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# Andreja Troha: SPREMINJANJE POSELITVENIH VZORCEV NA OBMOČJIH CHANGING SETTLEMENT PATTERNS IN AREAS OF AVTOHTONE RAZPRŠENE POSELITVE AUTOCHTHONOUS DISPERSED SETTLEMENT

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EDITORIAL  
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## IZVLEČEK

Razpršeno poselitev razumemo kot avtohtono lastnost določenih območij, ki je v preteklosti poleg samega preživetja prebivalcev prispevala tudi k vzpostavljanju in ohranjanju kulturne krajine, medtem ko razpršeno gradnjo razumemo kot negativen pojav v prostoru. Ta v osnovi pomeni degradacijo kulturne krajine zlasti v povezavi s suburbanizacijo ter z njo povezanimi družbenimi stroški, ki so posledica porasta prometa ter z njim povezanim vzdrževanjem in gradnjo infrastrukture. Na urbanih oziroma urbaniziranih območjih je pojavnost obeh oblik poselitve bistveno lažje opazovati in tudi opredeliti, tako s pomočjo matematičnih metod kot s pomočjo posameznih kazalnikov. Na območjih, kjer prevladuje razpršen vzorec poselitve, pa je te opredelitve težko kvantitativno in kvalitativno ovrednotiti. S pomočjo različnih pristopov (vsebinskih in matematičnih) k vrednotenju posameznih lastnosti prostora smo skušali potegniti ločnico med razpršeno poselitvijo in razpršeno gradnjo.

## KLJUČNE BESEDE

urbanizacija, suburbanizacija, razpršena gradnja, razpršena poselitev, razpršena urbanizacija, kazalniki

## ABSTRACT

Dispersed settlement is understood as an autochthonous characteristic of certain areas, which in the past, along with securing livelihood of the population, contributed to the establishment and preservation of the cultural landscape, while dispersed building is understood as a negative phenomenon in space. The latter basically means the deterioration of the cultural landscape, particularly tied to suburbanisation and related social costs, which are a consequence of traffic growth and the related maintenance and building of infrastructure. In urban or urbanised areas, the occurrence of both forms of settlement is much easier to observe and identify, both using mathematical methods or applying individual indicators. However, in areas with a prevalence of the dispersed settlement pattern it is difficult to quantitatively or qualitatively evaluate these definitions. Using various approaches (both substantive and mathematical) to evaluating the individual characteristics of space we wanted to draw a divided between dispersed settlement and dispersed building.

## KEY-WORDS

urbanisation, suburbanisation, dispersed building, dispersed settlement, dispersed urbanisation, indicators

RAZPRAVA  
DISCUSSION  
RECENZIJA  
REVIEW  
PROJEKT  
PROJECT  
DELAVNICA  
WORKSHOP  
NATEČAJ  
COMPETITION  
PREDSTAVITEV  
PRESENTATION  
DIPLOMA  
MASTER THESIS

## 1. INTRODUCTION

From the very beginnings, ever since humans have started to transform space, their actions in space have been affected by its use. Throughout history land use changed and transformed along with the development of settlement forms: from existential land uses as a means of survival at the very beginning, through economic and, finally, existentialist land uses. Settlement forms have changed throughout history in dependence of production means. With agricultural revolution, patterns and forms of permanent settlement started to emerge; with urbanisation revolution, as a consequence of division of labour, villages developed into towns and cities; and industrial revolution set off globalisation and urbanisation and, most recently, information revolution that conditions new types of social relationships and related social processes.

The image or formation of urban structures is determined by five generically autonomous spatial elements: *the location of a city (situs/locus)* is specified by the *edge* or *perimeter* around the urban tissue, which can be divided into anonymous, *housing tissue*, *tissue of architectural accents of special significance*, and *free areas of the communication network*. In terms of their emergence, urban structures are either designs (compositions) or formations (agglomerations). Here, formations are understood as unplanned built form, while designs are understood as planned built form (Košir, 1993).

Nowadays urbanisation is understood as expansion of cities and the urban way of life, which causes demographic, social, economic, and morphological changes (Mihelčič et al., 2015).

The phenomena of urban sprawl and suburbanisation led to the collapse of one of the generic spatial elements that in the past defined the settlement structure of urban form, i.e. the edge or perimeter, which restricted and defined this structure within space. The sprawl of (sub)urban areas also reflects the transition from urban structures, from distinctly compositional, planned, and organised structures into an archetype of formations – agglomerations.

In this sense we talk about disintegration of cities as developed spatial structures, which are changing into their opposite. The expansion of urban structures in space based on analytical findings and their application is replacing the wasteful building of land in the suburbs. Such expansion is directly related to uncontrolled growth of settlement and economic activities from urban areas towards rural areas.

In the 1920s, the term “suburbanisation” was first used in the literature concerned with American cities, at a time when the cities mostly expanded along railway lines. Later new terminological classifications were developed on this basis. Owing to the intensification of the research concerning this phenomenon whose manifestations were becoming increasingly problematic, the literature in principle agrees that the terms “suburbanisation” or “suburban areas” stand for “development and expansion of emerging transitional zones, which are the result of dynamic processes of dispersion taking place from densely populated city centres to scarcely populated rural areas”

(Ravbar, 2005, p. 31). The manner of expansion of urban areas, their manifestations in space, and the reasons underlying the expansion defined new forms and classifications of urbanisation.

## 2. DEFINITION OF THE TERM AND THEORETICAL STARTING-POINTS

### 2.1 Urbanisation

Urbanisation is the process of formation of urbanity, population growth, and transformation of rural areas into settlements with urban character, i.e. expansion of the urban way of life to rural areas.

According to the main characteristics, we distinguish between three development periods of urbanisation (Rebernik, 2008, p. 51–60): primary urbanisation or preindustrial phase, secondary urbanisation or industrial phase, and tertiary urbanisation or post-industrial or metropolitan phase of urbanisation, characteristic of highly developed countries.

The prevailing opinion in the literature is that, in principle, suburban areas are characterised by the development of emerging transitional zones that are the result of dynamic processes of dispersion, directed from densely populated city centres towards rural areas. Most authors agree that the phenomenon of suburbanisation is understood as a spatial manifestation of all social changes in the society. These changes are not manifested only in the increase or expansion of areas with stand-alone single-family houses on city outskirts, but also in the changed structures of workplaces in cities and their outskirts. Nowhere in the world was it possible to prevent or at least mitigate this process, despite the urban planning efforts in various social environments and at various levels (Ravbar, 2005: str. 31).

According to development stages and geographic manifestation characteristics, Ravbar (2005) divided suburbanisation into three stages, i.e. *demographic suburbanisation* (first, migration of population occurs), *industrial suburbanisation* (dispersal of jobs in production activities), and *tertiary suburbanisation* (dispersal of jobs in service activities).

Rebernik (2008) identifies four types of suburbanisation according to their spatial and locational characteristics:

- *Periurbanisation* – urbanisation of the wider rural environment of a city (periphery), often in the form of scarce or discontinued settlement. Periurbanisation areas have three basic characteristics: recent settlement, large share of commuters, and functional links with the city (Brunet, 1992 in Rebernik, 2008).
- *Exurbanisation* – a phenomenon of extended suburbanisation or urbanisation of the wider rural surroundings of metropolitan areas. It is related with the phenomenon of holiday houses in rural areas, emigration of retirees and the middle class to rural areas (Rebernik, 2008).
- *De-urbanisation (counterurbanisation)* – describes the emigration of population from metropolitan areas to rural areas. Some authors refer to it as emigration outside the reach of commuting (Rebernik, 2008). The most common factors contributing to suburbanisation are

(Pacione, 2001 in Rebernik, 2008): improved road transport network, improved accessibility to rural settlements, more long-distance commuting, lower cost of living in rural areas, decentralisation of employment, development of non-agricultural activities in rural areas, possibility of employment in rural areas, higher income and higher standard of living of inhabitants, higher share of retirement-age people coupled with higher retirement incomes, preference for single-family rural living, suburbs as rural nostalgia, growth of anti-urbanism.

- *Urban sprawl* – according to Ravbar (2005: p. 32) it is understood as the physical sprawl of cities (where built-up areas of lower density, which along with housing also include production and commercial facilities, grow faster than the population) and thus studies only a part of the highly complex process related to the much more complex term of suburbanisation. In fact, this relates to wasteful occupation of land in the suburbs. It is linked with uncontrolled growth of settlement and economic activities from urban areas towards rural areas.

Rebernik (2004) further states that two basic concepts of understanding urbanisation have been established: on the one hand, urbanisation as population growth and spatial expansion of cities and urban areas and, on the other hand, urbanisation as a social, economic, functional, and physiognomic transformation of rural areas in the sense of reducing the differences between the city and rural areas.

### 2.1.1. Dispersed settlement of major scale (urban sprawl)

The terms 'sprawl'<sup>1</sup> and later the phrase 'urban sprawl'<sup>2</sup> were first used in professional papers by American researchers, while in the 1990s the term was taken over by other scientific fields; similarly, the term was first commonly established among the professional and general communities in the United States, and later also worldwide.

Despite some common characteristics it should be underlined that the notion of "sprawl" means different things to different people (Chaltrape & Fulton, 2002). Also, the term "urban sprawl" is used differently in Europe and the US. Even though normative starting-points are mostly the same or similar, the causes of urban sprawl and its occurrence differ (Pattachini & Zenou, 2009).

Dispersed urbanisation, as a manifestation of suburbanisation, occurs in space as uncontrolled sprawling of both urban and rural areas. In the literature, the term is a set phrase describing unplanned sprawling of low population density on the outskirts of major urban centres or metropolitan areas. The ongoing research of the phenomenon has provided various definitions to describe it, nevertheless, there are some common characteristics pervading the literature (Brody, 2013): low-density, single family dwellings,

<sup>1</sup> The term "sprawl" in the context relating to expansion forms of urbanisation was first used in 1937 by Earle Draper in a national (US) conference of planners. Earle Draper used the term to characterise both an unaesthetic and uneconomic manner of settlement (cited in Wassmer, 2002).

<sup>2</sup> The phrase "urban sprawl" was first used in the article "Urban Sprawl" published by the sociologist William Whyte in Fortune magazine in January 1958 (Wassmer, 2002).

automobile dependency, where residents rely on cars rather than on walking for their everyday supply, spiraling (dispersed) growth outward from existing urban centres, 'ribbon' or strip development along roads, and undefined edge between urban and rural areas.

The focus of the international project Urban Sprawl: European Patterns, Environmental Degradation and Sustainable Development (URBS PANDENS) (Couch et al., 2006) was to comprehensively assess the various 'patterns', 'cause and effect' relationships, and the impacts of regulations and measures on the process of unplanned growth of urban areas at the (trans) national, regional, and local levels. The project provides the assessment of environmental, economic, social and political aspects related to urban growth in selected EU Member States and case studies of city areas<sup>3</sup>.

In the project some relevant 'archetype patterns' were identified, which occurred in the process of (non)sustainable expansion of European cities:

- "top-down" supply by building and upgrading major infrastructure systems and structures (airports, motorways, by-passes, high-speed railways, subways, etc.) in order to improve global accessibility, recognisability, and transnational competitiveness of the city (e.g. Athens and 2004 Olympics);
- the "bottom-up" demand influenced by the "new" lifestyle, "traditional" values, greater purchasing power of urban residents in order to improve the quality of life (changing holiday homes or other secondary housing to permanent housing and construction of new housing in the wider urban area, e.g. in Vienna, Stockholm, also Ljubljana and Athens);
- "specific" phenomena occurring in various combinations of infrastructure (non)supply and (new) lifestyle in the 1990s: influenced by new state and/or local governments in post-socialist cities (e.g. Leipzig, Ljubljana, Warszawa) and in post-industrial cities with a decline in the number of population in the inner city and wider urban areas (e.g. Liverpool, Leipzig).

In Slovenian scholarly literature, this phenomenon was not appropriately addressed until the international project URBS PANDENS (Couch et al., 2006).

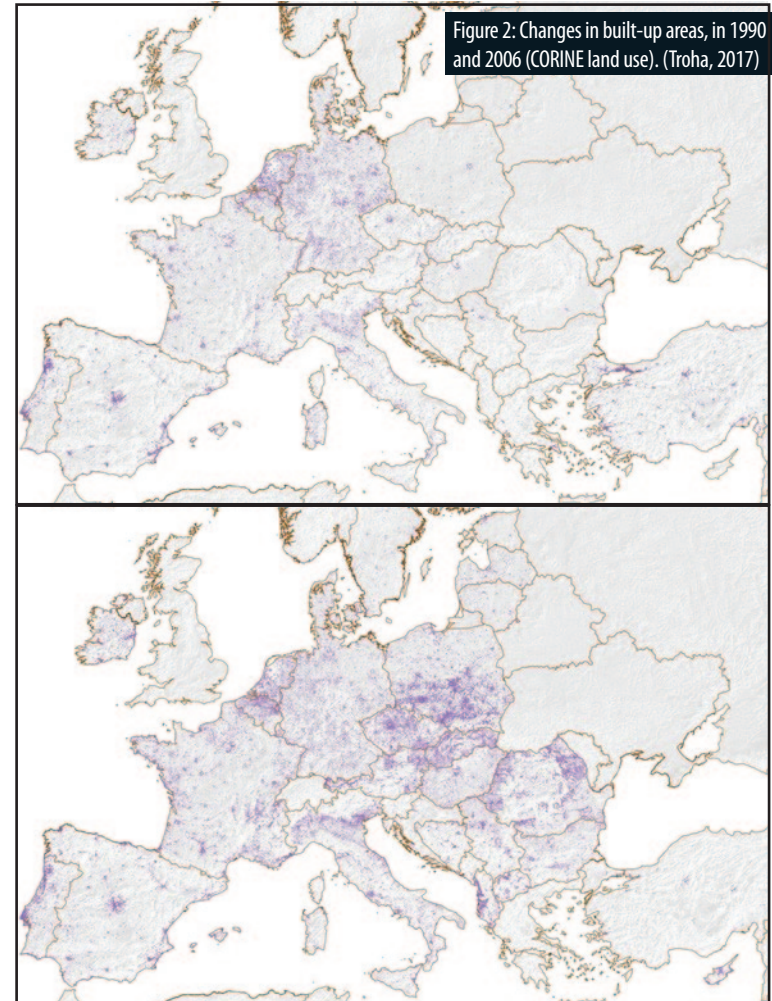
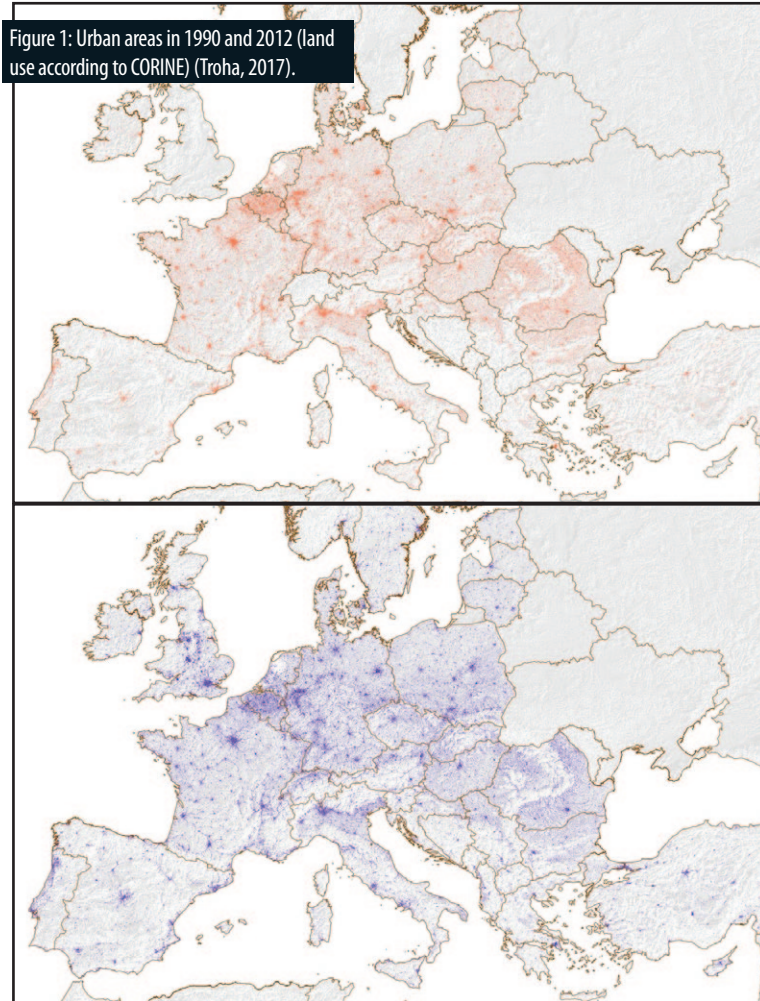
The reason is probably the unique settlement structure that has its roots in natural and historical conditions, but also because Slovenian territory has not seen the grand-scale design of entirely new settlements in the periphery as those typical for the areas where this phenomenon was first identified, i.e. in the United States. In the literature, the term "suburbanisation" is most commonly used.

## 2.2 Urbanisation in Europe

Urbanisation of rural areas in Europe started with the industrial revolution. In the time following the industrial revolution, Europe shifted from mostly agricultural to mostly urban. European cities witnessed the greatest growth

<sup>3</sup> As part of URBS PANDENS (Couch et al., 2006) the phenomenon of urban sprawl in Slovenian territory was also studied, i.e. in the metropolitan area of the Ljubljana Urban Region.





between 1950 and 1960 (EEA, 2006), a time characterised by the emigration from rural regions to cities.

In the following period the main settlement wave moved from the cities to their periphery and into agricultural hinterland. The expansion of cities towards their hinterland accelerated the development of public transport and accessibility by car, which enabled commuting. With population came other activities, e.g. production and service activities and, finally, commercial, financial, and research activities located in business centres with good accessibility and lower costs (e.g. the City of London). In some areas we see a decline in population in city centres, however, the surface area of built-up land is not increasing. The emigration of population and growth of cities is no longer tied to population density, as people emigrate both from regions with high population density and those with low population density (EEA, 2006). The rate of population growth in some European countries on urban outskirts has become higher than in cities (Rebernik, 2008).

The reasons underlying urbanisation are various; generally, several groups of reasons for urbanisation to occur have been identified<sup>4</sup>:

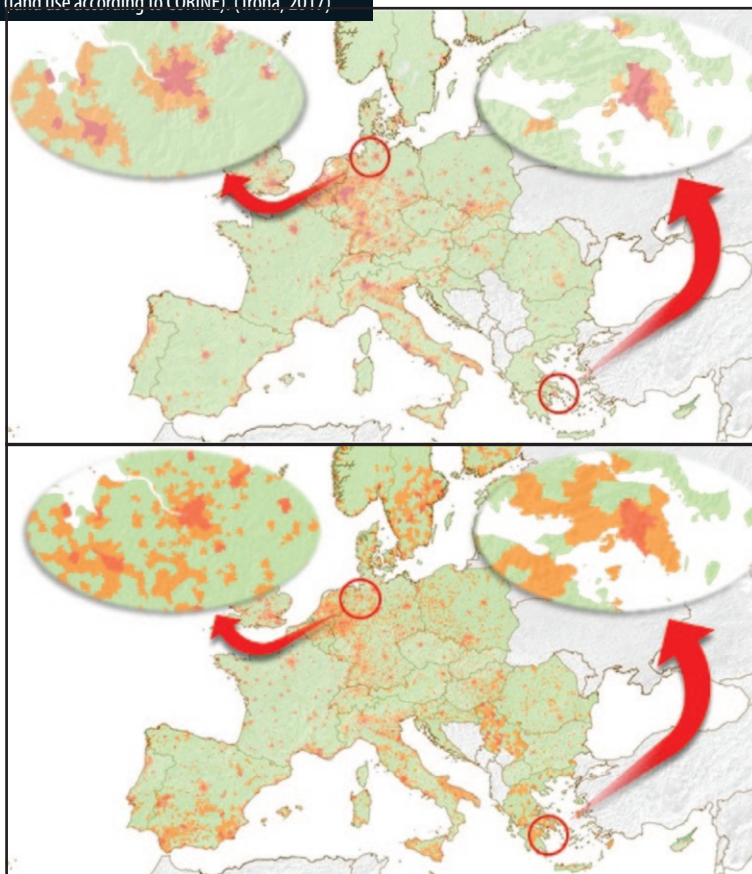
economic (economic growth, globalisation, European integrations, raising of the standard of living, price of land, both for building and agricultural, etc.)

social (population growth, higher household income, housing conditions, problems of city centres with inferior quality of residential and natural environments, transport with the growth in the use of cars and poor public transport, legislative framework with deficient spatial planning, lack of vertical and horizontal coordination in implementing land policies, etc.).

<sup>4</sup> Extensive studies that were systematically concerned with the phenomenon of "sprawling" in Europe, were commissioned by the European Commission; the study was completed in 2005 (Couch et al., 2005); and by the European Environment Agency; the study was completed in 2006 (EEA Report, 2006).



Figure 3: Degree of urbanisation in 2001 and 2014  
(land use according to CORINE). (Troha, 2017)



These studies report that urbanisation in Europe is the most evident in areas with high settlement density and strong economic activities on the one hand and in areas with fast economic growth on the other hand. Settlement pressures on smaller towns in rural regions, along transport corridors, and in waterfront (coastline) areas are also evident.

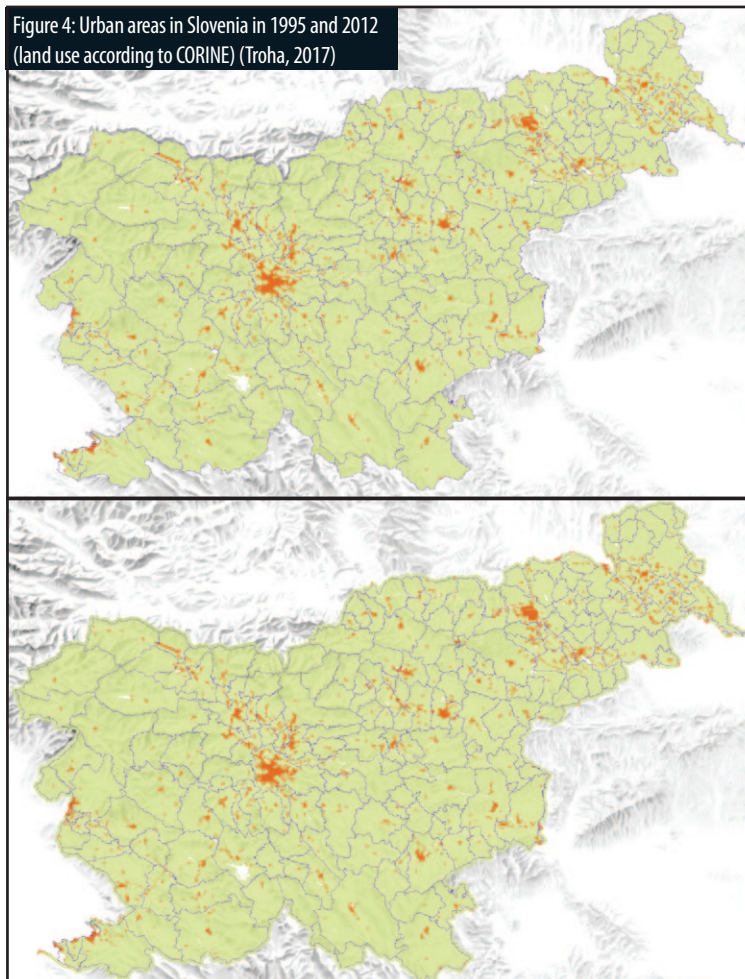
Both studies revealed that the urbanisation process in South European cities is slower, cities remained more compact, but nowadays this difference is shrinking.

### 2.3 Urbanisation in Slovenia

Slovenia's settlement is distinctly dispersed, and its settlements are historically unequally distributed, while in the decades following World War II, under the influence of socio-economic change, the settlement non-uniformity increased even further.

In Slovenia, intensive economic development after World War II (particularly by developing secondary economic activities) set off intensive urbanisation of regional and subregional centres, while urbanisation also reached rural

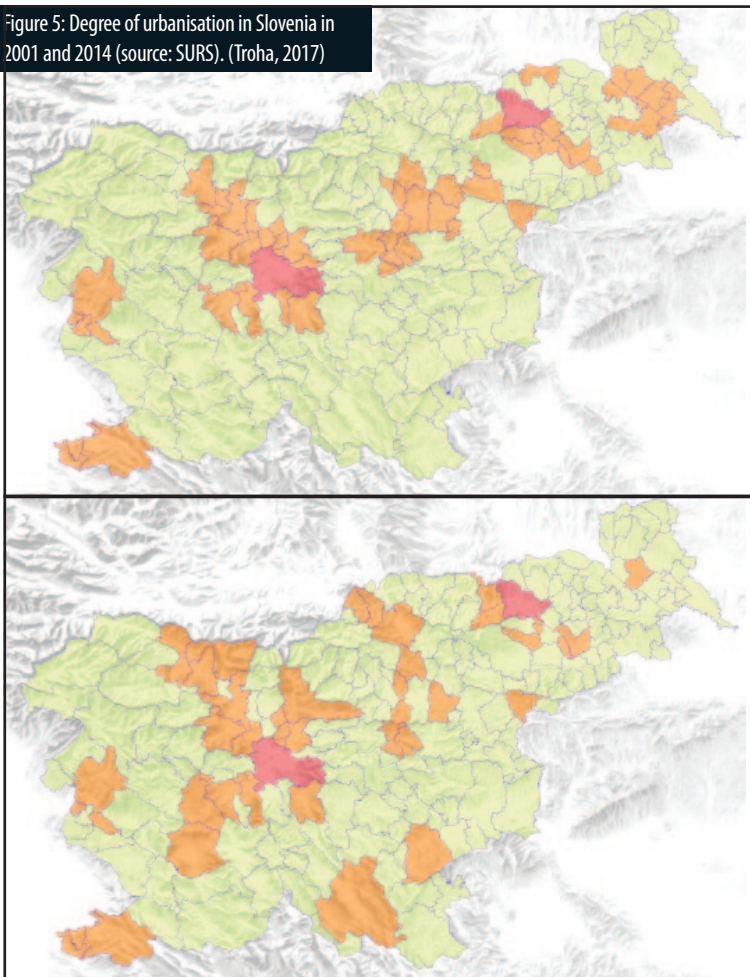
Figure 4: Urban areas in Slovenia in 1995 and 2012  
(land use according to CORINE) (Troha, 2017)



areas. Due to favourable social conditions (possibility of solving the housing problem, jobs, transport proximity, etc.) concentration of the population started to increase in small urban centres as well, particularly at the expense of depopulation of the rural hinterland. At the time of favourable economic and social conditions the depopulation trend continued, as in rural areas at higher elevations mostly the elderly and less educated inhabitants remained, while educated labour force migrated to urban centres with better work and living conditions. In the 1970s the trend of mass emigration to employment centres settled down which was mostly because of the better standard of living and lower transport costs and thus better transport options to employment centres. At the time, until the 1990s, in the areas of dispersed settlement, new-build developments started to emerge as a solution to the housing problem of the inhabitants. New builds were typically randomly placed, unplanned, and often illegal.

Compared to other European countries, Slovenia is characterised by a relatively low degree of urbanisation, which is the result of intensive commut-

Figure 5: Degree of urbanisation in Slovenia in 2001 and 2014 (source: SURS). (Troha, 2017)



ing, and the start of implementing polycentric development that became the main starting point of the Republic of Slovenia's development. Accessibility to employment and supply functions in rural regions slowed down migration flows. The first signs of suburbanisation around major urban centres were observed in the early 1980s and later these processes strengthened further. According to both Rebernik (2004) and Pichler - Milanovič (2005), urbanisation around major towns and cities strengthened in the first half of the 1990s, while at the turn of the millennium small rural settlements with good accessibility to major urban centres began to strengthen.

## 2.4 Dispersed building, dispersed settlement, and dispersed urbanisation

In official documents, dispersed settlement and dispersed building occur as a pair, where dispersed settlement is defined as the autochthonous characteristic of certain areas and, as such, presents a spatial quality, while dispersed building is understood as a distinctly negative spatial phenomenon.

Basically, this means the deterioration of the cultural landscape, particularly tied to suburbanisation and related social costs that are a consequence of traffic growth and the related maintenance and building of infrastructure. In terms of siting the building tissue we can understand that dispersed building concerns the dispersal of individual structures in a concrete location or an immediate settlement area. Dispersed settlement, on the other hand, can be understood as a characteristic of a certain wider area, where unlike the placement of structures in a concrete area, it is a system of small settlement units that are not hierarchically structured.

In the Slovenian legislative framework, the terms "dispersed building" and "dispersed settlement" were introduced by the Spatial Management Act (hereinafter ZUreP-1)<sup>5</sup> the Spatial Development Strategy of Slovenia (SPRS) arising therefrom, and the Spatial order of Slovenia (PRS)<sup>6</sup>.

In line with ZPNačrt, **dispersed building** is a negative phenomenon that occurs in space, characterised by irrational land use and insufficient municipal infrastructure and is, as such, in need of rehabilitation. It is thus seen as a low-density, non-contiguous distribution of structures in space, with low population density and without a recognisable settlement pattern. As early as 1980s the term was introduced in the legislative framework, but more in terms of content than terminologically. Thus already the Act on Urban Planning and Other Forms of Land Use<sup>7</sup> specified that outside settlement development areas, settlement areas can be determined only when they are directly intended for agricultural production, forestry, tourism, etc.

On the other hand, **dispersed settlement** is a type of settlement with low population density, which presents an autochthonous settlement pattern and is preserved as such. Dispersed settlement means a type of settlement which is characterised by a large number of scattered small settlements and parts of settlements with low population density, without a clear organisation and without clear hierarchical relations between them. Typologically they are classified as fragmented, dispersed, scattered, detached settlements as part of autochthonous settlement.

The term **dispersed urbanisation** was first used in the paper by D. Rebernik entitled Recent Urbanisation Trends: From Suburbanisation to Reurbanisation, published in 2004 in Geographical Bulletin (Geografski vestnik, 76-2, 2004, p. 53–63). The term used in this paper comes closest to the English term "urban sprawl" in the context of studying the changes in settlement patterns in dispersed settlement areas.

5 Zakon o urejanju prostora [Spatial Management Act] (Official Gazette of the RS, No. 110/02, 8/03 – corr., 58/03 – ZZK-1, 33/07 – ZPNačrt, 108/09 – ZGO-1C, and 80/10 – ZUPUDPP).

6 Odlok o strategiji prostorskega razvoja Slovenije [Ordinance on Spatial Planning Strategy of Slovenia] (Official Gazette of the RS, No. 76/04 and 33/07 – ZPNačrt), Uredba o prostorskem redu Slovenije [Decree on Spatial Order of Slovenia] (Official Gazette of the RS, No. 122/04, 33/07 – ZPNačrt and 61/17 – ZUreP-2).

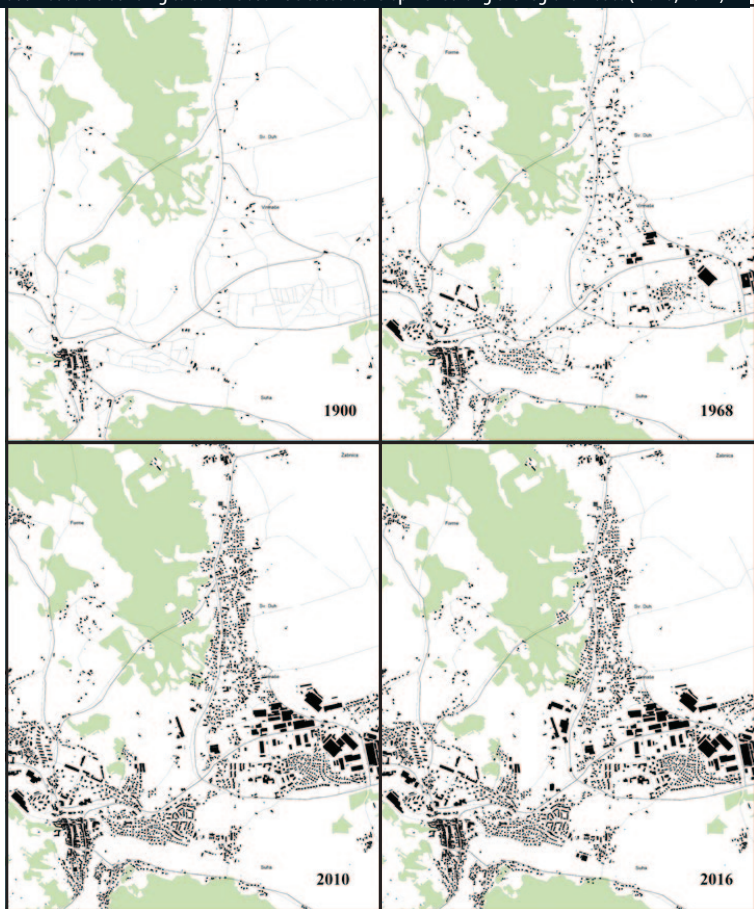
7 Zakon o urejanju naselij in drugih posegov v prostor [Act on Urban Planning and Other Forms of Land Use] (Official Gazette of the SRS, No. 18/84, 37/85, 29/86, Official Gazette of the RS, No. 26/90, 18/93, 47/93, 71/93, 29/95 – ZPDF, 44/97, 9/01 – ZPPreb, 23/02 – odl. US and 110/02 – ZUreP-1).



Figure 6: Škofja Loka with urbanised hinterland. Intensive suburbanisation led to merging of adjoining agglomerations (photo: Matevž Lenarčič, 2010)



Figure 7: Urbanisation of the villages from Škofja Loka towards Kranj from 1900 to 2016, from individual roadside building to continuous nucleated development along the regional road. (Troha, 2017)



By adopting new, current, spatial legislation in 2007 and 2009 the previous focus of the spatial policy of preventing dispersed building surpassed the framework of mere prevention and was thus directed into evaluating the existing dispersed settlement patterns. In line with the provisions of the act, in preparation of municipal spatial plans the qualitative characteristics of such settlement patterns should be determined (dispersed settlement vs. dispersed building). In the areas identified as areas of dispersed settlement building plots are determined within the areas of dispersed settlement. In the areas identified as areas of dispersed building, unlike the building *fundus* (the area of land under a building), building plots are not shown in implementing spatial planning documents. By preventing the expansion, development is, in fact, obstructed, while the preservation of the existing structures is ensured.

According to Furman Oman (2002), provisions of Slovenian spatial legislation do not ensure unambiguousness of the basic notions concerning dispersed building. The terminological definition of disperse forms is insufficient, as outside of agglomerations, only two types of built form are recognised, i.e. autochthonous dispersed settlement and dispersed building, without clear and objective definitions of these structures.

Gabrijelčič (1997) finds that dispersed building is a recent phenomenon rather than an autochthonous settlement trend developed across a longer period of time. He further explains that between 1970 and 1996 as much as 50% of the housing stock was built; in fact, between 1970 and 1980 housing construction shifted from central areas of urban agglomerations to open space, characterised by the previously characteristic forms of dispersed settlement.

Settlement, as a factor of changing the essential elements of Slovenian landscapes, has mostly adverse affects that are reflected in urbanisation of rural areas. Rather than areas intended for agriculture, rural areas are increasingly becoming residential areas (Hudoklin et al., 2005).



Figure 8: Dispersed construction in exposed areas (photo: Andreja Troha, 2017)



Figure 9: Martinj Vrh with isolated (individual) farmsteads – enclosures (photo: Andreja Troha, 2007)



Figure 10: A homestead with land as an enclosure, detached from other homesteads with large areas of land not built on (forest, pasture, arable land). Bregar, Municipality of Železniki (Photo: Andreja Troha, 2007)



In the Ljubljana Urban Region and in Slovenia in general, this phenomenon is manifested in the growth of built-up land, as a consequence of changing zoned land use from agricultural to developed and undeveloped building land intended for construction of transport infrastructure and utilities, housing, industry, business, and commercial activities. The reasons for this phenomenon can be economic, social, and environmental or a consequence of the statutory scheme (Pichler-Milanović et al., 2007). The various types and manifestations are to a great extent conditioned by the very reasons underlying the phenomenon and originate mostly from the social environment; by understanding the reasons for its occurrence we can develop the measures to control it.

Figure 11: Residential space – exclusively non-agricultural land use (photo: Andreja Troha, 2017)



### 3. METHODOLOGICAL APPROACH

The literature describes various methods for identifying the causes, characteristics, and the scope of dispersed building, dispersed settlement, and dispersed urbanisation.

For observing and identifying the reasons, characteristics, and the scope of the phenomenon, we usually use individual indicators that describe the characteristics of the phenomenon and which are quantifiable. The most commonly used methods for observing the phenomenon of dispersion of built-up areas are: historical method, method by observation – how the structure changed over time (temporal metamorphosis), observing changes in the phenomenon using various indicators that are characteristic for and define the phenomenon.

**Selected indicators** allow for assessment of urban settlements in dispersed building areas. The choice of indicators is based on the characteristics of urban sprawl, but they need to be evaluated based on the characteristics of autochthonous dispersed settlement. The selected indicators need to be compared and assessed. The criteria for each indicator need to be accurately defined, while the correlations between the individual indicators and groups of indicators are determined based on statistical analyses.

Characteristics of dispersed urbanisation and the underlying indicators:

1. *Low-density, single family dwellings*
  - median lot size
  - number of dwelling units per spatial unit
  - net floor space of residential buildings
2. *Large automobile dependency*
  - travel times to the city centre
  - distance to the city centre

- travel times to basic supply functions
- distance to basic supply functions
- 3. *Spiraling growth outward from existing urban centres to the periphery*
  - changing of zoned land use
  - building the infrastructure
- 4. *Leapfrogging, dispersed patterns of settlement development*
  - changing of zoned land use
- 5. *Ribbon settlement, strip settlement development*
  - changing of zoned land use
  - building the infrastructure
- 6. *Blurred, undefined boundary between urban and rural areas*
  - changing of zoned land use
  - building the infrastructure

The factors and reasons underlying the expansion of urbanisation in rural areas were divided into three basic aspects, wherein we wanted to find such a set of indicators that would allow for a detailed analysis and derivation of the appropriate set of indicators to define construction developments from the aspect of preserving the cultural landscape and to assess the expansion of settlement in this respect.

Table 1: Set of indicators concerning dispersed urbanisation development.

ECONOMIC INDICATORS	SOCIAL INDICATORS	ENVIRONMENTAL INDICATORS
<ul style="list-style-type: none"> <li>■ level of services with supply functions (school, shop, post office, bus stop, etc.)</li> <li>■ infrastructure services in settlements (municipal utilities, telecommunications, etc.)</li> <li>■ dynamics in residential buildings construction (period/year of construction)</li> <li>■ building status (obtained building permit)</li> <li>■ distance from the municipality centre</li> </ul>	<ul style="list-style-type: none"> <li>■ dynamics in the number of population (natural population growth, immigration, etc.)</li> <li>■ commuting (daily mobility)</li> <li>■ age structure</li> </ul>	<ul style="list-style-type: none"> <li>■ degree of urbanisation</li> <li>■ actual and zone land use</li> <li>■ share of protected areas</li> <li>■ intensively cultivated agricultural land</li> <li>■ forest and other wooded land area</li> <li>■ degree of motorization</li> </ul>

The use of the individual indicators was tested by observing the expansion of built-up areas in Europe and Slovenia (see Figures 1–7), where we observed the actual land use in 1990 in 2012, and the changes in land

use between 1990 and 2000 and between 2000 and 2006. The degree of urbanisation (see Figure 3), which is one of the key indicators of urbanisation expansion, was observed for 2001 and 2014. The same indicators for comparable years were observed for Slovenia as well (see Figure 5).

The most commonly used method for measuring urban sprawl dynamics is the Qualitative-Attractivity Migration Model – **QUAM method**. The method was, as a mathematical tool for describing the phenomenon, used in the international study URBANDENS. The second method is the **space-access model**, a model of choosing between accessibility and space, which explores the relationships between the individual spatial characteristics and describes their mutual interactions, based on stakeholder (actor) decision-making. For identifying the reasons, characteristics, and the scope of the phenomenon, we can also use **individual indicators** to describe and quantify the characteristics of the phenomenon.

The **QUAM model** deals with net migration flows of actor classes; some actors of the class may well move into the other direction, but the model describes the direction of the net fluxes under mean preference assumptions. The main idea is to deduce as many consequences as possible about the dynamic behaviour of the system if only the direction and the kind of the interactions between the actor classes are known. This approach allows for considering the interactions that are not quantifiable, while defining adequate parameters depends on the individual's perspective and is difficult to operationalize (Meyer-Veden and Eisenack, 2006).

The **space-access model** is based on systematic treatment of housing structures in urban settlements, which it tries to explain by the impact of the dwelling size and access to the city centre on decision-making of households concerning the use of housing services. Households, based on their income, are faced with the choice between accessibility and housing space. By considering the various incomes and preferences of various social and economic groups this model allows for establishment of a structure of rings of settlement around the city centre.

The phenomena of dispersed building, dispersed settlement, and dispersed urbanisation will be observed in the area of Škofjeloško-cerkljansko hribovje (Škofja Loka and Cerkno Hills).

### 3.1 Checking the method in the area of Škofjeloško-Cerkljansko hribovje (municipalities of Škofja Loka and Železniki)

The study area comprises the area of the municipalities of Škofja Loka and Železniki. A geographically larger part of Škofja Loka and Železniki territories is part of pre-alpine hills, only the plain around Škofja Loka is part of the Ljubljana Basin. The central part of Škofjeloško-cerkljansko hribovje lies between the valleys of the Poljanska Sora River and the Selška Sora River, while the central ridge extending from Škofja Loka to Lubnik and onwards to Stari vrh and Mladi vrh draws a divide between both Sora rivers.

The territories of Selška dolina (Selca Valley) and Poljanska dolina (Poljane Valley) and Škofja Loka were, according to the records available, settled back

UVODNIK  
EDITORIAL  
ČLANEK  
ARTICLE  
RAZPRAVA  
DISCUSSION  
RECENZIJA  
REVIEW  
PROJEKT  
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WORKSHOP  
NATEČAJ  
COMPETITION  
PREDSTAVITEV  
PRESENTATION  
DIPLOMA  
MASTER THESIS



in the Hallstatt Period, while during migration of nations this area had an important geostrategic position as the Selca Valley provided a gateway to the Soča Valley and further to Furlanija (Friuli). Until 1291 these lands were colonised, starting with colonisation of the plain Sorško polje and later with colonisation of both valleys and the surrounding hills. At the time the colonists were Slovenian, while the settlers from Carinthia and Bavaria came later. In the 14th century, the Selca Valley saw expansion of iron-making. The second wave of colonisation in the secluded, hilly region between Škofja Loka and Tolmin, i.e. the Rovte colonisation, started in the 16th century. Until the 19th century, the main economic activity in the Selca Valley was iron-making, while the conditions in the area drastically changed with the revolution in 1848, which officially marked the end of Feudalism. This region saw an economic revival only after 1950, with the development and expansion of wood and metal industries, which are still present nowadays. During its biggest economic heyday, architectural building industry and craft industry developed, which is reflected both in bourgeois buildings in Škofja Loka as well as various buildings in Železniki and the countryside. In this time both urban structures took shape, i.e. both of Škofja Loka and Železniki, while the basic settlement pattern in the hinterland developed already during colonisation. The siting of the built form was adjusted to natural conditions and, at the same time, to the rigid social structure of the time.

Based on the provisions of valid spatial documents in the area of Škofjeloško-Cerkljansko hribovje the methodology involving field work and statistical data analysis helped us to identify the various types of settlements and rural areas, including their function in the settlement system and the level of infrastructure services<sup>8</sup>.

Škofja Loka and Železniki are municipal centres that play very different roles in the wider settlement system; Škofja Loka is a centre of regional significance with all supply functions, while Železniki is a municipal centre. Significant local centres are Reteče and Gorenja vas – Reteče, while supply centres or rural settlements are Brode – Gabrk, Sv. Lenart, Bukovica, Bukovščica, Dolenja vas, Selca, Davča, and Spodnja Sorica. Other settlements have no supply functions or distinctly developed activities characteristic of urban settlements.

In Sorško polje nucleated settlements and partially roadside settlements prevail. Due to suburbanisation, the former village settlements between Škofja Loka and Kranj merged into a continuous built-up area (see Figure 7). The settlements are situated along the outer edges of fields, while the middle of the field mostly remained unoccupied. In the main valleys there is a prevalence of nucleated settlements, while in the Poljane Valley there is a prevalence of detached dispersed settlements mostly located along valley edges on alluvial fans of lateral streams rather than on the frequently flooded valley bottom. In the hills, settlements assume the form of isolated farmsteads and small hamlets, as well as detached dispersed settlements (ridges, rounded hills; in-between gullies and valleys are scarcely populated).

8 Troha, A., Krajner, P. (2007). Strokovne podlage za poselitev. Železniki: Občina Železniki. Valenčak J. et al. (2005). Izhodišča za pripravo strategije prostorskega razvoja in prostorskega reda Občine Železniki. Železniki: Občina Železniki.

The geographical position and geomorphological characteristics make up the characteristic image of the landscape. Sorško polje and the valleys of Selška Sora and Poljanska Sora form a natural boundary of Škofjeloško-Cerkljansko hribovje. In the valley there are the main communication lines, which, pursuant to spatial documents, make up the potential regional perimeter link between central Slovenia and Primorska region. Road connections in the area branch out to individual farmsteads, as compared to the valley, the individual farms were not connected into continuous settlements but rather they were separately distributed across the entire area. Thus dispersed settlement is strongly manifested in the area. In line with spatial documents, this area can be defined as less urbanized countryside comprising less accessible rural and mountainous areas with smaller settlements and a sparse population (SPRS, 2004).

### 3.1.1. Identifying the characteristics of urban tissue and landscape structures

Based on the analysis of settlement areas of autochthonous dispersed settlement within the individual areas, which have common built form and landscape characteristics, micro locations were selected where the individual characteristics of the built form and the efficiency using the selected indicators to identify dispersed urbanisation were tested.

Several methods were used to check the characteristics and applicability of the individual indicators.

Using the historical method, we checked the occurrence of dispersed settlement and the growth of built form across different periods. The Franciscan Cadastre, the Josephinian Cadastre as well as analogue and digitised military survey maps were used for checking. Partially, we could also apply GIS spatial data.

The method of spatial data processing and analysis was used also for checking the selected indicators in relation to the settlement and dispersed urbanisation systems. ACAD MAP 3D 9 and AGIS 2.18.1310 software was used for spatial data processing in GIS technology, allowing for the use of spatial data in GIS systems. Furthermore, various surveying and other spatial data were used, involving both geopositioned spatial data and other spatial data in digital format. By comparing spatial data we qualitatively and quantitatively checked the selected indicators.

### 3.1.2. A GIS data application example

Spatial data analysis was done using all three types of spatial data, both digital and analogue; digital geopositioned (georeferenced) data, tabular and information data, both in digital and analogue format.

On the illustrated example we aim to compare, using the historical method, the development of the settlement pattern in the study area as a function of time.

9 Autodesk® AutoCAD® Map 3D 2017 © 2016 Autodesk, Inc. 10 QGIS version 2.18.13 © 1989, 1991 Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA.



Figure 12: Historical background of settlement development in areas of a dispersed settlement pattern. From left to right: military survey map from 1763–1787 (source: Rajšp, Ficko, 1995), Franciscan Cadastre for Carniola 1823–1863 (source: RS Archive), Franciscan Cadastre and the Buildings Cadastre, buildings built before 1900, buildings built before 1968, buildings built before 2010, and buildings built before 2016 (source: RS and GURS archives). (Troha, 2017)

The digitised data of the military map (1763–1787), the Franciscan Cadastre (1823–1863), and the georeferenced data from the Buildings Cadastre suggest that the settlement pattern until 1968 was preserved in its original form by expanding and densifying the original locations of settlement in dispersed farmsteads and enclosures. After 1968 we have seen a more

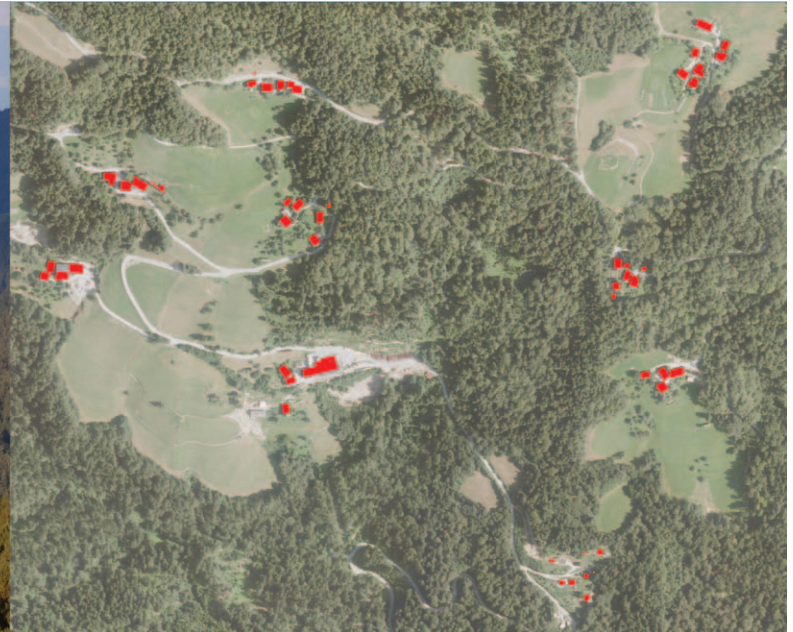
intensive expansion of settlement outside the original settlement areas (Figures 14 and 15).

Along with surveying data and records maintained by the Surveying and Mapping Authority of the Republic of Slovenia (GURS), other spatial data were used in the analysis, which are kept by other public authorities as part of their original tasks.

The following data are also essential for analysing the selected indicators: records on actual land kept, for agricultural policy needs, by the Ministry of



Figure 13: Residential space – exclusively non-agricultural land use. (Photo: Andreja Troha, 2017)



Agriculture, Forestry and Food (MKGP), data by the Statistical Office of the RS (SURS), spatial data kept by the Ministry of the Environment and Spatial Planning (MOP) and the Ministry of Culture (MK) and, finally, the spatial data kept by local communities for their own needs or to pass them on to public authorities.

GURS data provide information about the level of services of individual settlements in terms of utilities, supply functions, transport connections, distance to areas of supply functions as well as the previously mentioned dynamics of constructing buildings. Statistical data, both georeferenced and other data from SURS databases, are necessary to determine the social

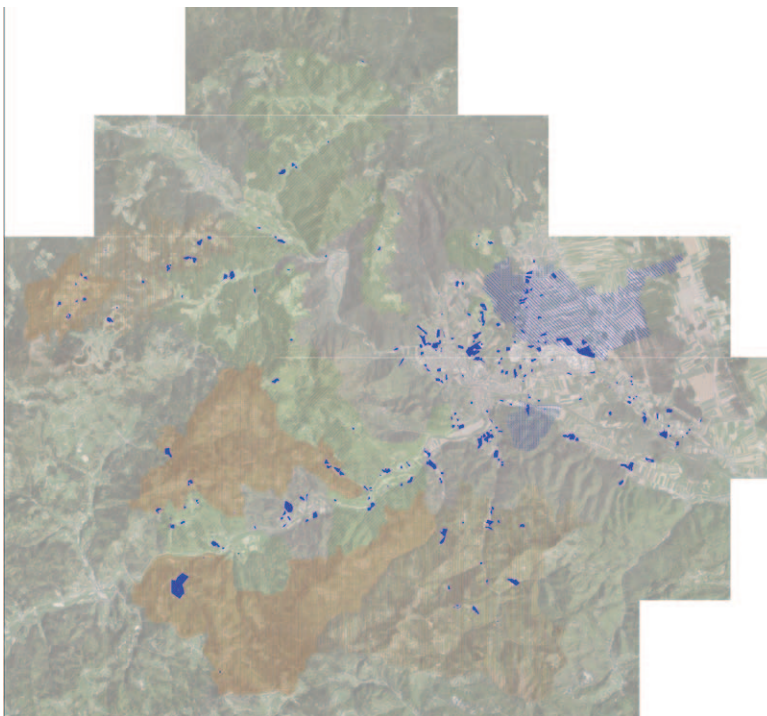
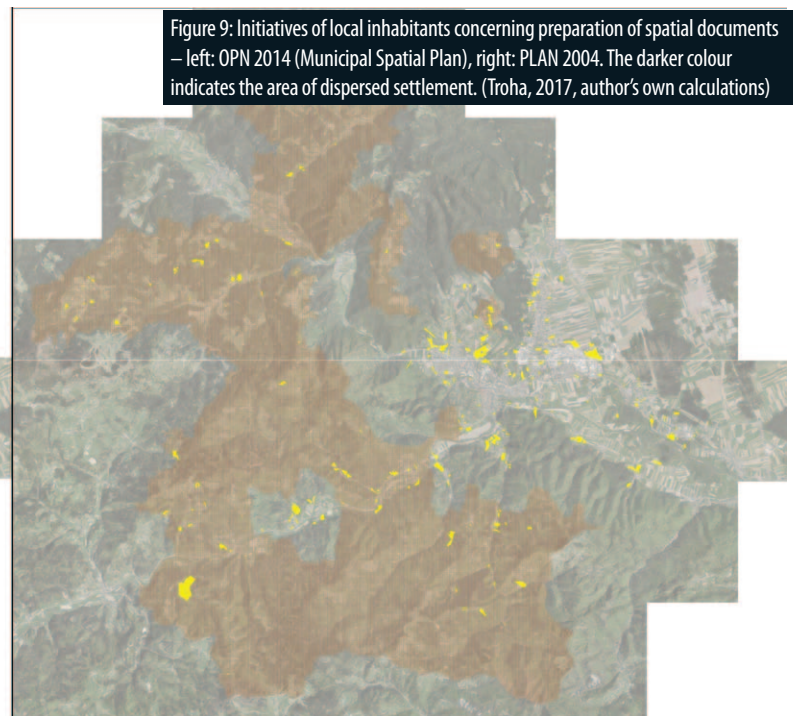


Figure 9: Initiatives of local inhabitants concerning preparation of spatial documents – left: OPN 2014 (Municipal Spatial Plan), right: PLAN 2004. The darker colour indicates the area of dispersed settlement. (Troha, 2017, author's own calculations)



indicators defining dispersed urbanisation. For checking environmental indicators, the databases kept by GURS, ministries, and local communities are crucial, particularly the data on zoned land use, along with the data on actual land use.

#### 4. CONCLUSIONS

The sprawl of settlement in areas where the dispersed settlement is an autochthonous settlement pattern is increasingly intensive, which is, upon initiatives of residents for changing zoned land use reflected in the adoption of spatial documents and through illegal construction and its (subsequent) legalisation. If the expansion of such settlement involves growth and traditional, existing settlement patterns, this, indeed, helps to preserve the cultural landscape and the quality of natural and architectural landscape. The latter is demonstrated through the preservation of zoned land use as well as preservation of agricultural and cultivated land in the areas concerned. On the other hand, in the case of dispersed urbanisation or the so-called "urban sprawl", such settlement expansion does not contribute to preserving landscape patterns, but rather accelerates the deterioration or shrinking of agricultural and cultivated land in these areas.

So far, the discussion revealed that *the growth of settlements in areas of autochthonous dispersed settlement is to a large extent dispersed building that does not contribute to greater preservation and recognisability of rural areas, while it does increase social costs for ensuring adequate supply of these areas.*

The hypothesis will be tested by using the individual indicators of urbanisation (social, economic, environmental, according to Vintar Mally, 2006) and determine the most appropriate areas for a detailed analysis. In the selected areas, using a set of indicators that define dispersed urbanisation, we will check whether this is, indeed, this type of settlement or the so-called organic expansion of settlement. The method for checking the individual indicators will be selected based on the spatial characteristics and the type of indicators used to check the spatial characteristics. Each of the previously presented methods can help us to determine the level of urbanisation (only to a certain extent), but each also has some deficiencies related to identification of physical characteristics of space, as the subject of their treatment is exclusively urban areas along major city centres, i.e. metropolitan regions. When choosing and developing the methodology for quantifying such phenomena in, exclusively, sparsely populated rural areas we will need to overcome the large-scale framework and observe the phenomenon in settlement structures at micro scale.

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