Effects of stand structure and tree species composition on different organism groups

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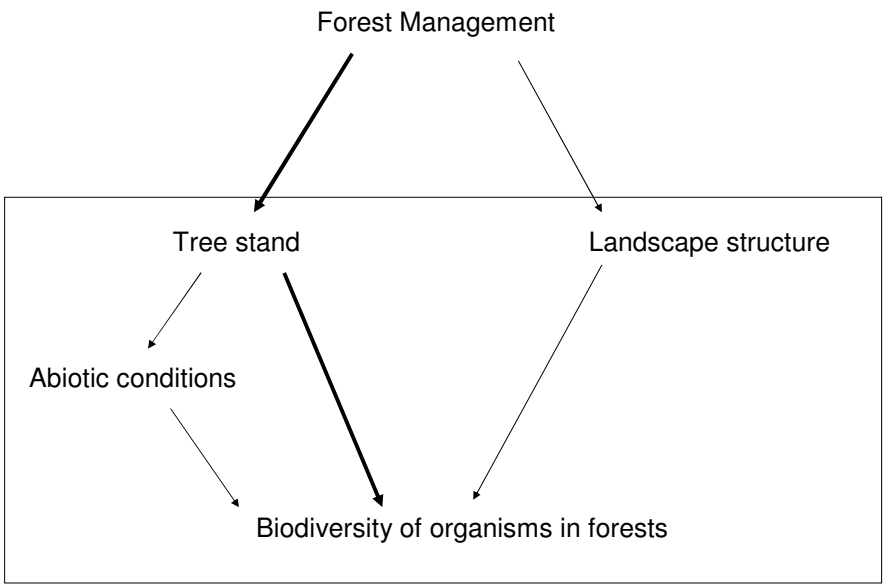


Aims of the study

- Explore the relationships between tree stand and the community ecological variables of different organism groups

- Develop models that can regionally predict difficult community ecological variables based on easily recordable stand structural characters

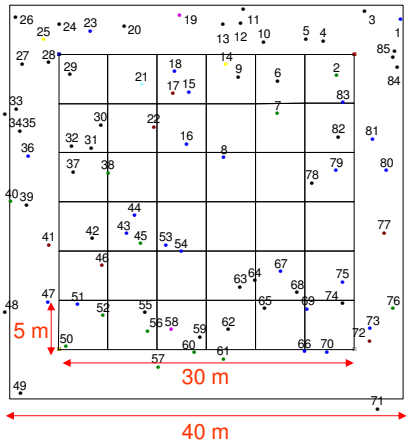
Tree stand	Compositions of tree species
	Tree size distribution (DBH, height)
	Dead wood
Abiotic conditions	Light
	Substrate conditions (soil, litter, dead wood)
Landscape structure	Proportion of landcover types (forests, meadows, arable lands, clearcuts etc.)
Organisms groups	Seedlings (height < 0.5 m)
	Saplings (height > 0.5 m, DBH < 5 cm)
	Forest herbs
	Ground floor bryophytes (on soil and dead wood)
	Breeding birds

Study area: Őrség National Park

Hungary

Field inventory

- 37 stands: age > 70 years, excluding steep slopes and wet areas, representing different tree species combinations
- Trees > 5 cm DBH: mapping in 40 x 40 m sized plots, DBH, height measurement
- Snags and logs mapped and measured
- Landcover type of the surroundings (r=300 m)
- Patches of saplings and shrubs mapped, individuals counted
- Herbs, seedlings, bryophytes, substrate cover: absolute cover in 30x30 m sized plots
- Relative diffuse light (LAI-2000)
- Breeding birds: point count sampling



Data Analysis of organism groups

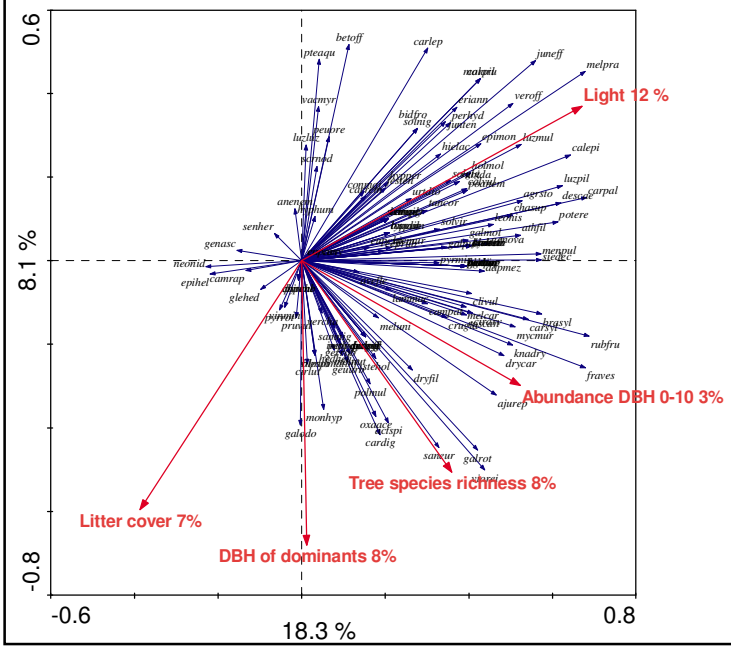
Species composition ⟶ Direct ordination: Redundance Analysis

Species richness

Cover or abundance

} Regression: Generalized Linear Models

Ordination - Herbs



Ordination

Seedlings	Saplings	Herbs	Bryophytes	Birds
23.8%	40.4%	26.4%	40%	14.8%
Tree species richness	Landscape: pine forests	Light	Litter cover -	Abundance DBH 41-50
Abundance DBH 31-40	Hornbeam%	Tree species richness	Soil cover	Dead wood
Light	Litter cover -	DBH of dominant trees	Pine%	Beech%

Species richness

Seedlings	Saplings	Herbs	Bryophytes	Birds
0.44	0.6	0.43	0.61	0.46
Tree species richness	Mixing trees%	Beech% -	Litter cover-	Height of dominant trees
Abundance DBH 6-10	Height heterogeneity	Abundance DBH 31-40 -	Abundance of trees	Herb cover
Light	Pine%	Light	Abundance DBH 31-40 -	Soil cover
	Stand volume -		Tree species richness	Landscape: spruce forests
			DBH heterogeneity	

Abundance/Cover

Seedlings	Saplings	Herbs	Bryophytes	Birds
0.51	0.58	0.72	0.76	0.61
Abundance DBH 10-20 -	DBH heterogeneity	Abundance DBH 31-40 -	Litter cover-	Cover of ground floor vegetation
Pine% -	Tree species richness	Beech% -	Stand volume -	Abundance DBH 41-50
		Dead wood		Abundance DBH 11-20

Correlations among plant organism groups

Species richness

	Seedlings	Saplings	Herbs	Bryophytes
Seedlings	-	0.68***	0.78***	0.60***
Saplings	0.13^{ns}	-	0.50***	0.62***
Herbs	0.37*	0.34*	-	0.64***
Bryophytes	0.27^{ns}	0.3^{ns}	0.61***	-

Cover

Conclusions

Seedlings: Tree species richness, Light, Medium sized trees -

Saplings: Pine%, Tree size heterogeneity, Mixing trees

Herbs: Light, Medium sized trees -, Beech% -

Bryophytes: Substrates (soil, dead wood, litter -), Pine%

Birds: Large trees, Dead wood, Ground floor cover

Plans for the future

Analysis of functional groups and separate species within organism groups

Inclusion other organism groups: epiphytic bryophytes, fungi, saproxylic beetles, spiders

Investigation other background variables: soil and litter conditions, microclimate, forest history

Simplification of background variables for the purposes of management

Testing the models in landscape scale

Other ecological questions: indicator species, nestedness, dispersal limitations, spatial scale dependence of the relationships

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