

Indicators and Methods to Assess Biological Qualities in Danish Terrestrial Nature Types

Dr. Jesper Fredshavn
NERI, Aarhus University
Denmark

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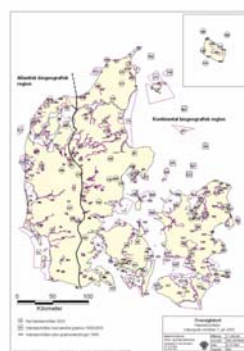


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NATURA 2000



According to the Habitat directive Denmark has designated 254 NATURA 2000 areas

The designated areas covers approximately 60 of the Annex 1 habitat types and 40 of the Annex 2 species

A total of 3172 km² is designated as Natura 2000 areas

equiv. to 7,4% of the total Danish land area

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Conservation measures in Denmark

National and regional NATURA 2000 plans for each of the 254 NATURA 2000 designated areas

- Basic mapping
- Assessment of Biological Status
- Goal setting
- Management plans

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Mapping of Danish habitat types

- **Stratified Network of Monitoring Stations**
based on size and quality of the areas
- **Natura 2000 Management Plans**

Biological status assessment - complete mapping of Natura 2000 areas and sampled data outside Natura 2000 areas

- **Area:** GIS data, field verification
- **Structure/function:** Visual, measurable field indicators
- **Species:** 5 m documentation circle

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Basic mapping of habitat types



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Biological Status Classes

5 quality classes for Biological Status
cf. the 5 class frame used by the Water Framework Directive

- I High nature status
- II Good nature status
- III Moderate nature status
- IV Poor nature status
- V Bad nature status

I & II represents the Habitat Directive's demands for FCS

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Indicators

The Biological Status assessment is based on the evaluation of a set of indicators.

The Biological Status is assessed on a reference scale between 0 and 1, where 1 is the optimal condition without any negative pressures and 0 is the worst possible condition

Each indicator is evaluated separately and given a score between 0 and 1, and the biological status is then calculated from the weighted scores of the indicators

Status class	I	II	III	IV	V
score	1,0 - 0,8	0,8 - 0,6	0,6 - 0,4	0,4 - 0,2	0,2 - 0,0

The process of calibrating a consensus system

- Select relevant **indicators**
- **Ranking**: areas with low pressures should be ranked high and areas with high pressures should be ranked low on the reference scale
- **Leveling**: Areas with favorable biological status have index above 0,6 and areas with unfavorable status have index below 0,6

Setting the targets

Setting reference values has scientific as well as political aspects



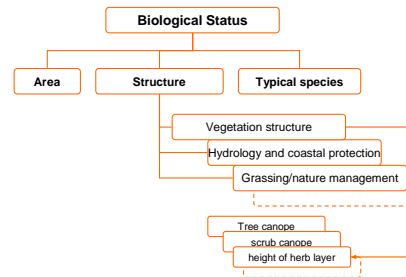
"how low can you go"



"how high will you fly"

A hierarchical structure of indicators

Each sublevel is characterised by a set of indicators/-groups



Structural indicators



The structural indicators reflects the pressures on the habitat types

All habitat types are evaluated from the same indicators, but the scoring and weighting of the indicators vary from habitat type to habitat type

- Vegetation structure
- Hydrology and coastal protection
- Grassing and nature management
- Eutrofication and pesticide spraying
- Habitat type specific structures

Vegetation structure

1. Vegetation Structure

Categories	Evaluation			
	1.	2.	3.	4.
Percent area without vegetation cover	0-5%	5-10%	10-30%	30-75%
Percent area with grass/herb vegetation below 15 cm	0-5%	5-10%	10-30%	30-75%
Percent area with grass/herb vegetation 15-50 cm	0-5%	5-10%	10-30%	30-75%
Percent area with grass/herb vegetation above 50 cm	0-5%	5-10%	10-30%	30-75%
Percent area with dwarf bush formation	0-5%	5-10%	10-30%	30-75%
Percent area with tree cover (canope)	0%	1-10%	10-25%	25-50%
Percent area with invasive species	0%	1-10%	10-25%	25-50%

Hydrology and coastal protection

2. Hydrology og coastal protection

1.		Categories			Evaluation
2.	3.	4.	5.		
Drainage and water catchment (bogs, mires and fens)					
No drainage and water catchment	No vegetation changes from drainage or water catchment	Drainage with summer desiccation and initial overgrowth	Generally desiccated and overgrown with tall dryland species	Complete desiccation and with dryland character	
Streams and watercourse					
Natural streams without management	Natural streams. Management is not affecting vegetation	Some regulation of streams and some stream plant cutting	Streams regulated and with annual cutting	All streams in pipes	
Coastal protection (coastal habitats)					
No coastal protection	Coastal protection but with natural dynamics and vegetation zonation	Coastal protection with significant influence on natural dynamics and vegetation zonation	Strong coastal protection with fresh water dominated vegetation and only little zonation	Fresh water vegetation with no salt influence	

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Agriculture and Nature management

3. Grassing and nature management

1.		Categories			Evaluation
2.	3.	4.	5.		
Percent area with grassing and/or hay cutting					
0-5%	5-10%	10-30%	30-75%	75-100%	

4. Agricultural pressures

1.		Categories			Evaluation
2.	3.	4.	5.		
Percent area with significant effects from agricultural spraying and manuring					
0%	1-10%	10-25%	25-50%	50-100%	

5. Habitat specific structures

1: abundant		Categories of positive and negative structures		
Habitat type		2: sparse/rudimentary	3: not present	
Structure				
6230	Nardus grassland	Large stones, ant's nests, steep slopes. Scattered trees and bushes	eurofalcated and dominated by <i>Lolium per.</i> , <i>Elytrigia rep.</i> , <i>Cirsium ar.</i> , <i>Cerastium</i> and <i>Poa ann.</i>	

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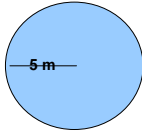
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Species lists from a circle of 5 m radius



Documentation from a 5 m circle
 ■ Species composition of vascular plants

The circle is placed in a homogenous area characteristic of the habitat type



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Calculation of Structural Index

1. Vegetation Structure

1.		Categories			Evaluation
2.	3.	4.	5.		
Percent area without vegetation cover					
0-5%	5-10%	10-30%	30-75%	75-100%	1
Percent area with grass/herb vegetation below 15 cm					
0-5%	5-10%	10-30%	30-75%	75-100%	3
Percent area with grass/herb vegetation 15-50 cm					
0-5%	5-10%	10-30%	30-75%	75-100%	4
Percent area with grass/herb vegetation 50 cm					
0-5%	5-10%	10-30%	30-75%	75-100%	1
Percent area with dwarf bush formation					
0-5%	5-10%	10-30%	30-75%	75-100%	2
Percent area with tree cover (canopy)					
0%	1-10%	10-25%	25-50%	50-100%	2
Percent area with invasive species					
0%	1-10%	10-25%	25-50%	50-100%	1

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Calculation of Structural Index

1. Vegetation Structure 0.40

1.		Categories			Evaluation	Score	Weight
2.	3.	4.	5.				
Percent area without vegetation cover							
0-5%	5-10%	10-30%	30-75%	75-100%	1	1.00	0.05
Percent area with grass/herb vegetation below 15 cm							
0-5%	5-10%	10-30%	30-75%	75-100%	3	0.40	0.20
Percent area with grass/herb vegetation 15-50 cm							
0-5%	5-10%	10-30%	30-75%	75-100%	4	0.60	0.20
Percent area with grass/herb vegetation 50 cm							
0-5%	5-10%	10-30%	30-75%	75-100%	1	1.00	0.20
Percent area with dwarf bush formation							
0-5%	5-10%	10-30%	30-75%	75-100%	2	0.60	0.05
Percent area with tree cover (canopy)							
0%	1-10%	10-25%	25-50%	50-100%	2	1.00	0.20
Percent area with invasive species							
0%	1-10%	10-25%	25-50%	50-100%	1	1.00	0.10

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Species scores

■ The species are assigned scores from 1 to 7 based on how they react on increased anthropogenic pressures:

-1 = Problem species
 1 = Very tolerant
 3 = Indifferent
 7 = Very susceptible

■ The species are related to Main Habitat types: 21, coastal dunes; 40, heath land; 62, grass land; 64, meadow; 91, forests etc.

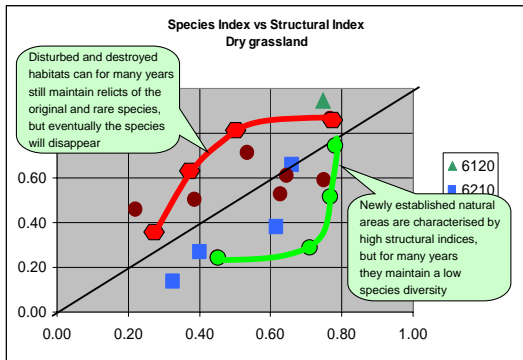
Main Nature type	Score	Danish name	Scientific name
62	-1	Klaver, hvid-	Trifolium repens
62	-1	kliv, almindelig	Elytrigia repens ssp. repens
62	1	hvidegræs, almindelig	Dactylis glomerata
62	1	klaver, rød-	Trifolium pratense
62	2	glæsmad, almindelig	Arabisopsis italiana
62	2	glæspotentil	Argentina anserina
62	3	hvidegræs, storblomstret	Cerastium anserina
62	3	kamgræs, almindelig	Cynosurus cristatus
62	4	enghavsgræs, dune	Helictotrichon pubescens
62	4	fløjtrave	Teesdalia nuticulis
62	5	djævelsbid	Succisa pratensis
62	5	evighedsblomst, gul	Helichrysum arenarium
62	6	kolbvede, opret	Anemone pulsatilla
62	6	kolbvede, blåkloppet	Melampyrum nemorosum
62	7	guldblomme	Arnica montana
62	7	gægeurt, bakke-	Oriochus ustulata

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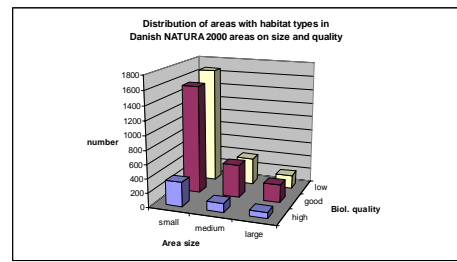
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Ecological inertia



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Mapping results

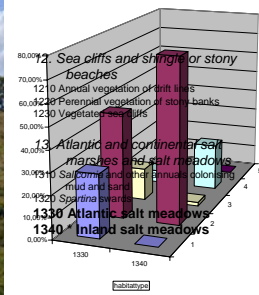


The mapped areas with habitat types in the Danish NATURA 2000 areas are generally small and of good or low quality.

Areas of low biological quality are expected not to fulfill the demands of favourable conservation status

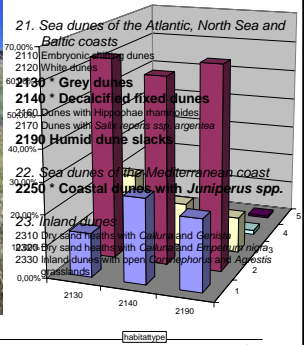
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Salt meadows



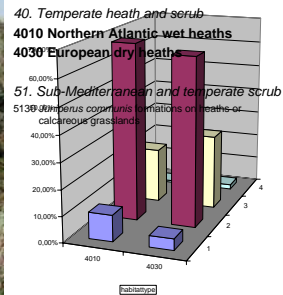
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Coastal sand dunes and inland dunes



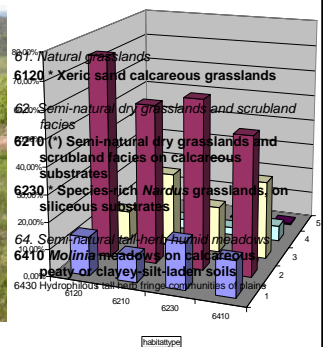
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Temperate heath and scrub



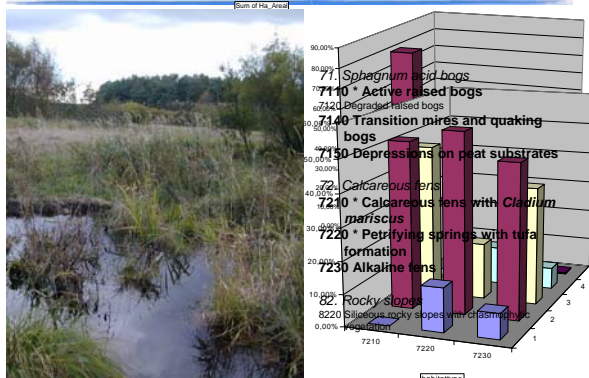
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Natural and semi-natural grassland formations



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Raised bogs and mires and fens

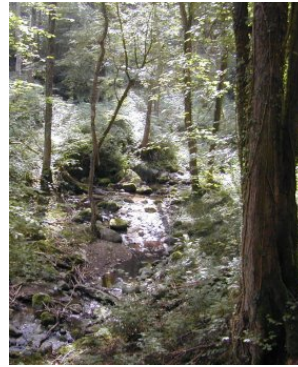


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Forests



91. Forests of temperate Europe
- 9110 Luzulo-Fagetum beech forests
 - 9120 Forests of Boreal Europe
 - 9130 Asperulo-Fagetum beech forests
 - 9150 Medio-European limestone beech forests
 - 9160 Sub-Atlantic and medio-European oak or oak-hornbeam forests
 - 9170 Galio-Carpinetum oak-hornbeam forests
 - 9190 Old acidophilous oak woods with *Quercus robur* on sandy plains
 - 91D0* Bog woodland
 - 91E0* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior*

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Cost calculations

How expensive is it?

Mapping:

1.000.000 Euro's = 16 man years over a 2 years period

254 N2000 areas with a total of 9.500 sites or appr.

16x1400 hours/ 9.500 sites = 2,4 hours/site

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Thank you for your attention



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