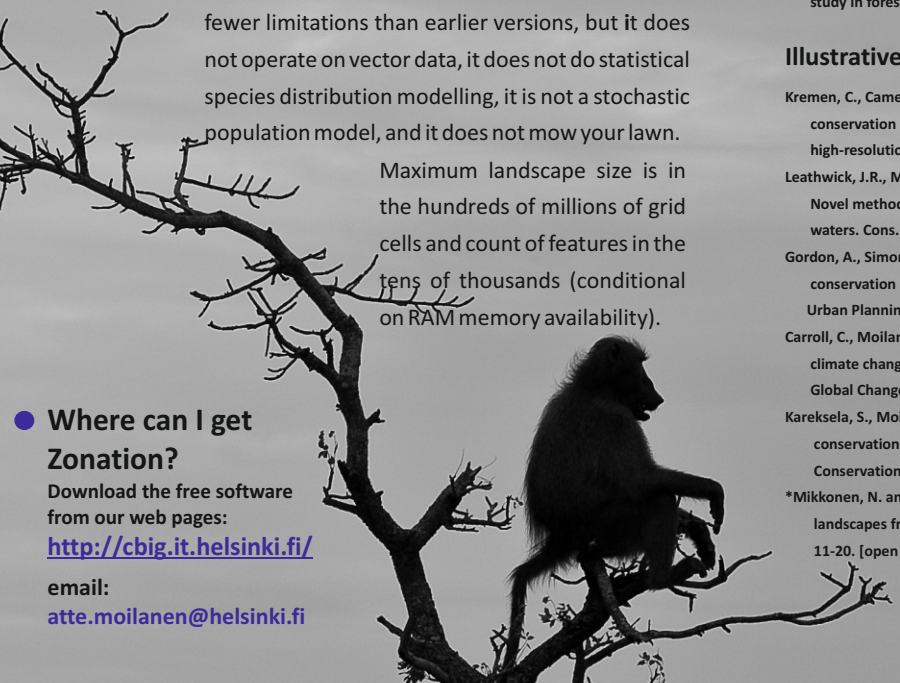
- **Why is Zonation useful?** Zonation is able to balance a large number of different factors in spatial conservation prioritization. It includes feature-specific connectivity responses, costs, uncertainty analysis, and several unique analysis options. It can analyse very large data sets in manageable time. The analysis is deterministic and its main results can be summarized in a map and a graph.

- **Where does data for Zonation come from?** Observation or modelling, including species distribution modelling. Zonation can use pretty much any data you can represent on a grid, with the number inside each grid cell telling the local occurrence level of the feature. GIS and statistical species distribution modelling are commonly used in data preparation.

- **How does Zonation differ from target-based planning?** First, Zonation also does target-based planning. However, the most common analysis modes of Zonation produce the representation levels of features as an emergent outcome of an integrated analysis process; it is the general principles of aggregating conservation value that are chosen instead of setting a multitude of hard targets for minor components of biodiversity.

- **What is new in Zonation v. 4.0?** Much increased capacity for handling large analyses. Corridor connectivity. Arbitrary dispersal kernels. Many improvements in the GUI and outputs.

- **What limitations does the software have?** Zv4 has fewer limitations than earlier versions, but it does not operate on vector data, it does not do statistical species distribution modelling, it is not a stochastic population model, and it does not mow your lawn. Maximum landscape size is in the hundreds of millions of grid cells and count of features in the tens of thousands (conditional on RAM memory availability).



- **Where can I get Zonation?**

Download the free software from our web pages:
http://cbig.it.helsinki.fi/

email:
atte.moilanen@helsinki.fi

Zonation references (* recommended starting points)

Basic Zonation methods and analyses

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Spatial conservation planning methods and software

ZONATION

Version 4

C-BIG Conservation Biology Informatics Group
University of Helsinki, FINLAND

With thanks to our main supporters

UNIVERSITY OF HELSINKI
ACADEMY OF FINLAND
erc European Research Council

ZONATION is methods and software for ecologically based land use planning including decision support for spatial conservation resource allocation. Zonation can identify areas important for retaining habitat quality and connectivity for multiple species, habitats or ecosystems, indirectly aiming at long-term persistence of biodiversity. When including costs, Zonation produces cost-efficient solutions. The operation of Zv4 is explained in a quick-start guide, a comprehensive manual, and in web-based material.

Zonation produces a balanced, complementarity-based, priority ranking based on the occurrence levels of biodiversity features and costs in sites (grid cells). The ranking is generated by iteratively removing the least valuable remaining cell, accounting for connectivity and the balance between features in the process. The output of Zonation can be imported into GIS software for further analysis. Zonation v4 can process data sets that are quite large, both in terms of effective landscape size and count of features.

Basic analyses

- Identification of (near-)optimal reserve areas
- Identification of reserve network area expansions
- Impact avoidance & offsetting; identification of areas for alternative land uses
- Traditional target-based planning
- With proper inputs, planning for habitat restoration or management
- Multiple alternatives for how conservation value is aggregated across features and the landscape
- Biodiversity offsetting

Input data includes

- Large-scale, high-resolution grids with
  - Presence/absence -data
  - Probabilities of occurence
  - Abundance/density -data
- Cost and opportunity cost layers
- Connectivity scales

Analysis features

- Species/feature weighting (prioritization)
- Connectivity methods
  - Distribution Smoothing
  - Boundary Quality Penalty
  - Boundary Length Penalty
  - Directed freshwater connectivity
  - Species interactions
  - Matrix connectivity between multiple habitat types
  - Corridor connectivity
- Uncertainty analysis for robust conservation decisions
- Combined ecosystem level and species level analysis
- Balancing needs of alternative land uses
- Landscape condition and retention analysis
- Prioritizing across multiple administrative regions with different priorities

Zonation v 4 software

- New improved GUI (graphical user interface)
- New manual, quick-start manual, and www-based material
- Now allows analysis of very large data

Background pictures: Enrico Di Minin, Atte Moilanen
Layout: Aija Kukkala and Atte Moilanen

Fig. 1. Zonation can balance requirements of species, habitats and people.

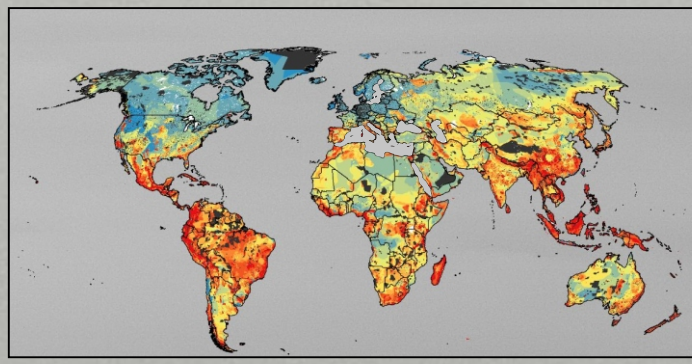

Fig.2. First main Zonation output: A visualization of the hierarchical priority ranking of the landscape. Here, areas have been zoned to graded colours based on their priority rank, with highest priorities shown in red. The priority ranking supports, among other things, expansion of conservation area networks, target-based systematic conservation planning, or identification of ecologically low-value areas for alternative land uses and impact avoidance.

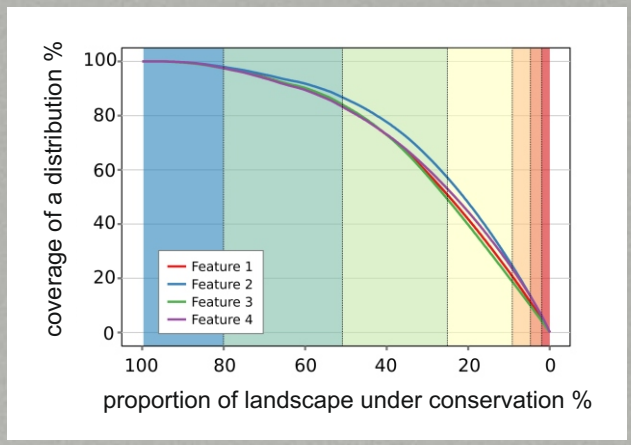

Fig.3. Performance curves, the second main Zonation output. These curves are directly linked with the priority rank map. A performance curve describes how the coverage of the distribution (summed occurrences) of a feature declines when the part of the landscape under conservation becomes smaller. Most often, performance curves are shown as averages for groups of features.