



Management of Danish inland wet heathland

Background for the case

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CASE

Observation:

Collapse of *Erica tetralix* ecosystem

Tasks:

Identification of causes

Possibilities for management

Working hypothesis

- Nitrogen deposition causes other species to outcompete *Erica tetralix*
- Expected effect: Competition - Decreased cover of *Erica* and increased cover of Purple moor grass, other graminoids and other species

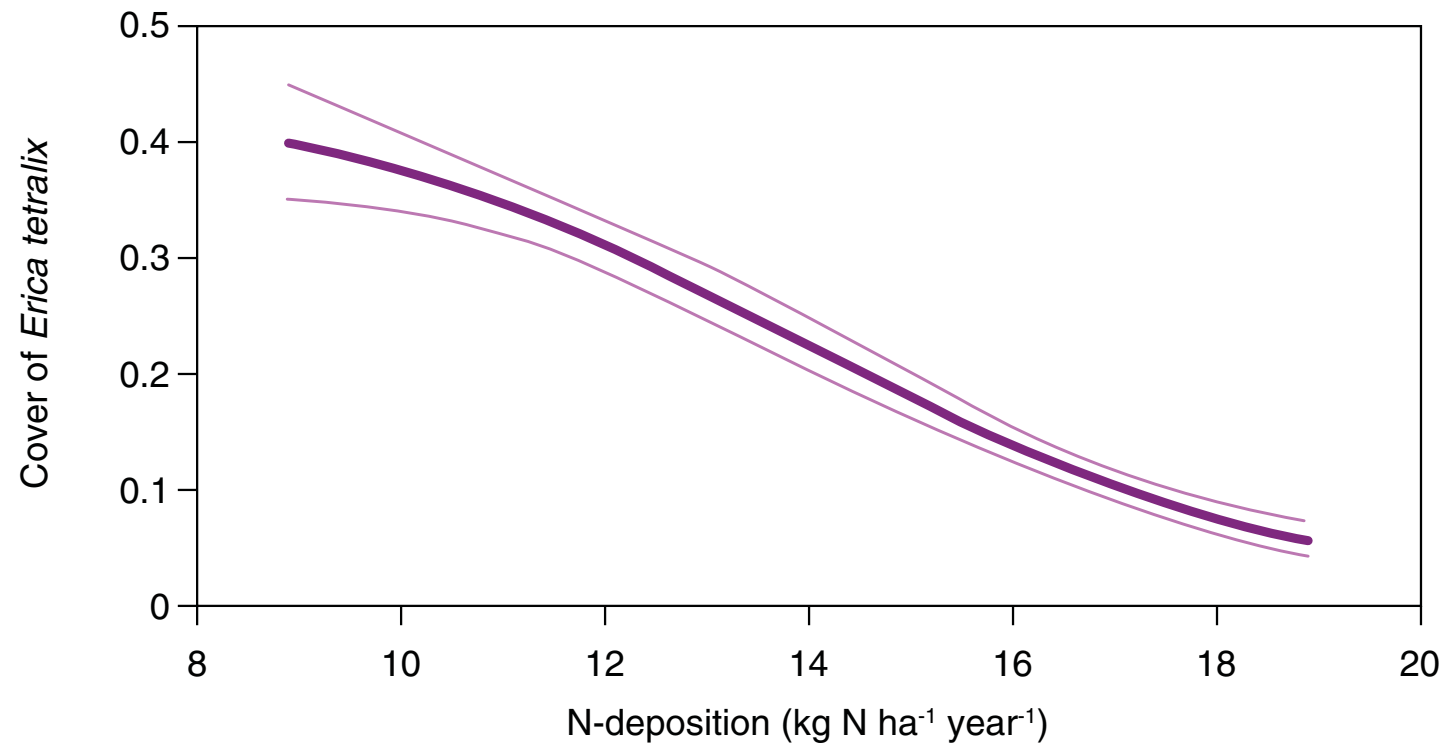
Falsification of hypothesis

- Not practically possible to design an experiment to test the hypothesis
- Data available – Monitoring data, existing studies, new studies
- What kind of evidence could falsify the hypothesis.
 - No relation between nitrogen input and status of *Erica tetralix*
 - No evidence of competition

Fishing in the pool of knowledge

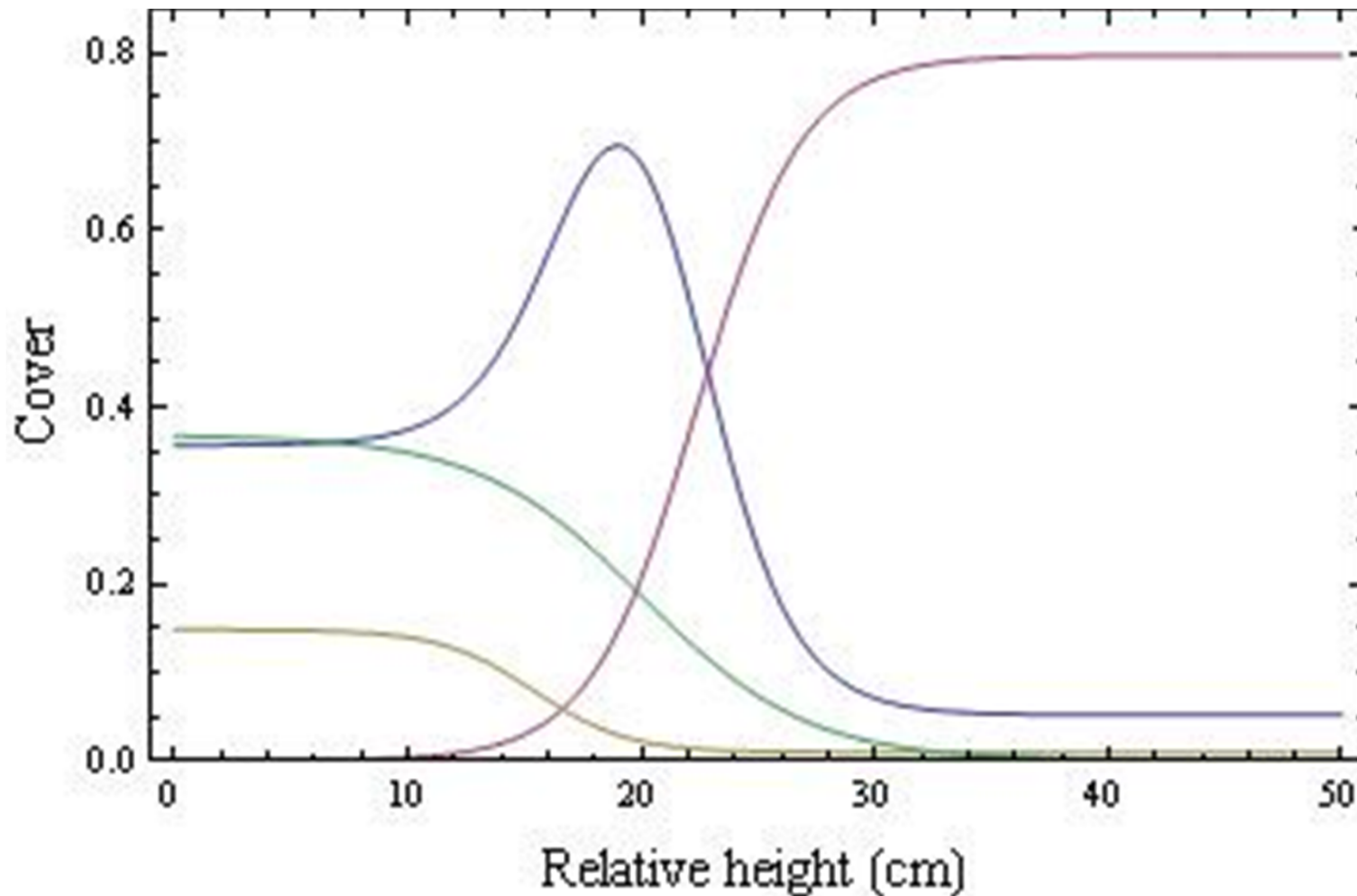


Evidence 1 (Monitoring data)

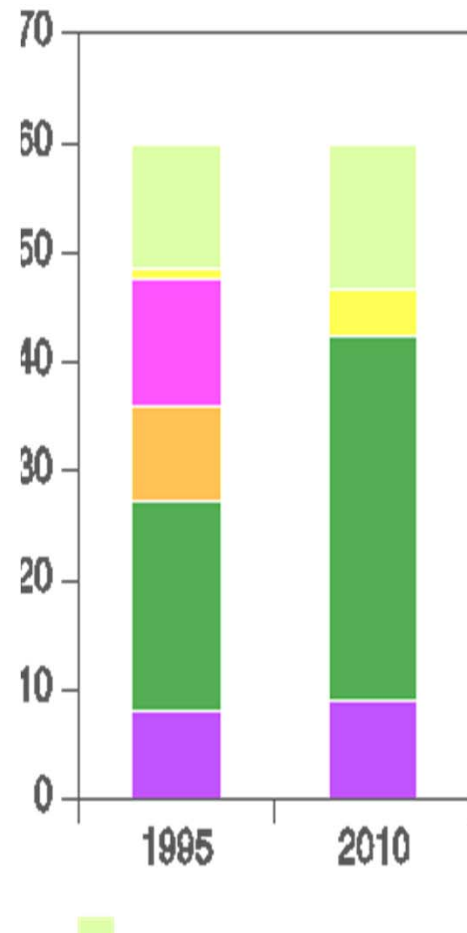


Evidence 2 (Transect study)

Occurrence of *Scirpus caespitosus*, *Molinia*, *Erica*, and *Calluna*



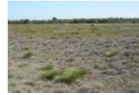
Evidence 3(vegetation change)



Conclusion

- Three clear **evidences** supports that nitrogen is the likely cause of the decline of Erica tetralix and that the decline is a result of nitrogen favouring competing species.
- Recommend that N-deposition from local sources is decreased through measures at local farm level.
- Initiate management that removes nitrogen from the Erica tetralix ecosystem

Thank you



Oouups! What a photo can do!



Erica died from 1999 to
2010

Alternative hypotheses?

Disease?

Drought/draining?

Climate?

Ecosystem function affected?



Need for improved ecosystem understanding and alternative hypotheses

Site inspection

Vegetation analysis

Vegetation chemistry

Soil analysis

Cation deposition

Climate change –

**More wet summers,
milder winters**



Fishing for more evidence



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Evidence 4 (Site inspection)

- Observation of dead Erica with variation in extent between sites
 - Coastal heaths appear healthy
 - Disease and drought appear unlikely

Evidence 5 (Comparisons)

- Calluna, Molinia and Scirpus caespitosus are thriving and Erica dying in the inland wet heathlands.
- In coastal heathlands Erica is healthy and dominant, especially in sheep grazed areas.

Evidence 6 (Vegetation chemistry)

Nitrogen concentration in leaves not increased in Calluna and Erica

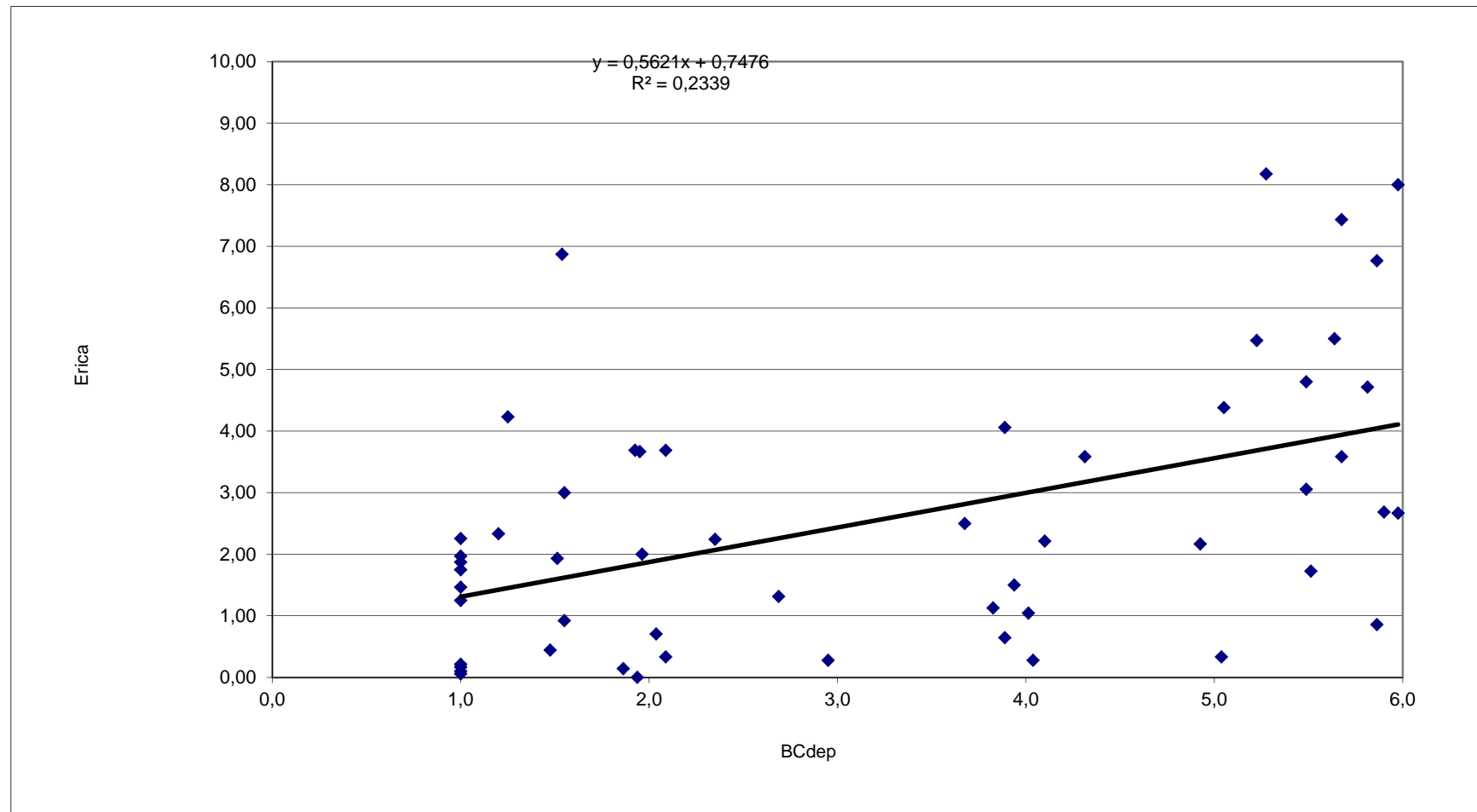


Evidence 7 (Soil chemistry)

- Soil C/N low
- Soil pH low
- Soil C/N between 20 and 25 indicates that the ecosystem is influenced by nitrogen deposition.
- pH-values between 3 and 3.5 indicates that the ecosystem is suffering from acidification



Evidence 8 (Base cation deposition)



Conclusions 1

- Nitrogen plays a role – as co-factor causing unbalanced nutrient dynamics and acidification
- Management to remove excess nitrogen may contribute to acidification
- Sulphurous deposition is still contributing to acidification and depletion of the base-cation buffering system
- Base-cation deposition from the sea maintain the coastal heaths in a healthy condition

Conclusion 2

- The system was more complex than anticipated in the original hypothesis
- We need a new hypothesis that incorporates soil – plant dynamics and soil buffer systems
- Suggestion: There is a need to test alternatives to present intensive short term management methods directed at removing excess nitrogen and halting natural succession.

Thank You for your attention



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