LANDSCAPE FEATURES AND BIODIVERSITY RELATIONSHIP: A QUANTITATIVE ANALYSIS APPROACH (CASE AREA PLA KŘIVOKLÁTSKO)

GEOBIO

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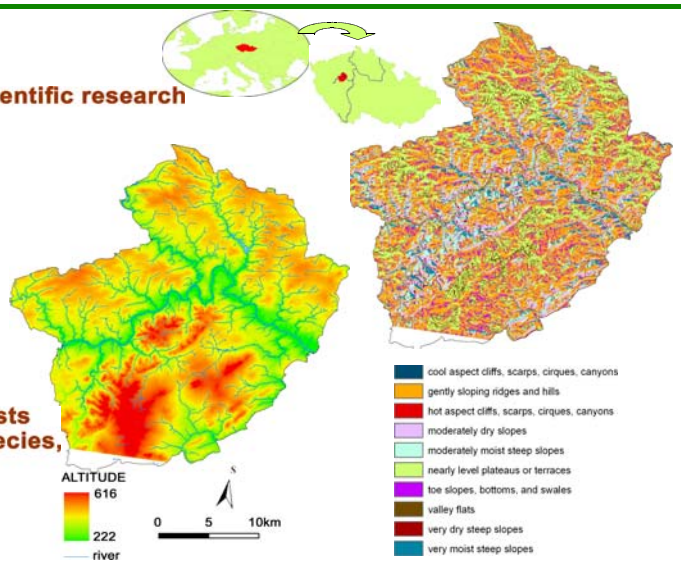
Introduction

Coupling between the components of nature – traditional scope of scientific research
Statistic modelling, GIS – bring new connections and scales
Development and verification of quantitative methods – useful
Content – introduction of two case studies in PLA Křivoklátsko

STUDY AREA

- In Central Bohemia, 628km2
- A PLA (Protected Landscape Area) and UNESCO biosphere reserve
- Altitude 223-616m, avg relative superelevation 100m
- High degree of ecological stability
- High variety of natural features (geology, geomorphology → microclimate)
- More than 2/3 of the area is covered by broad-leaved and mixed forests
- High biodiversity (> 1800 species of vascular plants, > 50 woody species, > 120 bird species etc.)
- Less anthropogenic impact (in comparsion to whole Czec rep.)



First Case Study - Effect of abiotic heterogeneity on biotopes richness

A) BACKGROUND:

- Qestions: How is the effect of abiotic heterogeneity on biotopes richness? Which heterogeneities are the most important?
- Hypothesis: Biotopes richness should be high in areas with a high diversity of abiotic conditions and vice versa?
- Landscape level
- Biotopes = typological mapping unit according to the Habitat Catalogue of the Czech Republic (Chytrý et al. 2001); classification is based on plant communities

B) METHODS:

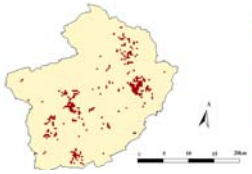
ENTER DATA → GIS → NATURAL FEATURES HETEROGENEITY → STATISTICAL MODELLING

Layer of Biotopes Mapping (NATURA 2000)
Geological layer (GEOČR50 databases)
Digital Terrain Model (ZABAGED databases)
Hydrographical layers (ZABAGED databases)

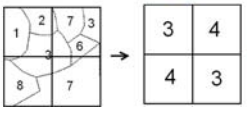
ArcInfo 9.2

dependent variable "biotopes richness" & 11 independent variables, which express abiotic features heterogeneity (geological, topographical, exposition, relative humidity, microclimate, landforms, shoreline length, mean elevation,...)

Multiple spatial linear regression (maximum likelihood method) sw R+ 2.6.1



- Case area was overlaid by grid (cell size 9ha)
- Only cells covered by natural biotopes more than 95% were analysed



Variables was counted for each cell

C) RESULTS:

- Biotopes richness positively correlates with abiotic features heterogeneity
- The model explained more than 40% of the biotopes richness variability

HYPOTHESIS WAS VALIDATED

- Biotopes richness positively correlates with abiotic features heterogeneity
- The model explained more than 40% of the biotopes richness variability
- Significant independent variables:
  - SHORELINE LENGTH: def.: shoreline length of wetland ecosystems
    express: potentional portion of biotopes adherent to wetlands
  - TOPOGRAPHICAL VARIABILITY: def.: standard deviation of altitudes
    express: relief variability
  - LANDFORMS RICHNESS:
    express: geomorphological heterogeneity (landforms, exposure)

Second Case Study: Landscape Structure and Biodiversity Relationship

- 56 x O,5ha monitoring plots
- Enter data: Precise data about biodiversity (flora&fauna&biotopes), remote sensing
- Question: Is there any causality between landscape pattern and biodiversity?

Methods:
Antropogenic impact will be included (recent and historic)
Overall biodiversity indicators will be used (red list index, biodiversity intactness index and others)
Landscape structure indicators will be counted (connectivity, fragmentation, diversity etc.)

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