A statistical stratification of the environment of Europe

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introduction

Stratification into homogeneous regions is essential for strategic random sampling and consistent modeling across large heterogeneous areas. Tried and tested statistical procedures were used to create the 84 class Environmental Stratification of Europe (EnS) at a 1km^2 resolution.

methodology

The twenty most relevant available variables were selected. Principal Components Analysis (PCA) was used to compress 88% of the variation in three layers, which were clustered into 84 classes using ISODATA clustering. All classes can now be described using available environmental datasets (see below).

aggregating and naming

The 84 classes were aggregated into 13 Environmental Zones (EnZs) based on the mean 1st principal component value of the classes. Within each EnZ the EnS strata are numbered by their 1st principal component value. For example, the class with the highest value in the Boreal EnZ is named BOR1.

validation

Correlations with available ecological datasets, e.g. soil, vegetation, land cover and species distribution, were all significant (Pearson correlation coefficient at 0.01 level), emphasizing that the EnS is an appropriate environmental stratification for Europe.
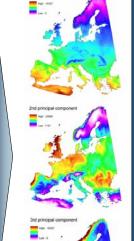
applications

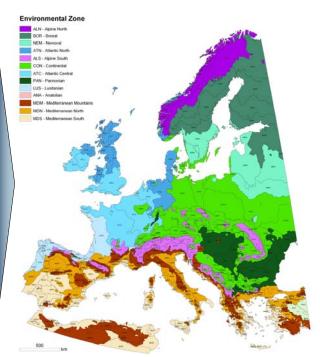On a national scale similar stratifications have proven successful in among others:
- integration of diverse datasets
- assessment of ecological resources
- assessment of environmental change
- scenario testing (e.g. climate change)

The EnS is used in several EU projects and is available for science on request.
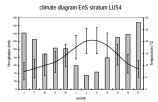
variables

climate
- minimum temperature
- maximum temperature
- precipitation
- sunshine

(all for January, April, July, October monthly means)

geomorphology
(substitutes)
- altitude
- slope

oceanicity
- annual temperature range divided by latitude

northing
- latitude

principal components

1st principal component

2nd principal component

3rd principal component

Environmental Stratification of Europe

Environmental Zone
- ALN - Alpine North
- BOR - Boreal
- NEM - Nemoral
- ATN - Atlantic North
- ALS - Alpine South
- CON - Continental
- ATC - Atlantic Central
- PAN - Pannonian
- LUS - Lusitanian
- ANA - Anatolian
- MDM - Mediterranean Mountains
- MDN - Mediterranean North
- MDS - Mediterranean South

500 km

descriptions of a stratum

climate diagram EnS stratum LUS4

soil types in EnS stratum LUS4

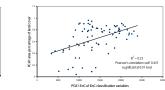Quercus species in EnS stratum LUS4

validation

correlation of the EnS with Potential Natural Vegetation
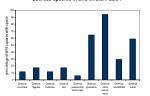
correlation of the EnS with CORINE land cover

correlation of the EnS with distribution of European Quercus species

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