The potential biodiversity effects of voluntary peatland conservation in Finland

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Introduction

- Many areas with high conservation effect are located on privately owned land, but protection of private land often leads to conservation conflicts.
- To ease conflicts, voluntary and incentive-based conservation measures have been widely applied.
- Many scientific papers report successful protection through voluntary measures and celebrate their ability to make conservation socially more acceptable.
- However, voluntary measures do not affect only the social aspects of conservation, but also the biodiversity representation, by limiting the options for protection.

Does emphazising landowners' willingness to conserve affect the resulting biodiversity representation and economic costs of a protected area network expansion?

Methods

Three scenarios using ZONATION Conservation planning software

1) *Fully voluntary protection (FVP)*: Landowners can decide whether to protect their mires or not. Zonation was coded to remove all the opposed peatlands from the solution despite their biodiversity representation.
2) *Mostly voluntary protection*: Landowners' willingness to protect is taken into account, but their land can be expropriated, if it contains very high or irreplaceable biodiversity. Zonation was coded to consider landowners' resistance as a continuous variable trying to balance resistance and biodiversity representation.
3) *Biodiversity matters most*: Landowners are not able to influence conservation decisions and their land will be expropriated for conservation. Zonation was coded to maximise biodiversity representation without considering landowners' resistance.

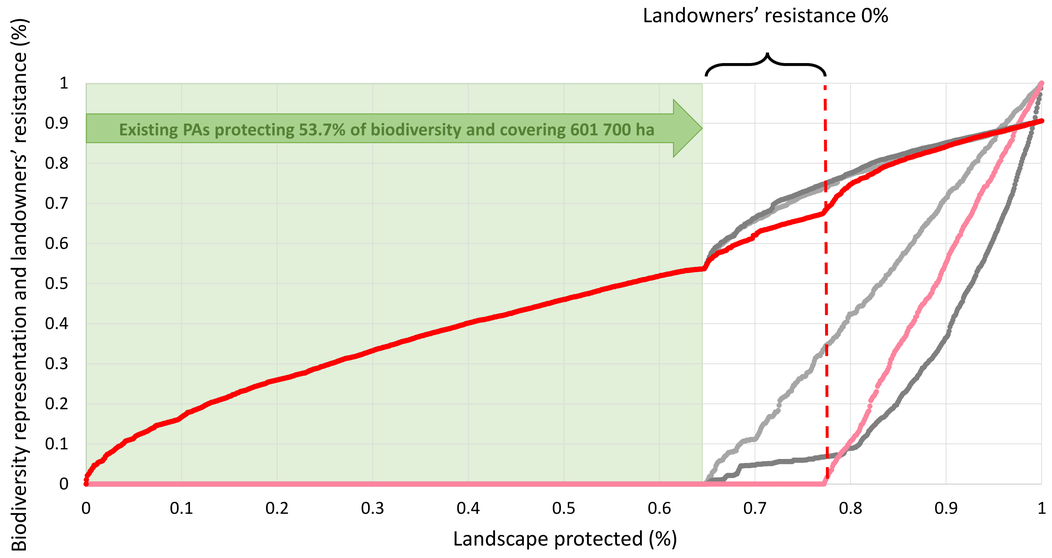
Results

Scenario	Area (ha)				Cost (M€)				Biodiversity (%)				Resistance (%)			
Fully voluntary protection (FVP)	115 400				97.9				67.4				0			
	Area (ha)	Cost (M€)	Biodiversity (%)	Resistance (%)	Area (ha)	**Cost (M€)**	Biodiversity (%)	Resistance (%)	Area (ha)	Cost (M€)	**Biodiversity (%)**	Resistance (%)	Area (ha)	Cost (M€)	Biodiversity (%)	**Resistance (%)**
Mostly voluntary protection	**115 400**	80.8	74.7	6.7	127 900	**97.8**	76.0	7.2	57 000	30.2	**67.6**	5.0	2 100	1.2	55.1	**0**
Biodiversity matters most	**114 700**	55.8	73.7	33.4	178 600	**97.8**	79.9	52.2	62 600	27.8	**67.7**	16.8	0	0	53.7 (PAs)	**0**

Table 1. In the scenario of *Fully voluntary protection* 115 400 hectares (about one third of all candidate mires) were free from landowners' resistance. Cost of this scenario was 97.9 million euros and it protected 67.4% of biodiversity included to the analyses. Other scenarios are fixed one after another to area, cost, biodiversity and resistance of *Fully voluntary protection*.

⇨ **Choosing the scenario *Fully voluntary protection (FVP)* as a starting point according to which area and cost were fixed to see the results of other scenarios.**

Fully voluntary protection (FVP):
Area protected 115 400 ha
Cost for protection 97.9 M€
Total biodiversity protected 67.4%
Landowners' resistance 0%



Colors of graphics:

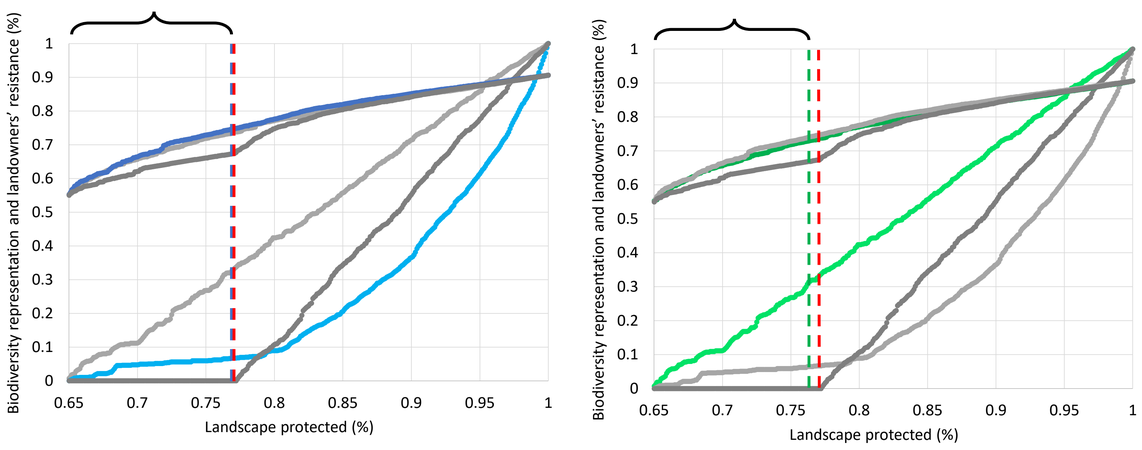
Biodiversity representation:
- Biodiversity matters most
- Mostly voluntary protection
- Fully voluntary protection

Landowners' resistance:
- Biodiversity matters most
- Mostly voluntary protection
- Fully voluntary protection

Area fixed for 115 400 ha, i.e. area from the scenario of *Fully voluntary protection (FVP)*:

Mostly voluntary protection:
Area protected 115 400 ha → same as in FVP
Cost for protection 80.8 M€ → 17% lower than in FVP
Total biodiversity 74.7% → 11% higher than in FVP
Landowners' resistance 6.7% (0% in FVP)

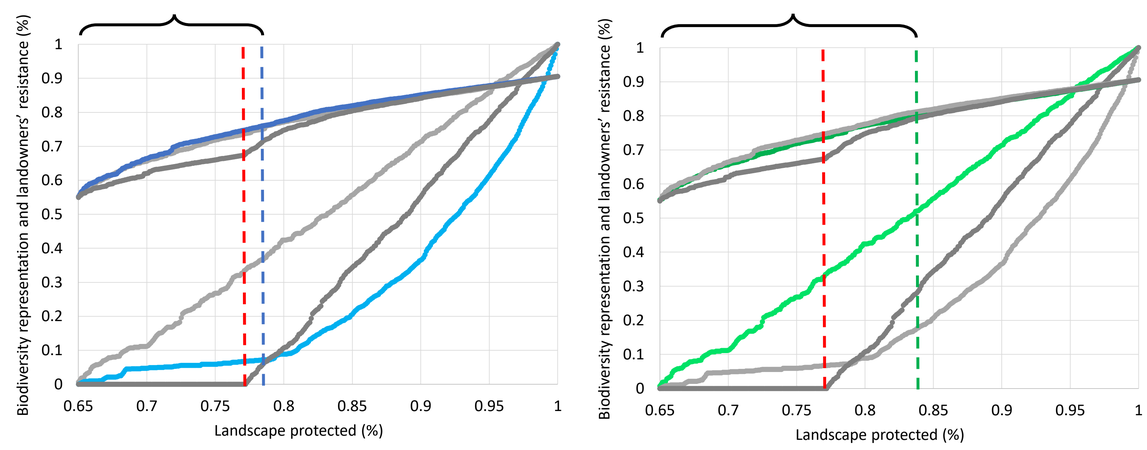
Biodiversity matters most:
Area protected 114 700 ha → 0.6% less than in FVP
Cost for protection 55.8 M€ → 43% lower than in FVP
Total biodiversity 73.7% → 9% higher than in FVP
Landowners' resistance 33.4% (0% in FVP)



Cost fixed for 98 M€, i.e. cost for 115 400 ha in the scenario of *Fully voluntary protection (FVP)*:

Mostly voluntary protection:
Cost for protection 97.9 M€ → same as in FVP
Area protected 127 900 ha → 11% higher than in FVP
Total biodiversity 76.0% → 13% higher than in FVP
Landowners' resistance 7.2% (0% in FVP)

Biodiversity matters most:
Cost for protection 97.9 M€ → same as in FVP
Area protected 178 600 ha → 55% larger than in FVP
Total biodiversity 79.9% → 19% higher than in FVP
Landowners' resistance 52.2% (0% in FVP)



Conclusions

- Enabling landowners categorically to decide about protection is likely to make conservation ineffective for the nature and expensive for the society.
- It is possible to find conservation solutions that are cheaper for the society than fully voluntary protection, decrease landowners' resistance remarkably compared to the situation of not taking resistance into account at all (scenario *Biodiversity matters most*), and are still able to protect fairly large proportion of biodiversity representation.
- If carefully planned and implemented, conservation will not be a zero sum game!