## Estimating the value of six ecosystem services in Europe

## **KIP INCA**

Alessandra La Notte



### OUTLINE

- What did we do
- Which services did we value
  - Fast-track approach
  - Modelling approach
  - Mixed approach
- Results
- Management: pros and cons
- Uses of the accounts



#### Knowledge Innovation Project - Integrated system for Natural Capital Accounting (KIP-INCA)

**Objective**: to develop a system of natural capital accounting for Europe, consistent with System of integrated Environmental and Economic Accounts – Experimental Ecosystem Accounts (SEEA EEA by UNSD)

#### Eurostat:

Coordination of INCA, data provider, SEEA EEA alignment/ testing

#### **DG Environment**:

Provides policy context, manages MAES, principal user of INCA outputs INCA partners

#### DG Research and

**Innovation**: Coordination between INCA and EU research activities

#### European Environment Agency:

Developing shared data platform and ecosystem extent and condition accounts, data provider

#### EC Joint Research Centre:

expertise in modelling ecosystem services, developing ecosystem services accounts



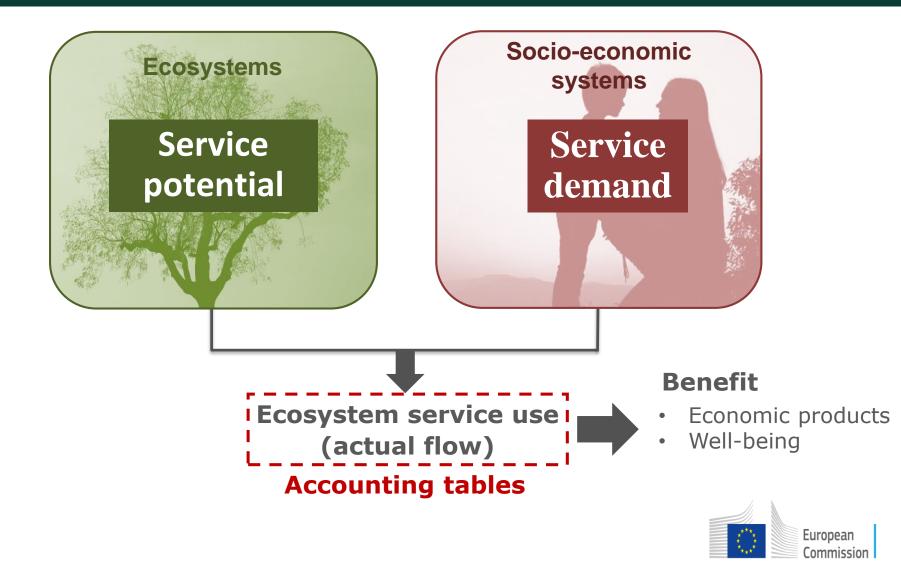
### Ecosystem Services Accounts (JRC)



Relevant references provided at the end of the presentation



# JRC approach on ecosystem services



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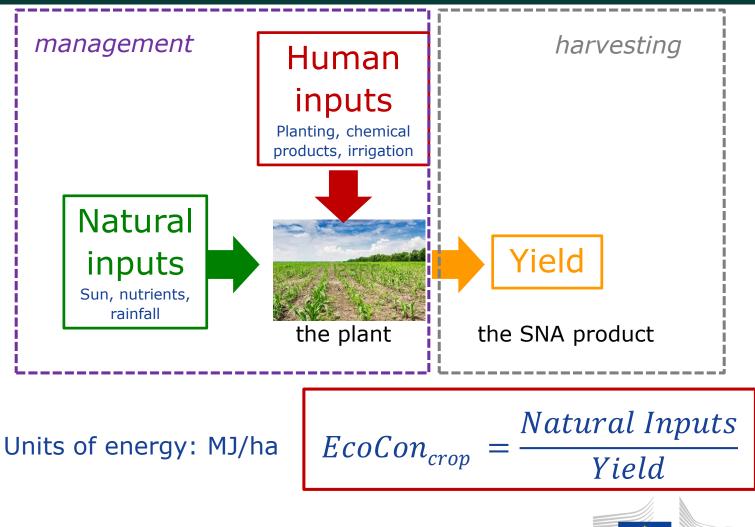


#### Ecosystem services assessed in KIP-INCA

Biophysical and monetary accounts	INCA work plan	Valuation technique	
PROVISIONING			
Crop provision	2018-19	Mkt price	
Timber provision	2018-19	Mkt price	
REGULATING AND MAINTENANCE			
Crop pollination	2017-18	Mkt price	
Soil erosion control 🤹	2019-20	Replacement cost	
Water purification (upd.) 🕵	2019-20	Replacement cost	
Global climate regulation	2018-19	Carbon rates	
Habitat maintenance ĸ	2019-20	Choice experiment	
Flood control	2018-19	Avoided cost	
CULTURAL			
Nature-based recreation	2017-18	Travel cost method	



#### Fast-track approach: crop provision

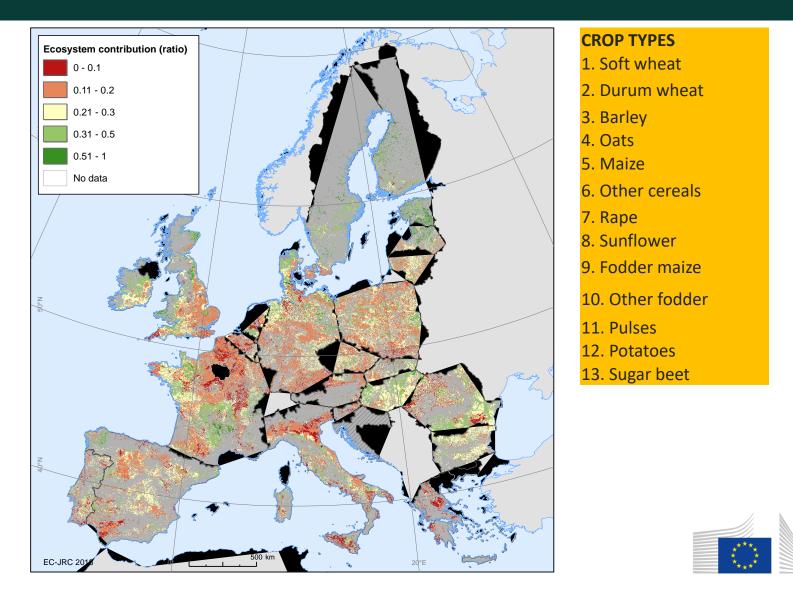


Based on CAPRI data: Pérez-Soba et al. 2020. JRC Technical report



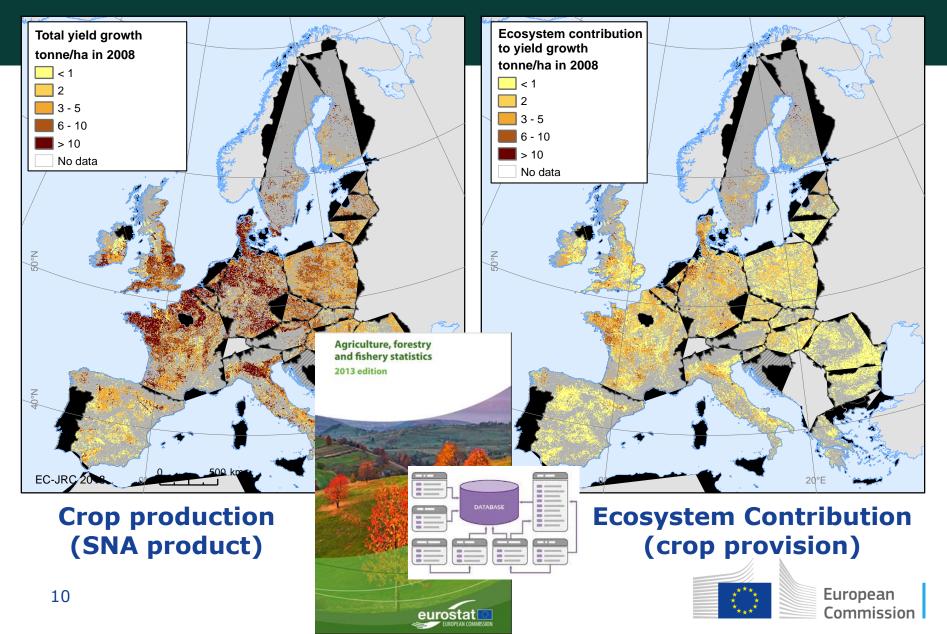
European Commission

#### Fast-track approach: crop provision

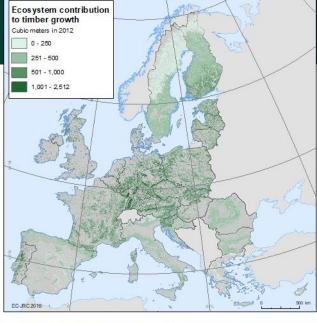


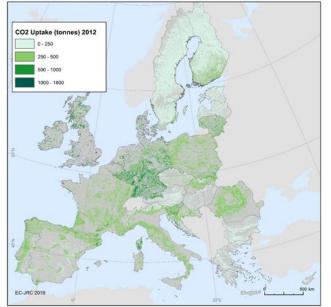
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#### Fast-track approach: crop provision



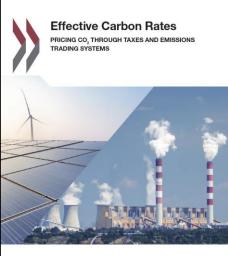
## Fast-track approach: timber provision and GHG regulation





Agriculture, forestry

and fishery statistics



OECD



European Commission

## Modelling approach: nature-based recreation [biophysical modelling]

#### Land cover

• Suitability of land to support recreation

#### Natural settings

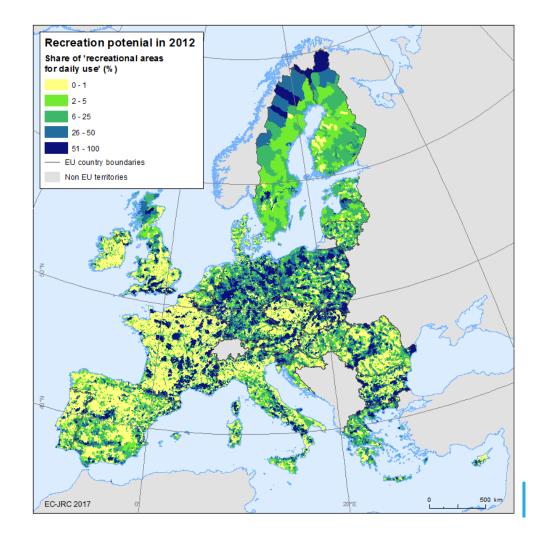
Protected areas

#### Water

- Presence and geomorphology of coast
- Lakes
- Bathing water quality

#### Features to reach

- Distance to the road network
- Distance to residential areas



### Modelling approach: nature-based recreation [monetary modelling]

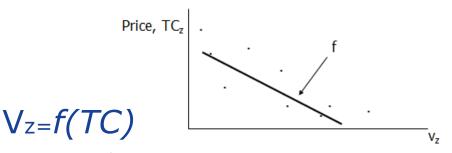
Potential users (within 4 km) How often do they use recreational areas?

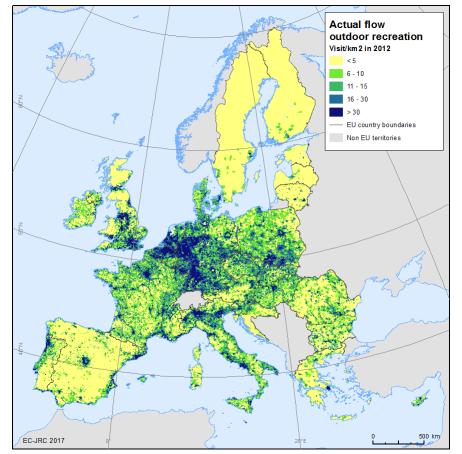
Potential visits (actual flow)

#### Mobility model/trip generation function

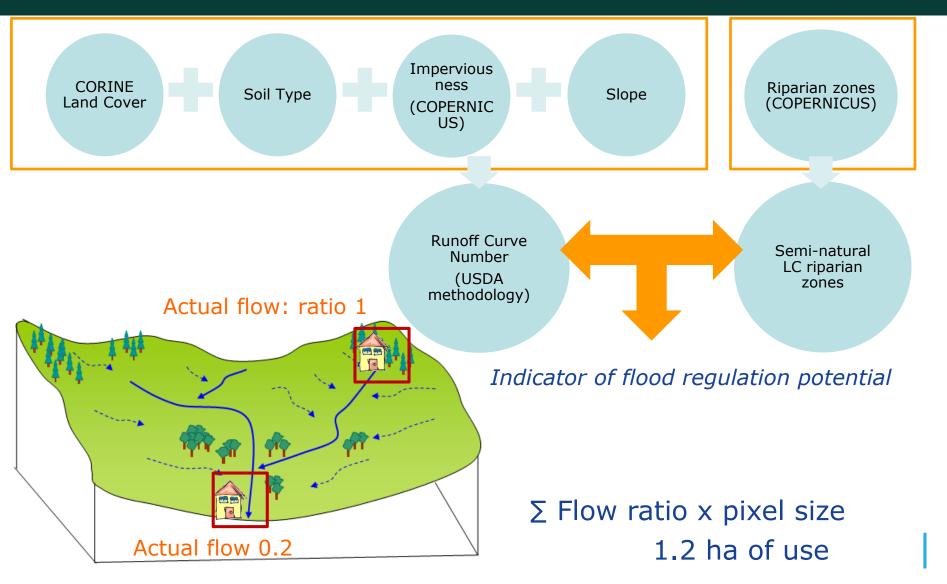


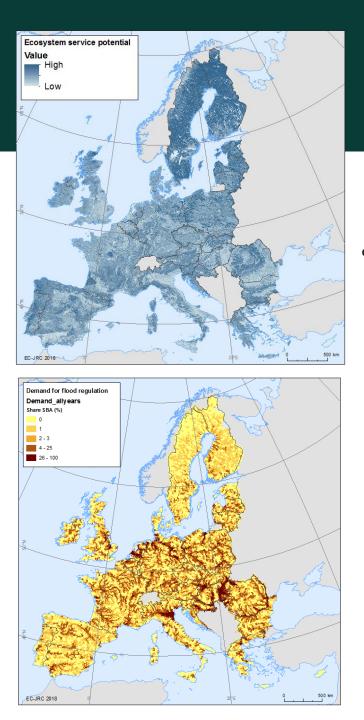




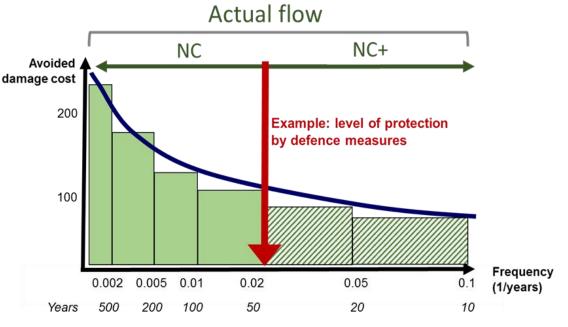


### Modelling approach: flood control [biophysical modelling]





### Modelling approach: flood control [monetary modelling]



NC: flood control derived from natural capital

NC+: flood control derived from natural capital in support to defence measures

#### **Expected Annual Avoided Cost**

EAAD  $\approx \Sigma ((f_i - f_{i-1})^* (A_i + A_{i-1})/2)$ 



## Mixed approach: crop pollination [biophysical modelling]

#### **Expert-based model**

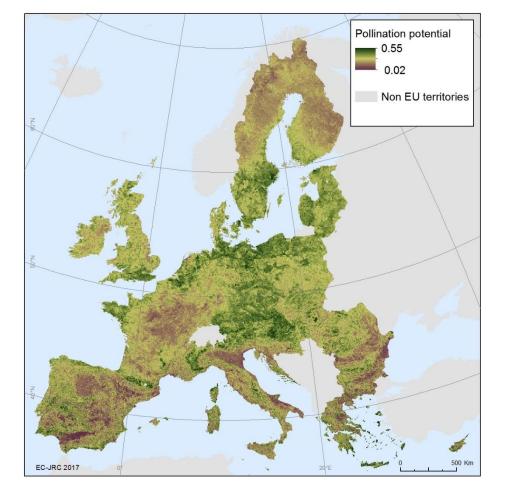
- Land Cover & roads
   (Food resources and nesting sites)
- Irradiance & Temperature (Insect activity)

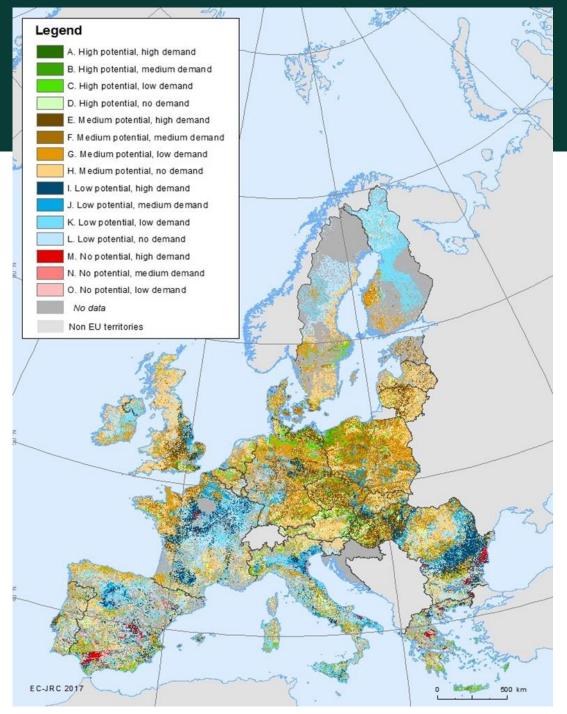


Distance to semi-natural areas

#### **Species-distribution model**

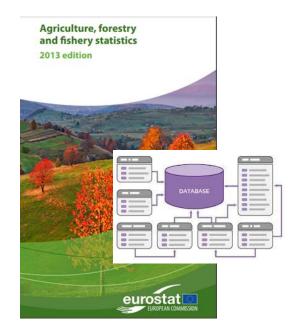
- Species occurrences
- Land Cover (%)
- Climate
- Topography
- Distance to semi-natural areas





### *Mixed approach: crop pollination*

#### [fast-track monetary valuation]





European Commission

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## ES supply and use tables

Year 2012, million EUR	Ecosystem type									
				and	and	land				_
Ecosystem service	Urban	Cropland	Grassland	Heathland a shrub	Woodland a forest	Sparsely vegetated la	Wetlands	Rivers and lakes	Coastal and intertidal areas	TOTAL
Crop provision		20,560	0	ΥS	> - <u>-</u>	<u> </u>	>	<u> </u>	ים בי. ∪	20,560
Timber provision					14,540					14,540
Global climate regulation	20	150	850	20	13,330	20	0	NA	NA	14,390
Flood control	90	1,020	3,130	360	11,390	0	330	NA	NA	16,320
Crop pollination		9,720								9,720
Nature-based recreation	80	4,070	7,480	3,100	30,720	1,350	2,300	1,020	280	50,400
Total	190	35,520	11,460	3,480	69,980	1,370	2,630	1,020	280	125,930
Value in EUR/km <sup>2</sup>	880	22,090	22,610	19,250	44,010	23,410	26,890	9,320	14,530	28,740

Ecosystem types yearly provide ES flows...

NA: not assessed

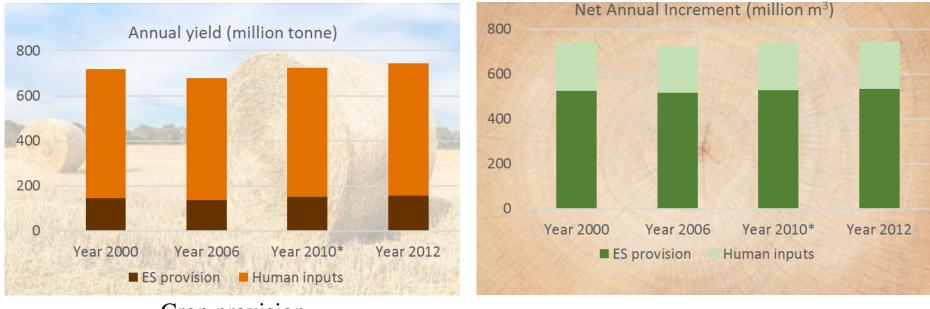
Values rounded to the nearest tens

...that enter the SNA as intermediate consumption for Economic Sectors (NACE) and as final consumption for Households and Global Society

Year 2012, million EUR	Economic units						
Ecosystem convice	Agriculture	Forestry	Industry	Services	Households	Global society	TOTAL
Ecosystem service Crop provision	20,560				<u> </u>		20,560
	20,300	44550					-
Timber provision		14,550					14,550
Global climate regulation						14,400	14,400
Flood control	800	0	2,400	1,380	11,730		16,310
Crop pollination	9,720						9,720
Nature-based recreation					50,390		50,390
Total	31,080	14,550	2,400	1,380	62,120	14,400	125,930

Values rounded to the nearest tens

#### Trend of crop and timber provision

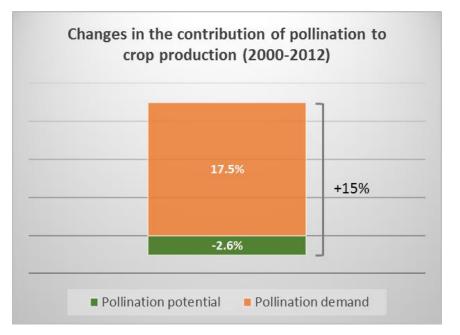


Crop provision

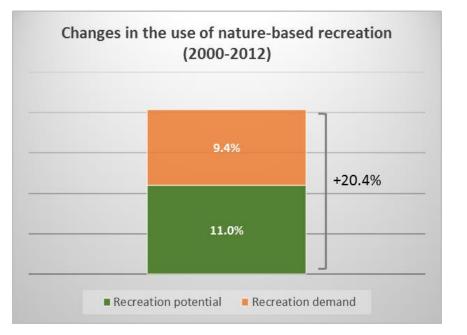
Timber provision



## Trend of crop pollination and nature-based recreations

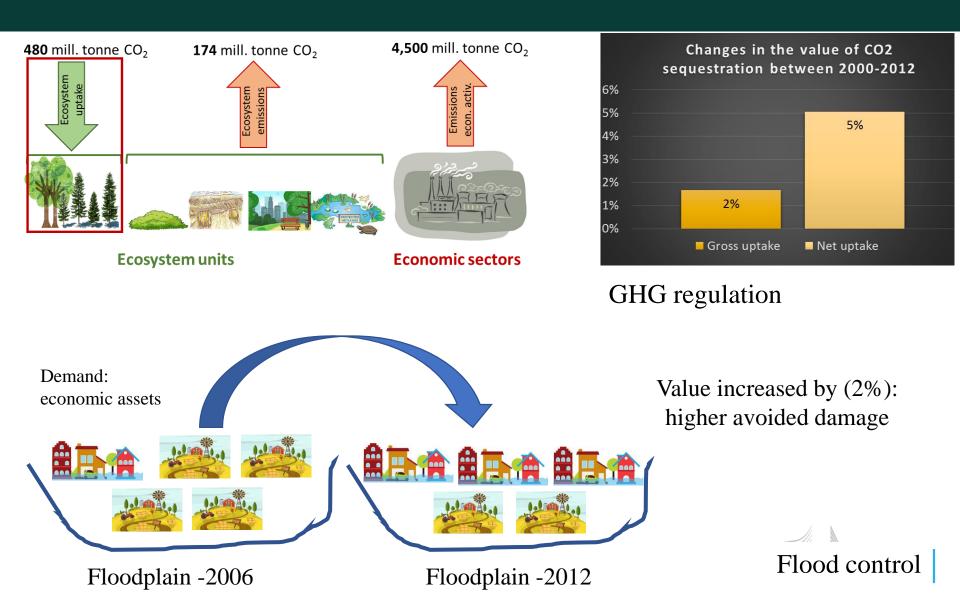


Crop pollination



#### Nature-based recreation

### Trend of GHG regulation and flood control



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Ecological modelers: inhouse Valuation models: inhouse + external contracts

First the experimental applications – now I need to build tools (GIS plug-in) to allow replications

Test and correct:

- Refinement of biophysical models in terms of input data and in terms of procedure
- Alternative valuation techniques to facilitate interpretation of relative values by practicioners



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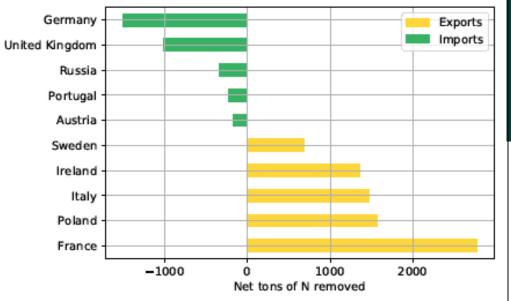


Linking accounts for ecosystem Services and Benefits to the Economy Through bridging (LISBETH)

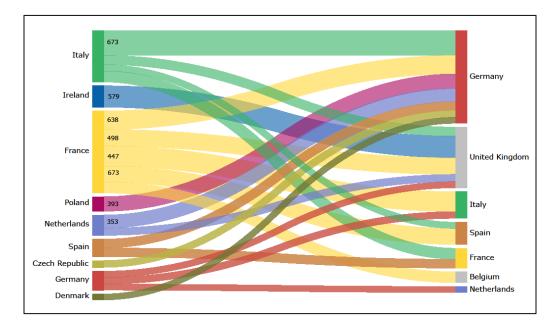
> Natural Copilal Accounts and economic models extension and application

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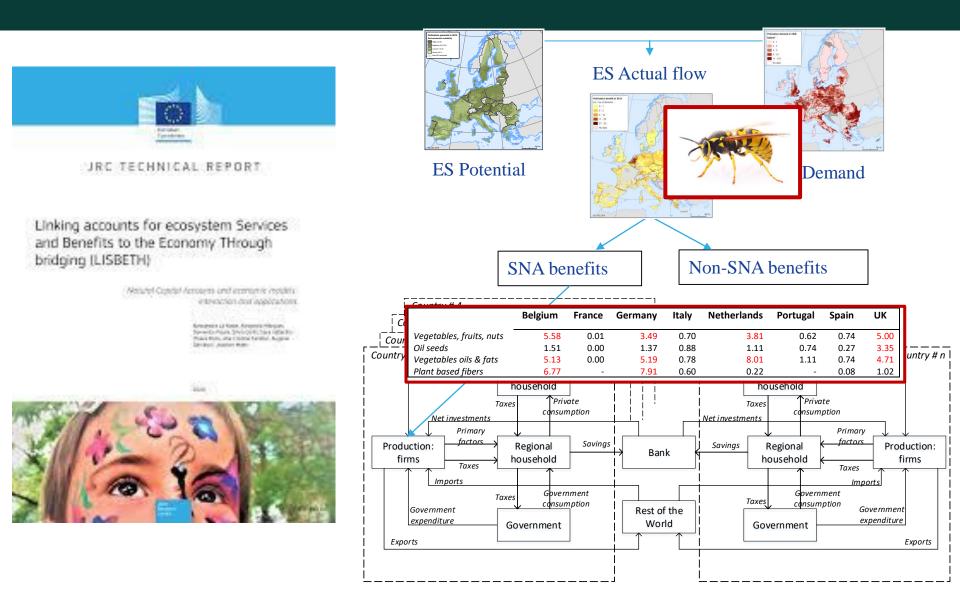




Multi-regional input-output analysis -> Water purification embedded in agricultural products traded in EU



#### Uses



## What was mostly appreciated of the accounts by policy DGs

Appropriate inclusion of the ecological component within a cause-effect chain from ecosystems to economy and society

Assessment of ES unmet demand

Need to test and develop uses concerning the monetary accounts



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- La Notte, A., Marques, A., Pisani, D., Cerilli, S., Vallecillo, S., Polce, C., Cardoso, A.C., Gervasini, E. and Maes, J. (2020) Linking accounts for ecosystem Services and Benefits THrough bridging (LISBETH), EUR 30193 EN, Publications Office of the European Union, retrieved from

https://publications.jrc.ec.europa.eu/repository/bitstream/JRC120571/jrc\_report\_lisbeth\_final\_1.pdf

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## Thank you

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