

Does Forest Structure Indicate Biodiversity?

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Introduction

In order to monitor species diversity, surveying indicators in habitats has often been recommended as more cost-efficient than assessing species directly.

Question

Can forest species density be assessed by site factors, forest structure and management aspects?

Methods

In Switzerland the National Forest Inventory (NFI) and the Swiss Biodiversity Monitoring Program (BDM) are collecting data on the same sample subgrid. In this study 58 NFI variables of forest structure, site conditions and management are used to build linear regression models on BDM species density of vascular plants, mosses and molluscs.

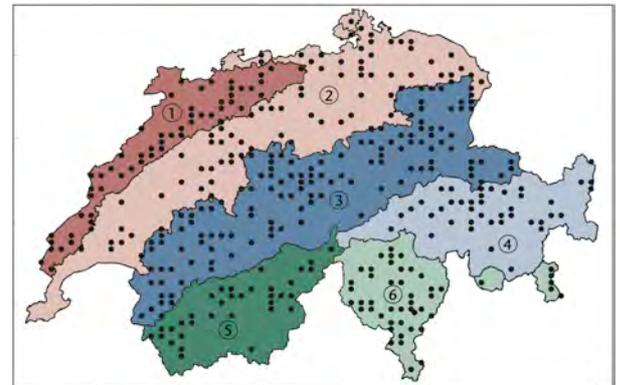
Results

The analyses show that site factors, in particular the biogeographic regions, the altitude, slope and the soil acidity, explain 18 to 49% of the observed variance in species density, depending on the species group (taxon). Of all the factors influenced by management, only the availability of light (stand density) was found to play an important role, most of all on vascular plants. In addition the density of molluscs is positively correlated with shrub cover.

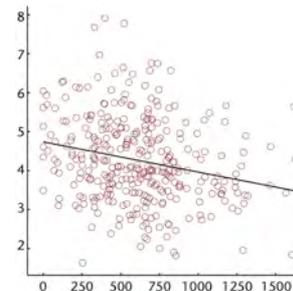
However, none of the regression models tested explains more than 54% of the variance of species density.

Conclusions

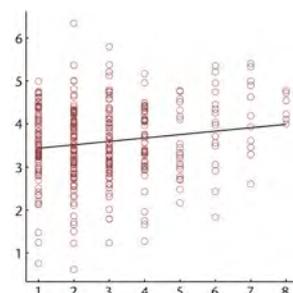
- Species density of vascular plants, mosses and molluscs can be assessed reliably only by direct survey.
- Nevertheless certain data assessed in forest inventories is ecologically very important and may be used to approximate large scale species density.
- It can not be excluded that the correlation with other taxa is stronger.



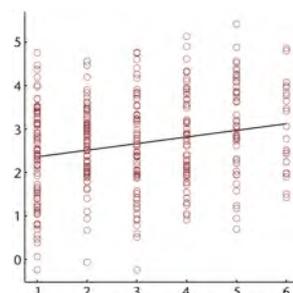
Location of the 381 analysed NFI and BDM sample plots in the Swiss forest and the 6 biogeographic regions



Correlation between number of vascular plant species (y-axis, transformed) & Stand Density Index (x-axis)



Correlation between number of moss species (y-axis, transformed) & crown closure (x-axis, 1=dense, 8=open)



Correlation between number of mollusc species (y-axis, transformed) & shrub coverage (x-axis, 1=low, 6=high)



References

Brändli UB, Bühler C, Zangger A (2007) Waldindikatoren zur Artenvielfalt – Erkenntnisse aus LFI und BDM Schweiz. Schweiz Z Forstwes 158:243-254. doi:10.3188/szf.2007.0243
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