

RURAL AND URBAN MUNICIPALITIES

delimitation with fuzzy inference system (Czech Republic in 2010)

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The presented map is the result of the original approach of rural and urban area delimitation with the application of the fuzzy logic. Most existing classifications of municipalities utilize Boolean logic, where the municipality is strictly designated as either rural or urban. This abrupt and strict classification does not reflect the real situation and is structured by simplistic rules, usually according to the total population in a region. This problem can be solved using fuzzy sets and logic theory, which allows smoother transitions between two adjacent classes via fuzzy degrees of membership. The aim of this map is to visualize, in an illustrative way, the fuzzy degree of membership of each municipality in the Czech Republic. Seven indicators were applied for the computation of the final degree of membership, which describes each municipality in the term of its urbanity and rurality, according to the principles of fuzzy sets and logic theory.

selection of indicators
correlation analysis
principal component analysis

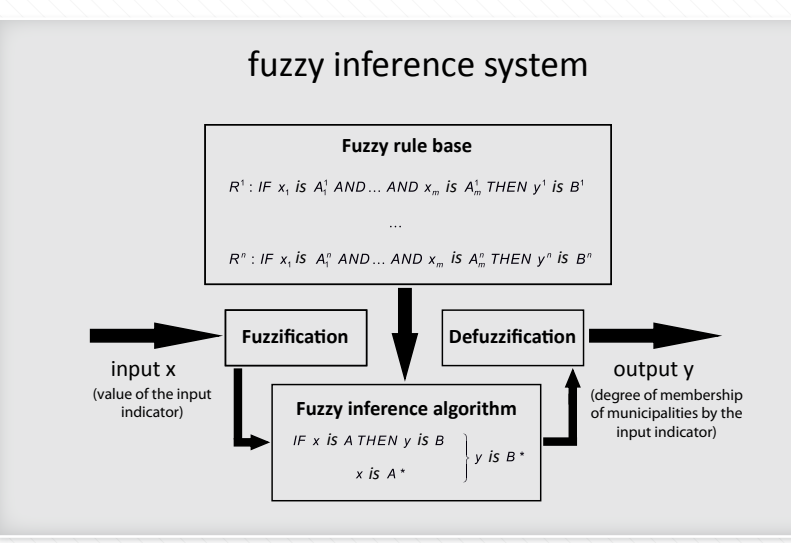
Czech Statistical Office database

limit values and weights

indicators

- total population
- total population per built-up area
- flats in family houses per total number of flats
- number of completed flats per 1000 inhabitants
- change of population
- driving distance from county seat
- urbanized area per overall municipality area

determination of municipality degree of membership to the rural or urban area in the interval $[0; 1]$



cartographic visualization



AREA OF INTEREST
localization of The Czech Republic within Europe



SPATIAL DATA SOURCES:

The National Topographic Database Data200 - Administrative areas (POLBND) and Seat represented by built up area expressed by point (BUILTUPP)
© Czech Office for Surveying, Mapping and Cadastre, 31/12/2010

Administrative Units - Countries 2010 1 : 60 000 000
© EuroGeographics, 2010

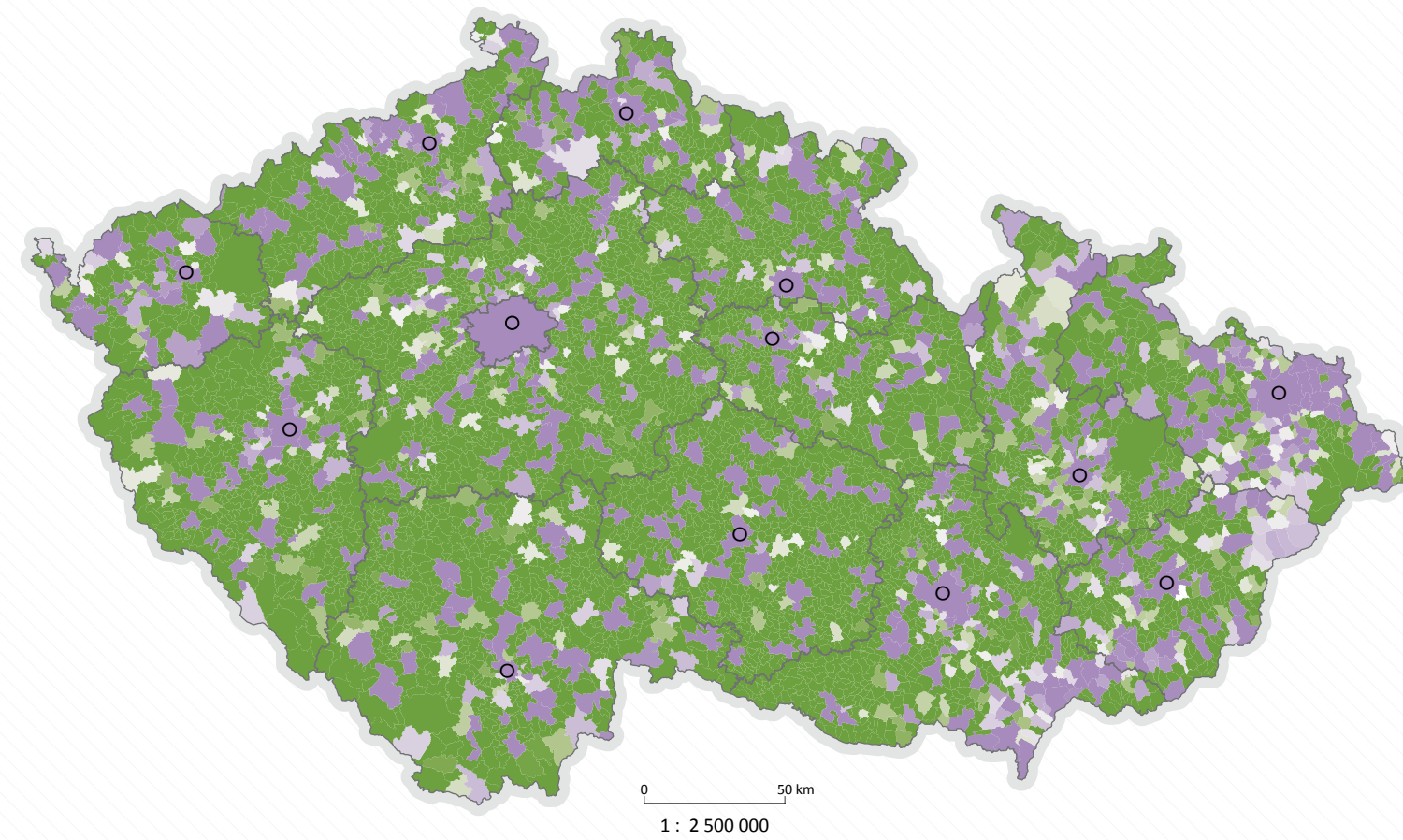
Table 1: Municipalities with the highest membership to the urban area.

municipality	membership to the urban area
1. Brandýs nad Labem-Stará Boleslav	1.00
2. Říčany	1.00
3. Čestkovice	0.99
4. Odolena Věda	0.99
5. Hostovice	0.98
6. Roztoky	0.98
7. Slápanice	0.97
8. Jílové u Prahy	0.96
9. Vejpřovice	0.96
10. Praha	0.95
11. Vráimov	0.95
12. České Budějovice	0.94
13. Hluzín	0.94
14. Hradec Králové	0.94
15. Kamennice	0.94
16. Liberec	0.94
17. Olomouc	0.94
18. Úňhošť	0.94
19. Brno	0.93
20. Jihlava	0.93

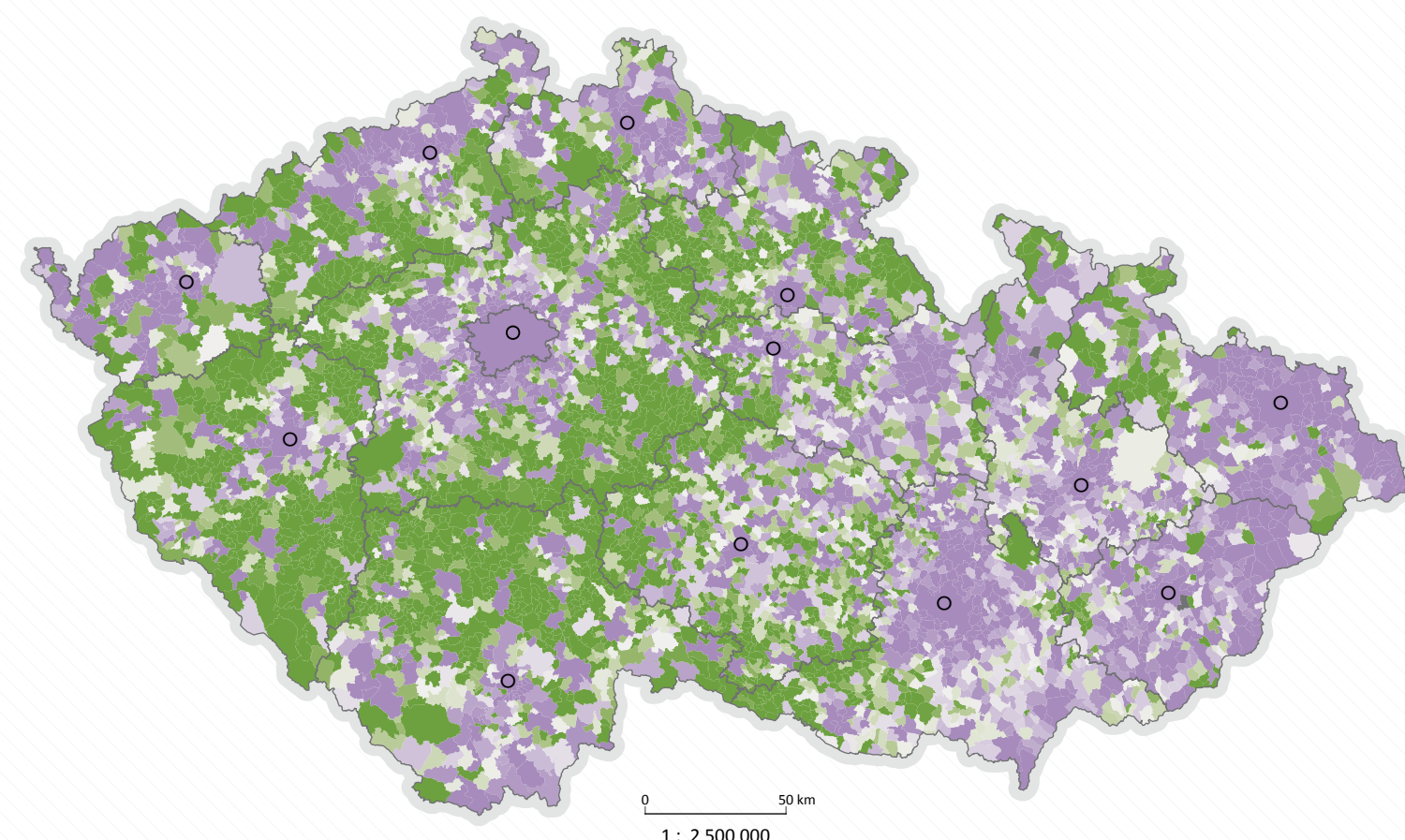
Table 2: Weights of indicators.

indicator	weight
1. Total population	0.35
2. Total population per built-up area	0.20
3. Flats in family houses per total number of permanently occupied flats	0.10
4. Number of completed flats per 1000 inhabitants	0.10
5. Population change	0.05
6. Driving distance to the county seat	0.10
7. Urbanized area per overall municipality area	0.10
Sum of weights	1.00

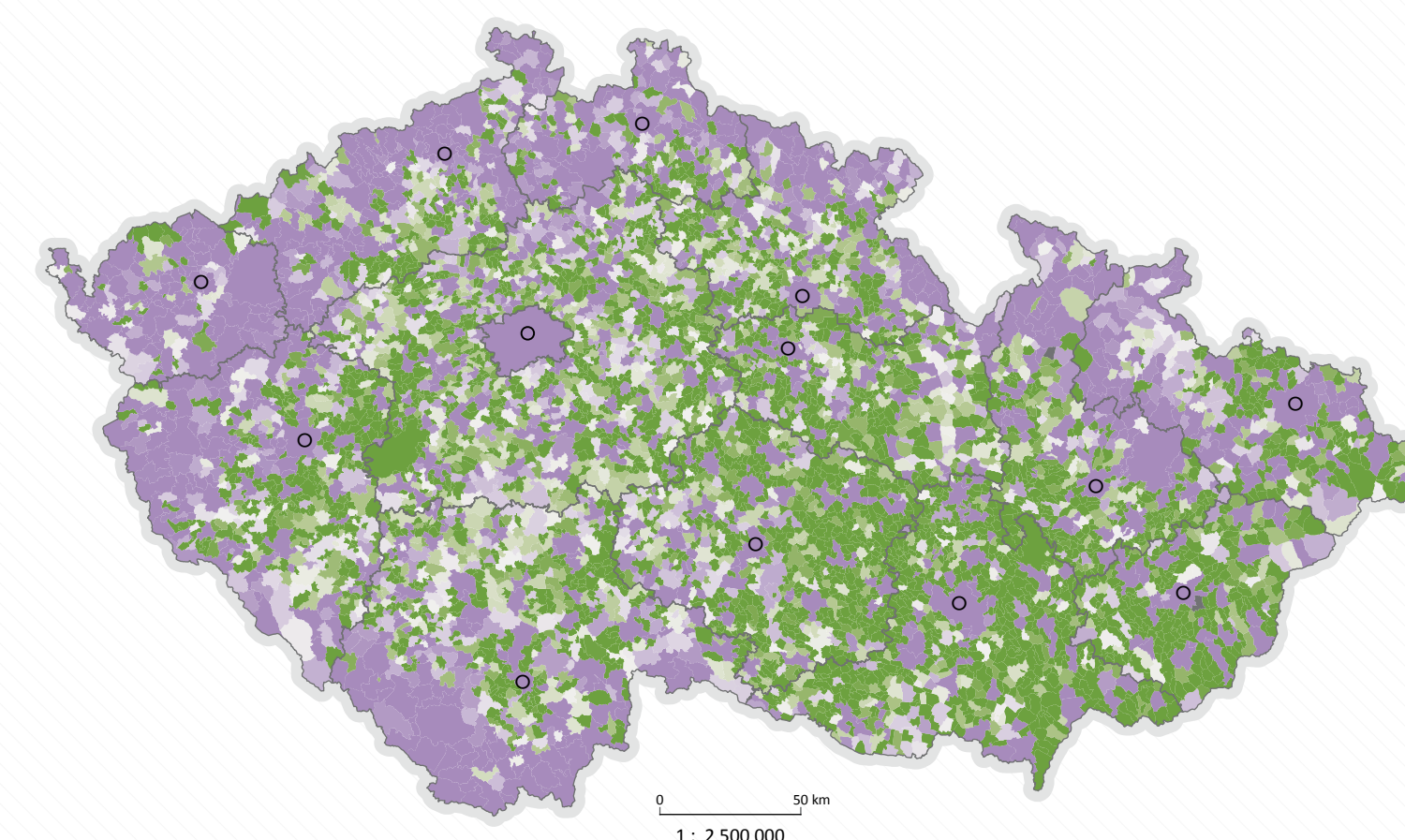
INDICATOR 1: MEMBERSHIP ACCORDING TO THE TOTAL POPULATION



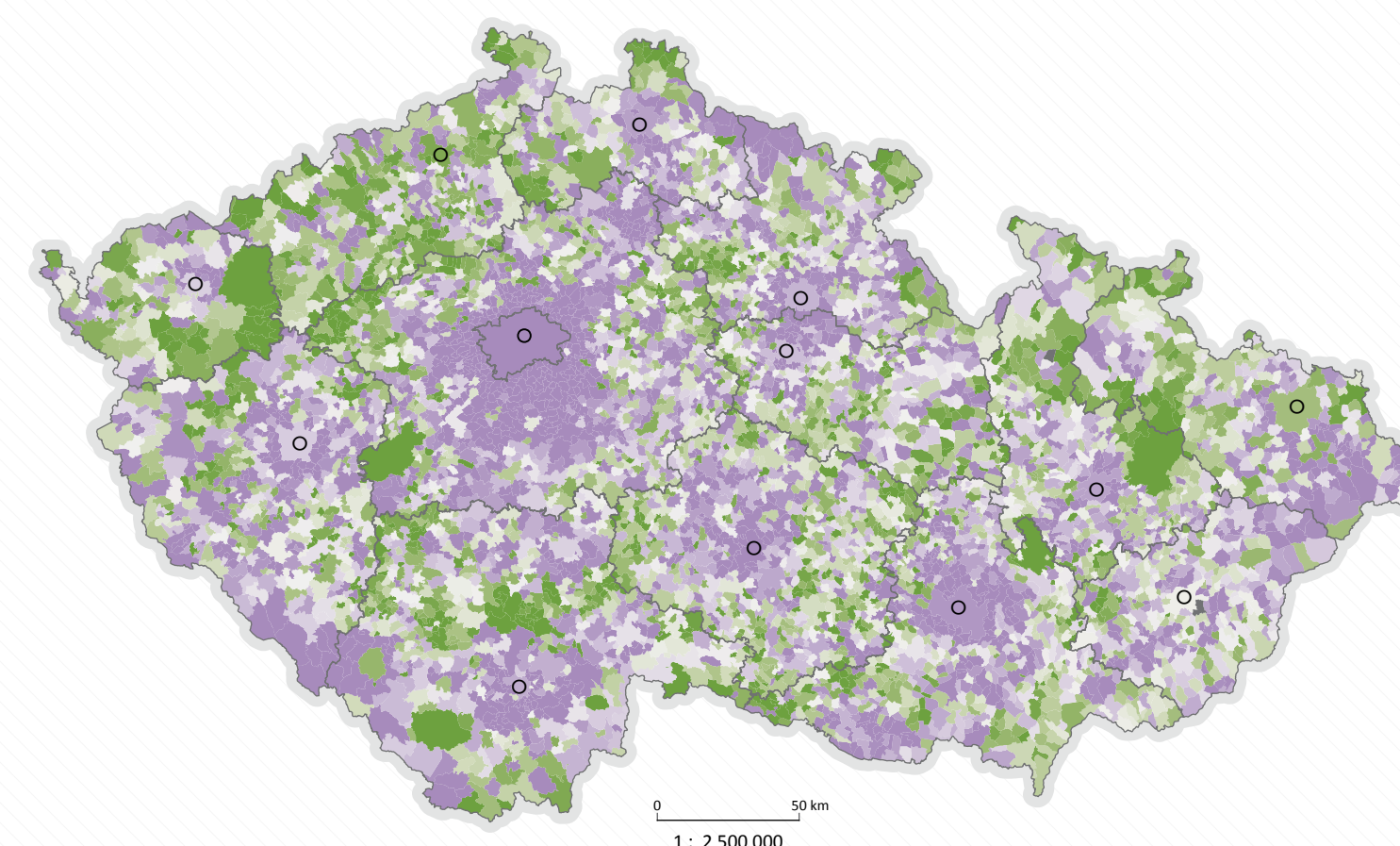
INDICATOR 2: MEMBERSHIP ACCORDING TO THE TOTAL POPULATION PER BUILT-UP AREA



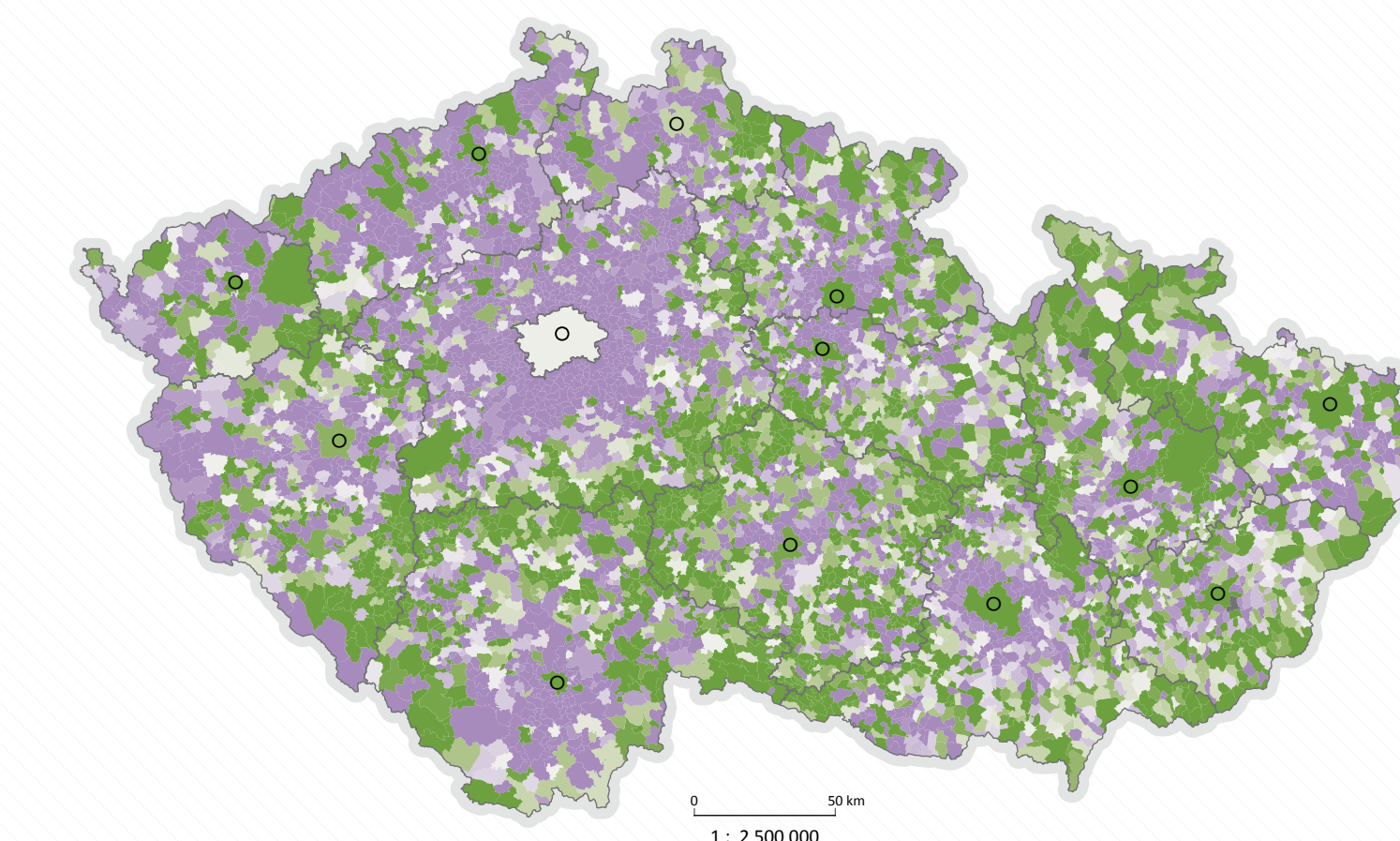
INDICATOR 3: MEMBERSHIP ACCORDING TO FLATS IN FAMILY HOUSES PER TOTAL NUMBER OF PERMANENTLY OCCUPIED FLATS



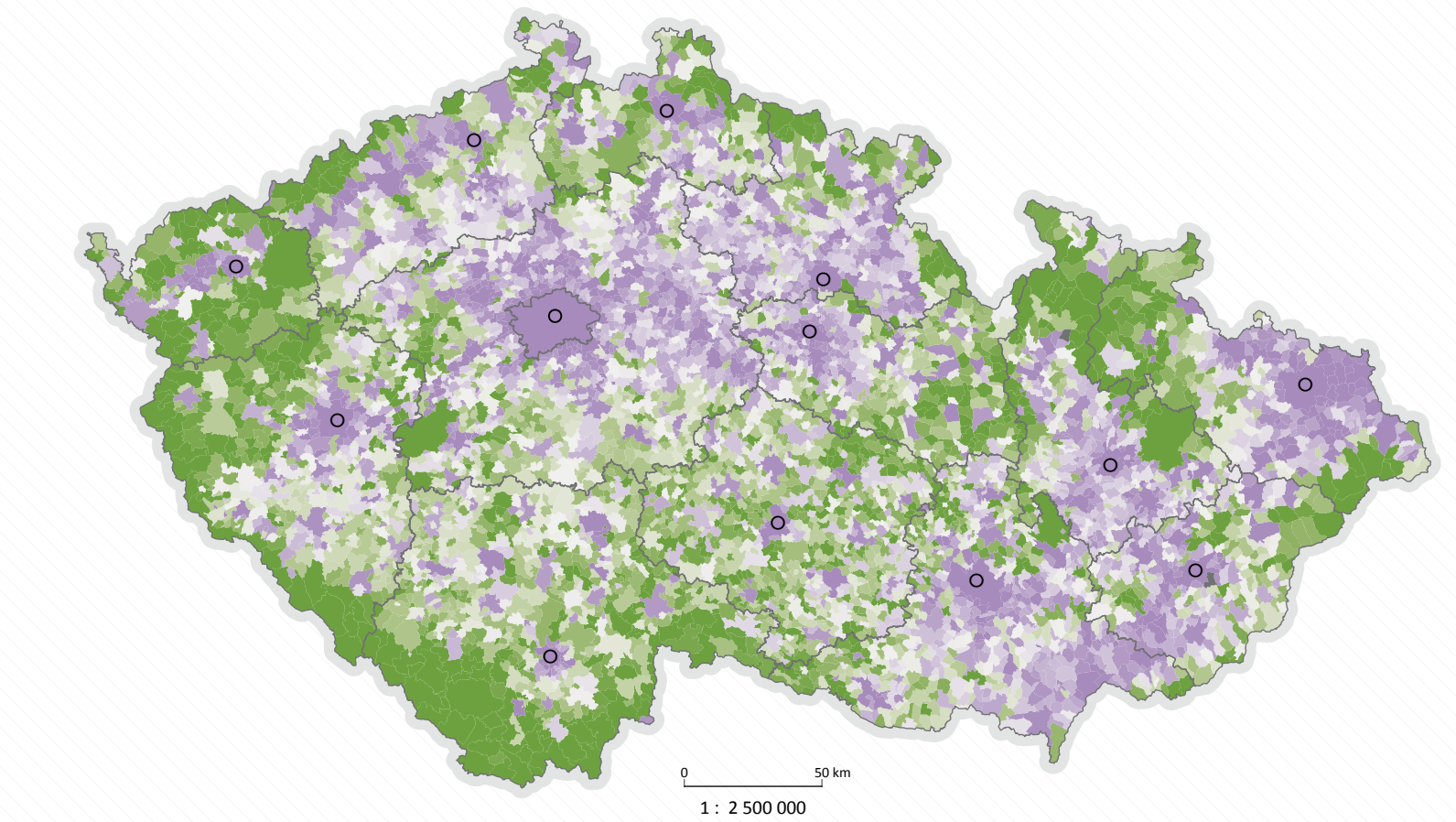
INDICATOR 4: MEMBERSHIP ACCORDING TO THE NUMBER OF COMPLETED FLATS PER 1.000 INHABITANTS



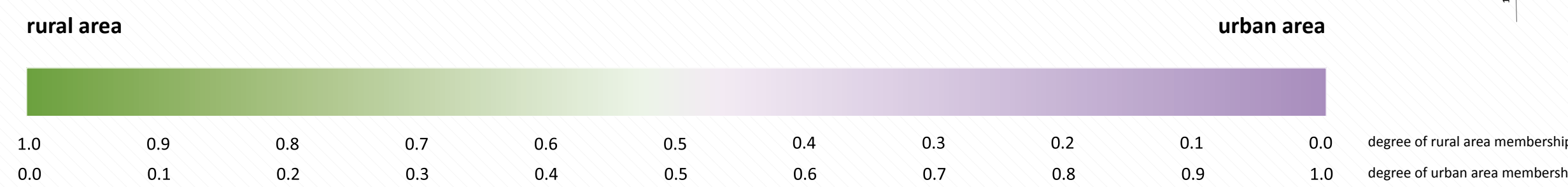
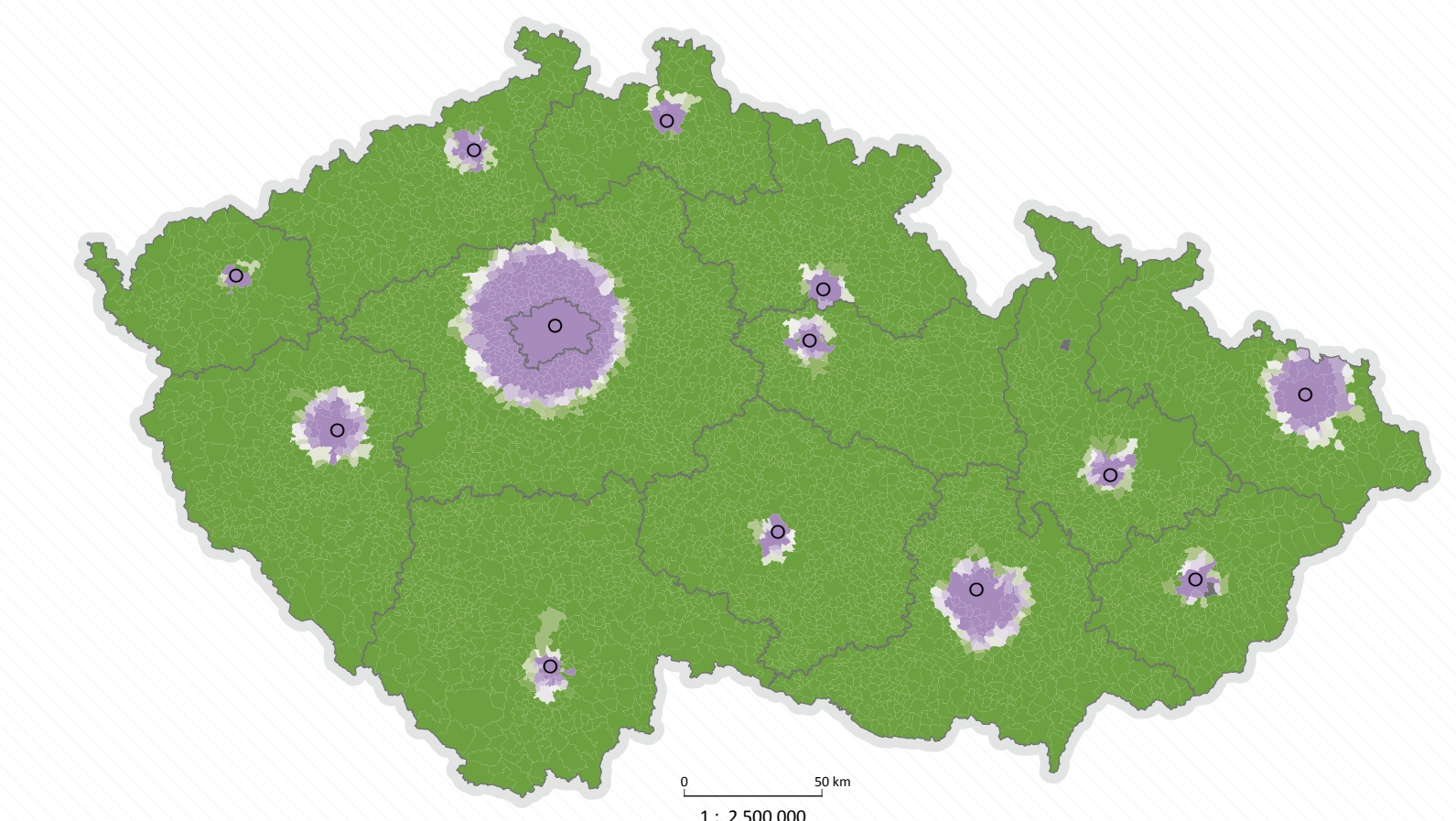
INDICATOR 5: MEMBERSHIP ACCORDING TO THE POPULATION CHANGE



INDICATOR 7: MEMBERSHIP ACCORDING TO THE URBANIZED AREA PER OVERALL MUNICIPALITY AREA



INDICATOR 6: MEMBERSHIP ACCORDING TO THE DRIVING DISTANCE TO THE COUNTY SEAT



unavailable data of monitored indicators

- CAPITAL CITY
- COUNTY CITY
- other municipality with the status of city

MAPS OF THE CZECH REPUBLIC:

Projection: UTM Zone 33N
Datum: WGS84
Coordinate System: WGS84
Scale of the main map: 1 : 500 000
Scale of the secondary maps: 1 : 2 500 000

MAP OF THE EUROPE:

Projection: Lambert Conformal Conic, central meridian 10°
Datum: WGS84
Coordinate System: WGS84
Scale: 1 : 30 000 000