Willingness to Pay for Enhanced Habitat Conditions in Europe

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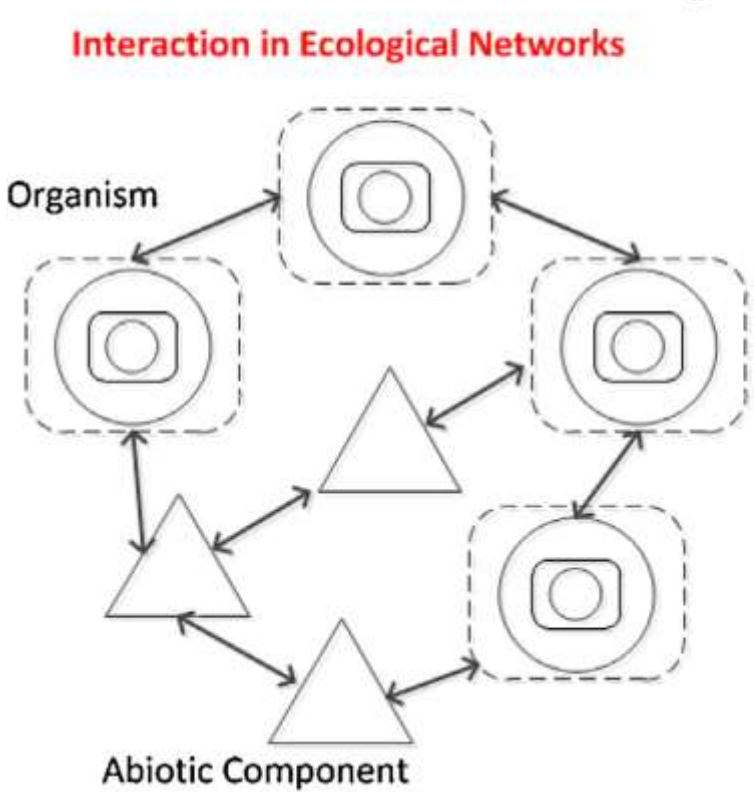
Economic Valuation of Biodiversity Wealth and Debt in National Accounting

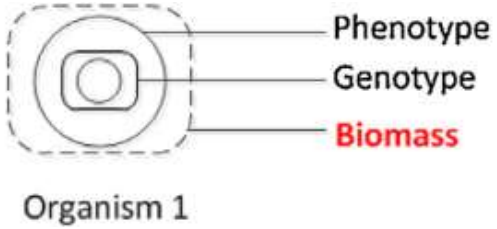
International online workshop, 20/21 November 2023

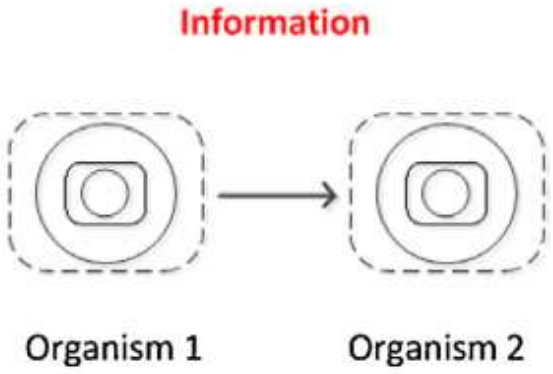
Outline

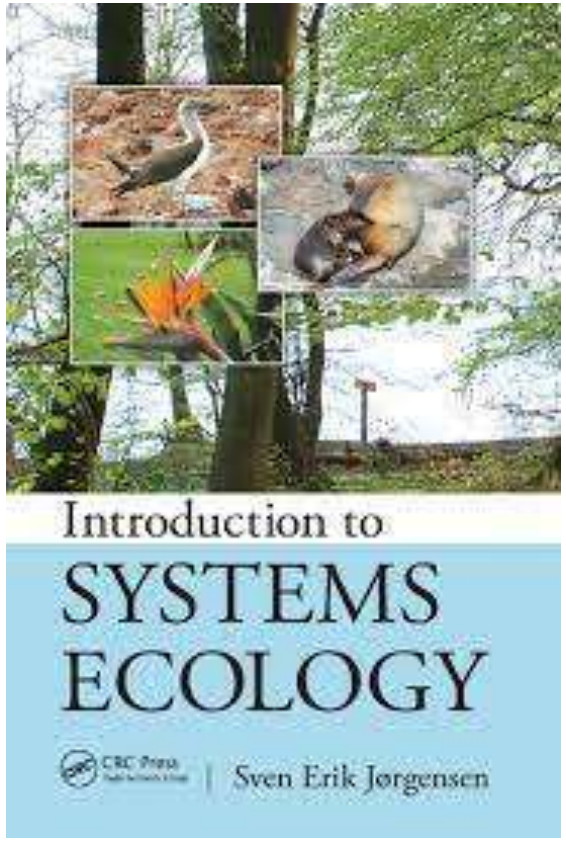
- Which kind of service is «habitat and species maintenance»?
- How to value «habitat and species maintenance»?
- How to account for «habitat and species maintenance»?

What service are we talking about?

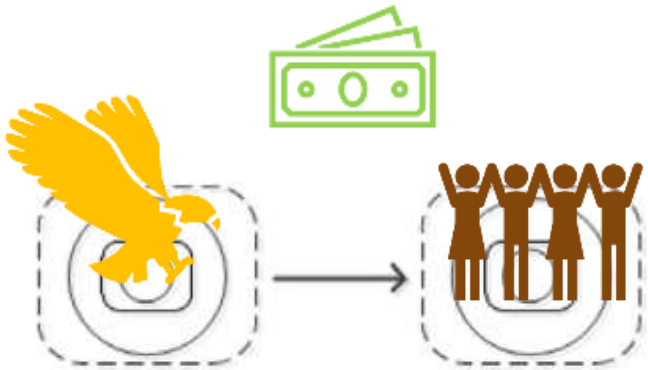






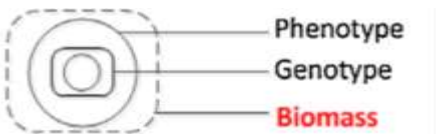


A “cultural” ecosystem service

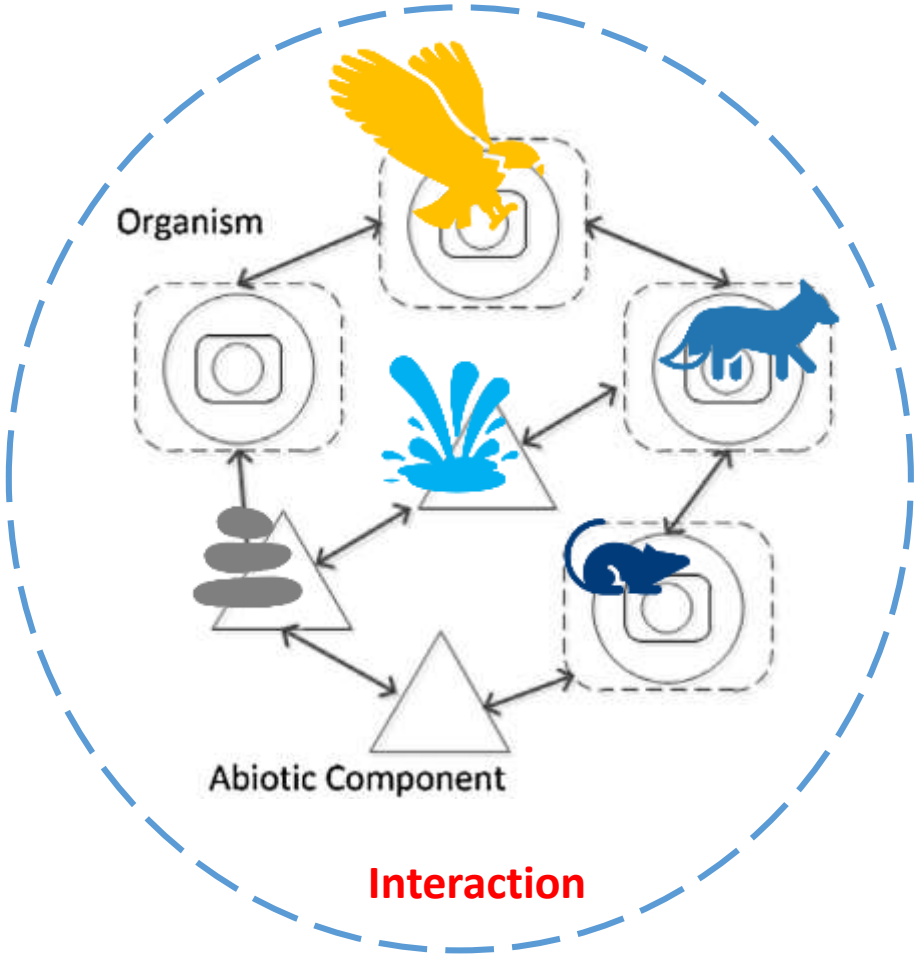


Information

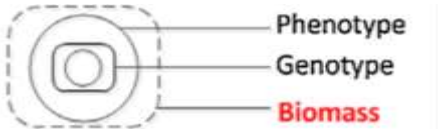
Symbol



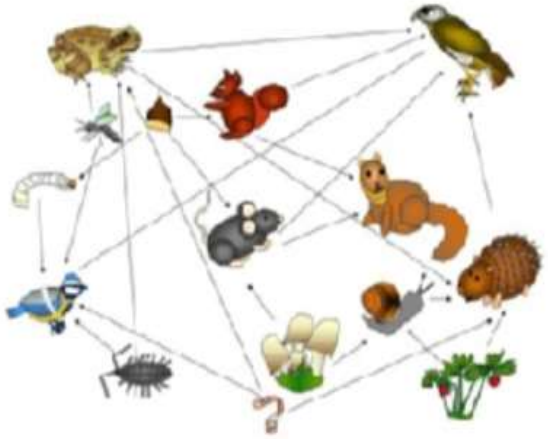
A “regulating and maintenance” ecosystem service

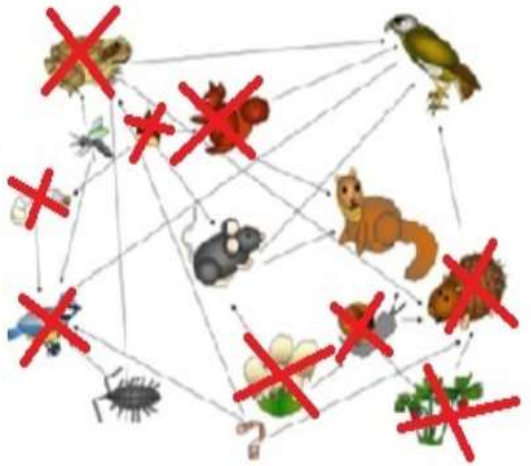


Symbol

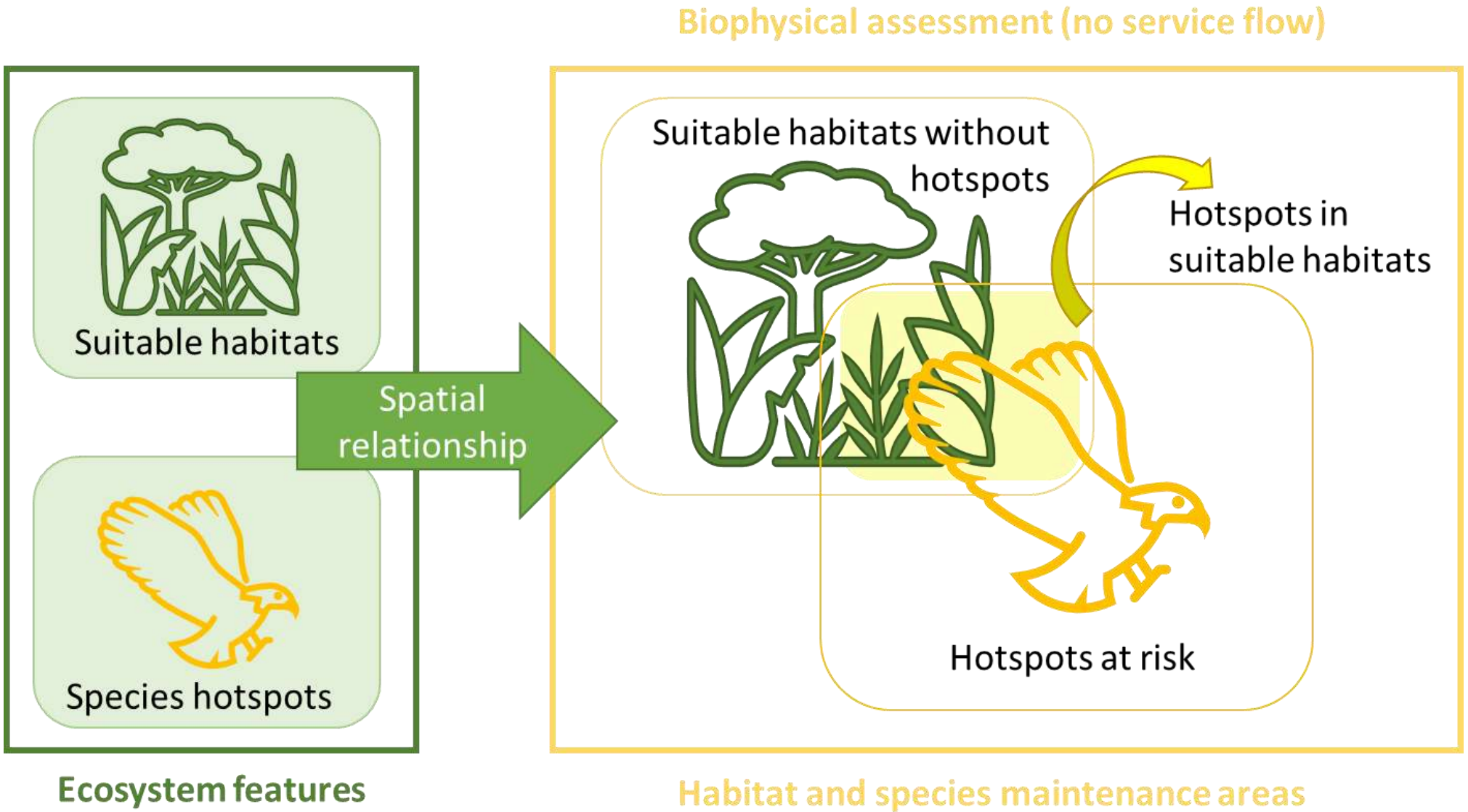


Are people willing to pay? Yes/No
if Yes….for what?

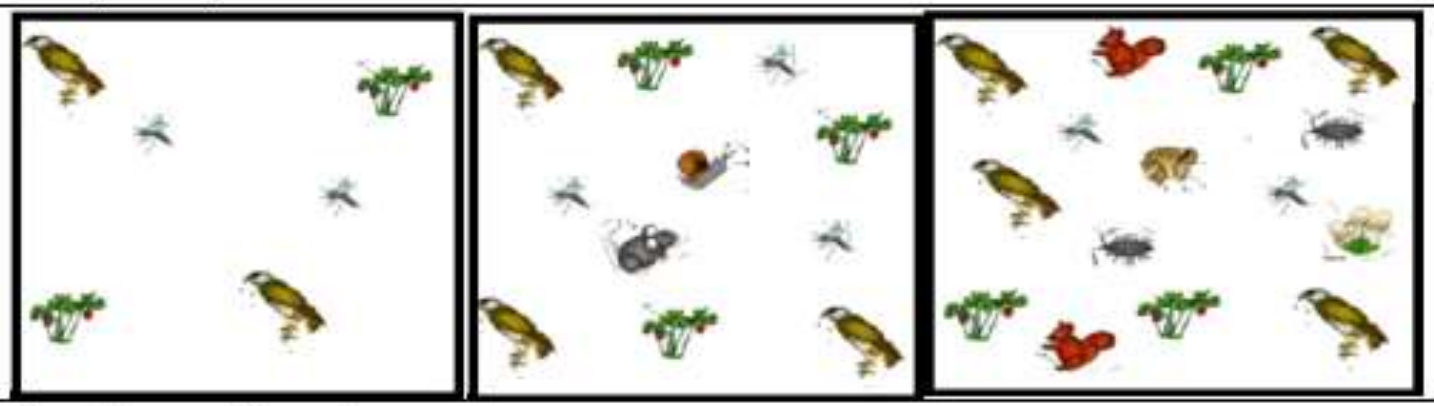




Keep the link with the biophysical model



How to translate biodiversity in what people can concretely understand?
Focus groups to determine the attributes of Choice Experiment

Land use levels	
Chemicals reduction	25%, 50%, 75% 100%
Biodiversity	
Size	Small, medium, large
Price	25,50,75,150,200, 300

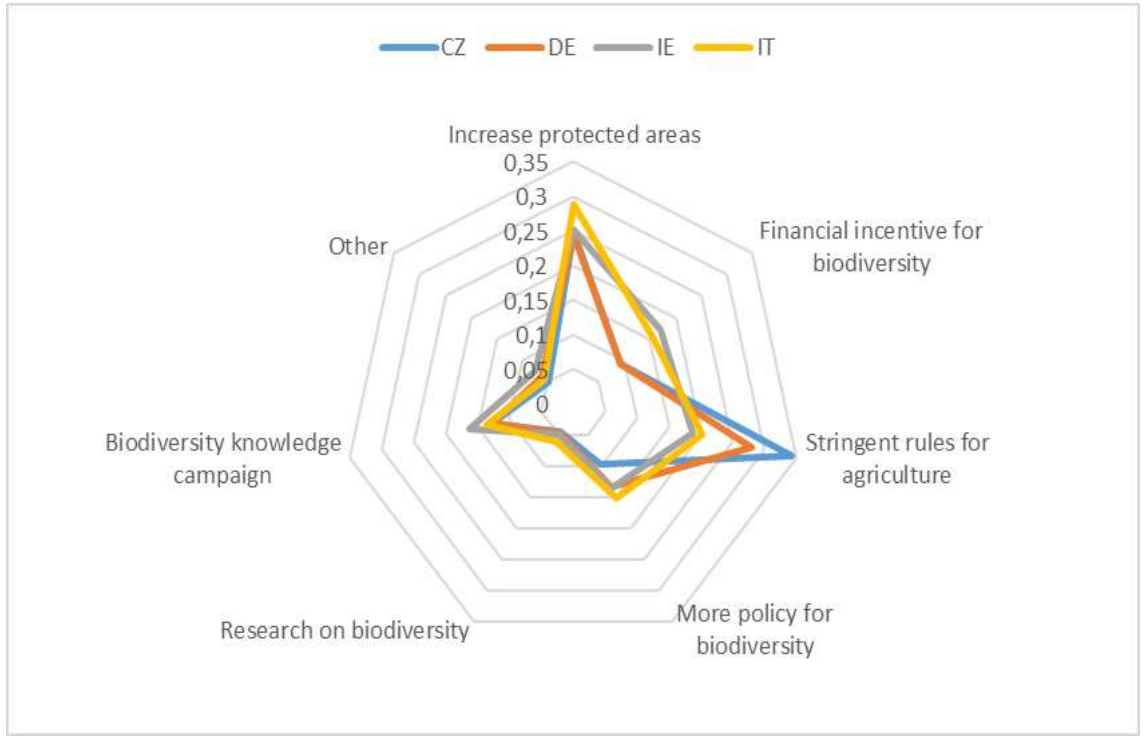
Choice Card (example)

	Option A	Option B	No change
Land use			
Chemicals	Reduced by 50%	Reduced by 50%	
Impact on biodiversity	 Large improvement	 Medium improvement	
Size	 Large (100 hectare as 150 football pitches)	Small (14 hectare as 20 football pitches)	
Costs (annual tax)	€300	€25	
Which would you choose?	○	○	○

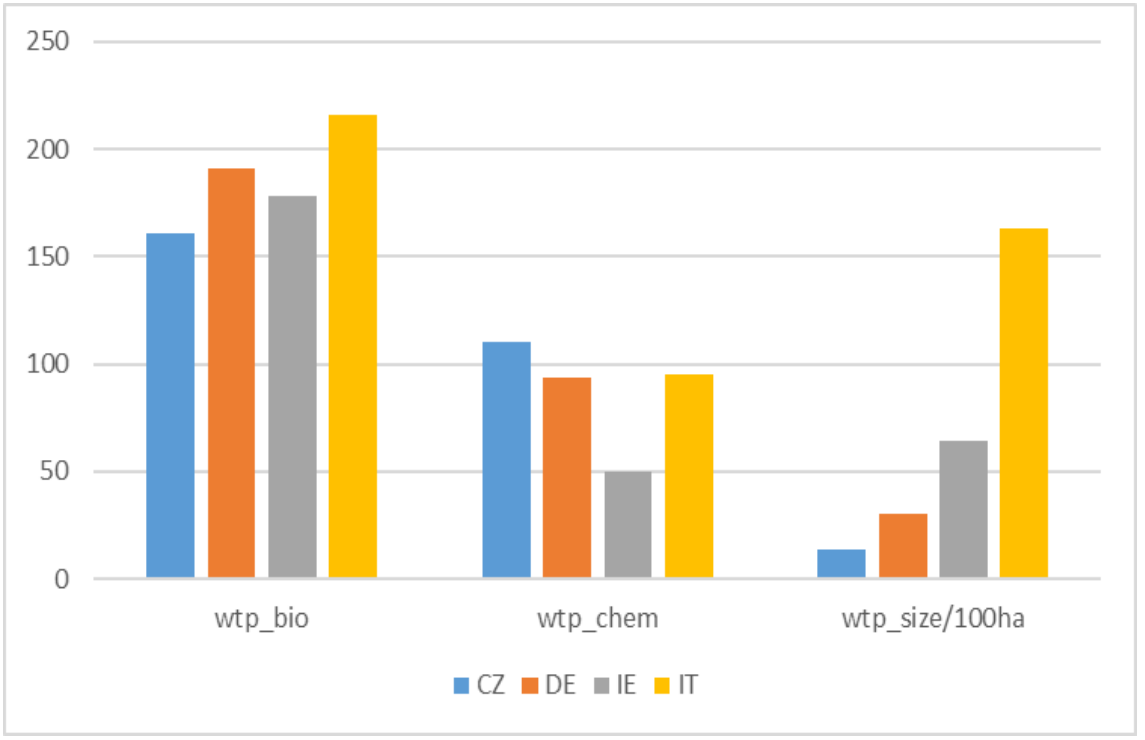
Outcomes of the survey…

…and of the Choice Experiment

Respondents' preferences on policy in support of the maintenance of habitat and species



WTPs for high species diversity, low chemicals and per hectare land use maintenance



From the Choice Experiment to the estimates needed for accounting

$$U_{njr} = f(x_{njrk}, \beta_n) + \varepsilon_{njr}$$

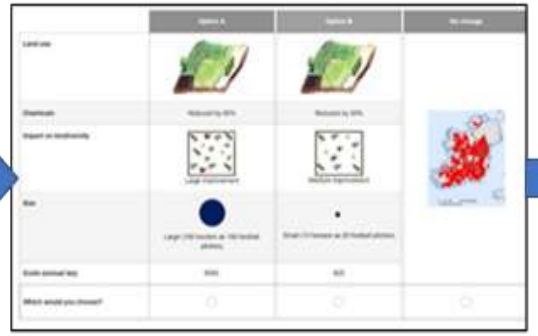
where

x_{njrk} is a vector of **k attributes** describing the **option j**

β is a vector of parameters to be estimated

ε_{njr} is a residual unobserved component

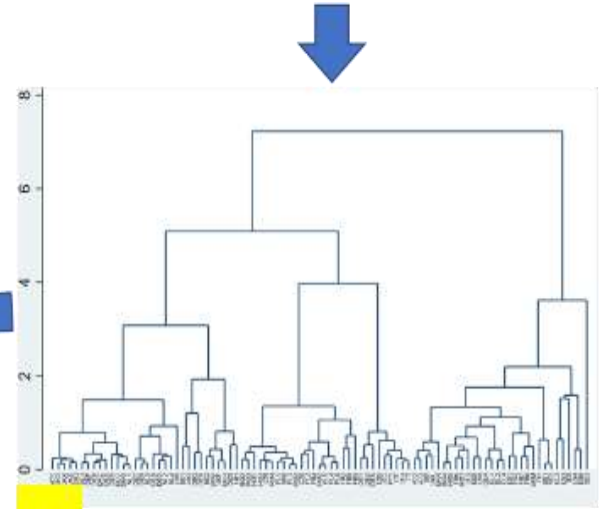
1 Model underpinning the structure of the Choice Cards



2 Survey to collect respondents' preferences through Choice Cards

	25 %	50 %	75 %	mean	std dev
Shannon	0.35	0.41	0.46	0.41	0.1
Share of natural area	29.5	47.97	65.59	48.1	23.31
Share natural area in surrdng areas	37.3	47.88	61.7	49.46	18.05
Average Nitrate	26.73	45.8	73.17	53.11	36.16
% cropland	0.21	0.38	0.55	0.38	0.22

3 Estimation refinement based on land use characteristics

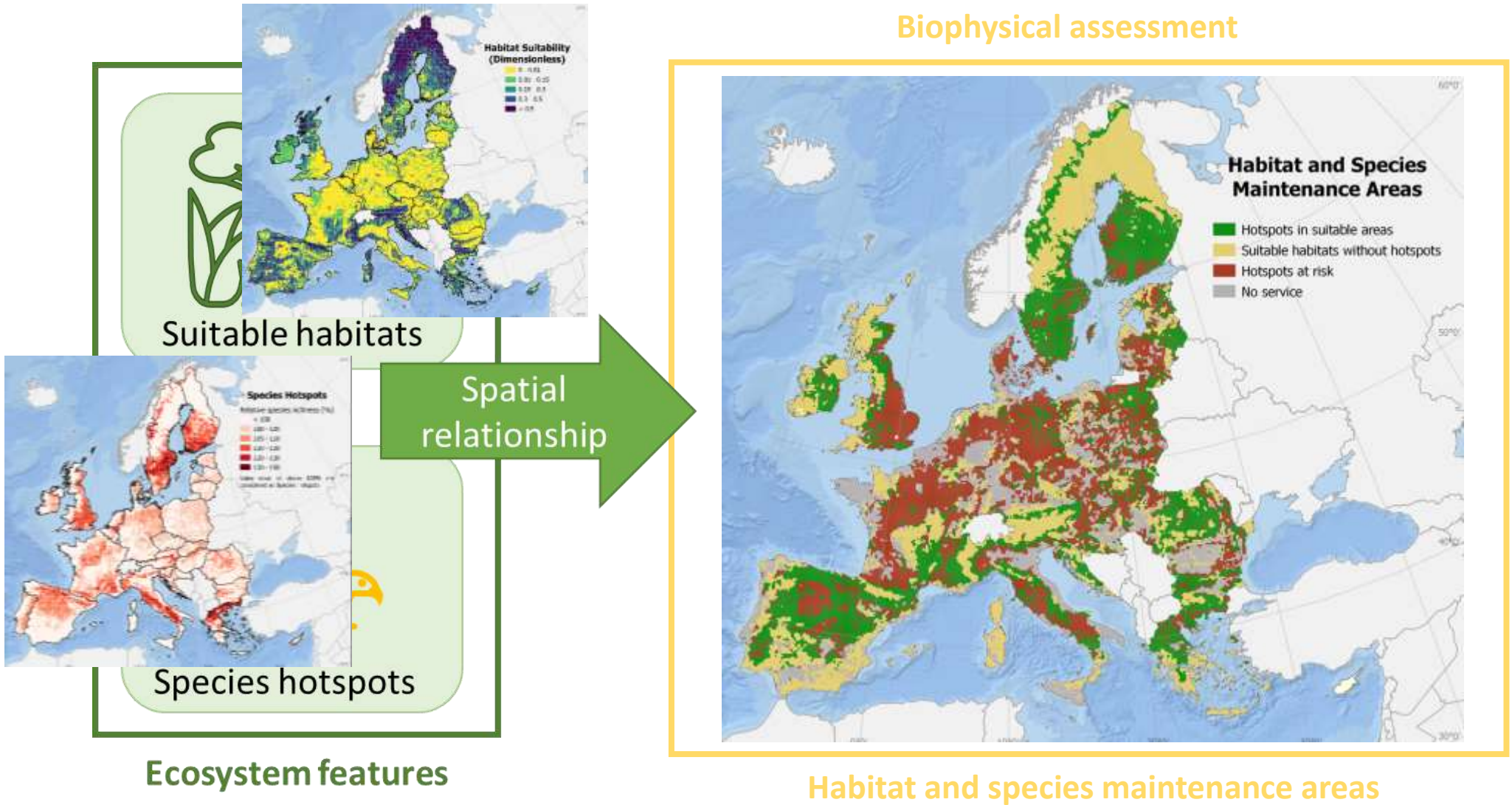


4 Cluster analysis: from four countries to all Member States

B	C	G	H	I	J	K
NUTS	NUTS1	pop12	Basic_hectar	wtp_bio	wtp_ch	wtp_inter
PT	PT1	1.380	1,200413247	204,8711	95,06745	8,342568
PT	PT1	152.929	1,200413247	204,8711	95,06745	8,342568
PT	PT1	38.453	1,200413247	204,8711	95,06745	8,342568
PT	PT1	3.927	1,200413247	204,8711	95,06745	8,342568
PT	PT1	243	1,200413247	204,8711	95,06745	8,342568
PT	PT1	1.659	1,200413247	204,8711	95,06745	8,342568
PT	PT1	421.353	1,200413247	204,8711	95,06745	8,342568
PT	PT1	22.524	1,200413247	204,8711	95,06745	8,342568
PT	PT1	28.518	1,200413247	204,8711	95,06745	8,342568
PT	PT1	17.763	1,200413247	204,8711	95,06745	8,342568
PT	PT1	16.255	1,200413247	204,8711	95,06745	8,342568
PT	PT1	30.161	1,200413247	204,8711	95,06745	8,342568
PT	PT1	268	1,200413247	204,8711	95,06745	8,342568
PT	PT1	1.740	1,200413247	204,8711	95,06745	8,342568

5 Habitat and Species maintenance monetary values dataset

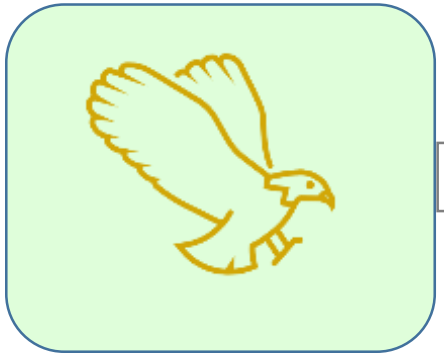
Biophysical assessment



For each cell of the grid that results from biophysical modelling:

from the CE: chemical reduction as proxy for enhanced habitat condition

101/person/year (average)



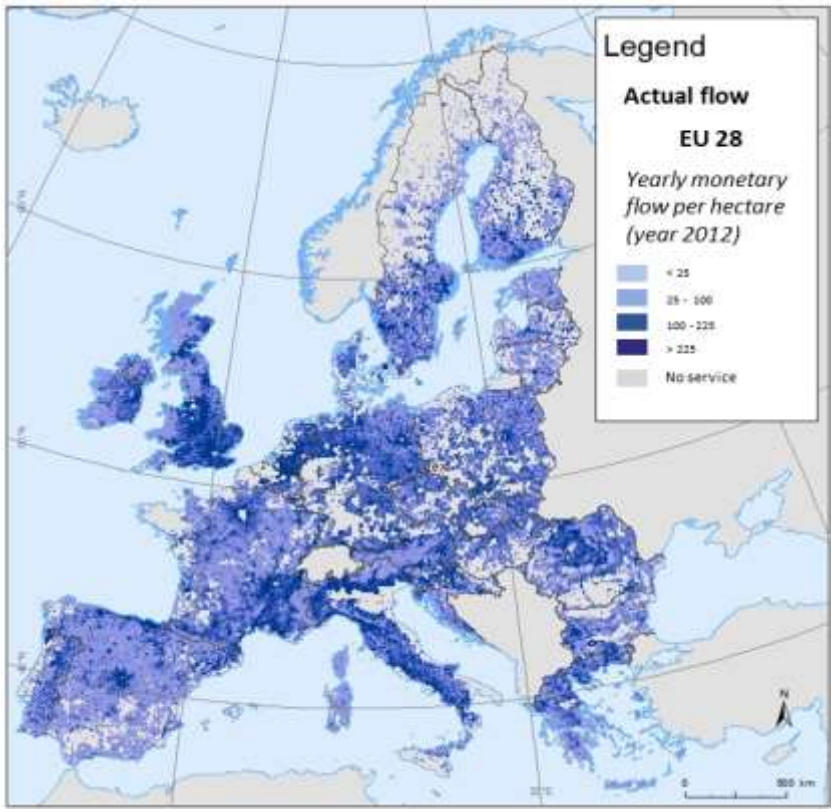
from the CE: species abundance as proxy for enhanced presence of target species

188/person/year (average)

from the CE: chemical reduction + species abundance + additional per hectare value as “premium” for the presence of both habitat and species

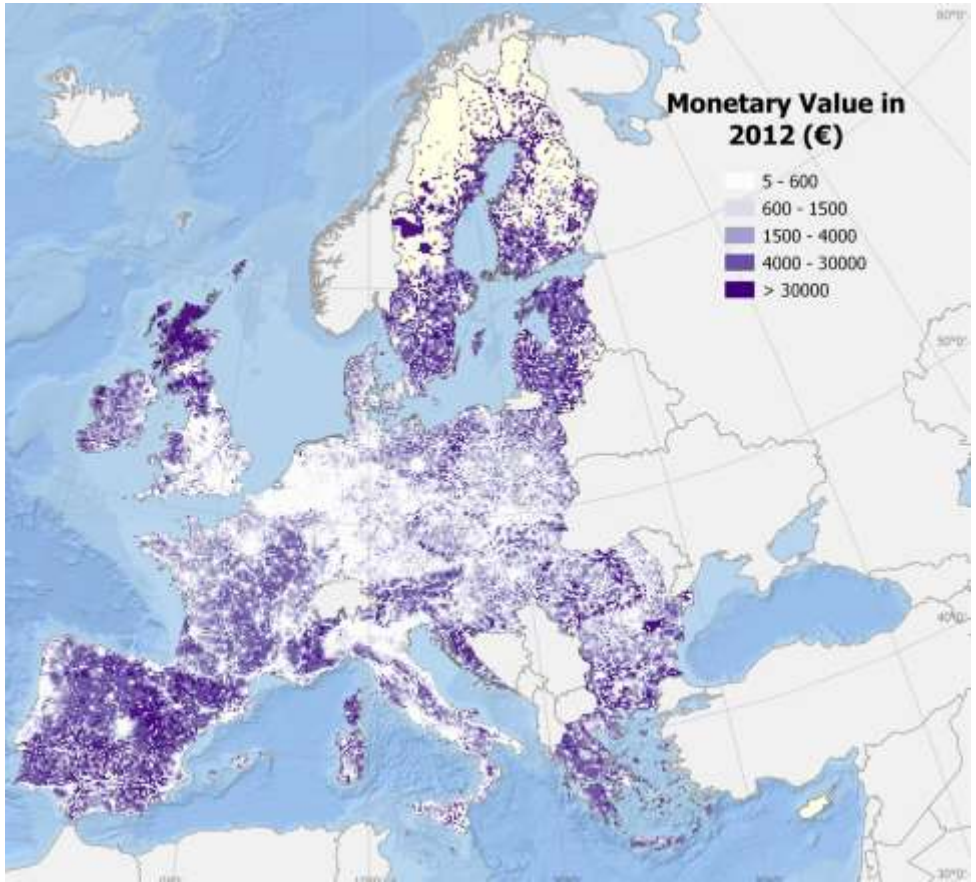
101/person/year (average)
188/person/year (average)
(0,56*ha)/person/year (average)

From the tabular data to the spatial allocation



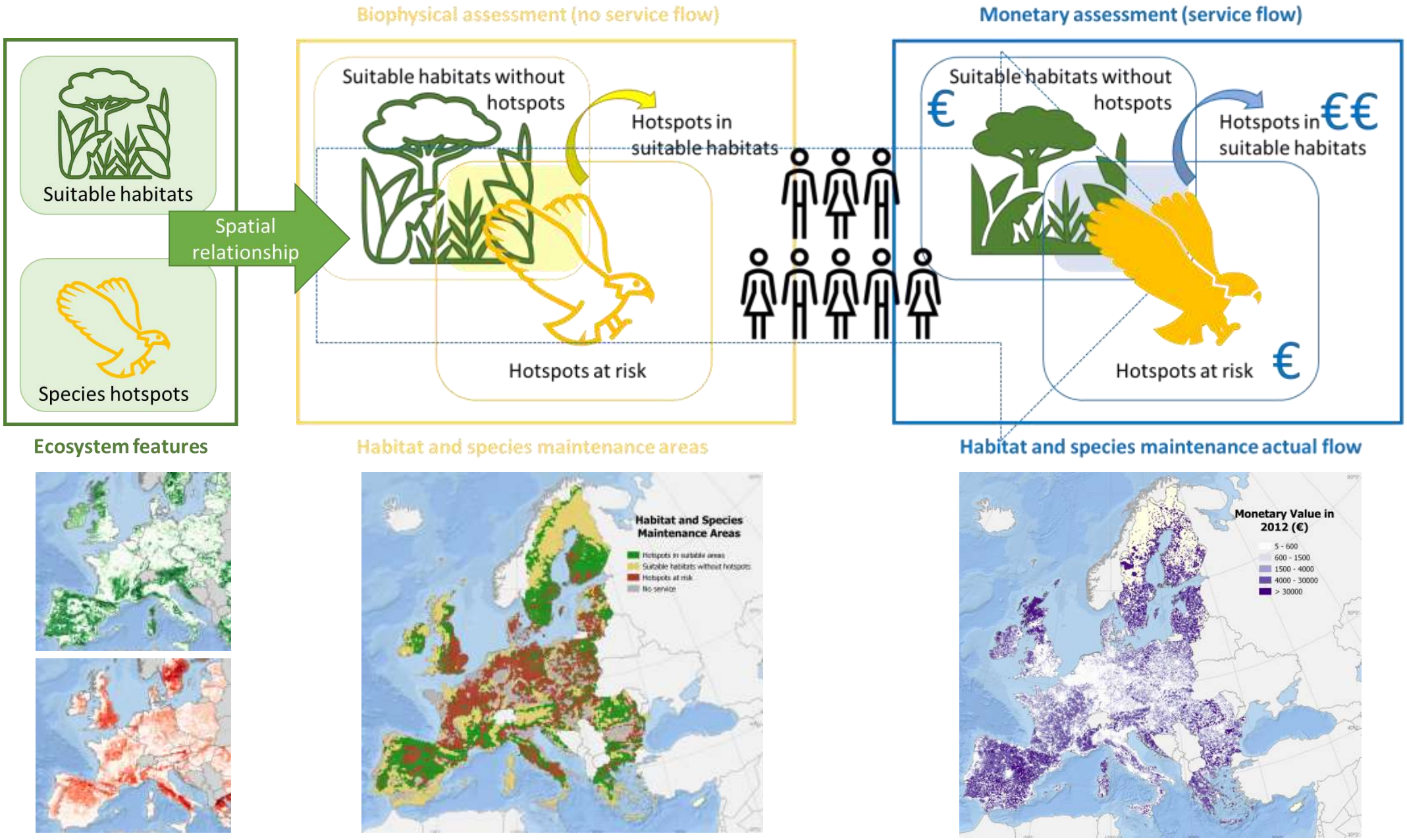
What's wrong with this map?

Higher values allocated where most people live, not where HSM is higher



application of the inverse probability function

$$\sum w_i = \sum \frac{N}{n_i}$$


Biophysical assessment (no service flow)
Monetary assessment (service flow)
Suitable habitats
Species hotspots
Spatial relationship
Suitable habitats without hotspots
Hotspots in suitable habitats
Hotspots at risk
€
€€
Ecosystem features
Habitat and species maintenance areas
Habitat and species maintenance actual flow
Habitat and Species Maintenance Areas
Hotspots in suitable areas
Suitable habitats without hotspots
Hotspots at risk
No service
Monetary Value in 2012 (€)
5 - 600
600 - 1500
1500 - 4000
4000 - 30000
> 30000

Supply and Use tables (in monetary terms)

	Ecosystem types										
				Woodland & forest							
million Euro	Urban	Cropland	Grassland	Available for Wood Supply	Other	Wetland	Heathland and shrub	Sparsely vegetated land	Rivers and lakes	Coastal /intertidal area	Total
crop provision		11,407									11,407
timber provision				22,714							22,714
crop pollination		4,517									4,517
soil retention		11,512									11,512
carbon sequestration	-	-	-	9,189		-	-	-	NA	NA	9,189
flood control	89	1,015	3,129	11,388		333	357	1	NA	NA	16,312
water purification	1,105	31,041	4,128	15,374		330	312	170	3,114	NA	55,576
habitat and species maintenance*	NA	15,731	4,473	12,448		683	1,250	385	689	NA	35,660
nature-based recreation	77	4,073	7,482	30,723		2,296	3,097	1,351	1,015	279	50,393
Total value	1,272	79,296	19,212	93,862		3,643	5,016	1,907	4,818	279	217,279
Euro/km²	6.026	49.327	37.894	64.040		37.245	27.772	32.472	44.221	14.531	49.595
% tot ecosystem types	0,6%	37,9%	9,2%	48,7%		1,7%	2,4%	0,9%	2,3%	0,1%	103,8%

* welfare value is reported for this ES

	Economic Units					
	Primary sector					
million Euro	Agriculture	Forestry	Secondary and Tertiary sectors	Households	Global society	Total
crop provision	11,407					11,407
timber provision		22,714				22,714
crop pollination	4,517					4,517
soil retention	11,512					11,512
carbon sequestration					9,189	9,189
flood control	799		3,786	11,726		16,312
water purification	38,615		11,307	5,653		55,576
habitat and species maintenance*					35,660	35,660
nature-based recreation				50,393		50,393
Total	66,851	22,714	15,093	67,773	44,849	217,279
% economic units	30.8%	10.5%	6.9%	31.2%	20.6%	100%

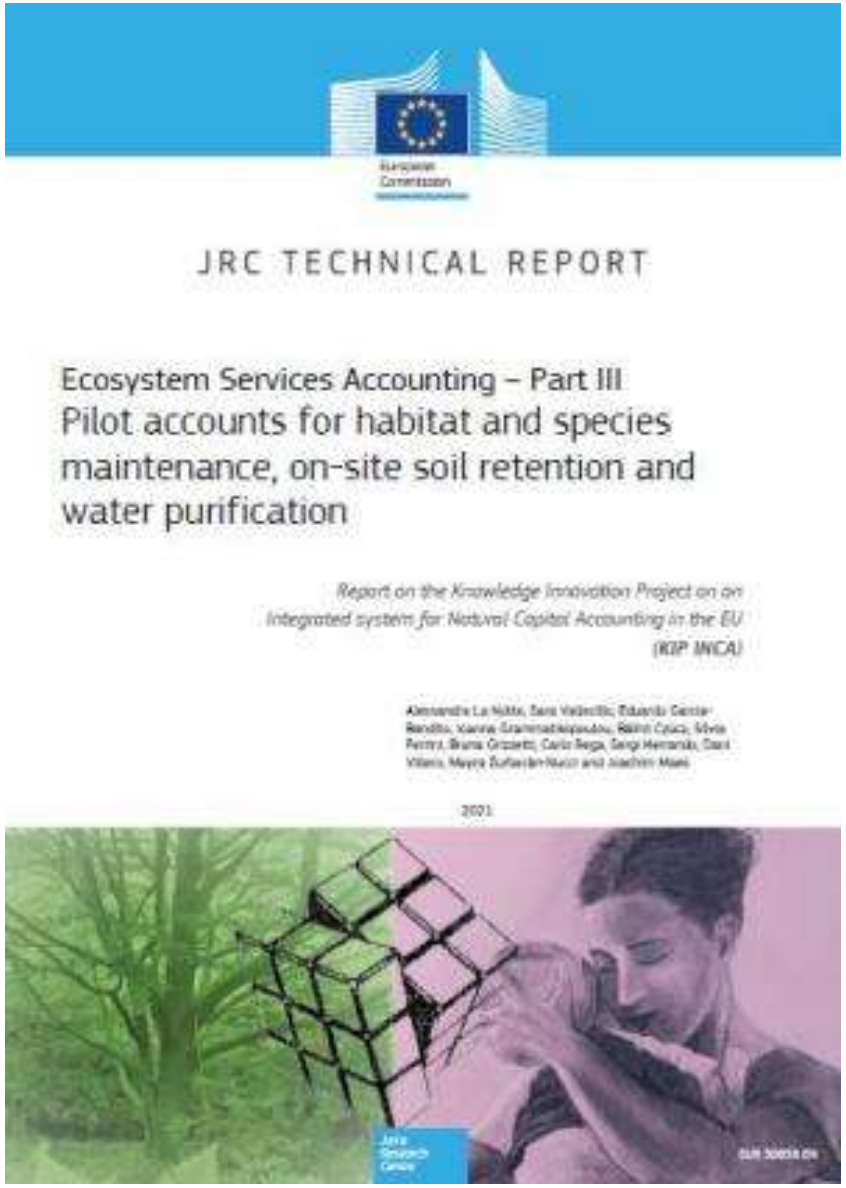
* welfare value is reported for this ES

- There is an additional flow of service that provides (in relative terms) more value to ecosystems (with little human activities) that otherwise would overall record low values;
- This flow does not enter the market and therefore does not interact with exchange-use values;
- Final flows to “Households” and “Global Society” (or Government beyond national boundaries) should be more flexible in enabling to record welfare values because it’s a single record with no further value added transactions

Lesson learned and open questions

- «Habitat and species maintenance» is a **final**, non-use service
- Common understanding needs to **translate ecological notions** into concrete (policy) actions
- The valuation and accounting of «Habitat and species maintenance» should be **based on biophysical assessment**
- In accounting terms, for non-use services directed to «Global society» should we include the «welfare component»?

THANK YOU FOR YOUR ATTENTION



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