Spatial conservation planning in Europe with Zonation

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Why Europe?

- Long-term human impact on environment
- Intensive land use change
- Data availability
- Exceptional collaboration between independent countries in the scope of EU (e.g. Natura 2000 network)
The workflow of spatial prioritization in Zonation

**Setting the objectives**

**Ecological model**

**Preprocessing of data**

**Spatial prioritization**

**Result visualization**

**Verification**

**Interpretation**

**Recommendations for action**

**Environmental data sets**

- Habitats / environmental data
  - Remote sensing & GIS analyses

- Species or BD features
  - Species distribution modeling

- Ecosystem services
  - Modeling and expert elicitation

**Societal data sets**

- Threats
  - GIS, registry data, statistics, simulations

- Costs
  - GIS, registry data, statistics, simulations

- Current plans
  - Planning documents
Our questions here:

- What kind of data can be used in Zonation analyses in the context of Europe?
- The potential of the INSPIRE process to benefit spatial conservation planning?
- How do data choices and data quality influence on spatial prioritization results?
- Continental vs. national priorities for biodiversity?
01 Spatial data resources in Europe
02 Zonation examples from Europe
Data: Data sets in spatial prioritization

**DATA THEME**
- Biodiversity features (species, habitats, ecosystem services)
- Anthropogenic data (land cover, land use, administrative borders)

**DATA ORIGIN & TYPE**
- Observation data
- Projected or modelled
- Presence-absence, probability of occurrence, density, abundance, amount

**DATA USAGE**
- Directly usable data sets (e.g. species distributions)
- Potential derivates (e.g. CORINE land cover)
- Additional data needs (e.g. costs)
Starting point

- Analysis extent?
- Available data?
- Prioritization method?
- Weighting of features?
- Connectivity?
Data and spatial prioritization

Preprocessing of data

Preprocessing in GIS software or R

Polygon or vector data are not directly supported

Spatial prioritization

Standard rasters
- same cell size
- Same extent

Zonation doesn’t recognize projections

Processing in GIS software, R, statistical software

Result visualization
- Verification
- Interpretation

Recommendations for action
Data: Data sets used in Zonation examples

**INPUT**

Species data (annex III)
- Amphibians, birds, mammals, reptiles
  - Thuiller et al.
  - Laboratoire d’Ecologie Alpine (LECA), Univ. Grenoble
  - IUCN Red Lists species (IUCN)

Natura 2000 (annex I)

Administrative regions (annex I)

CORINE land cover (annex II)

Bio-geographical regions (annex III)

**OUTPUT**
Results: Impact of analysis area

Red = Top priorities

EU28

Bio-geographical regions extent
Results: Impact of prioritization method

Balanced solution (ABF)

Emphasis on rare species (CAZ)

Zonation has several prioritization methods available
Results: Hierarchical analysis (Natura 2000)

Red = Top priorities

EU28 extent prioritization

Red = Top priorities are in Natura 2000 network

EU28 extent prioritization with Natura 2000 network
Results: Performance curves

Natura 2000

Species range protected on average %

Protected area %

Prioritization

Prioritization with Natura 2000
Results: Administrative units analysis

National or continental conservation planning?

EU28 extent prioritization

Prioritization with administrative units (countries)

National or continental conservation planning?

Species range protected on average %

Protected area %

Prioritization with administrative units

Prioritization EU28 extent
Results: Land cover

- CORINE derived data used as land use intensity layer in Zonation
- CORINE land cover classes got scores according to naturalness (environment in natural state)
- **Condition layer**

No condition transformation
Results: Land cover

- CORINE derived data used as land use intensity layer in Zonation
- CORINE land cover classes got scores according to naturalness (environment in natural state)
- **Condition layer**
Results: impact of data sources

- Preliminary analysis: comparison based on private non-open data and openly accessible data
- 920 species
- The significance of data quality
Results: impact of data sources

Open data, coarse
Proprietary data, detailed
• Data quality and data services are crucial
• More harmonized high resolution data -> more high quality results
• Data policy: international collaboration is vital -> EU and INSPIRE have an exceptional potential
Spatial conservation planning: Conclusions

• Land use change and policy emphasis may change conservation needs
• Zonation can help balance the needs of species, habitats, ecosystem services and other land uses
• Cost-efficiency can be considered in prioritization
• Alternative choices in prioritization and data can lead to major differences in the proposed priorities
• High quality data enables combining spatial conservation planning with general land use planning
• SCP is one of the beneficiaries of the INSPIRE process
Thank you! See you after the coffee break!

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