



Economic impact of invasive alien species

*linking Ecosystem Service accounts
to General Equilibrium models*

Alessandra La Notte

24th Annual Conference on Global Economic Analysis

25 June 2021

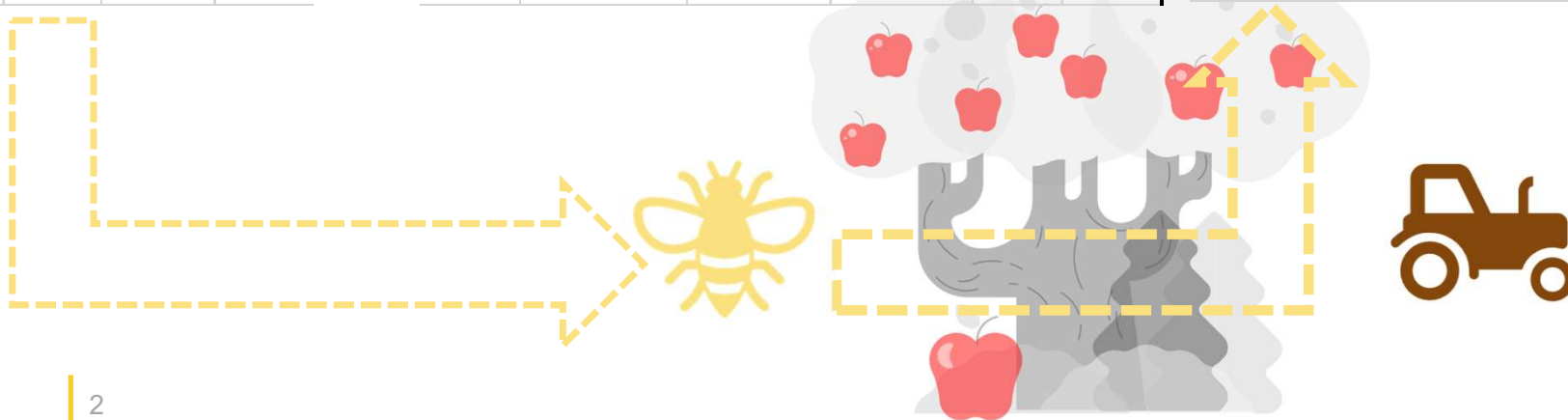
Joint
Research
Centre

Mainstreaming ecosystems into the economy

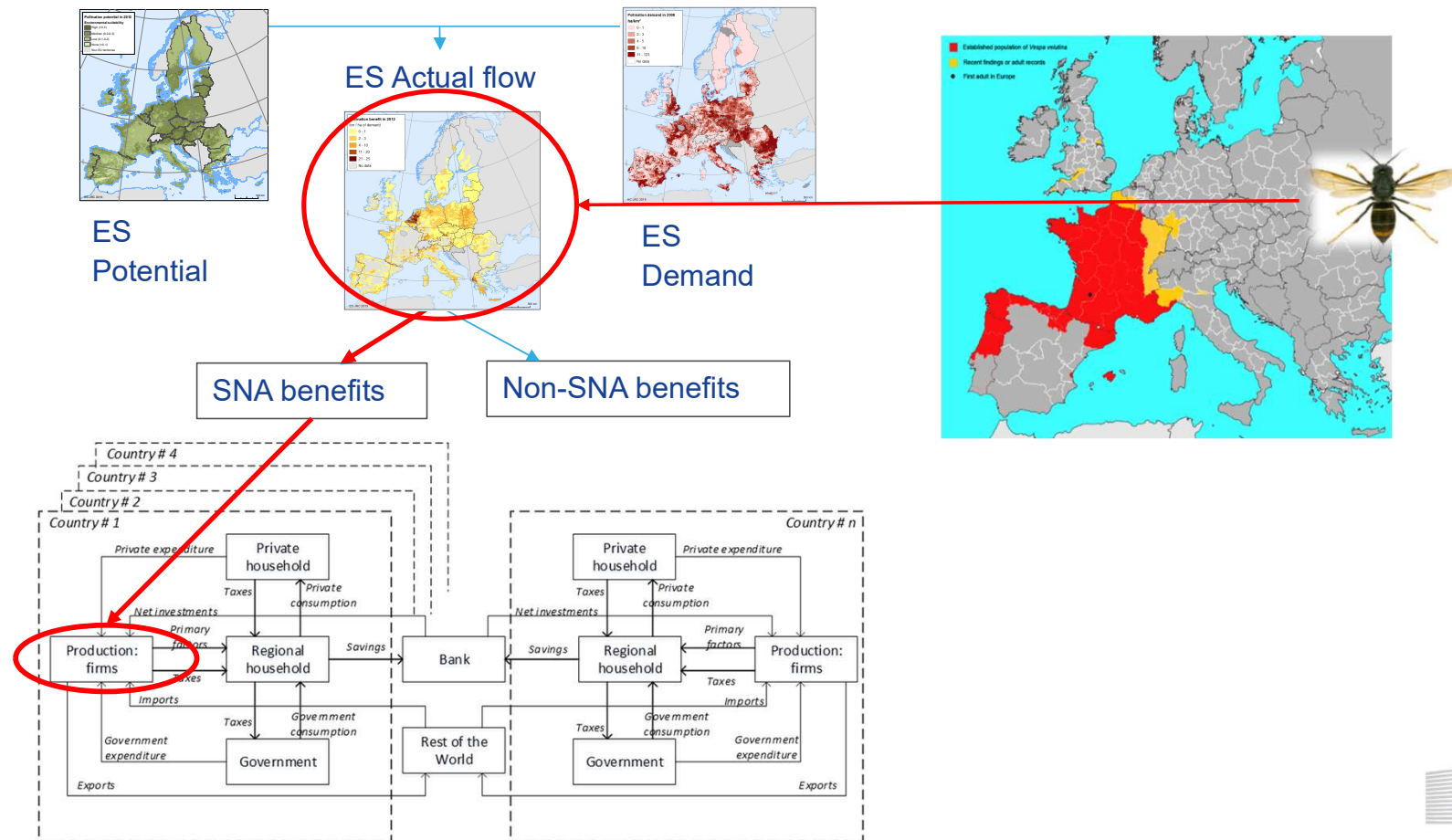
economic value $\neq$ economic impact

171 bln

Ecosystem types										Economic Unit					
Urban	Cropland	Grassland	Woodland and forest		Wetland	Heathland and shrub	Sparsely vegetated land	River and lake	Coastal/intertidal area	Primary sector		Secondary sector	Tertiary sector	Households	Global society
			Forest Available for Wood Supply	Other forest						Agriculture	Forestry				
0.7	35.4	8.7	47.8		1.7	2.2	0.9	2.4	0.2	37.3	8.6	10.4		37.9	5.4



If we are interested in economic impact...
...we need to track cause-effect over an extended chain



Talk the same language (and follow the same mechanism) to bridge current advanced knowledge

supply table	
Ecosystem types	
ES	urban
	cropland
	grassland
	forest & woodland
	heathland & shrub
	sparse vegetation
	wetland
	ivers and lakes
	marine

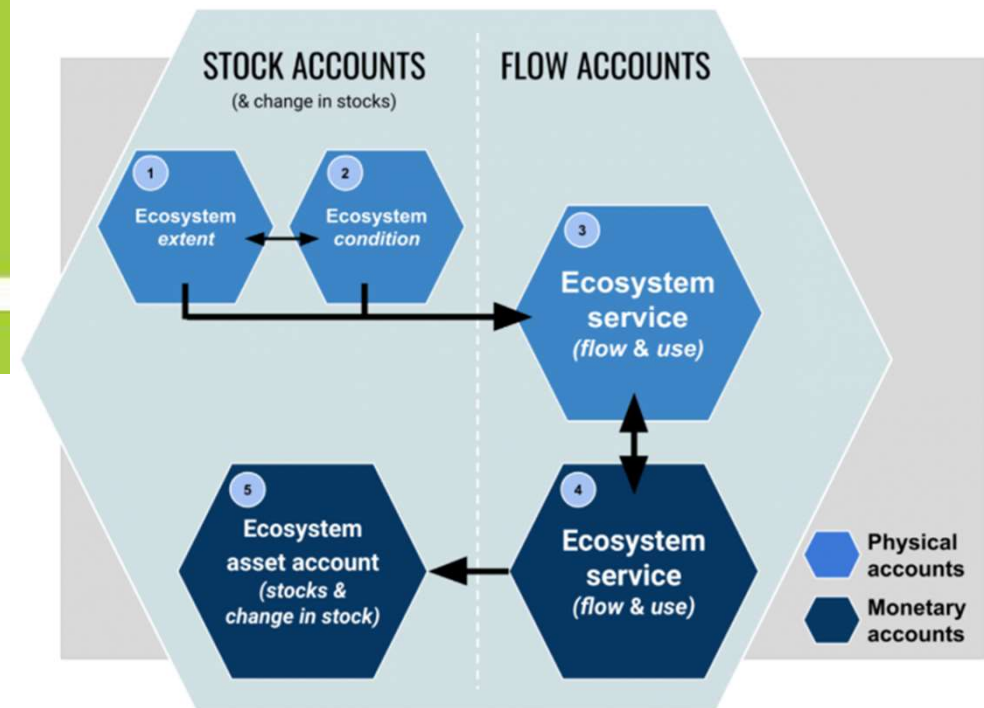
use table	
Economic Unit	
ES	agriculture
	forestry
	fisheries
	mining and quarrying
	manufacturing
	construction
	transportation and storage
	accommodation and food services
	electricity, gas supply
	water collection, treatment, supply

supply table	
Economic Unit	
PRODUCTS	agriculture
	forestry
	fisheries
	mining and quarrying
	manufacturing
	construction
	transportation and storage
	accommodation and food services
	electricity, gas supply
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System of integrated Environmental and Economic Accounts (SEEA)





SYSTEM OF ENVIRONMENTAL ECONOMIC ACCOUNTING

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No longer will we allow mindless
environmental destruction to be
considered as economic progress

*António Guterres, Secretary-General of the
United Nations*

Important!

The 52nd United Nations Statistical Commission, on March 2021, has adopted the [System of Environmental-Economic Accounting—Ecosystem Accounting \(SEEA EA\)](#). This new statistical framework will enable countries to measure their natural capital and understand the immense contributions of nature to our prosperity and the importance of protecting it.



UN adopts a new statistical standard to measure the value of ecosystems

11/03/2021



The UN Statistical Commission has adopted a new statistical standard - the 'System of Environmental-Economic Accounting-Ecosystem Accounting' (SEEA-EA). It provides an accounting framework to measure the contribution of ecosystems to our society, their condition (health) and the services they provide to us.

For example, following the SEEA-EA guidelines, we can calculate the value of the services that pollinators provide to our society. Pollinators – e.g. bees, butterflies and bumblebees – contribute to crop production in the EU at an estimated value of €3.7 billion per year. More importantly, we can determine not only where and how much of this service is being supplied by nature, but also where it is missing – the unmet demand. 50% of agricultural areas where pollinator dependent crops, in particular fruit trees, are grown, do not provide suitable conditions for pollinators (e.g. nesting sites). As a result, there are not enough pollinators. Restoring pollinator habitats in agricultural land has a potential to double the benefit from pollination.

Ecosystem accounts can also support Sustainable Development Goals (SDG) monitoring, for example, quantify open access to green spaces in cities (SDG 11 Sustainable cities and communities), changes in the extent of forest area, or land degradation and restoration (SDG 15 Life on land). European official statistics produced on the basis of the UN standard will be used for the implementation of the European Green Deal.

European statistics produced on the basis of the UN standard will be used for the implementation of the European Green Deal

Why to care?

Integrated system for Natural Capital Accounting (INCA)

Eurostat:

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

European Environment Agency:

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

INCA partners

DG Environment:

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

DG Research and Innovation:

Coordination between INCA and EU research activities

EC Joint Research Centre:

Operation of information systems, expertise in modelling ecosystem services, developing ecosystem services units



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Map Tool

INCA offers EU ecosystem accounts, maps and tables that allow exploring the contributions of ecosystems to people and the economy.

[START](#)

Ecosystem Services

Data and maps of the potential, use and demand for ecosystem services.



Accounting Tables

Supply use tables per ecosystem service for different years at EU level



Ecosystem Extent

Information about the total extent or area of different ecosystem types in an accounting area.



National Data

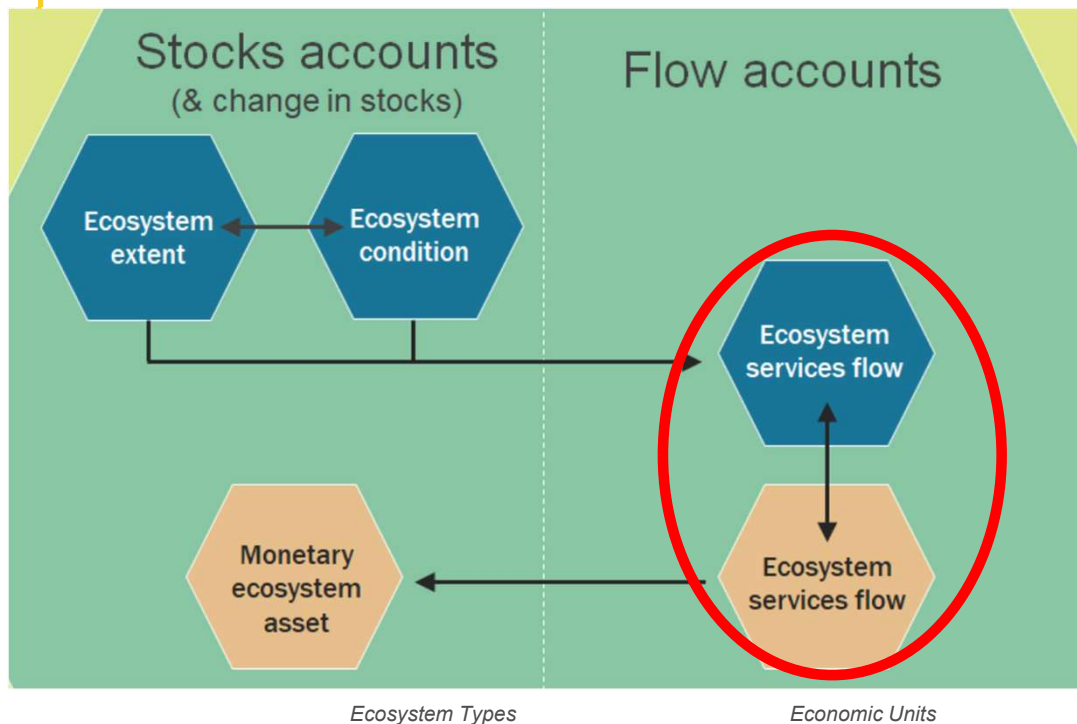
Potential, flow and demand of ecosystem services at national level



EU supply and use tables

These tables provide monetary estimates of the flow of ecosystem services from ecosystems to economic sector. The tables contain ag

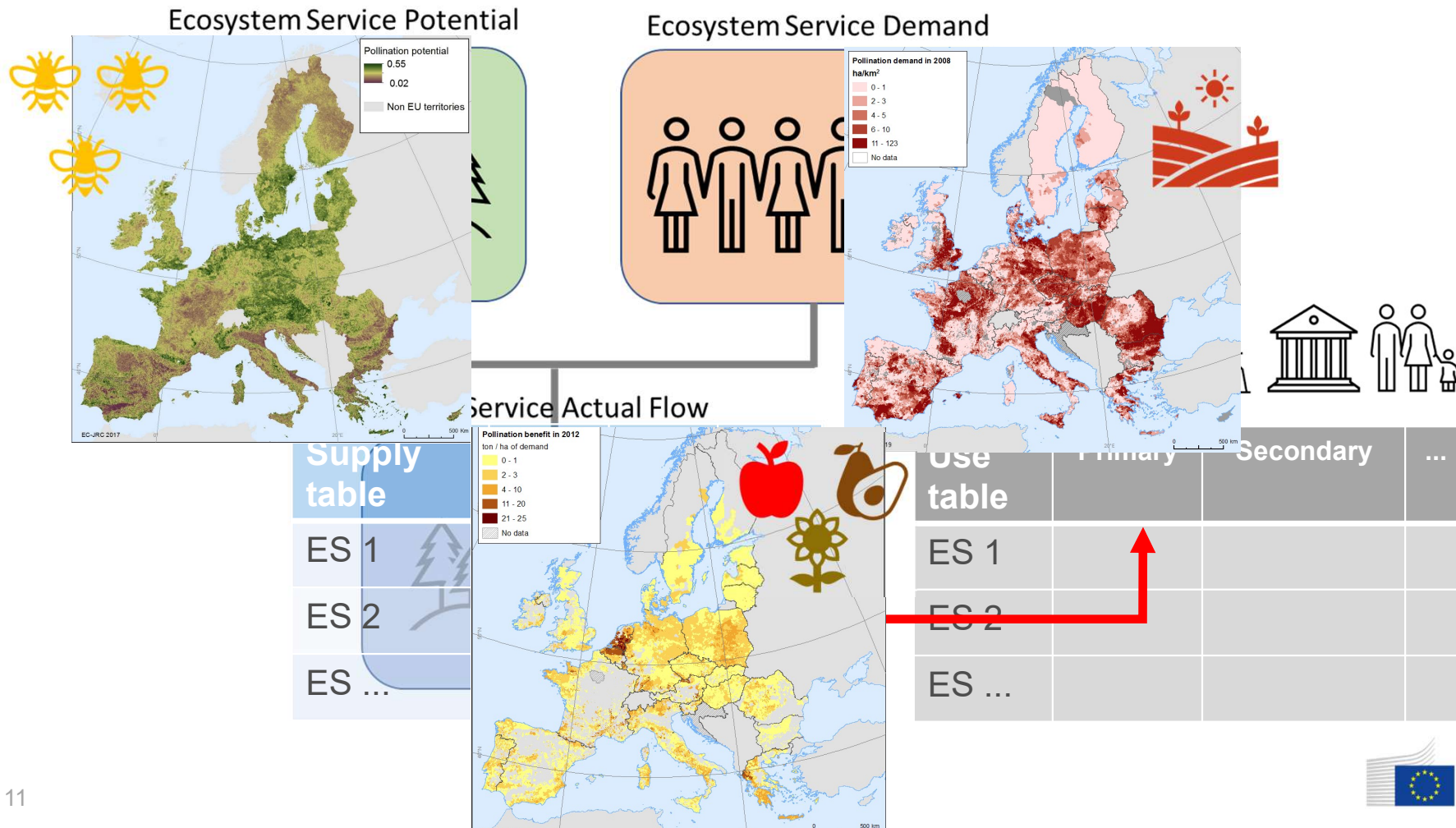
Ecosystem Services accounts (Supply and Use tables)



Supply table	ET 1	ET 2	...	Use table	Primary	Secondary	...
ES 1				ES 1			
ES 2				ES 2			
ES ...				ES ...			

Ecosystem Service actual flow is the “transaction” from Ecosystem Types to Economic Units

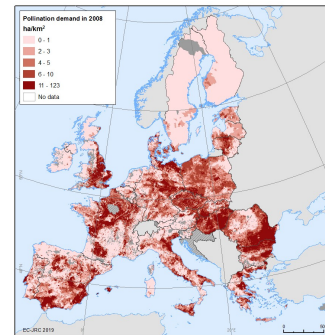
INCA structure behind Supply and Use tables



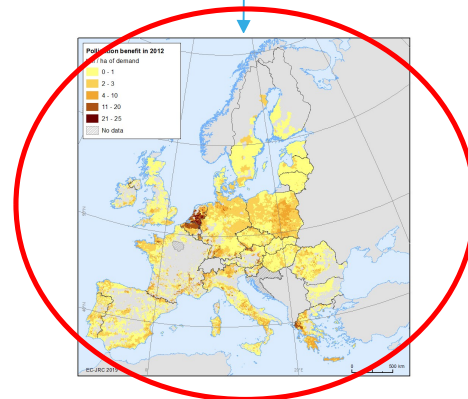
The case study: Asian hornet impact in EU



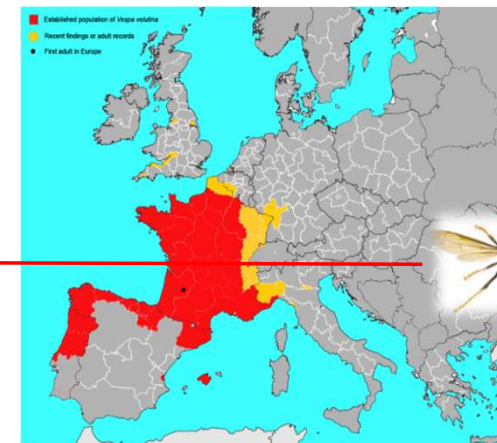
ES Potential



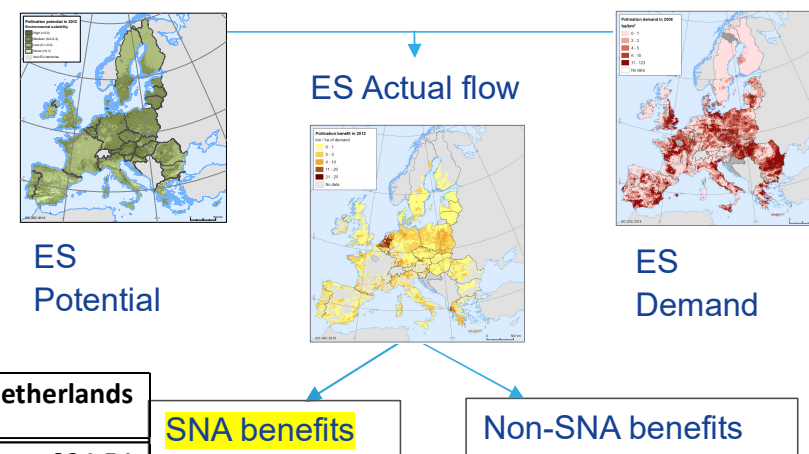
ES Demand



ES Actual flow

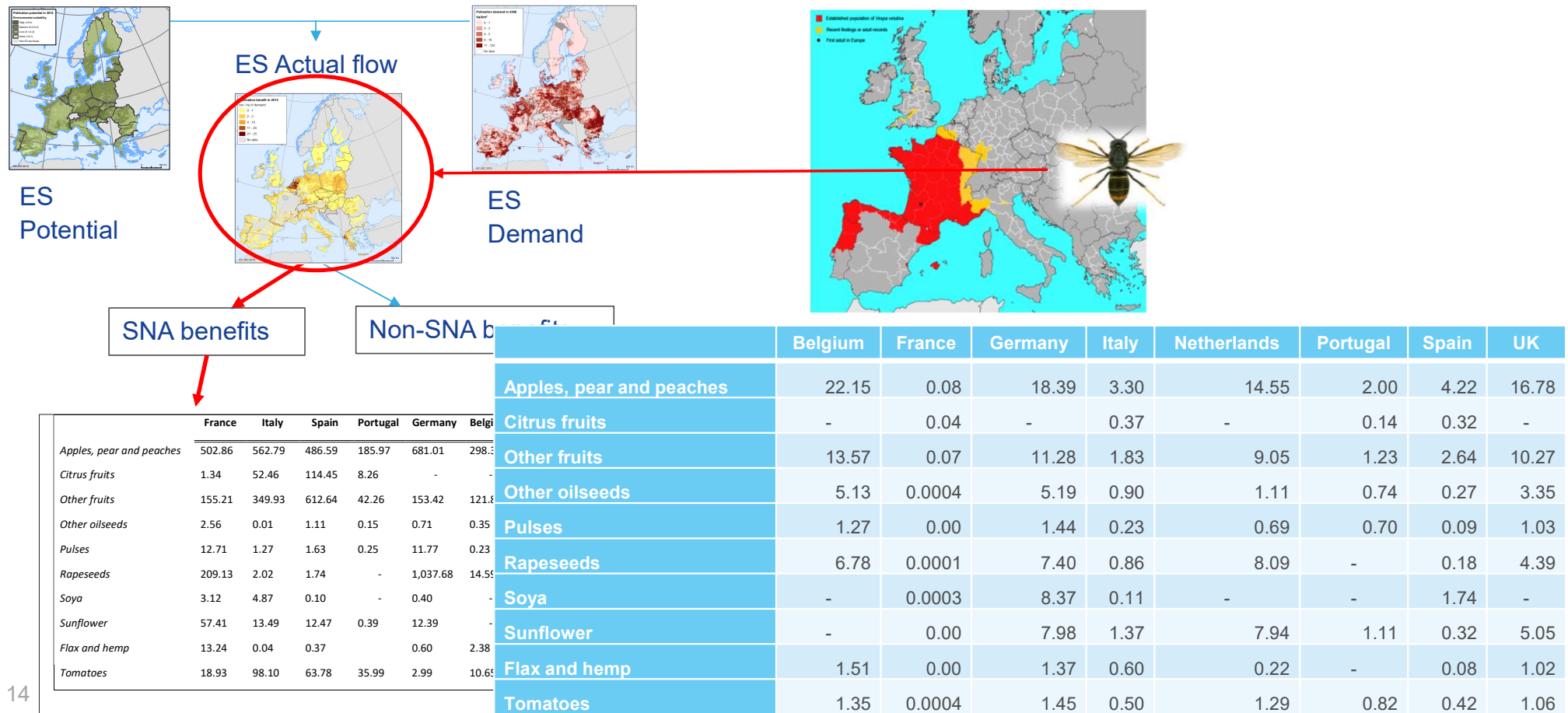


Crop pollination accounts



	France	Italy	Spain	Portugal	Germany	Belgium	Netherlands
<i>Apples, pear and peaches</i>	502.86	562.79	486.59	185.97	681.01	298.35	324.54
<i>Citrus fruits</i>	1.34	52.46	114.45	8.26	-	-	-
<i>Other fruits</i>	155.21	349.93	612.64	42.26	153.42	121.87	117.88
<i>Other oilseeds</i>	2.56	0.01	1.11	0.15	0.71	0.35	0.07
<i>Pulses</i>	12.71	1.27	1.63	0.25	11.77	0.23	0.25
<i>Rapeseeds</i>	209.13	2.02	1.74	-	1,037.68	14.59	2.05
<i>Soya</i>	3.12	4.87	0.10	-	0.40	-	-
<i>Sunflower</i>	57.41	13.49	12.47	0.39	12.39	-	0.63
<i>Flax and hemp</i>	13.24	0.04	0.37		0.60	2.38	0.68
<i>Tomatoes</i>	18.93	98.10	63.78	35.99	2.99	10.65	37.49

Assessing the shock of Asian hornet on pollination contribution to crop yield (INCA)



based on UN Geoscheme

From INCA to GTAP: the challenges

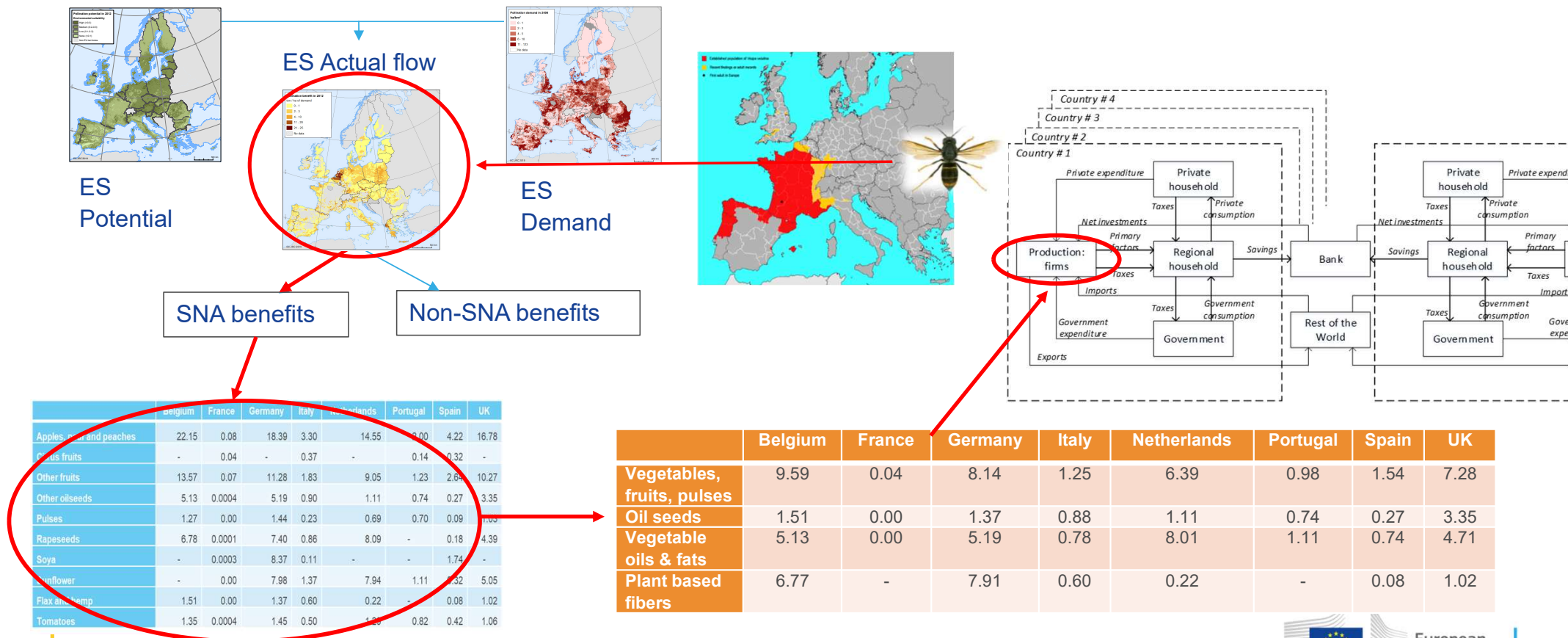
GTAP aggregation	GTAP Codes	Correspondence with ES accounts
Vegetables, fruits and pulses	v_f [4]	Apples, pears, peaches; citrus fruits, other fruits, tomatoes, pulses
Plant based fibers	pfb [5]	Flax and hemp
Oil seeds	osd [7]	Oil seeds
Other agricultural products	other agri [1-3,6,8-20]	[linked sectors]
Vegetables oils & fats	vol [21]	Soya, sunflower, rapeseeds
Food and beverage	other food & beverage [22-26]	[linked sectors]
Textile	tex [27]	[linked sectors]
Wearing apparel	wap [28]	[linked sectors]
Rest of sectors	other sectors [29-57]	[not linked sectors]

1. Belgium [BE]
2. France [FR]
3. Germany [DE]
4. Italy [IT]
5. Netherlands [NL]
6. Portugal [PT]
7. Spain [ES]
8. United Kingdom [UK]
9. Eastern Europe [EE]
10. Northern Europe [NE]
11. Southern Europe [SE]
12. Western Europe [WE]
13. Africa
14. Northern America [NA]
15. Latin America [LA]
16. Central America [CA]
17. Asia
18. Rest of the World [ROW]

Not all products reported in “Vegetables, fruits, nuts” are affected by the *Asian hornet* -> need to shock not the whole sector, but only part of it

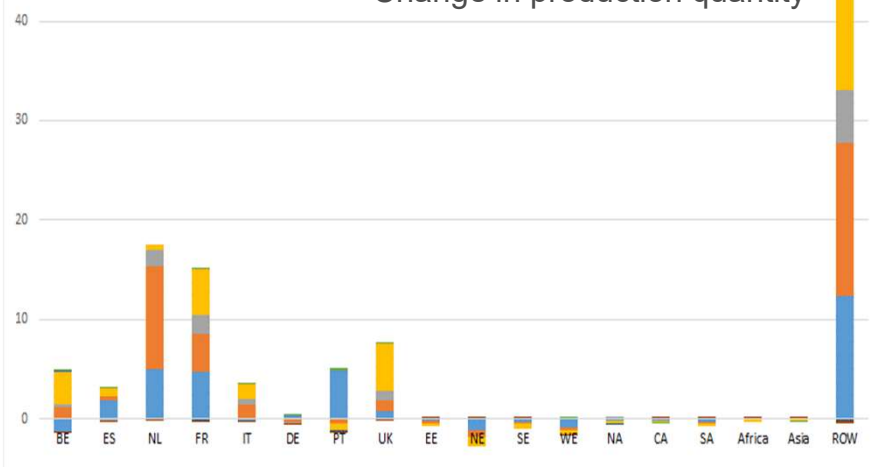
To obtain an estimate of the extent of “Vegetables, fruits, nuts” under consideration, we use the ESTAT dataset (specifically [apro_cpsh1]) and calculate for each country affected by the *Asian hornet* the proportion of pollinator-dependent crops

Assessing the shock of Asian hornet on pollination contribution to crop yield (GTAP)

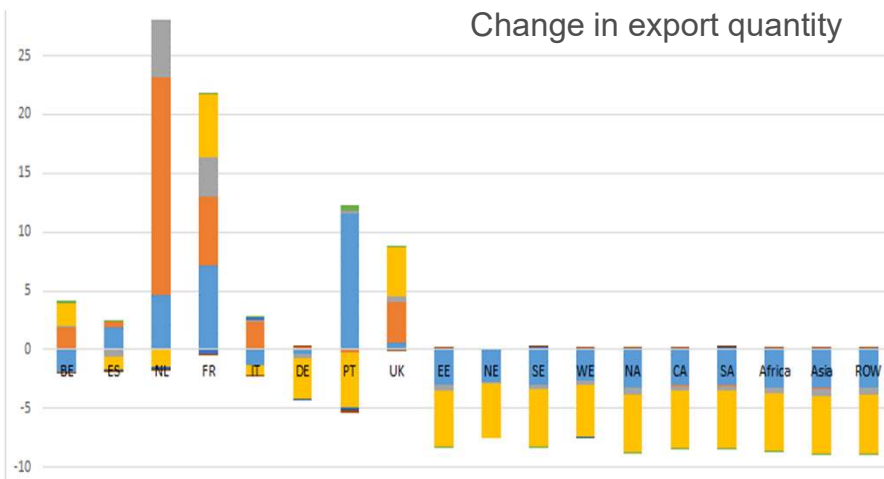


Impact of Asian hornet: missed gains

Change in production quantity

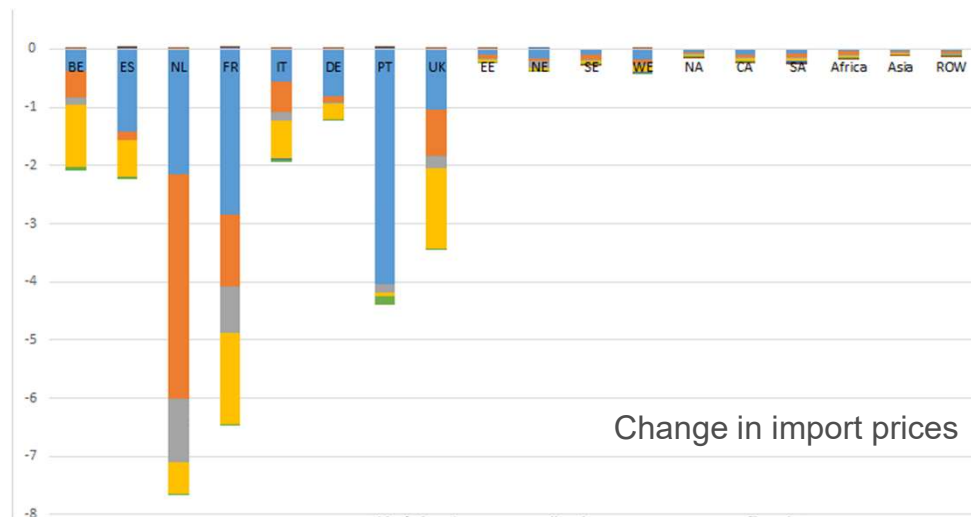


Change in export quantity

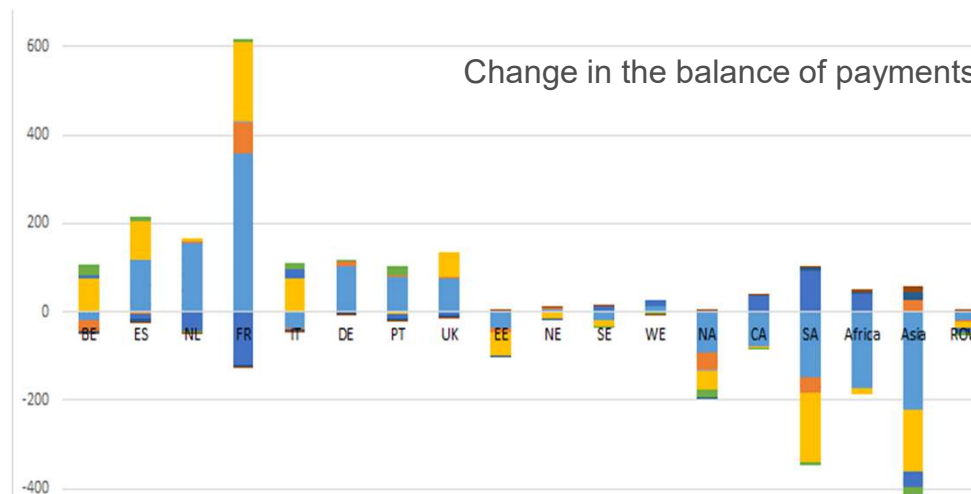


- vegetable, fruit, pulses
- vegetable oil and fats
- textile industry
- oilseeds
- other agri sectors
- wearing industry
- fiber plants
- food industry

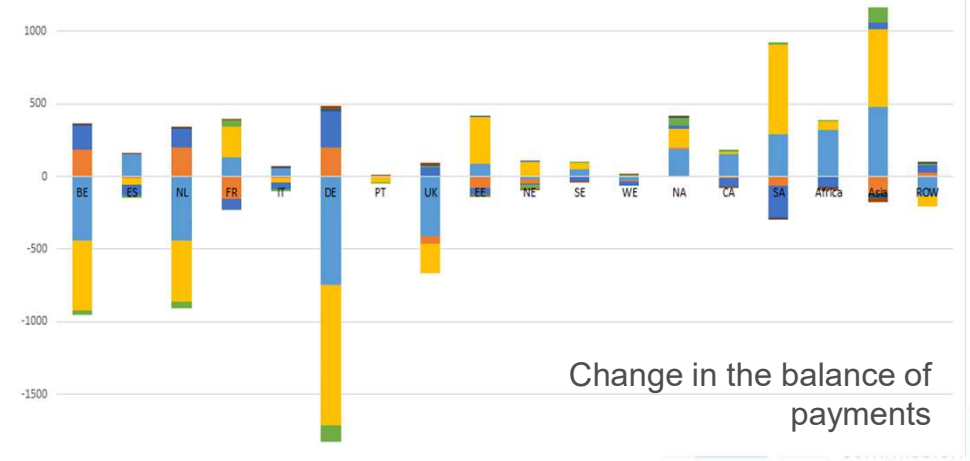
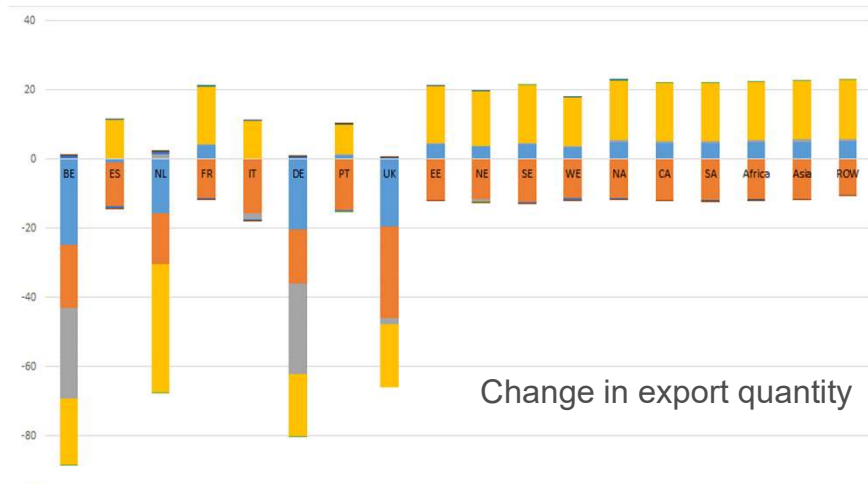
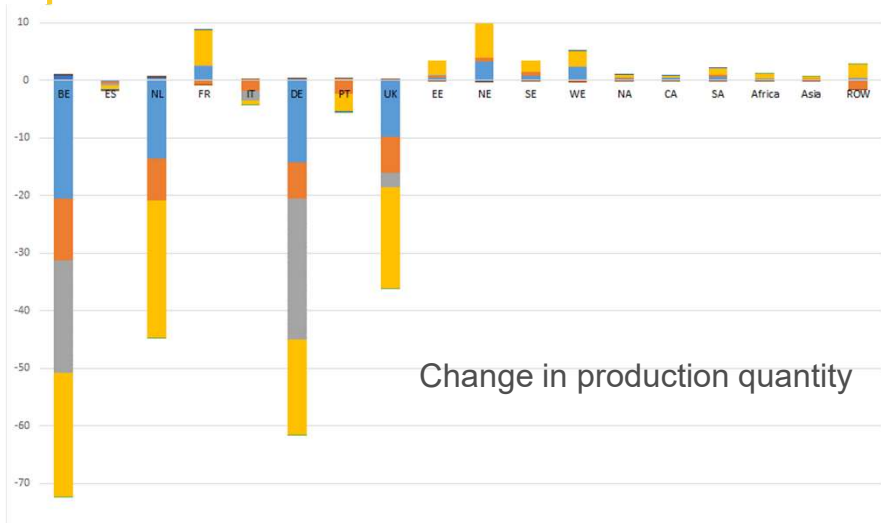
Change in import prices



Change in the balance of payments



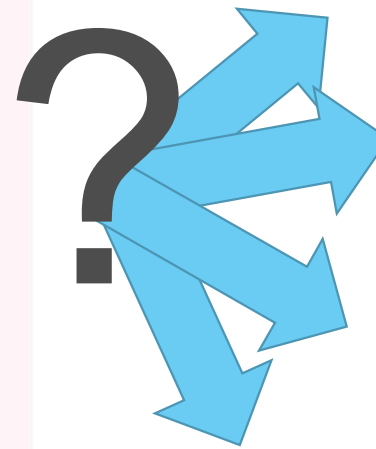
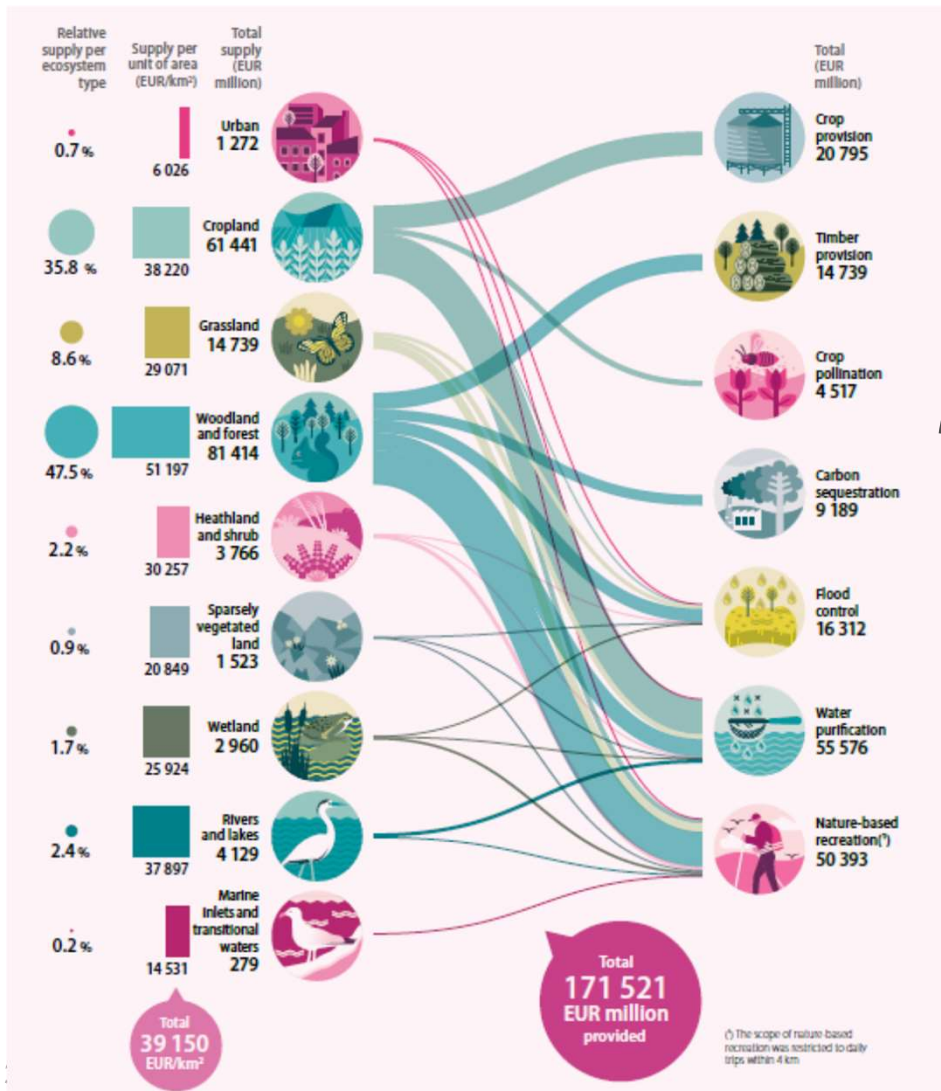
Impact of Asian hornet: hypothetical loss



What is needed

- replicable and systematic ES SUT (INCA follow-up → GIS plugin tools)
- robust procedure to reclassify and disaggregate GTAP DB
- guideline to analyse GTAP outcomes
- set a range of scenarios based on acknowledged policy needs

What can be done next?



Thank you

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