



Urban and peri-urban changes across Central and Eastern Europe and their socio-economic consequences

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Introduction

- *Since the process of economic transformation has started in the beginning of the 90s in the Central and Eastern Europe, the problem of the usage and the **change of urban and sub-urban** space have become very relevant.*
- *Before the 90 s, the expansion of cities into the surrounding landscape was more less limited because of many factors typical of the socialism system:*
 - *land market, private property and market economy didn't exist*
 - *effort to reduce the regional differences was very high*
 - *financial sources were distributed by central rules for settlement structure*
 - *the law for land preservation was very strict.*



Introduction

- *However after 1990 with the re-installation of a market economy, private property and land market, residential activities increased, in particular commercial, industrial and infrastructure usage of the space in sub-urban areas*
- ***The pressure on landscape** and building activities on agricultural have extremely increased*
- *Urban sprawl (suburbanization) has brought a lot of impacts on landscape and society*
- *The lack of coordination – the devolution of control over land use – responsibility of the local authorities*



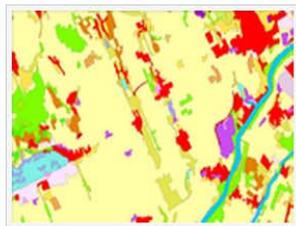


Aims

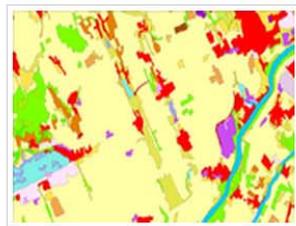
- overview of urban and peri-urban changes (spatial distribution and intensity) in Central and Eastern Europe during the periods 1990-2000 and 2000-2006,
- Consequency of urban and peri-urban development: impact on landscape and society
- Comparison of the change intensity 1990-2000 and 2000-2006

Data sources of the evaluation

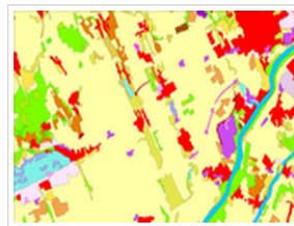
- Corine land cover (CLC) 1990, 2000 and 2006



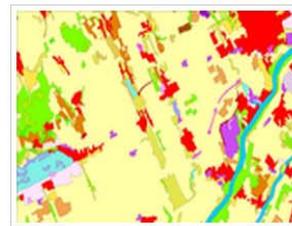
CLC 1990



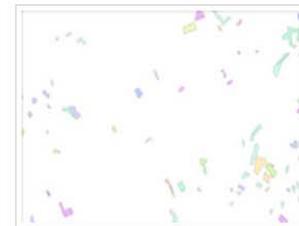
CLC 2000



CLC 2006



CLC 2012



LCC 1990-2000



LCC 2000-2006



LCC 2006-2012

- It consists of an inventory of land cover in 44 classes
- Minimum Mapping Unit (MMU) of 25 ha for areal phenomena and a minimum width of 100 m for linear phenomena.
- changes in land cover with an MMU of 5 ha.

Data sources of the evaluation

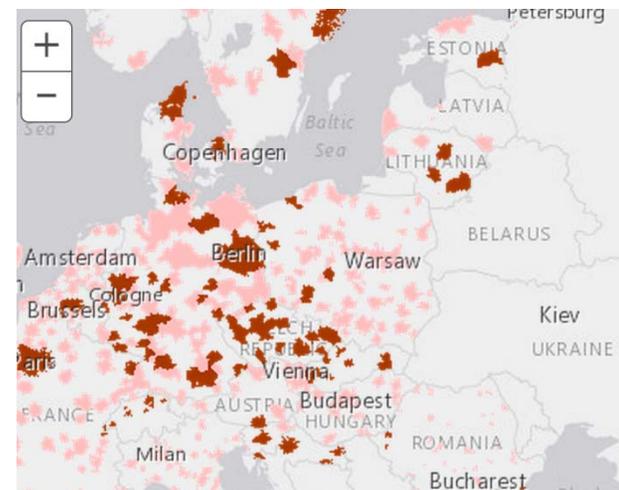
■ Urban Atlas



Urban Atlas 2006



Urban Atlas 2012

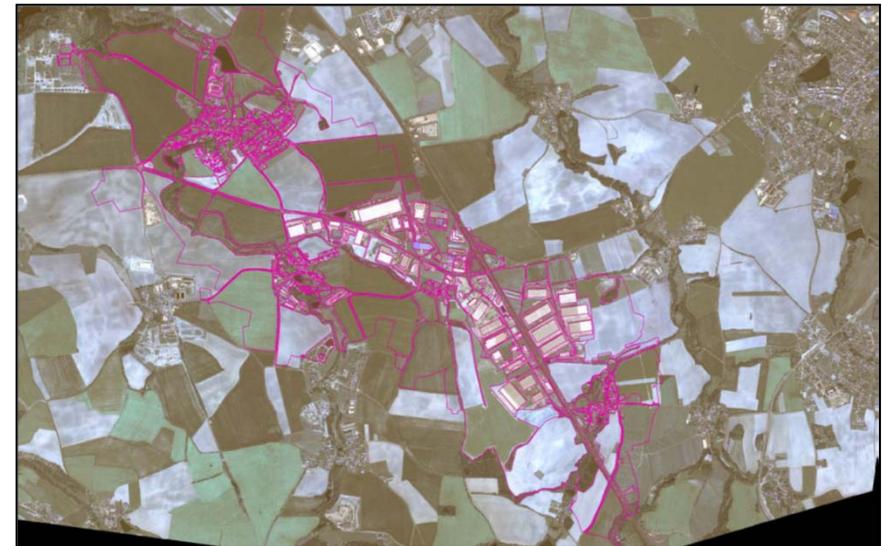
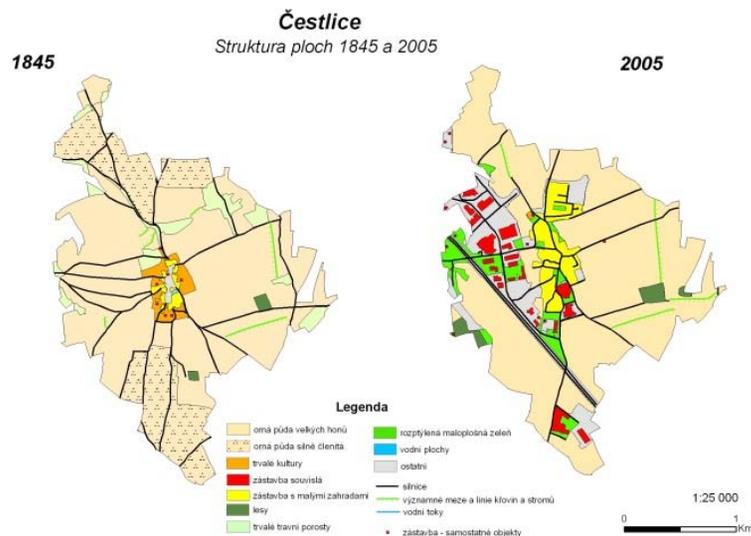


- The Urban Atlas is providing pan-European comparable land use and land cover data for Large Urban Zones (LUZs).
- LUZs with more than 100.000 inhabitants (50,000 inhabitants)
- 17 urban classes with MMU 0.25 ha; minor nomenclature changes
10 Rural Classes with MMU 1ha

Data sources of the evaluation

- very high resolution (VHR) data source
- Ortophotos,
- Topography map and old maps
- Statistical data

QuickBird images 2007)



Overview of urban and peri-urban changes in Central and Eastern Europe

- *LC changes in Central and Eastern Europe for 17 countries:*

Albania (AL), Bosnia/Herzegovina (BA), Bulgaria (BG), Croatia (HR), Czech Republic (CZ), Estonia (EE), Hungary (HU), Kosovo (KV), Latvia (LV), Lithuania (LT), Macedonia FYR (MK), Monte Negro (ME), Poland (PL), Romania (RO), Serbia (RS), Slovakia (SK) and Slovenia (SI).

- *two time periods: 1990-2000 and 2000-2006 and*

- *analyzed changes based on the Corine CLC database.*





Overview of urban and peri-urban changes in Central and Eastern Europe

Main landscape changes for the second level of CLC classes

The “matrix of changes”, groups LC changes of the same type, changes between the 15 CLC classes at the second level (Feranec et al. 2010).

1 – urbanization (industrialisation), 2 – intensification of agriculture, 3 – extensification of agriculture, 4 – afforestation, 5 – deforestation, 6 – water bodies construction and management, 7 – other changes (recultivation, dump sites, unclassified changes, etc.).

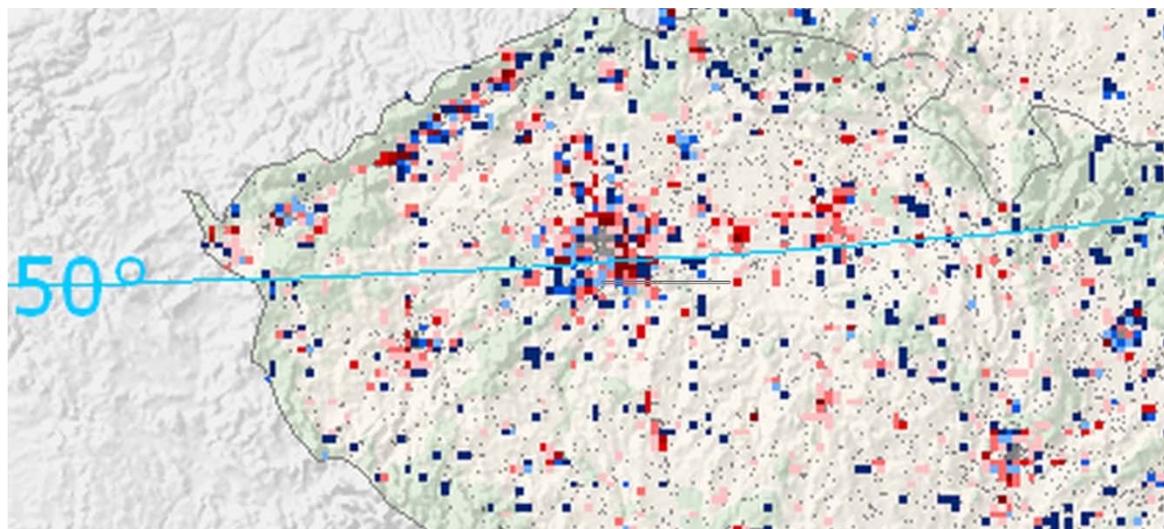
Urbanisation: represents the change of agriculture (CLC classes 21, 22 and 23;), forest land (classes 31, 32, and 33), wetlands (classes 41 and 42) and water bodies (51 and 52) into urbanized land (the construction of buildings designed for living, education, health care, recreation and sport) as well as industrialized land (the construction of facilities for production, all forms of transport and electric power generation).

Overview of urban and peri-urban changes in Central and Eastern Europe

The size of the changed areas is too small to present on a map that shows all of Central and Eastern Europe (e.g., the smallest identified change area in the frame of the CLC mapping is 5 ha.).

The presentation of their intensity/rate through a regular grid pattern.

Following the study by Feranec et al. (2010), we used a 3 × 3 km grid as a compromise between the actual spatial distribution of the seven above-mentioned changes and their presentation on the Central European level at a meaningful scale.



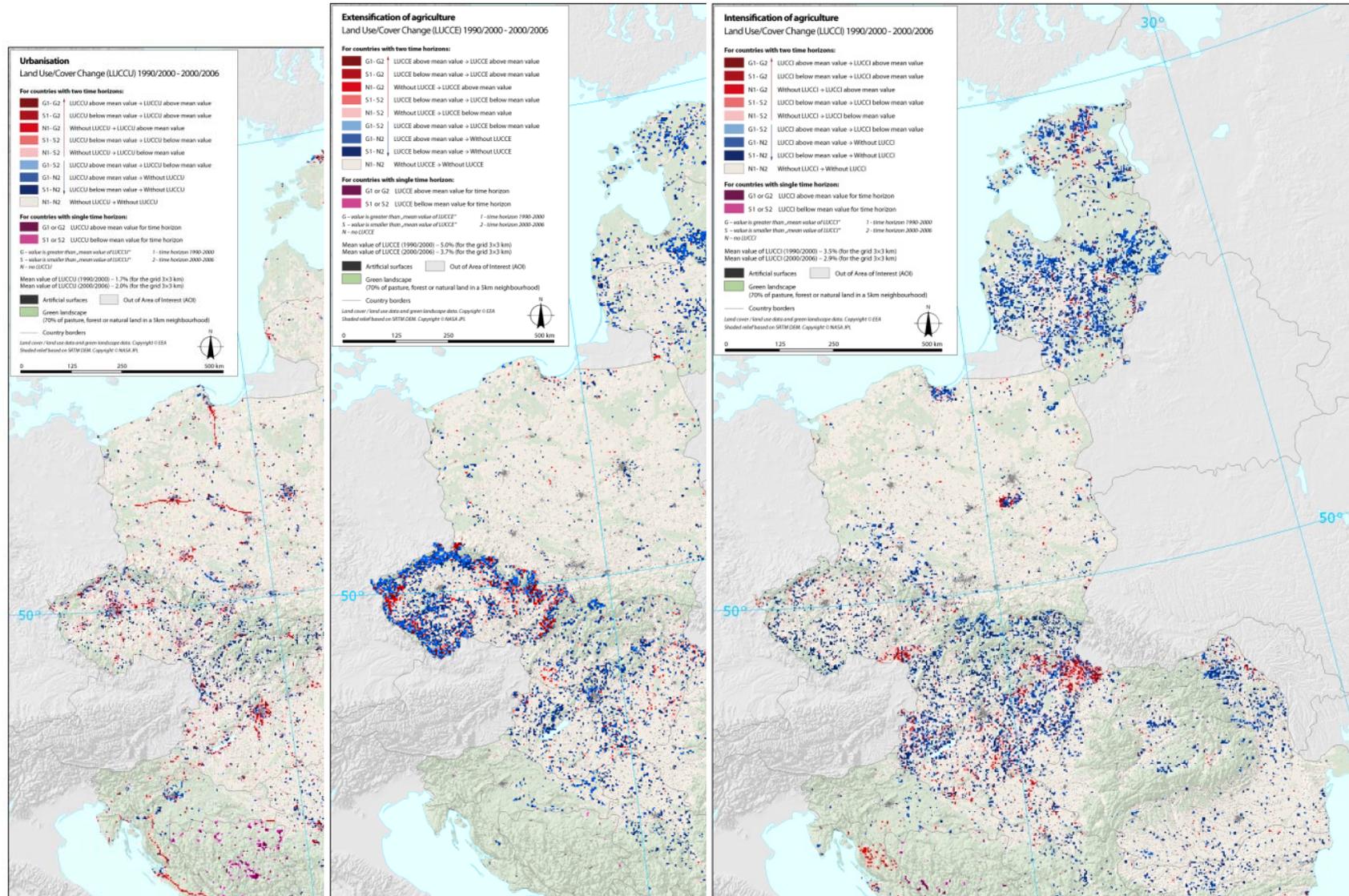
Overview of urban and peri-urban changes in Central and Eastern Europe

| | 1990-2000 | | | 2000-2006 | | |
|---------------------------|-----------------|---|---|-----------------|---|---|
| | Total area (ha) | Mean yearly increase in the period (ha) | Mean yearly change of total LUCC area (%) | Total area (ha) | Mean yearly increase in the period (ha) | Mean yearly change of total LUCC area (%) |
| URBANISATION | 70,377 | 7,037.7 | 3.2 | 131,143 | 21,857.2 | 9.5 |
| INTENSIFICATION | 381,648 | 38,164.8 | 17.4 | 114,785 | 19,130.8 | 8.3 |
| EXTENSIFICATION | 486,275 | 48,627.5 | 22.1 | 93,115 | 15,519.2 | 6.7 |
| AFFORESTATION | 619,346 | 61,934.6 | 28.1 | 344,569 | 57,428.2 | 24.9 |
| DEFORESTATION | 580,318 | 58,031.8 | 26.4 | 652,129 | 108,688.2 | 47.1 |
| WATER BODIES CONSTRUCTION | 17,204 | 1,720.4 | 0.8 | 10,283 | 1,713.8 | 0.7 |
| OTHER CHANGES | 41,855 | 4,185.5 | 1.9 | 39,715 | 6,619.2 | 2.9 |

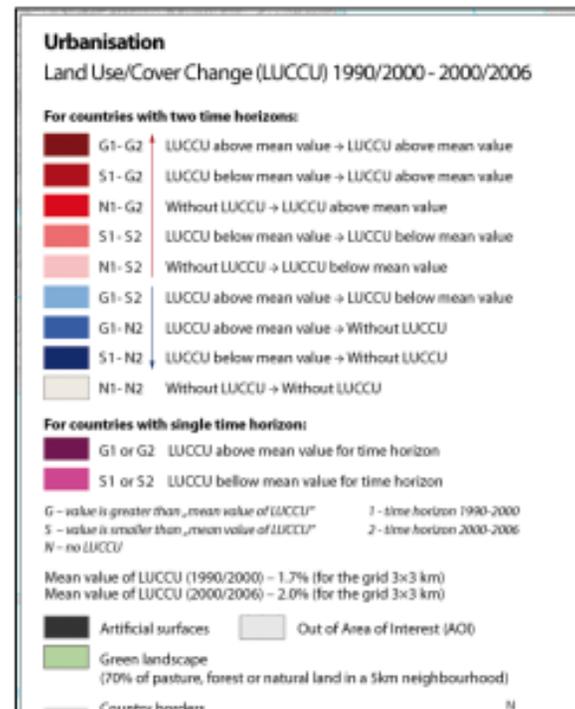
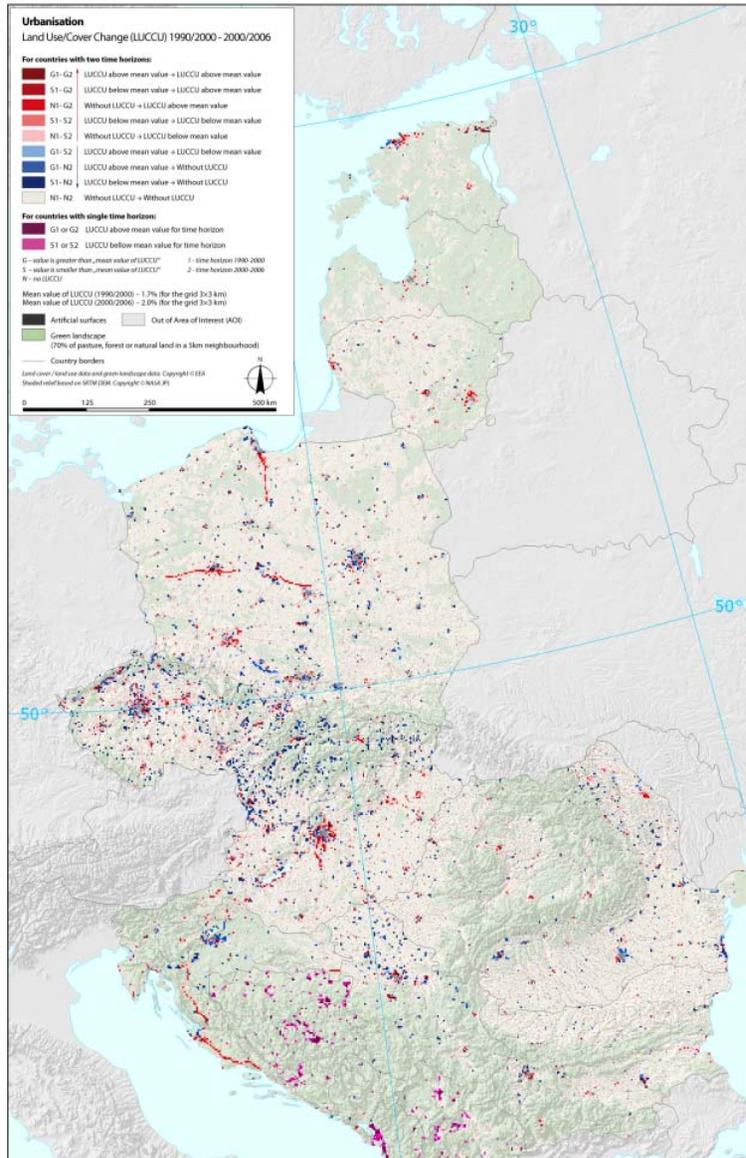
In total, from 1990-2000, an average of 7,037.7 ha (3.2%) of the total area experiencing LC change (219,702.3 ha) occurred annually as urbanization

During the six-year period between 2000 and 2006, 21,857.2 ha (9.5%) of the total mean annual changes (230,956.5 ha) corresponded to urbanization.

Overview of urban and peri-urban changes in Central and Eastern Europe

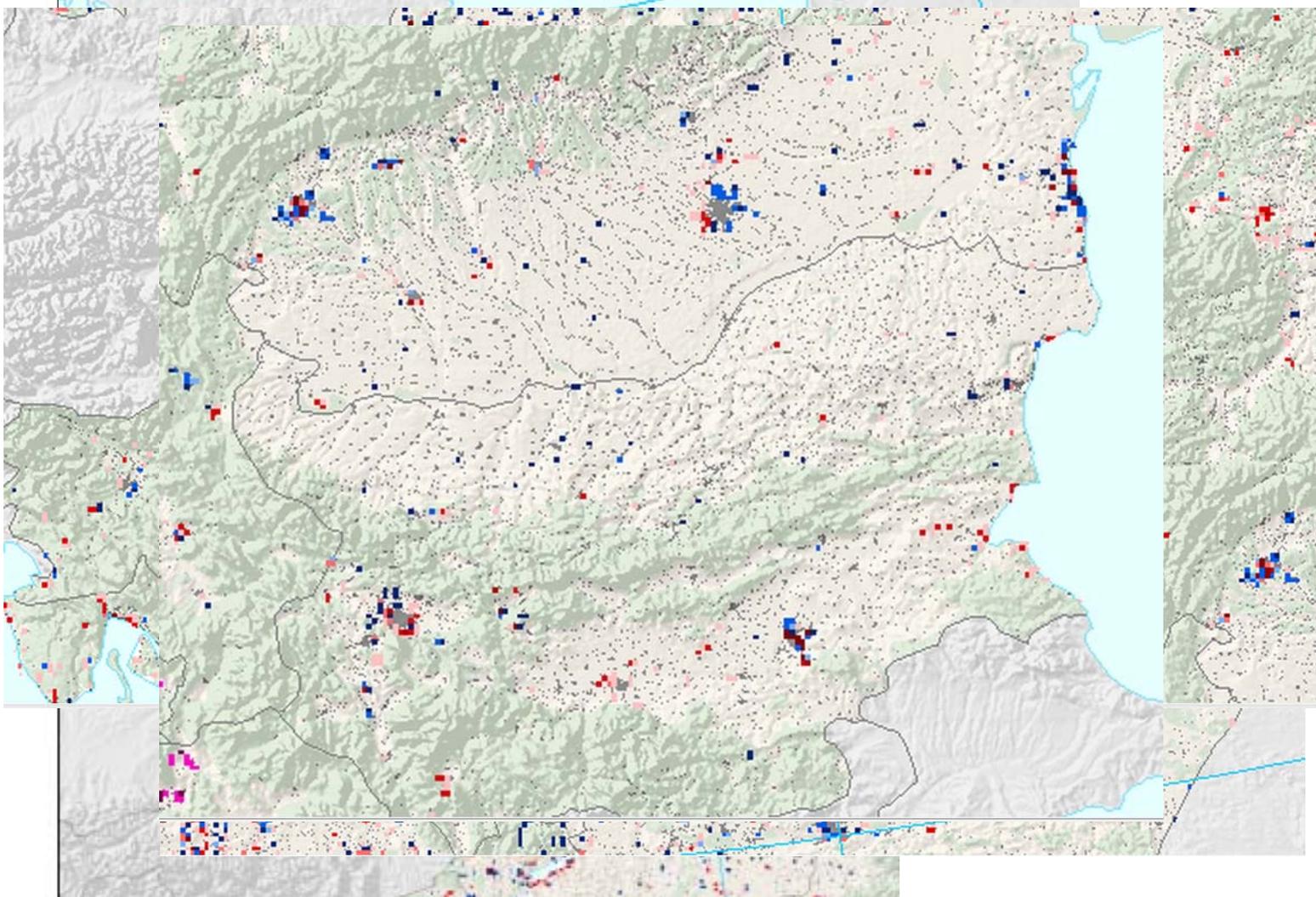


Overview of urban and peri-urban changes in Central and Eastern Europe



G1 – G2: LUCC above mean value – LUCC above mean value
S1 – G2: LUCC below mean value – LUCC above mean value
N1 – G2: Without LUCC – LUCC above mean value
S1 – S2: LUCC below mean value – LUCC below mean value
N1 – S2: Without LUCC – LUCC below mean value
G1 – S2: LUCC above mean value – LUCC below mean value
G1 – N2: LUCC above mean value – Without LUCC
S1 – N2: LUCC below mean value – Without LUCC
N1 – N2: Without LUCC – Without LUCC

Overview of urban and peri-urban changes in Central and Eastern Europe





Overview of urban and peri-urban changes in Central and Eastern Europe

Our results presented an increasing amounts of construction between the two time horizons, most of all in the suburban areas of big cities such as **Budapest**, the northern and north-eastern parts of **Prague**, north-eastern **Tallinn**, northern and western Vilnius, western Warsaw, western Bucharest, and north-eastern Bratislava.

Major cities in the northern, southern and eastern parts of the study area **have not been as affected** by the intensive urban and suburban processes as that which occurred in the cities in the central part.

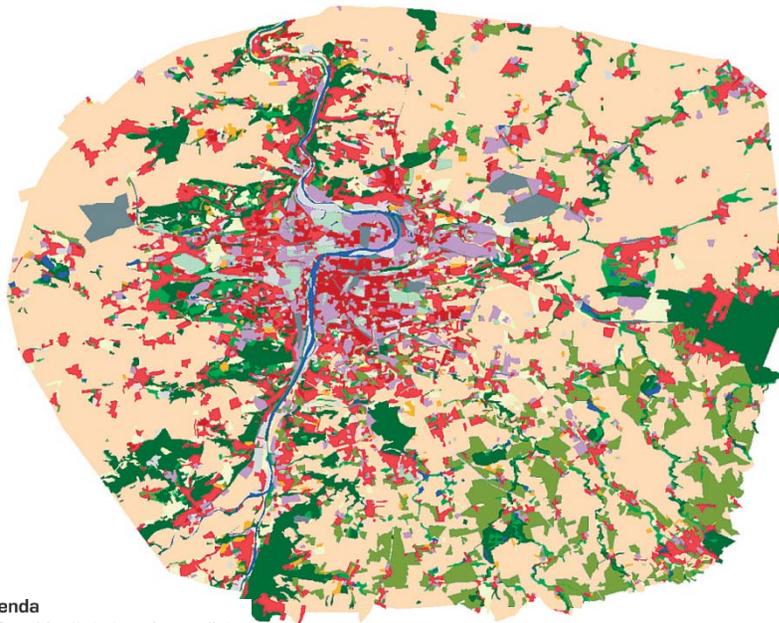
The construction of motorways dominated the western part of Croatia, central Poland, south-western part of Hungary, and the north of Slovakia.

In places where only the data for period 2000-2006 are available, urbanization took place in northern, central and partially also southern parts of Bosnia/Herzegovina, Kosovo and the northern and south-western parts of Macedonia.

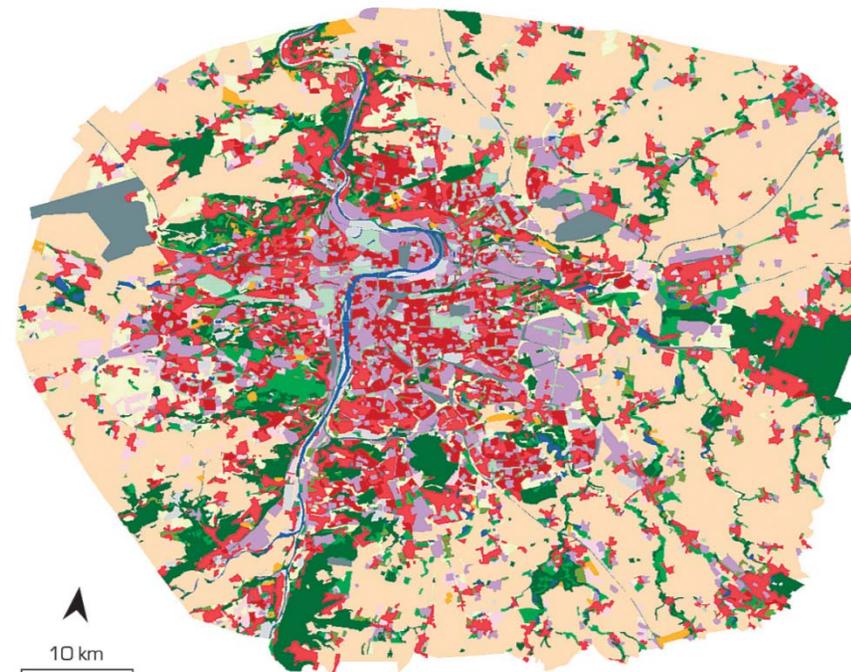
Consequences of peri-urban changes Prague Case study

Projekt MURBANDY/MOLAND
Prague City

1953



1998



Legenda

- rezidenční zástavba spojitá
- rezidenční zástavba nespojitá
- průmysl, komerce, služby
- výstavba
- městská zeleň
- orná půda
- trvalé kultury
- pole, louky, trvalé kultury
- zemědělství + vegetace
- louky
- lesy
- vodní plochy
- dopravní plochy
- ostatní plochy

10 km

Dobřejovice, Modletice, Jažlovice case study



76 new buildings
between

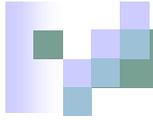
1994–2007

Commercial
areas 2007 –
5% of total
area

Crossroad of
highway D1
And road No. 101

ProLogis Park Prague D1 East





10 years of change



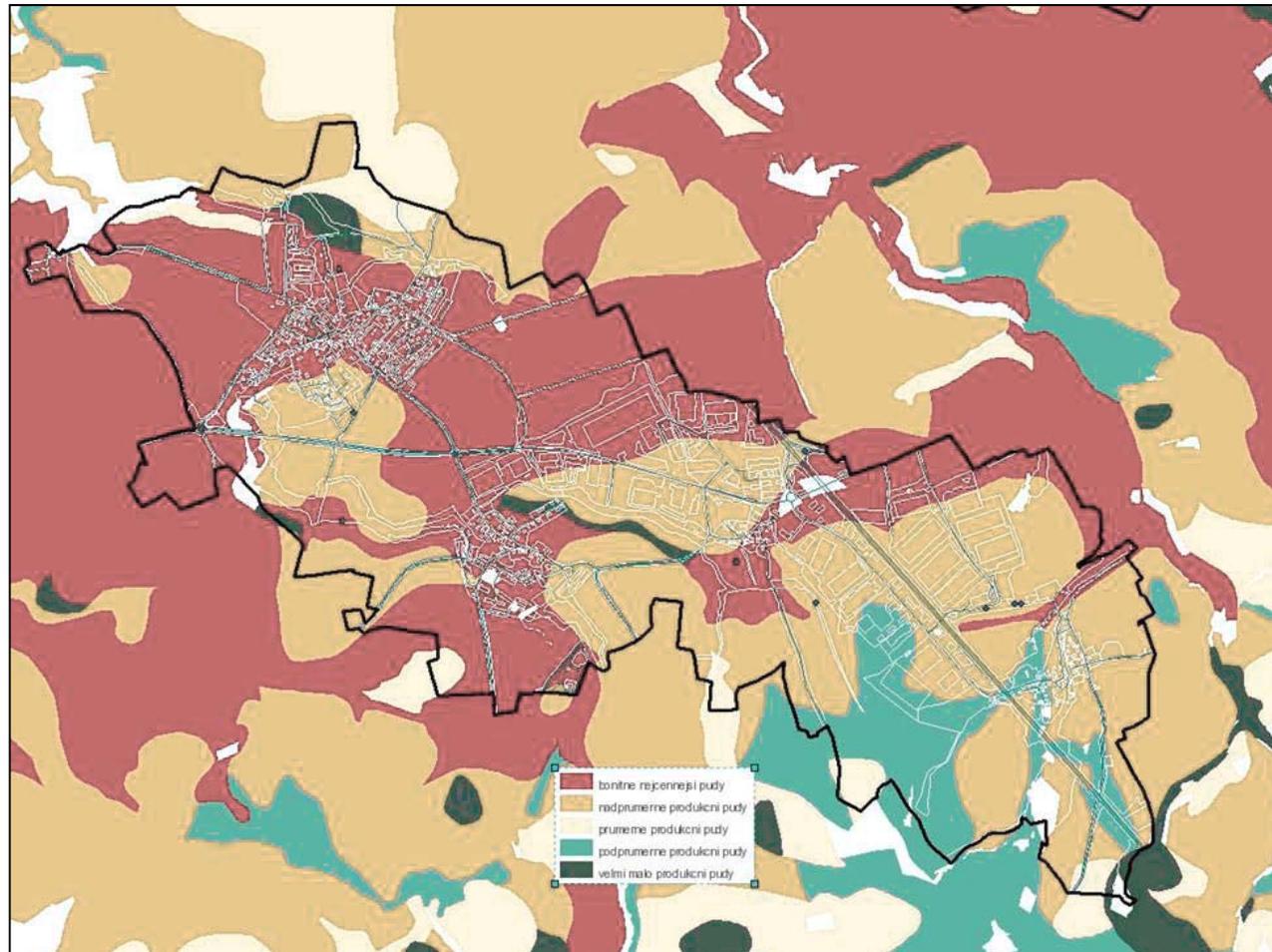
1994



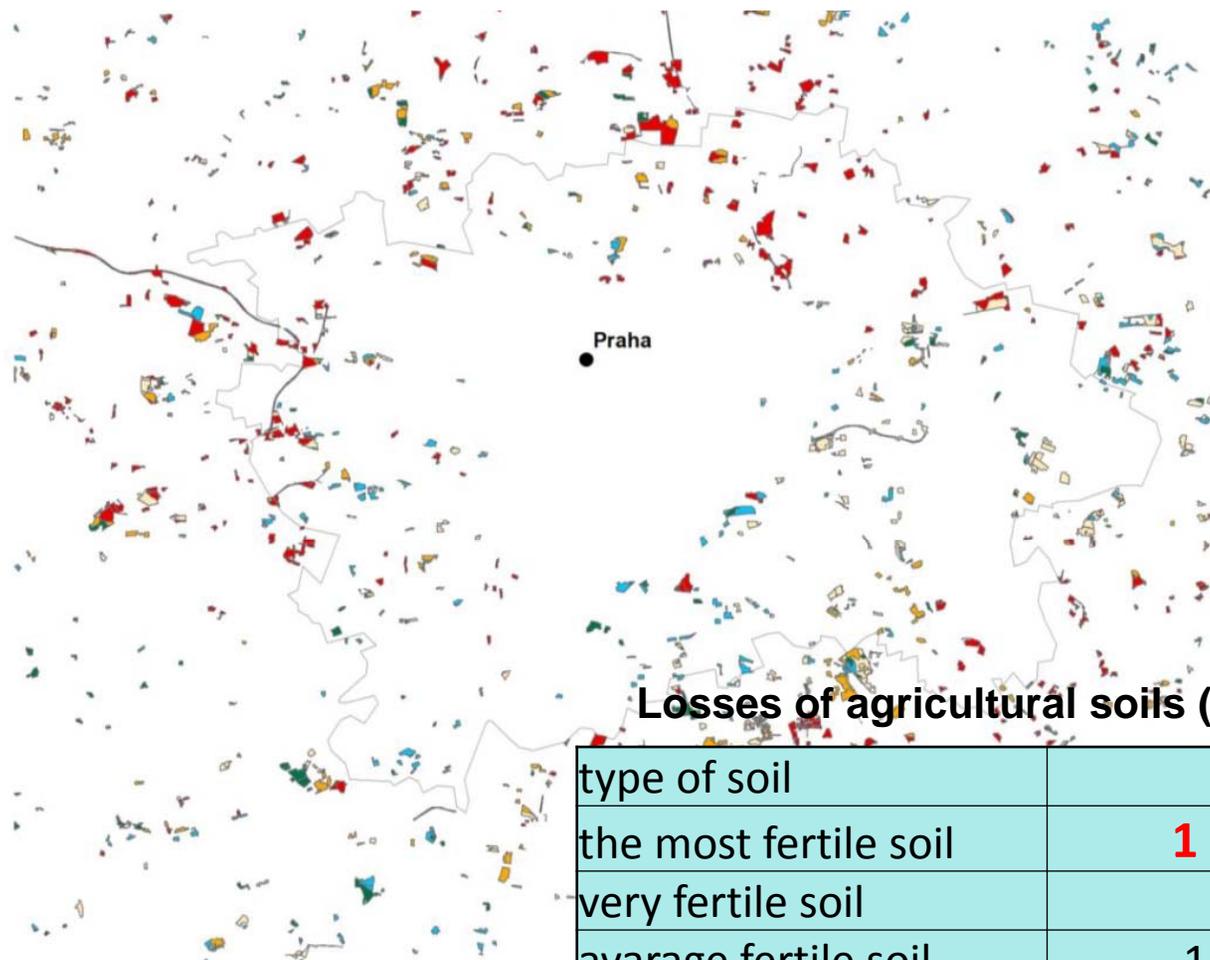
2004

Fertile soils degradation

In red and orange – the most fertile soils



Fertile soils degradation



Losses of agricultural soils (ha) 1989-2009

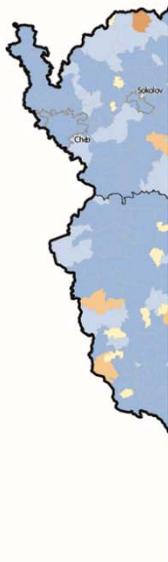
| type of soil | ha | % |
|--------------------------|--------------|--------------|
| the most fertile soil | 1 752 | 34.2 |
| very fertile soil | 998 | 19.5 |
| avarage fertile soil | 1 058 | 20.7 |
| low average fertile soil | 841 | 16.4 |
| very low fertile soil | 469 | 9.2 |
| total | 5 118 | 100.0 |

Popis tříd

- velmi málo produkční půdy
- podprůměrně produkční půdy
- průměrně produkční půdy
- nadprůměrně produkční půdy
- bonitně nejcennější půdy

High mobility of suburban people

6.2 Čas dojíždky 2001 Commuting Time 2001

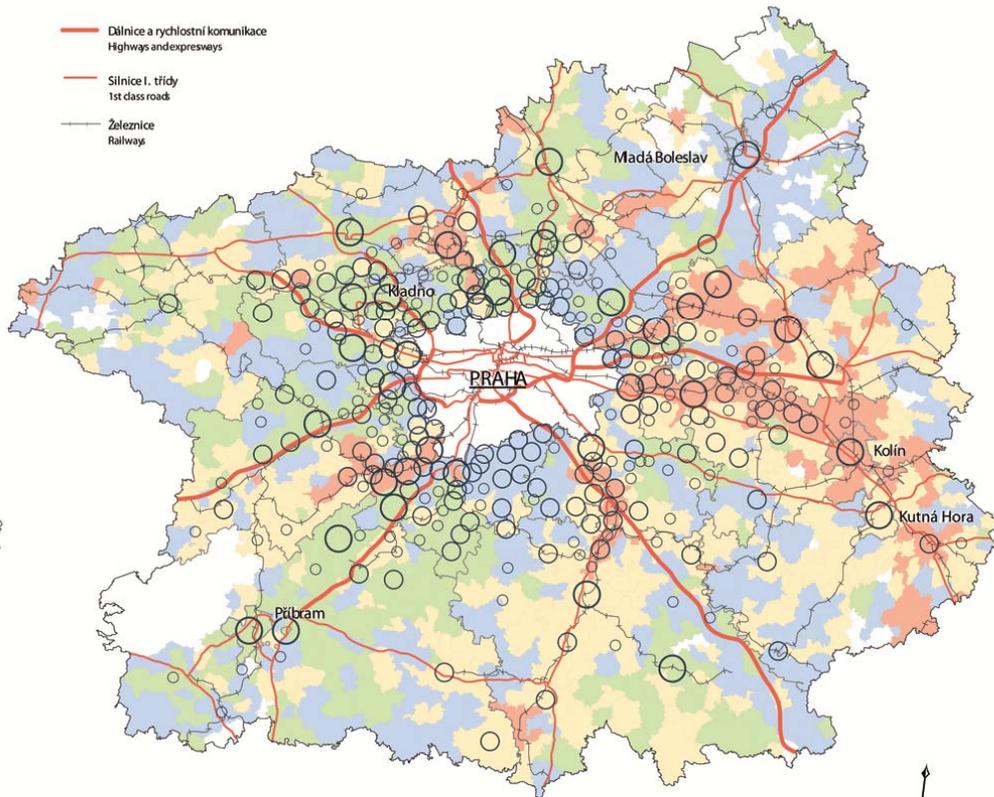


13.1b Suburbanizace a doprava Suburbanisation and Transportation

Počet obyvatel dojíždících denně do práce a do škol do Prahy v roce 2001
Number of inhabitants commuting to work and to school in Prague in 2001



- Dálnice a rychlostní komunikace
Highways and expressways
- Silnice 1. třídy
1st class road
- Železnice
Railways



Převládající použitý dopravní prostředek obyvatel dojíždících denně do práce a do škol do Prahy v roce 2001

Predominant means of transport used by inhabitants commuting to work and to school in Prague in 2001



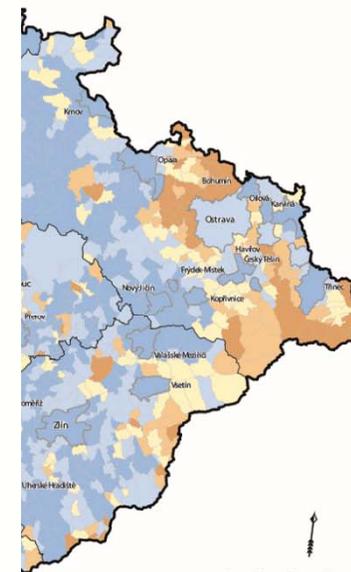
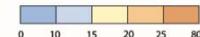
Vysvětlivka: Obce, z nichž žádný obyvatel do Prahy nedojíždí, jsou vyznačeny bíle.

Note: Municipalities with no inhabitant commuting to Prague are displayed in white.

Podíl osob dojíždících do zaměstnání více než 45 minut v roce 2001 (v %)
(počet osob na 100 zaměstnaných osob vyjíždících denně z obce)

Amount of people commuting to work more than 45 minutes in 2001 (in %)

(number of people per 100 daily commuters from the municipality)



Zdroj dat / Data source: Sčítání lidu, domů a bytů 2001, Český statistický úřad.



Low quality of social infrastructure for suburban people

Elementary schools

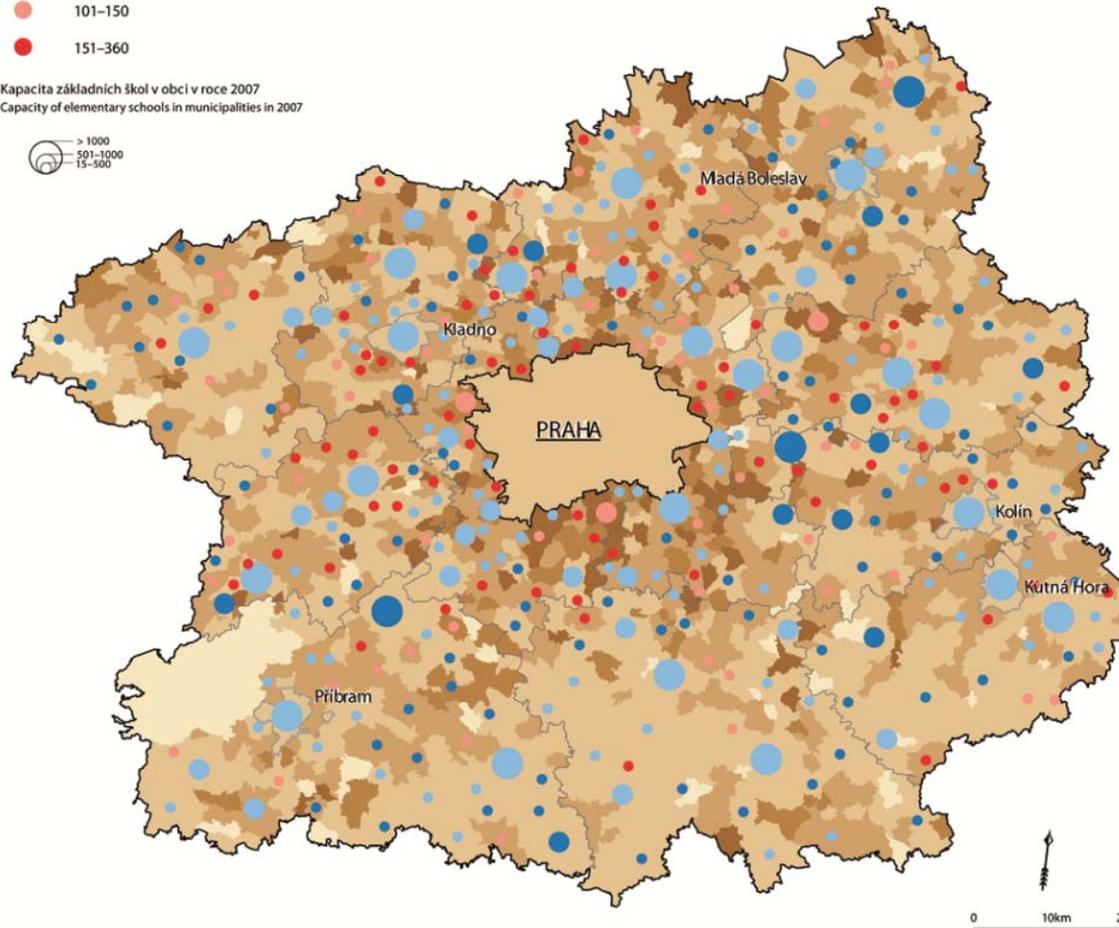
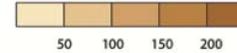
Počet dětí ve věku 6–14 let na 100 míst v základních školách v roce 2007
Number of children aged 6–14 per 100 spots in elementary schools in 2007

- 3–50
- 51–100
- 101–150
- 151–360

Kapacita základních škol v obci v roce 2007
Capacity of elementary schools in municipalities in 2007



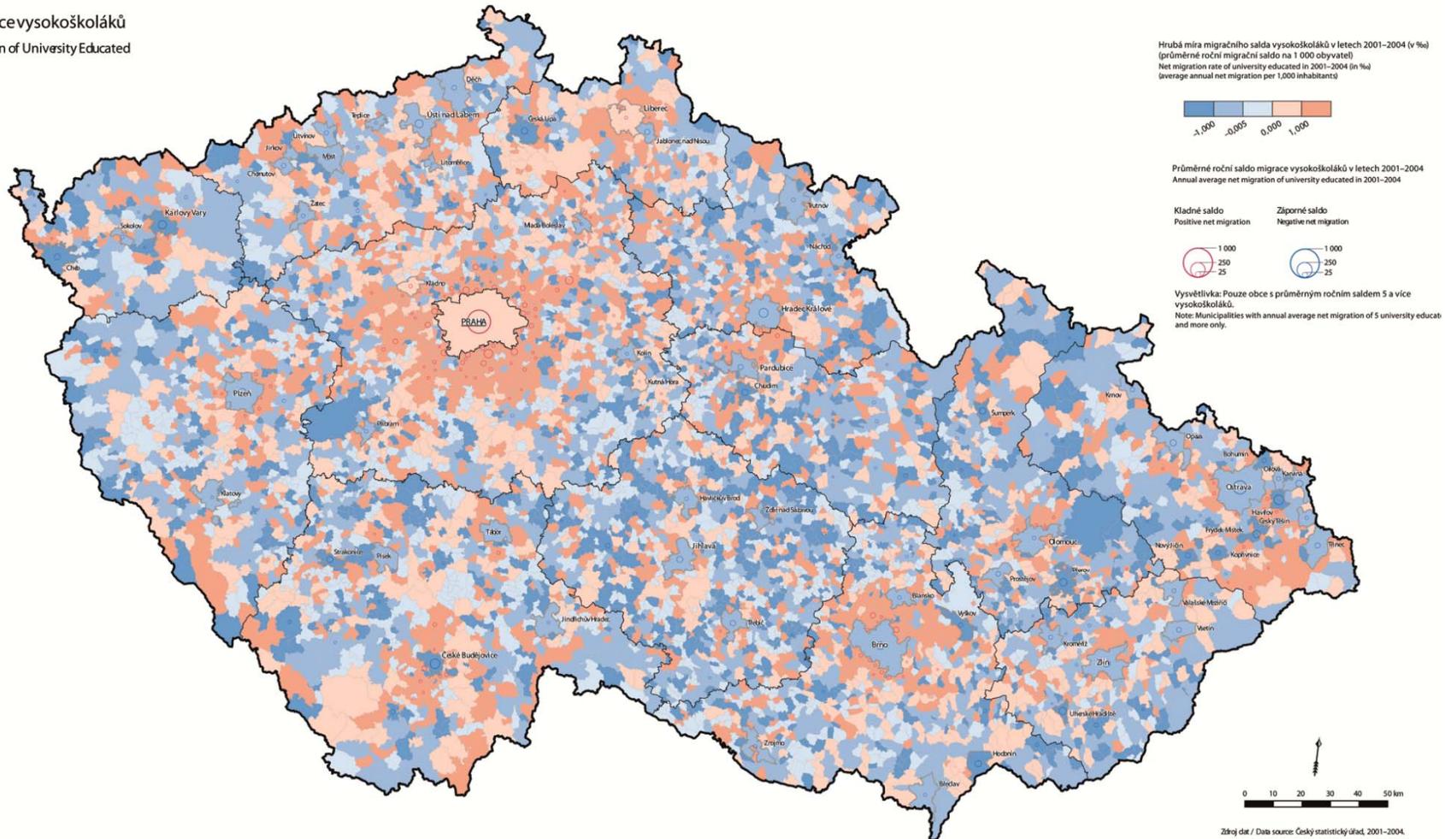
Nárůst počtu dětí ve věku 6–14 let v letech 1996–2007
(index vývoje počtu dětí ve věku 6–14 let, 1996 = 100 %)
Increase in number of children aged 6–14 years in 1996–2007
(index of number of children development, 1996 = 100%)





Strong polarization urban, suburban x rural areas

9.6 Migrace vysokoškoláků Migration of University Educated





Conclusions

- *The intensity of urbanisation was three times higher in 2000-2006 than in the first period.*
- *Urbanisation was concentrated in the largest core population areas (big cities) into which the main flows of investment were aimed.*
- *Urbanisation was the third most common trend, in terms of area, in the second period with almost 10% of the total LUCC area.*
- *Extremely high/fast changes in Prague suburban area with many negatives for landscape and social quality*
- *Highly fertile agricultural land occupation*

Thank you for your attention!

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