

SEEA EXPERIMENTAL ECOSYSTEM ACCOUNTS

SEEA EEA ecosystem services and monetary valuation in the Netherlands

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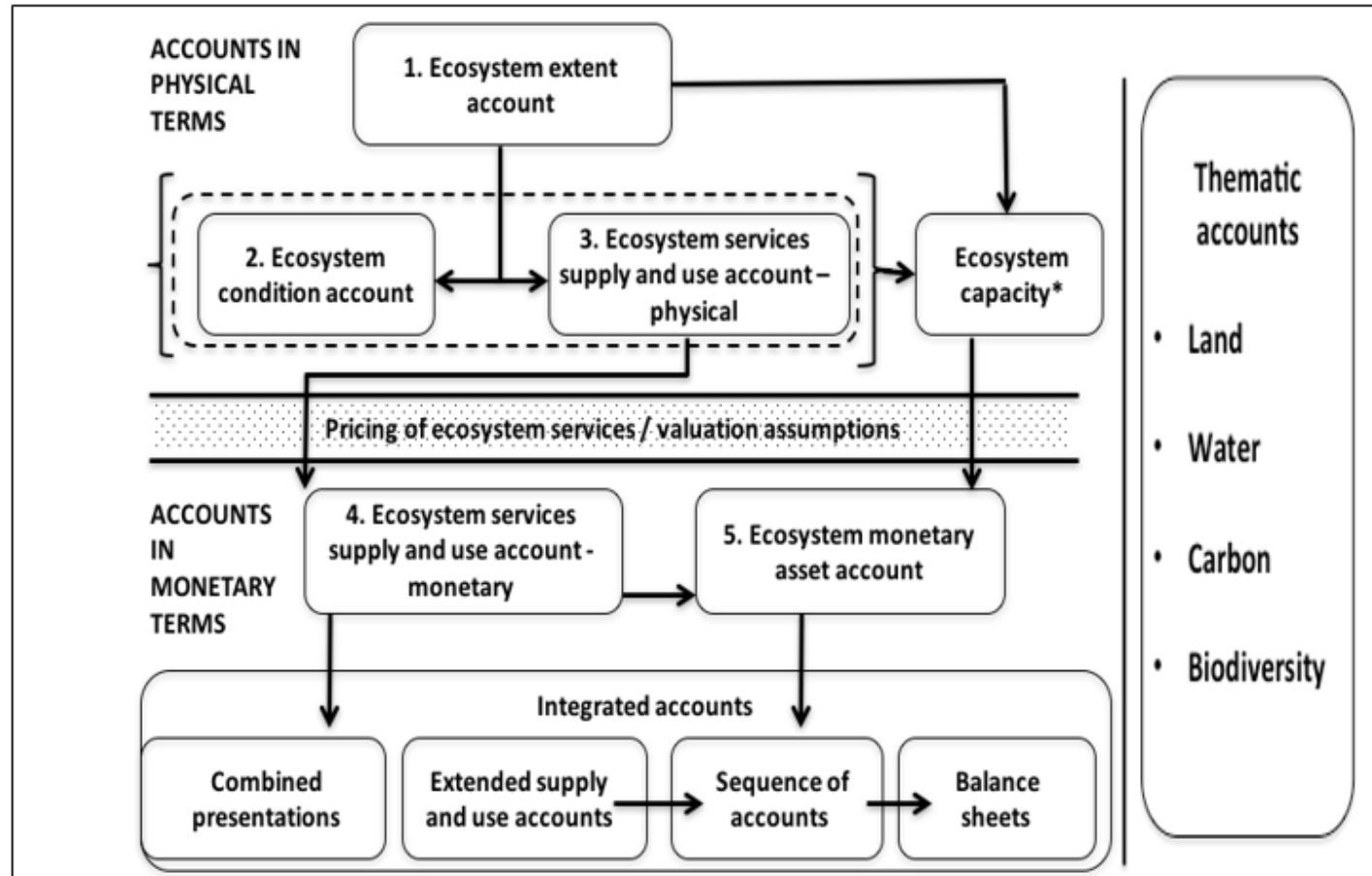
What is SEEA EEA?

“Ecosystem accounting is a **coherent and integrated approach** to the **assessment of the environment** through the **measurement of ecosystems**, and measurement of the flows of services from ecosystems **into economic and other human activity.**”

- Direct link with SEEA CF and SNA
- Integrates biophysical and economical data
- Spatial approach



The SEEA-EEA Framework



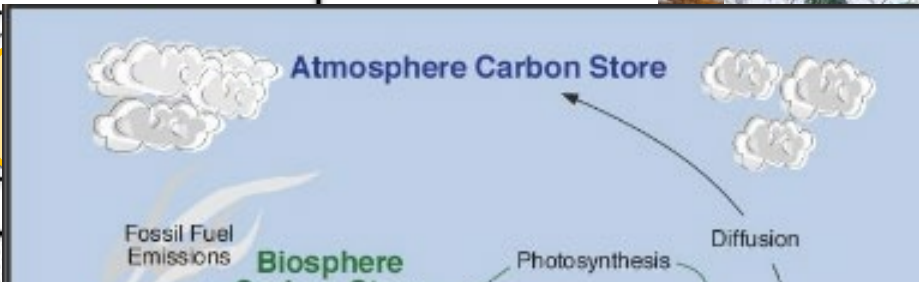
ACCOUNTS IN
PHYSICAL
TERMS

1. Ecosystem extent account



ACCO
IN
MONI
TERM

Combined
presentation



Policy applications of ecosystem accounts

- Understanding the **contribution of ecosystems to economic activities** (and the monetary value of these ecosystems)
- Measuring and monitoring **sustainability**: what are the changes in ecosystem capital / ecosystem assets from one year to the next
- **Identifying ecosystem types/ areas / services** under particular threat
- Show **trade-offs** between ecosystem uses
- The spatial approach of ecosystem accounting makes it also suitable **to support sustainability issues and policy effects**

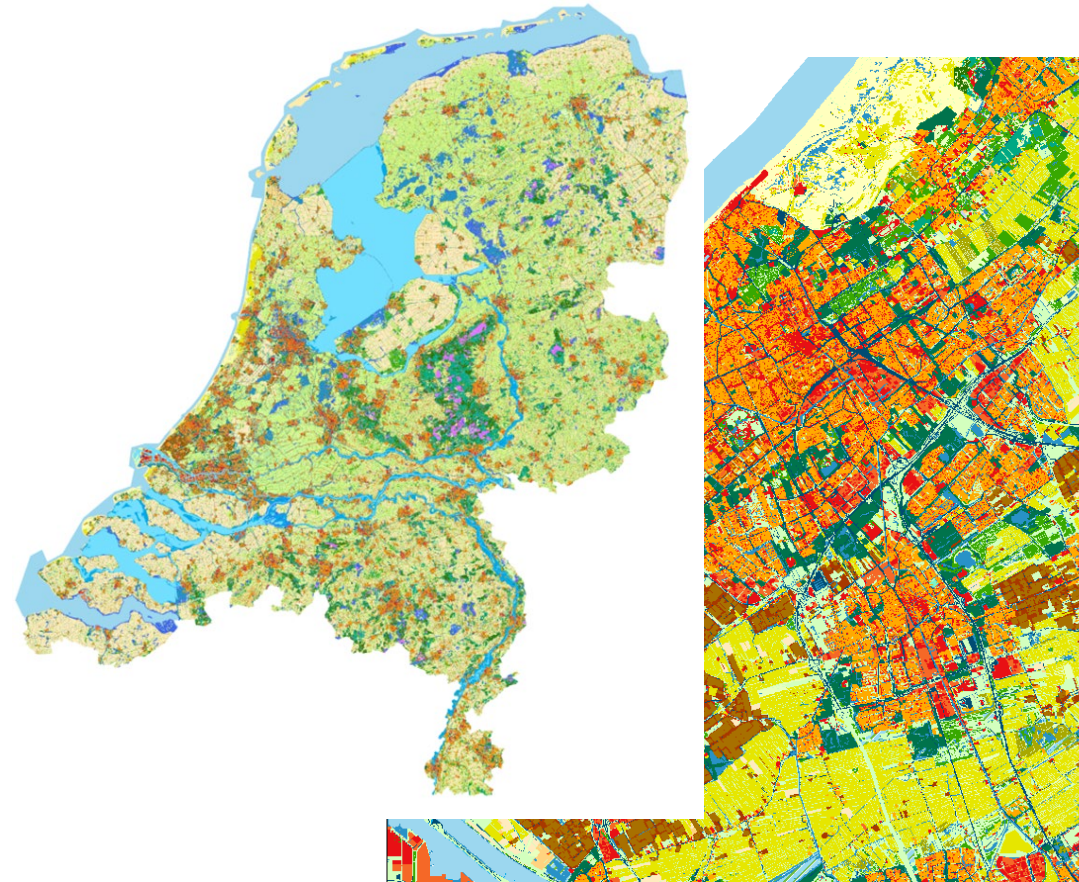


SEEA EEA in the Netherlands

- **Pilot project** of province Limburg in 2015
- Implementation of **full set of accounts** on national level started in 2016 and work in progress
 - Together with **Wageningen University**
 - **Financed** by Ministry of Infrastructure & Water Management and Ministry of Agriculture, Nature & Food Quality
 - **First results**, sometimes experimental methods
- **Other projects** for other governmental institutes
- Contribute to development of guideliness (such as **SEEA EEA revision**)



Ecosystem types and extent account



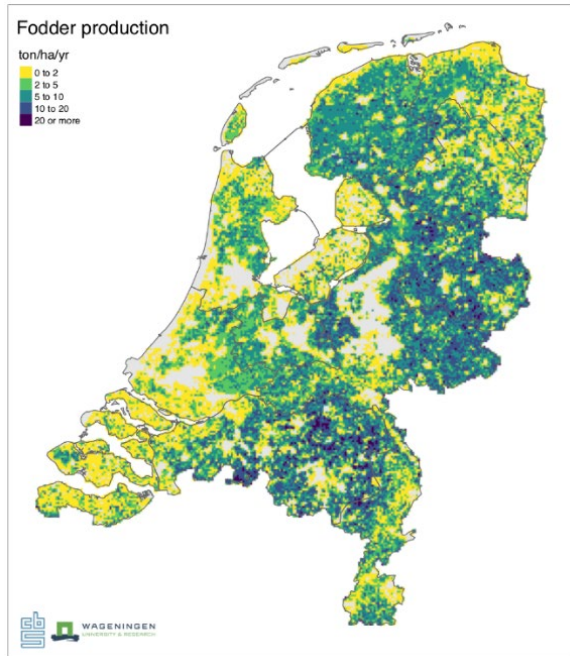
Ecosystem services and assets

“Ecosystem services are the contributions of ecosystems to benefits used in economic and other human activity”

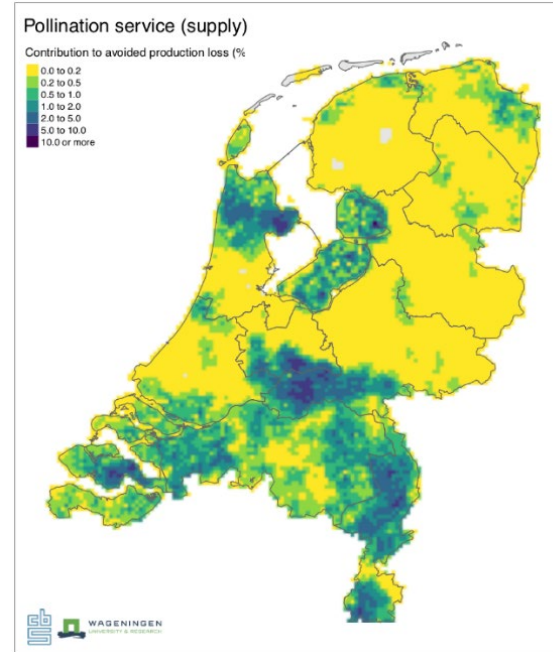
- Provisioning
 - Crop production
 - Fodder production
 - Timber production
 - Biomass from non-agricultural sources
- Regulating
 - Air filtration
 - Carbon sequestration in biomass
 - Pollination
 - Water filtration
 - Natural pest control
 - Erosion prevention
 - Protection against heavy rainfall
- Cultural
 - Nature recreation (hiking)
 - Nature tourism
 - Amenity service



Physical supply and use account



- Production of maize and grass
- Harvest data and remote sensing of net primary productivity (NPP)
- > 16,000 kton a year



- Avoided production loss due to pollination of wild bees
- Crops depending on pollination
- Ecosystem types suitable habitat
- >500 kton avoided production loss

Ecosystem unit																		
Ecosystem service	Unit	Null	Non-perennial crops	Perennial crops	Greenhouses	Meadows	Hedgerows	Farmyards and barns	Dunes with permanent vegetation	Active coastal dunes and beaches	Deciduous forest	Coniferous forest	Mixed forest	Heath land	Inland dunes	Fresh water wetlands	semi) Natural grassland	
Area	ha	379	781,401	79,228	11,790	927,216	36,492	35,491	15,943	33,946	109,142	81,923	118,571	40,813	2,364	34,346	54,010	
Crop production	ktons	0	15,177	1,081	0	0	0	0	0	0	0	0	0	0	0	0	0	
Fodder production	ktons	0	9,517	0	0	6,181	0	0	0	0	0	0	0	0	0	0	0	
Wood production	1000 m³	0	0	0	0	0	0	0	50	0	289	348	398	0	0	0	0	
Biomass production	ktons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
Drinking water production	mln m³	0	30	5	0	48	2	1	31	77	15	3	38	14	1	1	4	
Carbon sequestration in biomass	ktons	0	0	30	0	167	6	0	30	0	206	155	224	8	0	8	10	
Pollination¹	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Natural pest control¹	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Erosion control	ktons soil	0	57	34	6	893	77	50	197	13	480	316	518	175	4	39	195	
Air filtration	tons PM₁₀	0	2,725	287	0	3,266	127	0	463	0	4,063	5,014	5,835	145	0	114	192	
Protection against heavy rainfall	mln ltr in 1 hour	134	171,646	23,705	953	193,289	8,160	5,019	10,820	16,407	48,090	57,059	79,118	23,571	1,160	7,066	16,824	
Nature recreation (hiking)	mln hikers	0	2,041	408	47	2,973	149	245	811	1,199	2,068	1,807	2,360	836	52	453	436	
Nature tourism	1000 stays	0	2,327	266	0	2,870	127	0	967	2,134	430	494	706	264	19	103	224	
Ecosystem unit Cont'd																		
Ecosystem service	Unit	Public green space	Other unpaved terrain	River floodplains	Salt marshes	Residential area	Industry, offices and businesses	Services, offices and businesses	Public administration: offices and businesses	Roads, parking lots and other paved areas	Forestry, offices and businesses	Fishery: offices and businesses	Non-commercial services: offices and businesses	Sea	Lakes and ponds	Rivers and streams	unknown	Total
Area	ha	68,416	294,931	73,306	11,139	250,417	66,518	89,774	1,093	111,811	206	115	19,723	381,509	123,277	297,559	1,231	4,154,080
Crop production	ktons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16,259
Fodder production	ktons	0	0	340	0	0	0	0	0	0	0	0	0	0	0	0	0	16,039
Wood production	1000 m³	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,085
Biomass production	ktons	0	357	0	0	0	0	0	0	0	0	0	0	0	0	0	0	360
Drinking water production	mln m³	12	32	12	0	24	6	8	0	10	0	0	3	0	7	2	0	413
Carbon sequestration in biomass	ktons	18	53	15	45	0	0	0	0	0	0	0	0	0	0	0	0	975
Pollination¹	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	534¹
Natural pest control¹	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Erosion control	ktons soil	159	787	112	12	251	75	93	1	325	0	0	16	0	2	0	0	4,888
Air filtration	tons PM₁₀	252	1,071	290	0	0	0	0	0	0	0	0	0	0	0	0	0	23,843
Protection against heavy rainfall	mln ltr in 1 hour	26,412	97,808	14,269	2,856	52,531	6,299	14,439	142	21,671	66	21	3,591	0	0	0	0	903,128
Recreation: hiking	mln hikers	3,251	3,135	342	37	0	0	0	0	0	0	0	0	15	1,294	94	6	24,060
Nature tourism	1000 stays	256	1,066	257	22	2	0	1	0	9	0	0	0	0	142	230	0	12,916



Physical supply and use account

Province		Groningen	Friesland	Drenthe	Overijssel	Flevoland	Zeeland	Utrecht	Noord-Holland	Zuid-Holland	Zeeland	Noord-Brabant	Limburg	Netherlands
Ecosystem service	Unit													
Area ¹	ha	238,959	352,786	268,033	340,527	146,609	511,786	144,291	285,761	305,507	183,387	505,311	220,967	3,503,923
Crop production	ktons	2,178	590	1,950	310	2,605	611	71	1,067	1,241	2,429	2,010	1,199	16,259
Fodder production	ktons	786	1,839	1,258	2,657	216	2,879	557	591	562	330	3,353	1,012	16,039
Wood production	1000 m3	16	48	122	106	75	292	54	46	18	9	209	88	1,085
Biomass production	ktons	23	25	24	25	21	41	19	43	46	19	47	26	358
Drinking water production	mln m3	1	14	32	49	0	77	31	67	75	3	32	31	413
Carbon sequestration in biomass	ktons	38	90	81	100	36	216	47	60	41	30	163	73	975
Pollination	ktons	6	4	6	3	48	118	38	47	24	51	94	95	534
Natural pest control	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Erosion control	ktons soil	171	334	243	374	82	1,053	248	392	293	170	545	978	4,885
Air filtration	tons PM10	777	1,258	1,861	2,417	877	5,650	1,209	1,165	982	629	4,902	2,107	23,834
Protection against heavy rainfall	mln ltr in 1 hour	44,842	67,017	80,544	107,805	23,926	176,331	33,035	53,929	37,205	30,710	181,528	67,806	904,677
Nature recreation (hiking)	mln hikers	818	1,125	893	1,675	583	3,151	1,672	3,370	4,263	1,007	3,240	2,264	24,060
Nature tourism	1000 stays	134	1,288	1,134	1,073	184	2,391	302	1,259	582	2,166	834	1,364	12,711



Monetary valuation: Amenity service

Aim is to measure the utility that people derive from the landscape
→ reflected in **utility of living in green area**
→ reflected in property values

Hedonic pricing model:

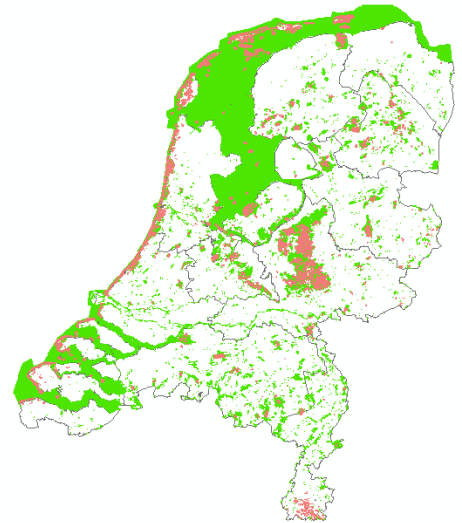
Value of property is determined by the **characteristics of the property** itself as well as **characteristics of its surrounding environment**



Amenity service - Data

1. Dataset of 4.5 million house observations
2. Living in green area: distance to nearest nature area
 - i. Clusters of perceived attractive nature
 - ii. Other nature: Nature classes from ecosystem types map

Source: Daams, M.N, Sijtsma, F.J. & Van der Vlist, A.J (2016). The effect of natural space on nearby property prices: accounting for perceived attractiveness. Land Economics, 92(3), 389-410.



Amenity service – Regression results

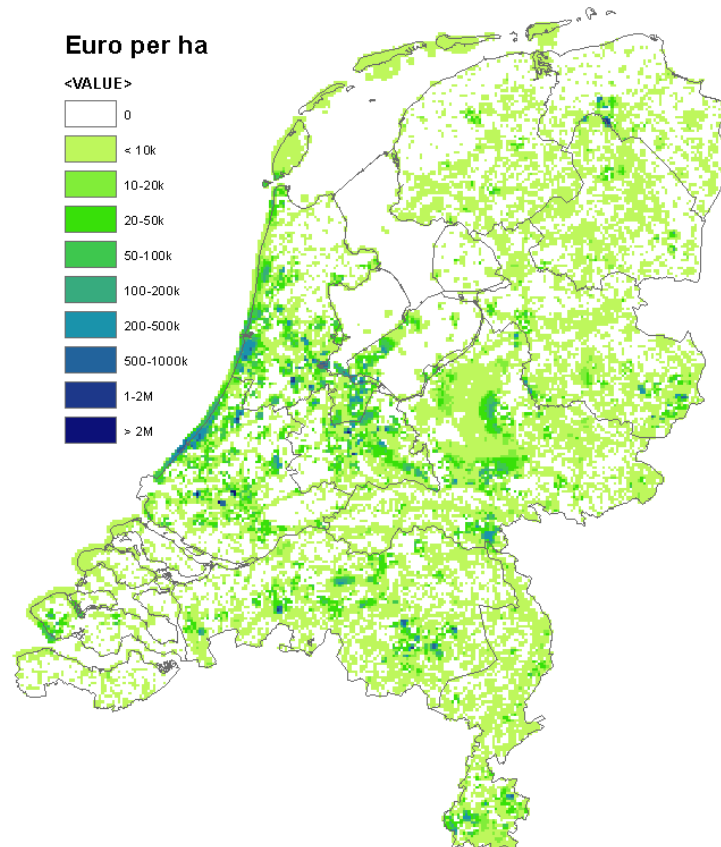
Proportion of house value attributable to nature (%)

1. Effect of nature area up to 7 km
2. Effect is larger if nature area is closeby
3. Effect is larger in urban areas

	NL	Urbanisation level				
		1	2	3	4	5
Observations	4.5 mln	472000	1.3 mln	1 mln	1.2 mln	600000
CANA (meters)						
< 500	6.5	20.8	6.9	4.9	2.7	2.0
500-1000	4.0	15.8	4.8	2.2	1.4	
1000-2000	3.4	11.3	5.5		1.1	
2000-3000	2.8	8.7	5.2			
3000-4000	1.8	9.2	2.4			
4000-5000	1.0	6.7	1.9			
5000-6000	1.0	5.3				
6000-7000	0.6					
ONA (meters)						
< 50	5.0	4.3	6.0	5.7	4.1	2.8
50-100	3.5	3.6	4.1	4.0	3.1	1.7
100-150	2.1	2.7	2.7	2.6	1.5	0.6
150-200	1.4	2.2	2.2	1.7	0.6	0.3
200-250	0.8	1.2	1.5	1.3	0.3	
250-300	0.4	0.6	0.8	1.0		
300-350	0.1		0.5	0.5		
350-400			0.3	0.4		



Amenity service – Results



Ecosysteem type	mln euro	
Agriculture	2.576	8%
Forest	7.074	23%
Heath land and inland dunes	732	2%
Dunes and beaches	3.373	11%
(semi)Natural grassland	716	2%
Public green space	6.255	20%
Built up areas	564	2%
Water (sea, lakes, rivers)	8.092	26%
Other	1.713	6%
	31.094	100%

SEEA EEA in the Netherlands – Lessons learned

- **High interest** at government and businesses
- **Step-by-step approach**: account-by-account and learning by doing
- **Collaboration** between statistical office and university
- Data available from many sources and institutes: **merging these data is already valuable**
- **Spatial approach is challenge** in terms of knowledge and infrastructure
- Choice of **level of detail and coverage** (national or regional)



More information

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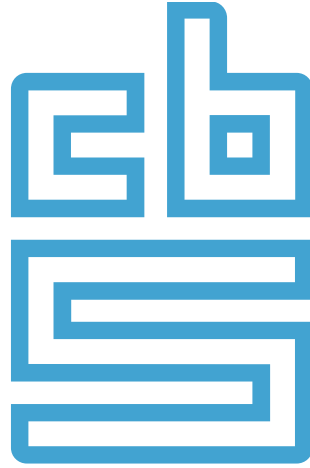
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www.cbs.nl/nl-nl/maatschappij/natuur-en-milieu/milieurekeningen

www.cbs.nl/nl-nl/maatschappij/natuur-en-milieu/natuurlijk-kapitaal (under construction)





Facts that matter

Questions to the audience

1. To which policy issues in your country would SEEA EEA provide answers?
2. What would be your main barrier for SEEA EEA implementation?

