

A METHOD FOR REDEFINING THE AGGLOMERATION OF BUDAPEST

NEW INDICATORS, NEW RESULTS?

EGY MÓDSZER A BUDAPESTI AGGLOMERÁCIÓ LEHATÁROLÁSÁRA ÚJ INDIKÁTOROK, ÚJ EREDMÉNYEK?

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INTRODUCTION

The Agglomeration of Budapest consists of the capital of Hungary and 80 surrounding settlements, each of these are located in Pest county. This delimitation has been in force since 1996 and, as a result, it no longer appropriately reflects the current and real spatial relations and processes of Budapest and its surroundings (Schuchmann & Tóth 2010; Schuchmann 2019). In 2007 the Development Council of the Agglomeration of Budapest – which has been disbanded by today – formulated the necessity of redefining the agglomeration (DCAB 2007). As a result in 2010 and 2014, a statistically-based method has been published, however, the results couldn't be put into practice (Schuchmann & Tóth 2010; Tóth 2014). In 2019, “Strengthening the cooperation between Budapest and its region” came forward, as the Budapest 2030 program set it as a goal. It was formulated as a criticism that the Act CXXXIX of 2018 was drafted without redefining the Budapest agglomeration, so no substantial progress has been made in this matter since the adoption of the National Development and Spatial Development concept in 2014 (Schuchmann 2019). Even though the National Development and Spatial Development defines “the reinterpretation of the delimitation of the Agglomeration of Budapest” as a development policy task, and that the Long-Term Urban Development Concept of Budapest formulates „defining the new boundaries of the Agglomeration of Budapest by taking into account spatial

Source	Definition
Kovács, Tóth (2003)	„A settlement structure, where population growth and significant housing activity can be observed. The processes that took place in the 1990s indicate that a growing population and housing construction activity. The processes that took place in the 1990s indicate that the growing population and housing activity is not typical in the centers, but in the surroundings: for various reasons, the population moves from the centers to the surroundings as immigration from other areas is directed to those areas, and they build a house there. Jobs for the active population (the vast majority) are located in the centers. Multifaceted functional relationships are established between the center and the settlements in its immediate vicinity (workplace-residence, business-economy, trade-market, education, culture, health, culture, various types of services). As a result of the intensive agglomeration process, continuous, physically integrated build-up areas are formed and the settlements are merged. The infrastructure systems cover and unite the entire territory of the agglomeration (transport, energy supply, public water supply). The settlement structure of the center and its co-centers, the morphological features, the natural-geographical conditions of the affected area (topographic features, hydrographic situation) and the territorial-geographical location of the linear infrastructure play a decisive role in the formation of the settlement structure of the agglomeration. The area of the agglomeration is characterized by intensive land use and the relative density of the build-up area. An increase in installation height can be observed.”
Nemes Nagy (2005)	„A complex of settlements created as a result of the processes of concentration and centralization of productive forces, in which the developed city stands out from its surroundings and the surrounding settlements are connected by intensive economic and social life to the central city, and where population densification can be observed around the central city.”

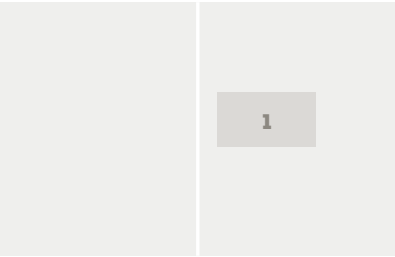


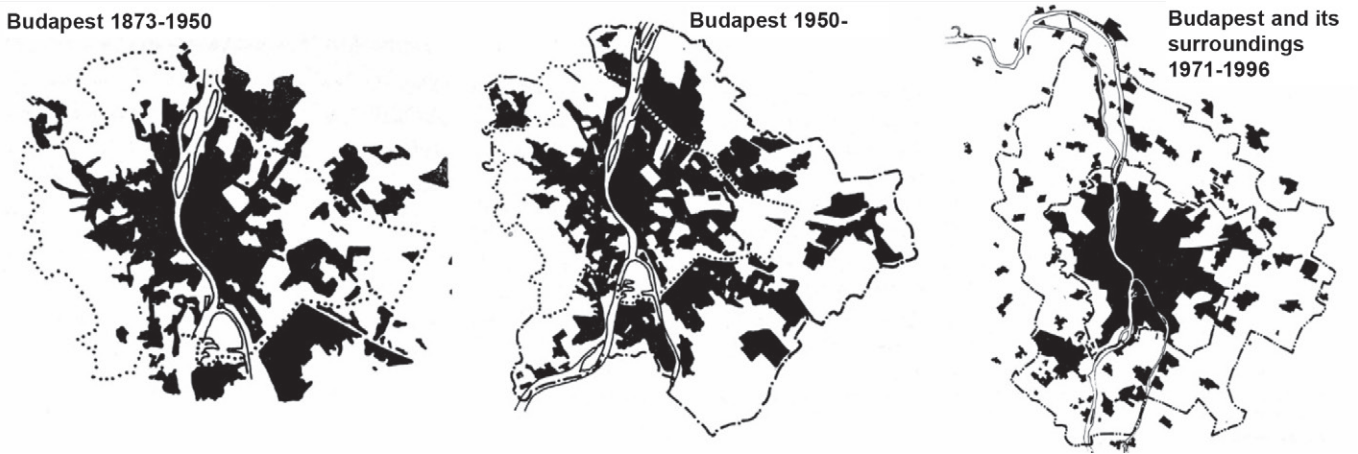
Table 1: The most detailed definitions for the agglomeration in Hungary

processes and the results of the 2011 census” as one of the means of implementing the thematic task “Strengthening territorial cooperation”. With these in mind, this study aims to find a delimitation methodology that follows the spatial processes with sufficient sensitivity and fits into the development documents.

1. THE CONCEPT AND INTERPRETATION OF AGGLOMERATION IN HUNGARY

First of all, it is necessary to interpret, understand, and formulate the concept and scope of an agglomeration, which sheds light on its basic elements, processes and shows how an agglomeration works. There are several definitions for agglomeration, which have come to light since professionals and scholars have dealt with this phenomenon in Hungary. The relevant and the most detailed definitions are given in Table 1.

Based on the definitions, it can be stated that agglomeration is characterized by very close relations. The intensive increase of the build-up areas, thereby the merge of the build-up areas plays a main role in the agglomeration, and as a result of these, the densification of the population and the increase of daily commute can be observed. Based on these, it can be concluded that the agglomeration is a set of settlements with the closest demographic and urban relations organized around the central core(s), in which the intensive physical growth of the build-up area and the merge of settlements are characteristic.



2. THE BRIEF HISTORY OF THE AGGLOMERATION OF BUDAPEST

The area of Budapest is one of the oldest inhabited areas in Europe, the historical significance of which is indisputable due to its strategic position and endowments. The remains of the Roman Empire, its significant role in the Middle Ages made this area one of the cultural centers of the Carpathian Basin and Europe. In its current name, but not in its current form, Budapest was established in 1873 by merging Buda, Pest, and Óbuda (Perényi 1976) (Figure 1).

After World War II, as a result of industrialization, Budapest, as the only city suitable for the establishment of a major industrial center, started to grow strongly (Bernát, Bora & Fodor 1973). In 1950, with the administrative unification of the then Budapest and its suburbs, the administrative border of the capital – which is still known today – was created (Figure 1). In 1960 the government approved the first General Settlement Plan by resolution 1027/1960/X.4., which managed Budapest and its surroundings together for the first time. At that time the surroundings of Budapest consisted of 64 settlements located in the capitals 15-kilometer ring.

In 1969 a new delimitation was created by a comprehensive methodology and detailed examination, which defined an active spatial processes based spatial category and consisted of the capital and 45 settlements in its immediate vicinity (Figure 1). This methodology has already taken into account the distribution of occupations, commuting, the supply levels, the pace of development, and the transport connections of the settlements too, thus the 1971 General Settlement Plan already included an agglomeration zone, which based on these indicators (SPAB 1999). The first plan which named as Spatial Plan of the Agglomeration of Budapest made in 1975 and revised in 1985. In 1996 the Agglomeration of Budapest was redefined by the Act XXI of 1996, which described and defined the extent of the agglomeration still in force today. This delimitation consisted of the capital and 78 surrounding settlements. Through the years the number of the surrounding settlement has numerically increased to 80 by the separation of two settlements. In 2005 the Spatial Plan of the Agglomeration of Budapest has risen to legal force as a priority area by the Act LXIV of 2005. During its review in 2011, the spatial regulations of the area were tightened, but by then it was

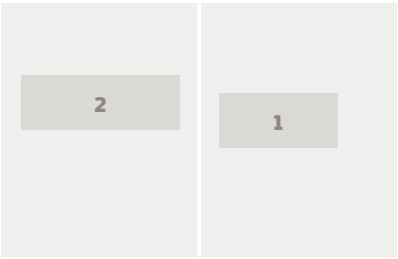


Fig. 1.: The forming of Budapest and its surroundings 1873-1996

Table 2: The statistical indicators of the 2010 and 2014 methodologies

The indicators of the 2010 methodology	The indicators of the 2014 methodology
Budapest city center public road accessibility 2009 (min)	Change in resident population 2001-2011 (%)
Budapest city center public transport accessibility 2009 (min)	Proportion of dwellings built between 2001 and 2012 as a percentage of the 2012 housing stock
Proportion of dwellings built between 2000 and 2008 as a percentage of the 2008 housing stock	Population density 2011 (person/km ²)
Number of cars per 1000 inhabitants 2008 (pcs)	PIT-based income per permanent residents 2012 (HUF)
Proportion of employees 2001	Number of cars per 1000 inhabitants 2012 (pcs)
Proportion of employees in industry, construction, and services 2001	Proportion of daily commuters compared to resident population 2011
Proportion of daily commuters to Budapest 2001	Proportion of active working population 2011
Proportion of daily commuters from Budapest compared to local employees	Proportion of employees in industry, construction, and services 2011
Number of active enterprises per 1000 inhabitants 2007	Proportion of daily commuters to central settlements 2011
Change in resident population 2000-2008 (%)	Difference in migration 2001-2011 (%)
Migration difference per 1000 inhabitants 2000-2008	
Population density 2009 (person/ km ²)	
PIT-based income per 1000 permanent residents 2008 (HUF)	

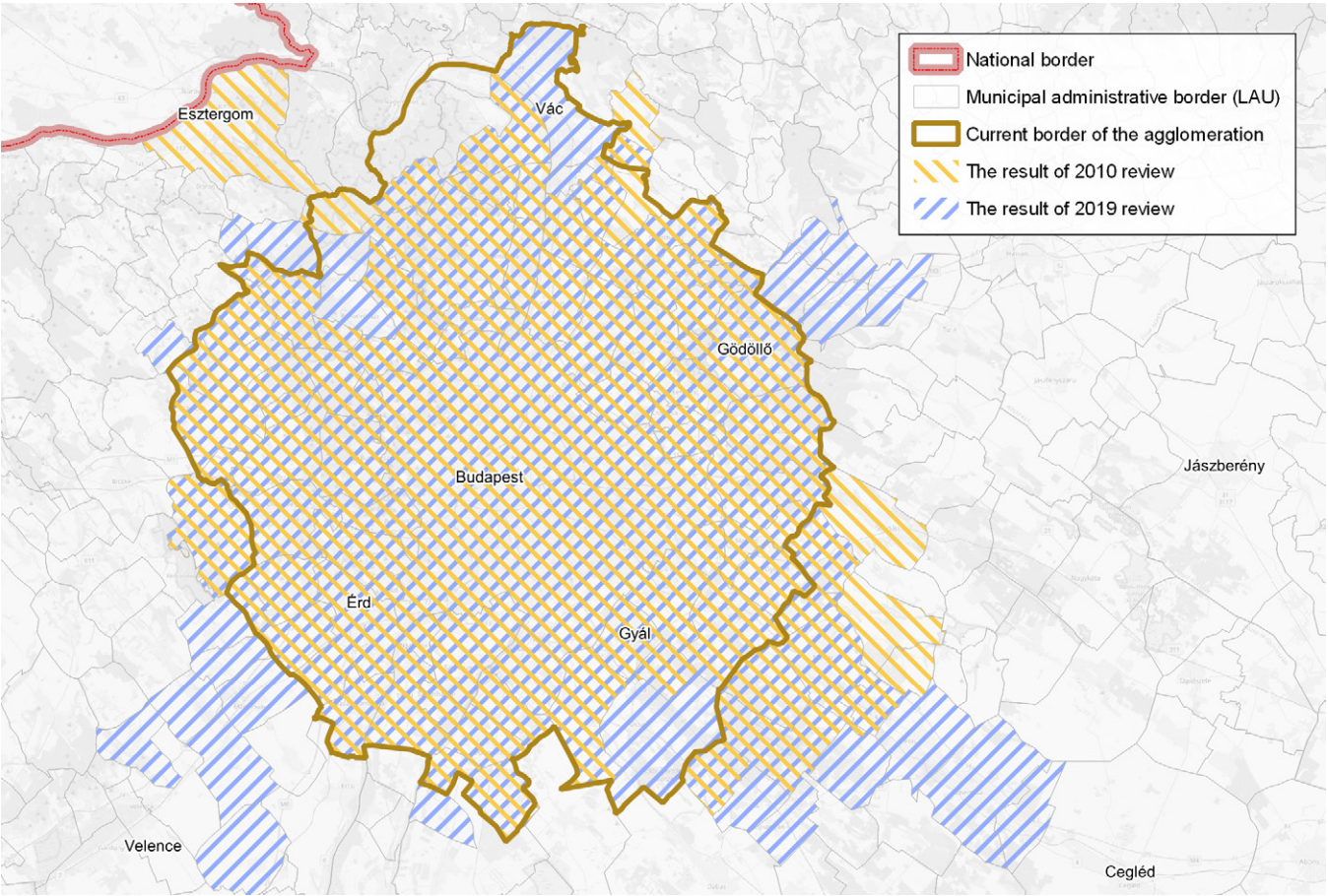
very late (Schuchmann 2015). In 2018 the Spatial Plan of the Agglomeration of Budapest has brought under the scope of Act CXXXIX of 2018 together with the National Spatial Plan and the Spatial Plan of the priority resort area of Lake Balaton. However, the agglomeration has not been redefined in any law since 1996.

On the other hand, if we look at some demographic and economic data – based on the Central Statistical Office data - we can see why so important and actual to redefine the Agglomeration of Budapest. For the examination, a study area was delineated which consists of Budapest and 301 surrounding settlements in an average 50-70-kilometer ring based on the functional urban area of Budapest (KSH 2018, UA 2018).

Between 1990 and 2018 the resident population of Budapest decreased by more than 250.000 and the surroundings increased by more than 300.000, thus the distribution of the resident population between Budapest and its surroundings changed from 60%-40% to

52%-48%. The migration difference indicator shows the process well because the value of this indicator in 2018 in Budapest was -1,78 ‰, and +11,90 ‰ in the surroundings. The number of employees decreased by 140,000 in Budapest and increased by 70,000 in the surroundings between 1990 and 2011.¹ The housing stock increased by 115,000 in Budapest and by 175,000 in its surroundings, thus the resident population per dwelling indicator decreased from 2,52 to 1,91 in Budapest and from 2,81 to 2,53 in its surroundings between 1990 and 2017. Meanwhile, the number of cars is significantly increased in the whole area. In this period the number of cars in Budapest increased by more than 140,000 and by more than 400,000 in the surroundings, which is a very big change. Connected to this, the proportion of commuting employees is 29,75% from the surroundings to Budapest in 2011, which means nearly one from every three employee commute to Budapest from the surroundings.

¹ This data based on the census databases. The last census was in 2011 in Hungary



Based on these data we can see how the base demographic and economic processes changed from the delineation of the agglomeration and why is it so important to redefine the agglomeration zone around Budapest these days.

3. ATTEMPTS TO REDEFINE THE AGGLOMERATION OF BUDAPEST

In 2010 a statistical methodology to redefine the Agglomeration of Budapest has created by Géza Tóth and Péter Schuchmann, which included 13 indicators (Tóth & Schuchmann 2010) (Table 2.). It was revised in 2014 and the indicators were modified, which are already based on the data of the 2011 census too (Tóth 2014) (Table 2.). These indicators were derived from Kovács-Tóth's definition.

Based on the 2010 methodology, those settlements could form the agglomeration, which indicators were better than the average of the study area, their population increased, the proportion

of new dwellings as a percentage of the housing stock in 2008 reached or exceeded the national average and the capital was accessible within 25 minutes. As a result, the redefined agglomeration consisted of the capital and 85 surrounding settlements (Tóth & Schuchmann 2010) (Figure 2.).

In 2014 the methodology changed a bit. Those settlements could form the agglomeration, which complex indicators were higher than the rural average, due to the general population loss, the criteria were not to be characterized by emigration in the given settlement and the proportion of daily commuters in the resident population should be at least 10%. If a settlement did not meet the criteria but wedged into the area as an enclave, it had to be part of the agglomeration. Thus the Agglomeration of Budapest consisted of the capital and 117 surrounding settlements (Tóth 2014).

The 2014 methodology was revised in 2019 but has not been published officially. The indicators did not change but

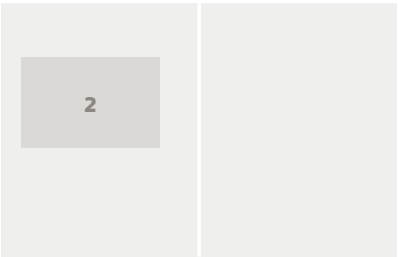


Fig. 2: The results of the reviews (2010, 2019)

were updated if new data were available. The method has changed a bit, those settlements could form the agglomeration, which complex indicators were higher than the rural average, the number of housing construction was higher than rural average, the capital was accessible within 35 minutes, the decrease of the population was lower than the rural average and the minimum of 8% of the resident population were daily commuter. Thus the Agglomeration of Budapest consisted of the capital and 107 surrounding settlements (Tóth 2019) (Figure 2.).

4. THE LACK OF STATISTICAL INDICATORS

The purely statistical indicators may show complex statistical differences and processes, but they can not show the spatial effects of the processes with sufficient sensitivity. Although statistical changes have often be linked to some spatial change, thus these indicators also have a significant spatial dimension. In the following, the lack of statistical indicators are highlighted one by one.

The change of the resident population an appropriate indicator, as urban agglomeration is accompanied by an increase in the population, however in Hungary the population is decreasing nationwide, so in this case, this indicator can not show a clear picture of the real processes by itself.

The proportion of dwellings built is theoretically correct, but it does not reflect the size of the dwellings and the land occupied by the associated property, so it is not sensitive to the dimensional properties of the urban sprawl.

The population density shows the distribution of the resident population compared to the total administrative area of the given settlement. Although administrative areas are very diverse in size and may contain many non-built-up areas, which may distort this indicator, while densification occurs in urban areas, so in this form, this indicator does not provide an appropriate picture of spatial processes.

The PIT-based income per permanent residents and the number of cars per 1000 inhabitants are a quality indicator, which is more suitable for exploring individual better or less better sectors rather than determining the extent of the agglomeration zone.

A high level of commuting is the basis of an agglomeration, so the *proportion of daily commuters compared to resident population* indicators is essential. Although, it is not necessarily to be examined in the proportion to the resident population. There is a large proportion of people who are locally employed or who are not even working and commuting within the resident population, thus this fact may distort the values of the indicator.

The proportion of the active workers is an appropriate indicator, as the central city

attracts and concentrates those who want to work in its area, but this cannot give a suitable picture alone, because it does not show the actual location of the workplace.

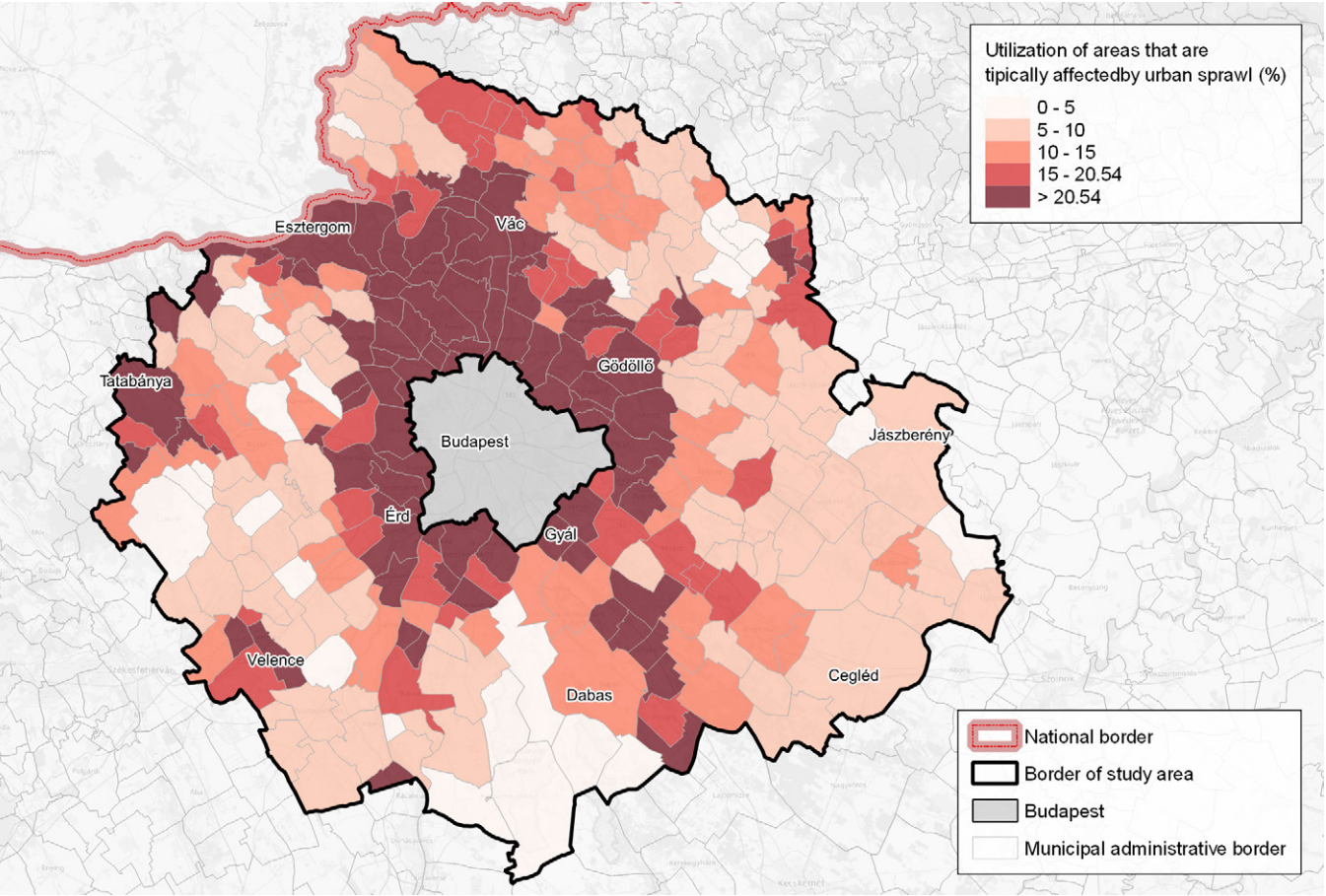
The proportion of employees in industry, construction, and services is not a necessary indicator. No further segregation within employees is required. People choose a job based on their motivations and opportunities, wherever they want or can. Compared to the country, Budapest also concentrates a large proportion of jobs, including jobs in industry, construction, and services, but a separate analysis of these is not necessary in terms of the extent of the agglomeration.

The proportion of daily commuters compared to the resident population is reflects the difference between the workplace and the residence location, which expresses an attachment to a center, so the examination of this indicator is necessary, because it may show relations between the central and the given surrounding settlement.

The difference in migration can be an appropriate indicator, in addition to the decreasing population, but its mistake is that it does not take into account the changes in the urban or built-up area and is not sensitive to urbanization and densification processes.

The time factor, and analyzing availability within a given time is an inappropriate indicator. In several cycles a day, the distance that can be covered in a given time varies often depending on the

The most affected relief categories by urban areas
A*:0-100 S**:0-5; A:0-100 S:5-12
A:100-150 S:0-5; A:100-150 S:5-12; A:100-150 S:12-17; A:100-150 S:17-25
A:150-200 S:0-5; A:150-200 S:12-17; A:150-200 S:17-25
A:200-250 S:0-5; A:200-250 S:5-12; A:200-250 S:12-17
A:250-300 S:0-5; A:250-300 S:5-12
A:300-350 S:0-5; A:350-400 S:0-5
*A = Altitude (m)
**S = Slope (%)



traffic, so the indicator is too diverse and it envisions a too ideal case and does not take into account the longer commuting time taken from the constraint.

5. THE NATURAL-GEOGRAPHICAL CONDITIONS

The biggest lack of statistical method is that they can not reflect appropriately to the natural-geographical conditions, thus their enumeration was not even part of the agglomeration delimitation methodologies in Hungary. Even though the most detailed definition underlying the natural-geographical conditions ability to influence the spatial structure.

Four main features were analyzed, that have a major influence on new build-up

areas: the forests, the water surfaces and wetlands, the altitude and the slope in the study area which consists of Budapest and 301 surrounding settlements. This study interprets forest, water surfaces, and wetlands as non-buildable areas. For the analysis of relief conditions, 10 categories were created based on the altitude and six categories based on the slope, so 60 different relief categories were formed based on their summation. After the summation, the forests, water surfaces, and wetland areas had been cut out from the database, and the remaining areas were further analyzed. The categories which most affected by urban areas were selected (Table 3.). These categories have been named as the area that typically affected by urban sprawl.

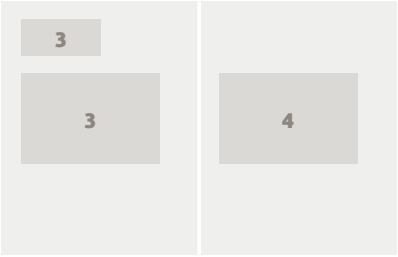
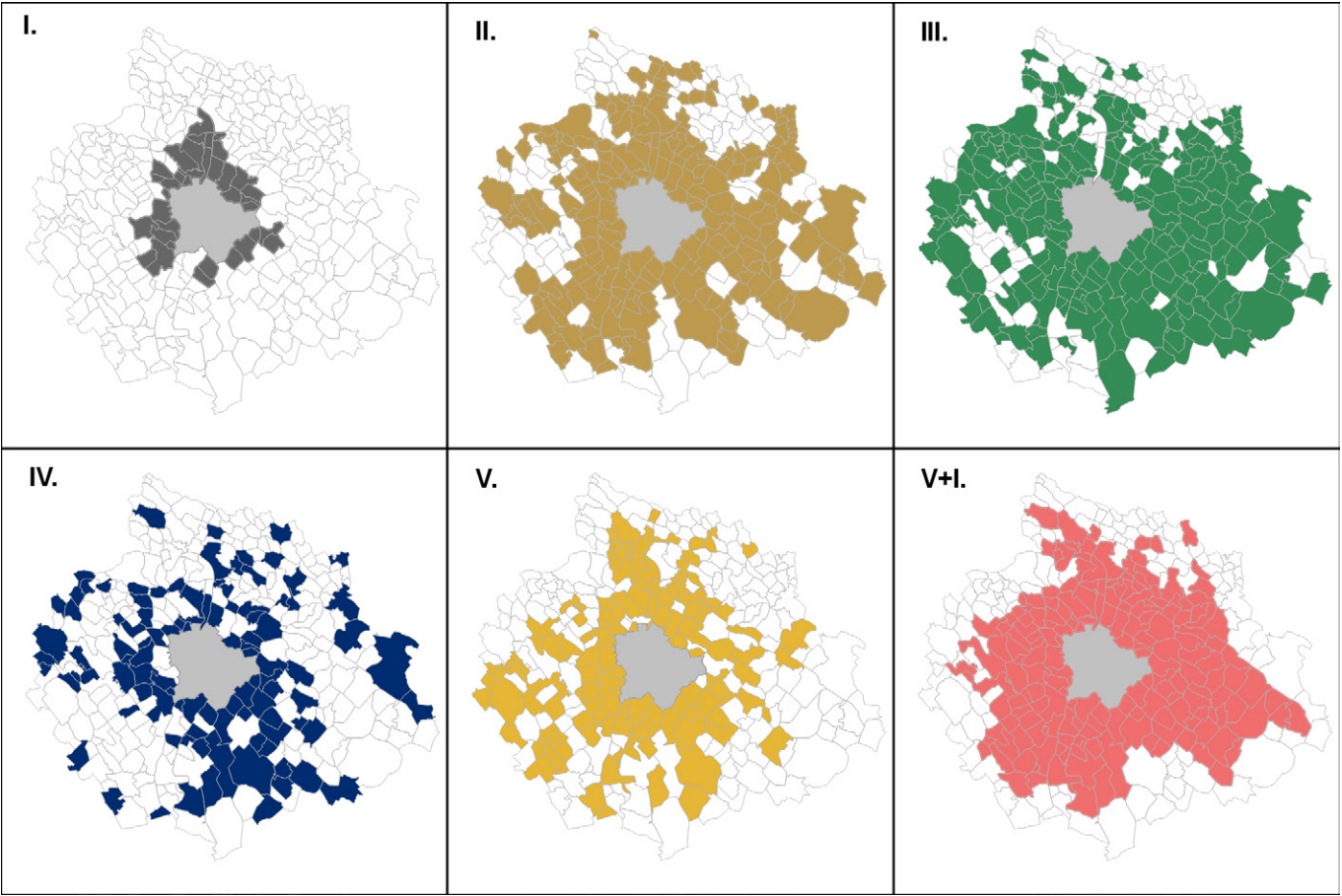


Table 3: The most affected topographical categories by urban areas
Fig. 3: The utilization of the areas that are typically affected by urban sprawl

Fig. 4: The results of the new indicators



After the identification of the areas that are typically affected by urban sprawl, the proportion of these areas by settlement had been identified, and after that, the proportion of already built-up areas has been identified in those areas by settlement. In the case of the whole analyzed area, this value was on average 20.54% per settlement (Figure 3). The existing spatial regulations may further reduce the extent of buildable areas, thus this proportion may increase taking them into account.

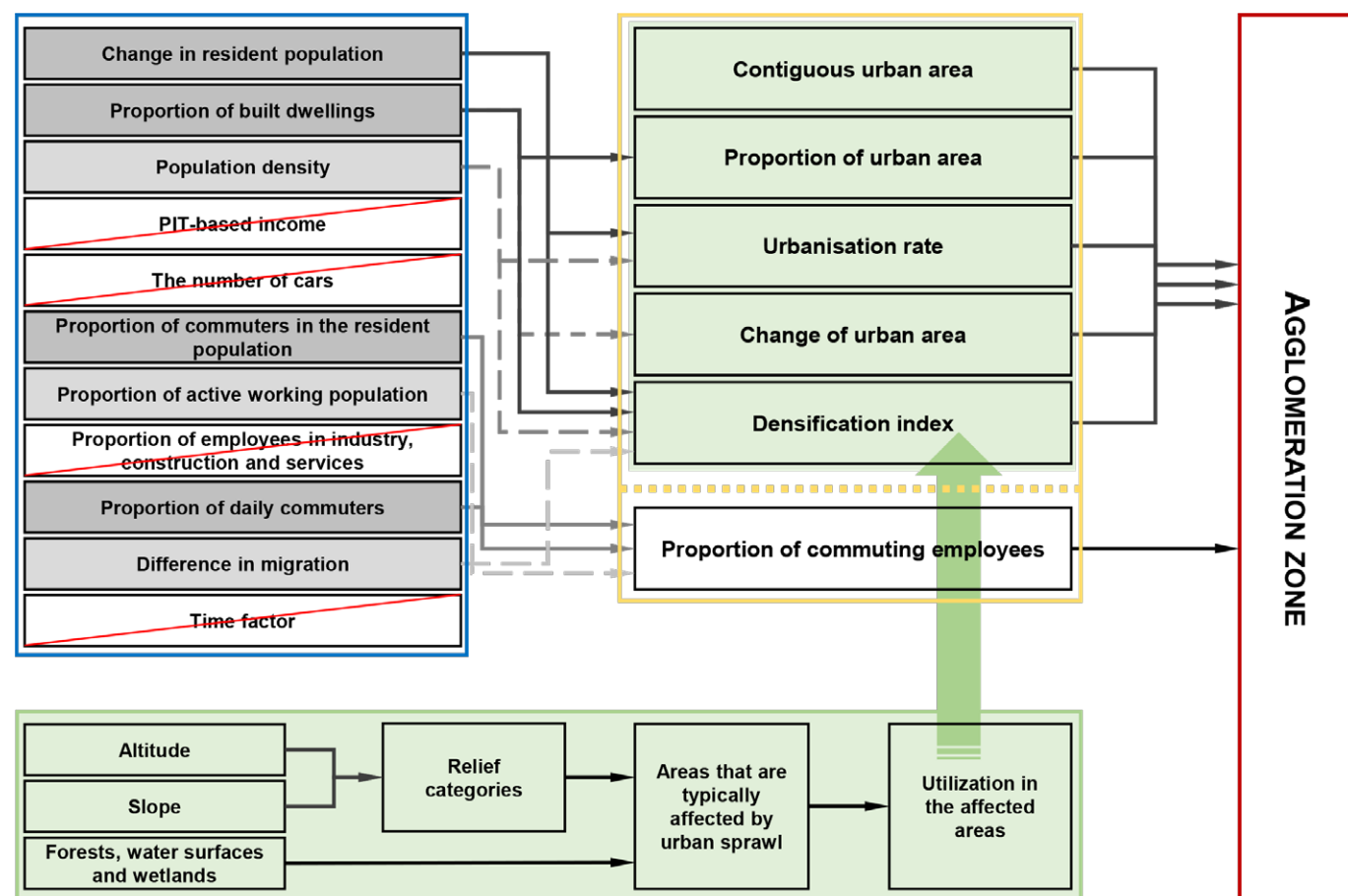
6. NEW INDICATORS

Based on available data six new indicators have been developed, five new „urbanization indicators” and one

modified statistical indicator. The analysis of the extension of land uses and urban or built-up areas are based on the CORINE land cover database.

I. Contiguous urban area
This indicator enumerates those settlements in which urban areas are physically connected to Budapest or are so close to each other that the 200-meter buffer zone of their urban areas meet, so their relative proximity to each other is very high. Thus, their urban areas could be said to be connected to the capital.

II. Proportion of urban area
Those settlements are located in the agglomeration, which has a prominently large urban area, thus more land is lost from other land uses than



average, so its presence is more significant. Accordingly, those settlements are included in this indicator in which the proportion of the urban area is higher than the national average.

III. Urbanization rate

This indicator based on the OECD's report named *Redefining „Urban” – A New Way to Measure Metropolitan Areas (2012)*. It highlights the relations between the resident population and the extent of the inhabited land. Essentially, it shows the population density concerning inhabited areas, thus getting rid of the error of the general population density indicator, which manages the entire administrative area. The indicator includes those settlements in which the urbanization rate exceeds the national average.

IV. Change of urban area

Indicators of changes have also been developed to appropriately illustrate the spatial processes. This indicator expresses the extent of the change in urban areas between 2006 and 2018. This indicator includes those settlements which values exceed the national average.

V. Density index

To express the relations between population concentration and change in inhabited areas, the so-called densification index has developed based on the OECD's report named *Redefining „Urban” – A New Way to Measure Metropolitan Areas (2012)*. This indicator shows the extent of the change in the urbanization rate in a given period,

expressed as a percentage. In this case, the national average was negative due to the decrease in the resident population, so this indicator includes those settlements which have a positive densification index.

V+I. Proportion of commuting employees

Examining the proportion of commuters is essential because it expresses well the basic labor market relations and the attachment to the center. The ratio within the employees is more appropriate than the ratio to the resident population because the driving force of the agglomeration and the basis for its formation is the increase in the distance between the place of residence and the place of work, not

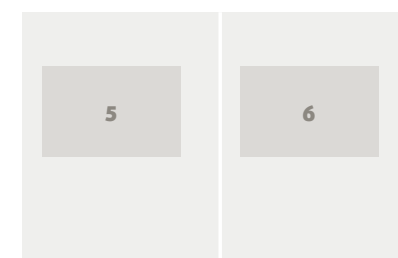
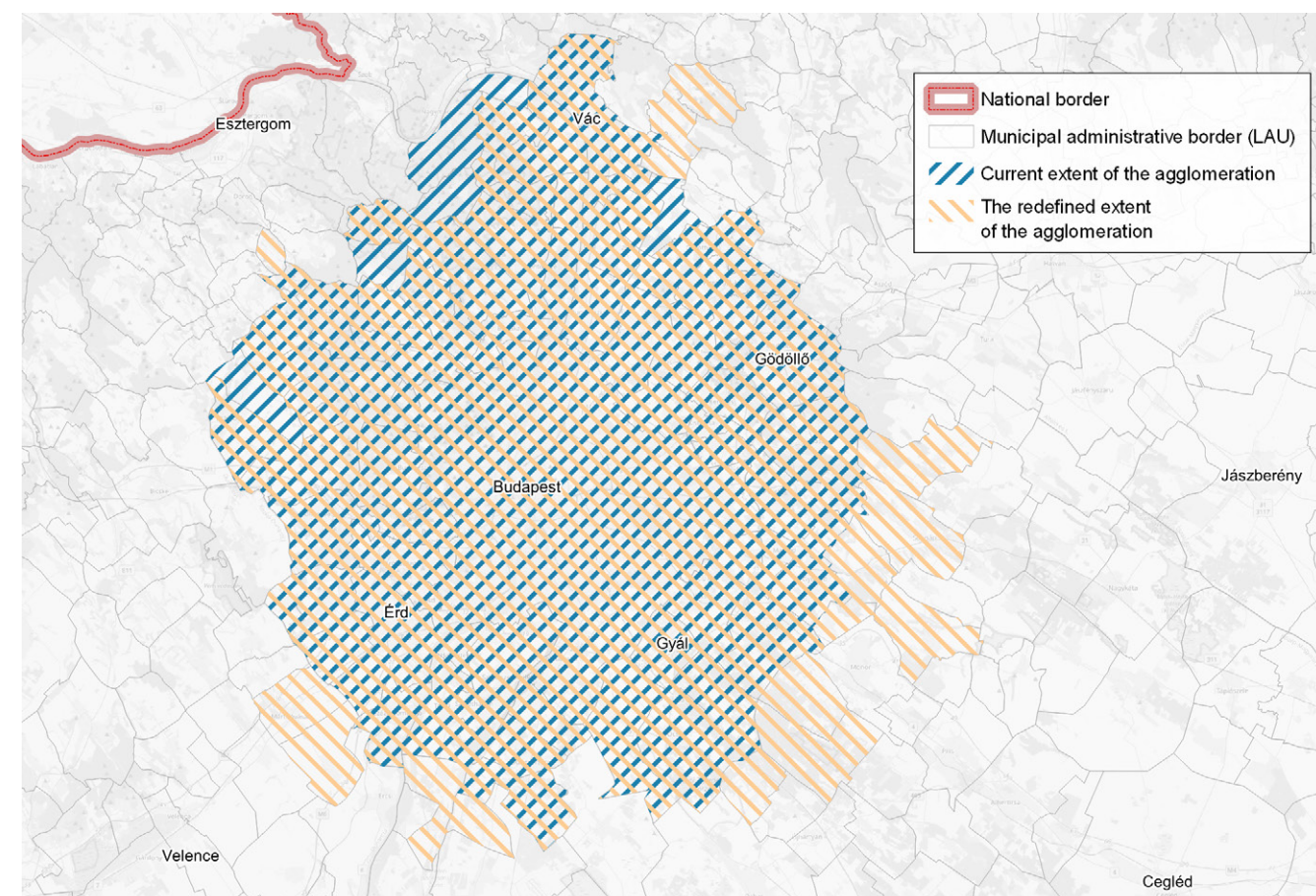


Fig. 5: The process of the new methodology

Fig. 6: The result of the new methodology



necessarily the mobility of the entire population. In line with Eurostat's functional urban area delimitation methodology, the threshold is set at 15%.

7. RESULTS

In the lights of the examined and analyzed data, it could be visible, that the new indicators include the necessary statistical data and they can add a spatial dimension to the delimitation method.

According to the results, the five new indicators can be divided into two subcategories. The so-called static indicators, which express a state at a given time, as the contiguous urban area, the proportion of urban area, and the urbanization rate. Furthermore, the so-called

dynamic indicators, which express processes of change, as the change of urban area and the densification rate.

Until the compliance with at least three indicators in a given settlement, dynamic indicators typically play a key role and the contiguous urban area indicator can be found on those settlements which comply with at least three indicators from five urbanization indicators. In settlements that reach the threshold of only two or fewer urbanization indicators, dynamic indicators play an increasingly small role and no settlement is affected by the contiguous urban area indicator.

The comparison of the natural-geographical condition analysis and the dynamic indicators shows that the settlements that have already used the

largest extent of their areas that are typically affected by urban sprawl are also the settlements those affected by densification and/or an above-average urban area change. This leads to the conclusion that there is a direct relation between changes in dynamic indicators and natural-geographical conditions. Settlements are either barely able to expand further within their territory or they have grown to such an extent that not able to expand because of the natural barriers.

Furthermore, it can be seen that the settlements affected by contiguous urban areas are characterized by the fact that the utilization of their areas that are typically affected by urban sprawl is above average and the densification index is also positive.

8. CONCLUSION

In conclusion, those settlements could be considered as part of the agglomeration, in which at least three of the five urbanization indicators reach the threshold and the proportion of commuting employees is at least 15%.

There are settlements in the study area in which urbanization rate or proportion of urban area does not reach the national average, however, the change of urban area is above average, and also the densification is positive. Comparing the results of the natural-geographical analysis and the dynamic indicators, it can be seen that they overlap each other largely. Accordingly, those settlements in which the proportion of urban area and urbanization rate are not above the national average are not necessarily formed because the urbanization processes would not have taken place or would not be present now and the expansion or densification of the settlement area not be problematic. Simply, their natural-geographical

conditions are such that they prevent a larger proportion of expansion, so a significant densification of the existing urban areas has started, which is a catalyst for the settlement to be treated as part of the agglomeration.

To sum up, it is necessary to meet only three of the five indicators, because it is not expected that only the settlement affected by contiguous urban areas will be delimited and just very few settlements can meet the other four urbanization indicator at the same time. According to this, a settlement is included in the delimitation in such a way that its existing values are already above the national average or their changes are of such magnitude and direction that it is essential to treat them in an agglomeration zone. Therefore, due to the influence caused by natural-geographical conditions, non-compliance with one indicator alone cannot exclude belonging to the agglomeration zone in this respect, so due to the different processes, it is necessary to allow some room for maneuver within the urbanization indicators. Finally, the last and mandatory criterion, which connects the settlement to Budapest is the proportion of commuting employees with a threshold of 15%. In this way, the settlements that are connected to the capital, are closely related to it, and have significant urbanization processes can be delimited (Figure 5).

As a final result the Agglomeration of Budapest consist of the capital and 91 surrounding settlements, which is 11 settlement larger than the current agglomeration in force. Six settlements were excluded: Kisoroszi, Pilisszántó, Pilisszentlászló, Tök, Vácrátót and Visegrád; and 17 new settlements were added to the agglomeration zone: Vácduka, Rád, Penc, Leányvár, Martonvásár, Ráckeresztúr, Szigetcsép, Szigetszentmárton, Áporka, Inárcs, Vasad, Csévharaszt, Péteri, Mende, Gomba, Süllyáp and Dány (Figure 6).

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EGY MÓDSZER A BUDAPESTI AGGLOMERÁCIÓ LEHATÁROLÁSÁRA – ÚJ INDIKÁTOROK, ÚJ EREDMÉNYEK?

Budapest és környékének kezelése több évtizedes téma Magyarország térstruktúrájával foglalkozó szakemberek között. Jelenleg a Budapestet és a hozzá csatlakozó térséget Budapesti Agglomerációnak nevezzük, mely 80 települést és a fővárost foglalja magába. Ez lehatárolás 1996 óta hatályos, azonban már 2007-ben felmerült a szakmai igény az agglomeráció új határainak definiálására. Ennek nyomán 2010-ben készült egy statisztikai alapú módszertan e célból, mely 2014-ben és 2019-ben is felülvizsgálatra került, azonban a gyakorlatba nem került átültetésre.

A Budapesti Agglomeráció kezelése és szabályozása a 2005. évi LXIV. törvény hatályba lépésével törvényi erőre emelkedett és elkészült a Budapesti Agglomeráció Területrendezési Terve is. E tervnek a felülvizsgálata 2011-ben történt meg, melybe az előbb említett statisztikai módszertan átültetése kudarcba fulladt. 2018-ban a Magyarország és egyes kiemelt térségeinek területrendezési tervéről szóló 2018. évi CXXXIX. törvény hatálya alá került a Budapesti Agglomeráció és a területrendezési terv ismét felülvizsgálatra került, de az agglomeráció újradefiniálása ekkor sem történt meg, így ez a 2007 óta megfogalmazott igény megvalósítása mindmáig várat magára, annak ellenére is, hogy a főváros és Pest megye fejlesztési dokumentumaiban mind fejlesztési célként jelenik meg az agglomeráció új határainak meghatározása. E tanulmány célja egy olyan lehatárolás módszertan lehetőségének felvázolása, mely kellő érzékenységgel leköveti a területi folyama-

tokat és a fejlesztési dokumentumokban foglalt célkitűzéseknek is megfelel, illetve túllépve a mindössze statisztikai mutatókon, új módszereket és eszközöket alkalmaz a területi folyamatok térbeli vetületének megértéséhez és kezeléséhez.

A célok elérése érdekében mindekelőtt tisztázni szükséges, mit is tekintünk agglomerációnak, így a részletes és kevésbé részletes meghatározások áttekintése után két definíció került kiválasztásra, melyek érdemi indikátorokat írnak le a lehatárolás módszertanához Magyarország és Budapest tekintetében. Ezt követően a Budapest és térségének története került áttekintésre, hogy érthetők legyenek a lezajló folyamatok és kirajzolódjanak a tendenciák. Majd az elkészült statisztikai módszertan és azok felülvizsgálatainak áttekintése következett, hogy a pusztán statisztikai indikátorok hiányosságai és erőnyei felszínre kerüljenek, így megértve és megmutatva miért is van szükség új módszerek és eszközök alkalmazására is egy 21. századi agglomeráció lehatárolás módszertanba.

Ezek után készült el az előzőekben feltárt elemekre való hatást figyelembe véve a természeti adottságok (domborzat, lejtőmeredekség, erdők, vízrajz) elemzése. Az elvi beépíthetőség és a beépítéssel jellemző érintett területek ezek alapján körvonalazódtak és látható vált, hogy e területeken milyen és mennyi lehetőség van a további beépített területi terjeszkedésre.

Végül 5+1 új indikátor került leírásra, melyek a ötvözik a térinformatika és a statisztikai adatok összehangolásában rejlő lehetőségeket. Az egyetlen pusztán statisztikai indikátor – „az ingázók aránya a foglalkoztatottakon belül” – mellett öt urbanizációs indikátor került megállapításra, melyek a következők:

- 1. Összefüggő településtest
- 2. Települési terület aránya
- 3. Urbanizációs ráta
- 4. Települési terület változása
- 5. Sűrűsödési index

Az indikátorok eredményeinek összevetéséből látható, hogy az urbannizációs indikátorok között további két alkategória határozható meg: a statikus- (1.,2.,3.) és a dinamikus (4.,5.) mutatók, melyek eltérő folyamatokat mutatnak meg a területi rendszerben.

Kimutatható, hogy a dinamikus mutatók azokon a településeken játszanak kulcsszerepet, melyek legalább három indikátor küszöbértékét haladják meg. A temrészeti adottságokkal való összevetés azt mutatja, hogy a dinamikus mutatókkal leginkább érintett települések használták fel legnagyobb arányba települési terjeszkedéssel leginkább érintett területeiket, mely megmutatja a dinamikus mutatók és természeti adottságok közötti összefüggést. Továbbá látható, hogy azok a települések, melyek összefüggő településtesttel érintettek a leginkább sűrűsödő települések és terjeszkedési területük kihasználtsága is átlag feletti.

Összegezve az e tanulmányban felvázolt indikátorok segítségével, akkor nevezhető egy település az agglomerációs övezet részének, ha az öt urbanizációs indikátorból legalább hárommal érintett és a Budapestre ingázó foglalkoztatottjainak aránya is meghalja a 15%-ot. Így végső eredményként egy 91 települést és a fővárost tartalmazó agglomeráció került lehatárolásra.

