

16.05.2018



LIFE Viva Grass project: Identification of ES bundles and 'hot-spot' & 'cold-spot' analysis

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Flow

Ecosystem service bundles:

- concept;
- identification;
- mapping

Hot spot / Cold spot analysis

- concept;
- assessment;

Application



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Ecosystem service bundles: **concept**

Ecosystem service bundle is spatial coincidence of the delivery of a range of services or sets of ecosystem services that repeatedly appear together across space or time. The ES within these bundles can interact with each other, potentially leading to synergies and trade-offs.



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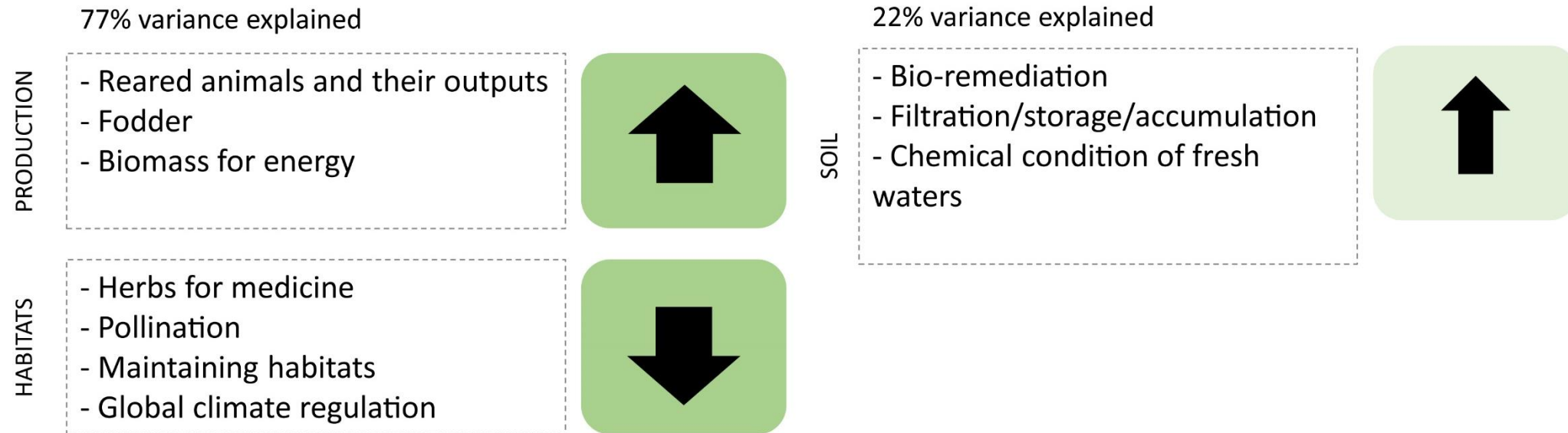
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Pairwise comparisons (PCA)

	Cultivated crops	Rearred animals and their outputs	Fodder	Biomass-based energy sources	Herbs for medicine	Bio-remediation	Filtration/storage/accumulation	Control of (water) erosion rates	Pollination and seed dispersal;	Maintaining habitats	Weathering processes/soil fertility	Chemical condition of freshwaters	Global climate regulation	Recreational	Educational	Cultural heritage	Aestetical					
Cultivated crops																						
Rearred animals and their outputs			A	A	D		A		D	D			D								<i>Drivers:</i>	
Fodder		0,896223		A	D		A			D											soil fertility	A
Biomass-based energy sources		0,896223	1		D		A			D											soil composition	B
Herbs for medicine		-0,83096	-0,54592	-0,54592		D, A			D	D			B, D								slope	C
Bio-remediation		-0,23519	0,059851	0,059851	0,565028		A, D		D			D	B, D								management type	D
Filtration/storage/accumulation		0,654596	0,7959	0,7959	-0,2479	0,559089						C										
Control of (water) erosion rates		-0,32588	-0,32418	-0,32418	0,240852	-0,0845	-0,37726														underlying drivers for synergy	
Pollination and seed dispersal;		-0,69687	-0,43398	-0,43398	0,897594	0,753913	-0,0003	0,194672		D			B, D								underlying drivers of trade-offs	
Maintaining habitats		-0,86201	-0,67098	-0,67098	0,967978	0,474383	-0,34012	0,267775	0,87193				B, D									
Weathering processes/soil fertility		0,196544	0,238971	0,238971	-0,0887	-0,18152	-0,01815	0,229834	0,0004	-0,12169		C, B										
Chemical condition of freshwaters		0,20472	0,371077	0,371077	0,143303	0,53671	0,55633	0,103705	0,422247	0,090335	0,637131											
Global climate regulation		-0,55258	-0,24663	-0,24663	0,814264	0,87023	0,238332	-0,03726	0,881845	0,74724	-0,36478	0,234585										
Recreational																						
Educational																						
Cultural heritage																						
Aestetical																						
<i>correlation analysis:</i>																						
≥0,5 synergy																						
<-0,5 trade-off																						

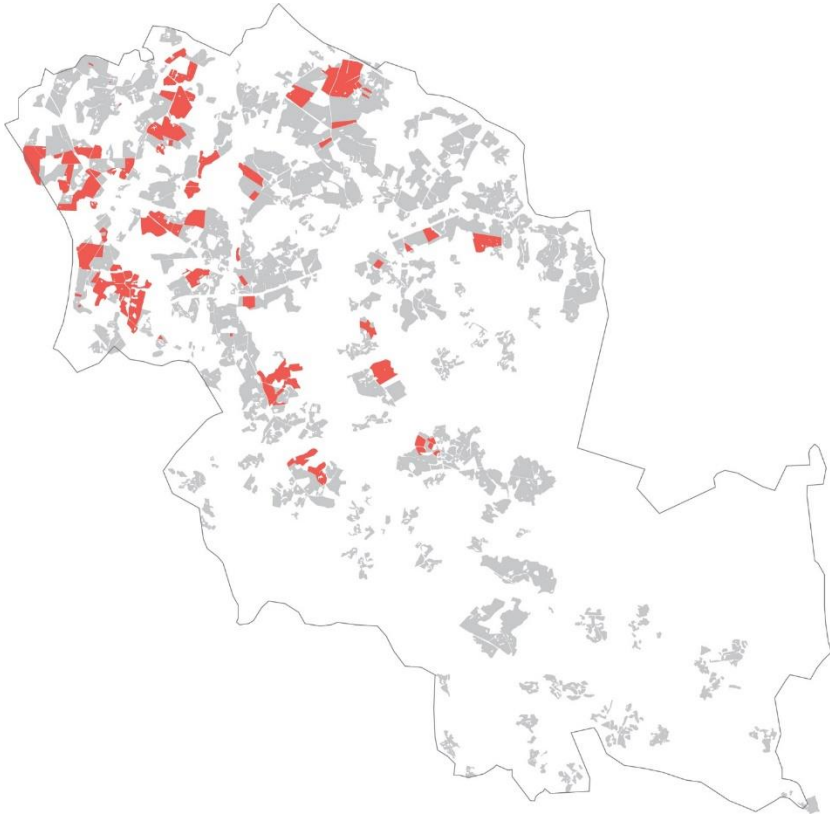


Principal Components Analysis (PCA)

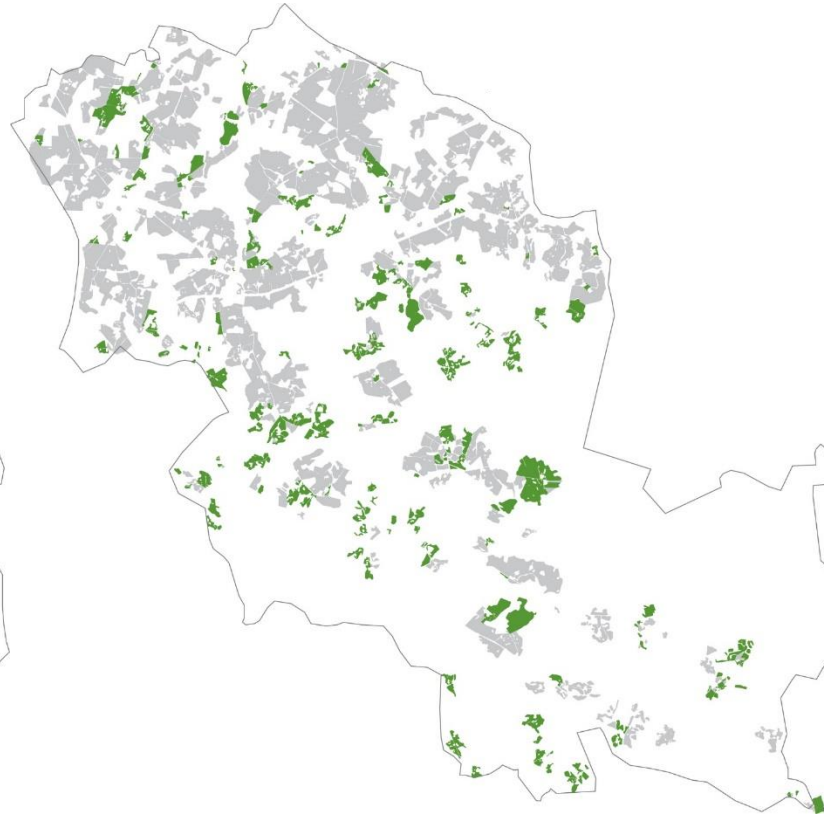


Ecosystem service bundles: **identification**

Production bundle



Habitats bundle



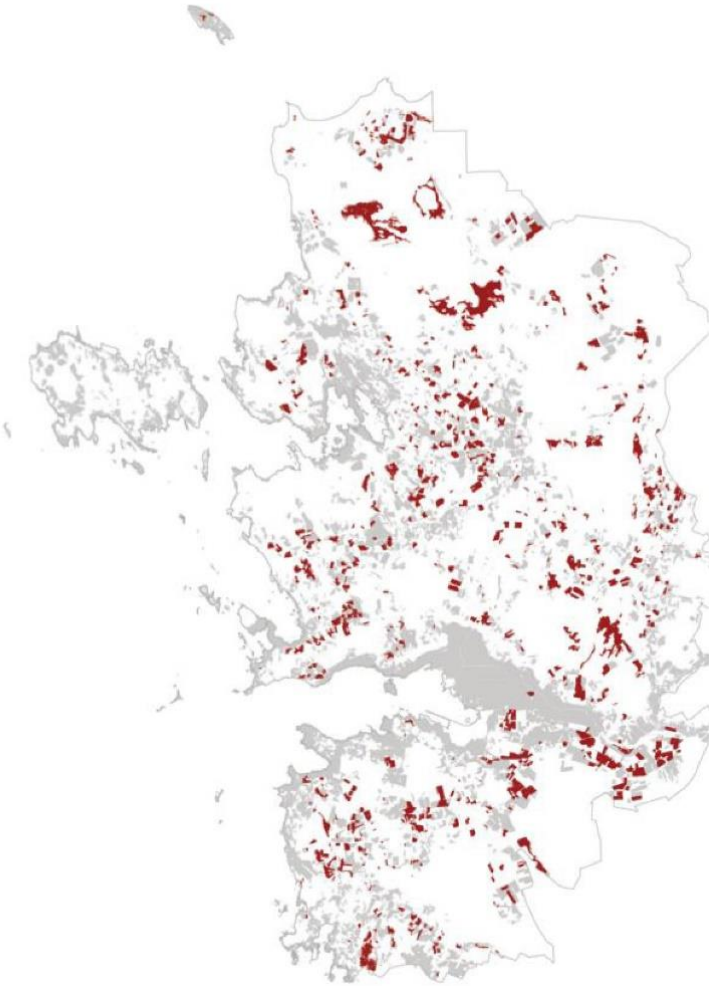
Soil bundle



Ecosystem service bundles: **identification**

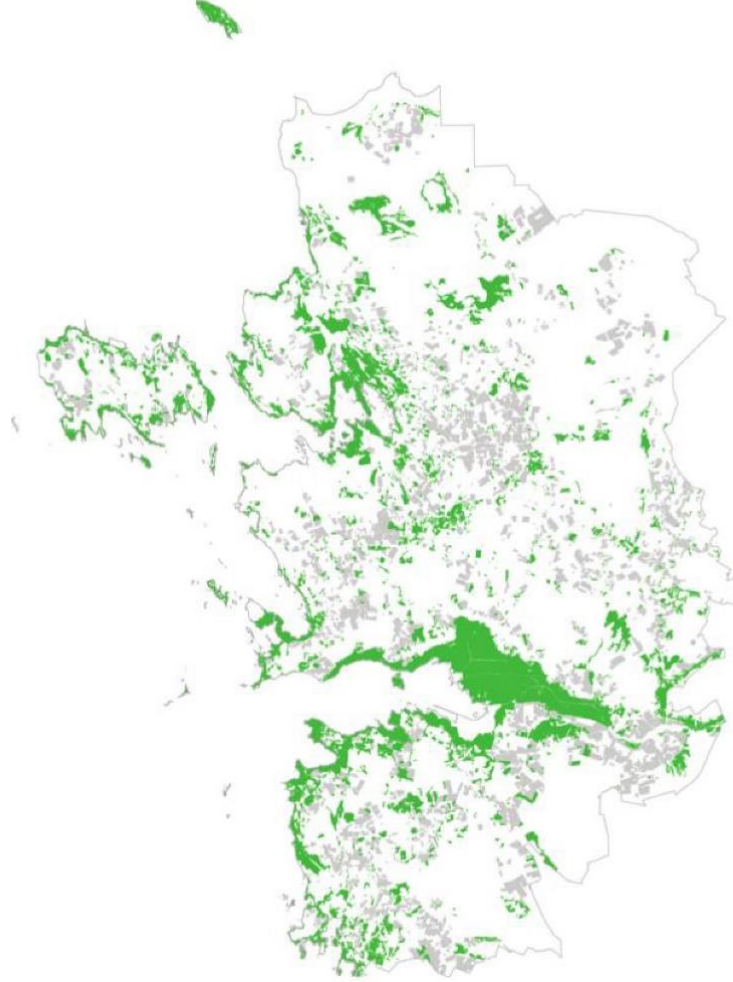
Bundle 1 - Production

- grasslands in the bundle
- grasslands outside the bundle



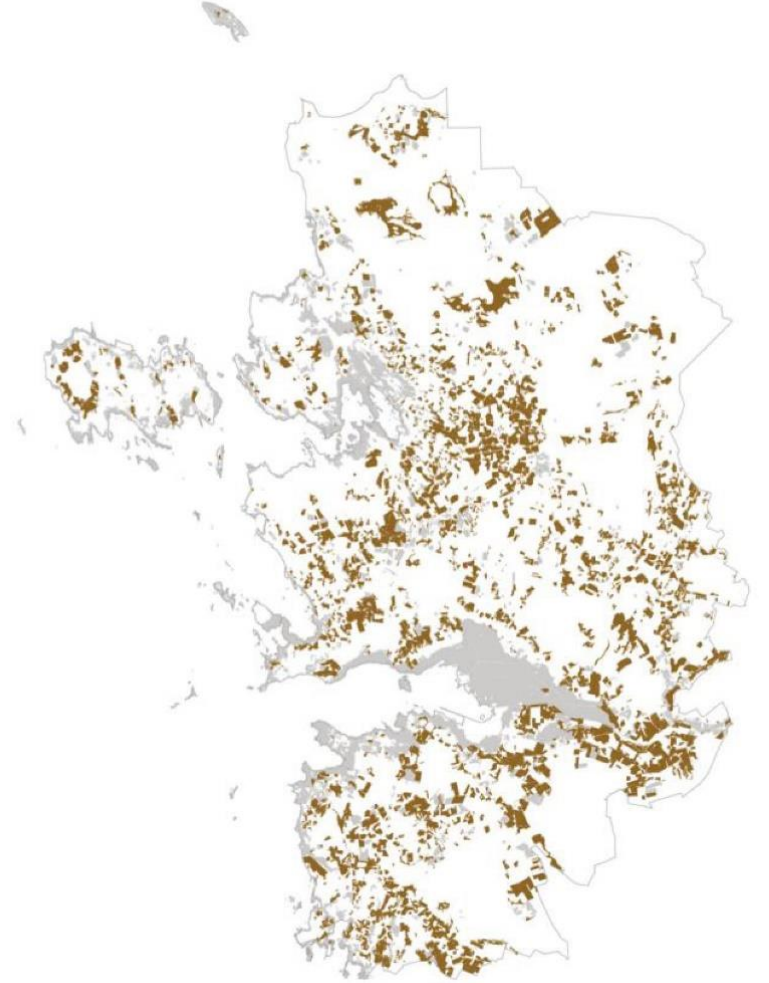
Bundle 2 - Habitats

- grasslands in the bundle
- grasslands outside the bundle



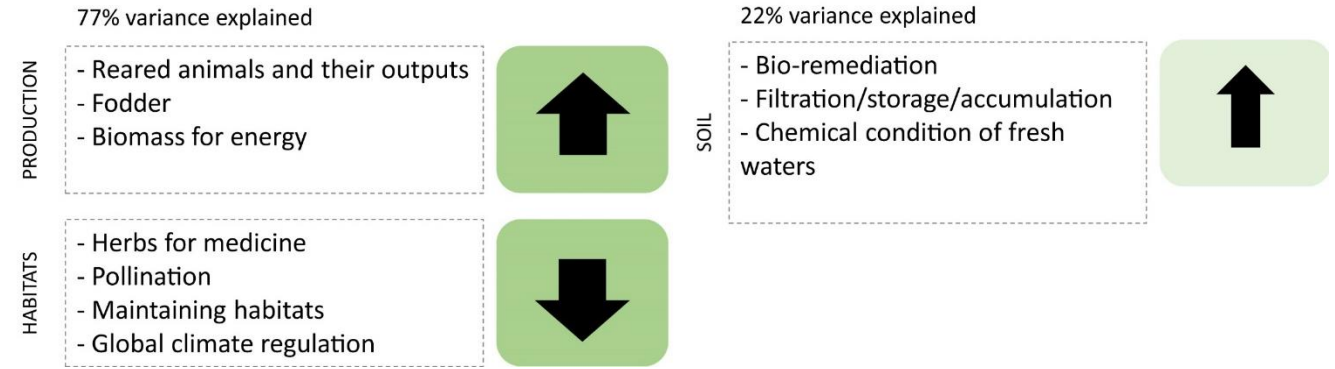
Bundle 3 - Soil

- grasslands in the bundle
- grasslands outside the bundle



Ecosystem service bundles: **tradeoffs and synergies**

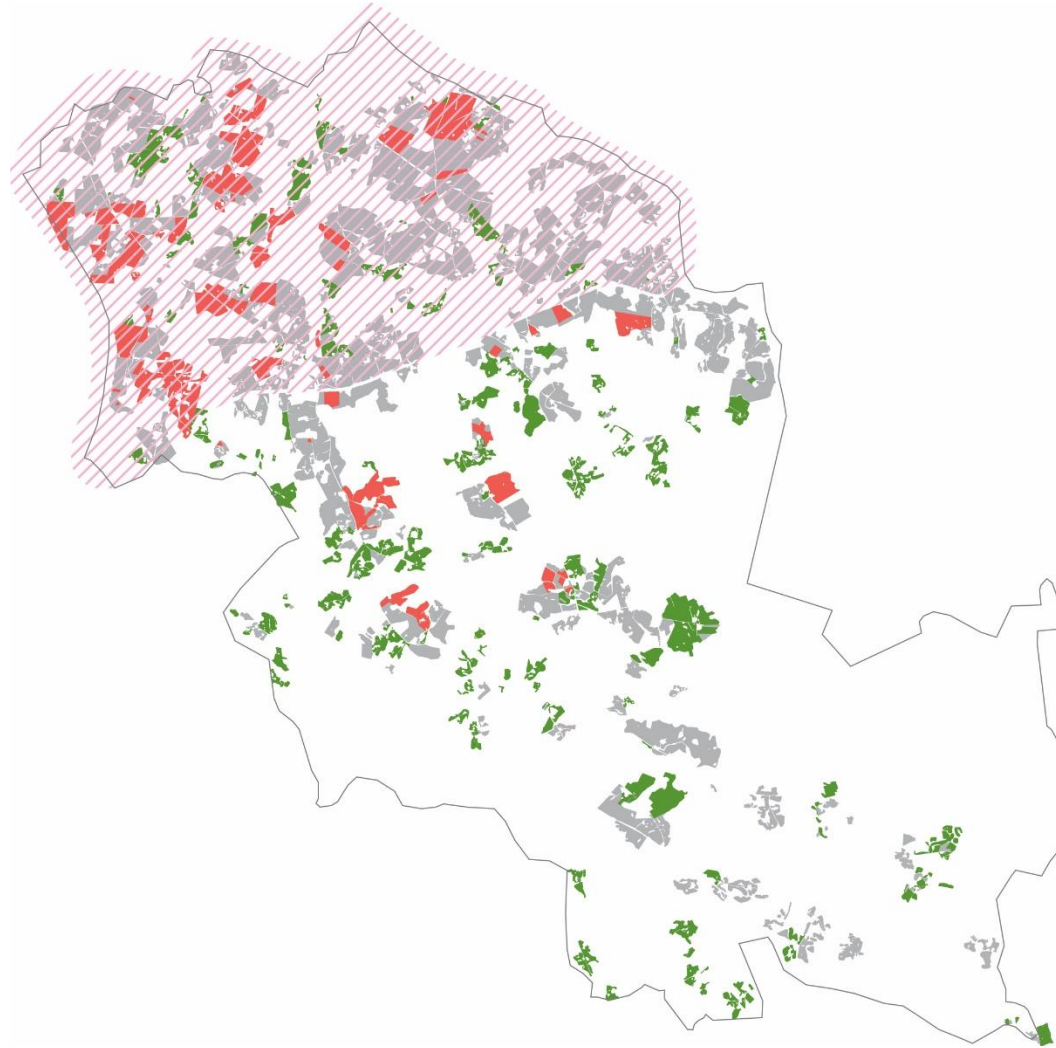
The ES within these bundles can interact with each other, potentially leading to **synergies** and **trade-offs**



A **synergy** is ‘a situation where the use of one ES directly increases the benefits supplied by another service’. A **trade-off** is ‘a situation where the use of one ES directly decreases the benefits supplied by another. ES synergies and trade-offs are causally linked – they respond to the same driver or functionally interact.



Ecosystem service bundles: **mapping**



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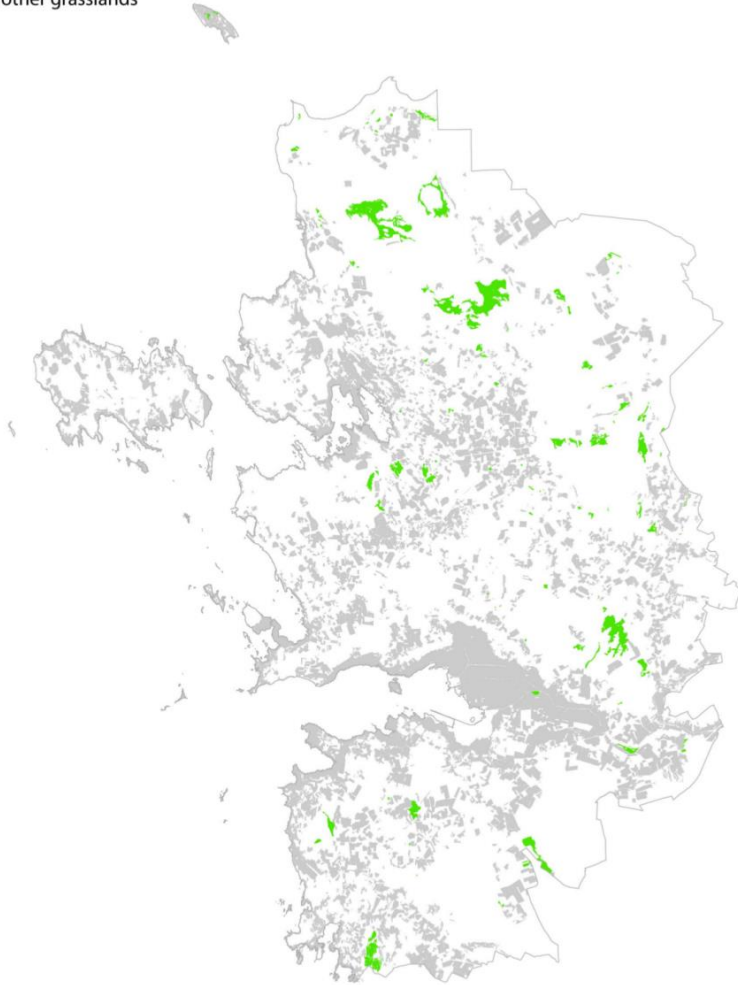
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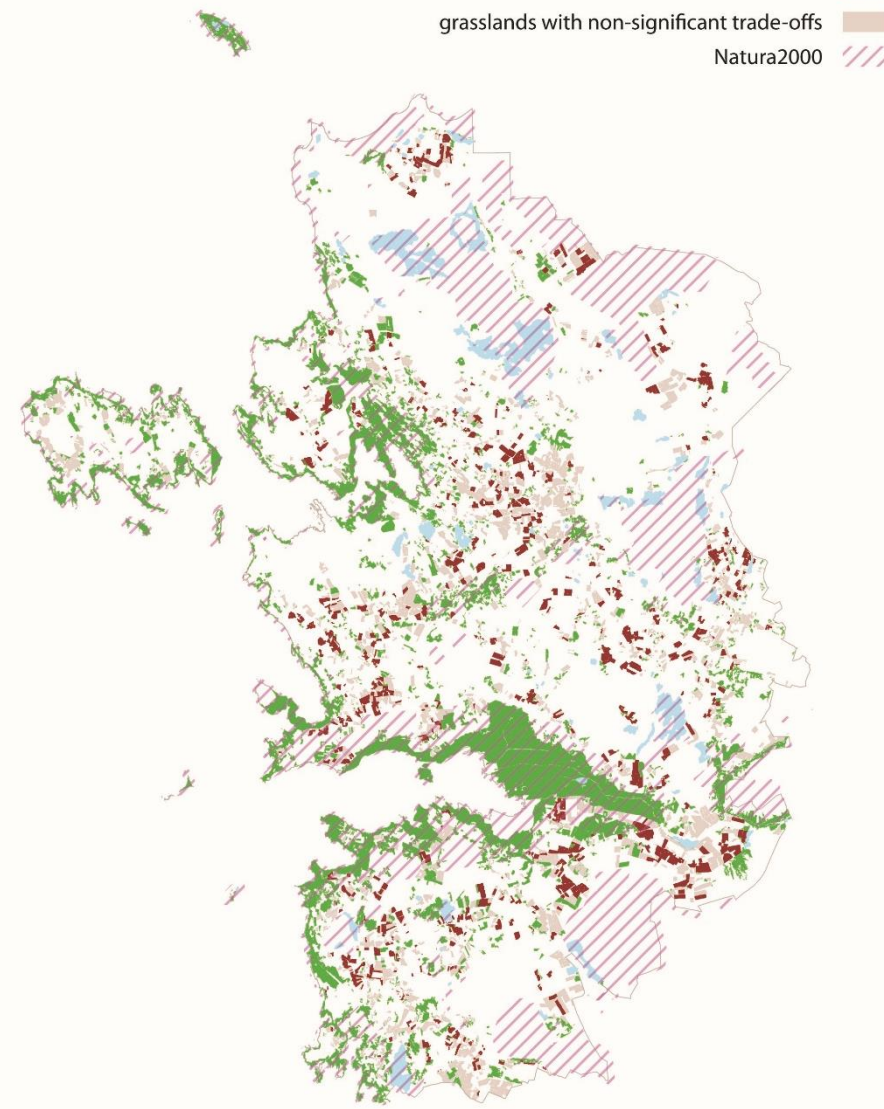
Ecosystem service bundles: mapping

Bundle overlap

- grasslands in all three bundle
- other grasslands



- grasslands with strong synergies
- grasslands with trade-offs in benefit of "habitat" bundle
- grasslands with trade-offs in benefit of "production" bundle
- grasslands with non-significant trade-offs
- Natura2000



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Ecosystem service ‘hotspot’ – territories delivering great number of ES at high value.

Ecosystem service ‘coldspot’ – territories delivering great number of ES at low value.

ES ‘hotspot’ – indicates progress towards greater multifunctionality and sustainability;

ES ‘coldspot’ – indicates inclining towards monofunctionality ecosystem vulnerability



Coldspot/Hotspot: assessment

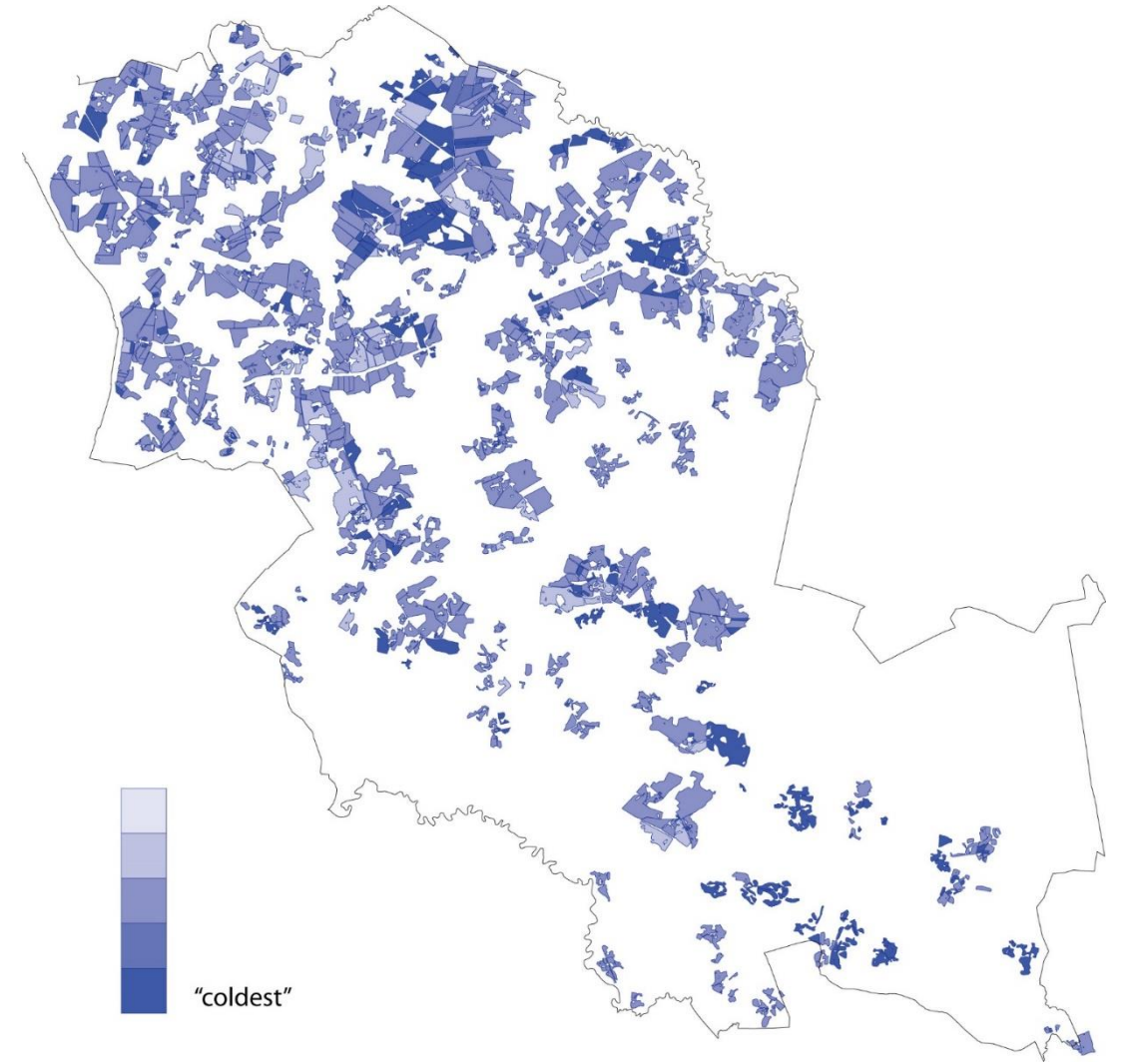
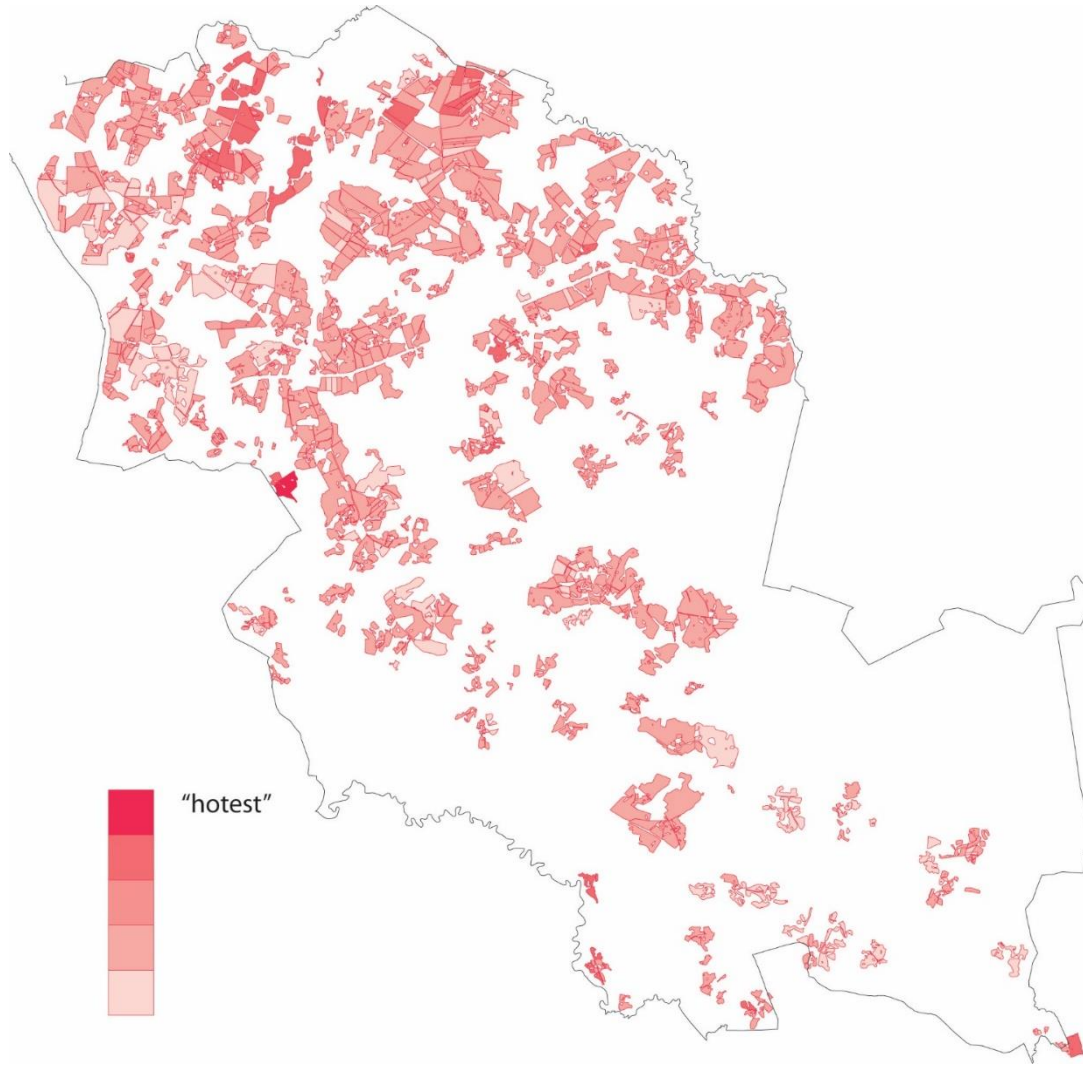


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Coldspot/Hotspot: assessment



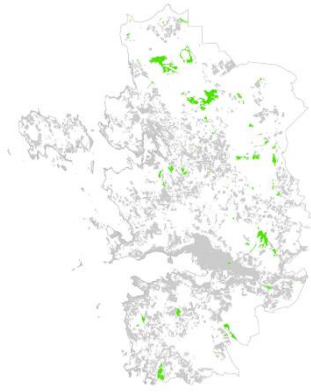
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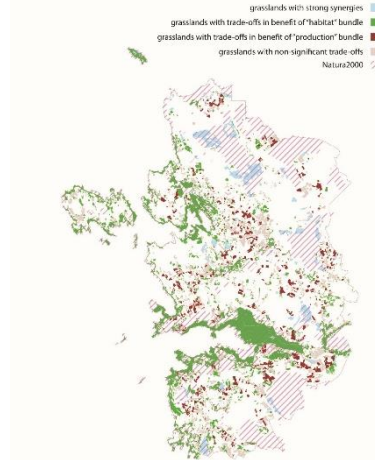
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Derivations

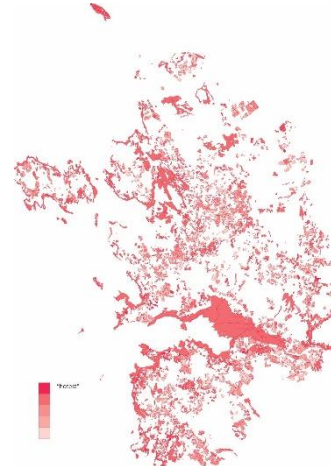
Bundle overlap
 ■ grasslands in all three bundle
 ■ other grasslands



grasslands with strong synergies
 grasslands with trade-offs in benefit of 'habitat' bundle
 grasslands with trade-offs in benefit of 'production' bundle
 grasslands with non significant trade-offs
 Natura2000



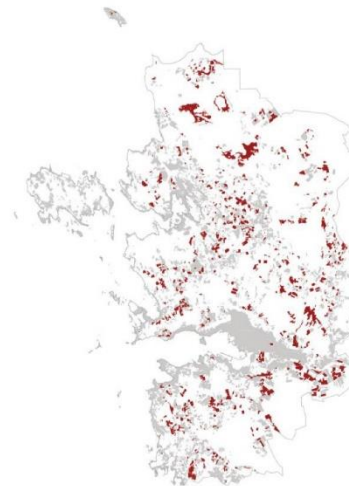
“worse”
 ■



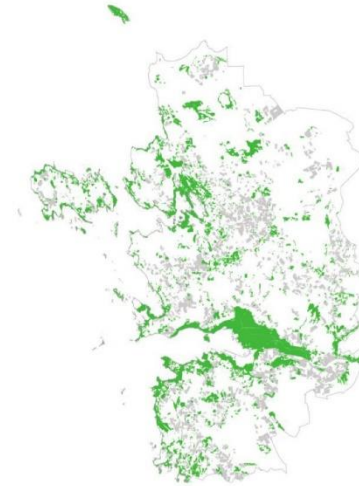
“better”
 ■



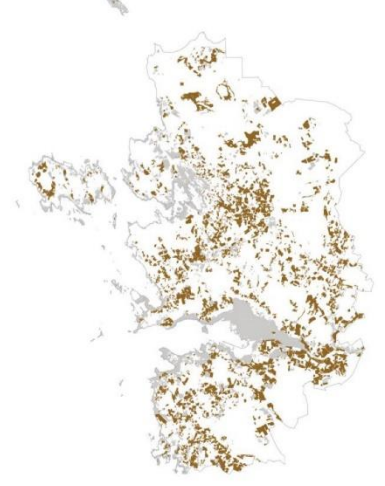
Bundle 1 - Production
 ■ grasslands in the bundle
 ■ grasslands outside the bundle



Bundle 2 - Habitats
 ■ grasslands in the bundle
 ■ grasslands outside the bundle



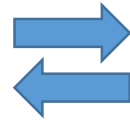
Bundle 3 - Soil
 ■ grasslands in the bundle
 ■ grasslands outside the bundle



Derivations

Tradeoff in benefit of 'production':

- agrienvironmental measures
- land use change
- change of intensity of agriculture



'Coldspot' eradication:

- agrienvironmental measures
- land use change
- change of intensity of agriculture

Tradeoff in benefit of 'habitats':

- enhancing land use multifunctionality
- adding cultural ES
- enhancing high added value production





Thank You for Your attention!

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