



System of
Environmental
Economic
Accounting

NCA Project India

Bram Edens, PhD

Senior statistician

United Nations Statistics Division
Planning and Stakeholder consultation meeting

Natural Capital Accounting and Valuation of Ecosystem Service Project



Outline

- Overview of the SEEA Experimental Ecosystem Accounting
- SEEA and policy
- The project
- Findings India mission



Overview of the SEEA Experimental Ecosystem Accounting

System of Environmental-Economic Accounting (SEEA)

- 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



Natural Capital Accounting

Individual environmental **assets & resources:**

Timber
Water
Soil
Fish



Ecosystems: Biotic and abiotic elements functioning together:



Forests
Lakes
Cropland
Wetlands

SEEA Central Framework (SEEA_CF) starts with economy and links to physical information on natural assets, flows and residuals



SEEA Experimental Ecosystem Accounting (SEEA-EEA) starts with ecosystems and links their services to economic and other human activity



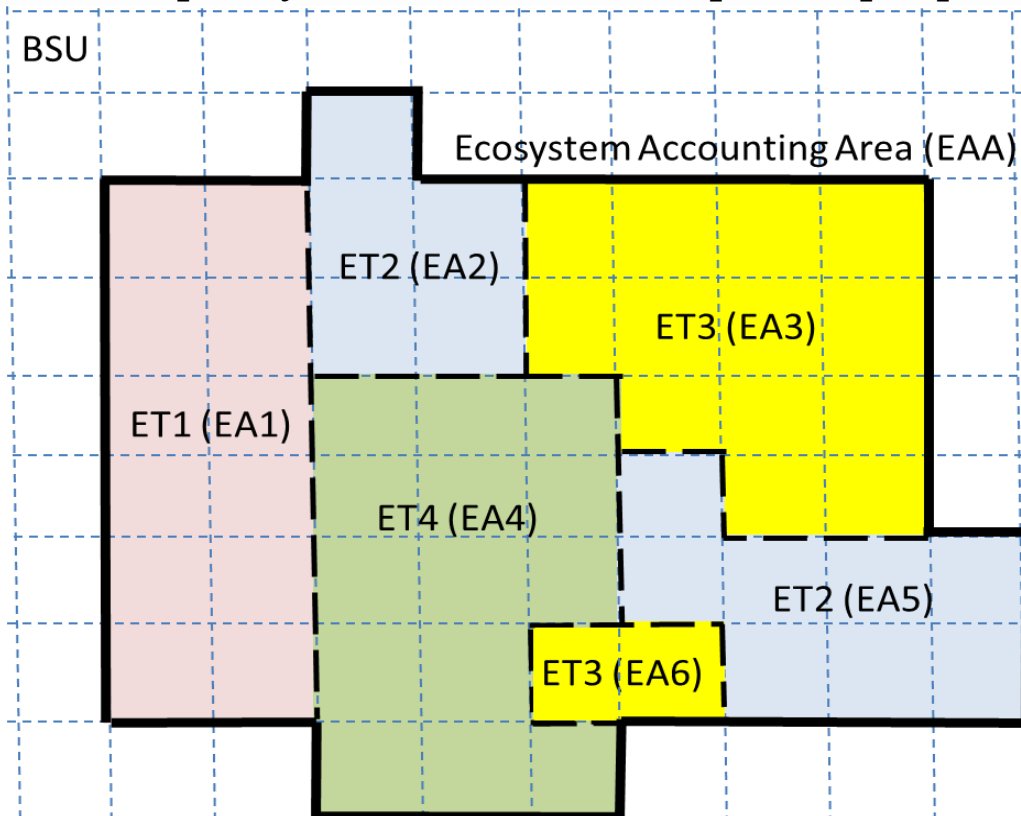
Together, they provide the foundation for measuring the relationship between the environment, and economic and other human activity

SEEA

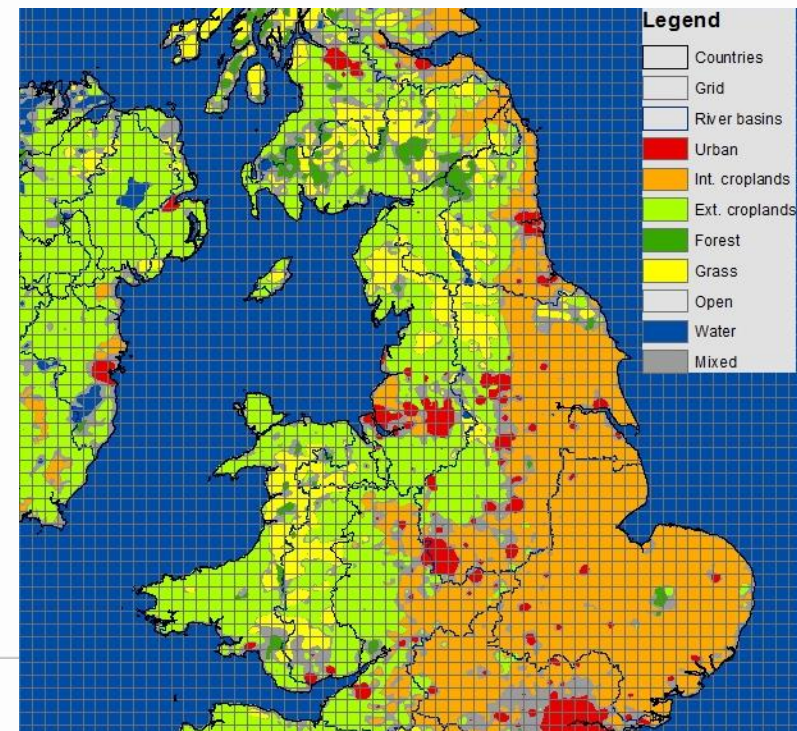
SEEA-CF (Central Framework)	<ul style="list-style-type: none">• Assets• Physical flows• Monetary flows	<ul style="list-style-type: none">• Minerals & Energy, Land, Timber, Soil, Water, Aquatic, Other Biological• Materials, Energy, Water, Emissions, Effluents, Wastes• Protection expenditures, taxes & 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

Spatial areas for ecosystem accounting

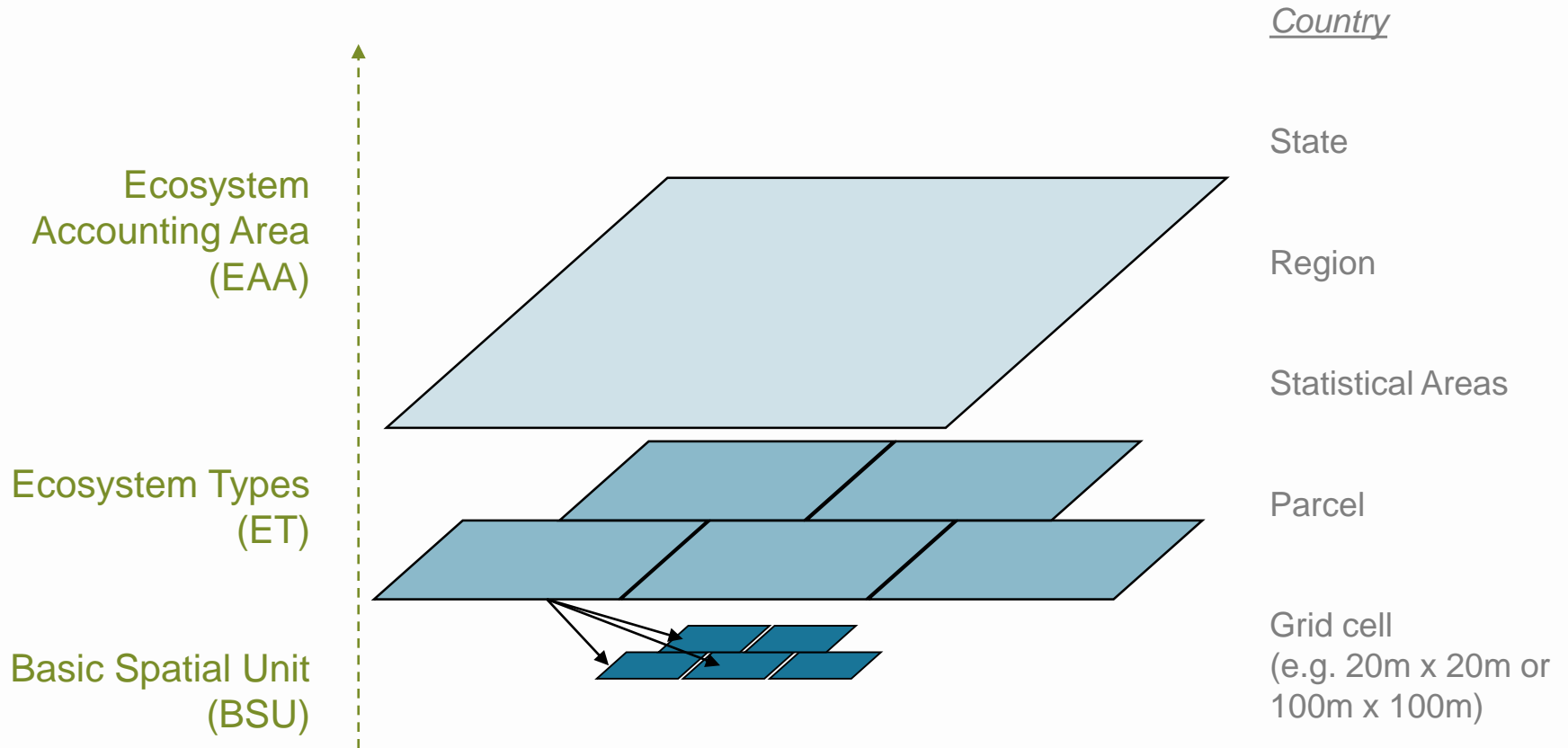
- Basic spatial units (BSU): small spatial area, a geometrical construct.
- Ecosystem Assets (EA): individual and contiguous ecosystems.
- Ecosystem Types (ET): aggregation of EAs of the same type.
- Ecosystem Accounting Area (EAA): aggregation of EAs and ETs relevant for policy at a scale fit for a specific purpose.



Overlay of units (UK)



Hierarchical (nested-grid) aggregation



Ecosystem extent account

	Type of Ecosystem Unit															
	Artificial surfaces	Herbaceous crops	Woody crops	Multiple or layered crops	Grassland	Tree-covered areas	Mangroves	Shrub-covered areas	Regularly flooded areas	Sparse natural vegetated areas	Terrestrial barren land	Permanent snow and glaciers	Inland water bodies	Coastal water and inter-tidal areas	Sea and marine areas	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Opening extent																
Additions to extent																
Managed expansion																
Natural expansion																
Upward reappraisals																
Reductions in extent																
Managed regression																
Natural regression																
Downward reappraisals																
Net change in extent																
Closing extent																

Europe

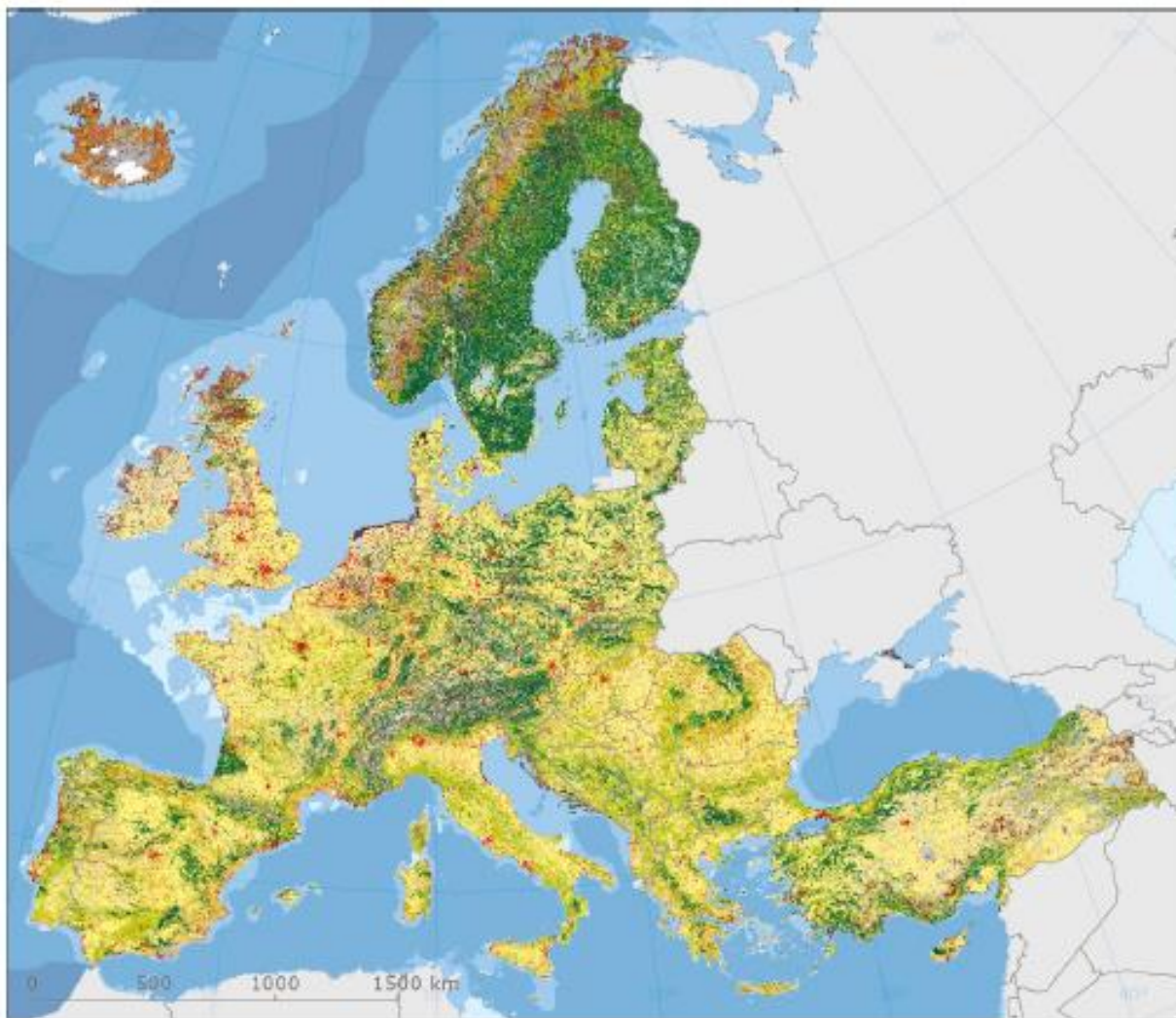
- 12 Ecosystem types, with further disaggregation
- Starting point Corine land cover (CLC) data set for 2006
- Enhanced with additional data sets (e.g. on forest cover, water bodies and roads.)
- Combined with EU Nature Information System categorisation of habitat types.
- Provides insights into the biodiversity per ecosystem type, and allows integration of national and local classifications that vary

3.2 Correlation between ecosystem map legend and MAES ecosystem types on EUNIS habitats

MAES categories		Units in legend of ecosystem map (Map 3.1, version 2.1)	
Level 1	Level 2	EUNIS level 1	EUNIS level 2
Terrestrial	Urban	J Constructed, industrial and other artificial habitats	
	Cropland	I Regularly or recently cultivated agricultural, horticultural and domestic habitats	
	Grassland	E Grassland and land dominated by forbs, mosses and lichens	
	Woodland and forest	G Woodland, forest and other wooded land	Broadleaved deciduous and evergreen woodland
			Mixed deciduous and coniferous woodland
			Coniferous and broadleaved evergreen woodland
	Heathland and shrub		Tundra
			Arctic, alpine and subalpine scrub and grassland
			Mediterranean scrub and bushes
			Heathland scrub
Sparsely vegetated or unvegetated land	H Inland unvegetated or sparsely vegetated habitats	Scree, inland cliffs	
		Snow- and ice-dominated habitats	
Attributed to sparsely vegetated land	B Coastal habitats (land)	Miscellaneous inland habitats with no or very sparse vegetation	
		Coastal dunes and sandy shores	
		Coastal shingle	
Wetlands	D Mires, bogs and fens	Rock cliffs, ledges and shores including supralittoral	
Water	Rivers and lakes	C Inland surface waters	Inland waters and shores
Marine	Marine inlets and transitional waters	A Marine habitats	Legend related to EUNIS and bathymetry data (see Table 3.1)
	Coastal	B Coastal habitats (water)	
	Shelf		
	Open ocean		

Source: European Commission, Mapping and Assessment of Ecosystems and their Services, 3rd Report – Final, March 2016.

EU - Ecosystem extent map



Ecosystem map (aggregated)

Marine waters

- Open waters
- European regional seas

Marine seabed and coastal habitats

- Sublittoral sediment
- Infralittoral and circalittoral rock and other hard substrata
- Marine habitats
- Coastal habitats

Inland surface waters

- Inland waters and shores

Inland vegetation and habitats

- Tundra
- Arctic, alpine and subalpine scrub and grassland
- Mediterranean-mountain scrub and bushes
- Heathland scrub
- Grasslands and land dominated by forbs
- Regularly or recently cultivated agricultural, horticultural and domestic habitats
- Broad leaved deciduous and evergreen woodland
- Mixed deciduous and coniferous woodland
- Coniferous and broad leaved evergreen woodland
- Wetlands - mires, bogs and fens

Inland unvegetated or sparsely vegetated habitats

- Scree, inland cliffs
- Snow or ice-dominated habitats

Human made constructions and habitats

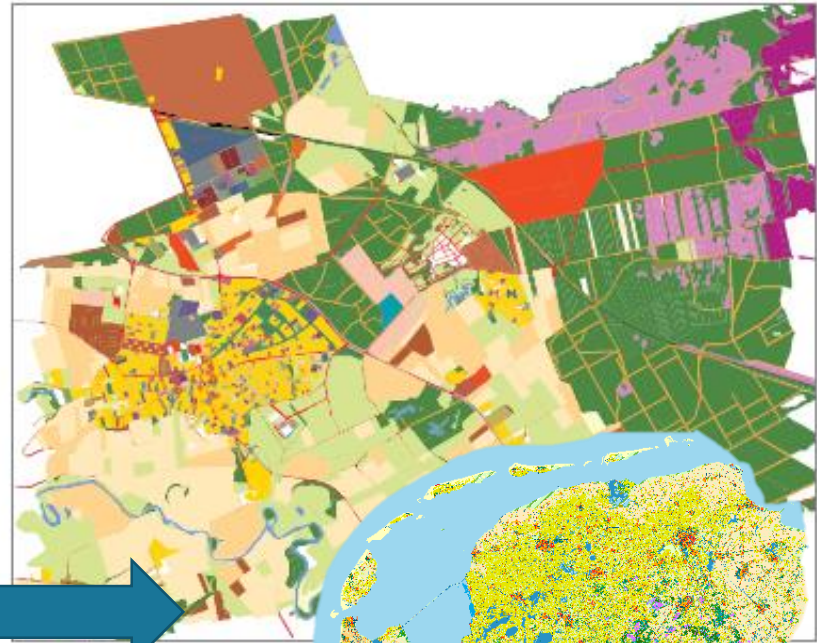
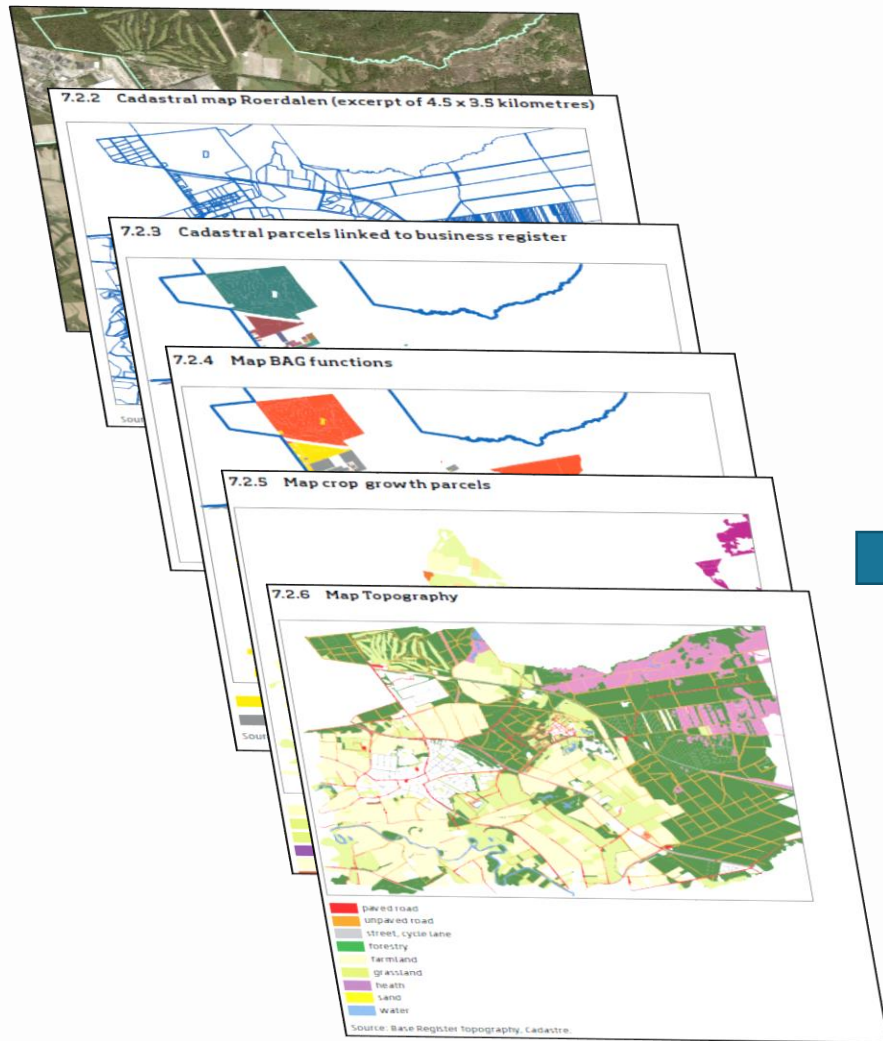
- Constructed, industrial and other artificial habitats

Non classified areas

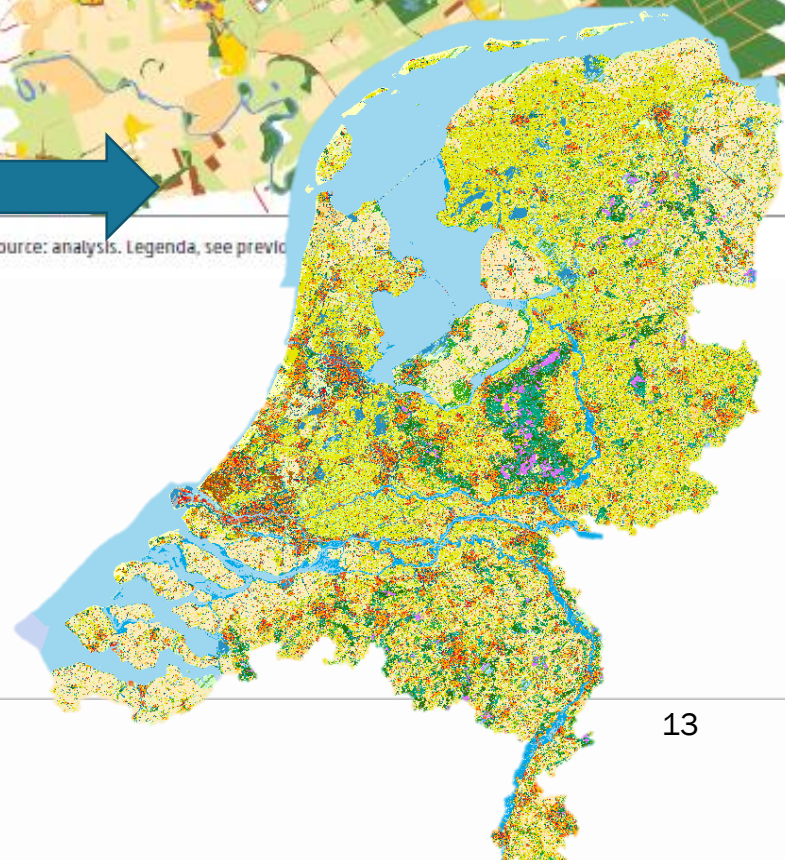
- Unclassified areas
- Outside area of interest

Netherlands

7.3.1 Land by use category Roerdalen



Source: analysis. Legenda, see previous slide





Source: PBL, RIVM, WUR, CICES 2014

Ecosystem services supply and use table

ECOSYSTEM SERVICES SUPPLY TABLE

	UNITS	Type of economic unit						Type of Ecosystem Unit								TOTAL SUPPLY					
		Agriculture, forestry and fisheries	Electricity, gas supply	Water collection, treatment and supply	Other industries	Households	Accumulation	Rest of the world - Imports	1 Artificial surfaces	2 Herbaceous crops	3 Woody crops	4 Multiple or layered crops	5 Grassland	6 Tree-covered areas	7 Mangroves		8 Shrub-covered areas	9 Regularly flooded areas	10 Sparse natural vegetated areas	11 Terrestrial barren land	12 Permanent snow and glaciers
Ecosystem services		A						B													
Provisioning services																					
Regulating services																					
Cultural services		C						D													
Products																					

ECOSYSTEM SERVICES USE TABLE

	UNITS	Type of economic unit						Type of Ecosystem Unit								TOTAL USE					
		Agriculture, forestry and fisheries	Electricity, gas supply	Water collection, treatment and supply	Other industries	Households	Accumulation	Rest of the world - Exports	1 Artificial surfaces	2 Herbaceous crops	3 Woody crops	4 Multiple or layered crops	5 Grassland	6 Tree-covered areas	7 Mangroves		8 Shrub-covered areas	9 Regularly flooded areas	10 Sparse natural vegetated areas	11 Terrestrial barren land	12 Permanent snow and glaciers
Ecosystem services		E						F													
Provisioning services																					
Regulating services																					
Cultural services		G						H													
Products																					

Valuation of ES – South Africa

- 10 individual services were modelled and valued
- Using a range of techniques, but always local/national data

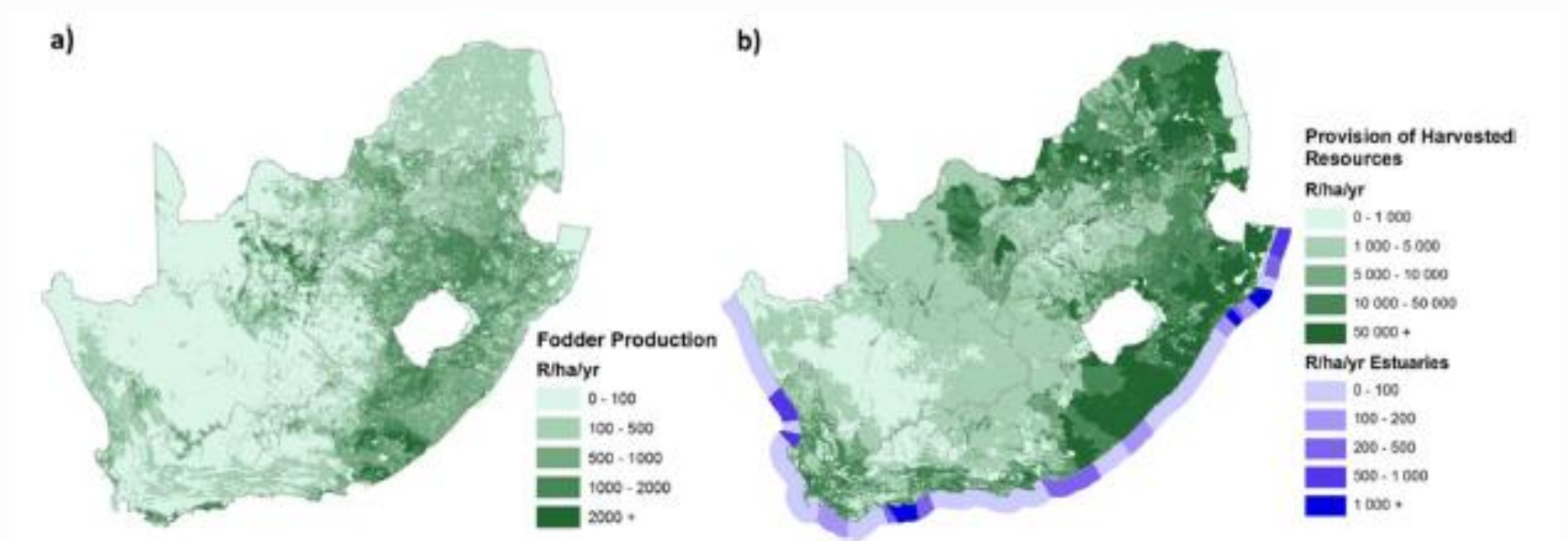


Fig. 3. Value of provisioning services in the form of (a) fodder production and (b) harvested natural resources, including instream water and estuarine/coastal resources.

Source: Turpie et al., 2017

Physical Supply Table (example Netherlands)

Physical supply, totals

Ecosystem Units		1	2	4	5	21	22	23	24	26	27	28	31	Totals
		Non-perennial plants	Perennial plants	Meadows (for grazing)	Hedgerows	Deciduous forest	Coniferous forest	Mixed forest	Heath land	Fresh water wetlands	Natural grassland	Public green space	River flood basin	
Ecosystem services	extent (ha)	53.600	8.100	27.100	2.900	11.400	7.100	10.400	2.100	900	3.100	4.800	14.100	220.900
Crops	tonnes/yr	1.427.300	65.000	-	-	-	-	-	-	-	-	-	-	1.492.400
Fodder	tonnes/yr	140.800	4.700	328.700	-	-	-	-	-	-	-	-	66.900	541.100
Meat (from game)	kg/yr	11.500	1.500	5.900	800	2.500	1.700	2.900	600	200	800	900	2.400	36.800
Ground water (drinking water only)	in 1000 m3/yr	9.000	1.400	4.200	500	1.900	100	500	100	-	700	400	1.300	27.000
capture of PM10	tonnes/yr	400	100	200	-	300	400	500	-	-	-	100	100	2.300
Carbon sequestration	tonnes C/yr	-	2.400	4.900	500	16.500	10.300	15.100	400	200	600	1.200	2.800	59.000
Recreation (cycling)	1000s of bike trips/yr	1.800	300	1.000	100	600	200	400	-	-	100	200	600	9.100
Nature tourism	# tourists/yr	94.000	22.000	136.800	57.000	160.300	93.800	147.400	22.700	11.600	55.400	11.800	94.500	974.300

Physical Supply per Hectare

Ecosystem Units		Non-perennial plants	Perennial plants	Meadows (for grazing)	Hedgerows	Deciduous forest	Coniferous forest	Mixed forest	Heath land	Fresh water wetlands	Natural grassland	Public green space	River flood basin
Crops	tonnes/ha/yr	26,63	8,02	-	-	-	-	-	-	-	-	-	-
Fodder	tonnes/ha/yr	2,63	0,58	12,13	-	-	-	-	-	-	-	-	4,74
Meat (from game)	kg/ha/yr	0,21	0,19	0,22	0,28	0,22	0,24	0,28	0,29	0,22	0,26	0,19	0,17
Ground water (drinking water only)	1000m3/ha/yr	0,17	0,17	0,15	0,17	0,17	0,01	0,05	0,05	-	0,23	0,08	0,09
capture of PM10	tonnes/ha/yr	0,01	0,01	0,01	-	0,03	0,06	0,05	-	-	-	0,02	0,01
Carbon sequestration	tonnesC/ha/yr	-	0,30	0,18	0,17	1,45	1,45	1,45	0,19	0,22	0,19	0,25	0,20
Recreation (cycling)	1000s of bike trips/ha/yr	0,03	0,04	0,04	0,03	0,05	0,03	0,04	-	-	0,03	0,04	0,04
Nature tourism	#tourists/ha/yr	1,75	2,72	5,05	19,66	14,06	13,21	14,17	10,81	12,89	17,87	2,46	6,70

SEEA and policy

The project

Natural Capital Accounting and Valuation of Ecosystem Services project

- (implementing) Partners
 - > United Nations Statistics Division
 - > United Nations Environment Programme
 - > CBD
- Sponsor
 - > European Union
 - Partnership program
- Five partner countries
 - > Brazil, China, India, Mexico, South Africa
- Project duration
 - > 3 years from 2017-2019

Overall objectives

Advance the knowledge agenda on environmental-economic accounting in particular ecosystem accounting, by initiating pilot testing of the SEEA Experimental Ecosystem Accounting in 5 strategic partner countries to the EU where biodiversity is at stake, with a view to:

- Improving the measurement of ecosystems and their services (both in physical and monetary terms) at the (sub)national level;
- Mainstreaming biodiversity and ecosystems in (sub)national level policy-planning and implementation;
- Contribute to the development of internationally agreed methodology and its use in partner countries.

Workstreams

- Piloting ecosystem accounts (in each of the 5 partner countries) for selected areas (national and/or regional)
- Developing guidelines and methodology
- Indicators
- Business accounting (sustainability reporting)
- Communication and outreach
- Training and capacity development

Findings India mission

Reflections

- Strong interest and ownership by MoSPI and other agencies in this topic (would link to the high-profile greening of national accounts commission - Dasgupta)
 - A concrete workplan for the project was proposed
 - > Focusing on 5 ecosystems, cover 5 states to a large extent
 - > First assessment phase + appointment of project director
 - > Interinstitutional coordination mechanism would be established
 - India has amazing technical capabilities to advance (shown by presentations yesterday by ISRO/National Remote Sensing Centre, FSI, DoLR etc.
 - RS data is already strongly used for policy making (e.g. land planning - on average a request per day)
 - Modes of implementation still to be further discussed
-



THANK YOU

seea@un.org