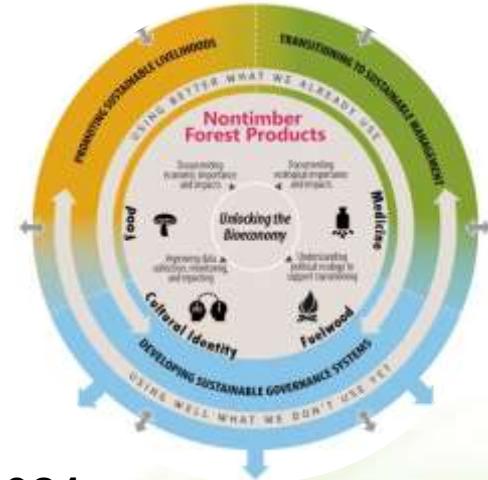




Comparing the potential of Non-Wood Forest Products in different European regions

Webinar Series: Unlocking the Bioeconomy for Nontimber Forest Products, Wednesday, 20 October 2021



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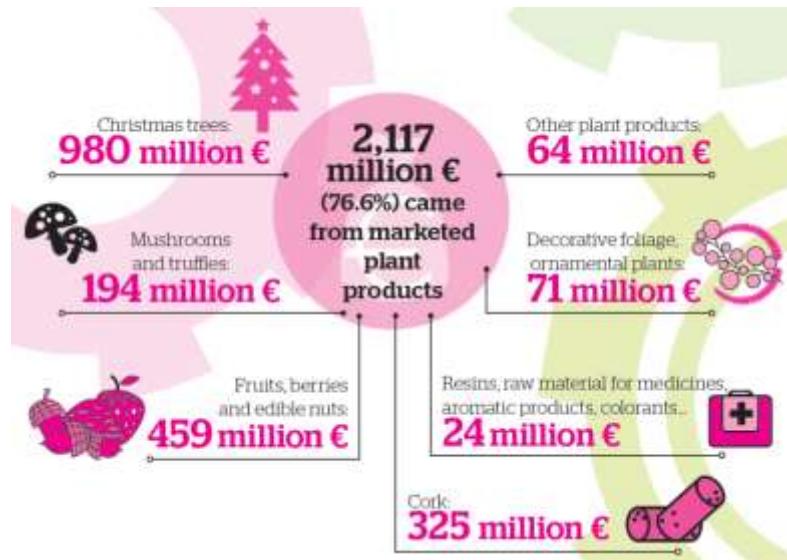
outline of the webinar

- Introduction
 - NWFPs and ecosystem services in Europe
 - Forest bioeconomy context
- Supporting forest owners
 - Multi-method approach (AHP, BBN, INVEST)
- European case studies
 - StartTree Project
 - COST Action on NWEPP
- Conclusions



Importance of Non Wood Forest Products

- traditional non-wood forest goods are cork, christmas trees, chestnuts, fruits, mushrooms, wild meat, honey
- source of additional income from forests
- reported value of marketed non-wood goods in Europe was about EUR 4 000 million (SoEF, 2020)



(SoEF, 2010)

Contribution of NWFPs to the economy



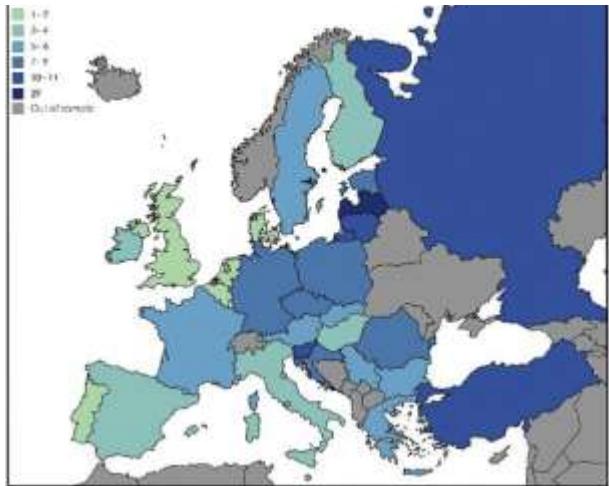
Share of households that collect NWFPs (%)



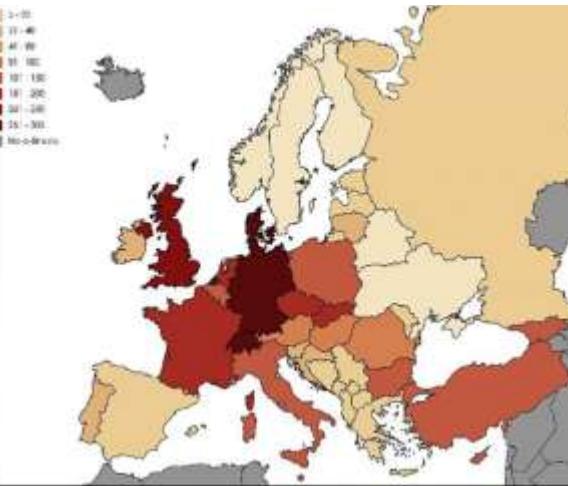
collected weight of NWFPs (kg household/yr)



households where NWFPs contribute to income (%)



Value of collected NWFPs (€ ha/yr)



Lovric et al. (2020)



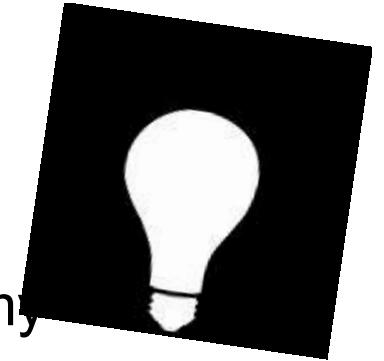
NWFPs in a bioeconomy context

- Supports the transition towards a bioeconomy by bringing socio-economic wellbeing to both urban and rural areas (“inclusive growth” in Europe)
- Allows to diversify the product portfolio of landowners
- Embedded products – various ecosystem services are intrinsically linked to picking/use of NWFPs
 - Organised *recreational mushroom/berry picking*
 - *Seasonal collection* e.g. Christmas decorations
 - NWFP identification *walks/courses*
 - *Hobby/craft courses* e.g. lavender crafts, dying, basket weaving
 - *Tourist attractions* e.g. chestnut festival, gourmet holidays
 - *Health therapy* e.g. growing/managing NWFPs for mental health
 - *Landscape management* e.g. resin production to help reduce fire risk



supporting small-scale forest owners with multi-method approach (i)

- Aim: support small-scale forest owners as regards the co-production of wood, non-wood forest products and other ecosystems services in order to
 - diversify their product portfolio
 - distribute related socio-economic risks
 - contribute to the transition towards bioeconomy



- Evaluation of the suitability of NWFPs (AHP)
- Estimation of the NWFP potential for FMU (BBN)
- Evaluation of co-production of NWFPs (IM)

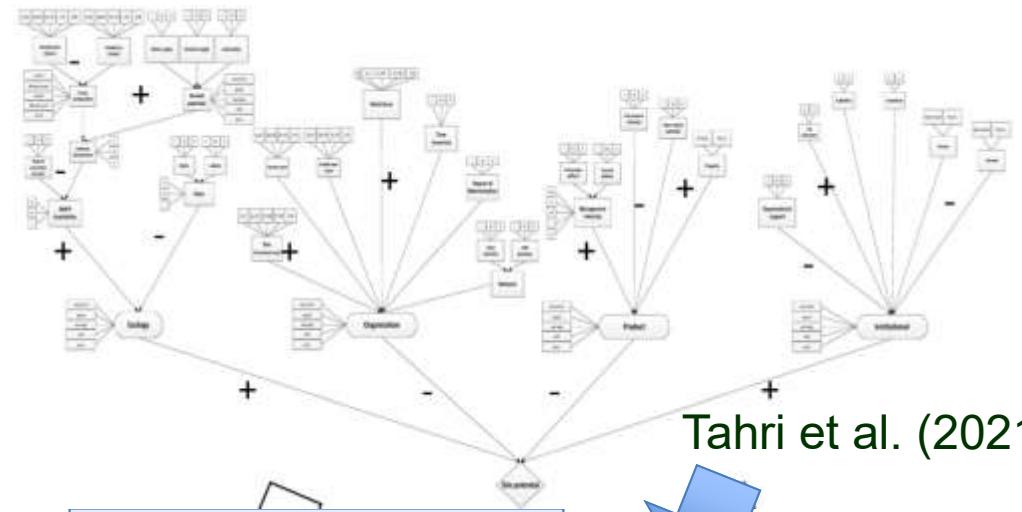
supporting small-scale forest owners with multi-method approach (ii)

1 Analytic Hierarchy Process

- Ranking of NWFPs
- Profiles for forest owners
- Specific for the region



Huber et al. (2017)



Tahri et al. (2021)

2 Bayesian Belief Models

- Estimate NWFP potential
- Assess the characteristics of FMU
- Specific for the forest enterprise

3 Influence Matrix



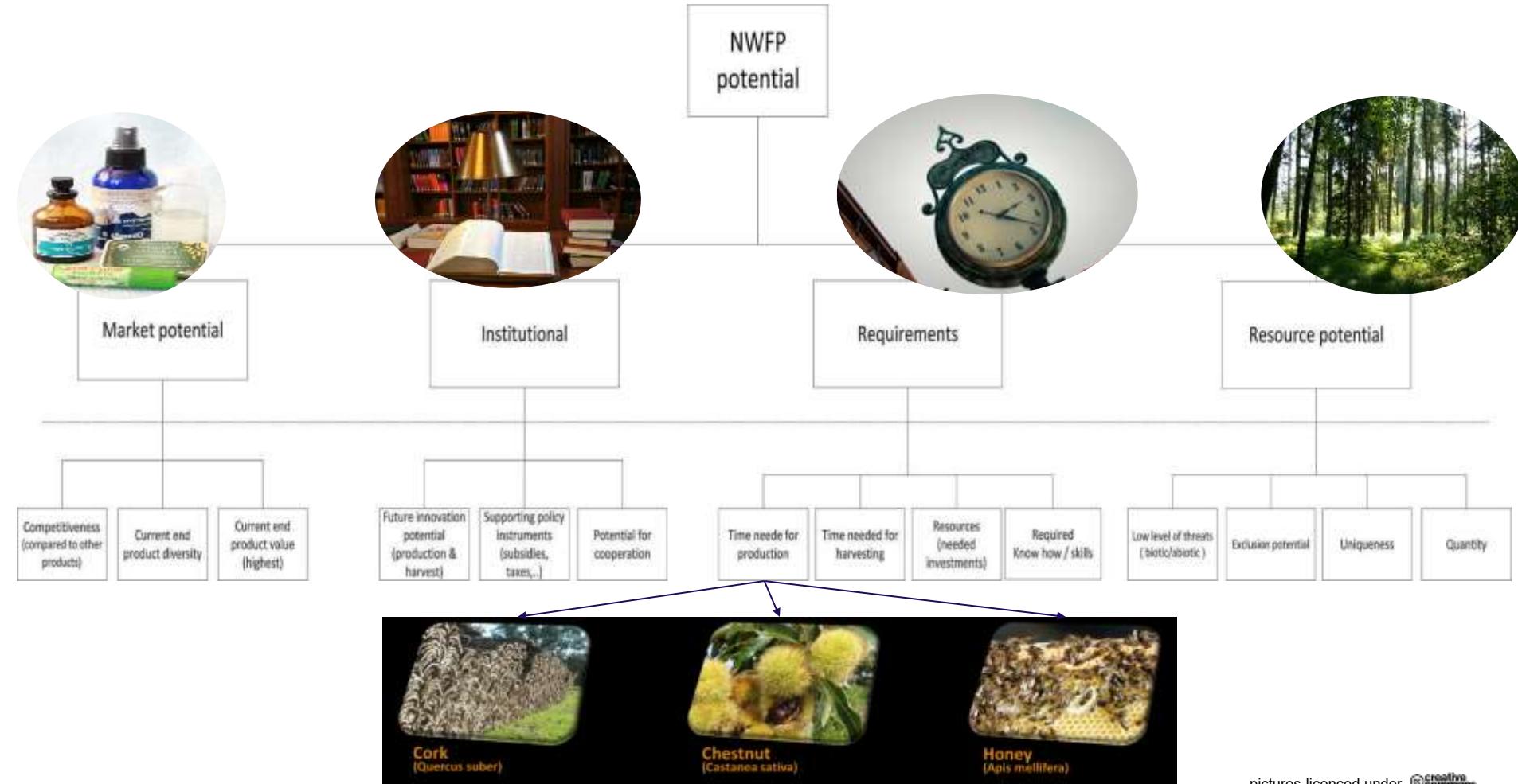
- Identify combination of NWFPs for co-production
- Specific for the individual planning unit

Vacik et al. (2020)



Analytic Hierarchy Process (AHP)

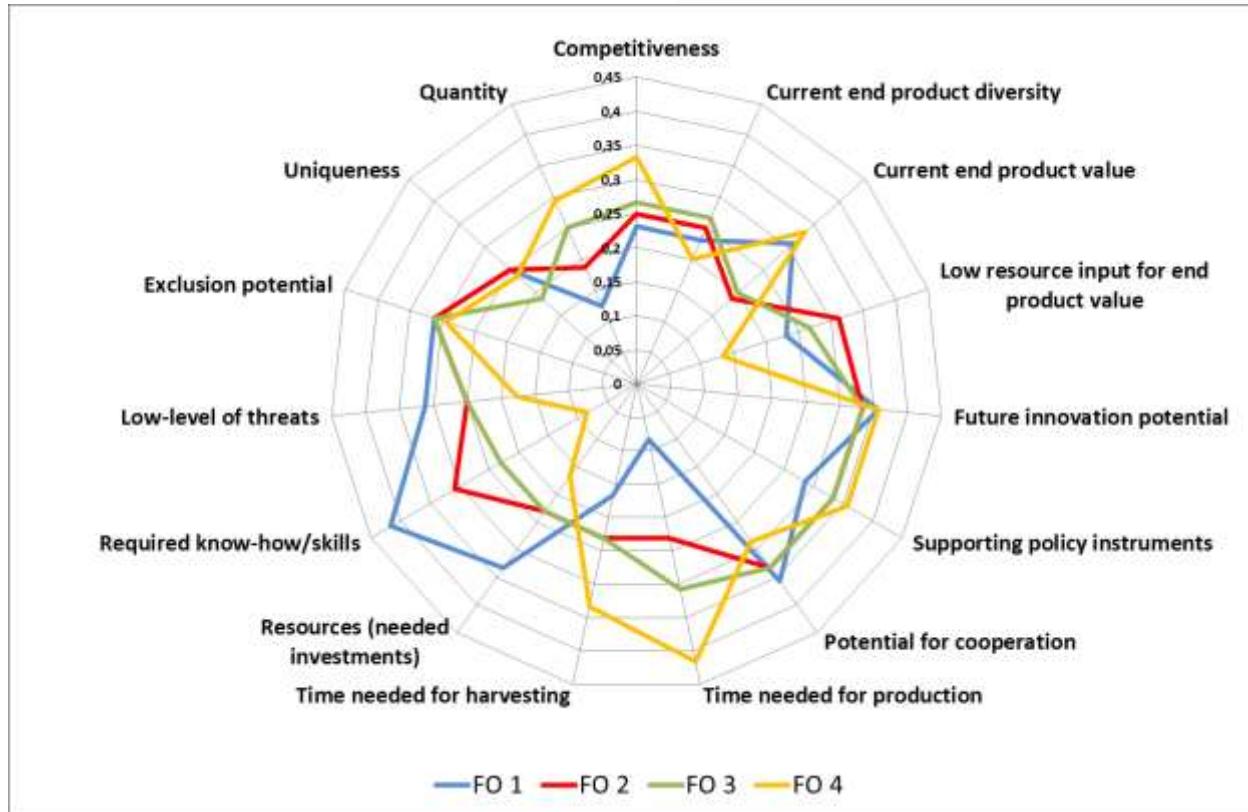
ranking of NWFPs according to their potential



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Forest owner profiles

can help to mimic diverging interests on a rural to urban gradient



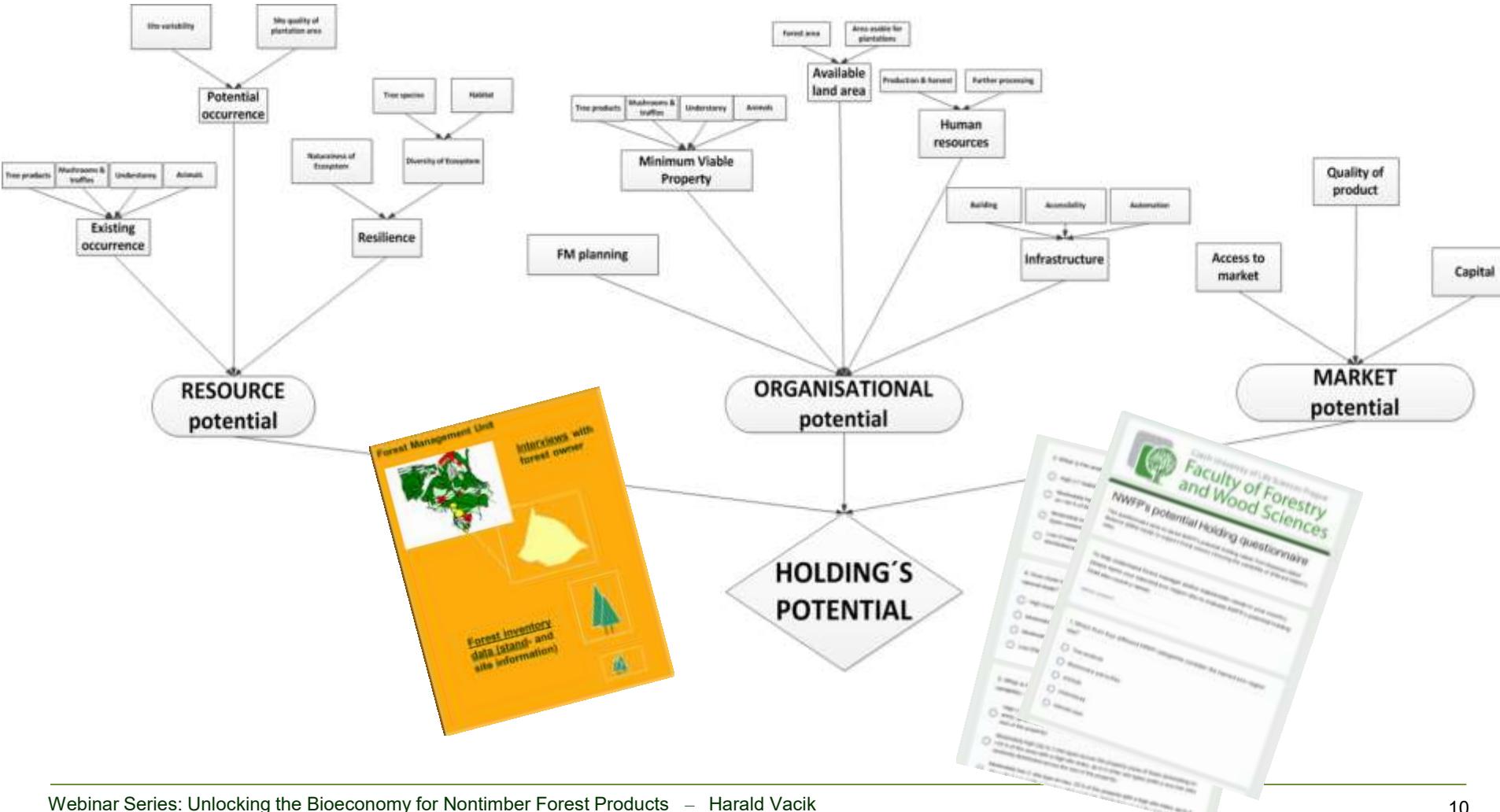
compare
Hogl et al. (2005)
Hujala and Tikkanen (2008)

- FO 1 = hands-on nurturer
- FO 2 = part-time outsourcer
- FO 3 = urban value-extractor with rural background
- FO 4 = urban value-extractor without connection to forestry/agriculture

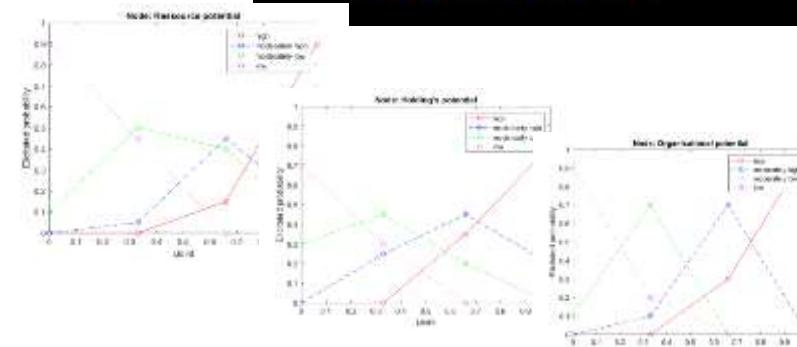
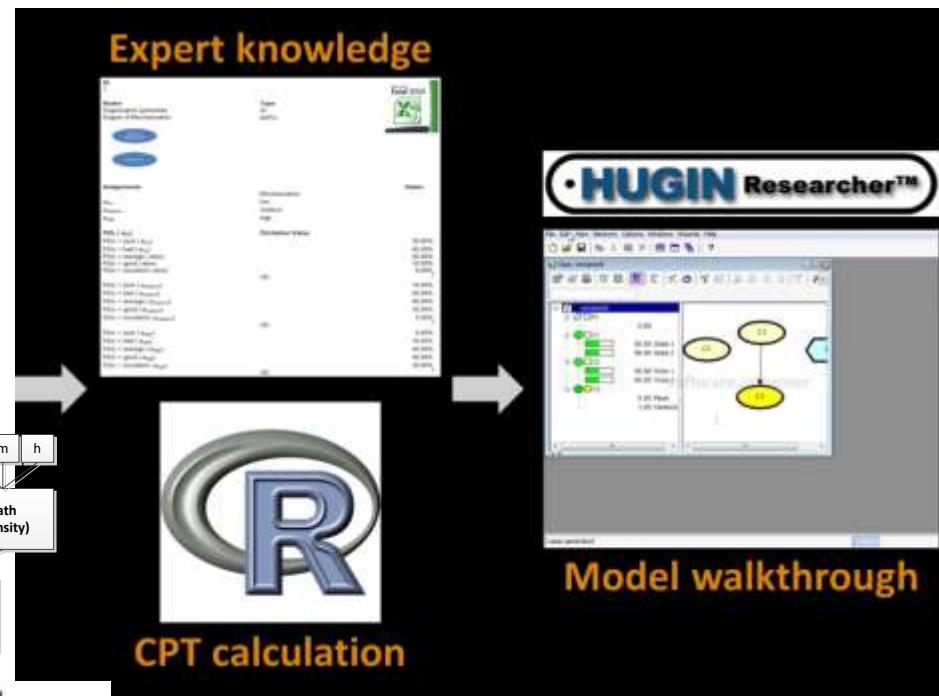
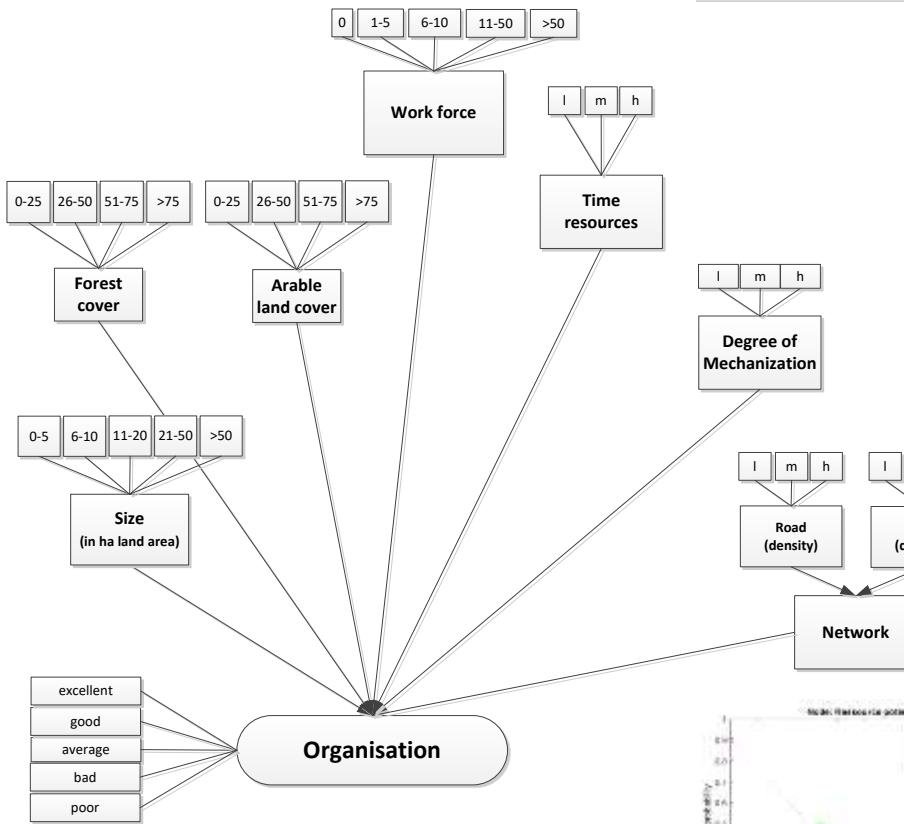


BBN – NWFPs causal network for forest holding

resource, organisational and market potential



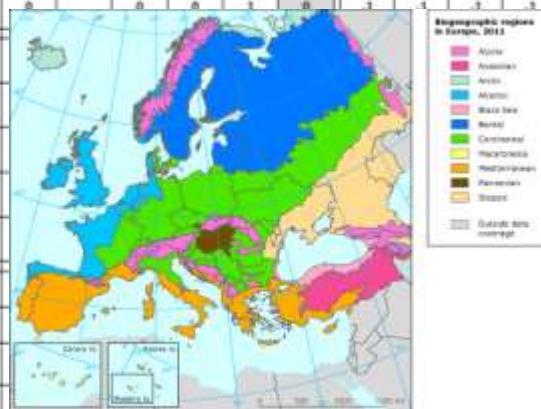
BBN – NWFPs causal network for forest holding organisational potential and conditional probability tables



Evaluating combined production of NWFPs and ecosystem services in influence matrix



	Phytocenosis solid wood	Truffles	Medicinal plants, fungi, herbs, crop	soil, bark	Biodiversity (Biomass, Plants, Birds, Mammals, Reptiles)	Fauna (Insects, Arachnid)	Forests and woodland utilization	Flora (mosses, lichens, vascular plants)	Soil (minerals, microflora, microfauna)	Water (water balance, hydrology, groundwater)	Forest Ecosystem Services (FES), Biodiversity	Flora	Vascular Plants (Biomass of Flora, Biodiversity)	Bark	Soil (minerals, microflora, microfauna)	Flora	Product protection	Preservation Forest Products	Value added Forest Products	Influence matrix
Influence matrix																				
Phytocenosis solid wood	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
Truffles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medicinal plants, fungi, herbs, crop	0	0	0	-1	0	0	0	1	0	0	1	1	0	0	0	-1	0	0	0	1
soil, bark	0	0	0	0																
Biodiversity (Biomass, Plants, Birds, Mammals, Reptiles)	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	2
Fauna (Insects, Arachnid)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Forests and woodland utilization	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Flora (mosses, lichens, vascular plants)	0	0	0	0	0	0	0	1	0	0	-1	0	0	0	0	0	0	0	0	0
Soil (minerals, microflora, microfauna)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Water (water balance, hydrology, groundwater)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest Ecosystem Services (FES), Biodiversity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Flora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vascular Plants (Biomass of Flora, Biodiversity)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Soil (minerals, microflora, microfauna)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Flora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Product protection	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Preservation Forest Products	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Value added Forest Products	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Influence matrix	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



European NWFPs network | Action FP1203 |
www.nwfps.eu



Example for influence matrix

$\downarrow \rightarrow$	A	B	C	D	E	sum active
A	0	1	3	1	5	
B	1	2	-2	0	-2,3[5]	
C	1	-1	0	3	-1,4[5]	
D	3	2	0	2	7	
E	0	2	0	1	3	
sum passive	5	-1,4[5]	0	-2,4[6]	6	

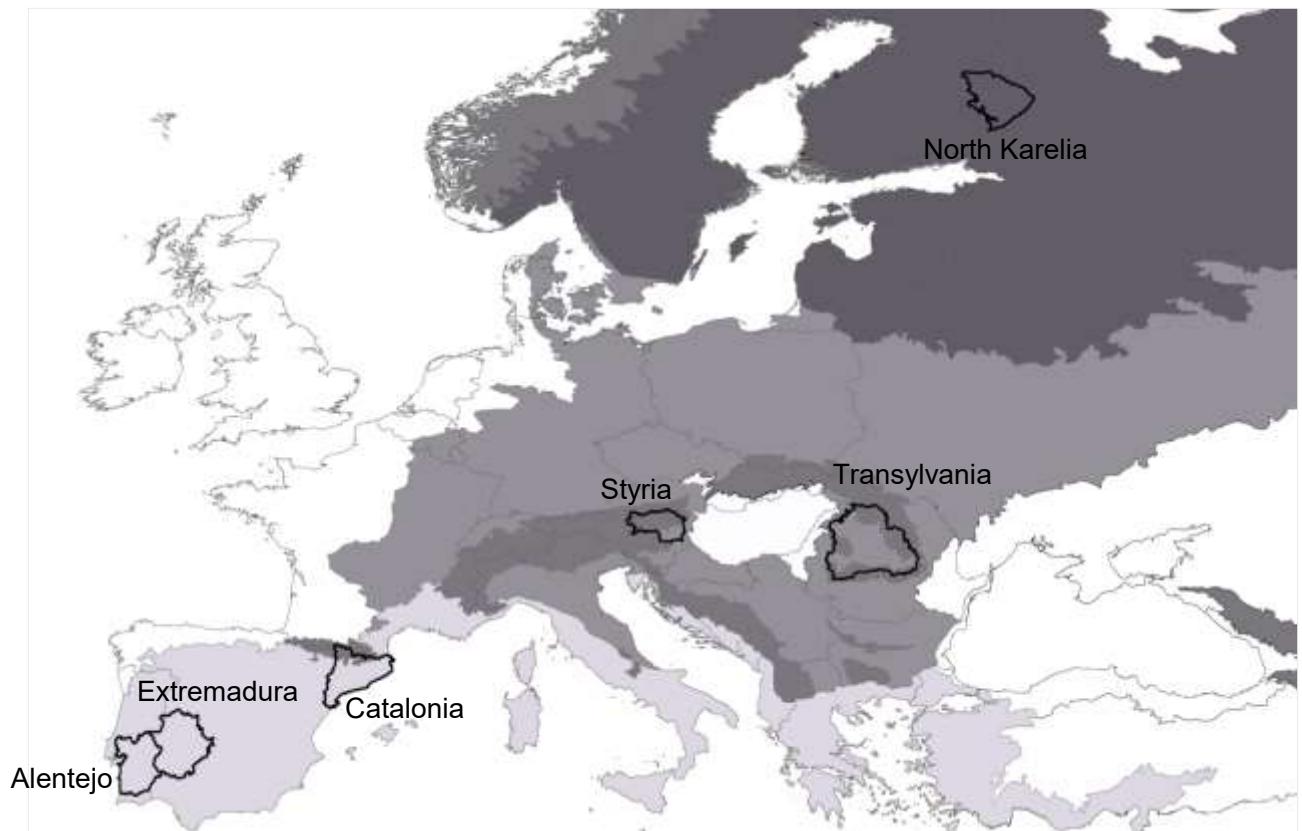
Has production of NWFP „A“ direct influence on NWFP „B“?

If YES, how strong? 1 = slight 2 = moderate 3 = strong



European case studies

Biogeographical zones



- a) Mediterranean (**Alentejo, Extremadura, Catalonia**)
- b) Alpine (**Catalonia, Styria, Transylvania**)
- c) Continental (**Styria, Transylvania**)
- d) Boreal (**North Karelia**)

Case studies (i)



Region	Mushrooms & Truffles	Understorey plants	Tree products	Animal origin
Alentejo	Cep (<i>Boletus edulis</i>)	Yellow lavender (<i>Lavandula viridis</i>)	Cork (<i>Quercus suber</i>) Pine nuts (<i>Pinus pinea</i>) Pine resin (<i>Pinus spp.</i>)	Honey (<i>Apis mellifera</i>) European rabbit (<i>Oryctolagus cuniculus</i>)
Catalonia	Saffron milk-cap (<i>Lactarius deliciosus</i>) Black truffle (<i>Tuber melano-sporum</i>)	Yellow gentian (<i>Gentiana lutea</i>)	Cork (<i>Quercus suber</i>)	Wild boar (<i>Sus scrofa</i>)
Extremadura	Cep (<i>Boletus edulis</i>)		Cork (<i>Quercus suber</i>) 	Cerdo ibérico (<i>Sus scrofa domestica</i>) Red deer (<i>Cervus elaphus</i>) Honey (<i>Apis mellifera</i>)

Case studies (ii)



Region	Mushrooms & Truffles	Understorey plants	Tree products	Animal origin
N-Karelia	Cep (<i>Boletus edulis</i>)	Bilberries (<i>Vaccinium myrtillus</i>)	Birch sap (<i>Betula pendula</i>) Pakuri mushroom (<i>Inonotus obliquus</i>)	Honey (<i>Apis mellifera</i>)
Styria	Chanterelles (<i>Cantharellus cibarius</i>) Cep (<i>Boletus edulis</i>)	Bilberries (<i>Vaccinium myrtillus</i>) Wild garlic (<i>Allium ursinum</i>)	Larch resin (<i>Larix decidua</i>) Christmas trees (<i>Abies nordmanniana</i>)	Red deer (<i>Cervus elaphus</i>) Honey (<i>Apis mellifera</i>)
Transylvania	Cep (<i>Boletus edulis</i>) Chanterelles (<i>Cantharellus cibarius</i>)	Rose hips (<i>Rosa canina</i>) Bilberries (<i>Vaccinium myrtillus</i>)	Seeds (<i>Picea abies</i>) Christmas trees (<i>Abies alba</i>)	Wild boar (<i>Sus scrofa</i>) Brown hare (<i>Lepus europeaus</i>)



Performance of NWFPs on regional level

CS	Category	Species	equal	regional	FO1	FO2	FO3	FO4
Alentejo	Mushroom & Cep		0,12	0,11	0,13	0,11	0,11	0,10
	Tree product Cork		0,26	0,27	0,26	0,26	0,27	0,30
	Tree product Pine nuts		0,18	0,18	0,17	0,17	0,17	0,20
	Tree product Pine resin		0,10	0,11				
	Understorey Yellow lavender		0,16	0,17				
	Animal origin Honey		0,10	0,09				
Catalonia	Animal origin European rabbit		0,08	0,08				
	Mushroom & Saffron milk-cap		0,14	0,14				
	Black truffle		0,22	0,21				
	Tree product Cork		0,22	0,21				
	Understorey Yellow gentian							
Extremadura	Animal origin Wild boar							
	Mushroom & Cep							
	Tree product Cork							
	Animal origin Cerdo ibérico							
N-Karelia	Animal origin Red deer							
	Mushroom & Cep							
	Tree product Birch							
	Understorey Pakur							
Styria	Animal origin Bilberries							
	Mushroom & Cep							
	Tree product Chant							
	Understorey Bilberry							
	Animal origin Wild boar							
Transylvania	Tree product Larch							
	Animal origin Christmas trees							
	Mushroom & Cep							
	Tree product Chrysanthemum							
	Understorey Red deer							
	Animal origin Honey							
	Mushroom & Cep							
	Tree product Chant							
	Understorey Seeds							
	Animal origin Christmas trees							
	Mushroom & Rosemary							
	Tree product Christ							
	Understorey Bilberries							
	Animal origin Wild boar		0,08	0,11	0,10	0,11	0,12	0,12
	Understorey Brown hare		0,06	0,08	0,08	0,08	0,08	0,08

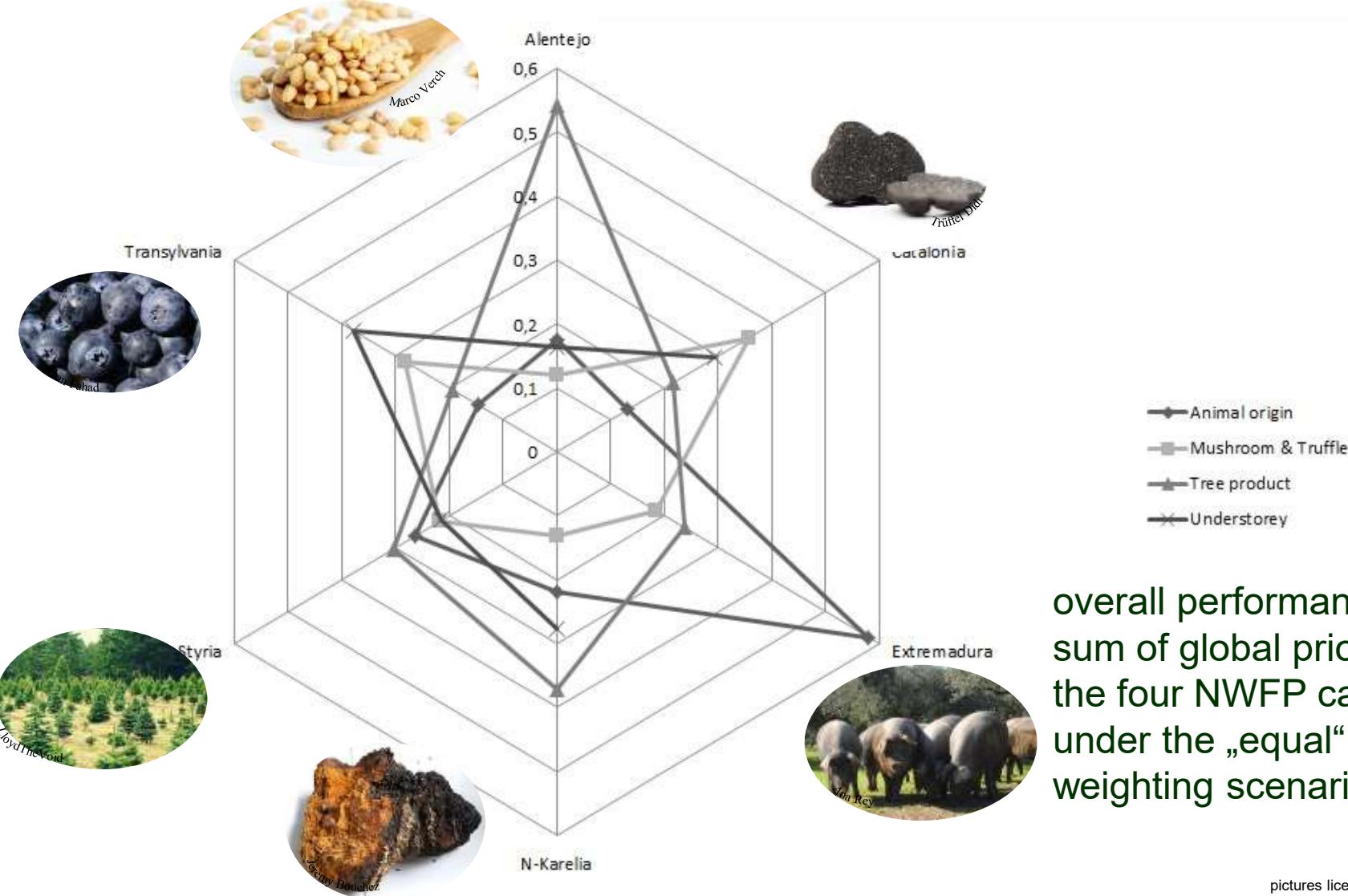
Most promising NWFPs

- i) Tree products (cork, larch resin and Christmas trees)
- ii) Understorey (yellow gentian, bilberries)
- iii) Animal origin (cerdo ibérico)



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Cross case study analysis for categories



overall performance (i.e. sum of global priorities) of the four NWFP categories under the „equal“ weighting scenario

Silvipasture in European Larch forests



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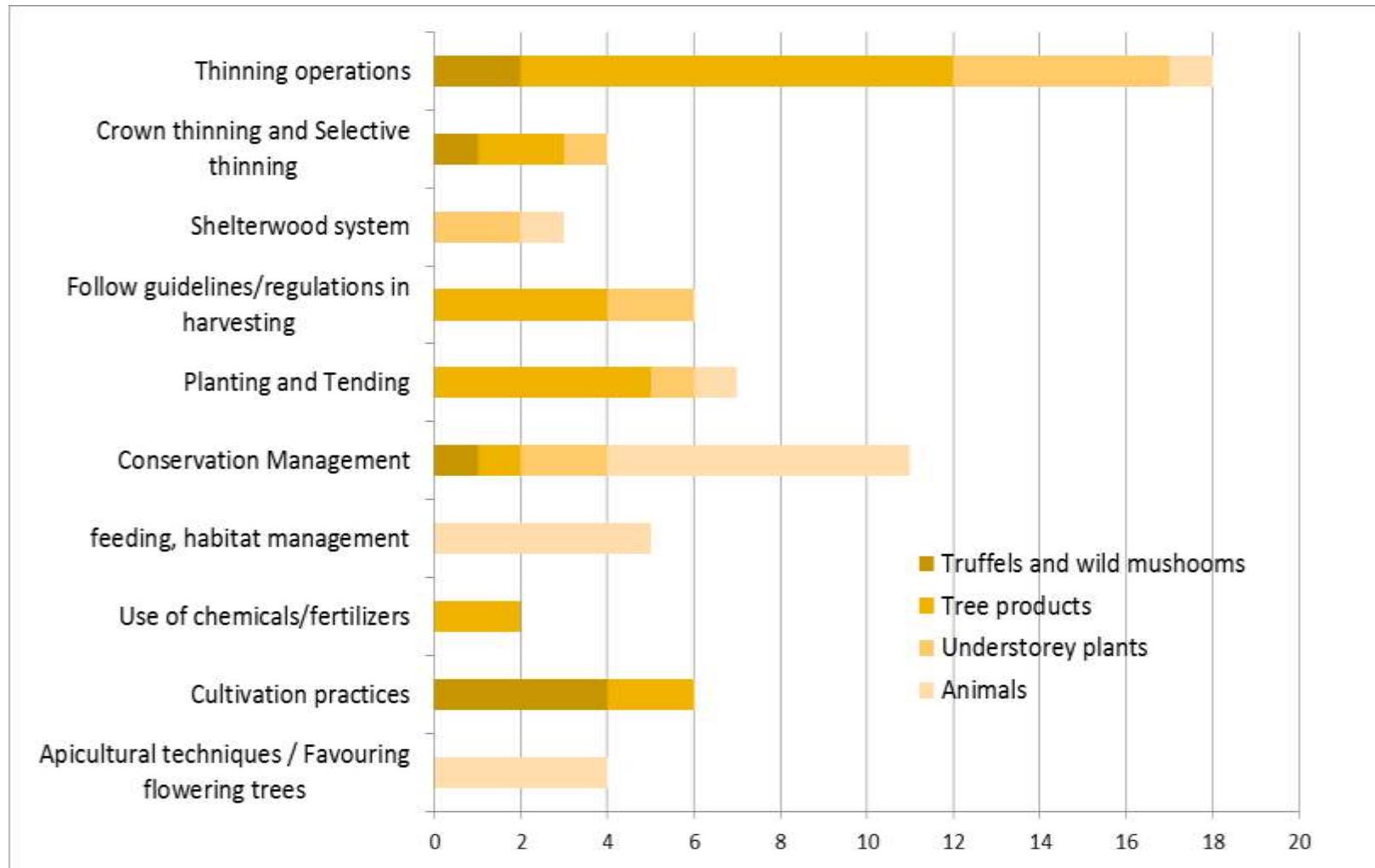
Organic Christmas tree production with Shropshire sheep



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Management interventions to favour NWFPs



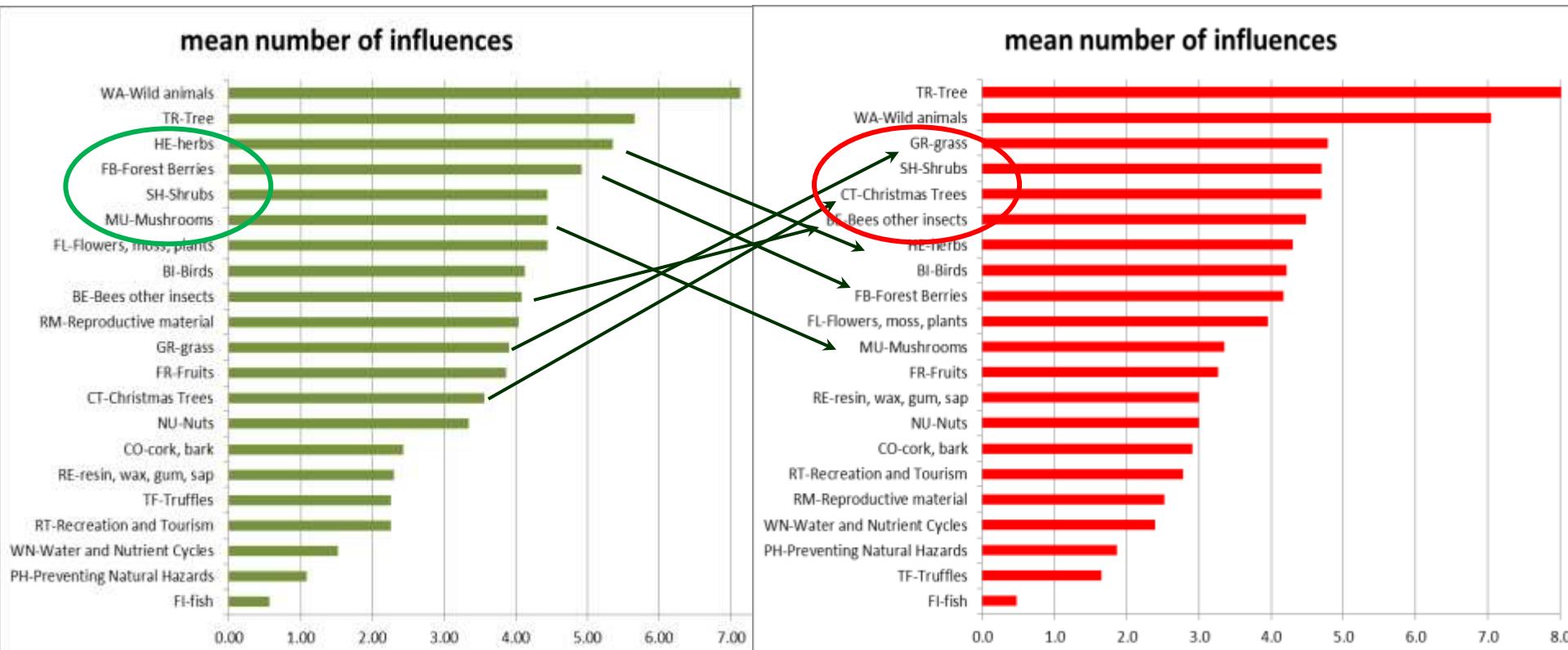
Total number of indicated influences

(average number crossover Europe)

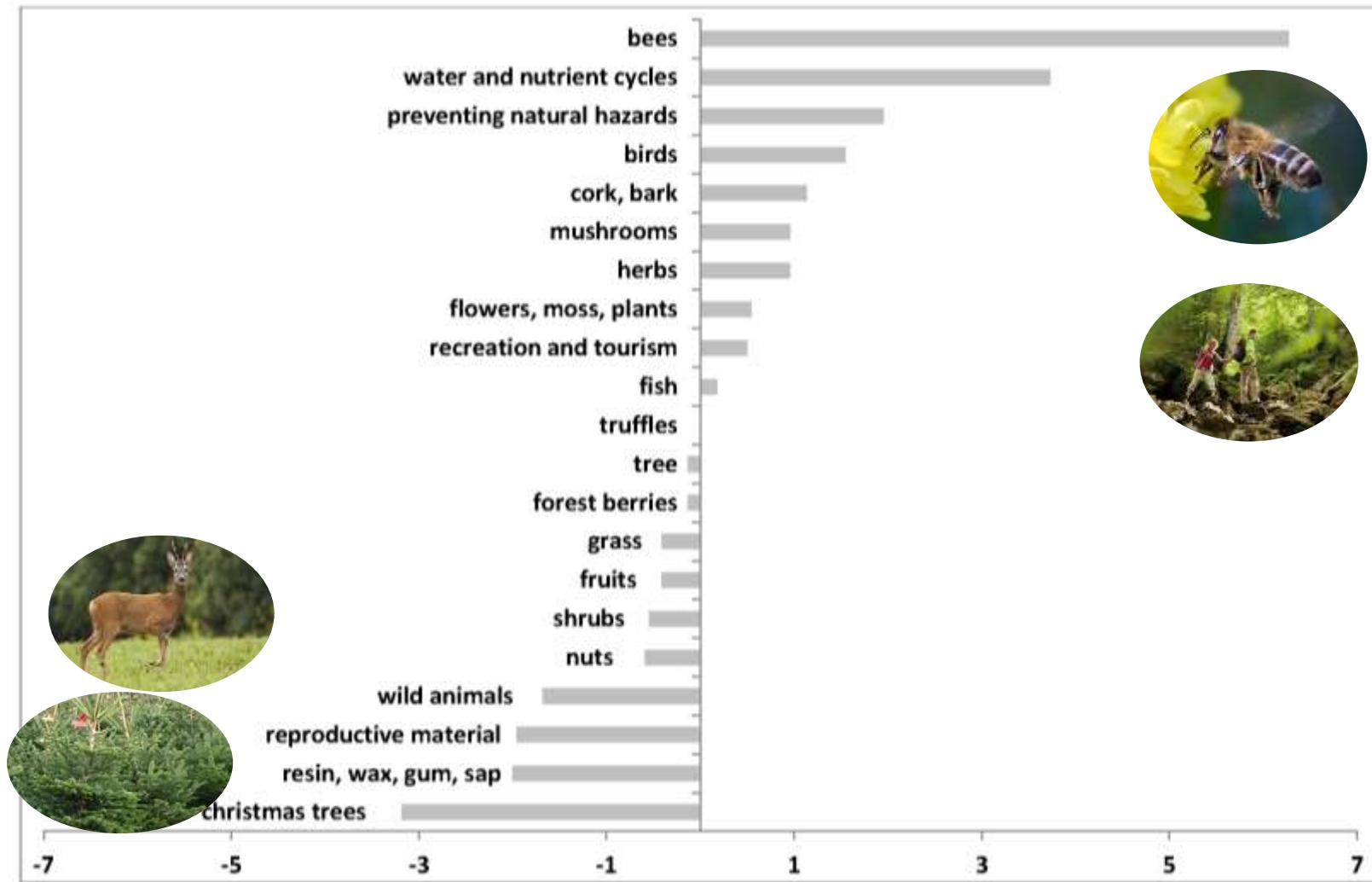


How often is the production of a NWFP influenced by others?

How often does the production of a NWFP influence others?

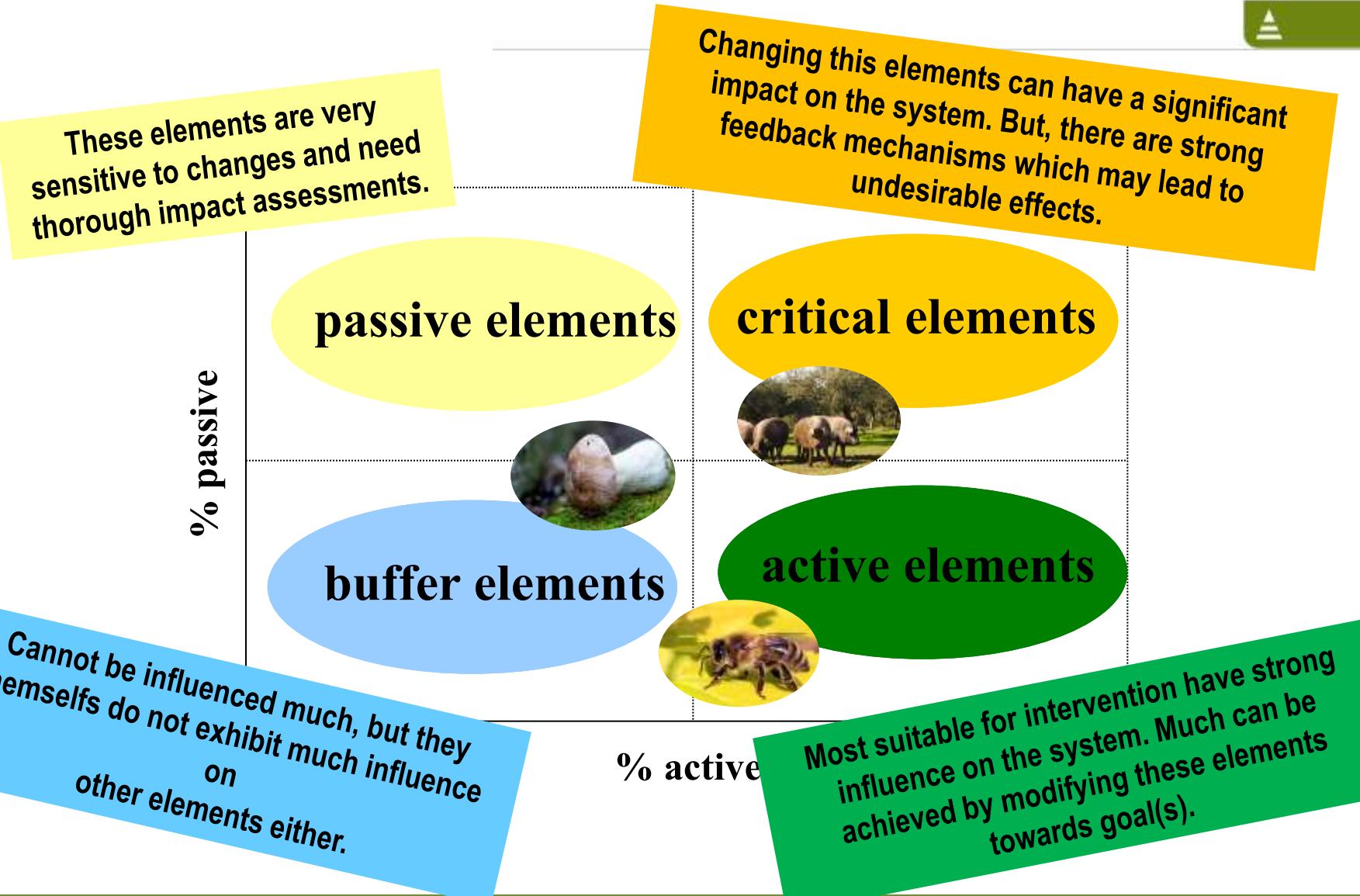


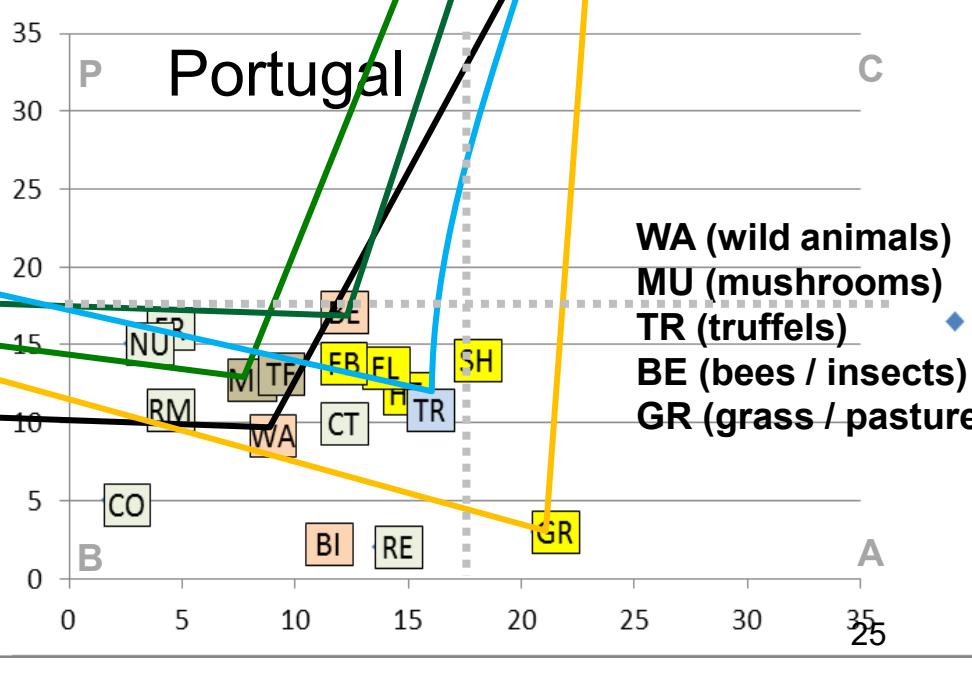
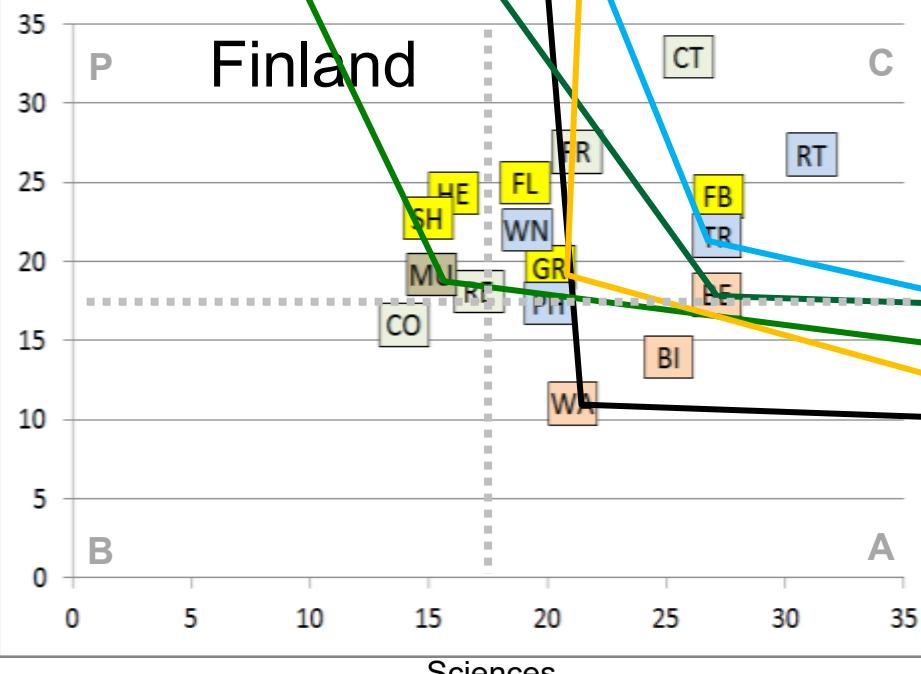
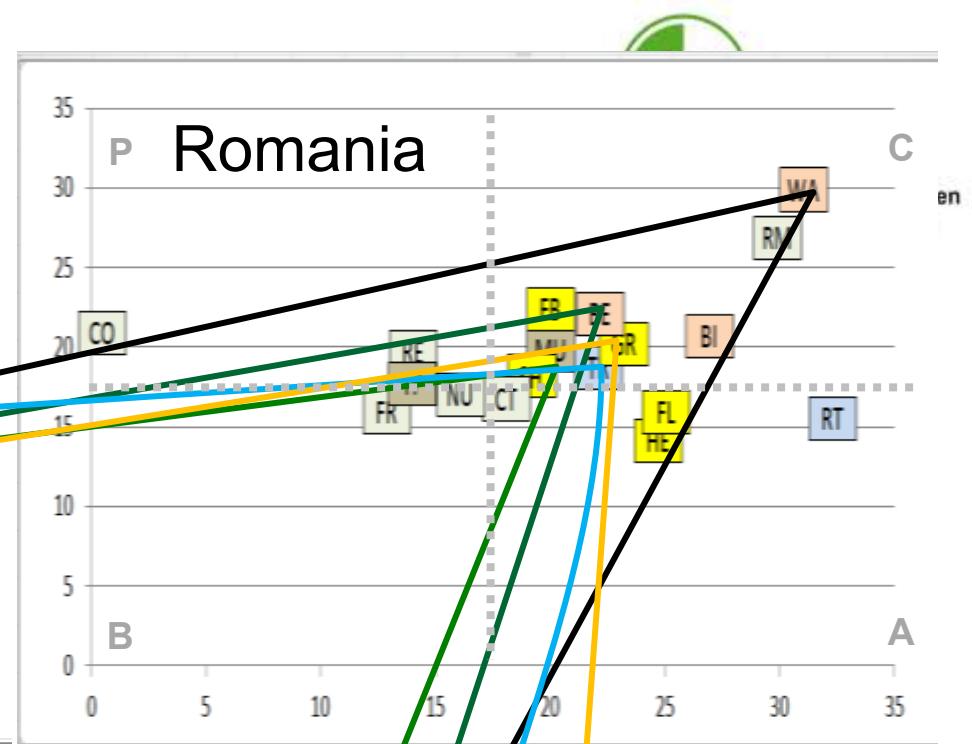
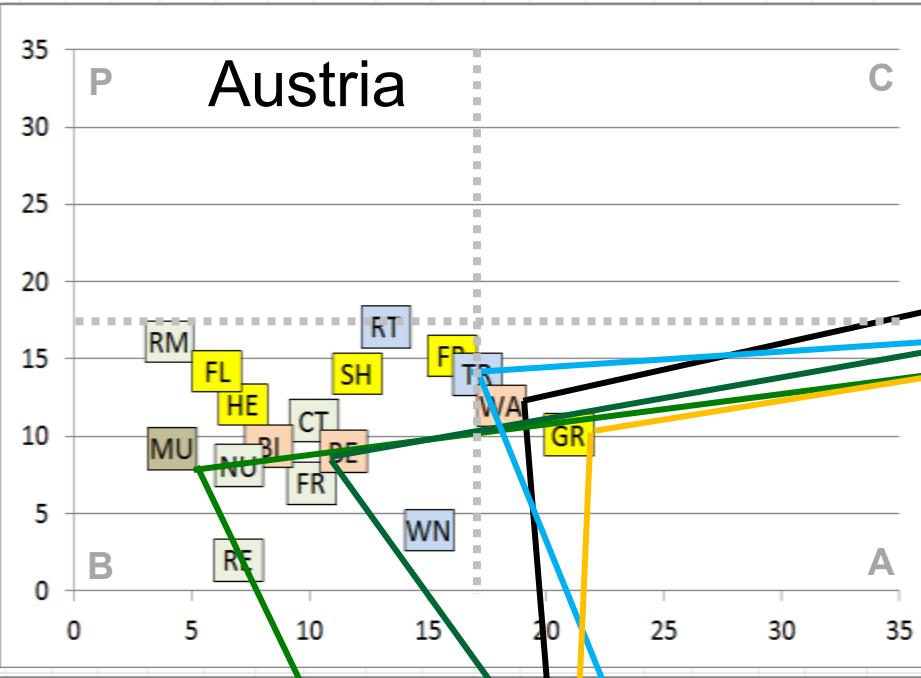
average positive/negative influences





Interpretation of influence matrix





WA (wild animals)
MU (mushrooms)
TR (truffels)
BE (bees / insects)
GR (grass / pasture)

Regional conclusions on NWFPs

- Mediterranean
 - Extremadura - cerdo ibérico" and cork as the products with the highest potential from a forest bioeconomy perspective – relevance of dehesas
 - Alentejo and Catalonia - cork and (pine nuts) relevant products
 - Mushrooms (e.g. gep, truffel), aromatic and medicinal plants (e.g. yellow lavender) important in gastronomy - further research needs to be undertaken about utilisation and production (e.g. yellow gentian)
- Boreal
 - North Karelia - bilberry most relevant, potential of birch sap and Pakuri mushrooms is high - production can be fairly integrated with wood production
- Alpine and Continental
 - larch resin indicates innovation potential at product and process level - relevant under the current bioeconomy discourse

Conclusions on forest owner perceptions

- “hands-on nurturer” live at or close to the farm are less limited by time constraints and know-how, may seek to harvest NWFPs opportunistically, steady income, low level of financial risks
- “urban value extractors” without any rural background, more financial power, but restricted by time resources and management skills focus on outsourcing - “high-cost/high-value” NWFPs may provide more attractive economic potential and opportunities for income generation
- performance differences between weights from forest owner profiles are small - more elaboration of different forest owners’ entrepreneurial behavior needed

General conclusions

- Interaction between NWFPs and services depends on specific ecological and socio-economic conditions and required scale of production
- Understorey plants and mushrooms tend to be influenced relatively stronger
- Forest management concepts that seek synergies and minimise tradeoffs are needed
- Harvesting, management and exploitation rights need to be defined for sustainable use
- Policies and legislation affecting NWFP-related value chains need to be coherent and consistent across scales to support bioeconomy strategies
- Boosting NWFP economy requires alliances with other sectors (industry, health, personal care, art, tourism, nature protection, biochemistry) to foster bio-based solutions and embedded products

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<https://www.bod.de/buchshop/non-wood-forest-products-in-europe-9783752675290>

