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Joint Research Centre

Crop pollination: disentangling the ecosystems service from the SNA products

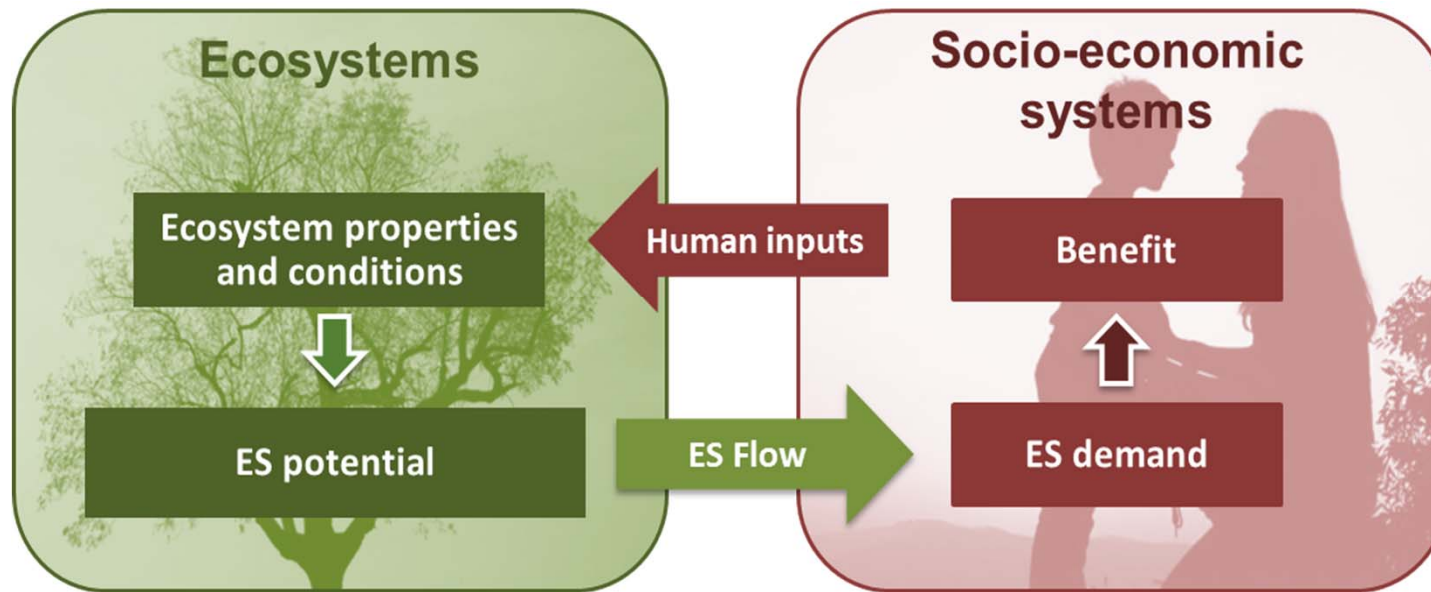
Presenter: Alessandra La Notte

Contributors: Sara Vallecillo, Chiara Polce, Joachim Maes

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JRC approach for Ecosystem Service Accounting



Crop pollination by wild insects

Wild insect pollinators



Pollination **POTENTIAL**

Pollinator-dependent crops



DEMAND for pollination

SEEA EEA
accounting
tables

USE of crop pollination



BENEFIT



Crop pollination potential

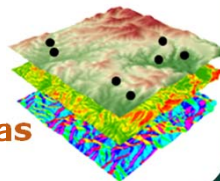
Expert-based model

- **Land Cover & roads**
(Food resources and nesting sites)
- **Irradiance & Temperature**
(Insect activity)
- **Distance to semi-natural areas**

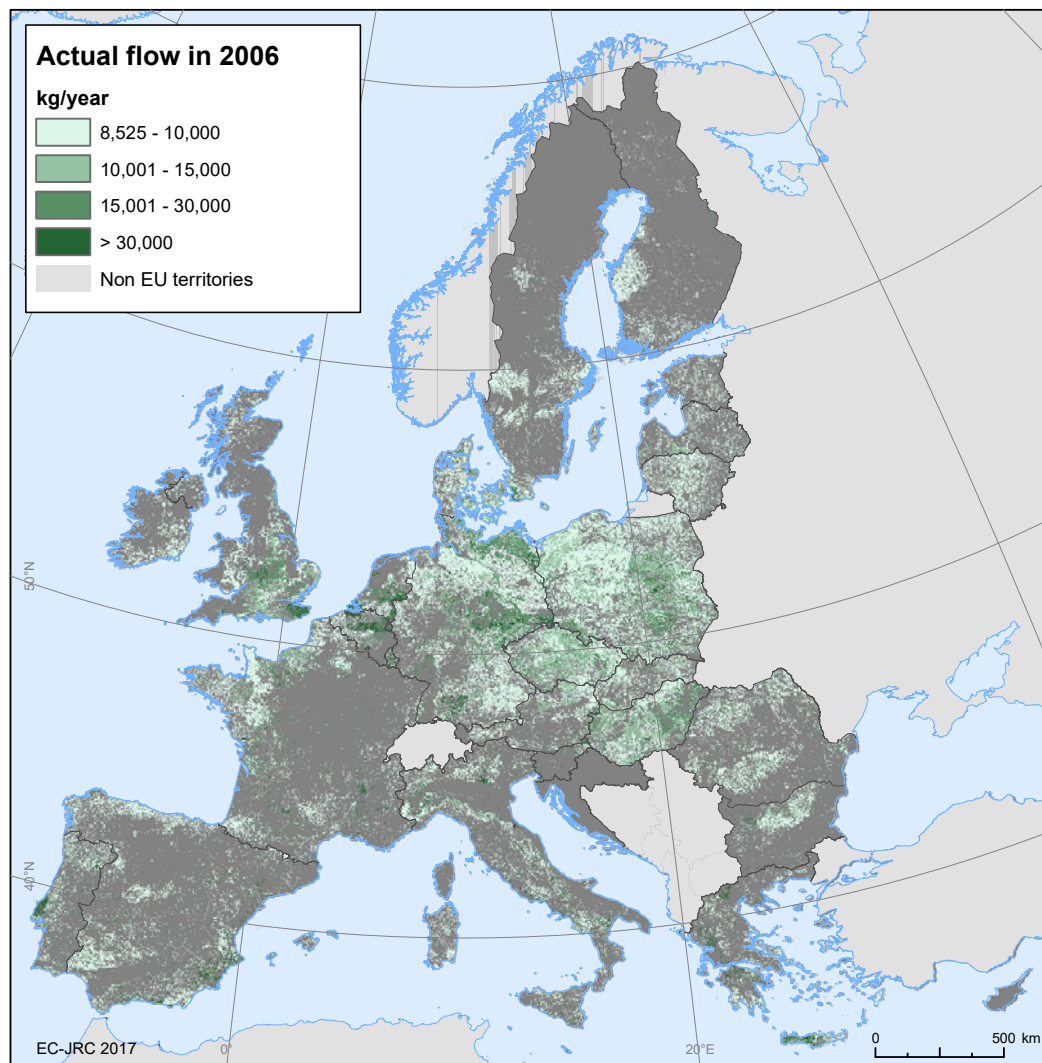


Species-distribution model

- **Species occurrences**
- **Land Cover (%)**
- **Climate**
- **Topography**
- **Distance to semi-natural areas**



Actual flow of crop pollination



How to use the biophysical model to disentangle the service from the product

	Agriculture									
	Apple, pear and peaches	Other fruits	Citrus	Protein crops	Oilseeds	Rape and rape seeds	Soya	Sunflower	Fibre plants	Tomatoes
AT	0.65	0.40		0.05	0.17	0.25	0.25	0.25	0.05	0.05
BE	0.64	0.39		0.04	0.16	0.23		0.07	0.05	0.05
BG	0.28	0.17		0.01	0.06	0.11	0.18	0.06	0	0.02
CZ	0.60	0.37		0.05	0.16	0.24	0.22	0.20	0.04	0.04
DE	0.57	0.35		0.04	0.15	0.21	0.25	0.23	0.04	0.04
DK	0.57	0.35		0.04	0.14	0.19			0.04	0.04
EE	0.63	0.39		0.05	0.17	0.24			0.05	0.05
EL	0.30	0.18	0.03	0.01	0.00	0.09	0.06	0.01		0.02
ES	0.26	0.16	0.02	0.00	0.01	0.03	0.08	0.01		0.02
FI	0.29	0.18		0.04	0.11	0.14		0.09	0.03	0.03
FR	0.29	0.17	0.03	0.02	0.05	0.05	0.04	0.05	0.03	0.03
HU	0.53	0.32		0.04	0.14	0.20	0.21	0.18	0.04	0.04
IE	0.26	0.16		0.03	0.13	0.10				0.04
IT	0.13	0.08	0.02	0.01	0.04	0.05	0.01	0.06	0.02	0.02
LT	0.64	0.39		0.05	0.17	0.24			0.05	0.05
LU	0.53	0.33		0.04	0.16	0.19	0.25	0.12		0.05
LV	0.65	0.40		0.05	0.17	0.25			0.05	0.05
NL	0.55	0.34		0.04	0.14	0.24		0.24	0.04	0.05
PL	0.59	0.36		0.04	0.16	0.22	0.22	0.22	0.05	0.04
PT	0.42	0.26	0.03	0.03	0.02	0.15	0.21	0.04		0.03
RO	0.47	0.29		0.02	0.06	0.05	0.06	0.04	0.02	0.02
SE	0.45	0.27		0.05	0.17	0.24		0.00	0.05	0.04
SI	0.58	0.36		0.04	0.15	0.20	0.20	0.12	0.05	0.04
SK	0.53	0.32		0.03	0.10	0.17	0.15	0.12	0.03	0.03
UK	0.55	0.34		0.04	0.13	0.17		0.19	0.04	0.04
EU	0.48	0.30	0.02	0.03	0.12	0.17	0.16	0.12	0.04	0.04
Dependency ratio according to the literature (Klein et al., 2007)										
	0.65	0.40	0.05	0.05	0.175	0.25	0.25	0.25	0.05	0.05

The assessment of the use area is a necessary preliminary step to the calculation of the actual flow

$$Actual\ Flow_{capri} = Yield * Dependency / 100$$

$$Pollination\ Contribution = \frac{Actual\ Flow_{capri}}{Total\ Production_{capri}}$$

$$Actual\ Flow_{ESTAT} = Pollination\ Ratio * Total\ Production_{ESTAT}$$

Be careful: the dependency ratio differs from the pollination contribution

Accounting for crop pollination

Agriculture										
Apple, pear and peaches	Other fruits	Citrus	Protein crops	Oilseeds	Rape and rape seeds	Soya	Sunflower	Fibre plants	Tomatos	Other
EU 28, mln euro										
SNA product										
2000	1,958	5,824	2,995	1,256	238	3,794	503	1,844	1,550	5,210
2006	2,241	5,923	3,238	884	155	4,177	287	1,585	1,135	5,928
2012	2,367	7,176	3,418	916	246	8,475	391	3,285	927	6,109

	Type of economic unit										Type of ecosystem unit			
	Agriculture										Green urban areas	Cropland	Grassland	Other
	Apple, pear and peaches	Other fruits	Citrus	Protein crops	Oilseeds	Rape and rape seeds	Soya	Sunflower	Fibre plants	Tomatos				
EU 28, mln euro														
Supply table														
crop pollination														
2000											2,668			
2006											3,130			
2012											4,357			
SNA met demand														
2000	588	1,941	1,142	673	148	1,845	69	348	191	2,696				
2006	682	2,343	1,217	436	106	2,124	66	410	155	2,932				
2012	712	2,946	1,240	466	170	4,323	106	807	110	3,221				
SNA unmet demand														
2000	703	2,045	1,795	548	60	1,374	414	1,399	1,350	2,376				
2006	761	2,313	1,960	425	28	1,390	201	1,057	972	2,845				
2012	823	2,604	2,115	426	46	2,805	253	2,249	812	2,721				
Use table														
crop pollination														
2000	667	1,037	58	35	30	575	20	97	10	139				
2006	797	1,267	62	23	22	663	20	118	8	151				
2012	833	1,626	63	24	30	1,348	32	229	6	166				

Issues that need to be discussed

- Need for more spatially and crop disaggregated agricultural statistics: it would be better to use agri-statistics rather than CAPRI data
- Which economic accounts to use for disentangling? Physical data and then apply price/ton or directly monetary data ? Average over three years?
- What adjustments to apply in order to deduct all the costs including produced capital (other than the net profit value of the ecosystem service)?

References



JRC TECHNICAL REPORTS

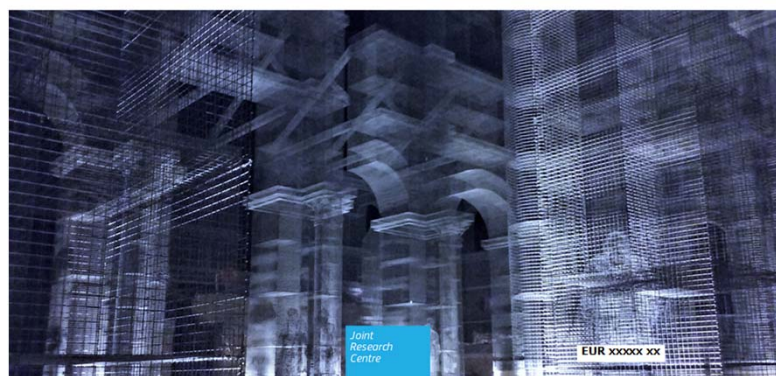
Implementing an EU system of accounting for ecosystems and their services

Initial proposals for the implementation of ecosystem services accounts

Report under phase 2 of the knowledge innovation project on an integrated system of natural capital and ecosystem services accounting in the EU

Alessandra La Notte, Sara Valledillo, Chiara Polce, Grazia Zulian, Joachim Maes

2017



JRC TECHNICAL REPORTS

Ecosystem services accounting

Part I Outdoor recreation and crop pollination

KIP INCA Report - contribution to the Knowledge and Innovation Project on an Integrated system of Natural Capital and ecosystem services Accounting in the EU

Sara Vallecillo, Alessandra La Notte, Chiara Polce, Grazia Zulian, Nikos Alexandris, Silvia Ferrini and Joachim Maes

2018

