



System of
Environmental
Economic
Accounting

Implementing NCA: experience, lessons and challenges from other countries

Bram Edens, Ph.D.

United Nations Statistics Division



United Nations



Overview

- Global context for NCA
- The policy demand
- Experiences
 - > Accounts
 - > Coordination
- Lessons learned + challenges





System of
Environmental
Economic
Accounting

GLOBAL CONTEXT



United Nations

Limitations of Traditional Accounts

National accounts do not cost depletion or degradation.

Narrow view of environment -> only asset when owned and yielding benefits

Do not capture all economic contributions of nature (e.g. regulating services)

-> Decision makers don't have key information necessary to effectively pursue and track sustainable development

-> Need for SEEA / NCA!



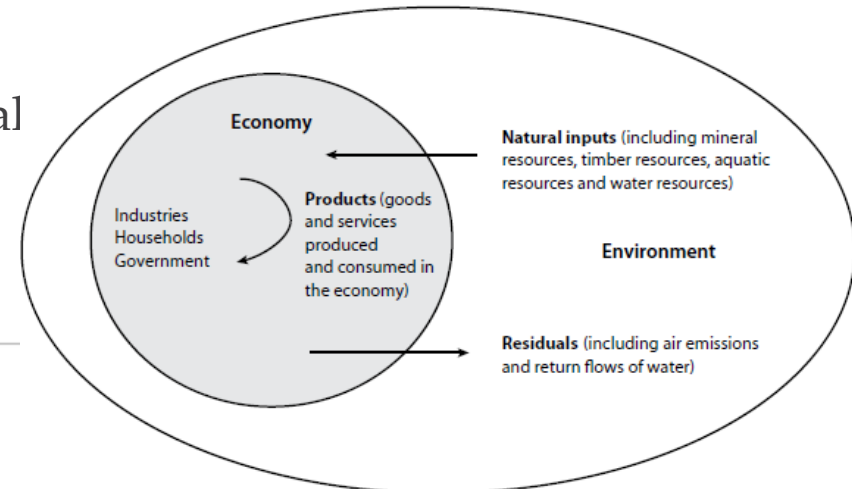
Q1: I believe all capital is included in the capital account, so I do not really understand what NCA is about?

A1: SNA has different asset (and production) boundary

System of Environmental-Economic Accounting (SEEA)

When doing NCA, applying SEEA as measurement framework

- Work started in late 1980s
- Rio 1992 / Agenda 21 -> recognized the need for satellite accounts
- The **SEEA Central Framework** was adopted as an international statistical standard by the UN Statistical Commission in 2012
- The **SEEA Experimental Ecosystem Accounting** complements the Central Framework and represents international efforts toward coherent ecosystem accounting



SEEA – two sides

1. **Environmental assets** are the naturally occurring living and non-living components of the Earth, together constituting the biophysical environment, which may provide benefits to humanity.
2. **Ecosystems** are a dynamic complex of plant, animal and microorganism communities and their non-living environment interacting as a functional unit

Natural capital = sum of environmental assets

SEEA Central Framework:

Individual environmental assets/
resources

Timber
Water
Soil
Fish



SEEA Experimental Ecosystem Accounts:

Ecosystem assets
(spatially based)

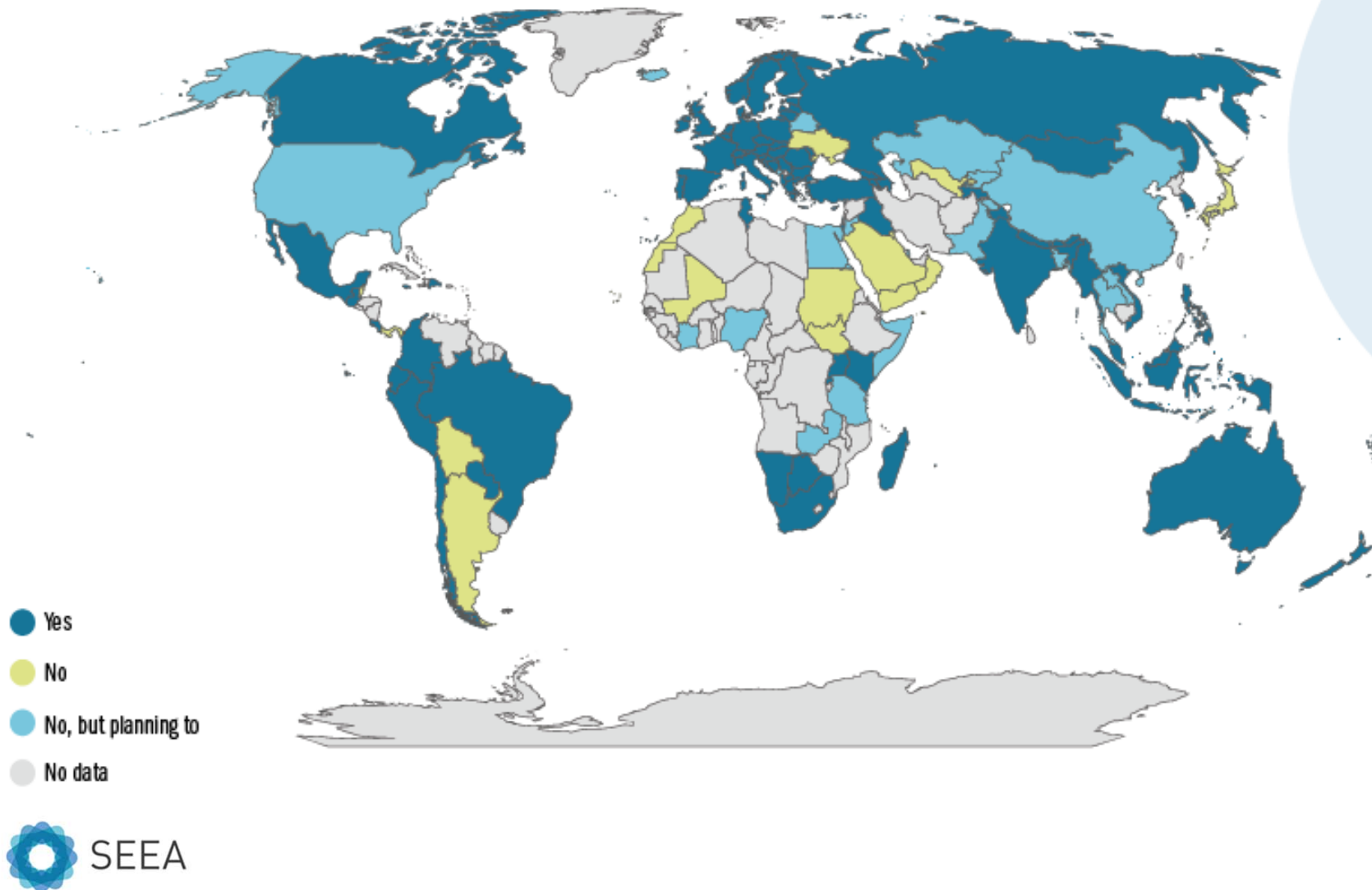
Forests
Lakes
Agricultural
areas

SEEA accounts

SEEA-CF (Central Framework)	<ul style="list-style-type: none"> • Assets • Physical flows • Monetary flows 	<ul style="list-style-type: none"> • Minerals & Energy, Land, Timber, Soil, Water, Aquatic, Other Biological • Materials, Energy, Water, Emissions, Effluents, Wastes • Protection expenditures, taxes & subsidies
SEEA Water; SEEA Energy; SEEA Agriculture, Forestry and Fisheries	Add sector detail	As above for <ul style="list-style-type: none"> • Water • Energy • Agricultural, Forestry and Fisheries
SEEA-EEA (Experimental Ecosystem Accounting)	Adds spatial detail and ecosystem perspective	Extent, Condition, Ecosystem Services, Thematic: Carbon, Water, Biodiversity

80 countries and counting

SEEA Around the World



Fast technological developments

- Era of Big Data (e.g. mobile phone data; social media, citizen science)
- Earth observation data
 - > EO4EA
 - > New generation of satellites
- Developments in data platforms and tools
- Biophysical modelling
 - > Platforms (Aries; Luci, Invest, Estimap) -> global data sets
 - > Machine learning



Stats Offices become data stewards

NCA at center of these developments



SNA revision / research agenda

- 3 Main topics
 - > Globalisation
 - > Digitisation
 - > Sustainability and well-being
- Some elements can be done within the current system
 - > Distributional aspects
 - > Better balance sheets
- Going beyond the current system
 - > Unpaid households activities
 - > SEEA

- Need for a broader frame

Q2: what does the future GDP measure look like, and how will the accounts be used to improve this?

Revision of the SEEA EEA

- Elevation to an agreed methodological document
- Engagement with various stakeholders
 - > Science community
 - > Environmental economics
 - > Geospatial community
 - > National Accounts
- Timeline by end of 2020 – endorsement by UN Statistical Commission by March 2021
- Process aligned with the Post-2020 biodiversity framework, review of SDG and Climate change process
- Seek for broad involvement of partners and experts in the process
 - > CBD, IPBES, UNFCCC, UNCCD, EU, Academia, etc...





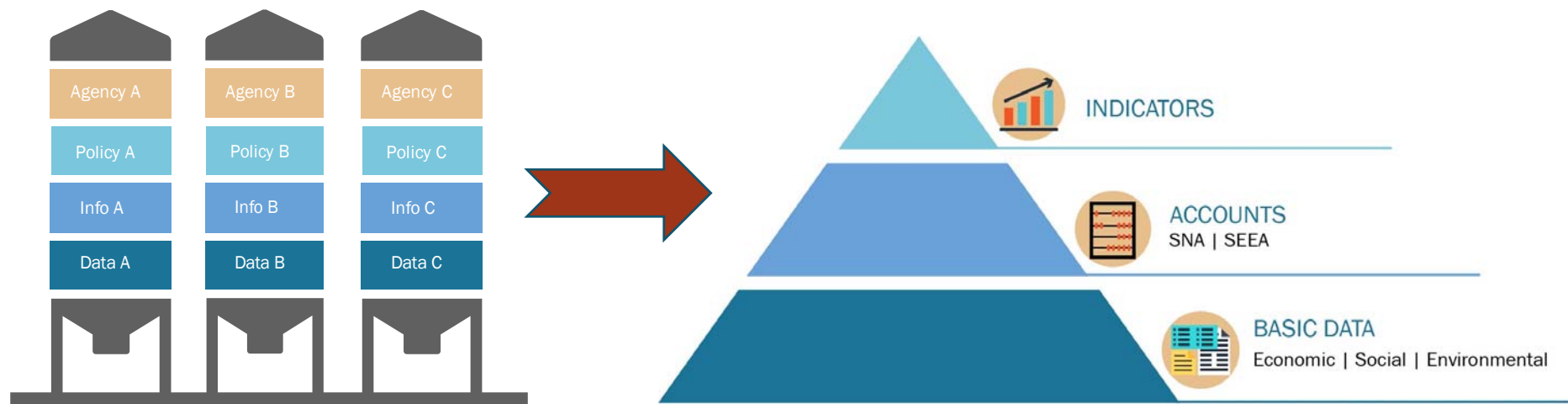
System of
Environmental
Economic
Accounting

POLICY DEMAND



United Nations

From data silos to integrated information



Why use an accounting framework for the environment?

- Presents environmental and economic information together in a consistent way
- Allows for environmental data to be integrated with existing System of National Accounts measures
- Provides:
 - International comparability
 - Broad credibility
 - Replicability
- *Transforms data into information*

The SEEA supports multiple ongoing initiatives



The SEEA and the SDGs

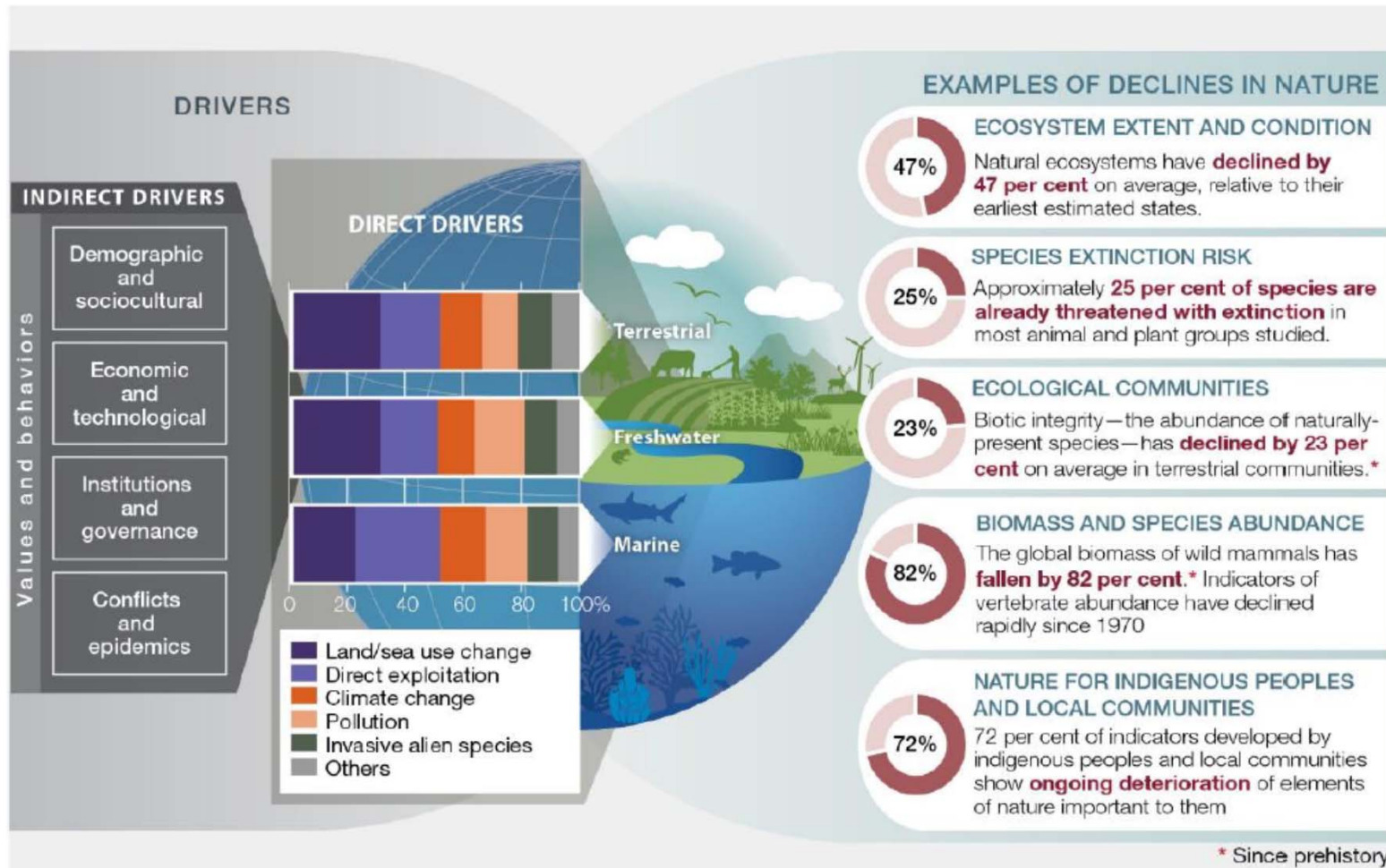
The SEEA supports 40 indicators for 9 SDGs

- GOAL 2: Zero Hunger
- GOAL 6: Clean Water and Sanitation
- GOAL 7: Affordable and Clean Energy
- GOAL 8: Decent Work and Economic Growth
- GOAL 9: Industry, Innovation and Infrastructure
- GOAL 11: Sustainable Cities and Communities
- GOAL 12: Responsible Consumption and Production
- GOAL 14: Life Below Water
- GOAL 15: Life on Land



Assessing the linkages between global indicators, the SEEA & The SDGs

IPBES – Global Assessment





System of
Environmental
Economic
Accounting

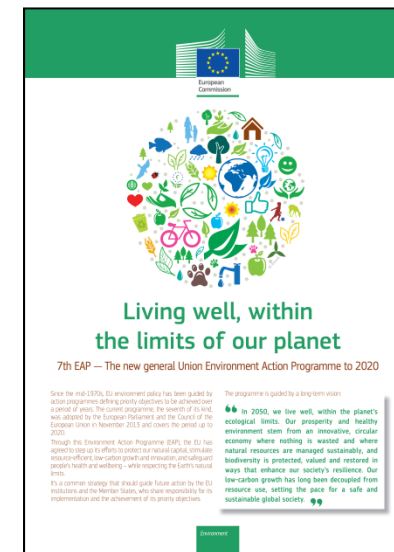
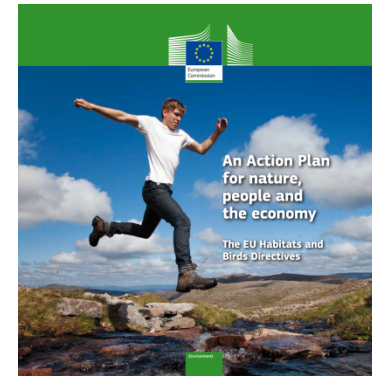
EXAMPLES *ECOSYSTEM ACCOUNTING IN ACTION*



United Nations

EU - policy context

- Sustainable Development Goals
- EU 7th Environmental Action Plan
- EU Biodiversity strategy to 2020
- EU Action Plan for nature, people and the economy
- **EU post-2020 framework**



Eurostat :

Expertise in geospatial-statistical data integration and accounting knowledge of SEEA. Coordinator, funding

DG Environment:

Provides policy context, manages MAES and is the principal user of INCA outputs

DG Research and Innovation:

Coordination between INCA and EU research activities, networking, funding

EEA:

Principal information provider on the state of the EU environment, focus on spatial data platform and extent accounts

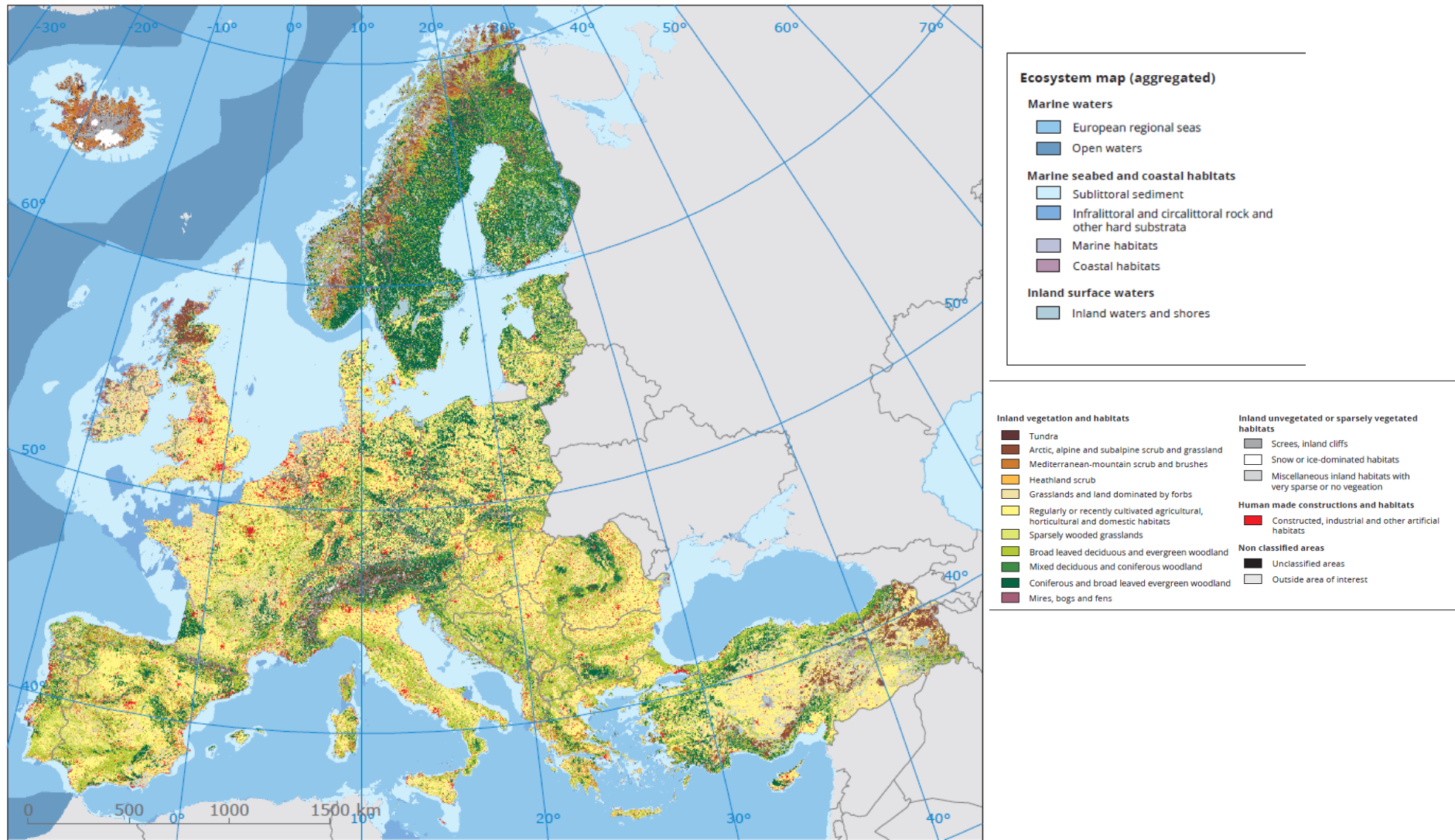
EC Joint Research Centre:

Operation of information systems, expertise in the modelling of ecosystem services. **Focus on services flows**

INCA
partners



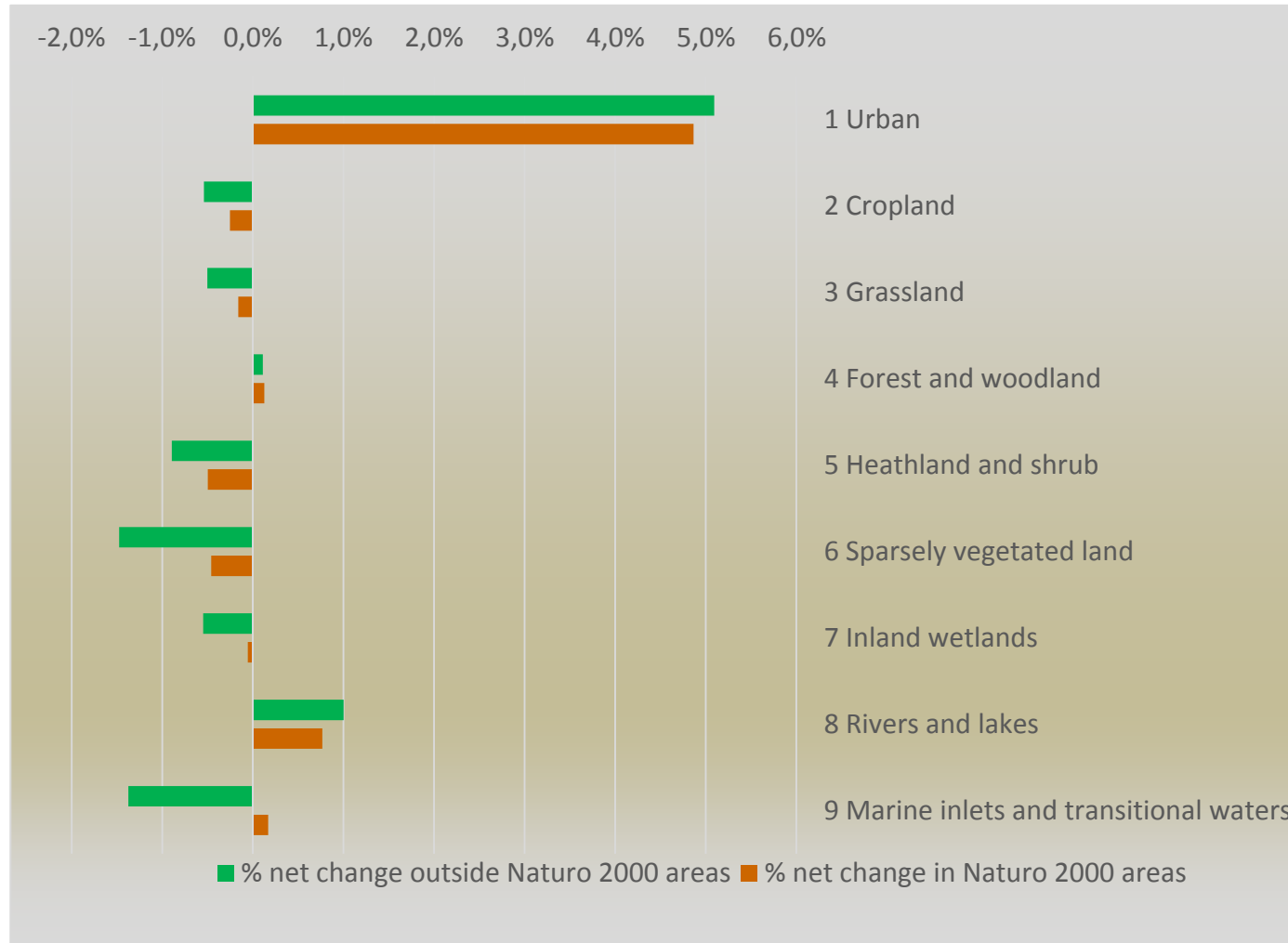
Ecosystem extent account - EU



Source: EEA, 2015a, *European ecosystem assessment: Concept, data, and implementation*, EEA Technical Report No 6/2015, European Environment Agency

- RESULTS -

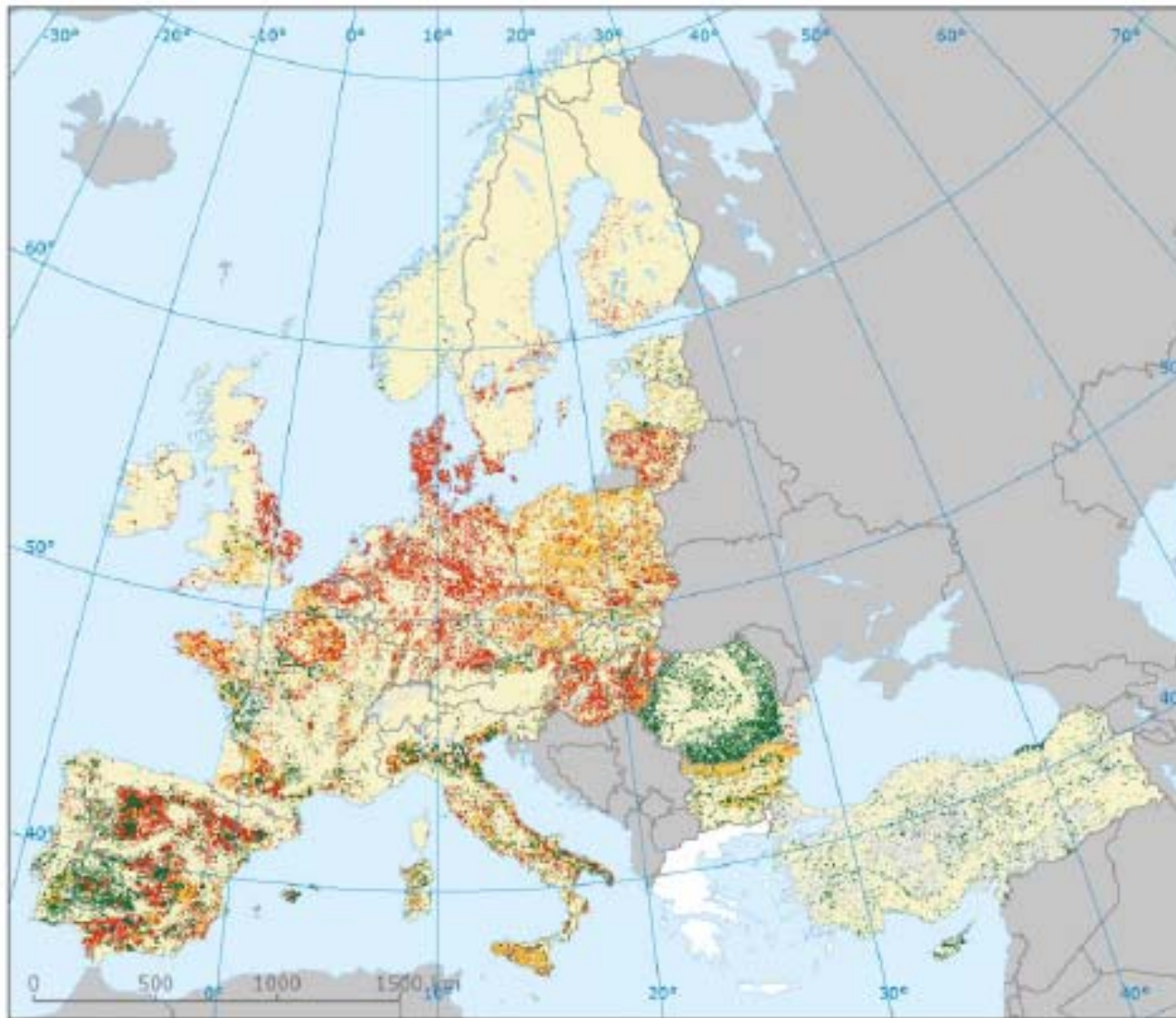
EEA: Net changes in ecosystem extent inside and outside of Natura 2000 (=protected) areas, 2000-2012



Source: EEA, CLC accounting layers 2000, 2006, 2012.

EEA May 2019: <https://www.eea.europa.eu/publications/natural-capital-accounting-in-support/>

Ecosystem condition account - EU



Aggregated assessment of cropland condition

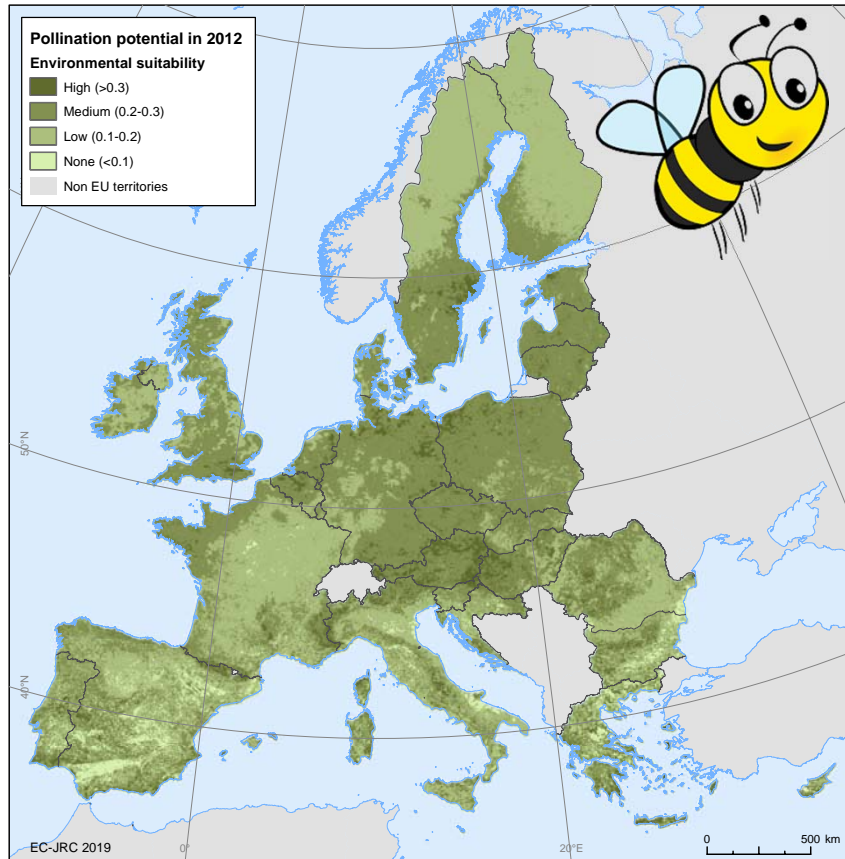
Condition

- Good
- Favourable
- Unfavourable
- No cropland

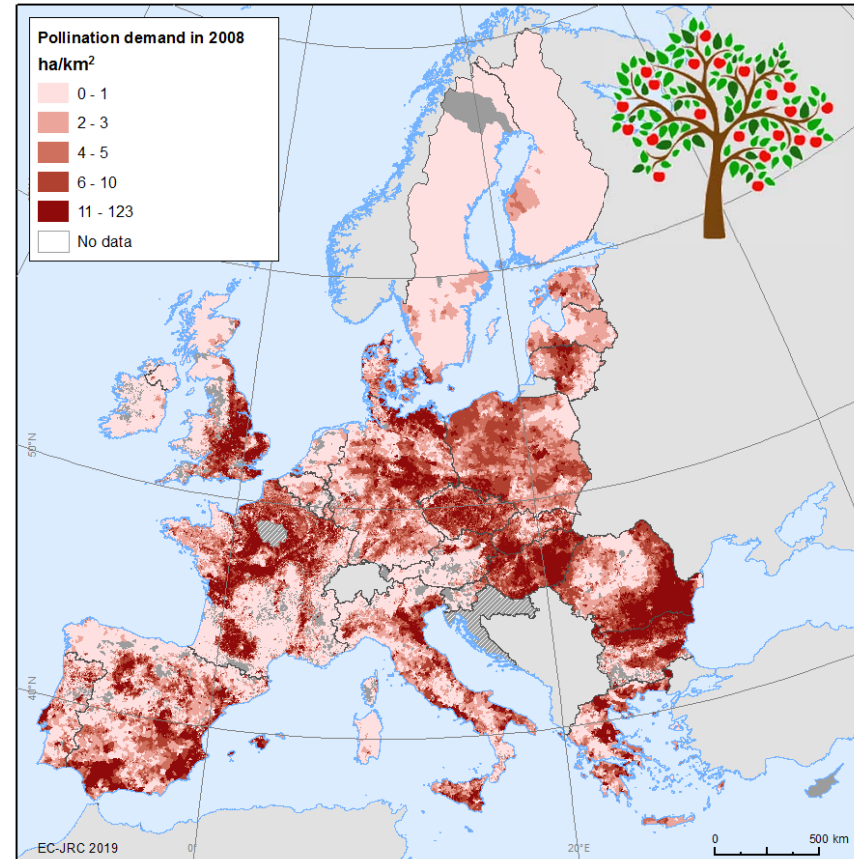
- No data
- Outside coverage

Assessing ES

Crop pollination

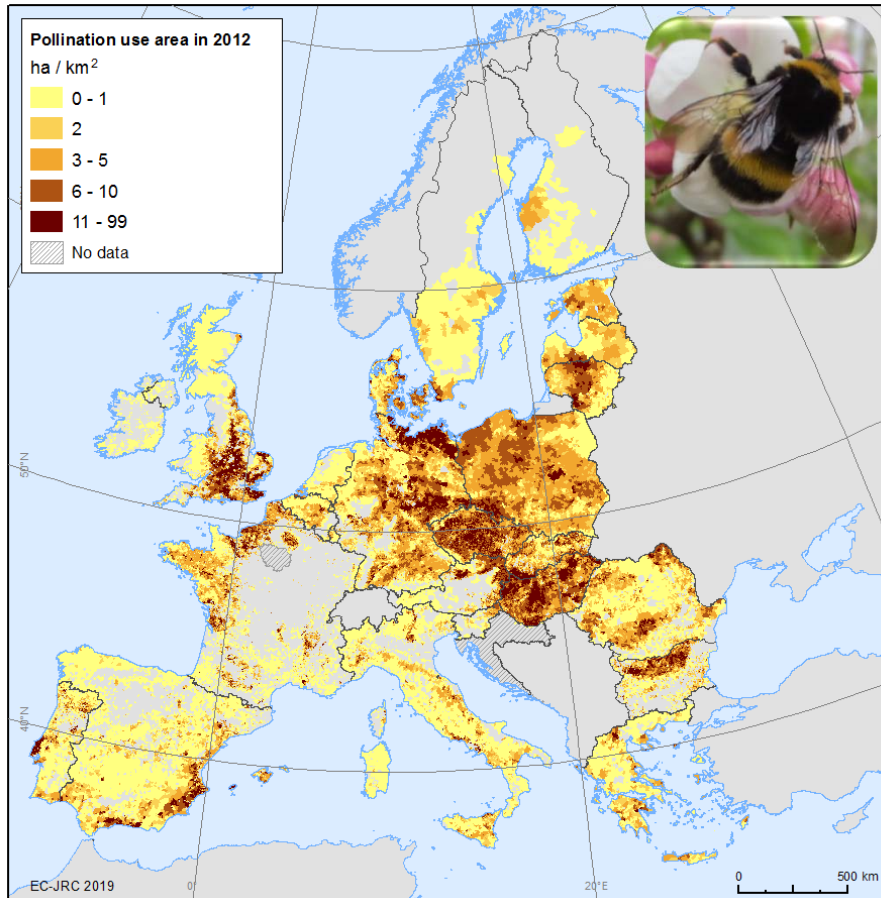


Pollination potential

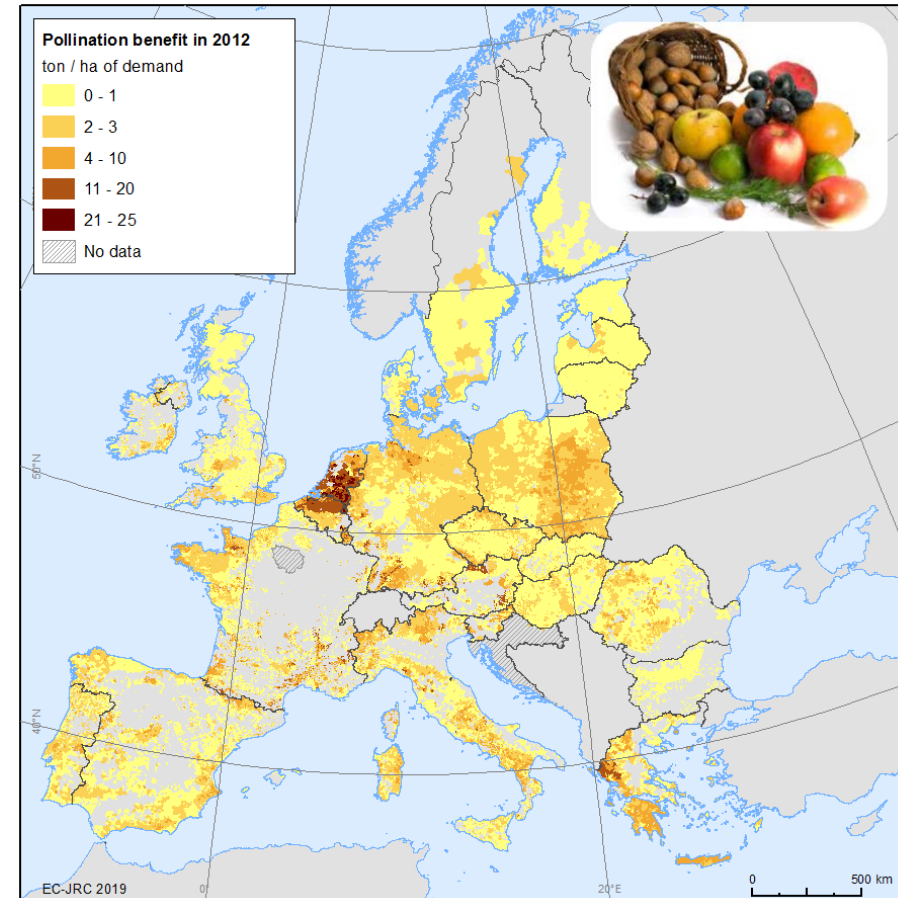


Pollination demand

Crop pollination

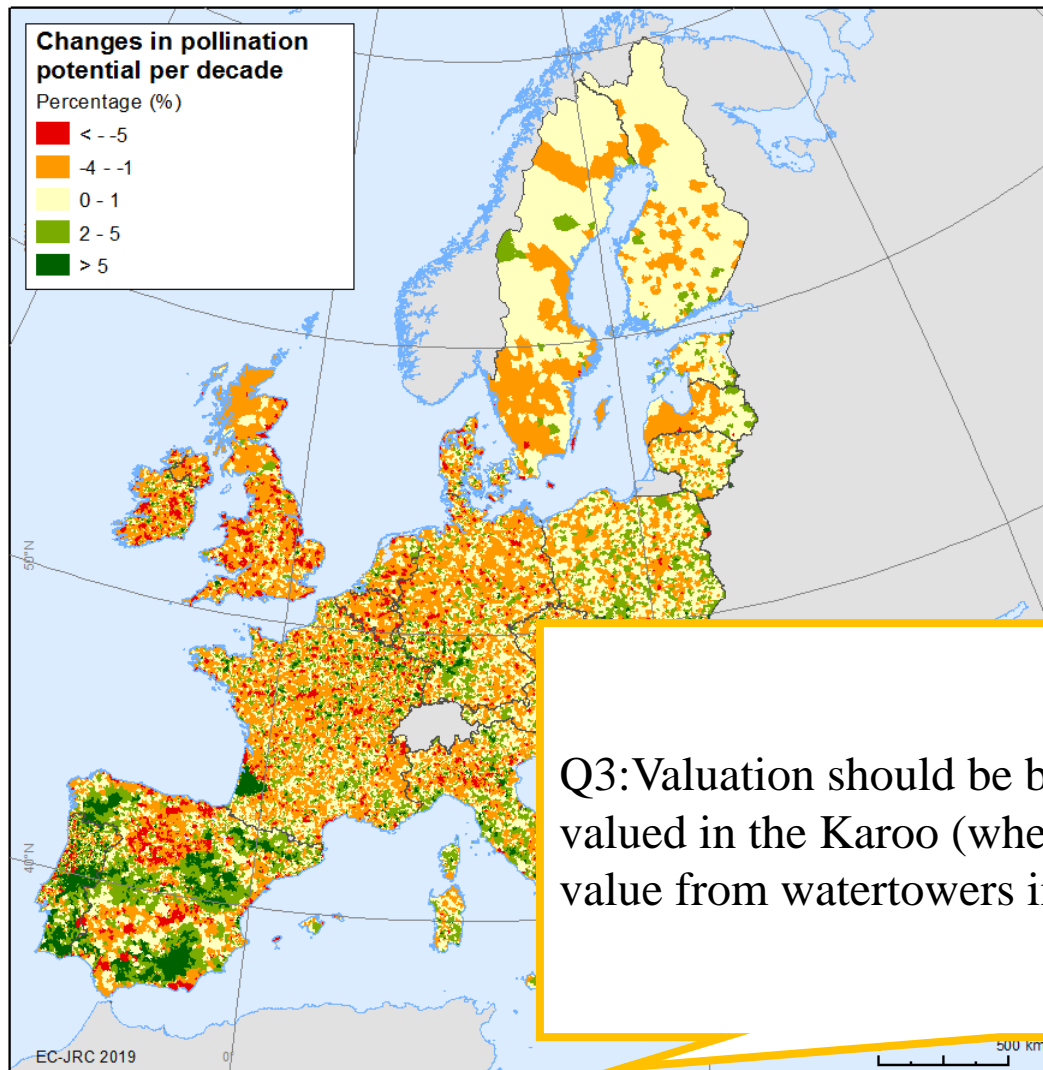


Use area (overlap)



Benefit: yield attributable to wild insect pollinators

Crop pollination

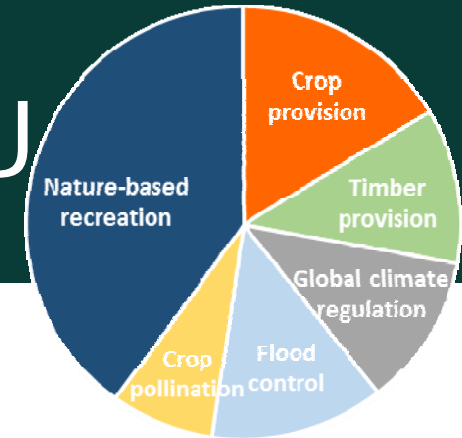


Useful for the integrated narratives

IPBES: “decline of wild pollinators in North West Europe”

Q3: Valuation should be based on impact i.e. water valued in the Karoo (where it is scarce) has a different value from watertowers in the Moloti-Arenberg region.

Supply table for the EU



Year 2012, million EUR	Ecosystem type									Total
	Urban	Cropland	Grassland	Heathland and shrub	Woodland and forest	Sparsely vegetated land	Wetlands	Rivers and lakes	Coastal and intertidal areas	
Crop provision		20,560								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						14,730
Total	190	35,520	11,460	3,480						56,370
Value in EUR/km²	880	22,090	22,610	19,250						56,370

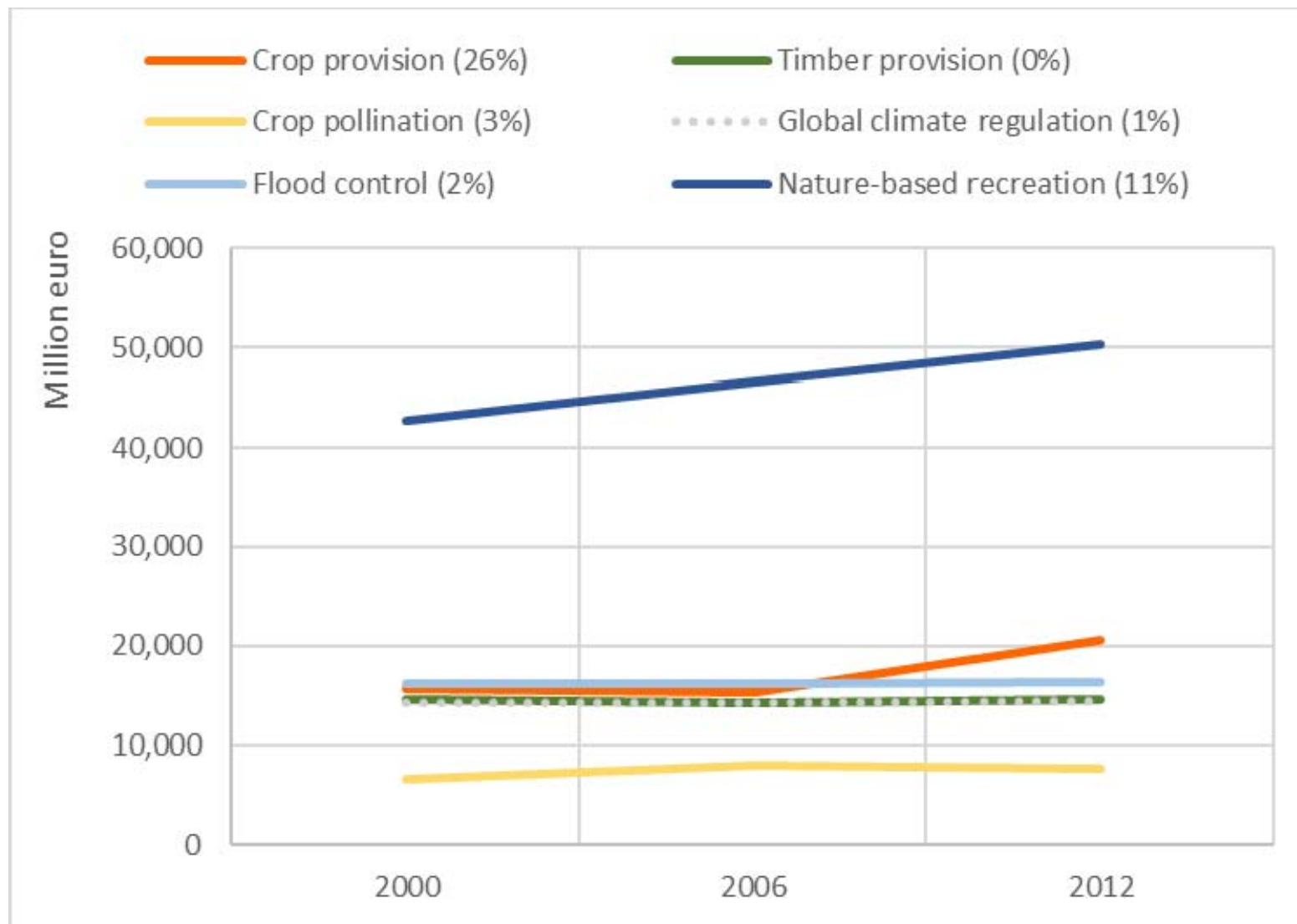
NA: not assessed
 Values rounded to the nearest tens

56,370 euro/km² of green urban area

Q4: What is the ultimate goal of NCA?



Trends for ecosystem services



Example 2 - Carbon account (NL)

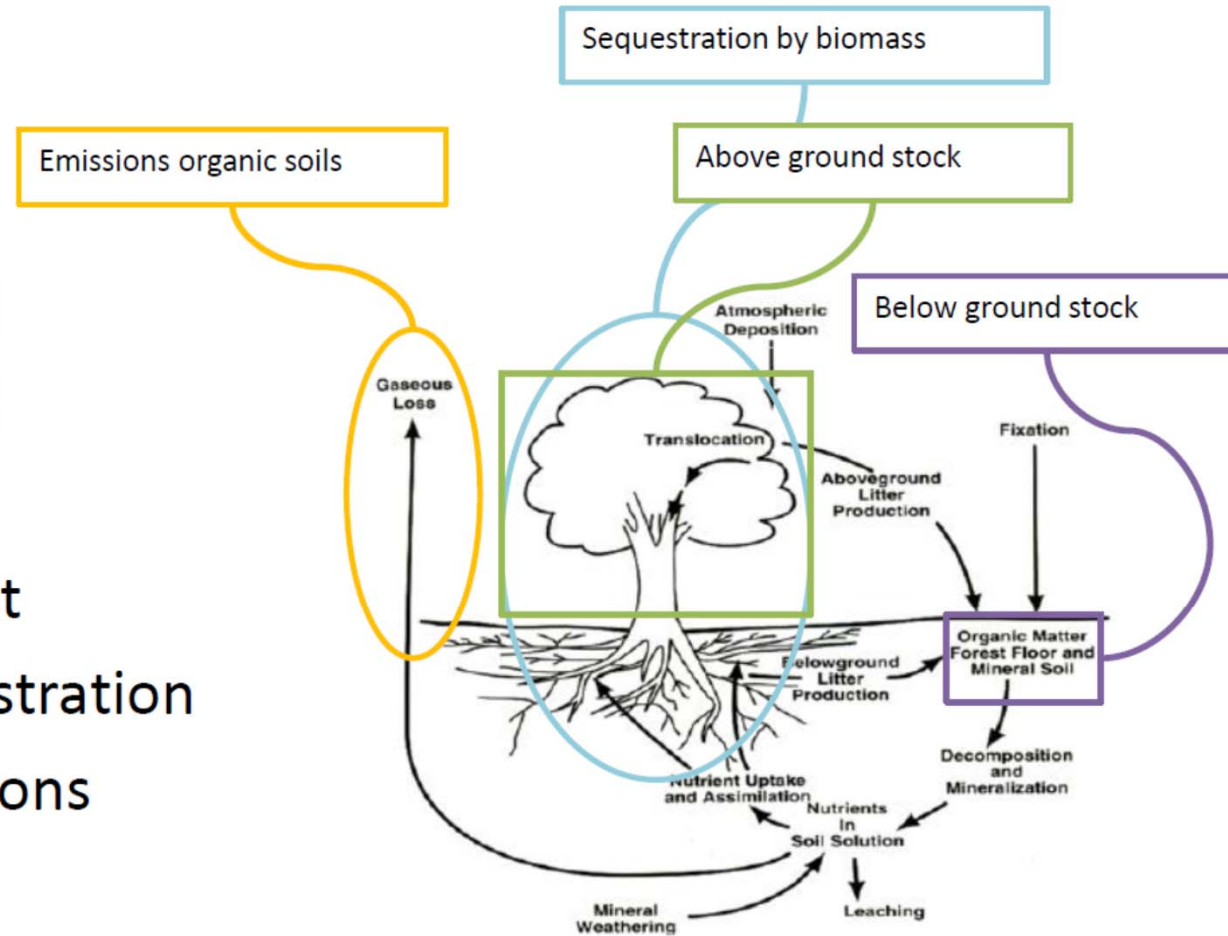
Biocarbon

Carbon stocks:

- above ground
- below ground

Carbon flows:

- timber harvest
- carbon sequestration
- carbon emissions



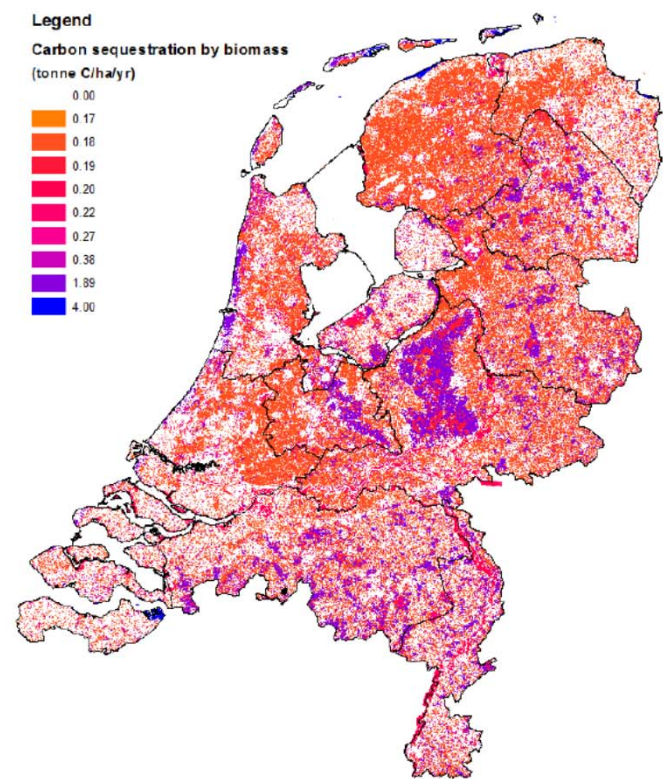
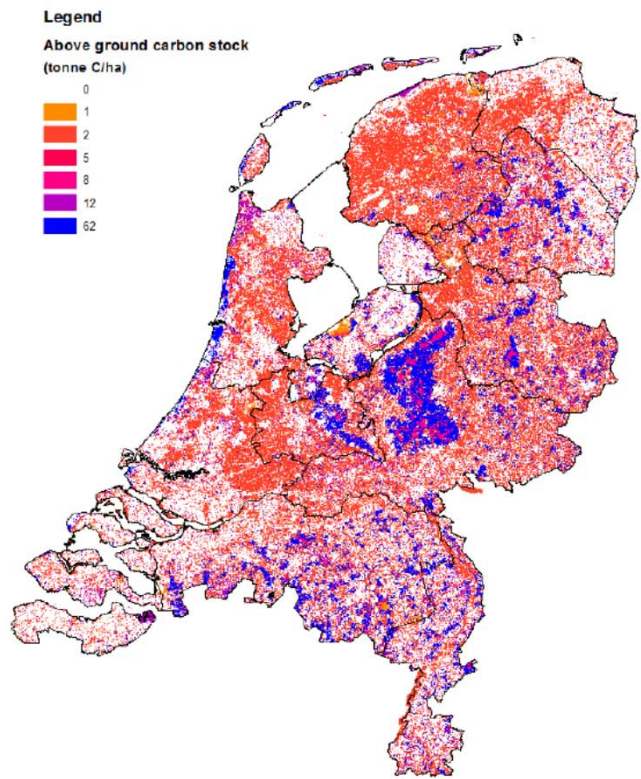
Carbon sequestration



Ecosystem unit	Carbon sequestration ton C/ha /yr	Carbon stock ton C/ha
Non-perennial plants	0	0
Perennial plants	0.38	17
Greenhouses	0	0
Meadow	0.18	2
Buffer strips	0.17	2
Coastal dunes (vegetated)	1.89	84
Coastal dunes (active)	0	0
Beaches	0	0
Deciduous forest	1.89	81
Coniferous forest	1.89	86
Mixed forest	1.89	84
Heath land	0.19	8
Inland dunes	0	0
Fresh water wetlands	0.22	1
Natural grassland	0.19	2
Public green space	0.27	6
Other unpaved terrain	0.18	2
River flood basin	0.2	2
Tidal salt marshes	4	12



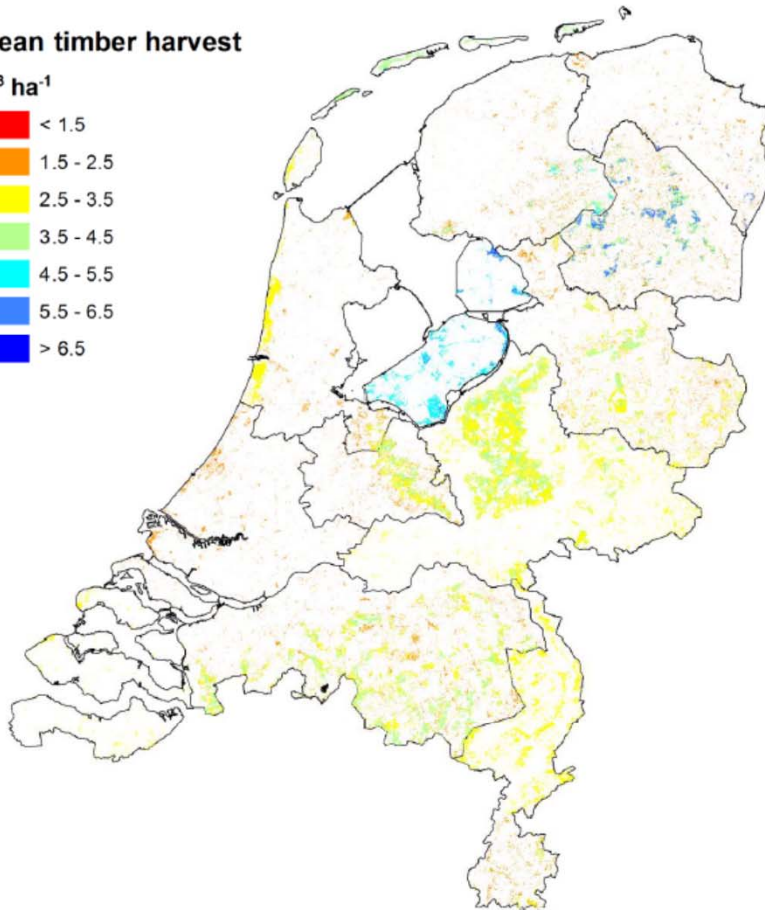
Aboveground stock & sequestration



Timber harvest

Mean timber harvest

$\text{m}^3 \text{ha}^{-1}$



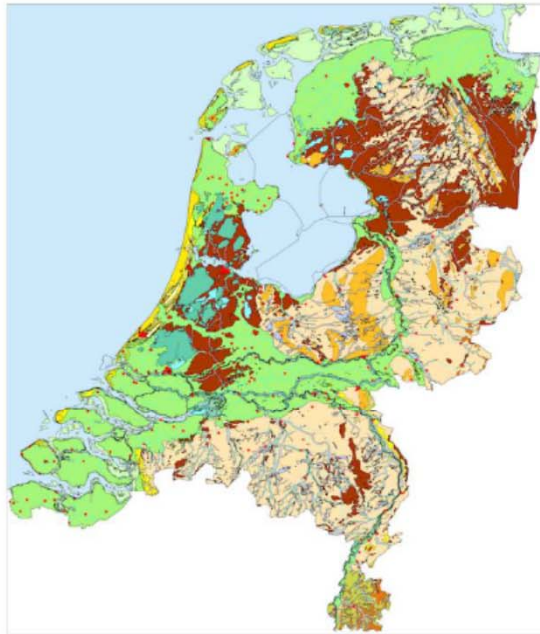
- Average harvest: $3.4 \text{ m}^3 / \text{yr}$
- Total harvest: $1.1 \times 10^6 \text{ m}^3 / \text{yr}$



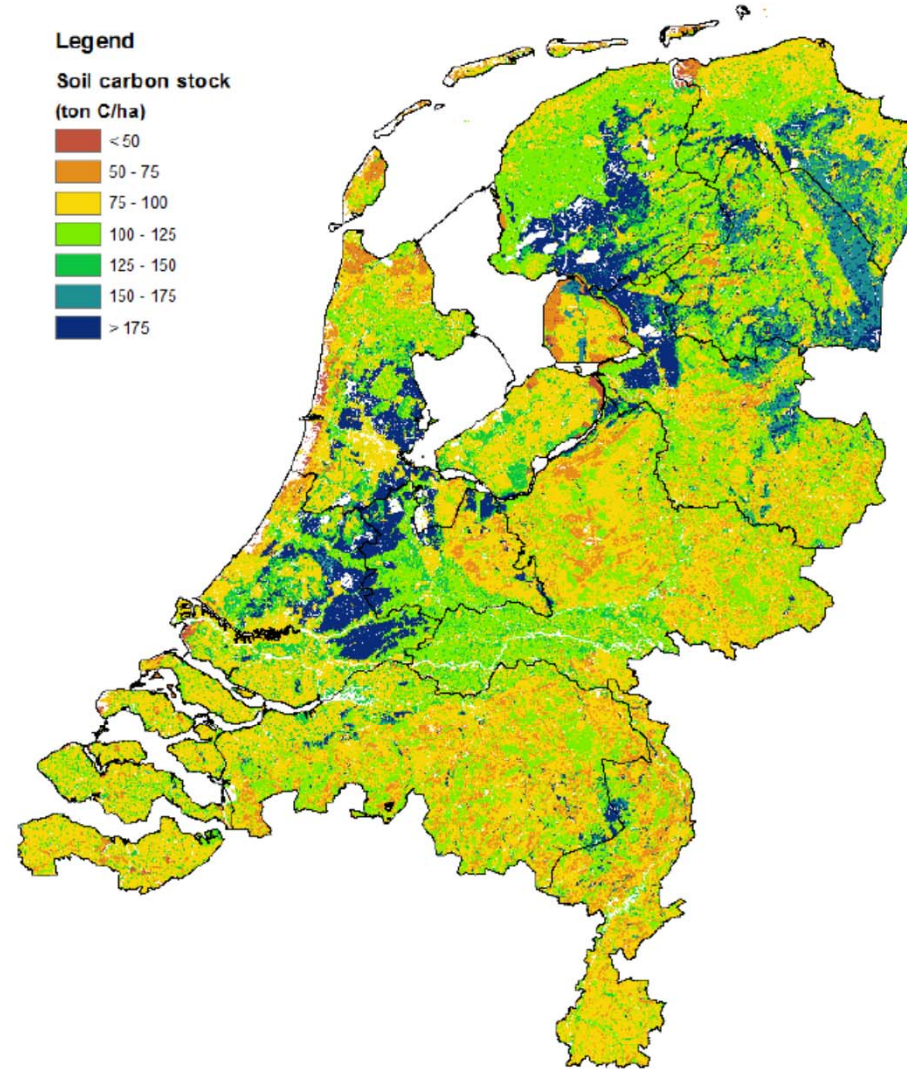
Example - Carbon account

Carbon stock in soil (upper 30cm)

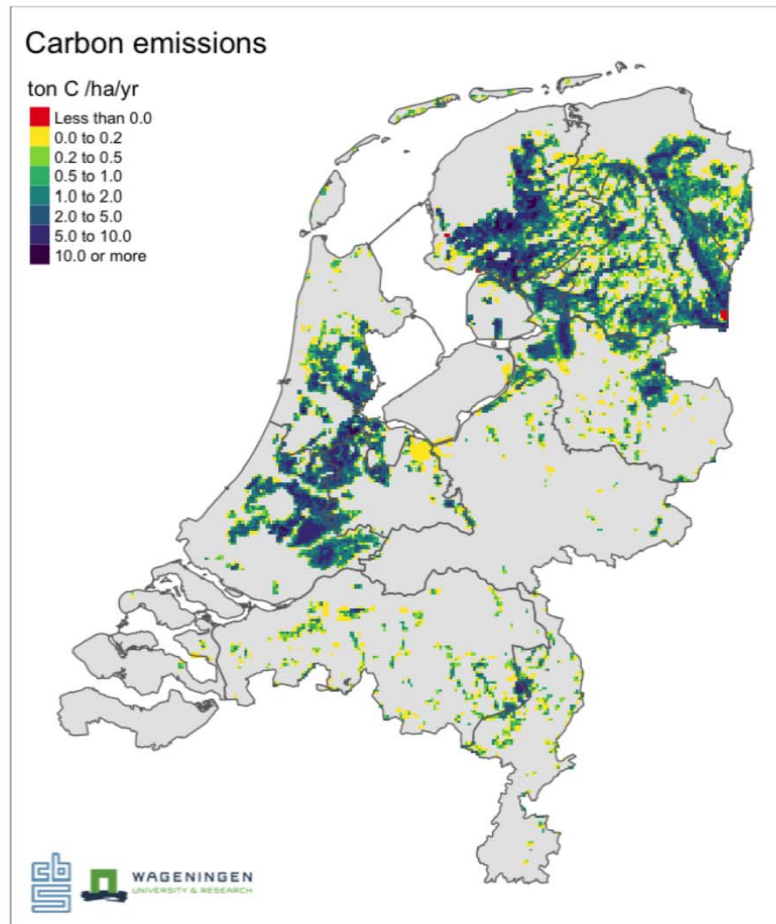
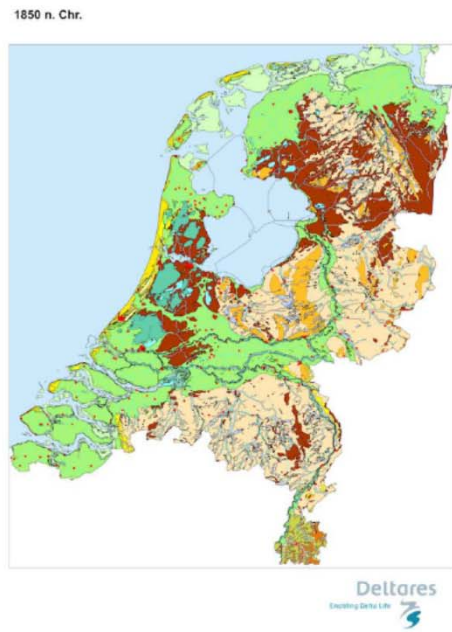
1850 n. Chr.



Deltares
Enabling Delta Life



Carbon emissions from drained peatland



Biocarbon account

	Meadow	Other agricultural land	Forrest	Dunes / beaches	Fresh water wetlands	Natural grassland	Public green space	Other unpaved terrain	Paved surfaces	Other	TOTAL	
Opening stock	112	94.1	48.2	5.3	0	5	6.1	30.6	52	23.6	376.9	← C stock above ground and in soil
Additions to stock												
Natural expansion	0.2	0	0.6	0	0	0	0	0.1	0	-0.9	0	← C sequestration
Managed expansion												
Upwards reappraisals												
Reductions in stock												
Natural contraction	0.9	0.4	0.1	0	0	0	0.1	0.1	0.2	-1.8	0	← Emissions from peat
Managed contraction			0.5								0.5	← Timber harvest
Downwards reappraisals												
Net carbon balance	-0.7	-0.3	0	0	0	0	0	-0.1	-0.2	0.9	-0.5	
Closing stock	111.3	93.7	48.2	5.3	0	5	6.1	30.5	51.8	24.5	376.4	



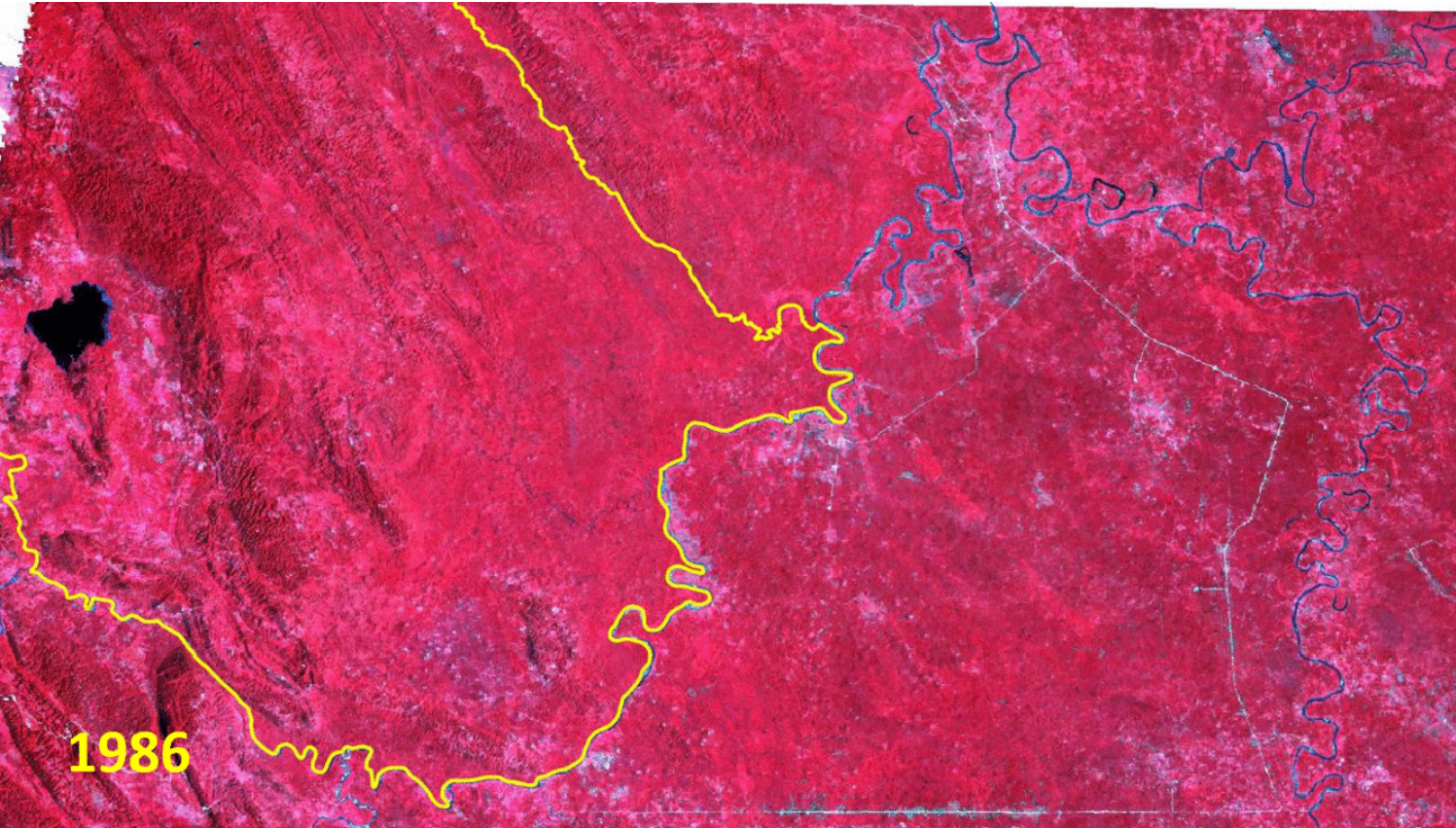
Carbon account for the Netherlands, 2013

	Geocarbon					Biocarbon				Carbon in the economy				Carbon in the atmosphere	Total
	oil	gas and shales	coal	limestone and marl	total geocarbon	Forests	Cropland / meadows	Other ecosystems	Total biocarbon	Inventories fixed assets, consumer durables	Waste	Total	Total		
Opening stock	533	189	0		722	35	132	-329	-162	24		24	0	584	
Additions to stock	0	0	0	0	0	0.4	0.2	0.6	1.2	251	2	10	263	265	
Natural expansion						0.4	0.2	0.6	1.2					1	
Managed expansion										50		50	50	50	
Discoveries	0	0	0		0									0	
Upwards reappraisals	0	0	0		0									0	
Reclassifications										15	2	6	23	23	
Imports										186	4	190	190	190	
Reductions in stock	41	0	0	41	82	0.4	1.0	0.0	1.5	246	0	10	256	-340	
Natural contraction						0.0	1.0	0.1	1.1					-1	
Managed contraction	40	0	0	41	81	0.4	0.0	0.0	0.4	60	3	62	62	-144	
Downwards reappraisals	1	0	0		1									-1	
Reclassifications										19	0	5	23	-23	
Exports										168	3	170	170	-170	
Net carbon balance	-41	0	0	-41	-82	0.0	-0.8	0.5	-0.3	5	2	0	7	-75	
Closing stock	492	189	0		681	35	131	-328	-162	30		32	0	551	

Policy relevance

- Measuring progress towards **international climate mitigation obligations**.
- **2.Supporting specific policy actions** in the field of climate change mitigation.
- 3.The ecosystem part of the carbon account (i.e. biocarbon) is **spatially explicit**. Maps depict where carbon emissions take place and which areas are most important for carbon sequestration. This facilitates **climate action by provincial and local stakeholders**.
 - > Used to inform public debate and policy making on pet;and uses
- 4.Measuring progress towards a **circular economy** regarding carbon
- Integration with the accounts?
 - > Valuation of services
 - > Costing degradation (Emissions)
 - > Carbon taxes / emission credits / REDD+

Example 3 - Mexico - Assessing ecosystem condition & environmental policies



**CHIAPAS
Mexico**

Montes Azules Federal Protected Area

Marqués de Comillas (not protected)



System of
Environmental
Economic
Accounting

EXAMPLES COORDINATION



United Nations

Example - UK

- Natural Capital Committee as an independent advisory committee in 2012.
- It provides advice to the government on the sustainable use of natural capital
- The committee consists of 8 experts (professors)
- It drafts an annual report – government provides a response
- 25 year environment plan
 - > Goals
 - > Policies

Identified 3 decision contexts for which value of NC+services is useful, determining:

- Priorities for investments in NC
- Actions affecting NC (e.g. target improvements; compensation for losses)
- Overall progress protecting and improving NC

“Accounting approaches can be particularly useful”

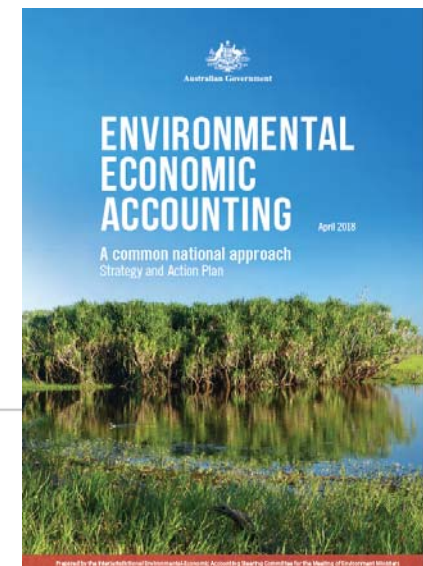
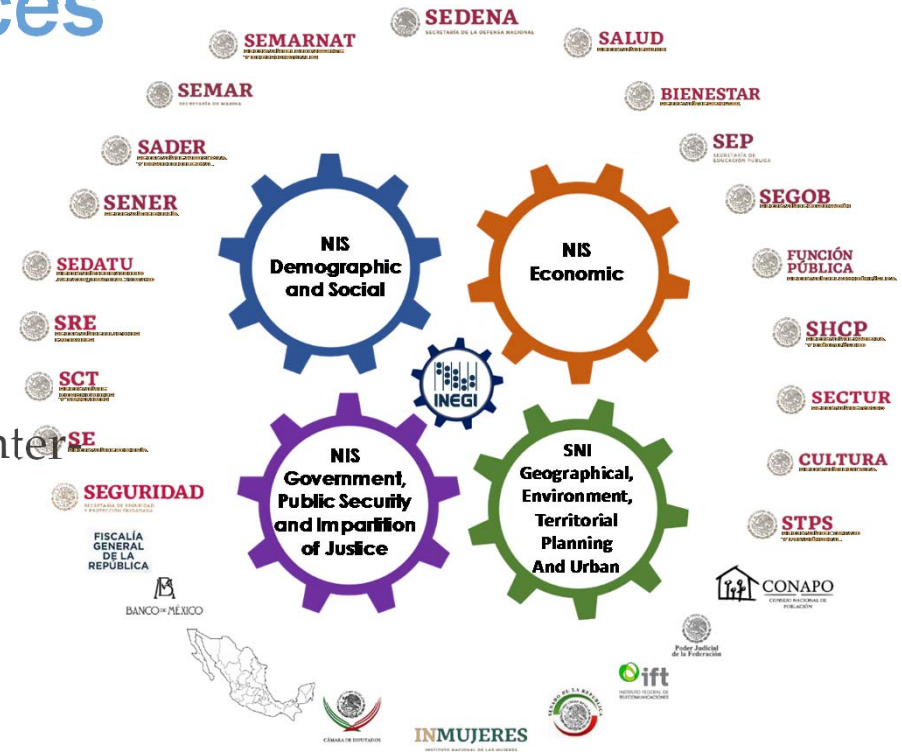


A Green Future: Our 25 Year Plan to Improve the Environment



Other country experiences

- Italy ->
 - > NCC consisting of various ministries
 - > Experts
- Mexico:
 - > SNIEG as a platform for the project's inter institutional groups
- Australia
 - > Commonwealth, state and territory environment ministers to deliver a common national approach to environmental-economic accounting
- EU Strategy for Environmental Accounting
 - > Updated every 5 years
 - > Directive since 2011; 7 accounts are compiled by all Member States



SEEA



System of
Environmental
Economic
Accounting

LESSONS LEARNED



United Nations

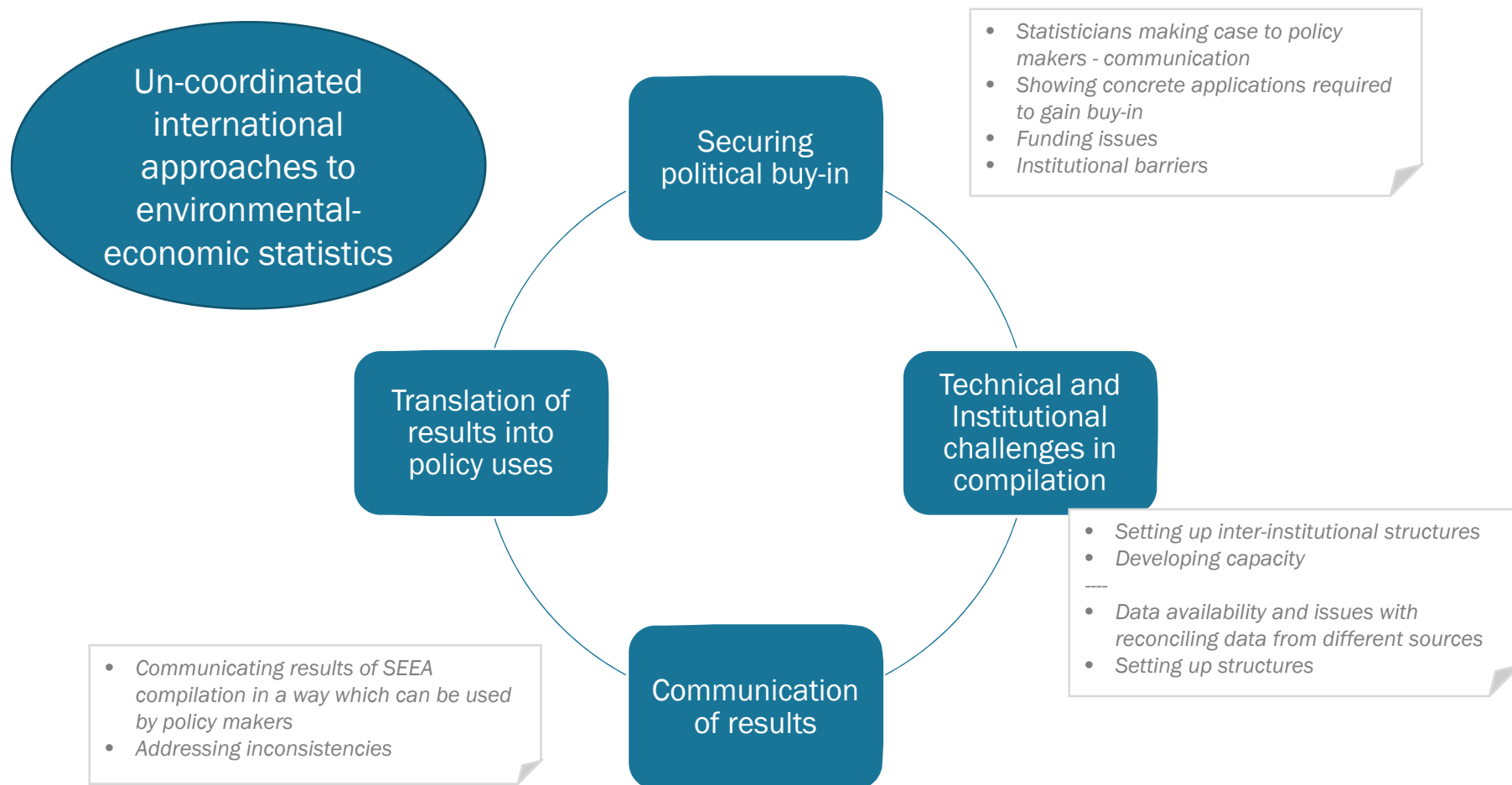
Key experiences 1 (2)

- Use of international standards and recommendations which can be applied nationally is essential
- “Experimental” accounts are a useful development tool
 - > Learning by doing
 - > Builds collaboration
 - > Potential users can see what an account looks like and consider how it could meet their needs
 - > Encourages user feedback
- Regular production of accounts encourages their use
- Need for sustained institutional support and appropriate governance

Key experiences 2 (2)

- Cooperation between geographic information professionals, economists, scientists and statisticians is fundamental
- Involvement of Statistical Office is essential
- Data sharing arrangements are important
- Need to target conversations on policy needs and how environmental-economic accounting can help
 - > Department of the Environment and Energy, Finance and/or planning
 - > State / province governments
 - > Private sector
- Continued need to build support of key stakeholders
 - > Bringing together the biophysical with the economy and society
 - > Find champions in government

Challenges and limitations





THANK YOU

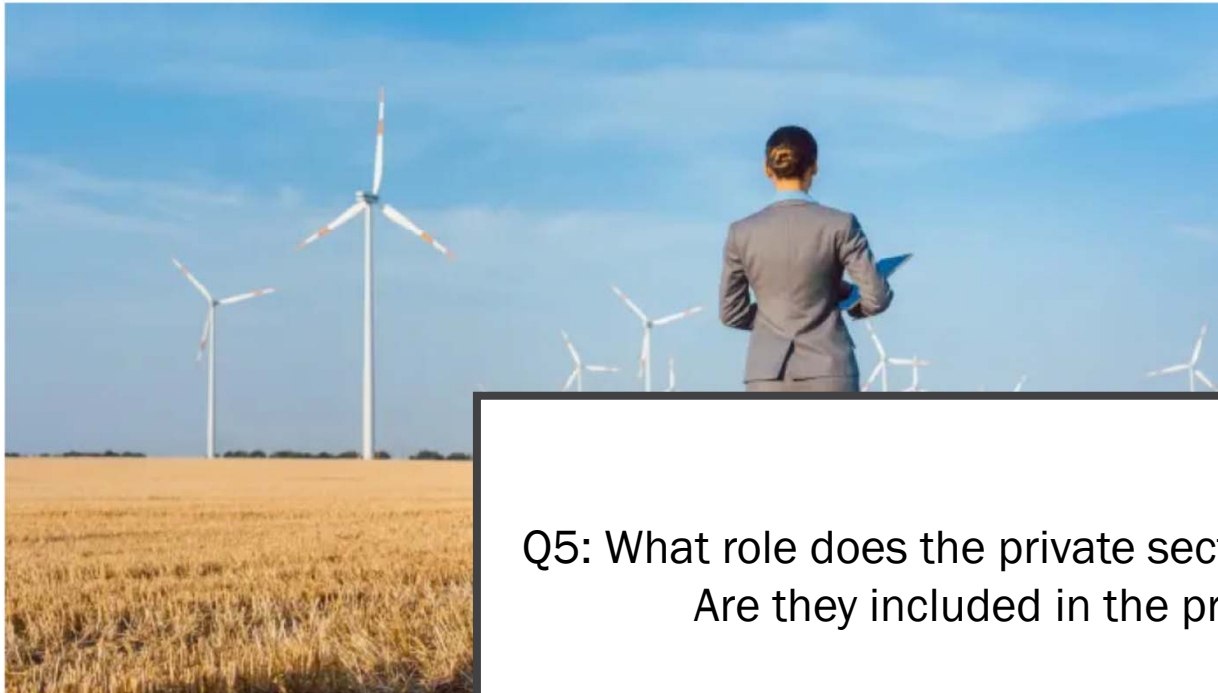
sea@un.org

Link with corporate accounting

The new front for green revolution rests on warrior accountants

Don't dismiss activist bean-counters: spreadsheets make more difference than placards

GILLIAN TETT



Q5: What role does the private sector play in NCA?
Are they included in the process?

Trying to start a revolution through corporate balance



Financial Times 10 July 2019