Fen restoration by top soil removal: assessment ecological and economical effectiveness

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Problems in fens

- Drainage and water deficit
- Eutrophication
- Succession

‘Common’ managements often not effective

Top soil removal

Advantage

- Improving water conditions
- Nutrient impoverishment
- Removing non-target plants + seeds

Disadvantage

- Expensive!!!
- Difficult to apply
- Not enough information

Examples of application

Method developed in 80`s-90`s for:

- Wet/fen meadows (D, NL, UK, CH)
- Heathland (NL)
- Costal dune slacks (NL)
- Floodplain grassland (D,NL)

Examples of effects

- First ruderals and weeds
  (Holzel and Otte 2003, Appl.Veg. Sci.)
- Competition limits the target species
  (Ramseier 2000, Bulletin of Geobot. Inst.)
- Establishment of target species within 2-5 (10) years
  (Beltman *et al*. 2001, Ecol. Engeneering; Patzelt *et al.* 2001, Restor. Ecol.; Oomes *et al*. 1996, J. Appl. Ecol.; Van Diggelen *et al.* 1997; Grootjans *et al.* 2002a and 2002b, Hydrobiologia)
- Re-appearance of pioneer and ruderals from seed bank, no target species
  (Grootjans *et al.* 2002b, Hydrobiologia)

Success factors

- Species in local pool!!!

  (Verhagen *et al.* 1995, Appl. Veg. Sci.; Grootjans *et al.* 2002a and 2002b, Hydrobiologia; Klooker *et al.*1999)
- Hay spreading/seedlings planting

  (Holzel and Otte 2003, Appl. Veg. Sci.; Patzelt *et al.* 2001, Restor. Ecol.; Tallowin and Smith 2001, Restor. Ecol.)
- Deep enough

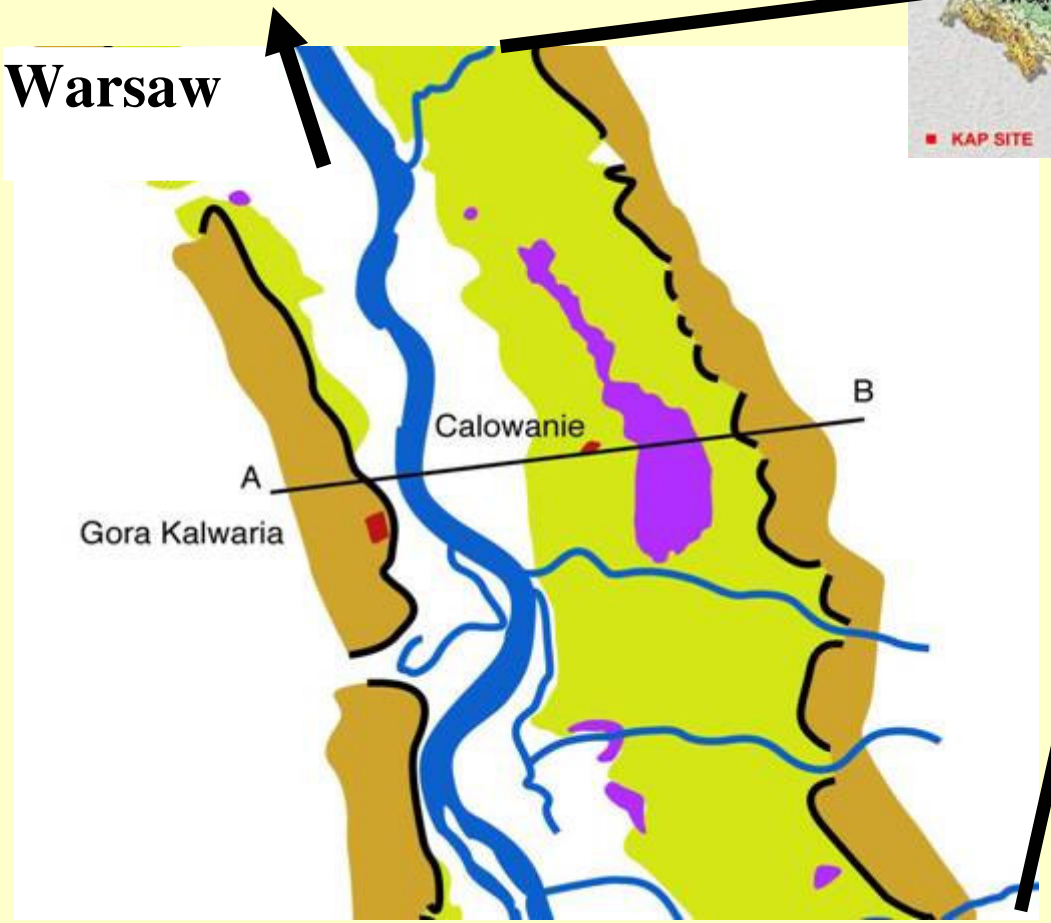
  (Van Diggelen *et al. 1997*)
- Re-wetting & no drainage

  (Grootjans *et al.* 2002b, Hydrobiologia)
- Mowing

  (Holzel and Otte 2003, Appl. Veg. Sci.)

Case study in Poland – Całowanie peatland

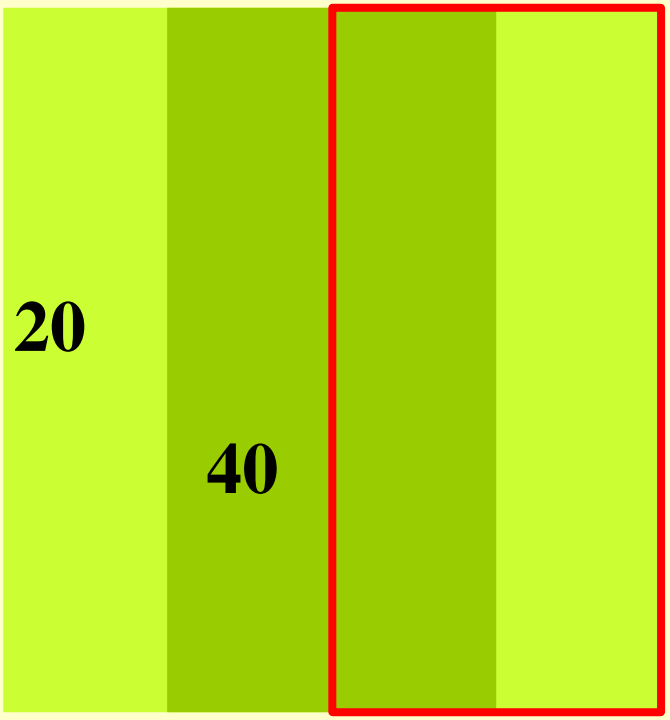
- Location of Całowanie
- Groundwater fed fen

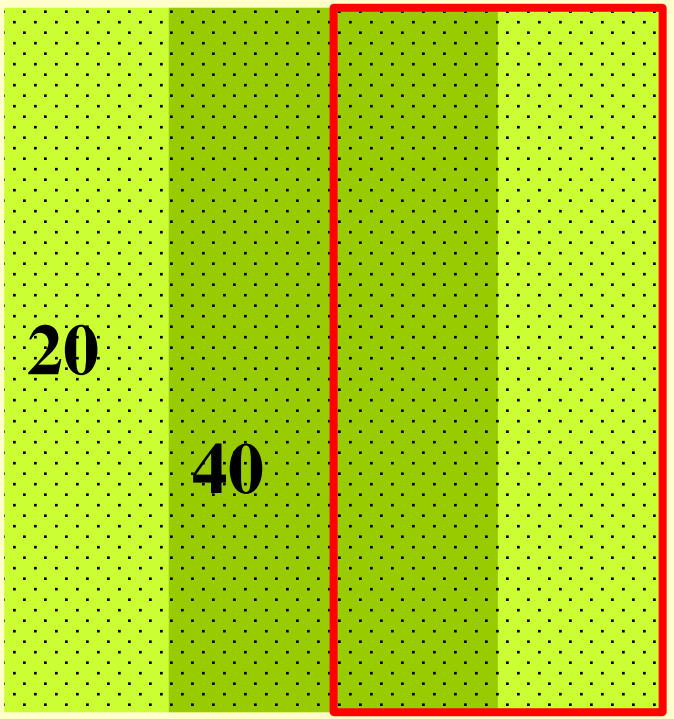


Technical

- 825 m³ soil
- Tractor and trench digger
- 3,5 week

Set-up





- 35x35m
- 20 / 40 cm
- Hay spread 2:1
- Fence
- 15x15m

hay

fence

Effectiveness

Ecological

Monitoring:

- Spring and autum
- Grid (2x2m)
- Cover per species
- Soil seed bank

First results available spring 2005

Effectiveness

Social aspects

Aspects topsoil removal:

- Positive image
- Interactions and contacts with potential clients
- Stimulating local community
  - Improving local situation (decrease of farming, other functions)

Effectiveness

Economical

How to make it economically feasible and sustainable?

- Lowering the costs
- Make it a ‘good business’ for locals
- Create a self-financing tool
  - ✓Utilization of soil → profits

Cost

Costs:

- Soil removal: ~ € 3500
- Transport: ~ € 1000
- Cost of transport is very high!!!

Lowering costs:

- Soil for free (no transport cost)
- Topsoil removal next to existing road

Local interest:

- Alternative for peat digging
- Use in the neighbourhood


Fot. M. Sielezniew

Potential benefits

Selling the soil:

- Commercial soil (sterile) € 28-40/ m³
- Local company (deeper) € 7/ m³

Composting soil and selling:

- Standard composting
- High temperature in containers

Conclusions

Topsoil removal

- Little known about effects for fens
- Expected to be ecologically effective
- Expensive but cost can be reduced

Does it work only in limited scale (Lamers, Smolders, Roelofs, 2002, Hydrobiologia; Ramseier, 2000 Bulletin of Geobot. Inst.) **or is it an appropriate management option?**