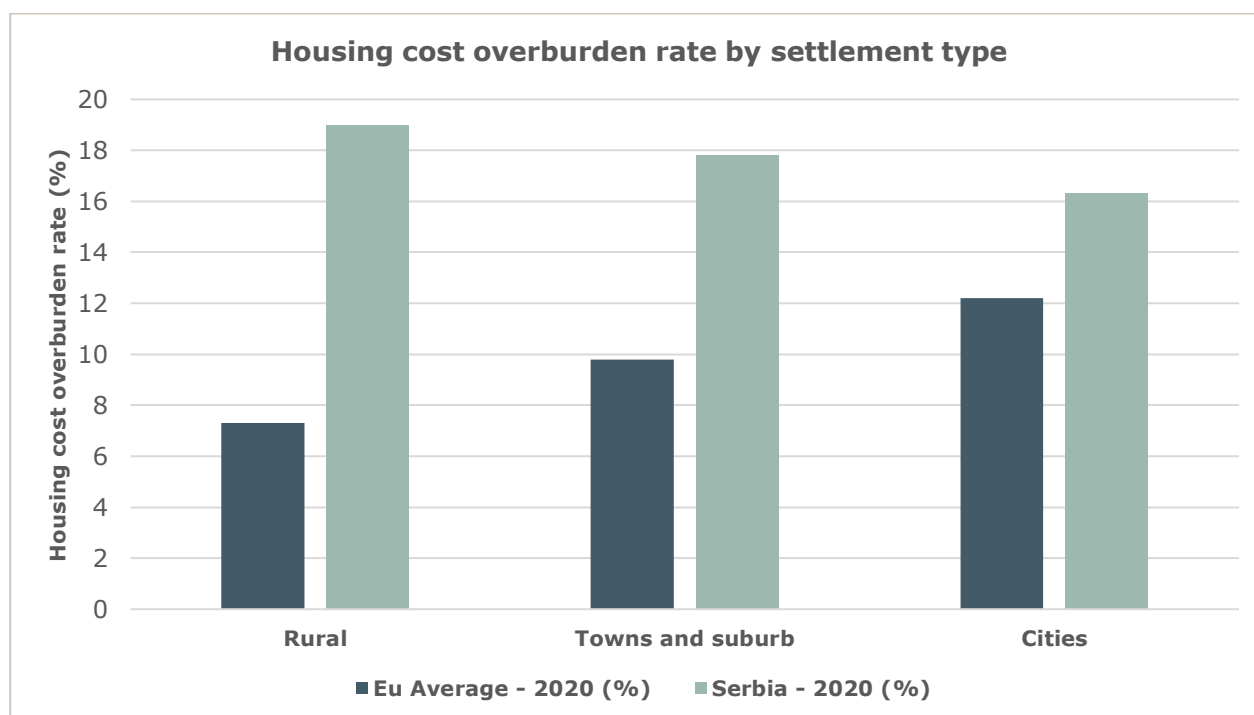
Box 5: Substandard Roma settlements

The Roma population in Serbia stands out as an especially vulnerable group in terms of social, economic, and housing deprivation. The Strategy for the Social Inclusion of Roma in the Republic of Serbia[66] stresses that the Roma population is facing discrimination, exclusion, and limited access to four main areas: education, employment, healthcare and housing.

While not all Roma are poor, substandard settlements (slums) in Serbia, which are typically characterized by much lower standards of living than other urban or rural areas, are inhabited almost exclusively by Roma population.[67] MCTI has adopted the term "substandard Roma settlements" to describe settlements with the lowest level of living conditions that are inhabited by Roma families. The definition that the Ministry used for these settlements is the official United Nations definition of slums: areas characterized by the very low quality of housing units, inadequate access to water and other public infrastructures and services, overcrowding, insecurity of tenure and poverty and social exclusion.[68]

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[66] Republic of Serbia, 2016. *Strategy for the Social Inclusion of Roma in the Republic of Serbia 2016 to 2020.* Available at:
aler.rs/files/STRATEGIJA_za_socijalno_ukljucivanje_roma_i_romkinja_u_Republici_Srbiji_za_period_od_2016__do_2025__godine_Sl_gl_RS_br_26_2016.pdf

[67] Macura, V., 2017. *Urbanism and Roma Settlements in Serbia.* Study prepared for the European Roma Rights Centre. Available at: https://www.academia.edu/41641515/Urbanism_and_Roma_Settlements_in_Serbia

[68] Đorđević, A., 2017. *Substandard Roma Settlements in Serbia: An overview of data from GIS for 2016.* Belgrade: OSCE Mission to Serbia. Available at: https://www.osce.org/mission-to-serbia/309396

The OSCE Mission to Serbia in cooperation with the Ministry of Construction, Transport and Infrastructure, undertook a mapping of all substandard Roma settlements in Serbia in 2015 and 2016. The data collected through the mapping showed that there are 583 substandard settlements in whole Serbia, with a total of 23,895 substandard housing units and 56,276 people living in them, and that they are almost exclusively populated by Roma. Around half of these are located inside urban settlements – cities and towns.[69]

In distinction to the informal settlements above, which are mostly located in fringe urban areas, Roma settlements are scattered throughout the built-up areas of cities. In terms of intra-city locations, the majority (53 percent) of the settlements are located inside the urban centers of cities, that is, integrated into the formal settlement, with 37 percent in fringe urban areas, and only 10 percent located outside any formal settlement (more than 1 km away).

The substandard Roma settlements are mostly small, with 44 percent of these having between 15 and 50 housing units and up to 100 inhabitants. Only 3.25 percent of the settlements have more than 200 housing units. Only 2 percent of settlements have over 1,000 inhabitants. These largest settlements (i.e., with over 200 housing units and/or 1,000 inhabitants) are mostly located in the South and East Serbia region, where 5 percent of all substandard Roma settlements have over 1,000 people, and 6 percent are with over 200 housing units.

3.3   Urban planning and land use policies

Despite encouragement the creation of compact cities in GUPs, as seen above, local planning and land policies contain elements that facilitate the spread of built-up areas. GUPs often fail to cover the whole built-up area of cities due to outdated administrative and cadastral boundaries of urban settlements. In many cases, urban built-up areas are even spreading to neighboring LSGs, out of the ambit of GUPs. Based on the examples of Belgrade and Novi Sad presented above, it is likely that these are the zones where informal construction is often taking place.

In trying to regularize spontaneous (informal) suburbs by putting them under the coverage of GUPs, some cities are expanding construction land areas in each iteration of the GUP, converting large zones of

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Based on the UN definition of slums, a substandard settlement is any cluster of houses that fulfils at least one of the following criteria:

- Inadequate access to drinking water
- Inadequate access to communal and other infrastructure (sewerage, sanitation, traffic network, electrical network, and other communal services)
- Inadequate quality of housing units (housing units built of inappropriate materials, or using inadequate building techniques, dilapidated, and potentially dangerous for inhabitants)
- Overcrowded (both in terms of the number of people per housing unit and in terms of average density in the settlement)
- Insecurity of tenure.

[69] Živković, Lj. And Đorđević, A., 2015. *General Characteristics of Substandard Roma Settlements in Serbia.* Belgrade: OSCE Mission to Serbia. Available at: https://www.osce.org/serbia/159711

agricultural and natural land to construction land, which in turn further motivates the spread of the built-up area and a decrease of urban density.

At the national level, the government's policies towards legalization may be encouraging further informal construction. Each new legalization campaign provides different types of discounts and tax relief and more simple procedures for obtaining building and use permits for illegal or informal builders.[70] Legalization campaigns have been in place since 1995 with the *Law on Construction of Buildings* which was the first law to incorporate a legalization process, though 1997, 2003, 2009, 2013 and finally 2015 with the current *Law on Legalization of Buildings.* The result of these campaigns is reflected in the growing numbers of applications for legalization, which also may indicate a mounting number of illegal/informal buildings: based on the legalization procedures in 2003, about 350,000 legalization applications were submitted in Serbia, in 2009 the number grew to over 700,000, and after the newest Law from 2015 over 2 million applications for legalization were submitted.[71]

3.3.1   City LSGs and strategic urban development plans

In the Serbian hierarchy of spatial and urban plans, GUPs, as an equivalent to Master Plans in the planning systems of many other countries, are strategic urban development plans that contain elements that address the general urban and spatial development of a city.[72] In addition to its strategic dimension, GUPs are legally binding, because they have a legal remit to determine how and with what intensity land is used in a city.

The *Law on Planning System of the Republic of Serbia* determines the hierarchy of planning documents, dividing them in three categories: *development planning documents*, *public policy documents*, and *other planning documents*. [73] In this hierarchy, GUPs and other spatial and urban plans are placed among the documents of development planning, which are *"the planning documents of the widest scope and highest importance."* Planning documents from the other two categories, *public policy documents* and *other planning documents*, should be aligned with the Spatial Plan of the LSG and the GUP.

They are mandatory for the 28 LSGs that have a status of a city as defined by the *Law on Territorial Organization of the Republic of Serbia.* GUPs are the only type of strategic planning document dealing exclusively with urban development.

GUPs focus only on the actual urban settlements and not the entire administrative territory of the LSG, with the boundaries of GUPs defined as boundaries of the "urban land" of cities.[74] Changes in GUP boundaries can extend or shrink areas of land designated for urban functions.

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[70] A study on informal construction in Southeast Europe has shown that, based on procedures in Serbia valid in that time, average costs of legalization made up only 24 percent of costs through official procedures: Mojović, D. and Ferenčak, B., 2011. *Challenges of Regularization of Informal Settlements in South-East Europe.* Skopje: NALAS.

[71] Analysis based on the data provided by the Ministry of Construction, Transport and Infrastructure.

[72] Republic of Serbia 2021. *The Law on Planning and Construction.*

[73] Republic of Serbia 2018. *The Law on Planning Documents.*

[74] Not all land within GUP boundaries is construction land. The Boundary of GUPs define urban land – land for urban uses, and within it, the urban construction land, the remaining being land that is urban but is not zoned for construction, e.g., parks, natural protected areas, corridors around infrastructure, etc.

The entire area of an LSG is nonetheless covered by some type of plan. The entire administrative territory of an LSG is covered by the Spatial Plan of the LSG, which defines "urban" and "other" areas, and provides general directions for spatial development, and specifies regulations and building codes. Urban settlements in city-rank LSGs are then covered by GUPs and lower-level, regulatory urban plans.

Other LSGs, with municipality status, are not obliged to have any urban development strategic document. Their strategic development is guided only by Municipal Spatial Plans which deal with broader spatial development and do not focus specifically on urban development. At the urban planning level, they have Plans of General Regulation as the highest-level urban plans, which are regulatory planning documents, developed for the issuance of building permits, without any strategic component.

It is often the case that parts of continuous urban areas are left out of the GUP because of administrative divisions. Since a GUP represents a local strategic urban planning document, parts of the continuous built-up area that are not included in it are regulated only by a spatial development plan, which only provides more general regulations and not urban development policy. This results in disproportionate and uneven treatment and regulation of parts of the same continuous urban built-up area.

3.3.2 Zoning in the General Urban Plans

The comparison of GUP boundaries and actual built-up areas of cities confirms a high consumption of urban land and provides information on the efficiency of land use and land zoning practices of city governments. The analysis of land zoned for construction in GUPs of the twelve largest cities in Serbia shows that, on average, these cities use 670 m^2 of construction land per inhabitant[75] which is more than in any European city.[76]

However, when only actual built-up areas are observed, i.e., land that is occupied by construction instead of land that is zoned for construction by urban plans, figures show that on average, the twelve largest cities in Serbia use 197 m^2 per inhabitant (see Table 3-2). This figure is closer to the average for comparable European cities. An analysis conducted by the same method used here (dividing the built-up area with the city population) shows that land consumption of Belgrade's built-up area of 133.6 m^2 per person, does not significantly differ from comparable regional capitals such as Sofia with 106 m^2, Prague with 142 m^2 or Budapest with 159 m^2 per person.[77]

Table 3-2: Construction land consumption and population densities in actual built-up areas and in General Urban Plans

CITY	Population in a continuously built-up area (2021)	Built-up area 2018 (km^2)	Urban construction land in current GUP (km^2)	Pop. density built-up area (2018)	Pop. density in current GUP coverage	Urban construction land consumption - built-up (m^2 per capita)	Urban construction land consumption – current GUP (m^2 per capita)
Belgrade	1,399,752	187	520	7,484	2,693	133.62	371.28
Novi Sad	356,825	69	109	5,138	3,274	194.63	305.47
Niš	219,855	29	267	7,553	824	132.41	1213.39

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[75] Population numbers used are from the analysis conducted for this project, and surfaces of urban construction land are extracted from General Urban Plans available online.

[76] Zeković S. et al., 2015. *Planning and land policy tools for limiting urban sprawl: the example of Belgrade*. Spatium No. 33, June 2015, pp. 69-75.

[77] Bertaud, A., 2015. *Land Markets, Government Interventions and Housing Affordability.* (p. 11)

Kragujevac	147,222	26	70	5,654	2,103	176.88	475.47
Subotica	100,645	30	80	3,389	1,258	295.10	794.87
Novi Pazar	90,507	10	33	9,264	2,743	107.95	364.61
Pančevo	80,203	19	63	4,143	1,273	241.39	785.51
Čačak	74,952	17	40	4,358	1,874	229.48	533.67
Kruševac	73,766	14	75	5,295	984	188.84	1016.73
Kraljevo	72,037	13	74	5,713	973	175.05	1027.25
Zrenjanin	70,400	21	39.6	3,356	1,778	298.01	562.50
Leskovac	69,309	13	41.1	5,161	1,686	193.77	593.00
AVERAGE	**229,623**	**37**	**118**	**5,542**	**1,789**	**197**	**670**
TOTAL	**2,755,473**	**449**	**1,411**	**66,506**	**21,463**	**2,367**	**8,044**

Source: COWI (built-up areas) and currently valid GUPs of cities

It can be inferred that the large areas of urban land zoned for construction in GUPs indicate inefficient urban land policies, rather than low actual densities and land use (see Figure 3-10 and Figure 3-11). This is also in sharp contrast with the proclaimed principles of creating a compact city which most of the cities include in their GUPs.

The reasons for the enlargement of construction land area are numerous, amongst the most important attempts to formalize informal construction. For example, the *Law on Legalization* requires local governments to "integrate" informal settlements into their urban plans.[78] Since reliable information on the exact locations of informally constructed buildings is missing, local governments tend to produce urban plans that cover a large territory, to be able to "capture" all informally constructed buildings. There are also examples of local governments that zone large areas of land for future residential and commercial construction, industrial development, and other purposes in attempts to attract investors.[79]

It seems that GUPs are still developed under the influence of a growth paradigm, which results in a lack of adaptation to and preparation for the context of shrinking populations. The literature stresses that, in the process of development of GUPs, many cities in Serbia keep relying on increasing populations and on extending city built-up areas, although statistical evidence shows that their populations are declining.[80] In general, adaptation to demographic dynamics – here shrinking populations – is rarely included in the strategic planning objectives of GUPs.[81]

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[78] Republic of Serbia, 2015. *Law on Legalization of Buildings (Official Gazette of the Republic of Serbia, No. 96/2015, 83/2018 and 81/2020).*

[79] Zeković S. et al., 2015. *Planning and land policy tools for limiting urban sprawl: the example of Belgrade.* Spatium No. 33, June 2015

[80] Čamprag, N., 2018. *Facing Shrinkage – Perspectives of Urban Development in Serbia.* In: Contemporary achievements in civil engineering – conference proceedings.

[81] The World Bank and SECO 2022. *Green, livable and resilient cities in Serbia,* Component 1 City Scans.

Figure 3-10: City of Niš - The boundary of the GUP and built-up area based on GHS 2018
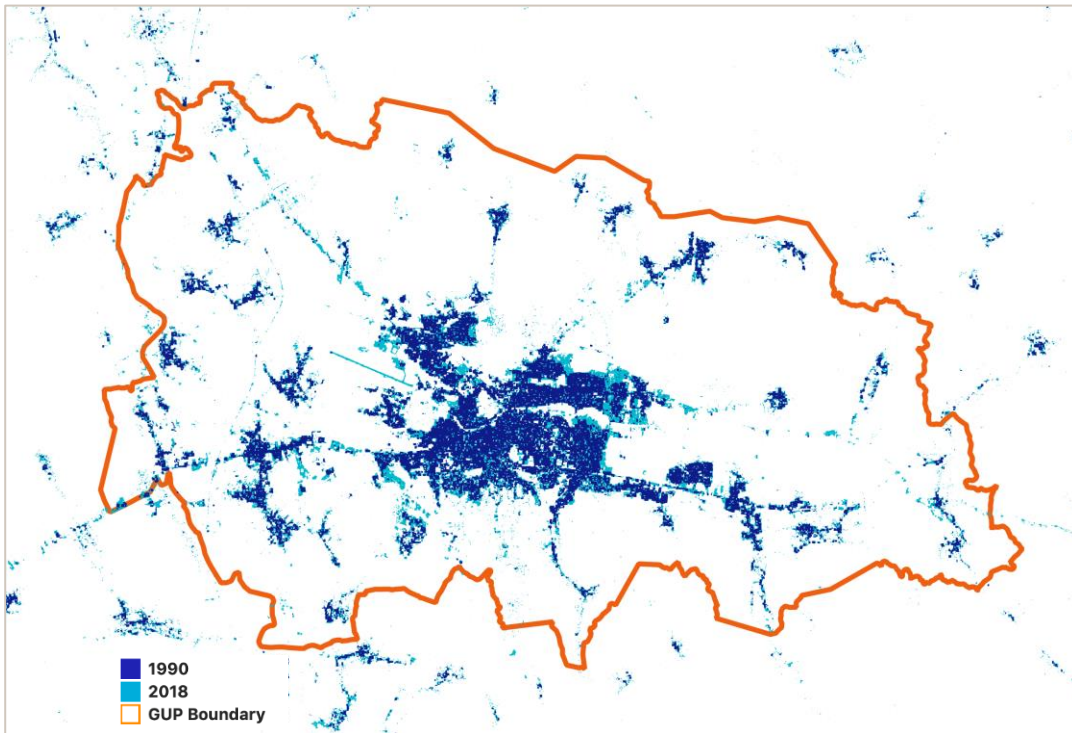
Source: COWI

Figure 3-11: Cities in which GUPs zone larger areas than the actual built-up area
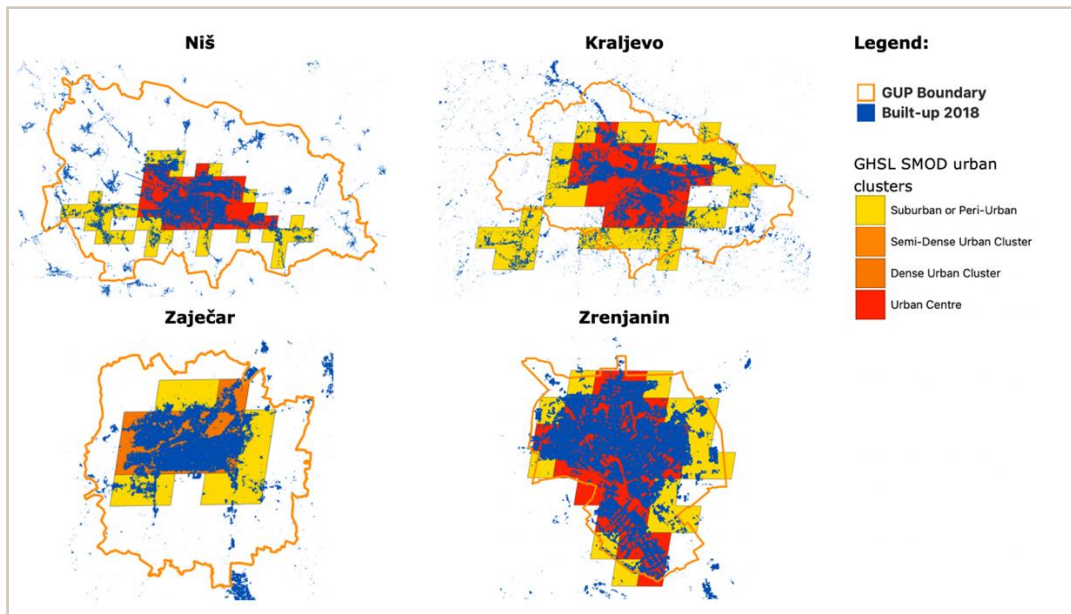
Comparisons of continuous urban built-up areas of cities as seen by the GHSL SMOD and boundaries of GUPs.

Source: COWI

3.3.3   General Urban Plans and the continuous built-up area

The boundaries of urban plans also show that in some cases GUPs do not cover the entire actual built-up urban areas of cities, although they zone much more land than the city's built-up area occupies. This is due to built-up areas transgressing administrative and settlement boundaries, which place parts of continuous built-up areas in different administrative and cadastral units and often under the jurisdictions of different local governments.

This tendency can be observed, for example, in Novi Sad, which has a GUP for the urban settlement as administratively defined which does not cover a large built-up area on the west side (Figure 3-12). In addition, some parts of the built-up area south of the city, across the Danube River, fall under the jurisdiction of different local governments (they belong to different LSGs), so are not treated in either the GUP or Spatial Plan of Novi Sad, although spatial analysis shows that they are part of the same continuous built-up urban area. Figure 3-13 shows a comparison of continuous urban built-up areas of the cities Novi Sad, Cacak, Leskovac and Bor as found by the GHSL SMOD and the boundaries of GUPs.

Figure 3-12: City of Novi Sad - the boundary of GUPs of Novi Sad and built-up area based on GHS 2018 and 1990.
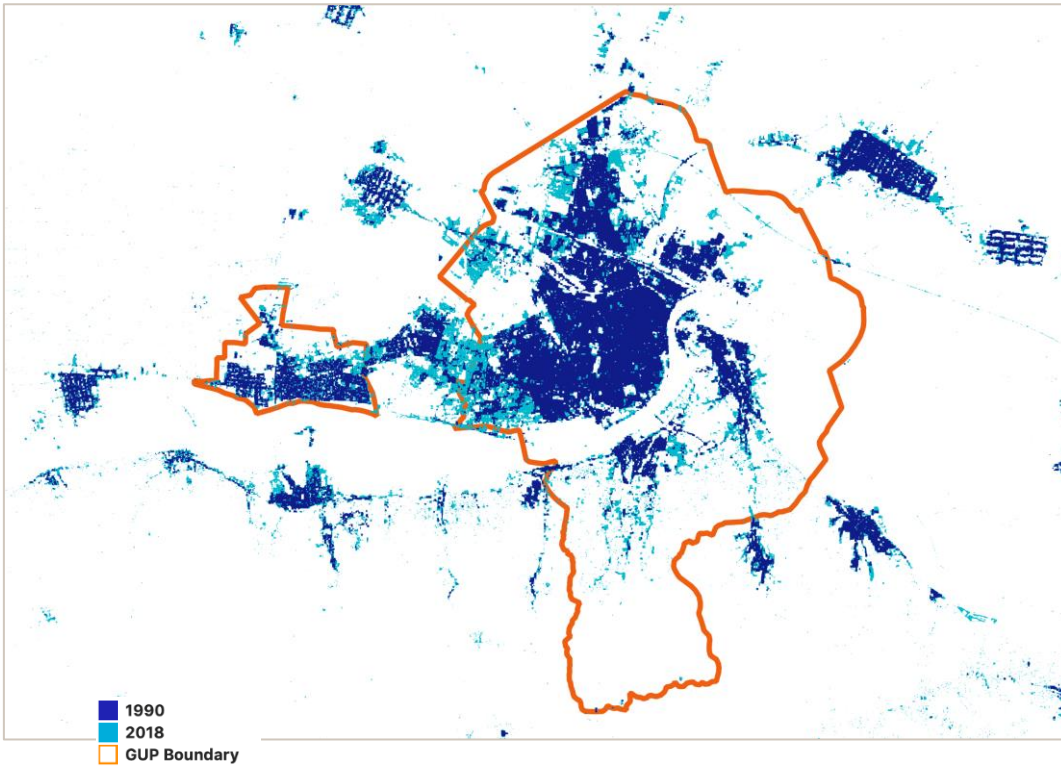
Source: COWI

Figure 3-13: Cities in which GUPs do not cover the whole built-up area
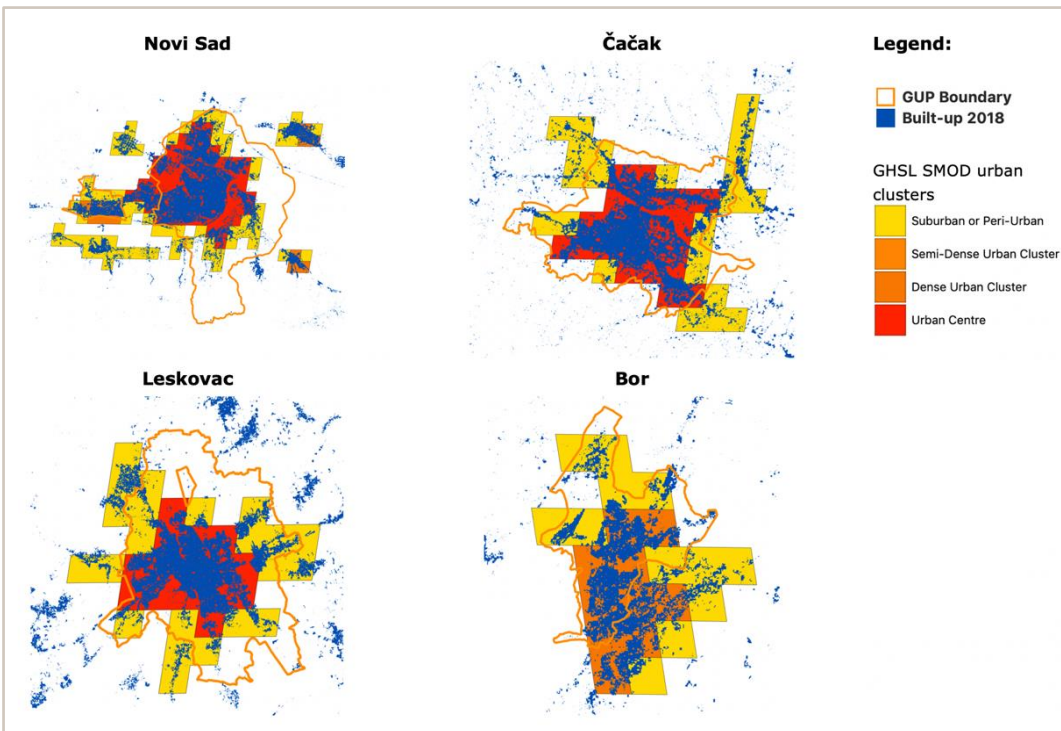
Comparisons of continuous urban built-up areas of cities as seen by the GHSL SMOD and boundaries of GUPs.

Source: COWI

3.3.4   Urban construction land

Serbian LSGs (cities and municipalities) derive income from four principal sources: centrally administered personal income tax; local property tax; fees and charges; and transfers from the central government. Of these, the single largest source is personal income tax (PIT), which accounts for around half of the municipal revenue on average, followed by property taxes and transfers from the central government.

While cities retain most income tax revenues raised, they do not have the autonomy to set rates, which are low by European standards with relatively high thresholds compared to income levels – resulting in low tax yields in poorer cities.[82]

LSGs have some autonomy in setting property tax rates, subject to ceilings set out in the property tax law. Tax is levied on land as well as residential and business buildings, apartments, office premises, garages, and recreational facilities. Liability falls on the occupant or user of the property, regardless of tenure. For businesses, the maximum rate on land is 0.4 percent, while for residents it is 0.3 percent of the market value. The rate on buildings is progressive, ranging from 0.4 percent of the first RSD 10 million of value to 2 percent on any value over RSD 30 million. Owner-occupied residential property is subject to a 50 percent reduction. In addition, all properties with a value of less than RSD 400,000 are entirely exempt.

The most significant revenue from fees and charges is from land development. The land development fee is intended to help finance municipal expenditures on preparing land for development, including the removal of buildings, rehabilitation of terrain and the provision of parks and other communal infrastructure. It is not intended to cover the costs of extending trunk infrastructure. Municipalities also impose fees and charges for the use of municipal properties (such as leases on municipally owned land) and for certain services that are funded directly from the municipal budget, such as childcare. Revenue generated from tariffs on water and sewerage, district heating and municipally owned bus and transport services is typically retained by the enterprises that provide them (apart from Belgrade's transport company) and is therefore not reflected in municipal budgets.

Transfers from the central government are a key source of revenue for Serbia's poorer cities, though their distribution is irregular. Serbia's transfer system is complex and has been revised frequently over the last few years. According to the current (2020) legislation, the government is required to allocate an amount equal to 1.7 percent of GDP to municipalities. First, transfers are distributed to reduce differences in per capita revenues among municipalities, bringing them up to 90 percent of the national average for all rural municipalities. However, cities are excluded from this transfer. After this, transfers are allocated to compensate municipalities for losses arising from changes to national tax legislation, followed by distribution following a two-stage formula based first on indicators of need (of which population is the dominant factor) and then adjusted according to each municipality's 'level of development' as defined by a regional development law. Belgrade receives no transfers.

This system of transfers has not been strictly observed for over a decade. The total revenue transferred in 2019 was equal to 0.86 percent of GDP, of which a quarter was allocated to address financial difficulties in municipalities rather than allocated based on the legal formulas. For poorer cities, however,

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[82] It should be noted that income is subject to other taxes including a flat withholding tax on all income as well as taxes for healthcare etc. like 'national insurance.'

these transfers are a vital source of revenue accounting for a similar proportion of revenue to personal income taxes in cities such as Novi Pazar and Leskovac.[83]

Secondary cities do not raise enough revenue to cover their recurrent expenditures, as evidenced by the number of recent bailouts via central government transfers, while capital investment has been financed in part by selling assets, which is not sustainable in the long term. Despite having, in principle, a relatively decentralized system of revenue allocation, the reality is that Serbian cities raise very little in revenues, primarily due to the low tax rates and high thresholds that are centrally determined – this is especially true in lower-income cities. Per capita, recurrent revenues range from a little over RSD 60,000 (EUR 510) in Novi Sad to around RSD 26,000 (EUR 220) in Novi Pazar[84] compared with an EU average of EUR 3,211.[85]

3.3.5   Brownfield sites

Cities in Serbia have experienced a proliferation of brownfield sites, particularly related to the deindustrialization that occurred from the 1990s onwards. The SUDS estimates the total area of brownfield sites as 1,500 ha. However, this would seem to be an underestimate. Less than half (44 percent) of land in Serbia's industrial zones is currently being utilized, which leaves 17,615 ha unutilized. Much of this land is located close to city centers and lacks the facilities to be attractive to modern investors – just 85 of Serbia's 342 industrial zones (41 percent of total industrial land) have a connection to all road/rail, electricity, gas, water, sewage, telecommunications, and waste. Consequently, new investment has tended to focus on greenfield sites, including the Government of Serbia's Free Zones program which began in 2008 and has led to the creation of 15 Free Zones across the country.

Investment in greenfield sites rather than the regeneration of existing brownfield land also contributes to the spatial expansion and de-densification of Serbia's cities. Brownfield sites are usually more difficult and costly to develop than greenfield sites, which creates an incentive for investors to develop new land on the periphery of cities. Often local governments need to work in partnership with the private sector to identify and re-develop suitable brownfield sites, often providing fiscal or other incentives for doing so. However, investment in Serbia is already greatly subsidized and there would seem to be little incentive or impetus to tackle the problem of underutilized brownfield land at present.

The problem is recognized in the SUDS, which calls for "*providing incentives to development and management of brownfield sites*" in the action plan. However, beyond incentives, mechanisms for governance and partnerships between the public and private sectors will be required to revitalize Serbia's brownfield sites. Priority should be given to those in cities with high demand for new industrial land. Potentially the existing system of generous subsidies for investors in the manufacturing sector could be tweaked to encourage brownfield rather than greenfield development.

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[83] World Bank, 2021c. *Municipal Finance Note June 2021 (unpublished).*

[84] Ibid.

[85] EU average from https://www.oecd.org/regional/EU-Local-government-key-data.pdf

3.4   Conclusion

Serbian cities are increasing construction densities in inner city areas while population growth occurs in suburban areas, mostly in informal settlements, which results in the spread of the built-up areas of cities.

The spatial expansion of cities is occurring in an inefficient fashion and is not supported by population growth. Population densities are decreasing in all except two cities (Novi Pazar and Novi Sad). The expansion of built-up areas of cities in Serbia is much less efficient than in any comparator country.

Within cities, the population in suburban areas is growing, while inner city areas are shrinking or stagnating, which indicates ongoing suburbanization. Since suburban areas are the principal locations of informal settlements, cities are spreading mostly in a spontaneous manner, with limited guidance by urban plans and policies. Increasing housing and utility costs in inner cities are motivating many families to move to mostly informal suburban.

Urban land policies in Serbian cities are also inefficient. In their General Urban Plans, the largest cities in Serbia on average zone 670m2 of construction land per inhabitant, which is more than any city in Europe. Analysis shows that, on average, cities in Serbia zone close to 3.2 times more land for construction than their built-up areas occupy - Belgrade zones 2.7 times more land for construction than its built-up area occupies, Novi Sad 1.5 times, Niš 9.2 times more, Kragujevac 2.7 times, and Novi Pazar 3.3 times, for some examples. In contrast, the actual built-up areas of cities are more compact, and do not differ significantly from comparable cities in Europe. The boundaries of General Urban Plans are aligned with often outdated administrative boundaries of urban settlements, and therefore do not match actual built-up areas.

Cities do not capitalize enough on urban construction land. Despite having, in principle, a relatively decentralized system of revenue allocation, the reality is that Serbian cities raise very little in revenues, primarily due to the low tax rates and high thresholds that are centrally determined.
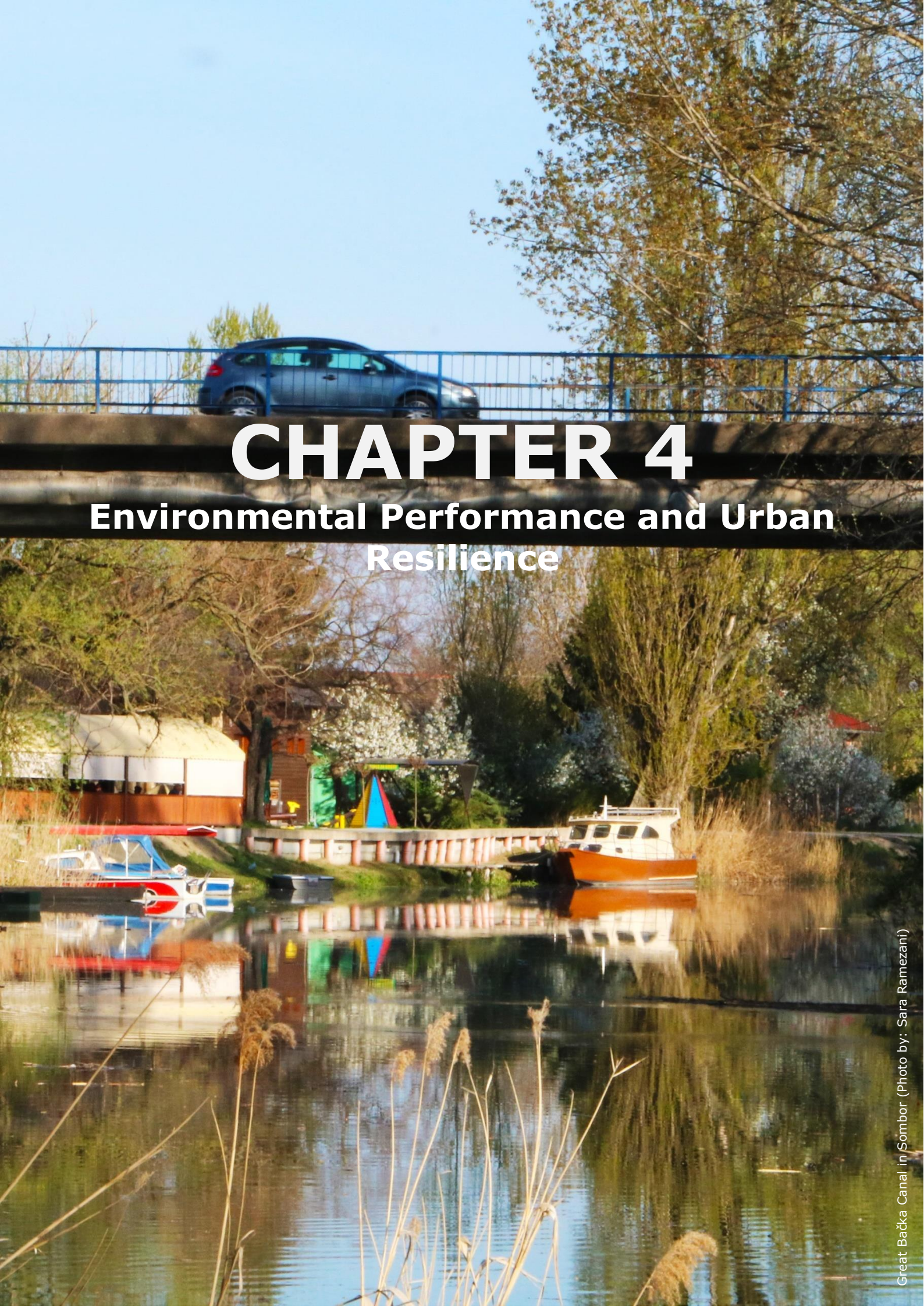
CHAPTER 4
Environmental Performance and Urban Resilience

4   Environmental Performance and Urban Resilience

This chapter evaluates the environmental performance of urban centers in Serbia, building upon the urbanization, spatial-economic and land use trends previously identified. The following analysis of environmental performance focuses on land use and green areas, disaster risks (flooding, seismic risk, and heat waves), air quality, and environmental services (water supply, sanitation, and solid waste management) as these are some of the main challenges regarding environmental, climate change, and disaster risk performance and management.

Examination of these key environmental issues permits deeper insights into the challenges facing Serbia's cities and towns and offers insights and potential opportunities that can inform decision-making and guide actions to build greener, more livable, and resilient cities.

4.1   Increasing urban footprints and decreasing densities

As discussed in previous chapters, Serbian cities and towns have undergone significant changes in land uses and urban footprints in the past decades. The GHSL provides data sets based on remote sensing for only 13 Serbian cities, to which the analysis below adds 19 regional comparator cities. Use of this data gives a deeper insight into how the cities are developing in terms of their land uses, urban footprints, densities, and green areas.[86]

Table 4-1 presents an overview of the land use and population trends of the 13 analyzed cities (urban centers) as well as the comparator cities over the 15-year period from 2000 to 2015. [87] The following is a summary of the key findings:

- Most of Serbia's cities have declining population but expanding their built-up areas, which results in decreasing densities. The process of densification is evident in only one city, Novi Pazar, while Novi Sad maintains a stable density, and all other cities in Serbia are experiencing a decline in their density. In three cities (Belgrade, Novi Sad and Kraljevo) the pace of built-up area expansion is rapidly accelerating, in five cities (Kragujevac, Subotica, Čačak, Pančevo, and Leskovac) the built-up area is expanding moderately (+4 to +7 percent). Only four cities – Leskovac, Kruševac, Zrenjanin, and Valjevo - have experienced a stable built-up area (below 4 percent growth from 2000 to 2015), but also a large population decrease (-11 to -20 percent). A positive correlation exists between the density of cities and the observed change in density over the last 15 years, whereby the least dense cities have experienced the most substantial loss of density. Conversely, such a correlation cannot be observed in the case of comparator cities (Figure 4-1).

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[86] The data on green areas in the GHSL dataset is produced by analyzing Landsat's annual Top-of-Atmosphere (TOA) reflecting the period 1990-2015. These composites are created by considering the highest value of the Normalized Difference Vegetation Index (NDVI) as the composite value (i.e., the greenest pixel). Therefore, the indicator is not an indicator of green areas in terms of public parks and open space alone, but is rather an indicator of vegetation, including in private buildings and brownfields.

[87] Analysis of city population and built-up area growth/decline in this chapter is based wholly on the GHSL database on urban centers. The GHSL database measures population only in urban centers, excluding suburban areas, hence showing slightly different population trends, built-up areas, and densities than those presented in Chapters 1 and 3 of the report. Its use enables, however, comparison with other countries.

- Comparator cities do not observe the same population and density decline trend. Among comparator cities, there is a relatively equitable distribution of cities with growing, stable, and declining populations. Urban expansion is more associated with population growth, as five of the 19 cities are densifying, and another six cities have a stable density.

- Serbian cities show a higher green area indicator than comparator cities. More than 30 percent of the population in the analyzed Serbian cities resides in areas with high levels of greenery, whereas in comparator cities, only about 20 percent of the population lives in such areas (Table 4-1). The cities with the highest green area indicator in Serbia are Kraljevo and Valjevo, while the cities with the lowest indicator are Niš and Leskovac.

- There is a negative correlation between a city's density and its green area indicator, with denser cities exhibiting a lower green area indicator (Figure 4-2). Given the correlation between density and density change, as explained earlier, the green area index groups by city categories based on density change reflect a similar trend, with sprawling cities exhibiting the highest green area indicator and densifying cities displaying the lowest indicator, as illustrated in Figure 4-2. In Serbia, Niš, Subotica, Novi Pazar, and Leskovac have a relatively lower proportion of green areas in relation to their density, whereas Kraljevo and Valjevo have a relatively higher share of green areas for their density. Among comparator cities, Zagreb, Bratislava, Kosice, and Szeged are considerably greener than other cities, including those with similar densities.

Table 4-1: Population and land use trends for Serbian and comparator cities

Country	City	Population 2015	Population growth 2000 - 2015 (%)	Built area 2015 (km2)	Built area growth 2000 - 2015 (%)	Density 2015 (pop/km2)	Density change 2000 - 2015 (%)	Population living in high green areas (%)
Serbia	Belgrade	1106870	-1%	120	11%	9258	-11%	34%
	Novi Sad	263087	12%	41	13%	6447	0%	37%
	Nis	188293	-2%	17	4%	10880	-6%	16%
	Kragujevac	126766	-7%	20	7%	6451	-13%	38%
	Novi Pazar	82734	19%	7	5%	11183	14%	21%
	Subotica	67829	-19%	17	6%	4089	-24%	24%
	Cacak	64808	-11%	13	5%	5177	-15%	40%
	Krusevac	60011	-11%	8	3%	7397	-13%	28%
	Kraljevo	59930	-4%	8	9%	7120	-12%	50%
	Zrenjanin	58789	-19%	16	3%	3687	-22%	42%
	Pancevo	53859	-16%	11	6%	4722	-21%	29%
	Valjevo	53092	-18%	10	3%	5587	-20%	49%
	Leskovac	52770	-20%	7	3%	7530	-23%	18%
Albania	Tirana	719252	67%	56	10%	12756	52%	18%
	Shkoder	83367	-4%	10	5%	8286	-9%	25%
Azerbaijan	Baku	1961523	27%	200	4%	9799	22%	0%
	Lankaran	113449	12%	2	9%	56627	3%	16%
Bulgaria	Sofia	926881	14%	92	8%	10032	5%	20%
	Plovdiv	309004	-8%	26	4%	11729	-12%	12%
	Burgas	111381	-5%	20	3%	5554	-8%	14%
	Stara Zagora	62441	-19%	13	4%	4639	-22%	24%
Croatia	Zagreb	660653	2%	103	4%	6422	-2%	46%
	Split	218497	0%	35	1%	6203	-1%	15%
	Osijek	61045	-12%	14	3%	4232	-15%	21%
Georgia	Tbilisi	1077840	3%	62	2%	17509	1%	9%
	Batumi	175251	15%	9	2%	20163	13%	18%
	Kutaisi	163971	-26%	14	1%	11435	-27%	20%
Hungary	Budapest	1758468	15%	288	4%	6115	10%	27%
	Debrecen	166658	37%	29	8%	5664	27%	20%
	Szeged	112516	-10%	25	4%	4543	-14%	40%
Slovakia	Bratislava	352002	-8%	73	3%	4853	-11%	45%
	Kosice	220297	1%	32	2%	6895	-1%	43%

Changes from 2000 to 2015 are expressed as the total change in percent over the 15 years period. Green to red coloring indicates high to low numbers but does not reflect positive (good) or negative categories.

Source: GHSL dataset - https://ghsl.jrc.ec.europa.eu/CFS.php

Figure 4-1: Correlation between density change from 2000 to 2015 and current density

Source: GHSL dataset - https://ghsl.jrc.ec.europa.eu/CFS.php
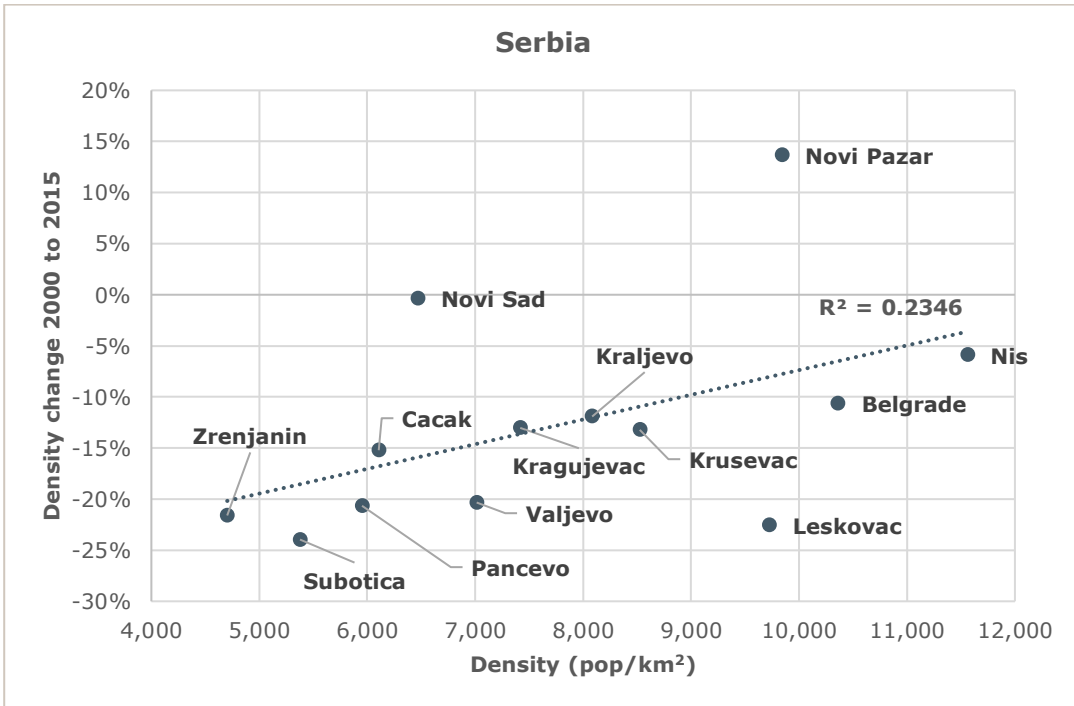
Figure 4-2: Relationship between population living in high green areas and city density

Source: GHSL dataset - https://ghsl.jrc.ec.europa.eu/CFS.php
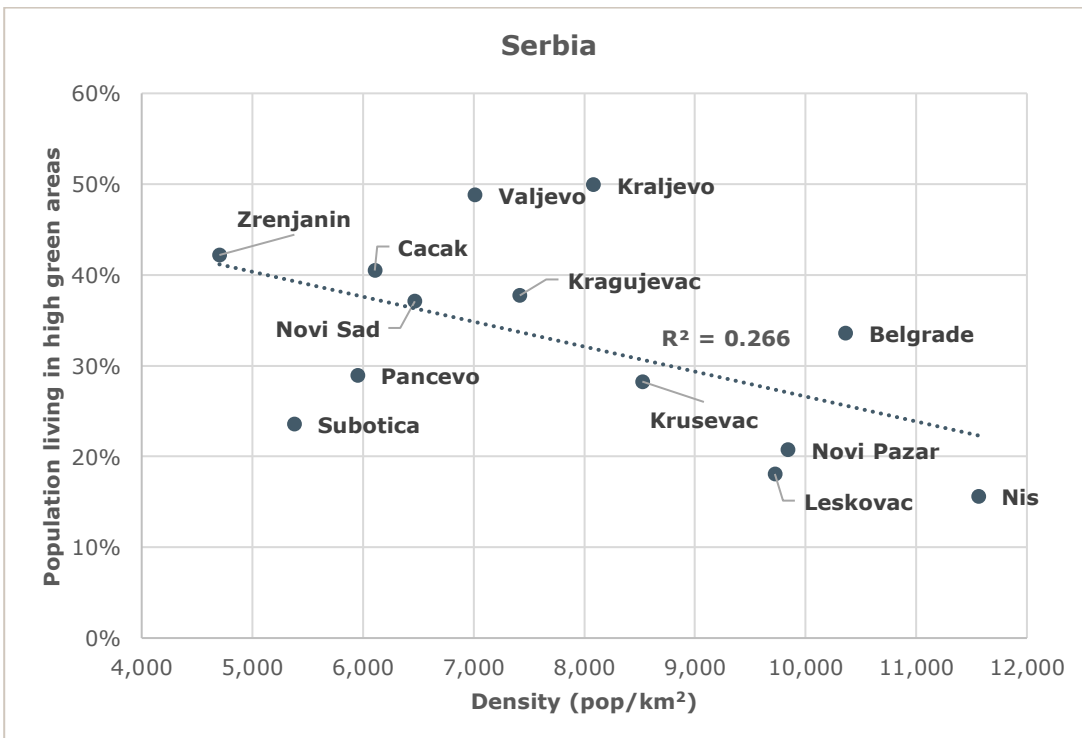
4.2   Disaster risks

Urban development can lead to a substantial increase in the risk of disasters if not planned appropriately. Extreme events such as floods, heat waves, and earthquakes have caused significant damage to Serbian cities in recent years, with devastating economic, social, and environmental costs. In this section a deeper exploration of the risks associated with urban development and their impact is undertaken, with emphasis on flooding, heat waves, and earthquakes.

4.2.1   Flood risks

Flood risks in Serbian cities have become a major concern in recent years, as they have caused significant damage to infrastructure, buildings, and human lives. The country has experienced several devastating floods in the past decade, including the 2014 floods that affected over 1.5 million people and caused extensive damage to infrastructure, agriculture, and housing.[88]

The Statistical Office of Serbia reported in 2021 that flooding from both surface and groundwater affected a total of 18,000 hectares of land (Table 4-2). [89] The same data source shows that settlements, transport infrastructure and industrial facilities are seriously endangered by flooding. The number of settlements flooded annually from 2017 to 2021 varied between 278 in 2017 to 330 in 2021, out of 6,158 settlements in total. A study on floods and road networks in Europe also showed that Serbia has the least robust road network and the highest percentage of potentially inundated networks at 48 percent.[90]

Table 4-2: Flooded areas and facilities

	2017	2018	2019	2020	2021
Areas and facilities flooded by surface and groundwater					
Flooded area, thous. ha	43	37	88	48	18
Utilized agricultural area, thous. ha	28	26	49	30	10
Number of settlements	278	393	286	443	330
Number of industrial facilities	38	79	171	266	110
Railway lines, km	33	32	78	30	1
Roads, km	660	1047	1518	1634	650

Source: Reproduced from Eco-bulletin 2021, Statistical Office of the Republic of Serbia, available at: https://publikacije.stat.gov.rs/G2022/pdf/G20225688.pdf

Fluvial floods

In this sub-section, the current flood risk for urban settlements from rivers and the level of expansion into flood-prone areas is evaluated.

To calculate the share of built-up areas at risk of flooding, the analysis considers the area that is both built-up and under flood risk (across all categories) within the city boundaries. This figure is then divided by the total built-up area within those same boundaries, as shown in Figure 4-3. The built-up areas for four different periods (1990, 2000, 2014, and 2018) are sourced from GHS Built-S2, and the boundaries

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[88] https://www.worldbank.org/en/news/feature/2014/10/06/after-the-rain-helping-serbia-rebound-from-disaster

[89] Statistical Office of the Republic of Serbia, 2022. *Eco-Bulletin 2021.* (pp. 38-39).

[90] Van Ginkel et al., 2022. *Will river floods 'tip' European road networks? A robustness assessment*. available at: https://doi.org/10.1016/j.trd.2022.103332

used are those of the urban settlements used in the previous analysis to determine continuous built-up areas of cities. The flood risk area is sourced from national flood hazard mapping.[91]

The flood risk area corresponds to a river flood with a 100-year return period, for (a) "real" flood: this assumes flood defense infrastructures perform as expected (e.g., no dike breaches), (b) "potential" flood: the additional flooded area if there is a breach in the flood defense infrastructure (e.g., a dike breach occurring).

The same flood risk is considered for all historical time periods: the analysis does therefore not account for the development of flood defense infrastructure over time. Therefore, a stable share of the built-up area under flood risk does not mean that flood risk management measures have not been taken, but that the same share of the built-up area is under the current flood risk.

Figure 4-3: Flood hazard and built-up area in Serbia, illustration of data and method for Belgrade
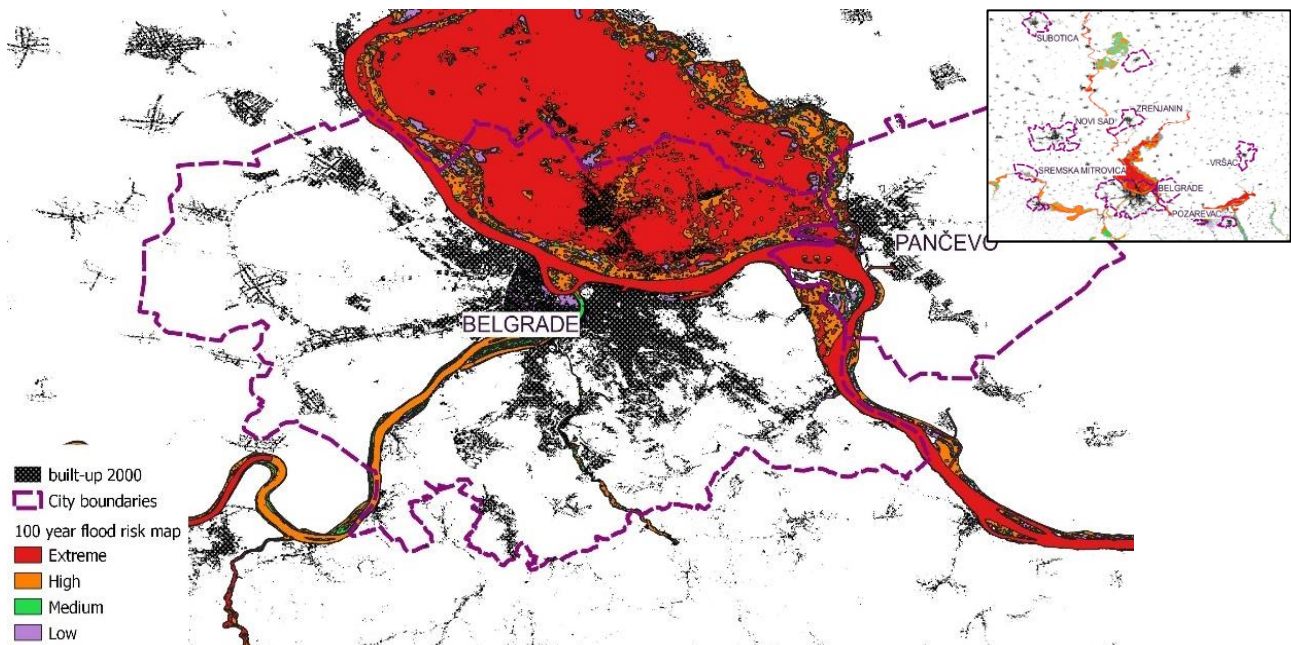
Source: Flood risk - Flood Hazard and Risk Management portal; built-up area - GHS Built-S2

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[91] World Bank, 2019. *Component 2 of Serbia National Disaster Risk Management Plan (NDRMP) - Flood Hazard and Risk Mapping.* Available at: http://gis.vodevojvodine.com/visios/fhrm

The main insights from the analysis are presented below:

- Serbian cities are exposed to critical flood risks. As shown in Table 4-3, nine of the 13 cities have over 20 percent of their built-up areas at potential risk of flooding. Belgrade and Smederevo have more than a third of their built-up areas under actual risk of flooding.

- Built-up areas also increased in flood risk zones. In most cities, the expansion of built-up areas has occurred slightly more in flood-prone zones than in areas not under flood risk, since the share of built-up areas under flood risk was stable to slightly increasing from 1990 to 2018 (see Figure 4-4 and Box 5). In Smederevo, the share increased from 38 percent in 1990 to 46 percent in 2015 and Pančevo from 33 to 41 percent. The stable rather than reducing share of buildings in flood-risk areas indicates that the planning of urban development is possibly not adequately considering flood risk.

- Flood risks will likely increase with climate change. Flood risk is likely to be aggravated by climate change, which might convert "potential" flood risk areas (in case of e.g., dike breaches) into real flood risk areas. The one-day rainfall event with a current return period of 100 years, could have a return period of 50 years in the future for most Serbian cities (see Table 4-3).

Table 4-3: Share of built-up areas at risk of fluvial flooding in Serbian cities for different periods

category	City	1990			2000			2014			2018			Future return period of current 100 year event
		real	potential	total	real	potential	total	real	potential	total	real	potential	total	
Primary	Belgrade	39%	19%	59%	38%	21%	59%	40%	24%	64%	40%	25%	64%	52
Small	Sremska Mitrovica	3%	54%	58%	3%	58%	60%	3%	57%	60%	3%	57%	60%	49
Medium	Leskovac	1%	47%	48%	1%	46%	47%	1%	45%	46%	1%	42%	43%	54
Medium	Smederevo	38%	0%	38%	40%	0%	40%	44%	0%	44%	46%	0%	46%	48
Medium	Zrenjanin	1%	37%	37%	1%	38%	39%	1%	39%	40%	1%	41%	42%	52
Medium	Pancevo	5%	28%	33%	5%	30%	35%	6%	33%	38%	6%	35%	41%	54
Secondary	Nis	1%	23%	24%	1%	22%	24%	1%	22%	24%	1%	21%	23%	48
Medium	Valjevo	11%	6%	17%	13%	6%	19%	13%	6%	18%	12%	5%	18%	65
Small	Pirot	3%	14%	17%	4%	14%	18%	5%	14%	19%	6%	14%	20%	55
Small	Prokuplje	5%	8%	12%	5%	8%	13%	6%	8%	14%	6%	7%	14%	48
Medium	Sabac	2%		2%	2%		2%	3%		3%	3%		3%	49
Medium	Cacak	0%	1%	1%	0%	1%	2%	0%	2%	2%	0%	2%	2%	55
Secondary	Kragujevac	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	1%	1%	51
Small	Pozarevac	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	54
Medium	Kraljevo	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	49
Medium	Krusevac	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	49
Medium	Novi Pazar	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	51
Medium	Vranje	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	51
Secondary	Subotica	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	48
Small	Zajecar	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	51
Small	Uzice	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	54
Small	Sombor	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	54
Secondary	Novi Sad*													49

*The share is calculated for the current flood risk for the built-up area in 1990, 2000, 2014, and 2018. The category "real" corresponds to the flood risk if the flood defense infrastructure performs as expected, "potential" is the additional area under flood risk if there are breaches in the flood defense infrastructure, and the total is the sum of both. The future return period of one-day precipitation event with a current return period of 100 years, is calculated for the period 2035-2064, for the SSP2-4.5 scenario, as the ensemble mean of Global Climate Models from CMIP6. *Novi Sad is excluded from the analysis since the dataset did not cover flood risk on the Danube upstream of Belgrade. Vršac, Jagodina, Loznica, Kikinda were also excluded, as no floods occurred.*

Source: https://climateknowledgeportal.worldbank.org/, is a proxy indicator for potential climate change impacts on flooding

Figure 4-4: Evolution of the ratio of built-up areas at risk of flooding from 1990 to 2018

Built-up areas at the risk of flooding 1990-2018
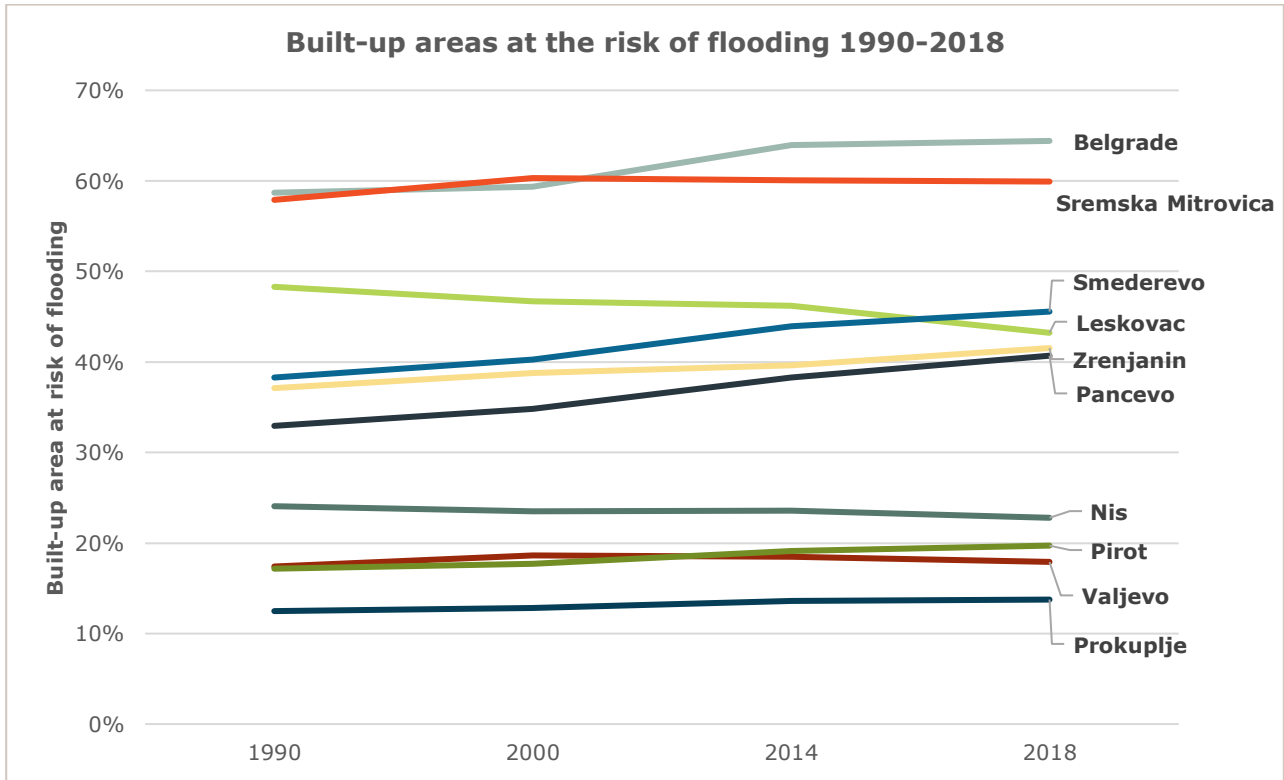
Built-up areas at risk of flooding are calculated for "potential" (including dike breaches) and "real" areas at risk of flooding for a flood event with a return period of 100 Years.

Source: Flood risk – Flood Hazard and Risk Management portal; built-up area – GHS Builet-S2

Box 6: Flood risk at the LSG level

Kragujevac[92]

Kragujevac is exposed to numerous natural hazards and therefore developed a Disaster Risk Assessment (DRA) for the City of Kragujevac.[93] The DRA assessed the disaster risk in the city, and identified a low risk of flooding, hail, and strong winds, a medium risk of landslides and industrial accidents, and a high risk of earthquakes as the most probable scenarios and recommended preventive measures.

Floods were recorded in 1999, 2013, and 2014, with the last one damaging 557 households, 40 public buildings, seven bridges and 175 km of roads, causing total damage of RSD 150 million (about EUR 1.3 million).

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[92] World Bank and SECO, 2022. *City Scan of Kragujevac.* Working draft *Green, Livable, and Resilient Cities in Serbia - Component 1*.

[93] Assessment of Vulnerability to Natural Hazards and Other Accidents for the City of Kragujevac, 2018. https://www.kragujevac.rs/e-usluge/stab-za-vanredne-situacije/

Kragujevac has not yet developed or adopted the Disaster Risk Reduction (DRR) Plan, although it is required by the *The Law on Disaster Risk Reduction and Emergency Management*.[94] The DRA has thus been used primarily for drafting the Protection and Rescue Plan adopted in 2019, and to a certain extent in developing the annual operational flood management plans.[95] The DRA has not been consulted for strategic planning or for drafting a vision of city development, and the city's general resilience status is not known.

Leskovac[96]

The DRA of 2021 reported the existence of flood barriers, fortifications along riverbeds and embankments, but evaluated them as insufficient. The risk of flooding is consequently considered to be high. The DRA and the Operational Flood Defense Plan[97] prescribed a set of flood risk reduction measures including the maintenance of all the existing and construction of new flood protection infrastructure, prevention of construction in flood zone areas, and prohibition of waste disposal in and along riverbeds. To increase the city's flood resilience additional investments are needed in flood protection infrastructure and in the extension of the rain drainage network and maintenance.

Like Kragujevac, Leskovac has not yet developed the Disaster Risk Reduction Plan as required by law. The DRA has thus primarily been used for developing the Protection and Rescue Plan (also adopted in 2021), and to a certain extent in developing the annual operational flood management plans. Measures for flood risk mitigation and further flood protection from watercourses on the city territory are not included in any urban planning document, except for the GUP. The GUP developed in 2013 and updated in 2018 (before the DRA) did not consider the Law on Emergency Situations of 2009[98] but has authorized regulation of all watercourses on the city's territory, the regular maintaining of all existing flood protection infrastructure and the prevention of construction in flood-prone areas.

Pluvial floods

Pluvial floods are generated from extreme rainfall events, independent of an overflowing water body. Unlike fluvial floods, there is no data available for pluvial floods at the national scale for Serbia in the flood hazard and risk mapping portal. This is because pluvial floods are associated with the urban drainage system, which is usually represented in different formats and models in each city. Therefore, it is not possible to conclude a systematic analysis of pluvial floods.

The City Scans from the World Bank's City Resilience Program (CRP)[99] evaluated rainwater flood risks for Niš (Figure 4-5) and Novi Sad based on the global Fathom-GlobalV2 Flood Hazard dataset.[100] This model is limited, however, as the sole source of flood hazard information for urban pluvial flooding analysis, because it only considers the topography of the terrain and does not account for the urban drainage

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[94] *The Law on Disaster Risk Reduction and Emergency Management* (Official Gazette of the RS, No. 87/2018).

[95] City of Kragujevac, 2021. *Operational flood defence plan for the City of Kragujevac area for watercourse category II for 2022.*

[96] World Bank and SECO, 2022. *City Scan of Leskovac.* Working draft *Green, Livable, and Resilient Cities in Serbia - Component 1.*

[97] Operational flood defence plans for the city of Leskovac area for watercourse category II for 2022

[98] Law on Emergency Situations (Official Gazette of the RS, No. 111/2009)

[99] World Bank City Resilience Program (CRP), 2022. *City Scan of Niš, Serbia.*

[100] The Fathom-GlobalV2 Flood Hazard dataset is a gridded product at 3 arc-second resolution that shows the maximum expected water depth in meters at 10 different return periods (between 1-in-5 and 1-in-1000 years).

system. Therefore, the outcomes are the potential pluvial flood risk in the absence of urban drainage and do not permit a conclusion of the actual risks for cities.

Figure 4-5: Assets potentially exposed to pluvial flood risk in Niš
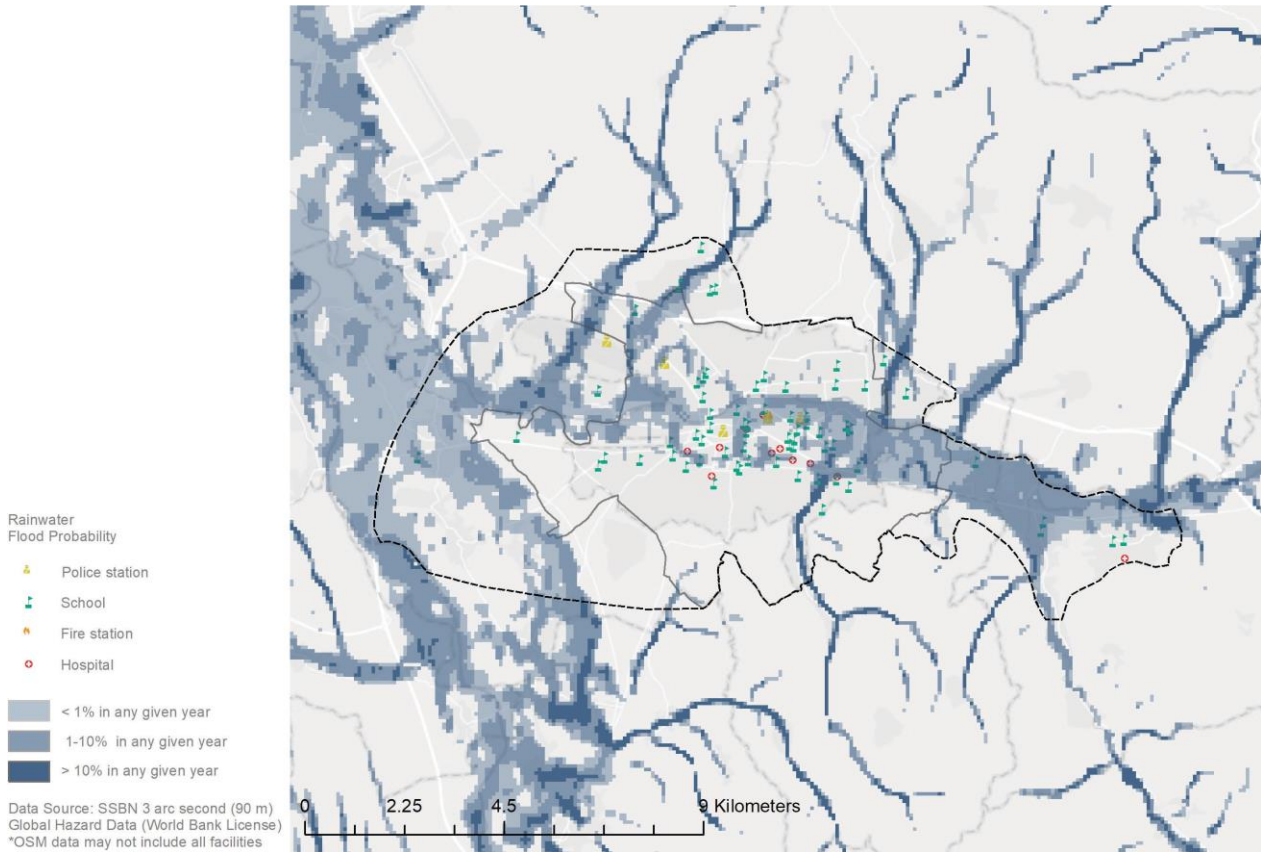
In Niš, 60 percent of police stations, 37 percent of schools, 64 percent of hospitals and 24 percent of major roads are located in a river flood risk zone with a minimum depth of 15cm.

Source: CRP 2022, City Scan of Niš.

However, looking at precipitation patterns and climate projections, the following can be observed:

- Heavy precipitation events have increased in recent time. A significant increase in very heavy precipitation events (>20 mm in one day) is clearly visible in the period 2001-2020 compared to 1961-1990. The largest increase is in areas that currently do not experience many heavy rains, such as in the north and central-south parts of the country.[101]

- Future extreme precipitation events will be more likely. The one-day rainfall event with a current return period of 100 years, could have a return period of 50 years in the future for most Serbian cities which will force urban centers to adapt their current drainage systems to future conditions (see Table 4-3).[102]

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[101] AFD 2022. *Urban Sector Vulnerability Impact Assessment (Draft report 3).*

[102] According to mean of ensemble global climate models projections (for scenario SSP2-4.5 for the horizon 2035-2064), source: https://climateknowledgeportal.worldbank.org/

4.2.2   Heat waves

In Serbia, the rising temperatures during summer months have resulted in an increased occurrence of heat waves, which can have severe consequences for urban populations. The Urban Heat Island (UHI) effect is a phenomenon in which urban areas tend to have higher temperatures than surrounding rural areas on account of the surface "fabric" of buildings and roads absorbing more solar energy and heating the air.

The UHI effect can cause higher temperatures and increased air pollution, which can exacerbate existing health conditions and lead to heat-related illnesses such as dehydration, heat exhaustion, and heat stroke. Older adults are particularly susceptible to these health risks, as they may have pre-existing medical conditions and reduced heat tolerance. Therefore, prolonged exposure to high temperatures can lead to a higher mortality rate, particularly among older adults. Understanding the factors that contribute to the UHI effect and how it exacerbates heat waves is crucial for developing effective heat mitigation strategies in Serbia's urban areas.

A heat wave index was obtained for the different urban centers from the GHSL dataset. The Heat Wave Magnitude Index is defined as the maximum magnitude of the heatwaves occurring in a year, whereas a heatwave is defined as the periods of at least three consecutive days with maximum temperature above the calendar 90th percentile centered on a 31-day window reference period. The Heatwave Magnitude Index was applied to classify observed heatwaves that occurred globally in the period 1980 to 2010.[103]

The heat wave index is computed at the resolution of a 0.5-degree grid and therefore does not consider the urban island heating effect.[104] However, the temperature anomaly for the cities of Belgrade and Novi Sad at the city scale is shown in Figure 4-6, which shows the impact of the urban island heat effect.

The following is a brief examination of the key findings of the heat wave risks in Serbia:

- Several cities are particularly exposed to heat waves. The cities Novi Sad, Subotica, Valjevo, and Čačak show the highest exposure to heat waves from 1980 to 2010 (Appendix B.2 Table 6-2).

- The urban heat island effect increases the impact of heat waves. When analyzing temperature anomalies in Novi Sad and Belgrade, it becomes apparent that there are significant temperature variations at the city level. Specifically, there are differences of several degrees between the temperatures in the urban center and those in suburban areas. For instance, in Belgrade, the temperature difference between the urban center and the suburban areas is around four degrees Celsius during night-time and two degrees Celsius during the daytime in summer (Figure 4-6). This highlights the impact of the Urban Heat Island effect and emphasizes the need for targeted heat mitigation strategies in urban areas to reduce temperature disparities between the city center and surrounding areas.

- Heat waves are already more frequent and intense than in the past. Serbia and the western Balkans are expected to experience a significant increase in maximum temperatures due to climate change, which will likely worsen the already challenging situation. The number of days with temperatures

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[103] Zampieri et al., 2016. *Global assessment of heat wave magnitudes from 1901 to 2010 and implications for the river discharge of the Alps.* https://doi.org/10.1016/j.scitotenv.2016.07.008

[104] AFD 2022. *Urban Sector Vulnerability Impact Assessment (Draft report 3).*

exceeding 35°C has already increased by four to seven days per year and the number of tropical nights (where the minimum daily temperature is above 20°C) by five to seven days in low altitudes between 2000 to 2020, compared to the period between 1961 and 1990.[105]

- Climate change will further worsen the observed trends. Looking ahead to the year 2050 (2041-2060), it is likely that the number of days with a maximum temperature above 35°C will increase significantly in low altitudes in Serbia, according to climate projections. Under the RCP 4.5 scenario, there is expected to be a 10-day increase, while under the RCP 8.5 scenario, the number of days could rise to 25, compared to the reference period of 1961-1990. This represents a significant increase compared to the period between 2001-2020. On the other hand, it is projected that the number of tropical nights will remain stable in the 2050 horizon, with only a small increase of five to seven days in low altitudes.

These findings underscore the urgent need for effective measures to mitigate the impact of rising temperatures on public health and well-being, particularly in those urban areas where the Urban Heat Island effect exacerbates the effects of heat waves.

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[105] AFD 2022. *Urban Sector Vulnerability Impact Assessment (Draft report 3).*

Figure 4-6: Average air surface temperature anomaly (compared to the average of the area)
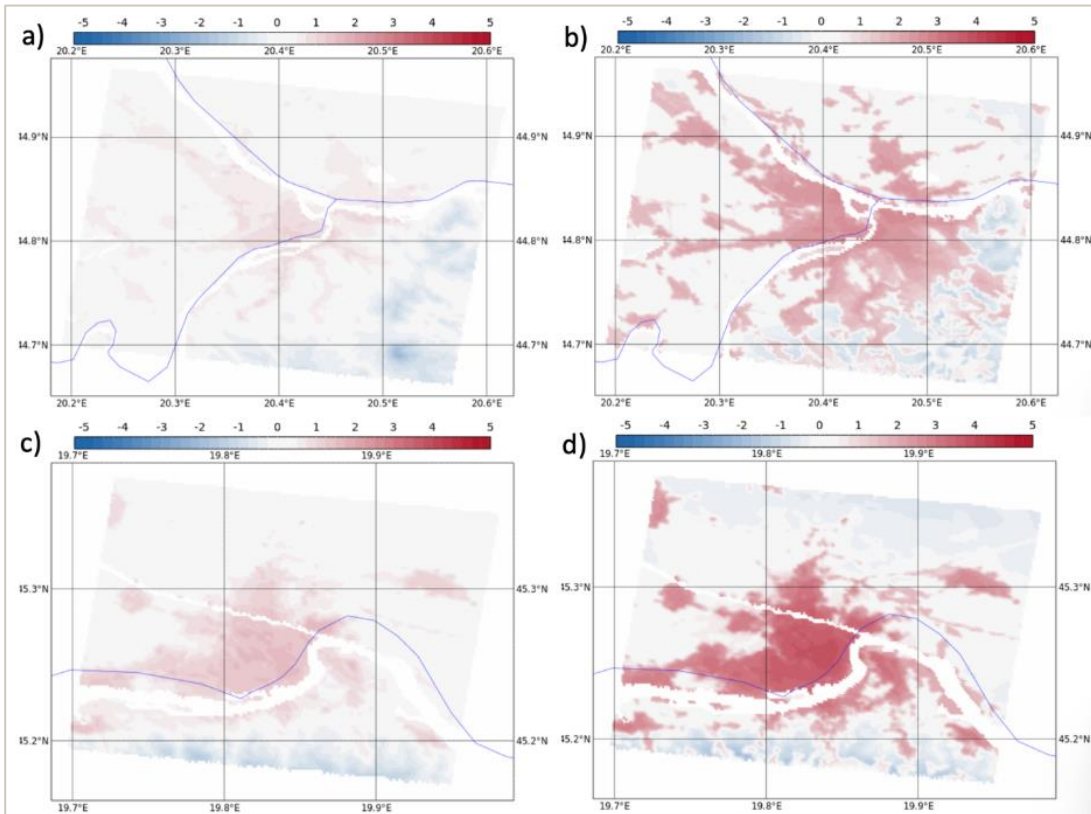
Summer daytime (a) and for nighttime (b) for Belgrade for the period 2008-2017 and in (c) and (d) Summer daytime and nighttime average temperature anomaly (compared to the average of the area) for Novi Sad for the period 2008-2017.

Source of data: Copernicus Climate Change Service (C3S), C3S Toolbox for visualization of data.

Source of figure: reproduced from AFD 2022. Urban Sector Vulnerability Impact Assessment (Draft Report 3)*.*

4.2.3 Seismic risk

Serbia is prone to seismic activity due to its location in a region that is situated at the intersection of several tectonic plates. Over the years, numerous earthquakes have caused significant damage to the country's infrastructure and resulted in the loss of life. Informally constructed buildings and those built before the 1960s, which are not adequately maintained, significantly aggravate the impact of seismic activity, putting individuals at higher risk of injury or death, as well as causing extensive damage to surrounding infrastructure.

Seismic building codes were established in 1964 in the former Yugoslavia and were subsequently updated throughout the 1970s and 1980s. The introduction of these regulations was a response to catastrophic earthquakes that occurred in Macedonia (in Skopje) in 1963, and in Montenegro (Podgorica and coastal cities) in 1979. Buildings constructed before the seismic building codes were put in place are at greater risk of being damaged during earthquakes. Moreover, as discussed previously, cities in Serbia have a significant number of informally constructed and illegally built structures, which do not adhere to seismic

building codes. Table 4-4 below provides an overview of the seismic risk class for 13 urban centers in Serbia, as identified by the GHSL Urban Center Database, and the numbers of informally or illegally constructed buildings from the MCTI register:[106]

- Cities with an important seismic risk also have a high share of informal buildings. In the three cities that are at the highest seismic risk – Kragujevac, Čačak and Kraljevo – large shares of buildings are informally constructed.

Table 4-4: Seismic risk class[107] and numbers of informally constructed buildings for 13 urban centers in Serbia

Urban center	Class	Population 2015	Built area (km2)	Seismic risk class (GHSL)	No of informal buildings	Informal buildings per 100 inhabitants
Belgrade	Primary	1,106,870	120	5	266,655	24
Novi Sad	Secondary	263,087	41	4	28,814	11
Niš	Secondary	188,293	17	5	31,890	17
Kragujevac	Secondary	126,766	20	6	88,208	70
Novi Pazar	Medium	82,734	7	5	20,102	24
Subotica	Medium	67,829	17	4	25,564	38
Čačak	Medium	64,808	13	6	66,306	102
Kruševac	Medium	60,011	8	5	50,341	84
Kraljevo	Medium	59,930	8	6	50,627	84
Zrenjanin	Medium	58,789	16	5	31,925	54
Pančevo	Medium	53,859	11	5	34,955	65
Valjevo	Medium	53,092	10	5	22,936	43
Leskovac	Medium	52,770	7	5	59,321	112

Source: Seismic class - GHSL Urban Center Database, informal buildings - MCTI register of illegal buildings

A magnitude 5.4 earthquake that hit Kraljevo in 2010 exposed the seismic hazard related to informal and older buildings, as compared to newer buildings built in accordance with anti-seismic regulations (see Box 7).

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[106] The MCTI register of illegally constructed buildings includes data on all illegal constructions – housing, commercial, auxiliary, economic, etc. including adaptations and additions to existing, non-illegal buildings.

[107] Seismic risk class estimates are expressed as Modified Mercalli Intensity (MMI) index, using national and regional probabilistic seismic hazard models. European Commission 2019. *Description of the GHS Urban Center Database 2015.* (pp. 42-43)

Box 7: The 2010 Earthquake in Kraljevo

The city of Kraljevo was hit by an earthquake measuring 5.4 degrees on the Richter scale in November 2010, followed by several lower intensity earthquakes over the following months. According to data from the Seismological Survey of Serbia, the epicenter was just 4 km north of Kraljevo.

Damage analysis conducted after the earthquake showed that 15,333 single-family houses and 211 residential buildings were damaged to different degrees. Damage assessment also showed that the newer buildings, designed in accordance with anti-seismic regulations, performed well while old residential buildings (built before 1964 when seismic building codes were introduced) and individual family houses sustained much higher levels of damage on average. [108]

According to the 2007 City Housing Strategy, the housing stock in Kraljevo is aged, poorly maintained and decaying. It is estimated that nearly a third of all the urban construction land in the city is occupied by illegal or informal construction, as the result of the absence of adequate urban planning, and suitable housing, land use and infrastructure policies. [109]

4.3   Air quality

Air quality in Serbian cities has been a matter of growing concern in recent years. Serbia, like many other countries, is facing the challenge of air pollution caused by a variety of factors such as industrial emissions, traffic, and heating systems. In fact, according to the World Health Organization (WHO), several Serbian cities, including the capital city of Belgrade, have high levels of air pollution that exceed the recommended limits. This can have serious consequences for public health, as poor air quality can lead to a range of respiratory and cardiovascular problems. WHO recently estimated that the impact of polluted air on health in Serbia causes 6,592 premature deaths every year due to air pollution at the national level, from which the vast majority, an estimated 6,394 deaths, are occurring in urban areas.[110]

A 2015 study by the WHO Regional Office for Europe and the Organization for Economic Cooperation and Development estimated that the cost of premature deaths due to air pollution represented over 33 percent of Serbia's gross domestic product which is on the high end of comparator countries (Table 4-5).

As a result, according to WHO, efforts must be redoubled to improve air quality through measures such as preserving and expanding green areas, promoting sustainable modes of transportation, and increasing efficiency of the heating network.

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[108] Blagojević, P., Brzev, S., Cvetković, R., 2023. *Seismic Retrofitting of Mid-Rise Unreinforced Masonry Residential Buildings after the 2010 Kraljevo, Serbia Earthquake: A Case Study*. Buildings 2023, 13, 597. https://doi.org/10.3390/buildings13030597

[109] City of Kraljevo, 2007. *City Housing Strategy.*

[110] World Health Organization, 2019. *Health Impact of Ambient Air Pollution in Serbia*. Copenhagen, DE.

Table 4-5: Economic costs of premature deaths as a share of GDP for 2010

Serbia	Albania	Azerbaijan	Bulgaria	Croatia	Georgia	Hungary	Slovakia	Germany	Denmark
33%	17%	7%	30%	11%	35%	19%	8%	4%	3%

Based on air-pollution morbidity and country specific value of a statistical life.

Source: OECD 2015. Economic cost of the health impact of air pollution in Europe

4.3.1   Air quality levels

The evaluation of air quality levels and parameters in 12 Serbian cities is based on EU compliance criteria outlined in Table 4-6. In most cases, air quality parameters have both average and acute thresholds. Each urban center is assessed against each air quality parameter and threshold, considering the trend in pollution levels over the last few years (depending on data availability) and the number of instances of EU standard exceedances across stations and years, spanning from 2015 to 2022. Air quality data for Serbian and comparator cities is derived from the Air Quality Database of the European Environment Agency.[111]

Table 4-6: Ambient Air Quality Standards for the European Union

Pollutant	Concentration	Averaging period	Permitted exceedances each year	The corresponding parameter in the air quality database
Fine particles (PM$_{2.5}$)	20 μg/m3	1 year	n/a	Annual mean / 1 calendar year
Sulphur dioxide (SO$_2$)	350 μg/m3	1 hour	24	1 year 99.73 percentile of hourly values each year
	125 μg/m3	24 hours	3	1 year 99.18 percentile of daily maximum
Nitrogen dioxide (NO$_2$)	200 μg/m3	1 hour	18	1 year 99.79 percentile of hourly values each year
	40 μg/m3	1 year	n/a	Annual mean / 1 calendar year
PM10	50 μg/m3	24 hours	35	1 year 90.4 percentile
	40 μg/m3	1 year	n/a	Annual mean / 1 calendar year
Ozone	120 μg/m3	Maximum daily 8-hour mean	25 days averaged over 3 years	1 year 93.15 percentile daily 8h maximum

Source: Directive 2008/50/EC (Annex XI) and European Commission's Air Quality Standards.

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[111] https://discomap.eea.europa.eu/App/AirQualityStatistics/index.html

The following is a brief examination of the key findings of the analysis of the air quality data set at the level of cities (Table 4-7):

- Air quality is below EU standards. Table 4-7 indicates that several air quality parameters in both Serbia and comparator cities exceed the EU's air quality standards. Novi Pazar exhibits significant concerns with PM2.5 and PM10 air pollution parameters, while Belgrade has measurements that surpass the EU standards for all air quality parameters.

- Particle matter pollution is particularly high. All Serbian cities show years with PM10 pollution levels above EU standards with no clear improving trend (also see Box 8). Most comparator cities are around the EU standards (within or above), and there seems to be a slowly improving trend (see Figure 4-7). PM2.5 pollution gradually improved over the last 10 years for comparator cities, while for Serbian cities there is not enough data to characterize any trend, but current values are above EU standards (Appendix B.3, Figure 6-5). Note that for PM2.5 the former EU standards (before 2020) were at 25 µg/m3, for which the measurements in Serbia were mostly complying, but with the new limit at 20 µg/m3 (from 2020), available measurements in Serbia are mostly above the threshold.

- The transport sector is responsible for most particle matter emissions (Box 9). This highlights the urgent need for effective urban policies aimed at improving the air quality in Serbian cities. Implementing sustainable mobility options and promoting the use of public transportation are crucial strategies to reduce harmful PM pollutants in the air.

- Ozone and Sulphur dioxide pollution improved but are still not satisfactory. Sulphur dioxide pollution has considerably improved in the last 20 years (Appendix B.3, Figure 6-4) for Serbian and comparator cities. Ozone pollution is on the edge of the EU guidelines and has not improved in the last 10 years, neither in Serbian nor in comparators cities (Appendix B.3, Figure 6-7). Additional figures representing PM2.5, NO_2, SO_2 and Ozone pollution are presented in Appendix B.3.

- The densest cities are the cities with the highest particle matter pollution. Across Serbian and comparator cities, there is a positive correlation between PM2.5 levels and the density of the city. The densest cities also show a higher level of PM2.5 measurements above EU thresholds, see Figure 4-8.

- There is a lack of air quality monitoring in Serbian cities. In medium cities, there is a lack of data regarding most of the air quality parameters (particularly PM and Ozone parameters), which limits the analysis (Table 4-7).

Table 4-7 Share of air quality measurements above EU standards

Serbia	PM2.5	PM10 daily	PM10 yearly	SO2 hourly	SO2 daily	NO2 hourly	NO2 yearly	Ozone
Belgrade	86%	16%	39%	6%	35%	20%	38%	30%
Novi Sad	50%	0%	27%	0%	3%	13%	7%	42%
Nis	100%	9%	27%	0%	4%	0%	4%	0%
Kragujevac		0%	75%	0%	0%	0%	10%	
Novi Pazar	100%	50%	100%					
Subotica					0%		0%	
Cacak				50%	17%	0%	0%	
Krusevac					0%	0%		0%
Zrenjanin					18%		0%	
Pancevo				0%	0%		0%	
Valjevo		100%	100%	0%	0%	0%	0%	
Leskovac								
Comparators	PM2.5	PM10 daily	PM10 yearly	SO2 hourly	SO2 daily	NO2 hourly	NO2 yearly	Ozone
Tirana	100%	50%	50%			0%	67%	50%
Sofia	39%	29%	52%	1%	4%	16%	15%	17%
Budapest	44%	2%	9%	0%	2%	0%	28%	54%
Bratislava	4%	0%	3%	2%	7%	2%	18%	60%
Zagreb	50%	0%	8%	0%	0%	0%	24%	50%
Split	0%	0%	0%	0%	0%	0%	0%	
Plovdiv	62%	50%	72%	6%	17%	17%	28%	13%
Burgas		0%	13%	8%	10%	0%	0%	13%
Debrecen	67%	0%	0%	0%	0%	5%	0%	30%
Szeged	56%	4%	42%	0%	0%	0%	0%	0%
Kosice	37%	0%	2%	0%	0%	0%	0%	28%
Shkoder	14%	0%	0%	0%	0%	0%	0%	33%
Stara Zagora	43%	4%	35%	0%	0%	17%	0%	5%
Osijek		0%	6%	0%	0%	0%	0%	0%

The indicator is calculated across stations and years from 2015 to 2022. When several stations are available in the city, the indicator can be influenced if air pollution varies across stations or years.

Source: https://discomap.eea.europa.eu/App/AirQualityStatistics/index.html

Figure 4-7: PM₁₀ air quality parameter

Serbia
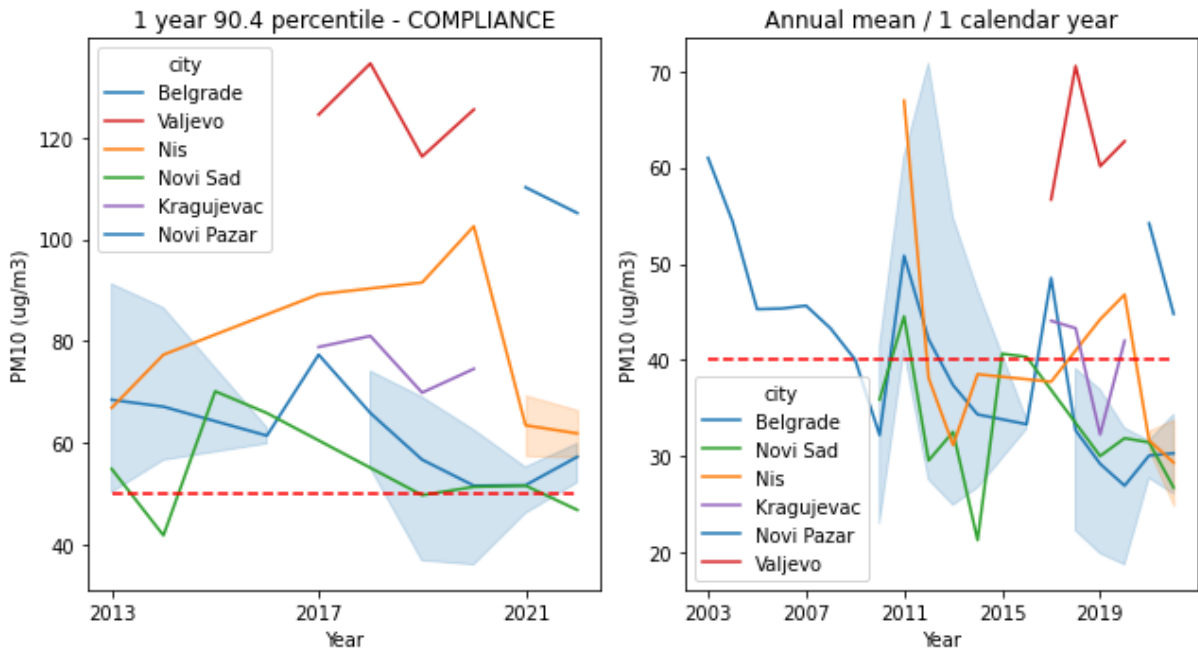
Comparator cities
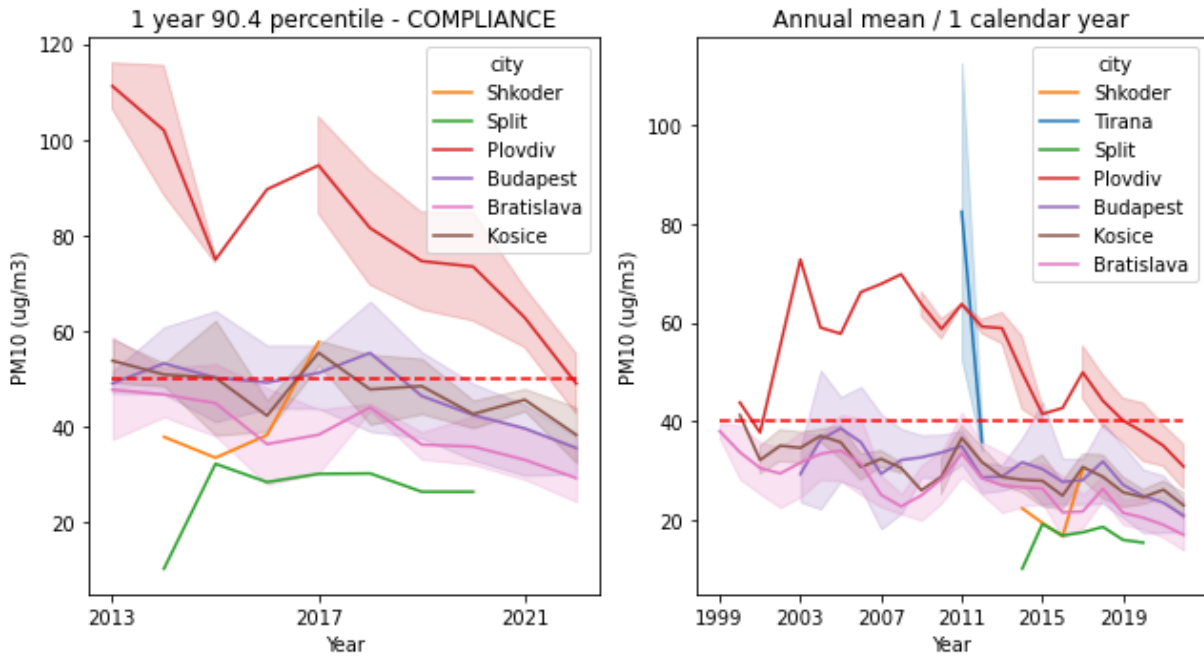
The red dotted line corresponds to the EU Air quality standards, the shaded area represents the variation across stations when several stations are available for a city.

Source: https://discomap.eea.europa.eu/Index/

Figure 4-8: Correlation between PM2.5 air pollution and city density

Correlation between PM2.5 pollution and population density in cities
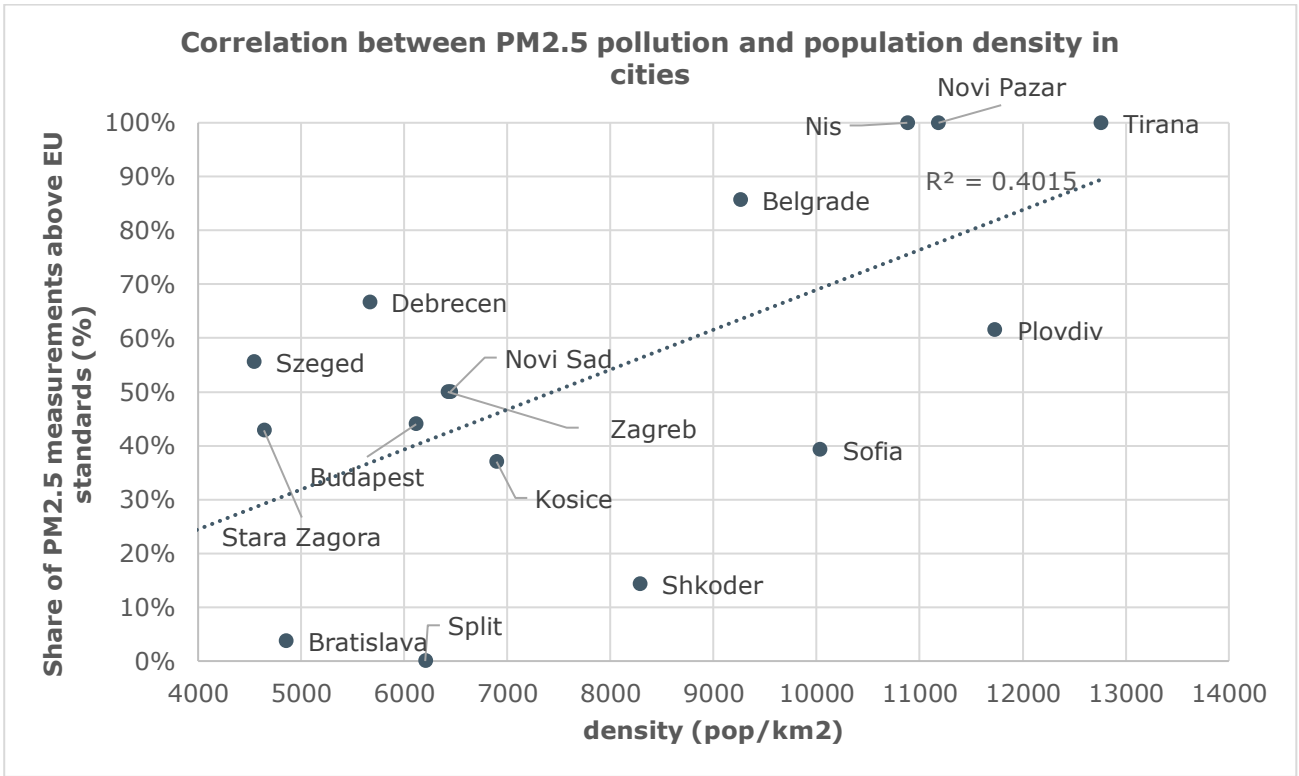
The Share of PM2.5 measurements above EU standards is calculated across stations and years from 2015 to 2022.

Source: https://discomap.eea.europa.eu/Index/

Box 8: Air quality at the LSG level

Novi Pazar[112]

The city's air quality was assessed as excessively polluted (national category III), due to exceeding the limit values of suspended particles PM10 and PM2.5.[113] The LSG is, therefore, obliged to enact an air quality plan, which up to now has not been accomplished. However, the city government confirmed that it is to be prepared.

Although the impact of road traffic on air quality and GHG emissions is recognized in strategic documents, there are no measures for mitigation. The average age of the fleet in Novi Pazar is 18 years for passenger cars (just above the national average of 17.7) and 18.6 years for all vehicles, which are both higher than the national average.

The Public Health Plan (PHP) proposes measures for air quality improvement such as the construction of a city bypass to decrease the traffic in the city center, electric buses for public transport and encouraging bicycling.[114]

In 2020, a station for automatic air quality measurement was installed, and it has been measuring the concentration of sulphur dioxide, ozone, nitrogen dioxide and PM10 and PM2.5 particles.

Kragujevac[115]

According to reports on air quality by the Environmental Protection Agency, in the territory of the City of Kragujevac in 2017 and 2018, the air was excessively polluted (category III), while in 2019 and 2020 the air was clean or slightly polluted (category I). According to the results of air quality monitoring in 2020 at measuring stations in the city, the prevalent polluter in Kragujevac is PM10. The main sources of pollution are energy generation, industries, and traffic.

The Assembly of the City of Kragujevac adopted an Air Quality Plan in November 2021.[116] The plan emphasizes already implemented measures of transport fleet management in public transport and its importance for air quality and climate change mitigation. Future measures are focused on traffic management, parking management, non-motorized traffic and continuity in public transport improvements and bypass construction.

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[112] The World Bank and SECO, 2022. *City scan of Novi Pazar.* Working draft *Green, Livable, and Resilient Cities in Serbia Component 1*.

[113] Environmental Protection Agency, 2020. *Annual report on the state of air quality in the Republic of Serbia*.

[114] City of Novi Pazar, 2018. *Public health plan 2019-2026.* https://www.novipazar.rs/dokumenti#projekti-u-novom-pazaru

[115] The World Bank and SECO, 2022. *City scan of Kragujevac.* Working draft *Green, Livable, and Resilient Cities in Serbia Component 1*.

[116] Air quality plan in the agglomeration of Kragujevac, year 2021, https://www.kragujevac.rs/lokalna-samouprava/strateski-dokumenti/

Box 9: Air Emissions

The recently published data on air pollutant emissions by sector for 2020, provided by the Statistical Office of Serbia, presents a stark reality:[117]

- The transport sector is responsible for the majority of PM_{10} and $PM_{2.5}$ emissions at the national level (Table 4-8). This highlights the urgent need for effective urban policies aimed at improving the air quality in Serbian cities. Implementing sustainable mobility options and promoting the use of public transportation are crucial strategies to reduce harmful PM pollutants in the air.

- NO2 emissions are primarily generated by the energy sector which includes electricity, gas, steam and air conditioning supply, as well as the heating sector. To effectively improve the quality of NO2 in the air, it is essential to implement urban policies that focus on the heating system. Strategies such as increasing efficiency and implementing district heating can result in a significant reduction of NO2 emissions.

- SO2 emissions are primarily attributed to the electricity, gas, steam, and air conditioning supply sector, and as such they are relatively independent of urban development policies. While SO2 emissions are not as influenced by urban policies as other pollutants, they are still a significant cause for concern, as they can have adverse effects on human health and the environment. It is crucial to continue monitoring SO2 emissions and implement strategies to reduce them at the source, such as promoting the use of cleaner energy sources and enforcing stricter emissions standards for industrial facilities.

Table 4-8: Annual emission of air pollutants for the main emission sectors

	NO₂		SO₂		PM₂.₅		PM₁₀	
unit	kg	%	kg	%	kg	%	kg	%
Total	176		417		58		76	
Electricity, gas, steam and air conditioning supply	73	41%	381	91%	1	2%	2	3%
Manufacturing industry	16	9%	15	4%	4	7%	6	8%
Households	59	34%	14	3%	50	86%	54	71%
transport	6	3%	10	2%	46	79%	47	62%
heating	53	30%	4	1%	4	7%	6	8%

Transport and heating are sub-categories of the Household sector and the percentage is indicated as relative to the total emissions.

Source: Statistical Office of the Republic of Serbia 2022. Eco-Bulletin 2021.

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[117] Statistical Office of the Republic of Serbia 2022. *Eco-Bulletin 2021.* Accounts of air emission of pollutants by Classification of Activities and for households, 2020 (p. 104)

4.4   Urban services

Urban services play a crucial role in ensuring the well-being and quality of life for residents in Serbian cities. The provision of essential services, such as water supply, sanitation, and waste management, is critical to the functioning and sustainability of urban areas. However, the provision of these services can be challenging, particularly in the context of the complex urban and spatial development and demographic changes facing Serbian cities which underlines the pressing need for efficient, accessible, and sustainable urban services.

4.4.1   Water supply and sanitation

According to data from the Statistical Office, there has been a gradual increase in the percentage of the population connected to water supply and wastewater collection networks at the national level since 2017. [118] In 2021, 91 percent of the population was connected to the water supply network, up from 87 percent in 2017. Similarly, the percentage of the population connected to the wastewater collection network was 67 percent in 2021, compared to 62 percent in 2017. However, the percentage of the population connected to wastewater treatment facilities remains low and is only gradually increasing. As of 2021, only 16 percent of the population was connected to such facilities, up from 14 percent in 2017, as shown in Table 4-9.

Table 4-9: Percentage of the population connected to water supply, wastewater collecting network and wastewater treatment plants

	2017	2018	2019	2020	2021
Percent of population connected in water supply network	86,9	87,9	88,9	89,8	91,1
Percent of population connected to wastewater collecting network	62,2	63,0	64,9	65,9	67,2
Percent of population connected to wastewater treatment, of which:	13,9	14,1	14,4	15,0	15,9
Primary treatment	1,3	1,3	1,3	1,3	1,3
Secondary treatment	9,2	9,4	9,6	9,7	9,4
Tertiary treatment	3,4	3,5	3,5	4,1	5,2

Source: Statistical Office of the Republic of Serbia, Eco-Bulletin 2021

Through an examination of the available data on the IB-net water utility database, valuable insights can be drawn at the city level.[119] This data allows for a better understanding of the current state of water supply and wastewater collection in various cities throughout Serbia.

The key findings and observations derived from the IB-net database are relevant:

- There is a disparity in water service provision between primary, secondary and medium-sized cities as previously defined (see Box 1). While primary and secondary cities generally have good coverage of water supply and sewerage systems (Table 4-10). Some medium-sized cities - such as Leskovac, Kraljevo, and Šabac - exhibit poor coverage in terms of water supply, with all medium-sized cities covering less than 80 percent of households with a sewerage network. The findings show a significant

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[118] Statistical Office of the Republic of Serbia 2022. *Eco-Bulletin 2021.* (pp. 34-35)

[119] IB-net Database: https://database.ib-net.org/

disparity in water service provision. There is also a correlation between the urbanization level of the LSG of the city and the service coverage, the LSGs with a higher urbanization level also present a higher share of service coverage (Figure 4-9).

- Non-revenue water is high in all cities, and extremely high (above 50 percent) in the cities of Novi Pazar, Valjevo, and Čačak (Table 4-10).

- Water and sewage coverage have not clearly improved in recent years. Besides some slight improvement in terms of water and sewerage coverage from 2014 to 2016, there has been no clear improvement over the period 2014-2020 for the different categories of cities regarding water supply coverage (Appendix B.4 Figure 6-8), sewerage coverage (Appendix B.4 Figure 6-9), and non-revenue water (Appendix B.4 Figure 6-10).

- Wastewater treatment is lagging. No data was available at the city level on the share of collected wastewater that is treated, but at the national level, the treatment rate is below 10 percent in Serbia. The indicator "people using safely managed sanitation services" is much lower in Serbia than in other countries because wastewater treatment is lacking in Serbia. While Hungary and Bulgaria continuously increased the percentage of the population connected to wastewater treatment over the past 20 years, in Serbian urban areas it has stagnated, and in rural areas it has decreased (Figure 6-11). Furthermore, while wastewater treatment is usually more developed in urban areas than in rural areas, in Serbia this is not the case.

- Serbian cities perform similarly to the comparator cities (or slightly better) for all observed indicators (Table 4-10)

Box 10: Water services at the LSG level

Novi Pazar[120]

Water for 75 percent of the residents of the administrative territory and 95 percent of urban dwellers is continuously supplied by the public utility company (PUC), but more than 27,000 citizens still use the water from wells on their properties. According to PUC data, non-revenue water (NRW) is around 60 percent and thus requires intensive attention from PUC and LSG. The PUC and LSG do not organize campaigns to reduce water consumption.

For sewerage removal, 70 percent of residents of the administrative territory and 85 percent of those in the urban area are connected to the sewerage network. The PUC is responsible for maintaining 177 km of sewerage network as there are no sewerage pumping stations. The sewerage network was not supposed to receive rain inflow. However, with time, rain inflow from properties and streets began to appear in sewerage collectors. Collected wastewater is not treated before discharge into the river in two locations.

To collect all wastewater from the households, the LSG is actively preparing the construction of 110 km of collectors. The conceptual design for a WWTP is also under preparation (both within the Clean Serbia Project). However, the development of the rain drainage system is not taking place. In the meantime, wastewater in the villages is being disposed of in households' septic tanks.

Out of RSD 670.8 million in total capital expenditures in the Capital Expenditures Funding Plan of the City of Novi Pazar, RSD 131 million is planned for the water and sewerage network and RSD 354.8 million is planned for the construction of communal road infrastructure which also includes some water and wastewater collection.

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[120] The World Bank and SECO, 2022. *City scan of Novi Pazar.* Working draft *Green, Livable, and Resilient Cities in Serbia Component 1*.

Table 4-10: Performance of water utility companies in Serbia and regional comparators

City	Water Coverage – Household Connections (%)	Sewerage Coverage (%)	Non- Revenue Water (%)	Water consumption (m3/conn/month)
Serbia				
Belgrade	100%	80%	39%	63
Kragujevac	99%	94%	45%	24
Niš	89%	89%	46%	37
Novi Sad	91%	84%	28%	37
Subotica	90%	59%	25%	16
Novi Pazar	87%	76%	65%	17
Leskovac	69%	55%	47%	17
Čačak	81%	70%	51%	20
Sabac	59%	53%	35%	17
Pančevo	92%	59%	26%	19
Zrenjanin	99%	80%	25%	
Kruševac	93%	60%	29%	21
Valjevo	89%	64%	55%	17
Kraljevo	65%	81%	40%	
Comparators				
Tirana	95%	73%	70%	13
Bratislava	95%	82%	37%	35
Sofia	100%	96%	50%	58
Burgas	100%	78%	50%	17
Plovdiv	100%	72%	60%	16
Kosice	73%	53%	30%	21
Shkoder	48%	31%	51%	14
Stara Zagora	100%	66%	50%	11

Green to red coloring indicates high to low numbers but does not reflect positive (good) or negative categories.

Source: https://database.ib-net.org/

Figure 4-9: Relationship between service coverage (water supply and sewerage) and urbanization level within LSGs
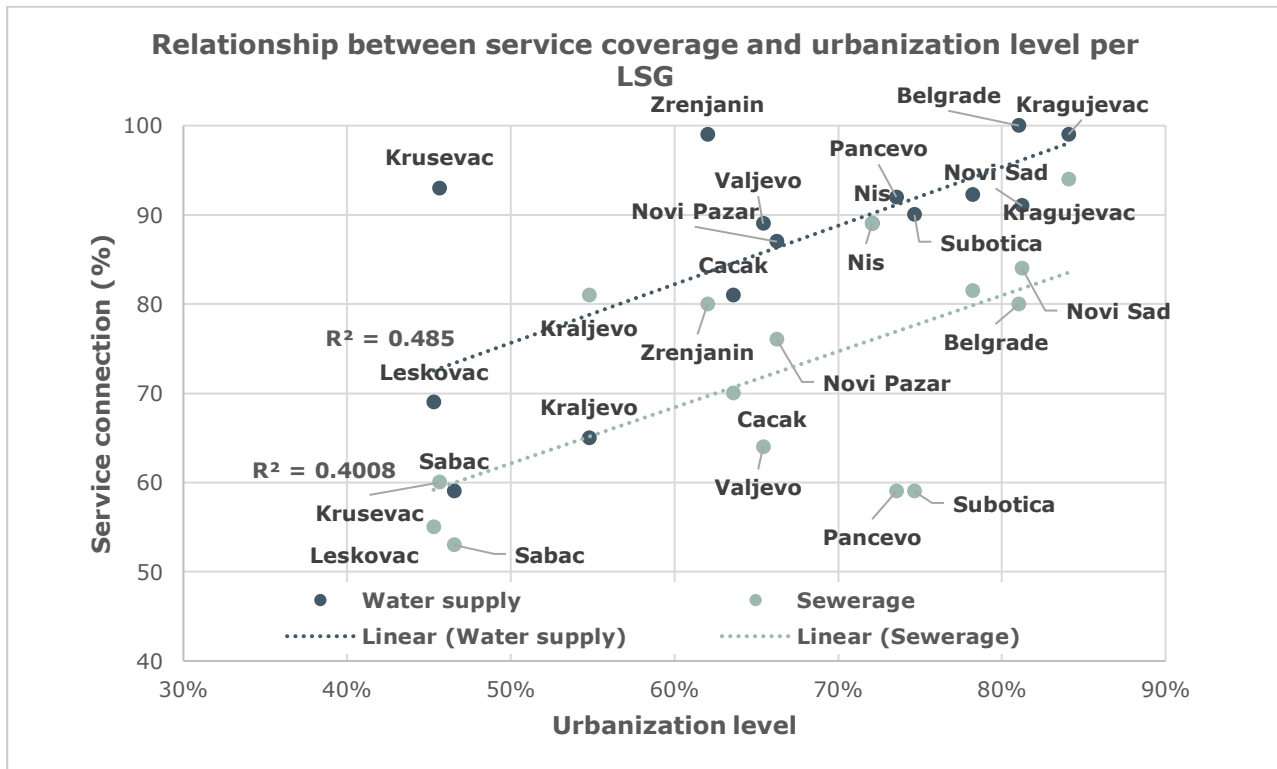
Source: Urbanization level from the Statistical Office of the Republic of Serbia, service coverage from https://database.ib-net.org/

4.4.2 Solid waste management

Waste management is a critical aspect of urban planning and development, as it has direct impacts on public health, the environment, and quality of life. In Serbia, waste management is a complex issue and one that poses significant challenges for city authorities. In recent years, the country has struggled to implement modern waste management practices, and as a result many cities have been grappling with issues related to illegal dumping, and inadequate treatment and recycling facilities. Despite efforts to improve the situation, waste management remains a significant problem in many Serbian cities. This section provides an overview of the current state of waste management in Serbian cities (see Box 11).

The amount of municipal waste generation in Serbia decreased from 2.65 million tons of waste generated in 2010 to 1.84 million tons in 2015 but then increased to 2.35 million tons in 2019 (Figure 4-10). According to the Eco-bulletin, household waste was 2.06 million tons in 2020 and increased to 2.12 million tons in 2021.[121] These inconsistencies are ascribed to data collection and reporting challenges.

The average coverage of municipal waste collection is 87.4 percent with almost all municipal solid waste collected landfilled. It is estimated that 20 to 30 percent of the total generated municipal waste ends up in illegal dump sites. The Serbian Environmental Protection Agency registered 2,642 informal landfills in

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[121] Statistical Office of the Republic of Serbia 2022. *Eco-Bulletin 2021.* (p. 45)

141 municipalities that provided the data.[122] The rest goes to officially designated but unsanitary sites (45 percent), while an estimated 25 percent of waste is sent to one of the 11 sanitary landfills, where a gate fee must be paid[123] (as of 2019). These landfills are, however, reaching the limits of their capacity and do not operate completely in accordance with the conditions set out in the EU Landfill Directive (1999/31/EC). Most cities and municipalities that have unsanitary landfills have adopted, or are in the process of adopting, plans for the closure and reclamation of such landfills.

The establishment of separate waste collection systems for major recyclable waste commodities in household waste, such as paper and cardboard, plastics, glass, and metals, is also lacking. As a result, only about 15 percent of waste is recycled.

Figure 4-10: Waste treatment by treatment category in Serbia, 2017-2020
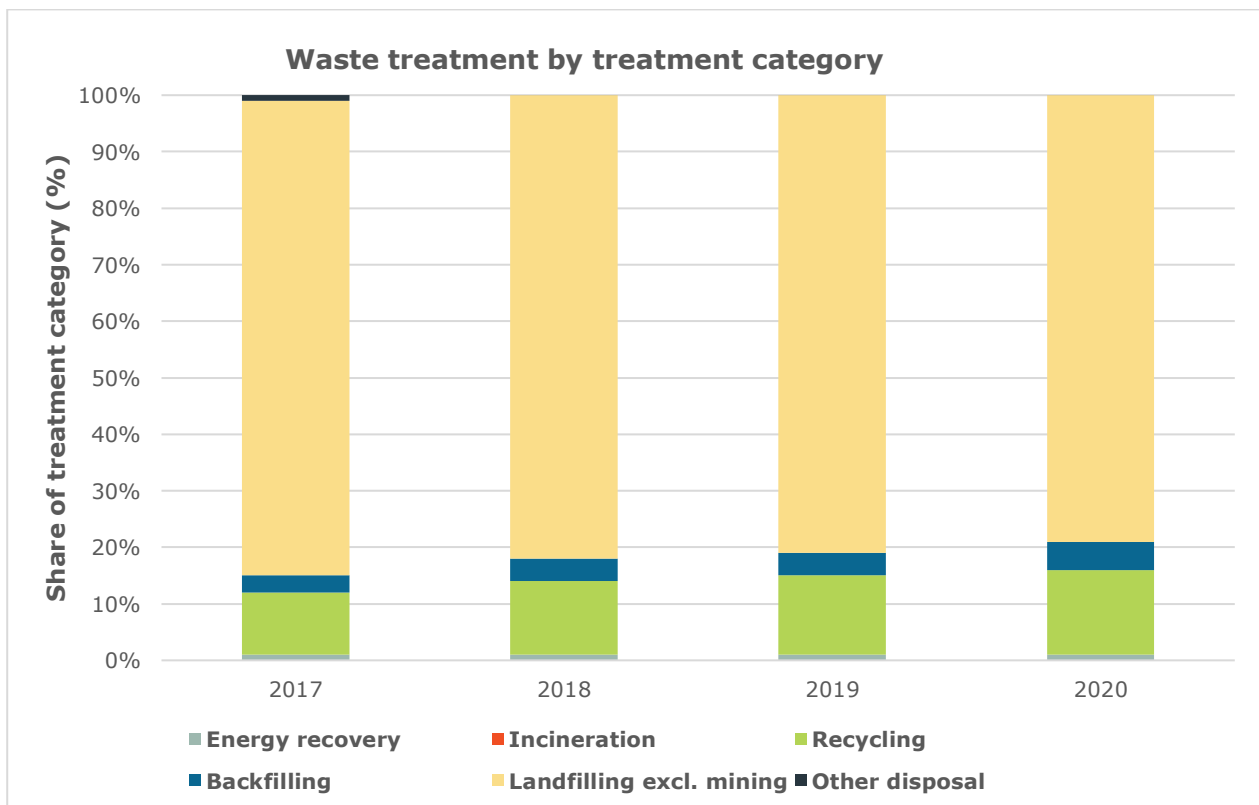
The numbers from eco-bulletin on waste treatment by category include mineral waste from mining, resulting in a recycling rate of 3 percent of total waste, however, mineral waste from mining is usually not included in those statistics. In these numbers all mineral waste from mining were subtracted to the amount of waste landfilled.

Source: Own calculations based on the Statistical Office of the Republic of Serbia, Eco-Bulletin 2021.

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[122] Environmental Protection Agency, 2021. *Waste Management in the Republic of Serbia in the period from 2011 to 2020.* Available at: http://www.sepa.gov.rs/index.php?menu=5000&id=1304&akcija=showDocuments&tema=Otpad
[123] European Environmental Agency, 2021. *Country fact sheet, Serbia - Municipal Solid Waste Management.*

Box 11: Solid waste management at the LSG level

Leskovac[124]
There is a valid Local Waste Management Plan, and a regional waste management system established in cooperation with six neighboring local governments. A regional utility company for waste management was formed as a public-private partnership (PPP) with Porr-Werner & Weber Ltd. The city generates 0.982 kg of municipal solid waste per capita per day, like the national average. Only 20 percent of rural settlements are not in the system of organized municipal waste collection and up to 10 percent of collected waste is recycled. Although the local regional companies periodically clean the illegal dumpsites, there are still around 120 of them on the territory of the city. There is no separate collection of special waste streams, but infectious medical waste is managed by Leskovac General Hospital, which is the Local Medical Infectious Waste Treatment Site. There is neither a composting facility for green waste nor biodegradable waste treatment in the regional waste management center.

Novi Pazar[125]
In Novi Pazar, the collection, transport, and disposal of municipal waste are performed by the PUC Gradska čistoća Novi Pazar. Waste is collected door-to-door, as well as through containers. The city confirmed that there is a not enough containers for waste collection. Municipal waste is deposited at the Golo Brdo municipal non-sanitary landfill serving 16,435 households, 720 industrial users and 1,558 entrepreneurs from Novi Pazar and Tutin municipalities in 2019. The landfill is located 23 km from the city center. The distance and terrain configuration makes it difficult to adequately provide this service, and only 72 percent of households are covered by waste collection services. Most waste transport vehicles are outdated and need to be replaced.

The total annual amount of municipal waste that is collected and permanently deposited from Novi Pazar to the municipal landfill is about 40,000 tons, while the municipality of Tutin disposes of about 10,000 tons annually. In Novi Pazar, 1.66 kg of municipal waste is generated per inhabitant per day, which is considerably higher than the national average of 0.95 kg of waste per day. The landfill complex covers 15 hectares, and the body of the existing non-sanitary landfill is larger than three hectares. The body of the landfill was placed in the upper reaches of the Brezovac stream, which receives the surrounding stormwater, at a depth of about 10 m.

Due to unsanitary conditions, rehabilitation and recultivation of the existing landfill "Golo brdo" are necessary and the documentation for a rehabilitation and recultivation project was prepared and submitted to the Ministry of Environmental Protection (MoEP) for approval. However, the competent ministry did not give consent over a period of three years, resulting in the documentation needing to be revised and resubmitted. For the planned regional sanitary landfill, a feasibility study, a preliminary design and an environmental impact assessment study are being prepared. Currently, the municipal landfill has storage space for at least five more years.

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[124] The World Bank and SECO, 2022. *City scan of Leskovac.* Working draft *Green, Livable, and Resilient Cities in Serbia Component 1*.

[125] The World Bank and SECO, 2022. *City scan of Novi Pazar.* Working draft *Green, Livable, and Resilient Cities in Serbia Component 1*.

4.5   Conclusion

Serbian cities and towns have undergone significant changes in land uses and urban footprints in the past decades. Most of the cities have a declining population but expanding their built-up areas, which results in decreasing densities. The least dense cities have experienced the most substantial loss of density. Still, more than 30 percent of the population in the analyzed Serbian cities resides in areas with high levels of greenery, compared to about 20 percent in comparator cities.

Cities in Serbia are exposed to critical flood risks - nine of the 13 cities have over 20 percent of their built-up areas at potential risk of flooding. In most cities, the expansion of built-up areas has occurred slightly more in flood-prone zones than in areas not under flood risk.

The rising temperatures during summer months have resulted in an increased occurrence of heat waves. Novi Sad, Subotica, Valjevo, and Čačak show the highest exposure to heat waves from 1980 to 2010. Construction densities in central parts of cities create heat islands effects, additionally increasing the impact of heat waves. Serbia and the western Balkans are expected to experience a significant increase in maximum temperatures due to climate change, which will likely worsen the already challenging situation.

Seismic risk in cities is increased by the large number of buildings that do not conform to seismic building codes, primarily informally constructed buildings, but also those build before 1960s (before introduction of seismic building codes) and buildings that are not adequately maintained. Cities with the highest seismic risk – Kragujevac, Čačak and Kraljevo – have a high share of informal buildings.

Air pollution in Serbian cities has been a major environmental issue over the past years. Particle matter pollution is particularly high, with all cities showing years with PM10 pollution levels above EU standards with no clear improving trend. Although for PM2.5 pollution there is not enough data to characterize any trend, current values are clearly above EU standards. The transport sector is responsible for most particle matter emissions. Population density also plays the role in air pollution, with the densest cities having the highest particle matter pollution.

While Serbian cities generally perform similarly (or slightly better) to the comparator cities regarding the service provision, wastewater treatment represents a large issue. No data is available at the city level, but at the national level, the wastewater treatment rate is below 10 percent. There is a disparity in water service provision between primary, secondary and medium-sized cities, with all medium-sized cities having less than 80 percent coverage. Non-revenue water is high in all cities, and extremely high (above 50 percent) in the cities of Novi Pazar, Valjevo, and Čačak.

The average coverage of municipal waste collection is 87.4 percent with almost all municipal solid waste collected landfilled. It is estimated that 20 to 30 percent of the total generated municipal waste ends up in illegal dump sites. Although still well below the EU average per capita, the amount of generated municipal and household waste is increasing, but only about 15 percent of waste is recycled.

CHAPTER 5
Findings and Policy Recommendations

5 Findings and Policy Recommendations

Serbian cities require significant corrective urban, land use and environmental policy changes and urban and economic infrastructure investments to achieve the goal of green and resilient urban development.

5.1 Key urban development challenges in Serbia

Based on the review of policy documents and reports, and the work on urban analytics, three main challenges for urban development in Serbia are identified: uneven spatial-economic development, the uncontrolled growth of urban areas, and compromised urban sustainability and resilience. Uneven development is reflected in large variations in demographic, economic and infrastructural development trends. Uncontrolled growth of urban settlements is evidenced in the spatial expansion of urban areas outpacing population growth, a large consumption of urban land, the conversion of agricultural into construction land and oversupply of some housing types, as well as considerable informal and often illegal construction. Constrained resilience and the resulting health and safety issues for urban residents are related to limited environmental management (e.g., for air and water pollution), and disaster risk management (floods and landslides).

Spatial distribution of population/demographic trends for the urban population

Demographic changes are unequally spatially distributed. There are large differences in demographic trends at the level of regions: the greatest population decline is in South and East Serbia, and at the rural/urban level, with rural areas depopulating much faster than urban ones. Population numbers in rural areas are shrinking at an 11.1 percent change in population between the 2002 and 2011 Census (364,532 people), resulting in a doubling in the number of settlements with less than 100 residents, and with the highest concentration of such settlements in the south and east of Serbia.

There are also disparities at the level of cities. Since 2011 only three cities experienced population growth - Belgrade, Novi Sad, and Novi Pazar, while all others are shrinking. Differences in average age in cities are also significant, ranging from 35.3 in Novi Pazar, to over 45 in cities with the oldest population - Zaječar, Pirot and Sombor.

Trends also show that the population of Serbia is concentrated in Belgrade, the north-western parts of Vojvodina province, and along the Corridor X Road and railway. Lagging regions in Serbia face large gaps in market access and intra-regional connectivity.

Economic development

There is a high concentration of economic activities and population in a relatively small area between Belgrade and Novi Sad. Belgrade produces 42.1 percent of the national GDP, 33.7 percent of registered businesses and 44.4 percent of investments. Additionally, there is a discontinuous urbanized area which encompasses the two largest cities in Serbia, Belgrade and Novi Sad, and the networks of towns in between, with branches towards the cities of Pančevo and Zrenjanin. This area creates around 60 percent of the national GDP.[126]

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[126] Vujošević M., Zeković S. and Maričić, T., 2012. *Novi evropski regionalizam i regionalno upravljanje u Srbiji: Knjiga 1.* Belgrade: IAUS. (pp. 153-155)

Infrastructure and transport networks are also disproportionately more developed here, compared to the rest of Serbia (e.g., Belgrade – Budapest and Belgrade – Zagreb highways and railways, Belgrade airport, ports on the Danube in Belgrade, Pančevo and Novi Sad, etc.), attracting industry, economic activities, and investment, which further influences the concentration of the population in this zone.

5.1.1   Limited guidance for the growth and expansion of urban areas

High consumption of urban construction land

Consumption of urban construction land demarcated in urban plans in Serbia is amongst the world's highest, although analysis shows that actual built-up areas of cities do not consume large surfaces of land. In large cities, where the demand for urban construction land is high, urban land surfaces in the General Urban Plans are constantly being increased. Comparing the land surfaces that are occupied by built-up areas of cities and the land surfaces zoned as urban construction land in GUPs (see Chapter 3) shows that, on average, cities in Serbia zone close to 3.2 times more land for construction than their built-up areas actually occupy. Among largest cities, Belgrade zoned 2.7 times more land for construction than its bult-up area occupies, Novi Sad 1.5 times, Niš 9.2 times more, Kragujevac 2.7, Novi Pazar 3.3 times, to name a few examples.

The increase in urban land coverage does not match a low increase in population. While urban construction land is increasing, the population of most cities in Serbia is shrinking or stagnating, with low to moderate population growth rates only in a number of cities. Only Novi Sad and Novi Pazar have population growth that could justify the expansion of urban land stipulated by GUPs.

Urban expansion and suburbanization

There is a constant increase in the number of housing units in Belgrade and medium-sized cities, although statistics simultaneously show an oversupply of housing units. Based on the 2011 Census, out of over 3.2 million housing units in Serbia, almost 590,000 were uninhabited (18.4 percent). In some cities, apart from housing units registered as empty in the Census, there are also more housing units than registered households.

The oversupply comes from an increase in construction densities in inner city areas over the last decades, while the population is moving to suburbs where the largest spread of urban built-up areas is identified due to growing housing prices, Suburban zones of cities have stronger population growth and positive migratory balances, while in many cities population numbers in central areas are stagnating or declining. Population growth in suburban areas is evident in many of the analyzed cities - Belgrade, Novi Sad, Niš, Kragujevac and Novi Pazar (see Chapter 3).

A growing number of informally constructed buildings

Informal construction is one of the greatest indicators of the unplanned growth of urban areas, and the dysfunctionality of land and housing policies. There are over two million illegally constructed buildings in Serbia. Over the last 30 years, social and economic transition, internal migration, and especially the large influx of refugees and IDPs during the 1990s, have significantly reshaped the spatial and social composition of cities in Serbia. This has led to an uncontrolled growth of informal construction, mostly in the fringe of urban areas. The leading contributing factors are inefficient land management, a shortage of affordable urban construction land equipped with infrastructure, and a shortage of affordable urban housing.

5.1.2 Compromised urban sustainability and urban resilience

Serbian cities suffer from numerous environmental, climate change and disaster management issues. The main challenges are air, water and noise pollution, energy and water consumption and shortages, heat waves, floods, inefficient solid waste processing and disposal and wastewater and sewage treatment and disposal. These challenges need to be addressed systematically to ensure environmentally sustainable, low-carbon, resilient and resource-efficient green urban development.

Spatial expansion is increasing despite decreasing populations

All cities except Novi Sad and Novi Pazar observed a decrease in density from the years 2000 to 2015, and multiple cities lost more than 20 percent of density within 15 years. The expansion of the urban fabric at low densities contributes to increased greenhouse gas emissions, as more land is taken up for development, urban transportation modes are extended, and energy use becomes less efficient. Furthermore, the cost-of-service delivery tends to increase as it becomes more expensive to provide public services like water, sewage, and waste management over a larger area. The trend of declining and aging populations in urban areas exacerbates sustainability challenges, as a smaller tax base will have to support the higher costs of servicing a larger area. This could lead to a vicious cycle of declining resources and worsening environmental impacts. However, the least dense cities are also the cities where a higher share of the population living in high-green areas is observed. Furthermore, across Serbian and comparator cities, a positive correlation between city density and fine particulate matter ($PM_{2.5}$) air pollution is found.

Air quality is poor and has severe impacts

Multiple air quality parameters are above the EU's air quality standards. Despite some improvement over the last 20 years (particularly improvement in Sulphur dioxide, and PM10 to a lower extent), it remains a severe health issue. In medium-sized cities, there is a lack of data regarding most of the air quality parameters which limits analysis and diagnosis. Particle matter pollution is mainly related to the transport sector and can therefore be tackled by urban policies.

Urban services are lagging

Several services are lacking in many cities. Water supply coverage is poor (around or below 80 percent) in four medium cities, while sewerage coverage is lacking in most cities, and most cities have non-revenue water shares between 30 percent and up to 65 percent. In general, very little improvement has been observed between 2014 and 2020 in terms of service coverage. In terms of municipal solid waste, while 87 percent of waste is collected at a national scale, 20 to 30 percent ends up in informal landfills, and 45 percent in official but unsanitary landfills.

Urban expansion has happened with little regard to disaster risk

Despite the decrease in population, the built-up area has increased in all Serbian cities. Urban expansion also has occurred to a large degree unmindful of disaster risk reduction considerations. Nine cities have more than 20 percent of their built-up area under a potential fluvial flood risk, and Belgrade and Smederevo have more than a third of their built-up area under real flood risk. In most cities, the expansion of urban areas has occurred similarly (or slightly more) in areas at risk of flooding compared to areas not at risk of flooding which is a missed opportunity for urban planning.

Furthermore, many cities have a high share of informal buildings and, worryingly, the cities with the highest seismic risk (Kragujevac, Čačak, and Kraljevo) are also cities with high shares of informal

buildings. Heat waves have been more frequent in recent years and are expected to increase in the future, the urban heat island effect of some cities further exposes some urban areas.

Several cities are exposed to a combination of critical environmental issues

The cities of Pančevo, Valjevo, and Leskovac have a large decrease in density (>20 percent), poor or unavailable air quality data, low coverage of the sewerage network (around 60 percent), and a high share of the built-up area under flood risk (20 to 40 percent).

5.2   Policy recommendations

The policy responses to the key urban development challenges in Serbia can be divided into three groups.

Firstly, certain urban development issues are adequately recognized by the official policies, but the policies have limited results in terms of addressing them. This is mainly due to a lack of capacities (primarily institutional and financial) to implement policies and measures appropriately. Some examples of these are low implementation rates of some strategies, such as the SUDS, or the Social Housing Strategy and Poverty Reduction Strategy, although these documents mostly adequately define actual issues, and the measures to resolve them.

Secondly, other issues are not understood accurately and thus responses are inadequately designed or lack a wide-ranging strategic approach. These often rely on ad-hoc interventions, without proper coordination of different institutions and levels of government. As such, these may even be often counterproductive, and further increase rather than resolve the problem. An example of this is the case of continuous efforts to legalize informal construction which resulted in even greater numbers of informal buildings.

And thirdly, there are cases where urban development issues are not identified by official policies at all, leading to no response. An example is that of urban housing markets which are almost completely unregulated, with almost no government intervention, as the introduction of regulations is not seen as an issue. A second example is the unplanned and unguided growth of urban fringe areas which has not been explored and well understood to date, so policies are often made with the assumption that central urban areas are still growing, while the expansion of fringe areas is left unrestrained and without any policy response.

Serbia's urban and economic policies to date have, in the case of the SUDS, been largely spatially neutral with policy recommendations made generally for all cities or skewed to favor the least developed municipalities (e.g., in the case of fiscal incentives).

In the *Urbanization and Territorial Review: Western Balkans and Croatia* (2019*)*, The World Bank recommends an alternative approach, structured around three C actions with policy targeted towards a typology of cities. The 3Cs are:

- Concentrate - resources on leading city regions to drive national growth and support secondary cities to become growth centers that expand opportunities to their hinterland; at the national level, concentrate resources on actual urbanization trends (such as demographic decline or suburbanization) and actual urban areas; at the city level, concentrate resources on actual built-up areas of cities and dimension infrastructure and services accordingly.

- Connect - people and places to opportunities, by developing competitive tradable sectors to leverage the comparative advantages and cities and regions, integrating enterprises into local, regional, and global markets, and delivering high-quality public services to citizens regardless of where they live; connect border cities with the main transport corridors by developing secondary transport networks; cities should coordinate their local plans and strategies (both spatial and urban – Local Spatial Plans, GUPs, and sectoral – economic, transport, infrastructure, services, waste processing, resilience) with neighboring LSGs.
- Capacitate – national and local governments by strengthening financial and technical expertise and improving local planning, coordination, and governance, while investing to raise human capital to ensure that citizens can take full advantage of their potential regardless of where they are born.

Policy recommendations in the further part of this Chapter are clustered by wider themes: Spatial-economic and urban development, Urban planning and environmental performance and further categorized by the 3C framework. As per the analysis conducted in this Report, the following typology of cities is proposed as backdrop for policy responses (Table 5-1).

Table 5-1: A proposed typology of cities for targeted spatial-economic policy

Typology	Description	Cities
Leading – drivers of economic development	Cities that concentrate on the most productive economic sectors and have high levels of GVA, jobs and wages per capita. They are also growing in population.	• Belgrade • Novi Sad
Catching up – potential to drive economic development	Secondary and medium-sized cities that have experienced economic renewal in recent years, attracting new investment, creating jobs, and closing the gap with the leading cities. Population is shrinking, but generally not rapidly.	• Niš • Kragujevac • Subotica • Čačak • Kruševac • Kraljevo • Valjevo • Smederevo • Leskovac • Sremska Mitrovica
Stagnating	Medium size cities with economic indicators above average but recent performance declining – mostly located off the main Corridor X. Population is shrinking rapidly in most of these cities.	• Pančevo • Užice • Zrenjanin • Šabac • Požarevac • Vršac
Lagging and shrinking rapidly – policies for managed decline	Mostly smaller cities that are continuing to lag economically and/or shrinking rapidly and whose decline must be managed.	• Vranje • Jagodina • Sombor • Pirot • Kikinda • Zaječar • Prokuplje • Loznica

Other/outliers	Bor is the location of a large copper mine generating significant economic output and well-paying jobs, but is a small city located well away from the main Corridor X; Novi Pazar is Serbia's poorest city but continues to grow in population for reasons outlined earlier in this report.	• Bor • Novi Pazar

Source: COWI

5.2.1 Spatial-economic and urban development policies should adjust to the key dynamics of urbanization

Concentrate: Focus investments on cities with the potential to drive economic development

Serbia has two leading cities that between them contribute half of the country's total economic output, Belgrade (42 percent) and Novi Sad (8 percent), with their economies oriented towards tradable knowledge-intensive services, concentrating 60 percent of jobs and more than three-quarters (78 percent) of output in these sectors. Both cities have comparably high wages, a third higher than the average for other cities, low unemployment, half that of other cities, and high levels of job creation and investment per capita. These cities will continue to drive economic development – and should be enabled and strengthened to do so. Further concentration and co-location of knowledge-intensive sectors will improve productivity as these sectors benefit especially from spillovers and access to skilled labor.

Spillover effects are highly spatially concentrated, being effective at distances as low as 1km.[127] It should be recognized that Belgrade and Novi Sad are competing for FDI with other comparable cities, in particular capital cities in the region, rather than other cities in Serbia. The existing and potential scale of these cities must be leveraged to improve the competitiveness of Serbian firms.

Serbia should also aim to address regional-level disparities and make the best use of often underutilized city-scale assets and resources by developing select secondary cities as additional growth poles. The economy outside of Belgrade and Novi Sad experienced a prolonged period of decline which has now to some extent been reversed. The impacts of this have not, however, been evenly distributed, with some cities recovering, attracting new investment, and creating jobs, particularly larger cities located on the major transport corridors, while smaller cities and those in more peripheral areas have not recovered to the same extent and continue to lag, many of these with rapidly shrinking populations.

To date, Serbia's economic reforms and fiscal incentives have aimed to catalyze investment in all locations, with greater incentives offered to the least developed municipalities. This policy is not sustainable in the context of continued demographic decline, actively discourages agglomeration economies, and can displace economic activity from more productive cities. It is recommended that the fiscal incentives are revised with the objective to better concentrate investment into typically secondary and medium-sized cities with the potential to drive long-term economic development and arrest the demographic decline.

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[127] https://www.centreforcities.org/reader/building-northern-powerhouse-lessons-rhine-ruhr-randstad/introduction/

Connect: Leverage investments in connective infrastructure

Serbia's population and economic activity are increasingly concentrated along the major transport corridors, primarily Corridor X. The largest, fastest growing/slowest shrinking cities and those that are creating jobs at the fastest rates are generally located on or near Corridor X, while stagnating, lagging and rapidly shrinking cities are located away from this corridor in peripheral areas. Significant investments have been made in the Corridor X infrastructure in the last two decades. There is increasingly evidence that improved transport connectivity has led to new investment and job creation.

Serbia should leverage this improved connectivity to develop a system of secondary city growth poles that are attractive to investors in export-oriented / tradable sectors along the primary Corridor X. In parallel, investment in secondary transport infrastructure should focus on connecting the remaining cities in the urban system to the primary Corridor X trunk infrastructure.

Capacitate: Revise classification of urban settlements to better match urbanization trends of the country

Urban development policy in Serbia is based on urbanization level figures that come from the official classification of urban settlements. This classification is not often updated and does not reflect that some settlements outgrow their boundaries, as well as the changes in character of settlements over time – in particular, as former rural settlements became urban. This results at times in a distorted picture of the key dynamics of Serbia's urbanization process.

National-level strategic planning documents such as SUDS or the Spatial Plan of the Republic of Serbia are based on these numbers, and the resulting assumptions about very low levels of urbanization in Serbia compared to other countries in the region and Europe, and small cities with very low population densities. At the local level, built-up areas of many cities outgrew the boundaries of urban settlements and have much larger populations than official figures show. Relying on these figures, as a basic input for both national and local-level planning, limits strategic planning that would capture the entire urban area with all its components (e.g., city centers, suburbs, and peri-urban areas).

There is a necessity to revise the classification of urban settlements and to adjust it to urbanization trends that occurred over the last several decades. Global data and internationally harmonized definitions of cities and urban areas can be helpful in this process.

The Census of the Population (2022), that was done in accordance with the new international practice and also classify settlements applying the *Degree of Urbanization* methodology, represents a positive step in this direction.

Capacitate: Address uneven development with a differentiated spatial-economic policy approach

Serbia's post-2009 economic reforms have been successful in reversing the prior long-term economic decline and catalyzing a wave of FDI into high-value tradable services, such as ICT, finance and professional services, and manufacturing, especially automotive supply chains and consumer goods. They have not, however, significantly impacted the demographic decline experienced by Serbia's cities – and this trend is likely to continue, and potentially even accelerate, as Serbia integrates further with the EU economy. At the same time, Serbia's spatial economy experienced a period of significant concentration towards Belgrade and Novi Sad from 2000 onwards, both in terms of population and economic activity, which has resulted in a high degree of primacy and lack of spatial balance.

Serbia should respond to these trends by planning for and actively managing its spatial development through a differentiated spatial-economic policy approach that aims to build a more equitable space economy (and accompanying urban system) in which the advantages of the concentration of population and economic activity in several large cities (primarily Belgrade and Novi Sad) are acknowledged, as is the need to build such agglomeration advantages in suitable secondary cities – while simultaneously recognizing and managing the impacts of declining city and town populations at the lower levels of the urban system.

Capacitate: Place focus in national-level policies on managing the impacts of demographic decline

Most urban settlements in Serbia are undoubtedly shrinking and aging, and this process seems irreversible in the medium term. The topic of shrinking cities and managing the decline is not adequately addressed in urban development planning documents, such as SUDS or the National Spatial Plan.

While the background analysis for policy documents usually detects the issue of the shrinking population, there are no specific goals or measures on how to address it. In the SUDS, for example, a shrinking and aging urban population is recognized as one of the main demographic issues. However, managing the shrinkage is not among the strategic or specific goals.

As it is not likely that the general trend of shrinkage will be possible to reverse, the urban policy could face the fact of the shrinking population and prioritize the issue to manage the decline, thus minimizing negative side effects.

5.2.2   Urban planning should reflect the realities of spatial development

Concentrate: Adjust GUP boundaries to built-up areas of cities

As the analysis of built-up areas and boundaries of GUPs showed, most GUPs do not cover the whole urban built-up areas of cities. Boundaries of GUPs are mostly defined by following administrative, statistical, and cadastral boundaries, mostly the boundaries of urban settlements. Since many cities have seen their built-up areas outgrowing the administrative boundaries of urban settlements, GUPs do not always encompass all built-up areas and hence face limitations in providing inclusive strategic planning. Central city areas are often well-considered, but analysis and planning are limited for peripheral zones, both suburbs and peri-urban areas, which in turn tend to develop more spontaneously.

On the other hand, there are cities in which GUPs cover much larger zones than the actual built-up area, thus creating unnecessarily large zones of urban land.

Boundaries of GUPs should thus be revised to cover real, continuous urban built-up areas of cities, to be able to strategically plan the development having in mind the totality of the city (city center and all suburban and peri-urban areas).

Better matching of GUP boundaries with built-up areas would also help to dimension urban construction land use, and infrastructure and service provision more efficiently.

Concentrate: Adapt GUPs and other planning documents to population decline

In many cases, local urban policies (GUPs, Spatial Plans, and others) are drafted overlooking the statistical evidence of a constantly shrinking population. In cases where this key dynamic is acknowledged, adaptation to the shrinking population is not reflected in planning objectives.

The World Bank's report on shrinking cities in Romania offers an overview of possible policy responses to shrinkage, derived from existing examples of city-level policies of facing shrinkage. [128] Approaches are classified based on the way shrinkage is understood in the terms of countering shrinkage, accepting shrinkage, and making use of shrinkage.

Serbian policy could turn the growth-oriented planning now applied by most of the cities into the more pragmatic model of the compact city, implementing measures to reduce land consumption, convert a large share of existing brownfields into housing or green areas, and stabilize the housing markets.

While measures related to regeneration of brownfield sites exist in SUDS, more concrete measures could be included such as demolishing underused or abandoned buildings, improving the more stable housing areas, and restraining the number of newly built housing units accompanied by the prioritized development of public housing.

New uses of the existing built environment, or the adaptation of old buildings is often done in accordance with an "aging in place" concept that could be further explored. The UK's approach of planning for decline is an example of an accepting shrinkage approach in the urban policy at the national level.

Connect: Coordinate urban development planning with neighboring LSGs

In larger cities such as Novi Sad or Belgrade, it is often the case that continuous urban built-up areas transgress the boundaries of LSGs, which places parts of urban areas under the jurisdictions of other local governments. In Novi Sad, a significant part of the built-up area that is functionally part of Novi Sad's urban area is in Beočin LSG. In Belgrade, the city of Pančevo and municipalities in the north of Belgrade (Stara Pazova and Banovci) function as a part of the same metropolitan region.

In such cases, it would be beneficial that the local plans (GUPs, local spatial plans, transport and infrastructure, and economic development) are developed in close coordination with neighboring LSGs, to enable planning that covers the entire urban area and all its components.

Capacitate: Further develop institutions and mechanisms to better regulate land use and urban development in a market-oriented environment

Further adjustment of the planning system to the current market-oriented environment is necessary. Current policy and legislative frameworks still strongly rely on techniques, tools and instruments that are not effective in a market environment, notably for urban land use planning and the regulation of land and housing markets. Literature suggests that, although the former socialist concept of the welfare state has been transformed into the market economy in a relatively short period, there is an evident delay in the

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[128] World Bank Group 2020. *Cities in Transition: A literature review of urban shrinkage and its implications for Romania.* Inputs for the Urban Policy 2020-2035.

reforms of the urban land policy.[129] Construction land management takes place in the absence of real and segmented market institutions and mechanisms, with relatively complicated administrative procedures. Tools such as land value capture or land banking are not recognized in Serbia's legislative and planning systems and could be very efficient in the better regulation of land and property markets in Serbian cities, and a more efficient use of land.

Capacitate: Acknowledge and address peripheral development

Cities should acknowledge and address unregulated spatial extension in peripheral areas, whether suburban or peri-urban. Although analysis undoubtedly shows an ongoing suburbanization trend in most cities, it is rarely addressed in local plans which focus on efforts to create a compact city and increase built-up area densities in central city areas. There is very little planned peripheral expansion and creation of new medium- or large-scale residential suburbs in Serbia's cities over the last decades.

National-level urban development policy documents also rarely consider peripheral development enough and do not provide concrete measures to manage and regulate it. While SUDS recognizes a spontaneous growth of urban built-up areas and extremely inefficient construction land use as one of the key challenges of urban development in Serbia, there are no specific measures that focus on peripheral or urban fringe development. Instead, the solution is seen in a set of measures focused on densification of urban areas, more intensive land use, and urban renewal in central city zones.[130]

Capacitate: Develop more multi-faceted policies towards informal construction

Existing policies legalizing informal construction have proved to be counter effective. To begin, each new law provides more incentives for legalization, which makes informal construction cheaper and quicker than following the formal procedures, thus motivating people to build informally as growing numbers of informal buildings show. Secondly, the process is mostly observed as a legal issue, so devised solutions primarily revolve around solving legal issues related to informal buildings. Informal construction is a multi-dimensional problem: beyond legal perspectives it includes social, economic, spatial, and many other components as well, such as environmental or disaster resilience.

The current legalization process treats all informal builders in the same way, not making a distinction between those that build out of necessity (as they do not have other options, such as refugees, IDPs and low-income families) and those who are driven by opportunistic or speculative motives, such as developers that construct apartments for sale in informal settlements (by constructing informally and subsequently legalizing buildings, they decrease costs of construction and make higher profits than though formal procedures).

Generally, the processes of regularization and legalization should be conceived to address different aspects of informal construction more adequately, to offer different options to different groups of builders, and to eventually make informal construction less financially attractive than the formal option.

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[129] Zeković, S. and Vujošević, M. 2018. *Construction Land and Urban Development Policy in Serbia: Impact of Key Contextual Factors.* In: Bolay, J, Maričić, T. and Zeković, S. (eds.) 2018. *A Support to Urban Development Process.* IAUS: Belgrade.

[130] Sustainable Urban Development Strategy of the Republic of Serbia until 2030: *Key challenges of urban development* (p. 60) and *Strategic direction II: Development of Urban Settlements – set of measures* (p. 70)

These issues are adequately recognized by SUDS (at the policy level) but are not reflected in legal documents such as the Law on Legalization.

5.2.3   Urban policy and planning should improve environmental performance

Enhance and coordinate cities' urban development and disaster risk reduction strategies and plans

Many urban centers face risks associated to unplanned urban development as well as natural and human-induced disasters. To address these interlinked challenges, Serbian cities must concentrate efforts to tackle disaster risk by coordinating urban development policies with disaster risk strategies. This can be done through implementing disaster risk reduction plans, adopting nature-based solutions for risk reduction, improving climate adaptation of informal construction, and addressing the urban heat island effect together with other environmental challenges.

Capacitate: *Implement measures to mitigate the urban heat island effect*

Different measures can be taken to mitigate the impact of heat waves that will be more frequent in the future while tackling several challenges: (1) Green roofs and walls can absorb heat, provide shade, improve air quality and also reduce the amount of stormwater runoff (2) Trees and green areas can provide shade and evaporative cooling (3) Cool pavements (e.g., permeable pavements, reflective pavements, and pavements with light-colored surfaces) that reflect more sunlight and absorb less heat can reduce the urban heat island effect (4) Improved energy efficiency in buildings can reduce the amount of heat that is generated by air conditioning and other energy uses (5) Heat warning systems can provide early warnings to vulnerable populations and help to prevent heat-related illnesses.

Capacitate: *Adopt nature-based solutions for risk reduction*

The strategy for flood management needs to move from flood protection to flood risk management by shifting from only hard structural measures to also including nature-based solutions (e.g., restoring wetlands), resulting in a mix of technical and natural measures for flood control.[131] This is also identified in the SUDS (measures 4.2.1 and 4.2.2), with a focus on urban stormwater management.

Connect: *Coordinate urban planning and development with disaster risk reduction*

Cities should go beyond disaster risk analysis and adopt disaster risk reduction plans. Many cities have not yet developed or adopted the Disaster Risk Reduction Plan as required by the law.[132] These must consider the risks related to climate change, with more frequent pluvial and fluvial floods likely to occur. These plans must be coordinated with urban development policies and avoid zoning of construction land in flood-prone areas. A digital platform with the disaster risk register has been only recently launched but is not yet fully functional. [133] LSGs should incorporate this platform in their disaster risk reduction strategies.

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[131] Trgovčević, F. et al., 2020. *Toward Flood Resilience in Serbia: The Challenges of an (Un)Sustainable Policy.*

[132] The Law on Disaster Risk Reduction and Emergency Management (Official Gazette of the RS, No. 87/2018)

[133] https://drr.geosrbija.rs/drr/

Capacitate: *Regularize informal settlements to improve climate change adaptation of cities*

A critical issue in urban development in Serbia is manifested through informal construction.[134] Although there is clear jurisdiction for controlling and preventing these activities on the local level (by construction inspection), local governments do not have capacity to fully stop and prevent future illegal construction, while they still try to cope to integrate existing unplanned construction into the legal framework, via the process of legalization which has been in operation since 2003. Apart from inspection and enforcement mechanisms, a combination of different supporting policies must be put in place to prepare Serbian cities to create adequate responses to the future challenges related to climate change.

Tackle air quality issues by improving energy efficiency, air quality monitoring and implementation of sustainable mobility

Air quality levels in Serbian cities are poor. By exceeding the EU's air quality standards, these levels pose great health risks for the urban population. Improving air quality can be addressed in urban and national policies by improving efficiency, monitoring, and developing sustainable mobility.

Capacitate*: Invest in improvement of energy efficiency*

While energy prices are close to or at the cost recovery level, energy taxation is relatively low leading to relatively low prices compared to elsewhere in the region and to limited incentives provided to invest in energy efficiency measures and distributed renewable generation.[135] Therefore, the authorities may consider removing price caps and gradually increasing energy taxation (e.g., to account for externalities). At the same time, national government should consider gradually phasing out subsidies for electricity generation from coal and lignite, together with measures to protect vulnerable households against energy price increases. National government could also aim at transforming the Administration for Energy Efficiency Financing and Promotion to make it financially sustainable and autonomous in matters related to governance, procurement, budget control, and staffing. In addition, the authorities should prioritize the introduction of consumption-based billing in all district heating systems to avoid deterioration of financial sustainability and quality of district heating services.

Furthermore, incentives and programs for strengthening energy efficiency in buildings prior to the adoption of regulations in 2012 could be adopted (as per SUDS, measure 4.1.5). The EU policy objective for near-zero energy buildings (nZEB) has not yet been set into Serbian legislation and measures for reducing energy consumption in the household sector do not as yet include cooling.

Connect: *Develop sustainable urban mobility*

Particle matter air pollution is a critical issue in Serbia. Considering the EU accession process, Serbian LSGs have a responsibility to develop local public/city transport policies and set up standards for public transport vehicles (in line with the EU Directive 2009/33/EZ on the decrease of emission of pollutants), implement EU standards to taxi service and align with EU standards on traffic safety. As highlighted in the SUDS (set of measures 2.3.1 to 2.3.4), cities need to adopt Sustainable Urban Mobility Plans (SUMP).

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[134] AFD, 2022. *Urban Sector Vulnerability Impact Assessment.*

[135] The World Bank, 2022. *Supporting Serbia's Transition to Greener and More Resilient Growth, Policy and Institutional Reforms.*

Capacitate: *Improve air quality monitoring*

As showed in this report's analysis and highlighted by the European Commission, Serbia needs to prioritize improving its air quality plans and air quality monitoring system. [136] In particular, the Serbia 2021 Progress Report's key recommendations include the adoption of the EU air quality index and ensuring adequate staffing of the Serbian Environmental Protection Agency (SEPA). The SUDS also highlights a need for improved air quality monitoring (measure 4.3.6). However, improved air quality management generally needs more effective support from national government, including measures to update the Law on Air Protection, implement the National Air Protection Program, and strengthen the institutional framework. There is also a need to reform some of the existing financial instruments since they do not penalize polluters.

Environmental services need to be improved

The environmental services currently in place in Serbian cities are often in poor condition but could be improved by better coordination, cost recovery, and infrastructure development.

Capacitate: *Coordinate relevant policy documents and institutions to improve water services*

At the national level, clarification and definition of the roles and duties are needed to improve the efficiency and effectiveness of water policy. To achieve this, the authorities need to adopt the newly drafted Water Law and formulate and implement associated regulations. Furthermore, the River Basin Management Plan and the first Flood Risk Management Plan need to be finalized to guide the planning of investments in Serbia's water sector. Finally, measures to further align Serbia's water-related legislation with EU standards will be necessary, particularly regarding the institutional framework for enforcement, monitoring, and coordination.

Connect: *Enhance cooperation of neighboring LSGs to remediate informal landfills*

Serbia needs to redouble its efforts to close its non-compliant landfills.[137] The SUDS identifies as strategic measures the elimination of informal landfills, building and developing existing landfills, and increasing waste treatment and recycling capacity. LSGs are responsible for the establishment of public utility companies responsible for the management of municipal waste and regional companies (private/public) to maintain regional landfills and other waste centers.

Bearing in mind the financial, human and technical capacity constraints of most cities and municipalities, the regional cooperation of neighboring LSGs in solid waste management could be boosted. Regional cooperation has proven to be successful in several cases of regional landfills, and there is the opportunity to expand and further improve such cooperation on other aspects of solid waste treatment such as recycling, remediation of illegal landfills and preventing creation of new illegal landfills.

The inclusion of waste-to-energy processes for municipal solid waste, at the local or regional level, brings different benefits to the community. These could contribute to the fulfilment of obligations under the Global Methane Pledge initiative that Serbia joined, which was announced by the EU and the US at COP

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[136] European Commission, 2022. *Serbia 2022 Report*. Available at: https://neighbourhood-enlargement.ec.europa.eu/system/files/2022-10/Serbia%20Report%202022.pdf

[137] European Commission, 2022. *Serbia 2022 Report*.

26 in Glasgow in November 2021). The initiative aims to reduce overall emissions of signatories by 30 percent by 2030, compared with 2020 levels.

Capacitate: *Improve water services through cost recovery*

With low water tariffs in Serbia, the authorities should set the tariffs in accordance with the cost recovery principle. This could contribute well to the cost of achieving compliance with EU standards which is estimated to stand at around five billion euros (40 percent for drinking water supply and 60 percent for sanitation), or an average of 32 euros per inhabitant per year for the next 20 years, around twice the current annual investment rate.

6   References

AFD, 2022. *Urban Sector Vulnerability Impact Assessment* (report 3).

Angel, S., 2021. Comments on From Pancakes to Pyramids. UPenn Institute for Urban Research Webinar, 16 September 2021.

Bertaud, A., 2015. Land Markets, Government Interventions and Housing Affordability.

Blei, A. and Angel, S., 2021. Global Monitoring with the Atlas of Urban Expansion. In: Yang, X. (ed.) 2021. Urban Remote Sensing: Monitoring, Synthesis, and Modelling in the Urban Environment, Second Edition.

Čamprag, N., 2018. Facing Shrinkage – Perspectives of Urban Development in Serbia. In: Contemporary achievements in civil engineering – conference proceedings.

CCRE-CEMR, 2016. Local and Regional Governments in Europe: Structures and Competences. https://www.ccre.org/img/uploads/piecesjointe/filename/CEMR_structures_and_competences_2016_EN.pdf

City of Belgrade, 2016. *General Urban Plan of Belgrade 2016 to 2021*. http://www.beoland.com/wp-content/uploads/planovi/gup-beograda/SL_11_2016.pdf

City of Kragujevac, 2018. *Assessment of Vulnerability to Natural Hazards and Other Accidents for the City of Kragujevac*. https://www.kragujevac.rs/e-usluge/stab-za-vanredne-situacije/

City of Novi Sad, 2021. *General Urban Plan of Novi Sad until 2030.* http://www.nsurbanizam.rs/sites/default/files/1828%20GUP%20Novog%20Sada%20do%202030_SL_list.pdf

EBRD, 2016. *Life in Transition Survey*. https://litsonline-ebrd.com/index.htm

Environmental Protection Agency of Serbia, 2020. *Annual report on the state of air quality in the Republic of Serbia*.

Environmental Protection Agency, 2021. Waste Management in the Republic of Serbia in the period from 2011 to 2020. http://www.sepa.gov.rs/index.php?menu=5000&id=1304&akcija=showDocuments&tema=Otpad

European Commission, 2019. *Description of the GHSL Urban Center Database 2015.*

European Commission, 2022. *Serbia 2022 Report*. https://neighbourhood-enlargement.ec.europa.eu/system/files/2022-10/Serbia%20Report%202022.pdf

European Environmental Agency, 2021. *Country fact sheet, Serbia: Municipal Solid Waste Management.*

Eurostat, 2018. *Living Conditions in Europe*. https://ec.europa.eu/eurostat/web/products-statistical-books/-/KS-DZ-18-001

Grubovic, Lj., 2006. *Belgrade in Transition: an analysis of illegal building in a post-socialist city*. PhD Thesis, London School of Economics and Political Science, London.

Macura, V., Petovar, K. and Vujovic S., 1997. *Siromašna područja Beograda: prikaz stanja i mogućnosti poboljšanja uslova življenja (Poor Areas of Belgrade: assessment of current situation and possibilities for improving the living conditions).* Institut za arhitekturu i urbanizam Srbije (IAUS), Beograd.

Milic V., Petovar, K. and Colic R., 2004. *Illegal construction: genesis and perspectives for the problem solution, in: The national report on the problem of informal settlements in Serbia*. Stability Pact of South-Eastern Europe Conference, Vienna.

Ministry of Construction, Transport and Infrastructure of the Republic of Serbia, 2018. *Sustainable Urban Development Strategy of the Republic of Serbia until 2030*.

Ministry of Construction, Transport and Infrastructure, 2021. *Database of illegally constructed buildings.*

Mojović, D. and Ferenčak, B., 2011. *Challenges of Regularization of Informal Settlements in South-East Europe. Skopje: NALAS.*

Petrić, J., Bajić, T. and Danilović-Hristić, N., 2018. *Urban sprawl of informal settlements in Belgrade, Serbia - Models for standardization and reflections on recovery.* 4th ISUF International Conference. Bari, September 26th-28th 2018. Proceedings U+D Editions, 2019, 793-801.

Pihler, V., 2007. T*owards Upgrading of Informal Settlements in Serbia: Assumptions on Future of Veternik. In: Vitrano*, R. M. 2007. Scenarios of Illegal Building: Strategies of building and town recovery. (pp. 436-447). https://www.academia.edu/7911884/Towards_Upgrading_of_Informal_Settlements_in_Serbia_Assumptions_O

Rašević, M., 2016. *Migration and development in Serbia*. International Organization for Migration (IOM), Belgrade.

Republic of Serbia, 2009. *The Law on Emergency Situations* (Official Gazette of the RS, No. 111/2009)

Republic of Serbia, 2015. *The Law on Legalization of Buildings* (Official Gazette of the Republic of Serbia, No. 96/2015, 83/2018 and 81/2020).

Republic of Serbia, 2018. *The Law on Disaster Risk Reduction and Emergency Management* (Official Gazette of the RS, No. 87/2018).

Republic of Serbia, 2021. *Economic Migration Strategy of the Republic of Serbia for the period 2021-2027.*

Republic of Serbia, 2021. *The Law on Local Self-Governments* (Official Gazette of the RS, No 29/2007, 83/2014 - dr. zakon, 101/2016 - dr. zakon, 47/2018 i 111/2021 - dr. zakon).

Republic of Serbia. *National Housing Strategy 2020 to 2030 – Draft*. https://www.mgsi.gov.rs/sites/default/files/NACIONALNA%20STAMBENA%20STRATEGIJA_17.01.22.pdf

Saveljic, B. 1988. *Beogradska favela: nastanak i razvoj Kaludjerice (Belgrade favela: the formation and development of Kaludjerica settlement)*. Kultura, Beograd.

Slaev, A. et al., 2018. *Suburbanization and sprawl in post-socialist Belgrade and Sofia*. In: European Planning Studies 2018

Statistical Office of the Republic of Serbia, 2011. Census Atlas.

Statistical Office of the Republic of Serbia, 2020. Demographic Yearbook. https://www.stat.gov.rs/en-us/oblasti/stanovnistvo/demografski-indikatori/

Statistical Office of the Republic of Serbia, 2020. *Statistical Release No. 180*

Statistical Office of the Republic of Serbia, 2021. *Statistical Release No. 181 – Statistics of Population*.

Statistical Office of the Republic of Serbia, 2022. *Eco-Bulletin 2021.*

The City of Novi Pazar, 2018. *Public health plan 2019-2026.* https://www.novipazar.rs/dokumenti#projekti-u-novom-pazaru

Tošić, D and Nevenić, M., 2006. *Settlement Network of Novi Pazar Municipality – Present State and Development Tendencies*. Bulletin of the Serbian Geographical Society, Tome 86 No. 1.

Trgovčević, F. et al., 2020. *Toward Flood Resilience in Serbia: The Challenges of an (Un)Sustainable Policy*.

UN HABITAT, 2003. *Rental Housing: An Essential Option for the Urban Poor in Developing Countries.*

United Nations, 2012. *World Urbanization Prospects 2011.*

United Nations, 2019. *World Urbanization Prospects 2018.*

Urban Planning Institute of Belgrade, 2018. *70 Years of Urban Planning Institute of Belgrade, Book 2: Plans*.

Van Ginkel et al., 2022. *Will river floods 'tip' European road networks?* A robustness assessment. https://doi.org/10.1016/j.trd.2022.103332

Vujosevic M., Zekovic S. and Maricic, T., 2012. *Novi evropski regionalizam i regionalno upravljanje u Srbiji: Knjiga 1*. Belgrade: IAUS.

World Bank Group, 2018. *Migration and Remittances, Recent developments and Outlook.* https://openknowledge.worldbank.org/handle/10986/29777

World Bank Group, 2020. *Cities in Transition: A literature review of urban shrinkage and its implications for Romania*. Inputs for the Urban Policy 2020-2035.

World Bank, 2019. *Western Balkans and Croatia: Urbanization & Territorial Overview.*

World Bank, 2019. *Component 2 of Serbia national disaster risk management plan (NDRMP) - flood hazard and risk mapping.* http://gis.vodevojvodine.com/visios/fhrm

World Bank, 2021. *Municipal Finance Note June 2021 (unpublished)*

World Bank, 2022. *Supporting Serbia's Transition to Greener and More Resilient Growth, Policy and Institutional Reforms.*

World Health Organization, 2019. *Health Impact of Ambient Air Pollution in Serbia*. Copenhagen, DE.

Zampieri et al., 2016. *Global assessment of heat wave magnitudes from 1901 to 2010 and implications for the river discharge of the Alps*. https://doi.org/10.1016/j.scitotenv.2016.07.008

Zeković S. et al., 2015. *Planning and land policy tools for limiting urban sprawl: the example of Belgrade.* Spatium No. 33, June 2015

Zeković, S. and Vujošević, M., 2018. *Construction Land and Urban Development Policy in Serbia: Impact of Key Contextual Factors*. In: Bolay, J, Maričić, T. and Zeković, S. (eds.) 2018. A Support to Urban Development Process. IAUS: Belgrade.

Živanović, Z., Tošić, B., Nikolić, T. and Gatarić, D., 2019. *Urban System in Serbia: The Factor in the Planning of Balanced Regional Development.* Sustainability 2019, 11, 41-68.

Živković, Lj. And Đorđević, A., 2015. *General Characteristics of Substandard Roma Settlements in Serbia*. Belgrade: OSCE Mission to Serbia. Available at: https://www.osce.org/serbia/159711

APPENDICES

Appendix A   Methodology of Delineation of Urban Areas

A.1   Delineation and classification of urban areas

There is a difference between the GHSL classification of urban areas and the Serbian official legislative and statistical definitions of cities and urban settlements. GHSL uses satellite imagery to delineate urban areas, as well as population density and the size of settlements to classify these as urban or rural. Serbian statistics are based on administrative and statistical delineations of settlements, classified as urban (i.e., "urban settlements").

Some of the areas which GHSL classifies as *urban* (cities, towns and suburbs), are not classified as *urban settlements* in Serbian statistics as urban, and vice-versa, as some settlements that Serbian statistics classify as urban are not urban areas based on the GHSL classification method.

This is particularly relevant for urban policy at both national and local levels since this is focused on statistically defined and physically demarcated urban areas. For example, the Sustainable Urban Development Strategy of the Republic of Serbia (SUDS) deals with *192 urban settlements* as classified by Serbian statistics. The difference between these urban settlements and what GHSL classifies as urban is shown on the map below (see Figure 6-1). This divergence will be further explained in the next sections.

Figure 6-1: Administrative boundaries of urban settlements as defined in Serbian official statistics (grey); and urban areas as classified and mapped by GHSL (red, black, brown, yellow) Inset: urban settlements and areas in and around Novi Sad.
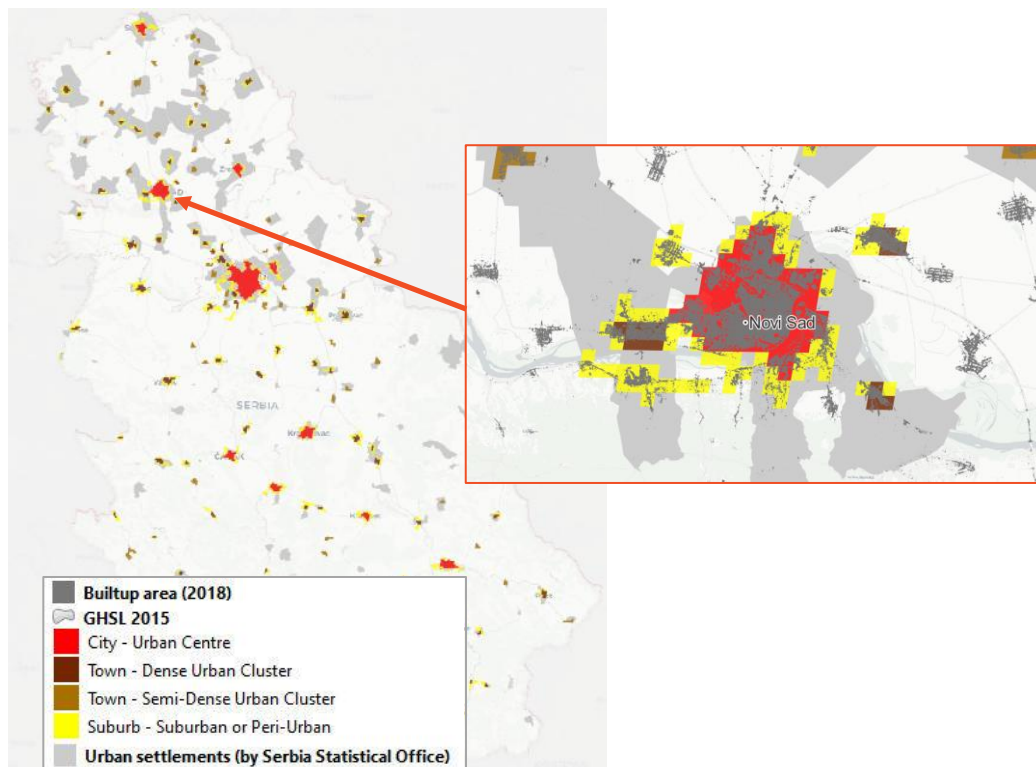
A.2   Urbanization and the Built-up Area at City Scale

This section presents the work for the spatial demarcation of cities, to reconcile the different definitions of urban areas in the official national legal and policy framework with the international definitions and methodology.

A.2.1   Link between urban centers and their suburbs and peri-urban areas.

A recent analysis[138] of the global information on urban areas in the GHSL Degree of Urbanization database, stresses several issues related to the methodology of delineating urban areas used in the GHSL methodology. While the study finds it justifiable to limit the analysis to cities with 50,000 people or more, the authors believe that it is not legitimate to ignore suburbs and peri-urban areas of urban centers.

In the GHSL database, suburbs and peri-urban areas are not associated with particular urban centers; the database can say little about suburban or peri-urban expansion on the periphery of urban centers, which limits the validity of conclusions pertaining to urban expansion.[139] An analysis of urban centers, disconnected from their suburbs and peri-urban areas, may not be informative enough for national or local urban development policies and plan making.

A.2.2   Identify Census settlements based on continuous built-up data

Bearing in mind these limitations, the attempt was to define the extent of individual cities by mapping whole continuous built-up areas that contain any type of urban cluster, as these are defined by the GHSL.

Cities in this mapping are thus composed of urban centers and all the adjacent urban clusters directly attached (or, in other words, adjacent) to these: dense urban, semi-dense urban, and suburban or peri-urban clusters. Continuous built-up areas that contain any kind of urban area were linked to the relevant settlements for which census population is available. The population of cities was calculated based on these data (see Figure 6-2), where these calculations are labelled "Census Population based on continuous built-up settlement". In this fashion, urban trends in both urban centers and their suburbs can be observed.

The difference between the official delineation of urban settlement in Serbian statistics, that using the GHSL urban center method, and delineation of cities based on continuous built-up areas is shown in Figure 6-2 and in the box A1 below that explains a step-by-step process of delineating a continuous urban built-up area of a city and calculating the total population in it.

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[138] Blei, A. and Angel, S. 2021. Global Monitoring with the Atlas of Urban Expansion. In: Yang, X. (ed.) 2021. Urban Remote Sensing: Monitoring, Synthesis, and Modelling in the Urban Environment, Second Edition.

[139] Angel, S. 2021. Comments on From Pancakes to Pyramids. UPenn Institute for Urban Research Webinar, 16 September 2021.

Figure 6-2: Delineation of city limits combining GHSL Degree of Urbanization and Built-up global datasets and official administrative boundaries of settlements (green).
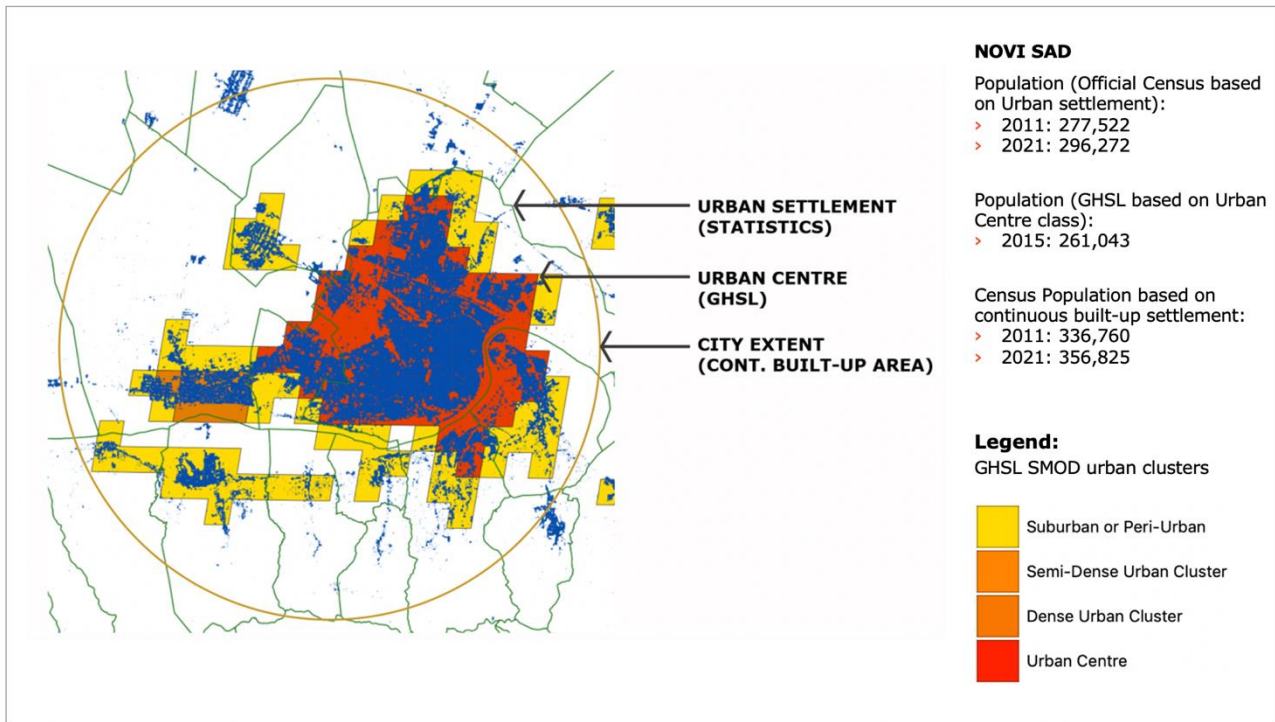
Both GHSL SMOD/Degree of Urbanization140 and WorldPop (Population) global datasets were used in order to detect contiguous high-density population areas. GHSL SMOD141 uses GHS-POP data from 2015, while WorldPop provides more recent data from 2020[142]. For determining built-up areas, the GHS Built-S2 dataset 2018 was used.

Differences in population numbers between urban centers derived from the GHSL and the delineation of city extents in our own mapping are in some cases significant, as shown in the example of Novi Sad in Figure 6-2.

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[140] https://ghsl.jrc.ec.europa.eu/ghs_smod2019.php

[141] https://data.jrc.ec.europa.eu/dataset/42e8be89-54ff-464e-be7b-bf9e64da5218

[142] https://hub.worldpop.org/geodata/summary?id=28745 The spatial distribution of population in 2020, allocated to 100x100 meter cells, with Serbia's total adjusted to match the corresponding UNCPD estimate.

Box A1: Example of the demarcation of the city of Novi Pazar

The urban settlement Novi Pazar is depicted by the red line in the figure below, surrounded by rural settlements (in green). The actual built-up area is shown in grey, which does not cover all the urban settlement (open areas in the northwest, south-west and east of the urban settlement) and extends into rural settlements (to the north, west and south of the urban settlement). Based on Census 2011, the population of Novi Pazar (based on the depicted urban settlement) was 66,527.
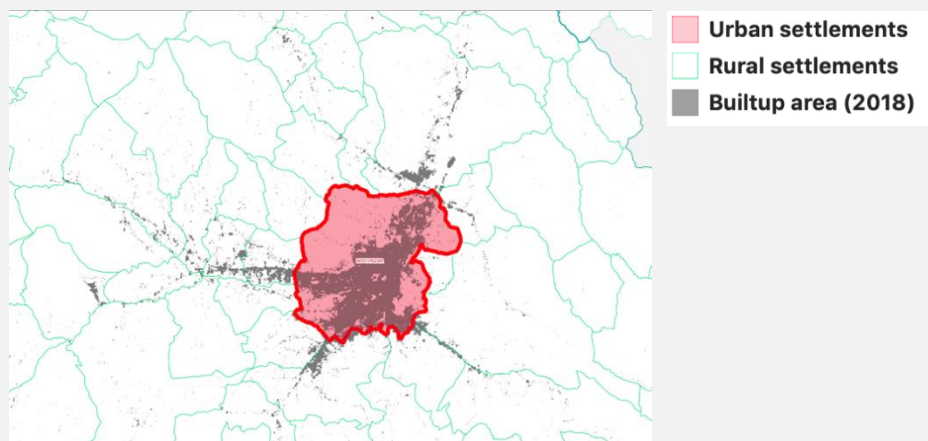

In the following figures, WorldPop and GHS SMOD[143] were used to confirm population densities of at least 1,500 people per km^2 in the continuous urban areas.

Firstly, GHS SMOD was used to a) identify all urban clusters, and b) control that the entire continuous urban area is covered by mapping. The urban center of Novi Pazar, as defined by GHSL, has a population of 82,728 (GHSL Degree of Urbanization 2015: https://ghsl.jrc.ec.europa.eu/CFS.php).
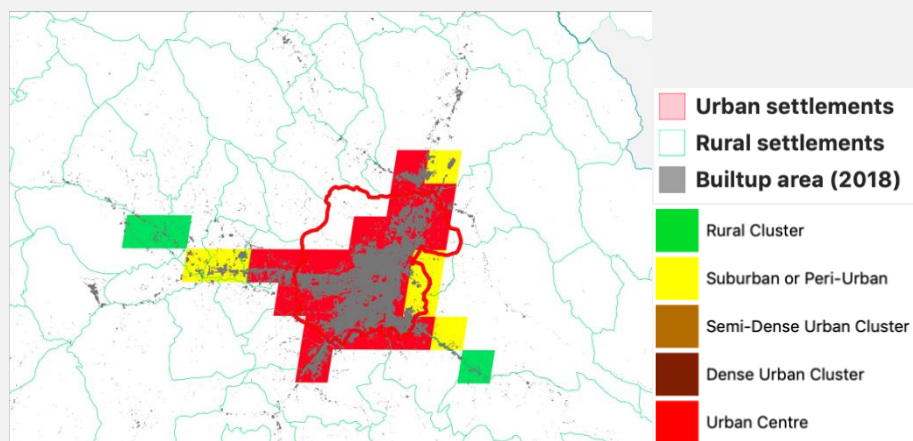

Secondly, WorldPop (2021) was used to cross-check and compare the population densities in built-up area, as determined by the GHSL (2015).

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[143] https://www.worldpop.org/ & https://ghsl.jrc.ec.europa.eu/ghs_pop2019.php & https://ghsl.jrc.ec.europa.eu/ghs_smod2019.php
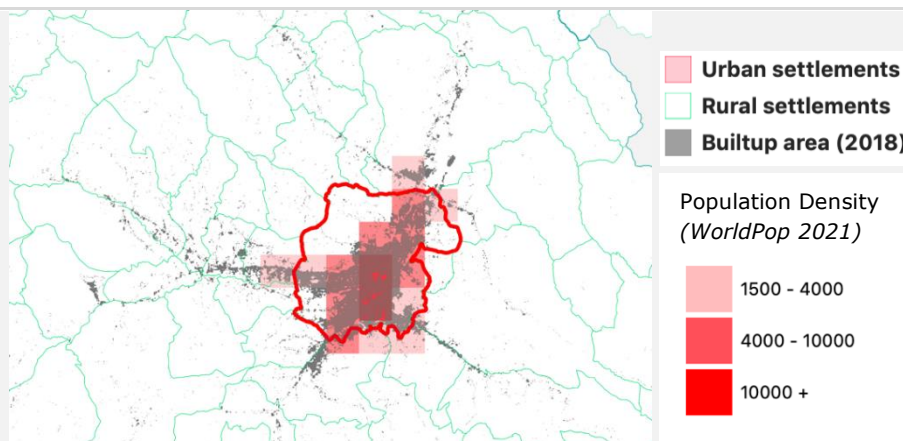
Finally, the boundaries of 'settlements' as defined by the administrative division of Serbia are used. The built-up areas confirmed by WorldPop and GHS SMOD information lead to a selection of settlements (regardless of their class in Serbian statistics as "urban" or "rural") that cover the continuous built-up area of a city. Based on the census data aggregated at settlement level, the actual population figures of continuous built-up areas of cities were calculated (see the figure below). Based on this, the city of Novi Pazar had 83,450 people in 2011 (based on population figures from 2011 Census) and 90,507 people in 2021 (based on the Statistical Office of Serbia annual population surveys).
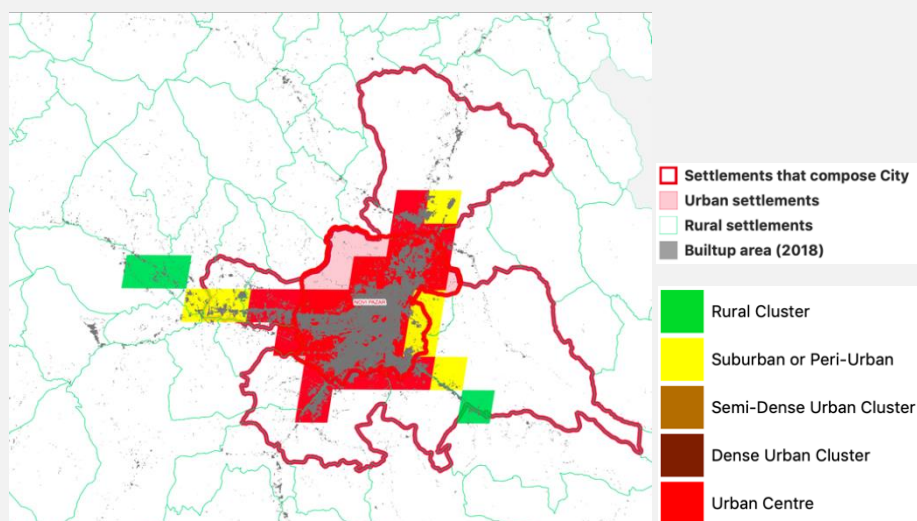
The data from Census 2011 is used for comparing official data (*Official Census based on Urban settlement*) with data related to continuous built-up settlement that make up the city and its suburbs and peri-urban areas. In all further analysis, data from the 2021 annual survey was used. Earlier censuses (2002 and 1990) are also used to observe the longer-term population trends in cities.

The analysis was applied to the 27 cities that have an official city status based on Serbian legislation.[144] As the result of this analysis, there is an evident difference in population sizes of cities when contrasted both to the official data and the GHSL Urban Centre Database, as shown in Table 1-3. The column 'Population 2011 (Official Census based on Urban Settlement)' shows the population figures based only on the urban settlements, and as it is reported in official statistics in Serbia, whereas the column 'Population 2011 (Census based on continuous built-up settlement)' is showing the population in the settlements with continuous built-up areas of the cities as calculated in our analysis. The third column 'Degree of Urbanization Classification (GHSL)' shows how the built-up area of each city is classified by the GHSL.

The resulting population differences are especially significant in the secondary cities Novi Sad and Niš, which have around 20 percent larger populations than both official figures (urban settlements) and GHSL (urban centers) show. This is also visible for several medium-sized cities where the results of our calculations are more than 30 percent higher than the official statistics.

If the Degree of Urbanization definition of the city (minimum 50,000 people in an urban center) is extended to whole continuous urban built-up areas, as cities were delineated in our mapping, only 17 cities had over 50,000 people in 2021, of which only five cities have more than 100,000 people (Belgrade, Novi Sad, Niš, Kragujevac and Subotica). Of the remaining cities, three had over 40,000 inhabitants and the remaining six are smaller than required to be classified as cities.

The same definitional approach that was applied to cities was applied for delineating (separate) towns: i.e., dense and semi-dense urban clusters were observed together with suburban and peri-urban clusters directly attached to them. In Figure 6-3, an example is provided of delineating a town (Lazarevac, in the Belgrade Administrative Region) by determining the continuous build-up area (blue) that contains urban clusters (semi-dense and suburban) and then, using boundaries of settlements (brown), determine population based on census information.

This enables, at the national level, the calculation of the number of people living in cities (urban centers), the number of people living in other urban settlements, and the number of the rural population, as an input for national and local level urban development policies.

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[144] Out of 28 cities determined by the Law on Territorial Organization, for the City of Užice the data from the Census is not available (apparently because of errors in the census taking process), so 27 cities in total were analyzed.

Figure 6-3: Example of delineating a town (Lazarevac) based on built-up areas.
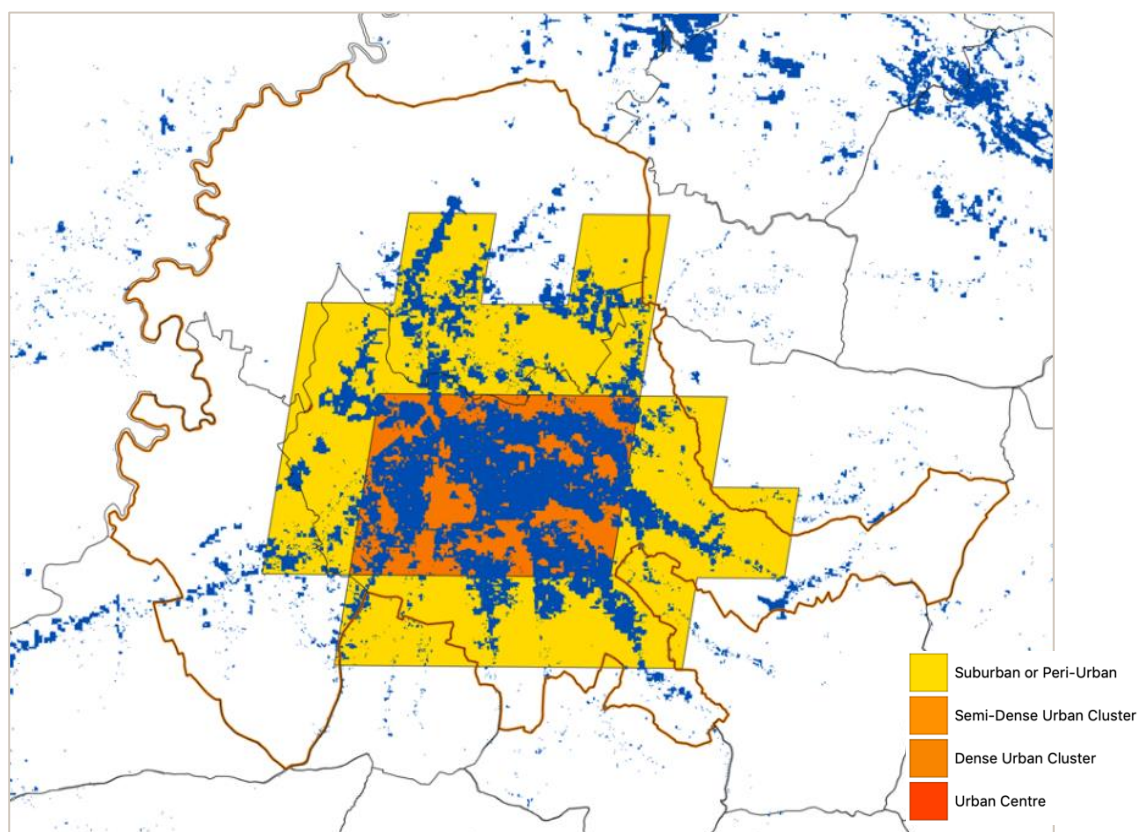
Appendix B   Environmental performance of cities

B.1   Green areas

Table 6-1: Population living in high green areas for Serbian and comparator cities

City	Country	Category (population)	Population living in high green areas (%)
Serbia			
Belgrade	Serbia	Primary	34%
Novi Sad	Serbia	Secondary	37%
Nis	Serbia	Secondary	16%
Kragujevac	Serbia	Secondary	38%
Novi Pazar	Serbia	Medium	21%
Subotica	Serbia	Medium	24%
Cacak	Serbia	Medium	40%
Krusevac	Serbia	Medium	28%
Kraljevo	Serbia	Medium	50%
Zrenjanin	Serbia	Medium	42%
Pancevo	Serbia	Medium	29%
Valjevo	Serbia	Medium	49%
Leskovac	Serbia	Medium	18%
Comparators			
Tirana	Albania	Primary	18%
Shkoder	Albania	Medium	25%
Baku	Azerbaijan	Primary	0%
Lankaran	Azerbaijan	Secondary	16%
Sofia	Bulgaria	Primary	20%
Plovdiv	Bulgaria	Secondary	12%
Burgas	Bulgaria	Secondary	14%
Stara Zagora	Bulgaria	Medium	24%
Zagreb	Croatia	Primary	46%
Split	Croatia	Secondary	15%
Osijek	Croatia	Medium	21%
Tbilisi	Georgia	Primary	9%
Batumi	Georgia	Secondary	18%
Kutaisi	Georgia	Secondary	20%
Budapest	Hungary	Primary	27%
Debrecen	Hungary	Secondary	20%
Szeged	Hungary	Secondary	40%
Bratislava	Slovakia	Primary	45%
Kosice	Slovakia	Secondary	43%

Source: GHSL dataset - https://ghsl.jrc.ec.europa.eu/CFS.php

B.2   Heat wave magnitude index

Table 6-2: Heatwave magnitude index for Serbian and comparator cities

City	Heat wave index
Serbia	
Belgrade	8
Novi Sad	11
Nis	6
Kragujevac	8
Novi Pazar	9
Subotica	12
Cacak	10
Krusevac	7
Kraljevo	8
Zrenjanin	9
Pancevo	8
Valjevo	10
Leskovac	7
Comparators	
Tirana	7
Shkoder	9
Baku	18
Lankaran	11
Sofia	7
Plovdiv	11
Burgas	6
Stara Zagora	9
Zagreb	10
Split	23
Osijek	11
Tbilisi	12
Batumi	5
Kutaisi	9
Budapest	18
Debrecen	18
Szeged	14
Bratislava	11
Kosice	15

Source: GHSL dataset - https://ghsl.jrc.ec.europa.eu/CFS.php

B.3   Air quality

SO_2 air pollution levels have been improving considerably between the years 2000 to 2010 in all Serbian and comparator cities.
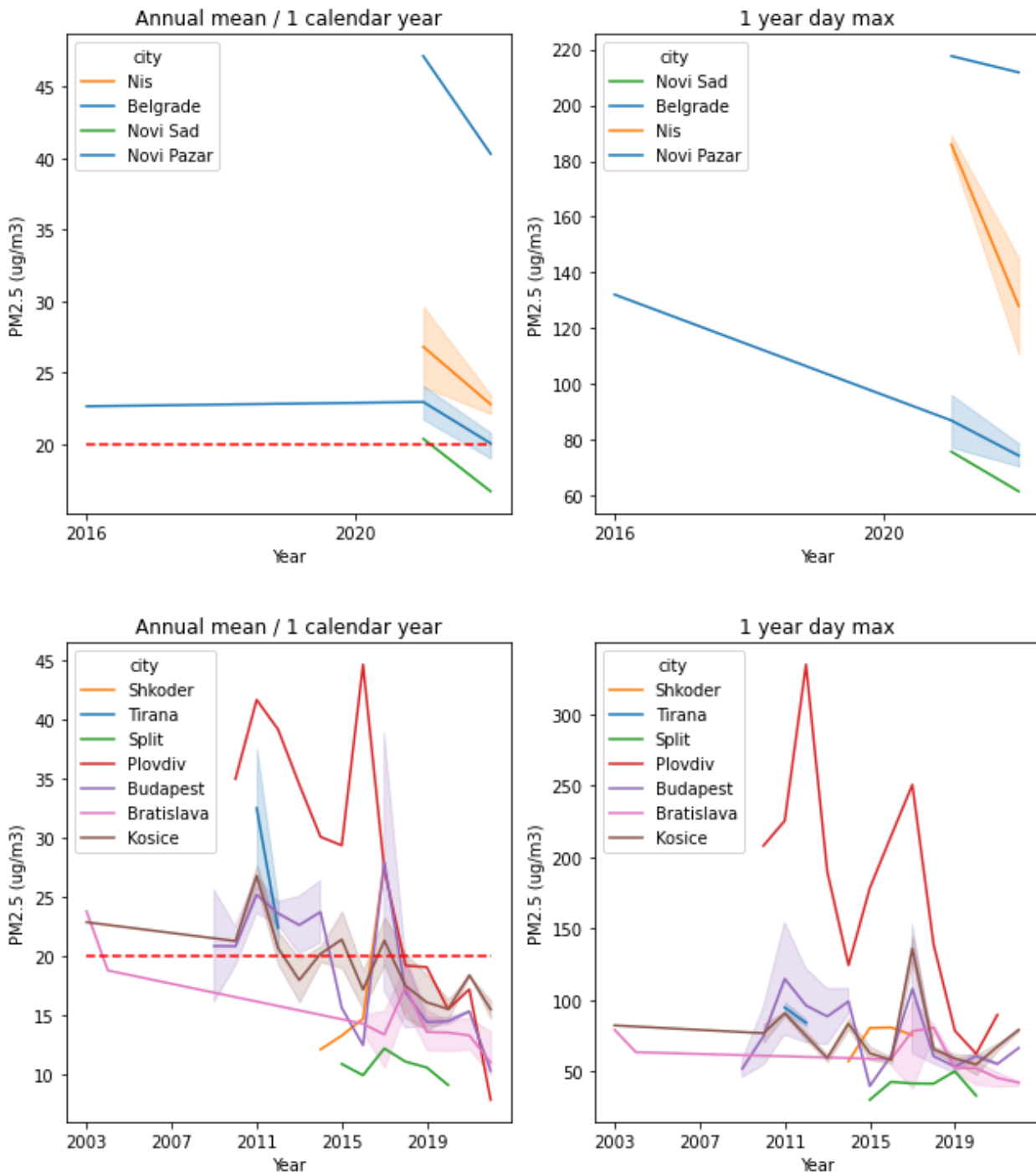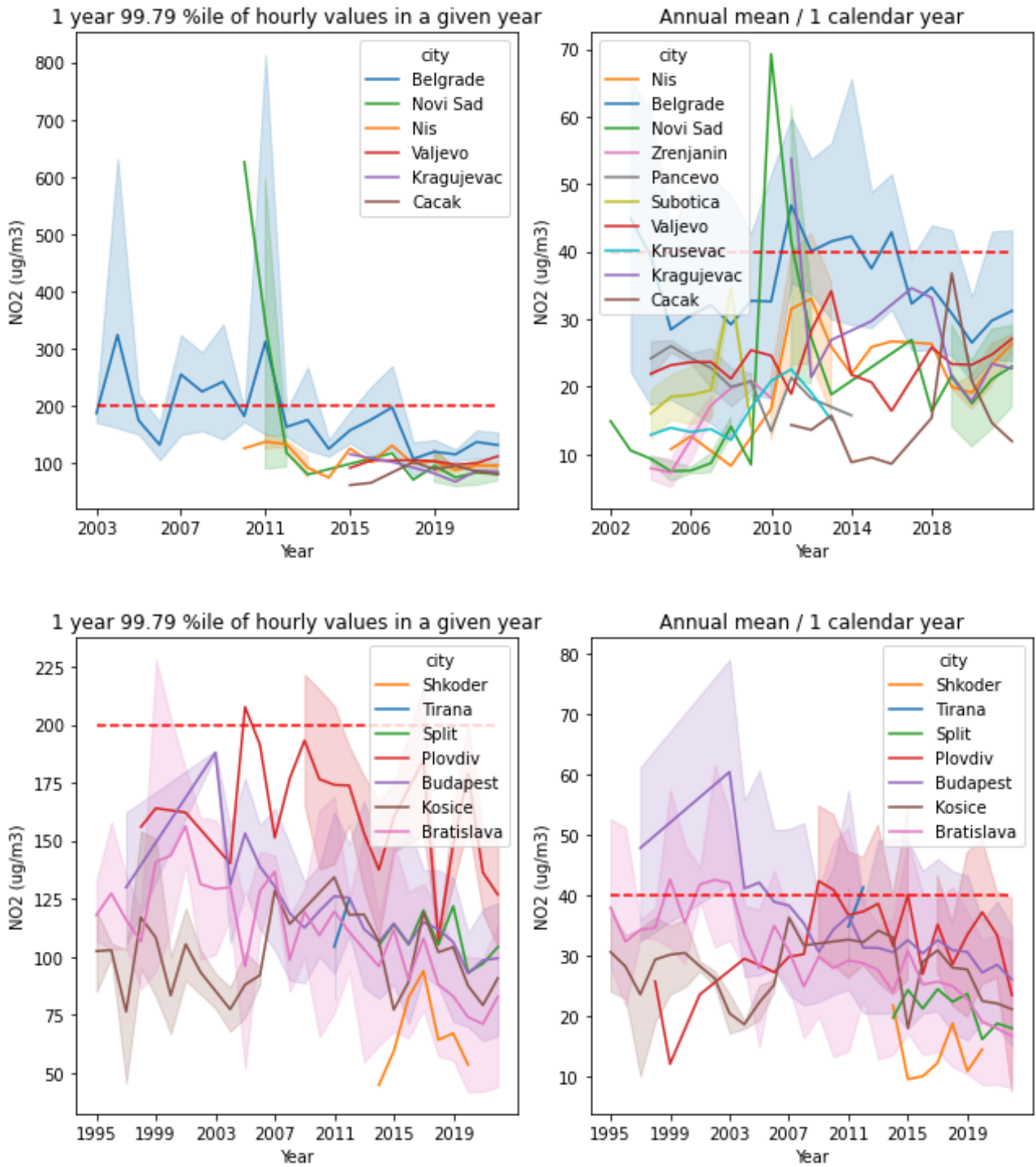
Figure 6-4: SO_2 air quality parameter
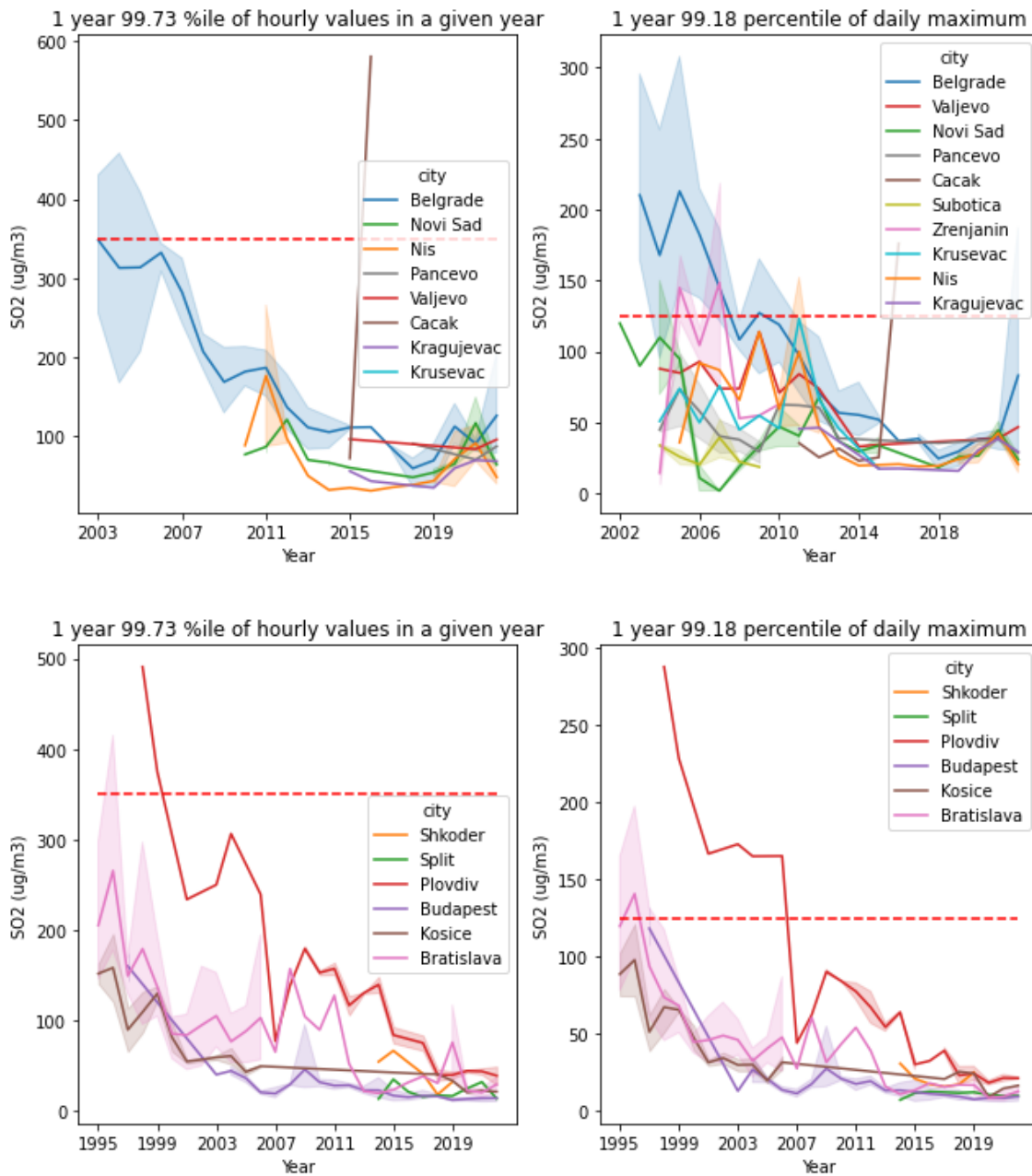
The red dotted line corresponds to the EU Air quality standards, the shaded area represents the variation across stations when several stations are available for a city.

Source: https://discomap.eea.europa.eu/Index/

Figure 6-5: PM2.5 air quality parameter

The red dotted line corresponds to the EU Air quality standards, the shaded area represents the variation across stations when several stations are available for a city.

Source: https://discomap.eea.europa.eu/Index/

For PM2.5 there is missing data in Serbia, the live air quality database from the same source shows issues with PM2.5 in Belgrade, while the only two measurements from the historic database, show PM2.5 levels just within EU standards.
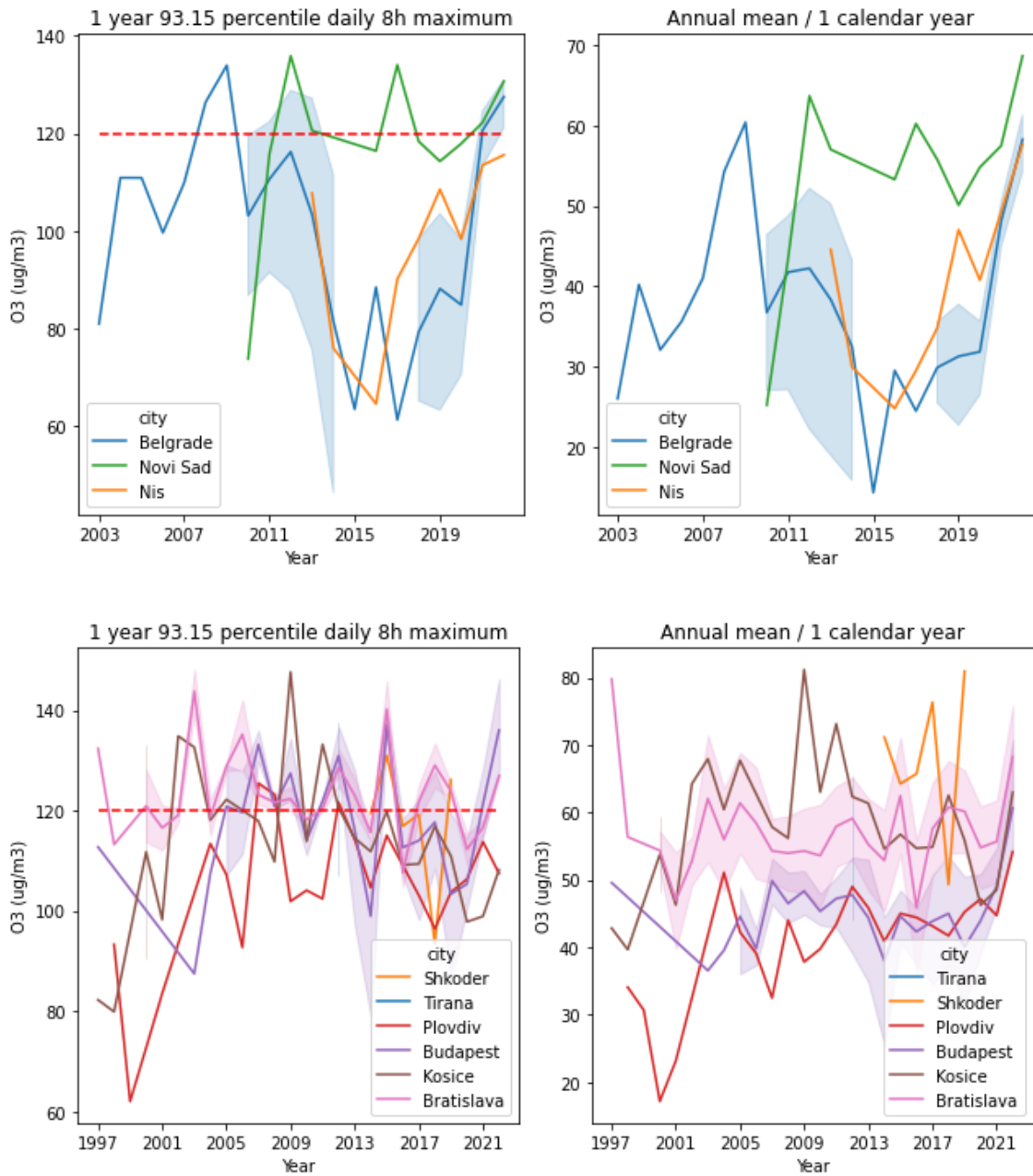
Figure 6-6: NO2 air quality parameter

The red dotted line corresponds to the EU Air quality standards, the shaded area represents the variation across stations when several stations are available for a city.

Source: https://discomap.eea.europa.eu/Index/

NO₂ air pollution level is within the EU standard for all Serbian cities except Belgrade.

Figure 6-7: Ozone air quality parameter

The red dotted line corresponds to the EU Air quality standards, the shaded area represents the variation across stations when several stations are available for a city.

Source: https://discomap.eea.europa.eu/Index/

There are very limited data on Ozone pollution levels. Belgrade, Novi Sad, and Niš are just around the EU standards, Belgrade and Niš had improving levels from 2010 to 2015, but a worsening trend from 2015 to today. Many of the comparator cities also show ozone pollution levels above the EU standards.
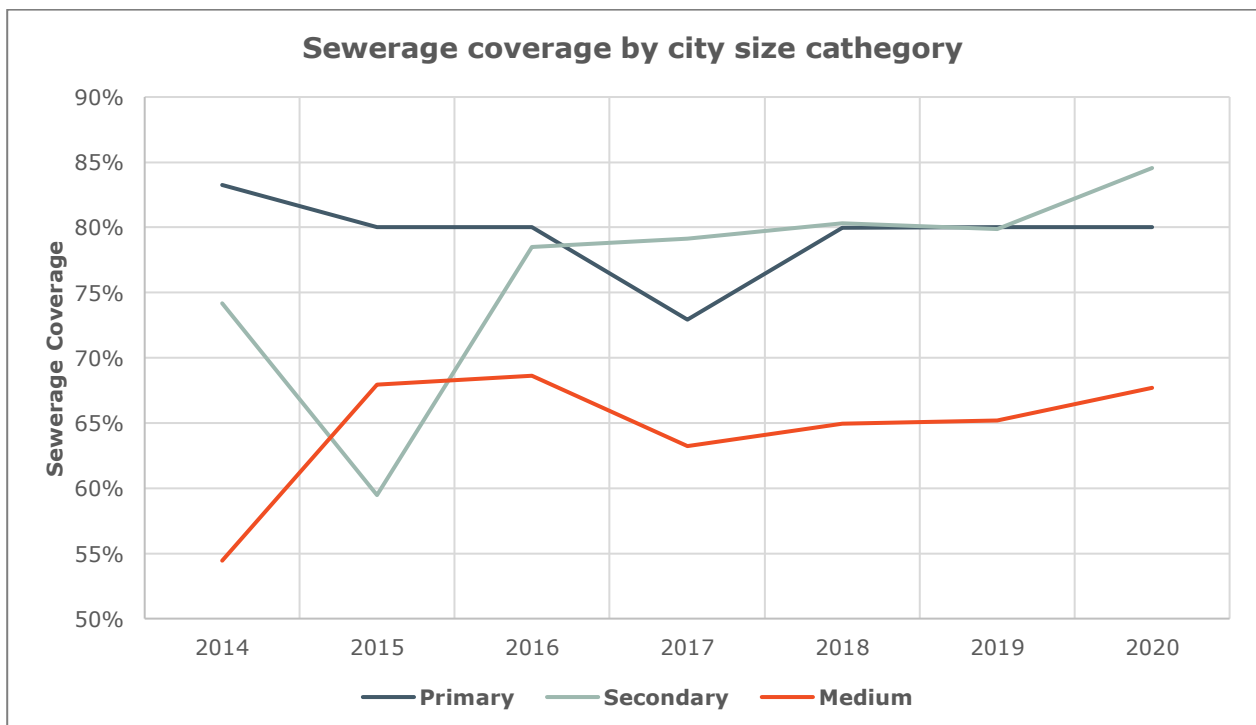
B.4   Environmental services

Figure 6-8: Evolution of water supply coverage for Serbian cities aggregated by categories based on population
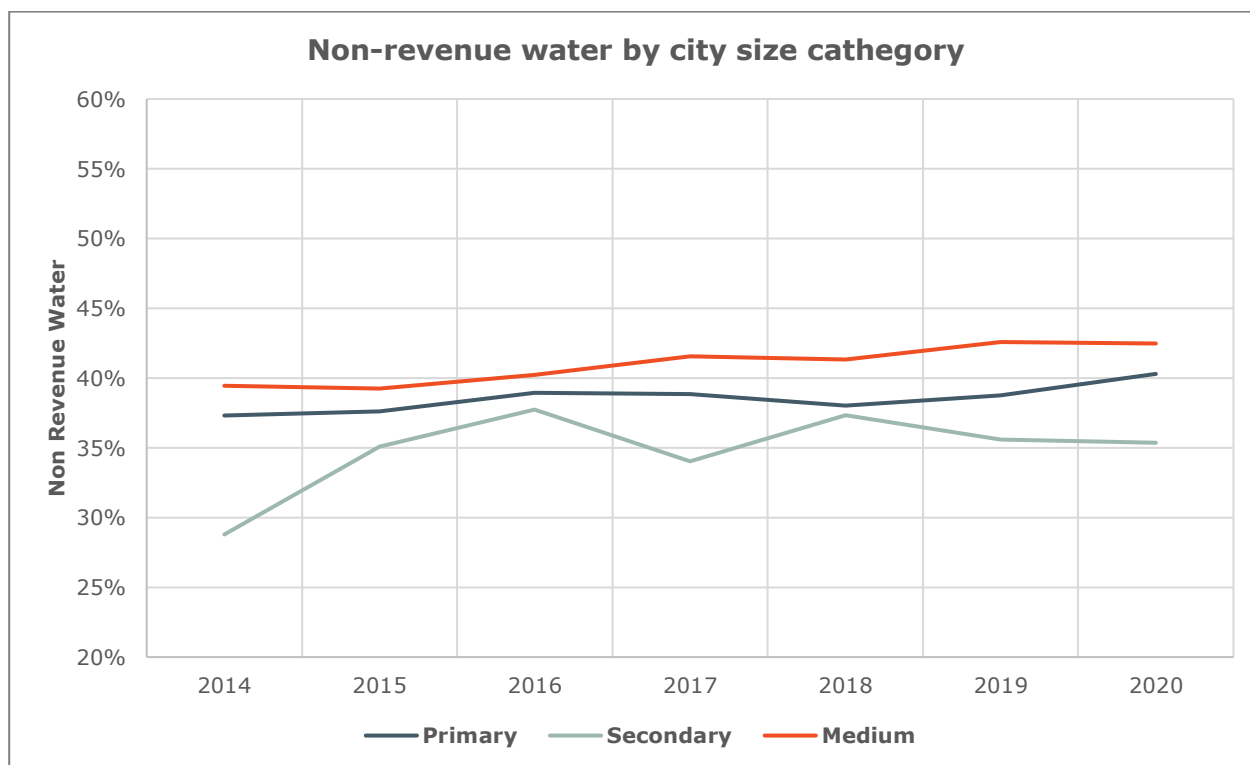

Source: *https://database.ib-net.org/*
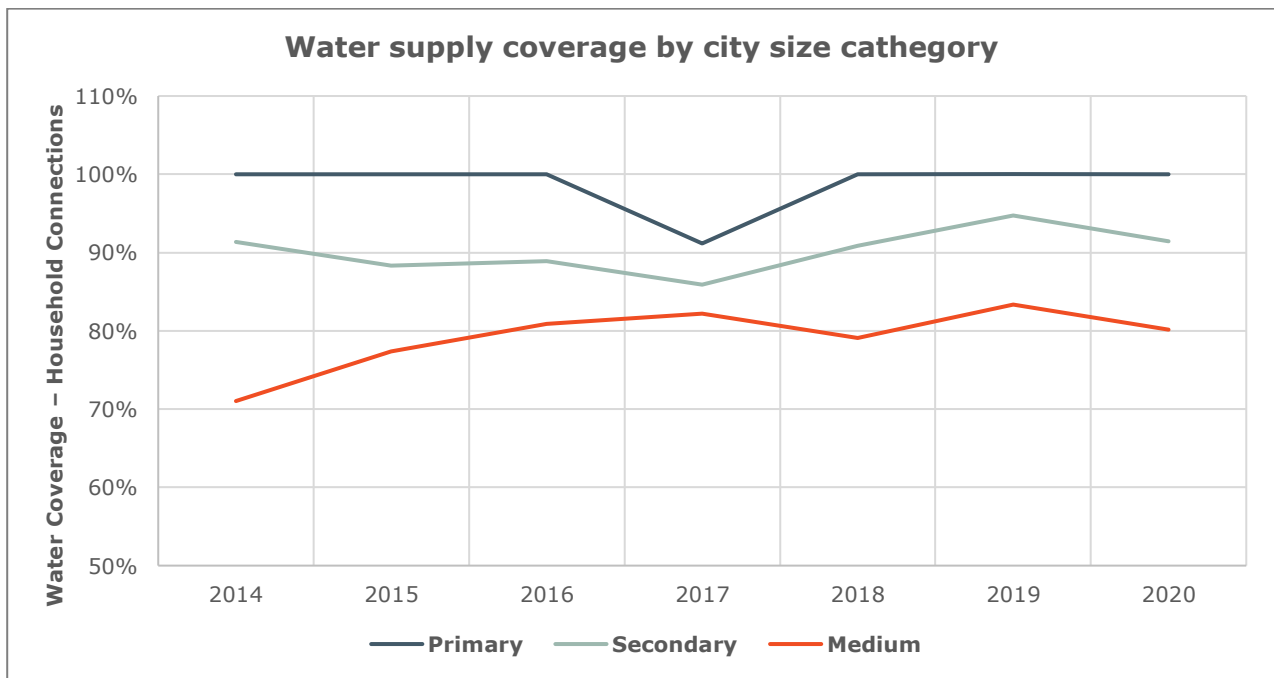
Figure 6-9: Evolution of sewerage coverage for Serbian cities aggregated by categories based on population

Source: *https://database.ib-net.org/*

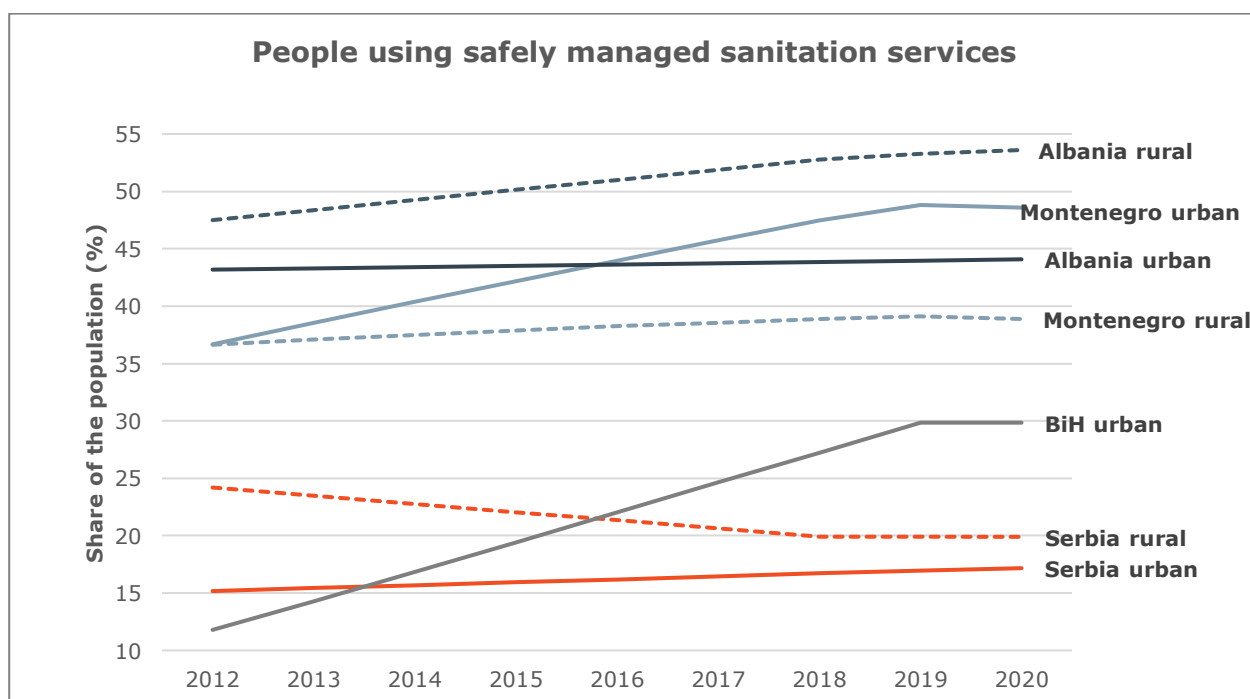*Figure 6-10: Evolution of non-revenue water for Serbian cities aggregated by categories based on population*

Source: https://database.ib-net.org/

Figure 6-11: People using safely managed sanitation services for rural and urban populations

Source: World Bank World Development Indicators database - https://databank.worldbank.org/source/world-development-indicators

B.5   Indicator list

The following list of indicators was established based on the Sustainable Urban Development Strategy of the Republic of Serbia (SUDS), and the analysis of different international frameworks for the environmental performance evaluation: EBRD Green City Action Plan, EU Urban Agenda, IHS Green City Conceptual Framework, Global Platform for Sustainable Cities' Urban Sustainability Framework, and World Development Indicators.

Indicators differ between the national, urban/rural, and individual urban center levels, based on the availability of data.

Table 6-3 Proposed list of indicators

Indicator name	Indicator description	Source	Level of data availability
GHG Emissions and air quality			
CO2 Emissions	Total annual CO2 emissions in T/capita.	GHSL Urban Center Database WB data	City (14) National
PM2.5 Concentration	PM2.5 air pollution, mean annual levels (micrograms per cubic meter)	GHSL Urban Center Database WB data	City (14) National
Energy			
Energy intensity level	Energy consumption per unit of GDP - the ratio between energy supply and gross domestic product, an indication of how much energy is used to produce one unit of economic output.	GHSL Urban Center Database WB data	City (14) – GDP only National
Access to electricity	Percentage of the population with access to electricity.	WB data Census and Statistics	National City (14) urban/rural

Indicator name	Indicator description	Source	Level of data availability
Access to clean fuels and technologies for cooking	Percentage of the total population primarily using clean cooking fuels and technologies for cooking	WB data Census and Statistics	National Urban/rural
Water and sanitation			
Access to water	The percentage of people using at least basic water services.	Comp. 1, P2- q. 4.4 WB data	City (10) National, Urban
Water consumption	Annual freshwater withdrawals, total (% of internal resources).	Census and Statistics WB data	Urban
Water losses	Water system leakages - share of water lost in transmission between supplier and end-user	Census and Statistics	National
Access to improved sanitation	The percentage of people using improved sanitation facilities	Census and Statistics WB data	City (Census) National
Wastewater treatment	Share of wastewater produced by the city that is collected and treated to at least a basic/primary level.	Census and Statistics	National
Wastewater generated	Total wastewater generated	Census and Statistics	Urban
Solid Waste			

Indicator name	Indicator description	Source	Level of data availability
Waste collection	Waste is adequately disposed of in sanitary landfills, incinerated or regulated recycling facilities. Expressed as a % of the total volume of waste generated by the city.	Comp. 1 – P2, q. 3.1 and 3.3 GIS portal – Waste management	City (10)
Waste generated	Total annual volume of waste generated, including waste not officially collected and disposed of, in kg/capita.	Census and Statistics	National/urban/city
Green areas and land use			
Vegetated surfaces in cities	Amount of healthy vegetation in the city center as estimated by the Normalized Difference Vegetation Index (NDVI). Unitless value in the range from 0 to 1	GHSL Urban Center Database	City (14)
Share of green areas in cities	Share of the surface by class of Normalized Difference Vegetation Index (NDVI)	GHSL Urban Center Database	City (14)
Access to green areas	Percentage of the population living in dense green areas	GHSL Urban Center Database	City (14)
Land use efficiency	The ratio of land consumption growth rate to the population growth rate (SDG11.3.1)	GHSL Urban Center Database Analytics from Task 2	City (14) City (27)
Disaster risk			

Indicator name	Indicator description	Source	Level of data availability
Population exposed to floods	Population potentially exposed to floods considering a 100-year return period	GHSL Urban Center Database WB Flood Hazard and Risk Mapping	City (14)
The built-up area exposed to floods	Built-up area potentially exposed to floods considering a 100-year return period (km2)	GHSL Urban Center Database WB Flood Hazard and Risk Mapping	City (14)
Heat waves	Maximum of the heatwave magnitude index (HWMId)	GHSL Urban Center Database (1980 – 2010)	City (14)