

# Land cover changes in Prague hinterland caused by suburbanization



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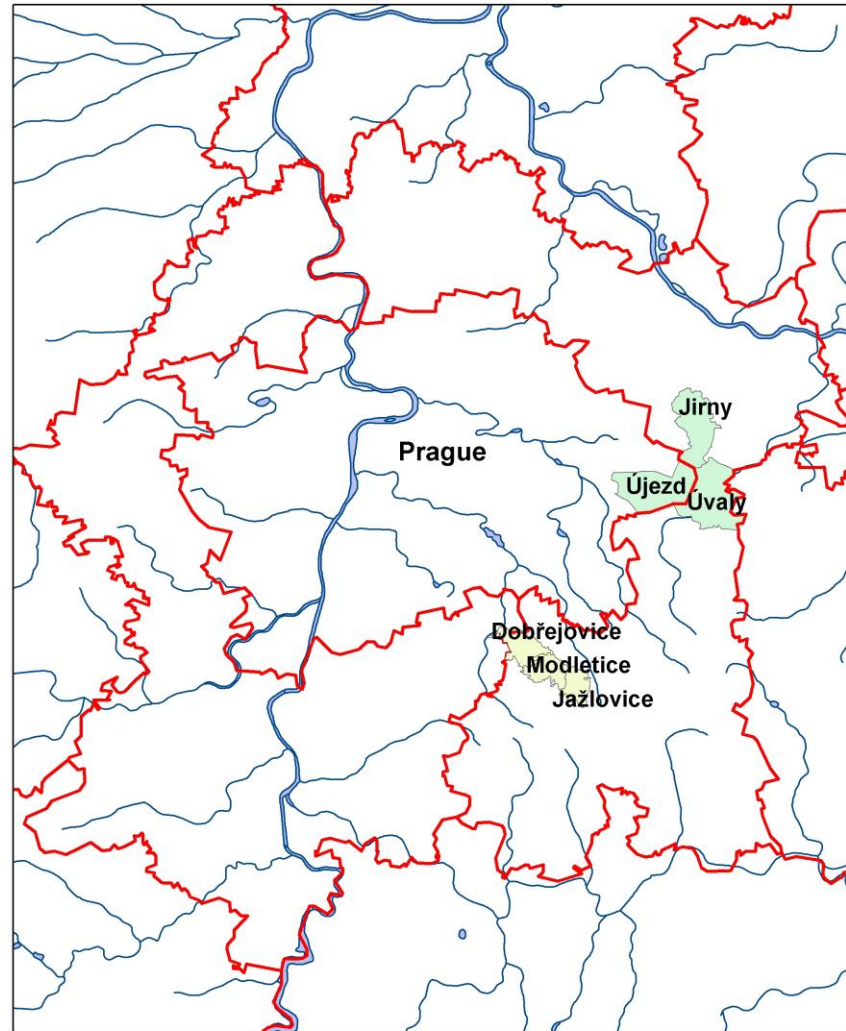
Charles University Prague, Faculty of Science, Department of  
Applied Geoinformatics and Cartography

*Project MŽP ČR SP4i5 : Suburban development, suburbanization and urban sprawl in Czech  
Republic: negative environmental influence limitation*

*Projekt GAČR č. 205/09/0995: Regional differentiation and possible risks of land use as a  
reflection of functional changes of landscape in Czechia 1990 - 2010*

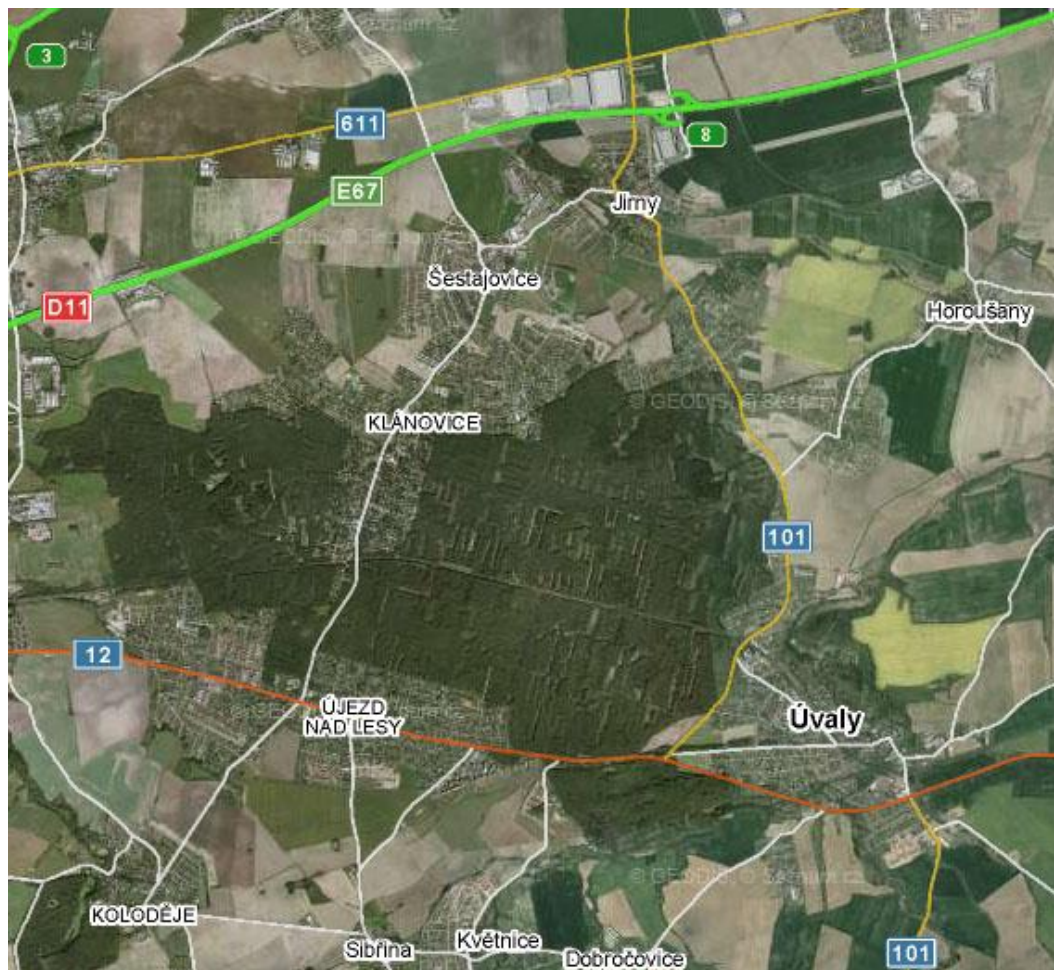
# Study area

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# Jirny, Újezd, Úvaly

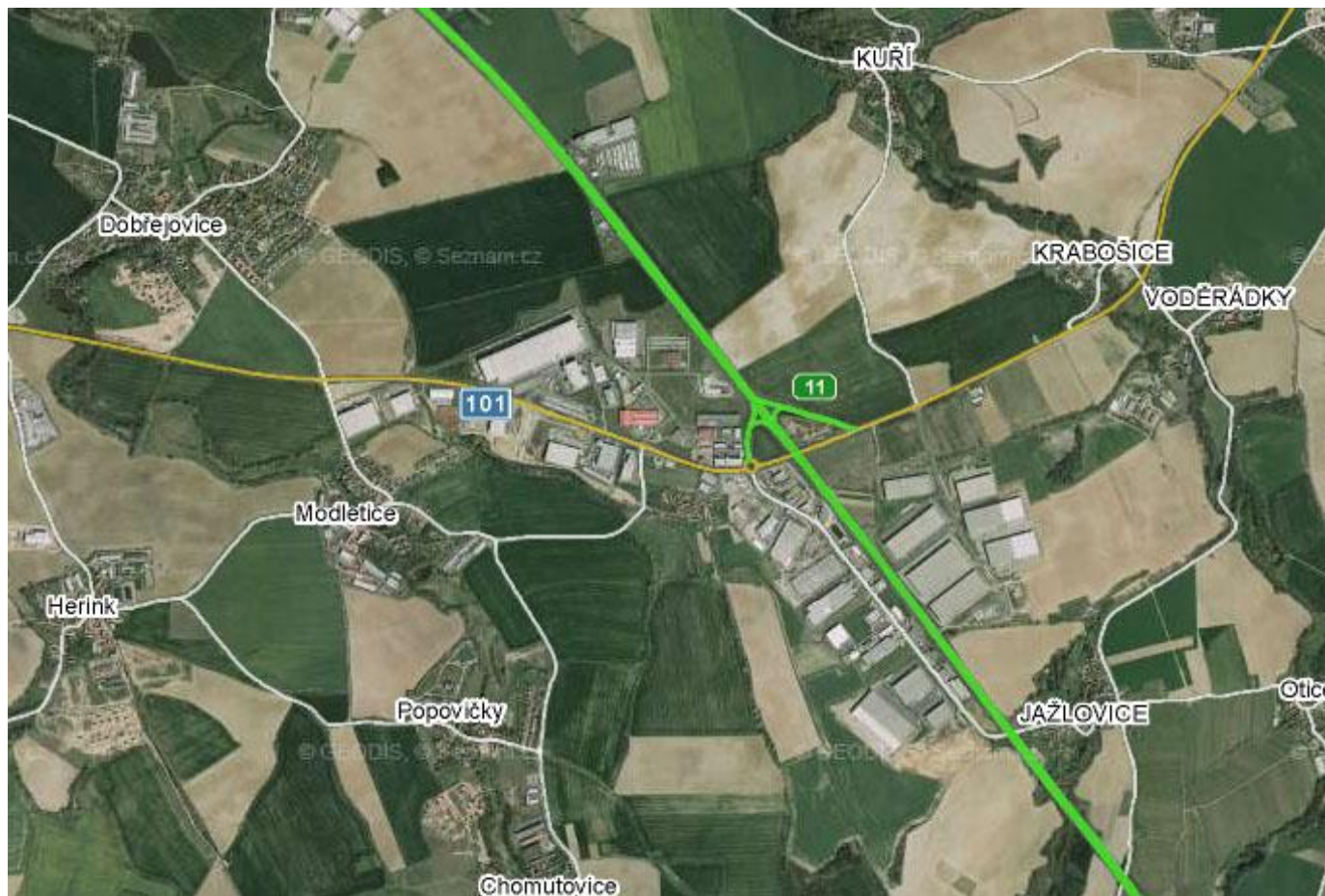
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# Dobřejovice, Modletice, Jažlovice

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# Data sources

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- ❑ Black and white aerial photos 1990
- ❑ Ortophotos 1997
- ❑ QuickBird images 2007
  
- ❑ ZABAGED
  - Auxiliary data
  - CZECH OFFICE FOR SURVEYING, MAPPING AND CADASTRE (COSMC)
  - Fundamental Base of Geographic Data – 1 : 10 000

# Legend – modified CORINE legend

- **Artificial surfaces**
- **1.1 Built-up areas**
- 1.1.1 Residential buildings (family houses, panel houses, attached houses)
- 1.1.2 Commercial buildings (supermarkets, storage areas, logistic areas, industrial and agricultural complexes)
- **1.2 Purpose areas**
- 1.2.1 artificial purpose areas (parking fields, aprons)
- 1.2.2 bare surfaces (construction sites, dumps, piles, mining areas)
- **1.3 Roads**
- 1.3.1 road network and railway network with surrounding areas (oil stations, crossroads), ports, airports with artificial surface
- **Agricultural and green surfaces**
- **2.1 Agricultural areas**
- 2.1.1 arable land
- 2.1.2 meadows and pastures
- **2.2 Green surfaces**
- 2.2.1 orchards and gardens
- 2.2.2 parks, cemeteries, playing fields, sport and recreational areas
- 2.2.3 garden colony
- **Forst and shrub areas**
- **3.1 Forest areas**
- 3.1.1 forest
- **3.2 Shrub areas**
- 3.2.1 shrubs, succession stages
- **Water and wetland areas**
- **4.1 Water areas**
- 4.1.1 water areas and rivers (water flows)
- **4.2 Wetland areas**
- 4.2.1 wetlands, bulrush fields
- **Line and solitary elements**
- **5.3 line vegetation**
- 5.3.1 tree lined roads
- 5.3.2 other line vegetation (lines of trees and shrubs, balks with vegetation)
- **5.4 Solitary vegetation**
- 5.4.1 solitary vegetation

# Data preprocessing

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- ❑ BW photos

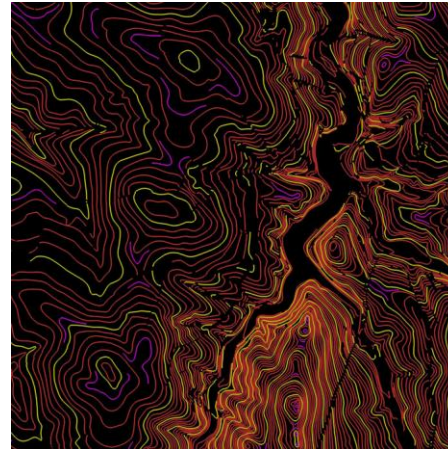
- Ortorectication (ZABAGED hypsometry - 5, 2, 1 m)
- Mosaicing

- ❑ Ortophotos

- Mosaicing

- ❑ QuickBird images

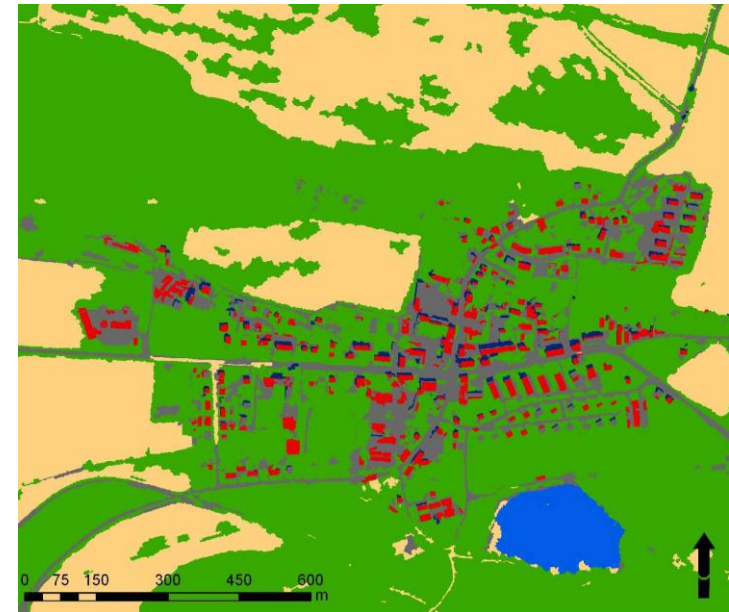
- 2,4 m spatial resolution pansharpenning to 0,6 m resolution
- Georeferencing



# Data processing

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- ❑ OBIA – buildings, roads
  - not possible to standardize
  - long scientific work
- ❑ Manual vectorization



## Legend

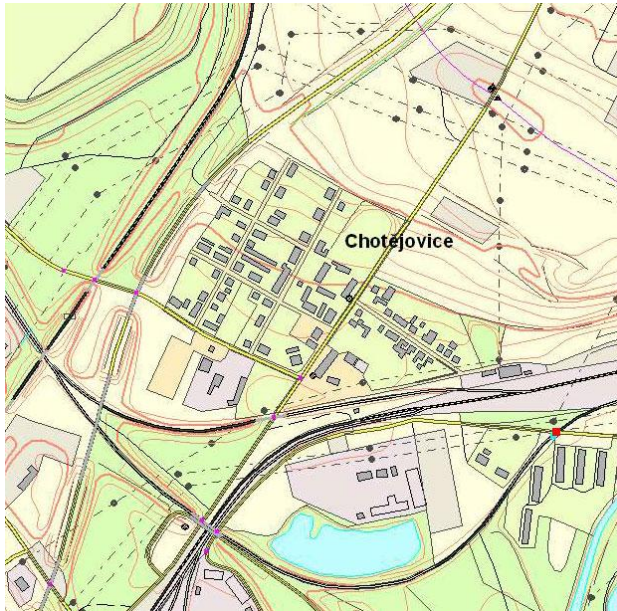
- arable land
- vegetation
- water areas
- shadows
- buildings
- other imprevious



# Data processing – manual vectorization

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- ▣ Based on ortophoto 1997
- ▣ And ZABAGED- 1 : 10 000 - Fundamental Base of Geographic Data



- ▣ !! Unique spatial resolution – the level of particular buildings (cadastral map)

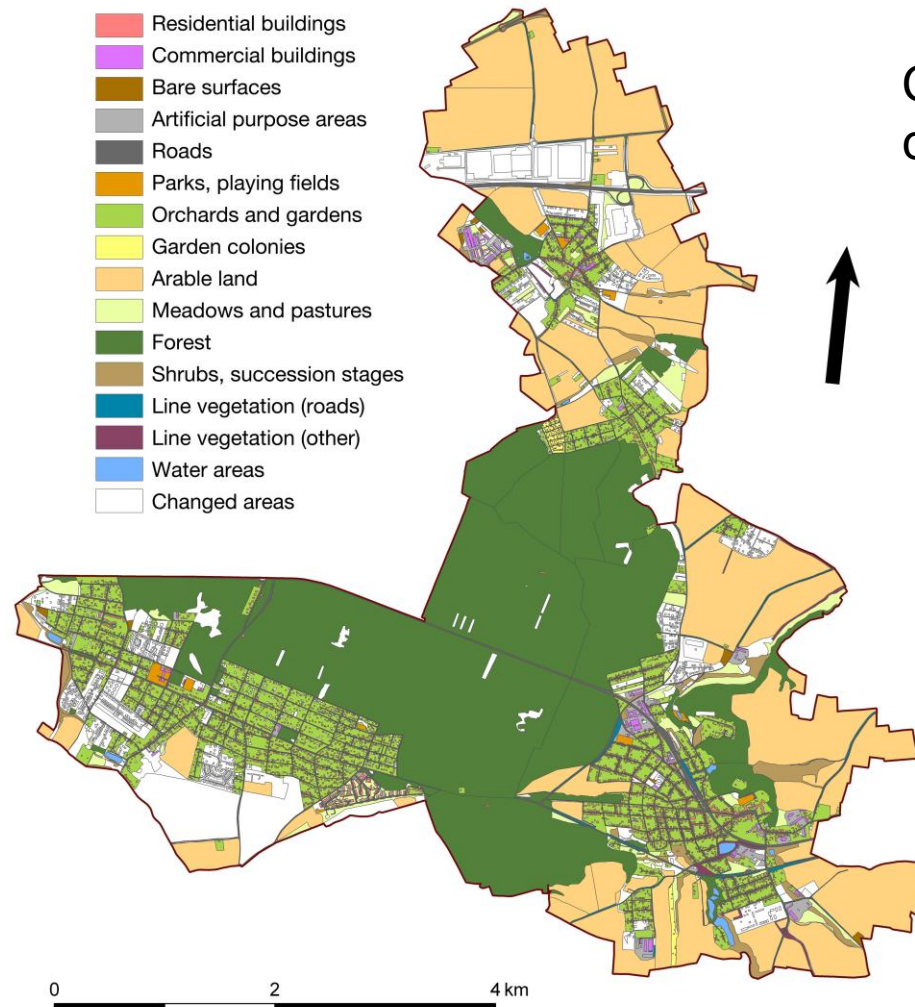
# Data processing

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- ▣ Spatial overlay in GIS
- ▣ Map and tables outputs

# Results – stable areas 1990 - 2007

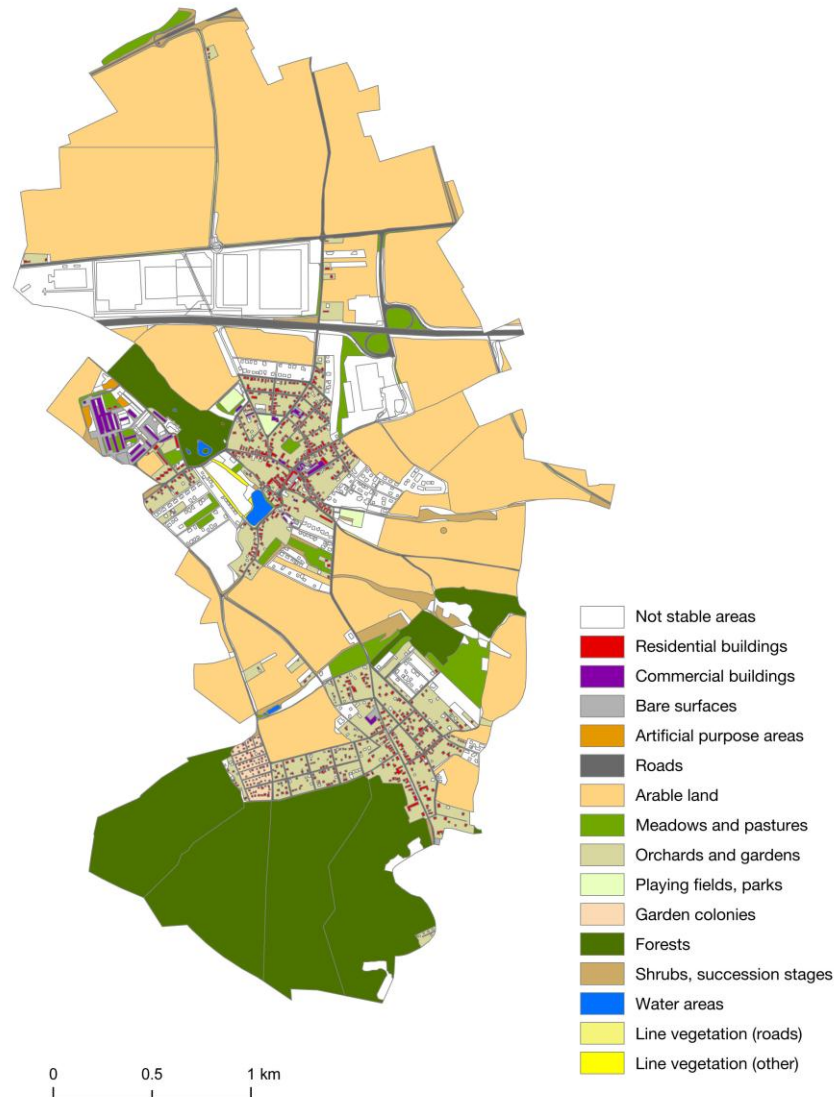
Jirny, Újezd,  
Úvaly area



Change on 15.7 %  
of total area



# Results – cadaster Jirny – stable areas 1990 - 2007



# Results – cadaster Jirny – changes 1990 - 2007



Change on 16,4 %  
of total area

## Type of change

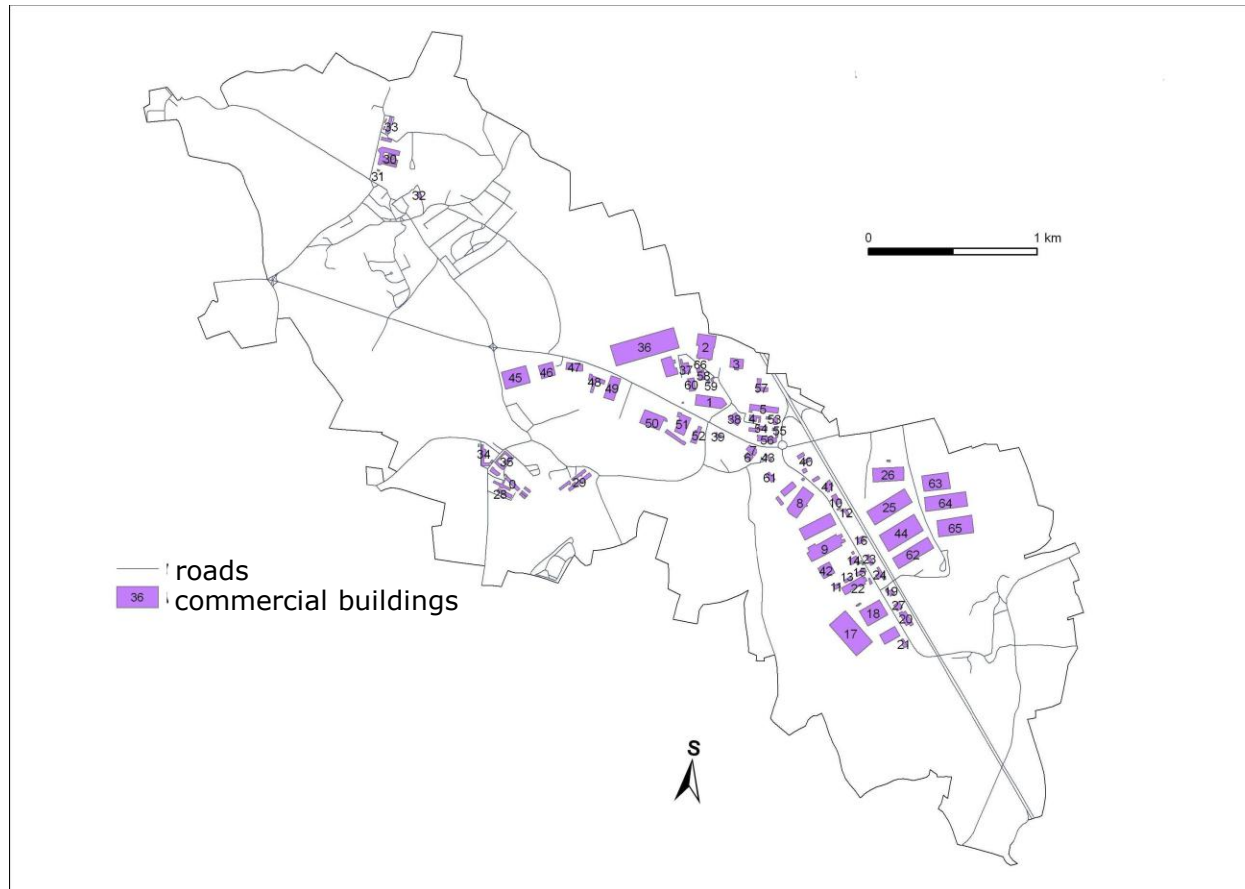
- Stable areas
- Other change
- Bare surfaces → artificial purpose areas
- Arable land → residential buildings
- Arable land → commercial buildings
- Arable land → artificial purpose areas
- Arable land → bare surfaces
- Arable land → roads
- Arable land → meadows and pastures
- Arable land → orchards and gardens
- Arable land → shrubs, succession stages
- Meadows and pastures → residential buildings
- Meadows and pastures → commercial buildings
- Meadows and pastures → artificial purpose areas
- Meadows and pastures → bare surface
- Meadows and pastures → roads
- Meadows and pastures → arable land
- Meadows and pastures → orchards and gardens
- Meadows and pastures → shrubs, succession stages
- Meadows and pastures → line vegetation
- Orchards and gardens → residential buildings
- Orchards and gardens → artificial purpose areas
- Orchards and gardens → roads
- Orchards and gardens → shrubs, succession stages
- Forests → meadows and pastures
- Shrubs, succession stages → orchards and gardens
- Shrubs, succession stages → forest
- Lime vegetation → roads



# Results – cadaster Jirny

Category	1990			2007		
	No. of areas	area [ha]	Share of total area [%]	No. of areas	area [ha]	Share of total area [%]
Residential buildings	770	11,46	1,39	1002	16,57	2,01
Commercial buildings	38	4,27	0,52	44	20,58	2,49
Bare surfaces	18	5,94	0,72	27	20,59	2,49
Artificial purpose areas	6	6,21	0,75	38	27,06	3,28
Roads	35	29,99	3,63	35	35,46	4,29
Arable land	33	442,22	53,56	36	377,17	45,68
Meadows and pastures	46	62,98	7,63	47	36,97	4,48
Orchards and gardens	90	70,22	8,50	99	89,88	10,89
Playing fields, parks	3	2,15	0,26	5	2,35	0,28
Garden colonies	7	3,73	0,45	8	3,69	0,45
Forests	6	164,78	19,96	10	163,65	19,82
Shrubs, succession stages	31	16,18	1,96	54	24,08	2,92
Water areas	5	0,57	0,07	6	1,89	0,23
Line vegetation (roads)	12	3,54	0,43	23	4,68	0,57
Line vegetation (other)	5	1,43	0,17	4	1,03	0,13

# Dobřejovice, Modletice, Jažlovce – commercial buildings 2007



Total number  
110 buildings  
in 2007

76 built between  
1994 - 2007

Commercial  
areas 2007 –  
5% of total  
area

Crossroad of  
highway D1  
and  
road No. 101

# ProLogis Park Prague D1 East

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# 10 years change

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1994

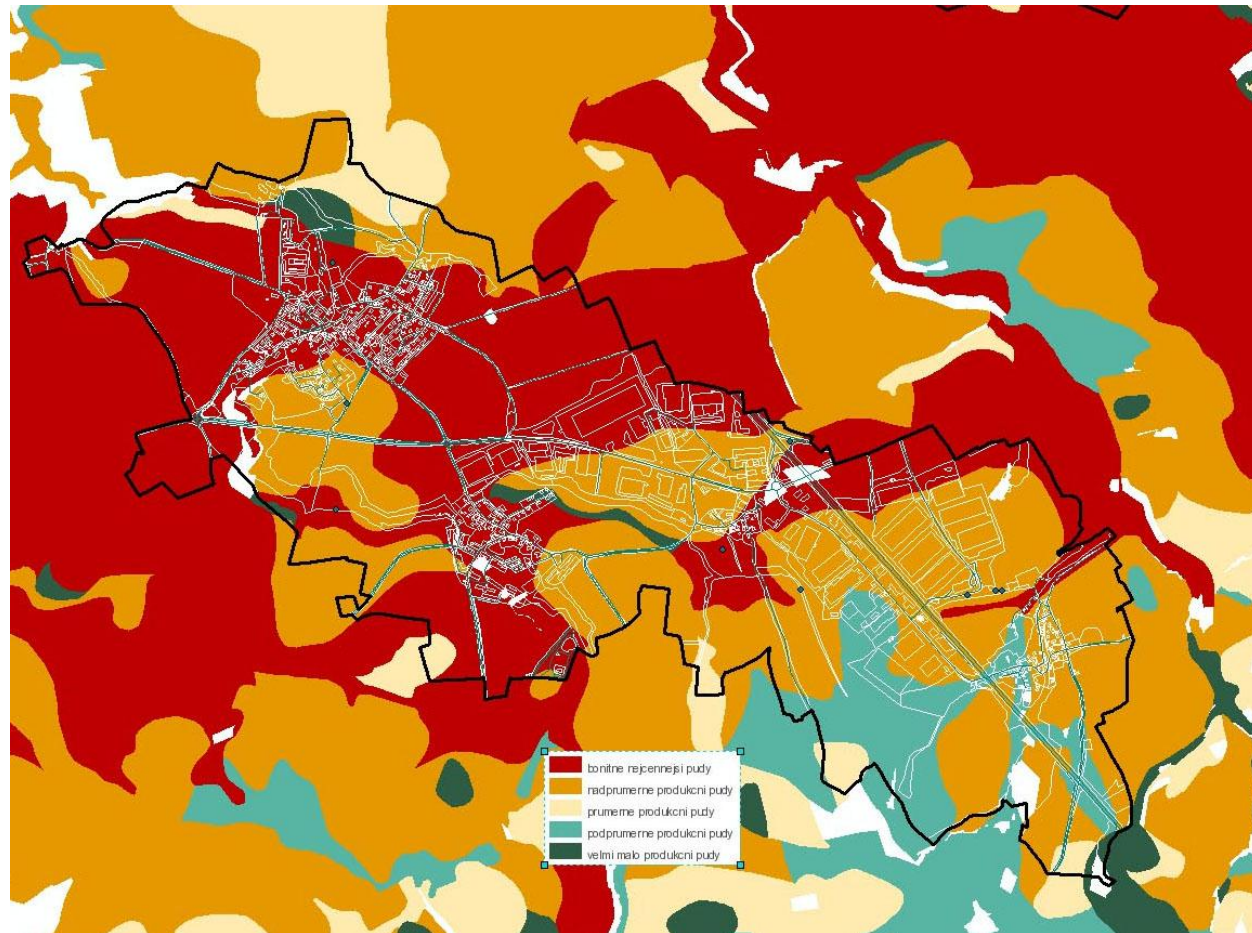


2004



# Fertile soils degradation

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# Conclusions

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- ❑ Extremely high/fast changes in Prague suburban area 1990 – 2007
- ❑ New buildings on arable land and meadows
- ❑ Highly fertile agricultural land occupation
- ❑ No forest and shrubs occupation
- ❑ Location dependence in the case of commercial suburbanization (roads)

# Consequences

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- ❑ Areal planning – highly fertile land preserved x future built-up zones planned on the 1st and 2nd class of soil preservation
- ❑ Urbanists payed by municipalities
- ❑ Ministry of environment indicators of suburbanization (goal of the project) x practical restrictions
- ❑ Economical crisis ???

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□ Thank you for your attention

