Biodiversity as an important factor to maintain the current status of forest ecosystems

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Objectives

- To determine the current and future status of biodiversity and its endangerment and propose most effective protection areas with high value of biodiversity

Introduction

- Global climatic change – importance to predict the changes in the forest-agriculture landscape

- GIS tools – predict changes in biodiversity status in future

- Three GIS tools: combined habitat layer, models Globio3 and Marxan

Combined habitat layer

- GIS layer consisted of Habitat mapping of AOPK (previous Natura 2000) for 138 natural and close to nature habitats and Corine LC for more anthropically influenced habitats

- Each habitat has point and financial biodiversity value based on the Biotope valuation method (BVM) by Seják et al. (2003)

- All habitats were divided into 5 groups according to their naturalness, from natural to artificial habitats

- The financial value of one point is 0.58 EUR

- This value presents the cost that government payed in past restoration programs to increase the ecological quality of 1 m^2 of habitat by 1 point.

5 groups of naturalness

- Natural habitats – (forests L5.4, L7.1), (wetlands, peat bog M1.1,R)
- Near to nature habitats – (meadows T1.1, T1.4)
- Habitats distant to nature (degradation meadows XT3)
- Alien to nature habitats (field X4.4)
- Anthropogenic habitats (built-up area XX3.1)

Land use with marked naturalness habitats in Dřevnice catchment

|		
X3		0,5
X4		0,3
X5		0,5
X6		0,2
X7		0,3
X7a		0,3
X7b		0,5
X8		0,5
X9		0,5
X9a		0,5
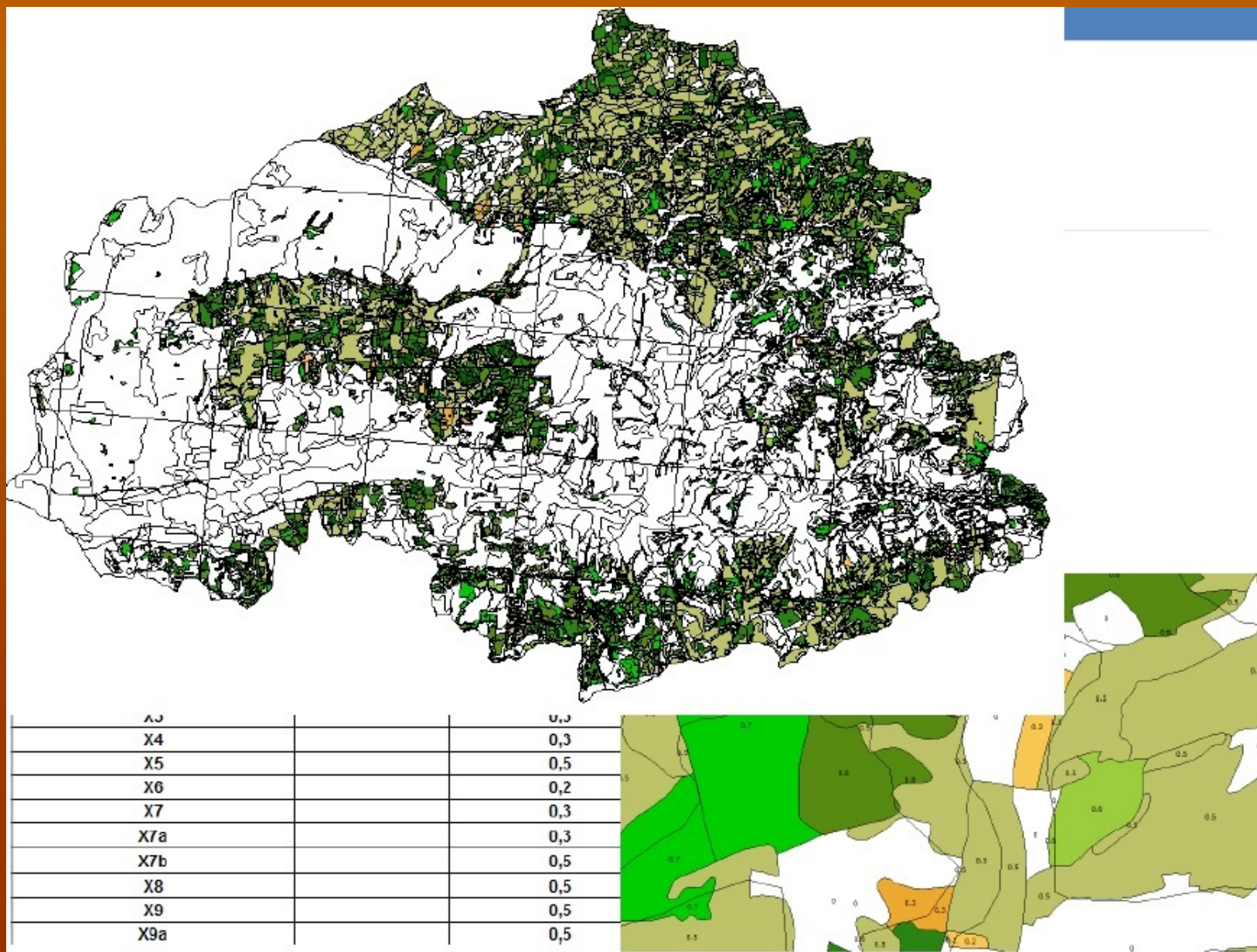
Combined habitat layer

- The biodiversity values can be used for the quantification of economic value of environmental damage, e.g. building new settlements

- BVM method is currently being renewed in cooperation with AOPK and should be integrated into Czech legislation

- In combination with land use change prediction models this layer can be used for prediction of biodiversity values in the landscape

GLOBIO3 (Global Biodiversity model)

- GLOBIO 3 is a tool for valuation of naturalness – losses of the diversity of origin species
- Model assesses risk of the reduction of biodiversity in current and future.
- GLOBIO3 works with 5 drivers, which have impact to biodiversity:
  – land use
  – infrastructure
  – fragmentation of territory
  – atmospheric nitrogen deposition
  – climate change
- MSA indicator (mean species abundance per area) reflects the worldwide threat to selected endangered species
- With regard to the conditions of the Czech Republic, we used MHV (mean habitat value per area); it reflects the naturalness of habitats according to BVM method
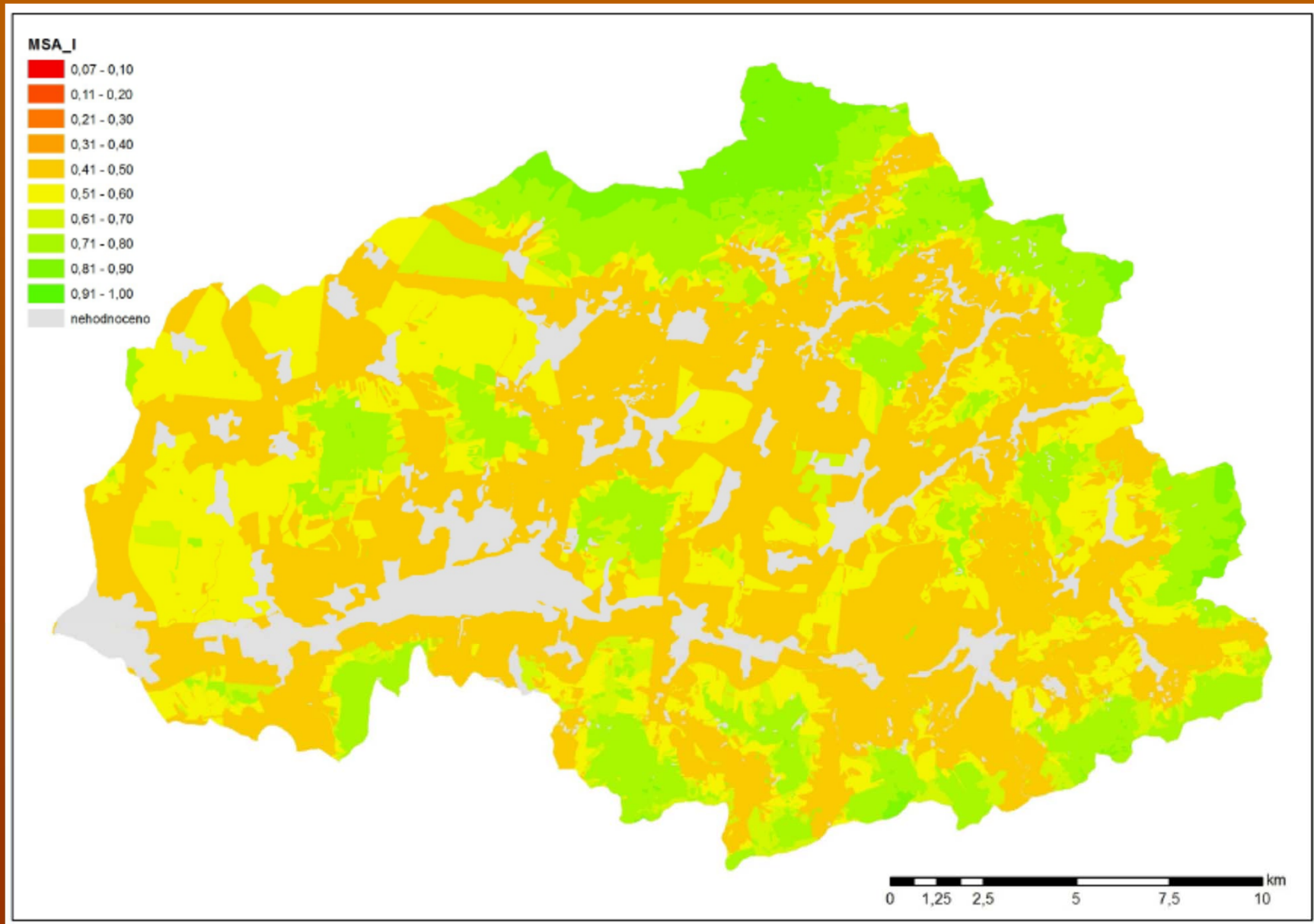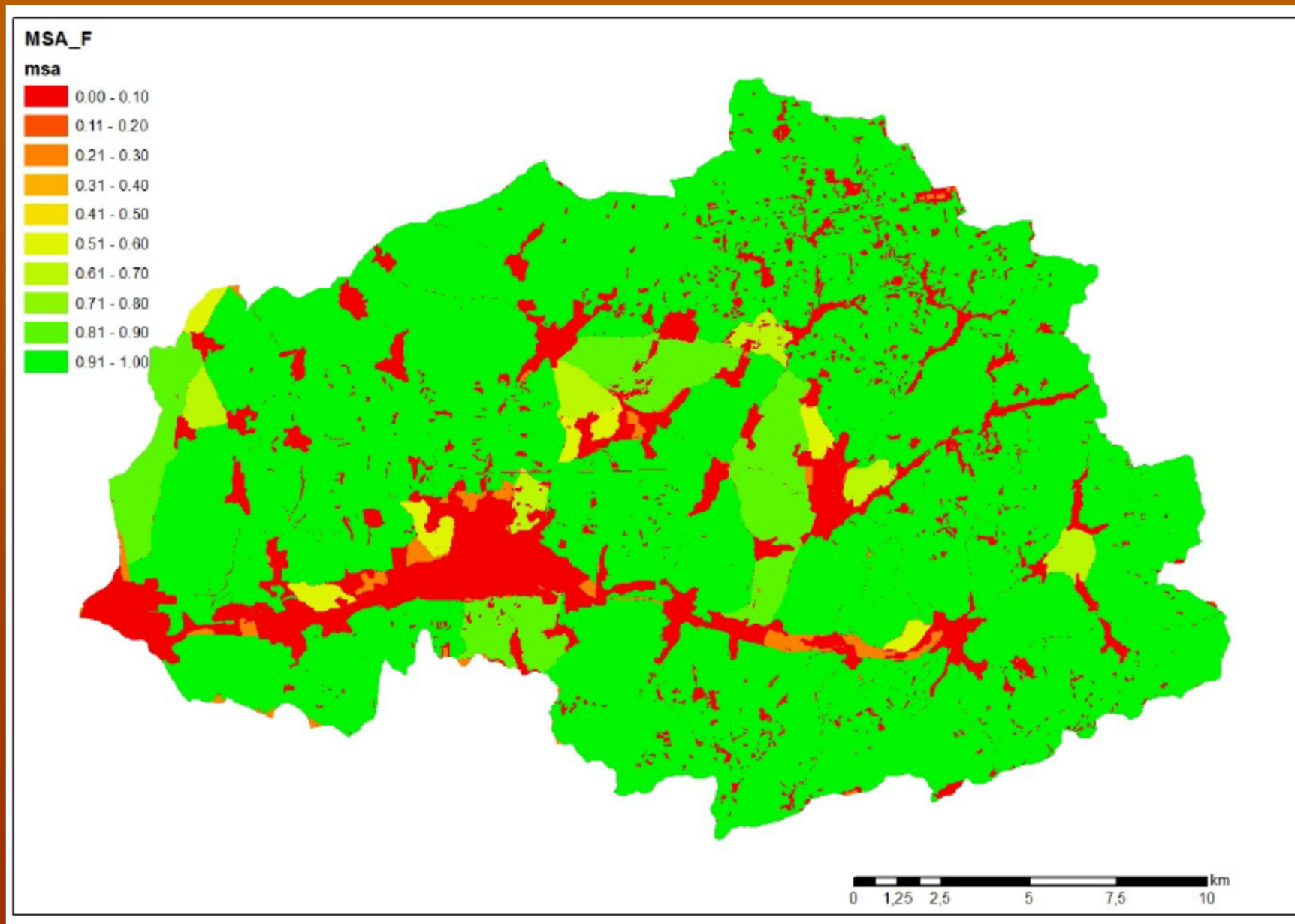
Catchment Dřevnice
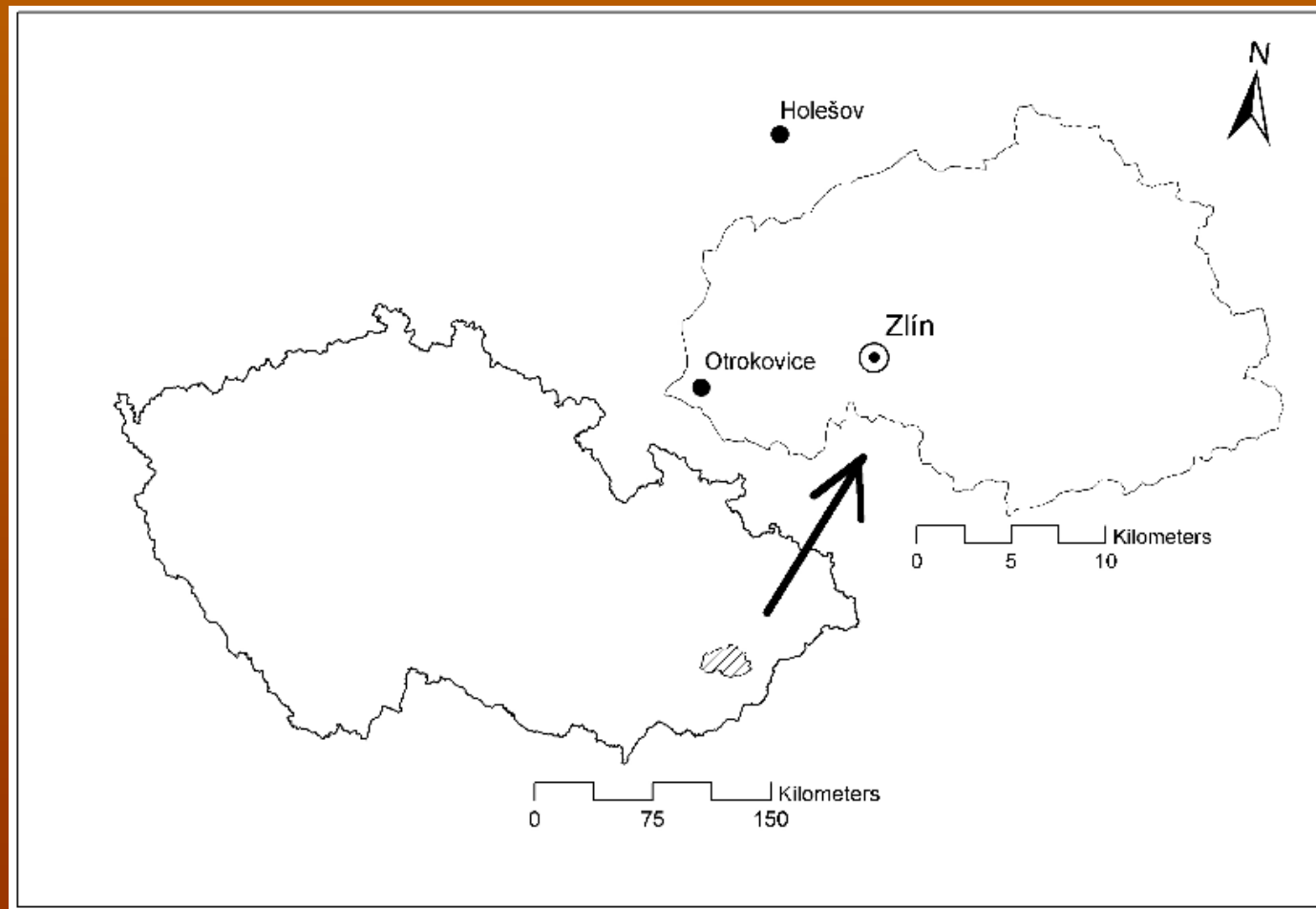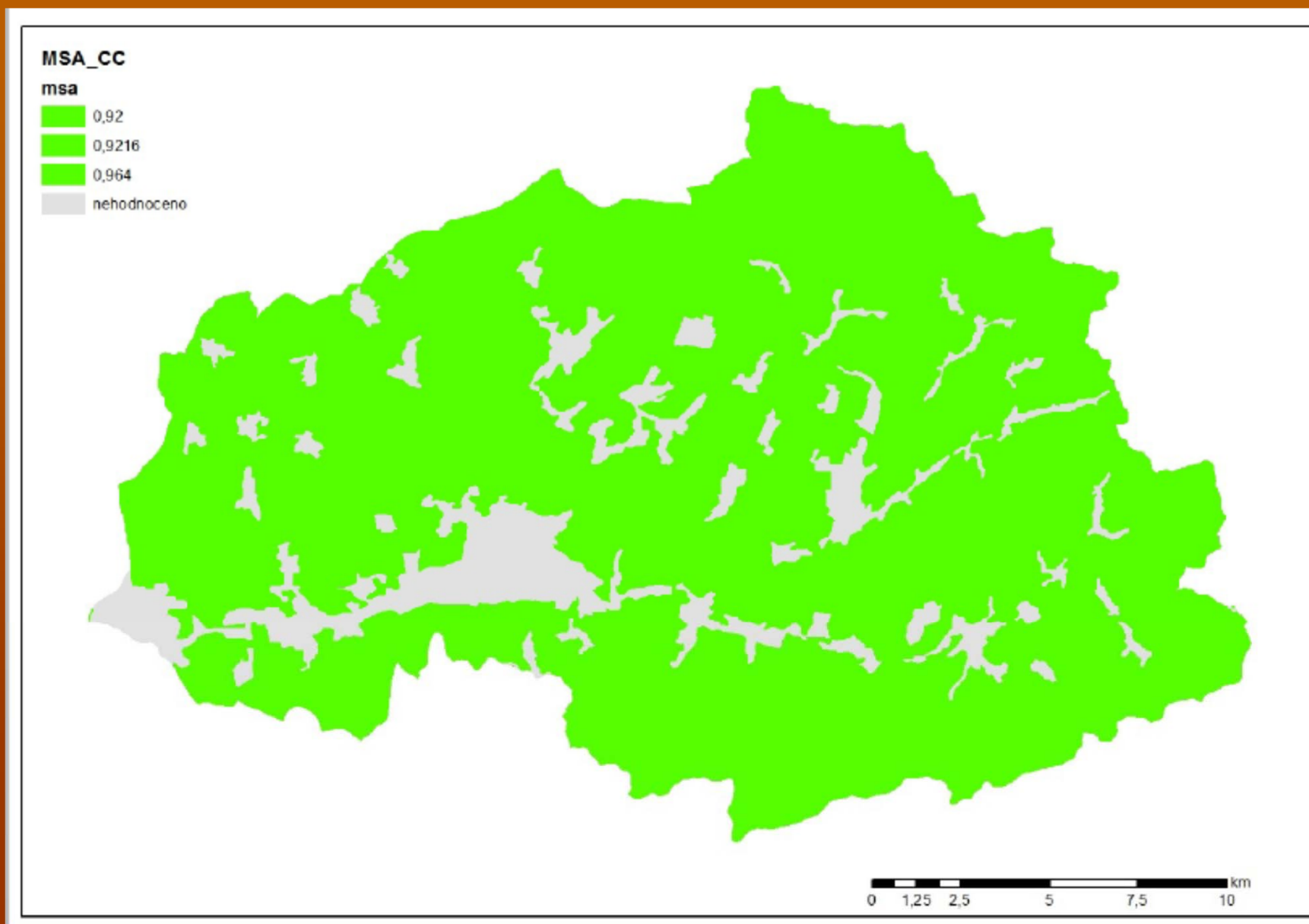
MSA – evaluation of habitat naturalness
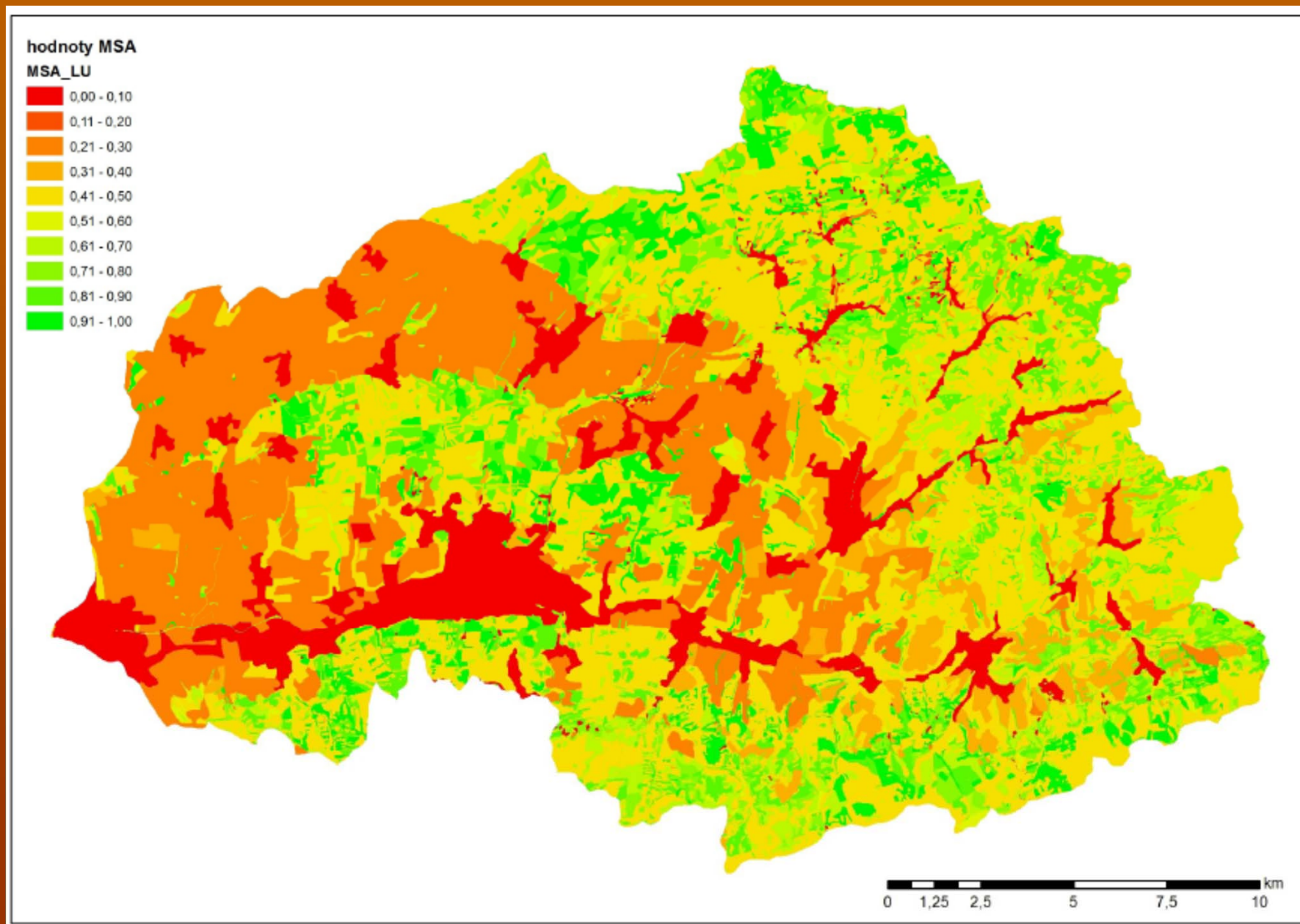
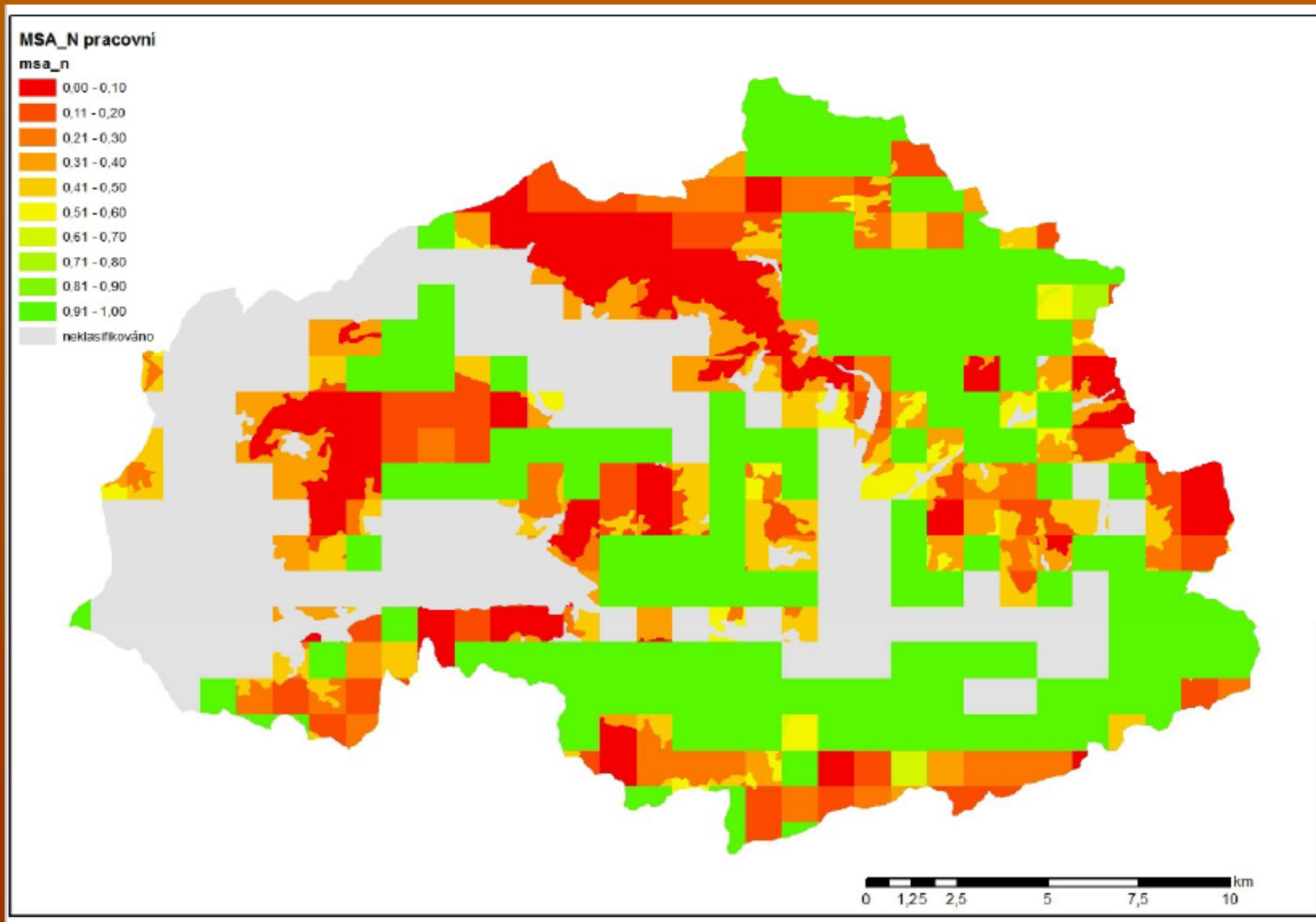# MSA – evaluation of expanding the infrastructure

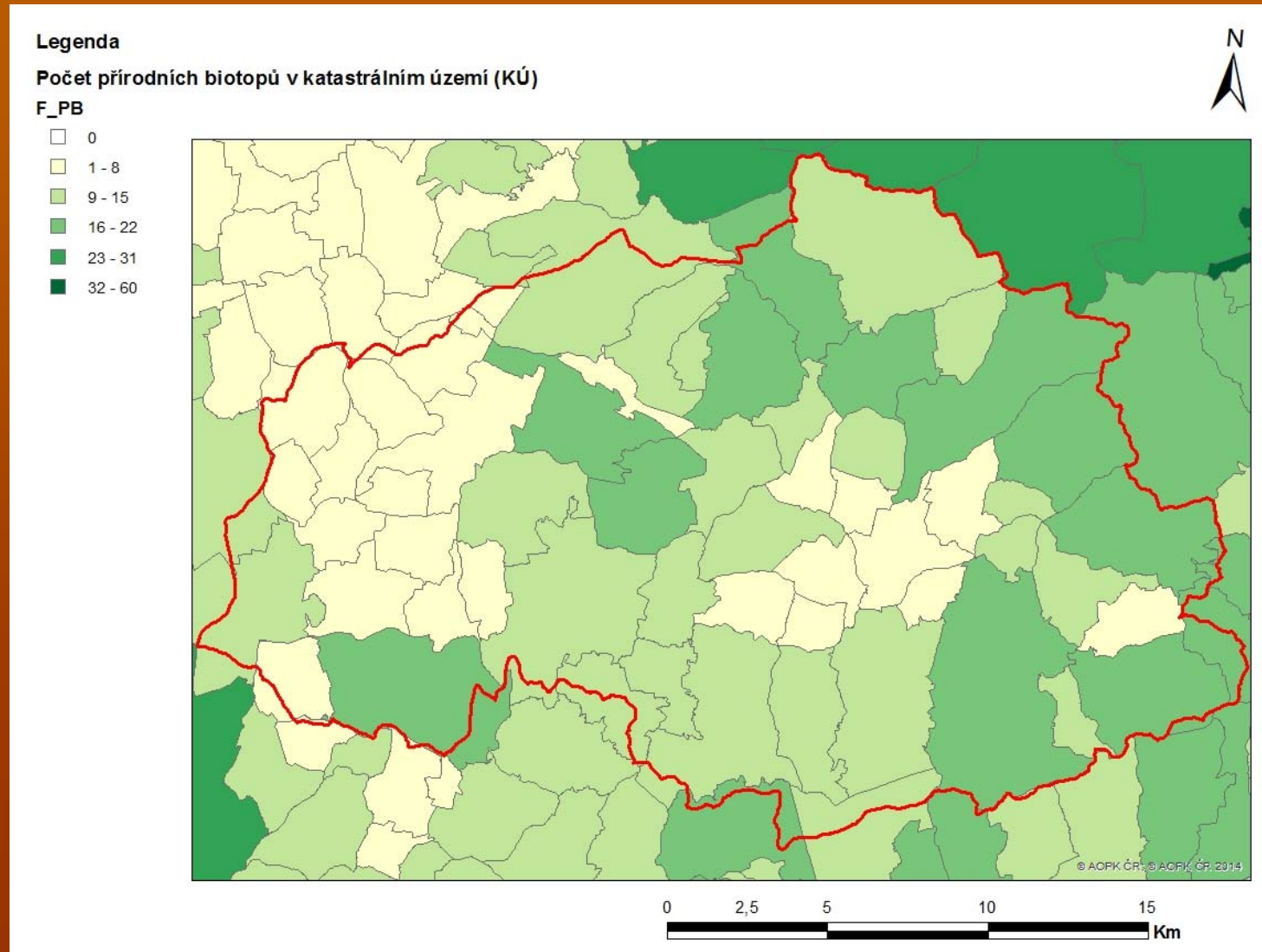# MSA – evaluation of increasing the landscape fragmentation

MSA – evaluation of impacts of climate change

MSA – evaluation the influence nitrogen deposition on the area

Number of nature habitats in cadastral territories (AOPK, 2016)

Legenda

Počet přírodních biotopů v katastrálním území (KÚ)

F_PB
- 0
- 1 - 8
- 9 - 15
- 16 - 22
- 23 - 31
- 32 - 60

GLOBIO3

- The output is a layer identifying areas with a high degree of risk, which need a general nature protection.

- These habitats should be reduced to avoid irreversible biodiversity losses.

- Results indicated 25% habitas with naturalness with values 0-0.3; 50% habitats with value 0.31-0.6 and 25% habitats has value higher than 0.60

Marxan

- Marxan selects up to now unprotected areas with a high degree of naturalness and biodiversity values
- Marxan chooses conservation units with the lowes cost for conservation
- We used as conservation units:

  - small and large protected territories and habitats within the Natura 2000 assessment with high representativness

  - distance to settlement and infrastructures
- Selected habitats could be proposed as special-purpose and genetically important forests with close to nature management

The scenario for Dřevnice catchment predicted by model Marxan
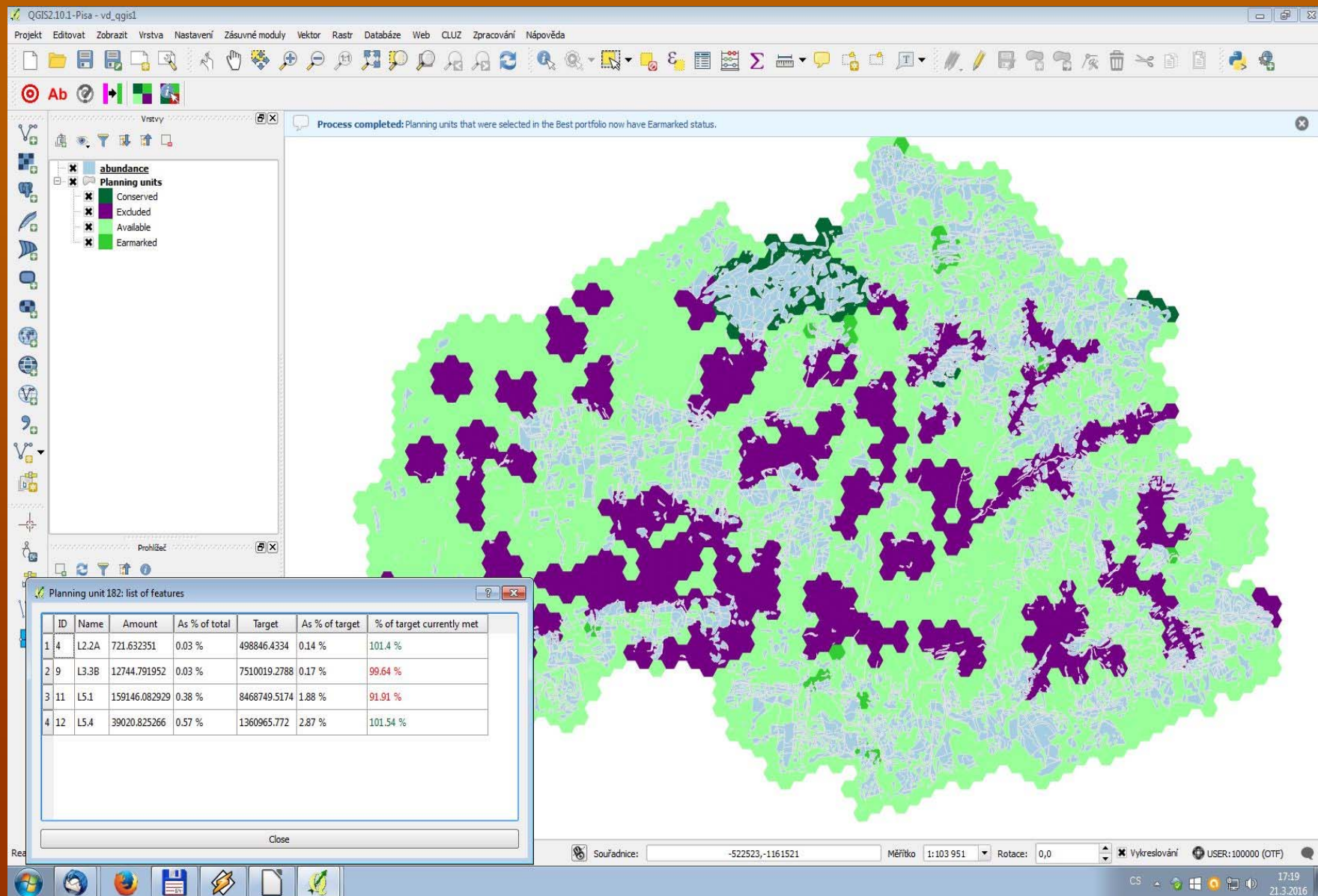
Conclusions

- Combination of described tools and models informed us at relevant level about present habitat naturalness and biodiversity values and areas with low biodiversity

- Model Marxan looks for areas with natural habitats, up to now non-protected by territory nature protection

Thank you for your attention