

System of
Environmental
Economic
Accounting

Introduction to the SEEA and project presentation

Julian Chow

Jessica Ying Chan

United Nations Statistics Division



United Nations

The Need for Natural Capital Accounting

- Nature and the services it provides support almost every aspect of human well-being
- But headline indicators like GDP, the unemployment rate and inflation do not capture the full economic contributions of nature
- Traditional accounts don't help us understand how the depletion of natural resources and degradation of the environment affect the economy and wellbeing
- The System of Environmental Economic Accounts (SEEA) fills that gap.
- SEEA integrates information on the economy and the environment showing their interrelationship complementing the System of National Accounts

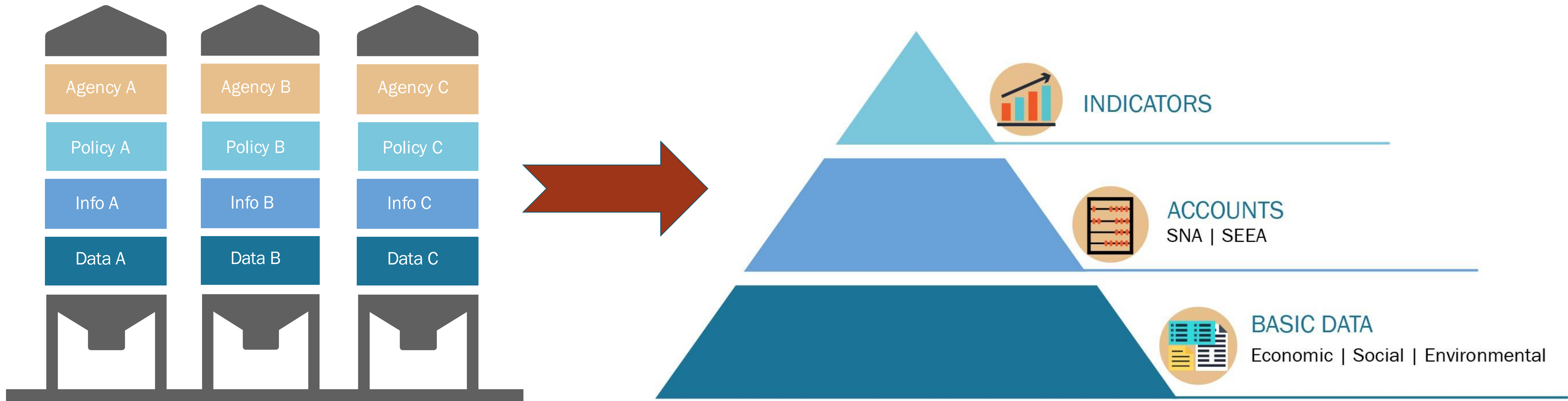


The SEEA as a Unifying Framework

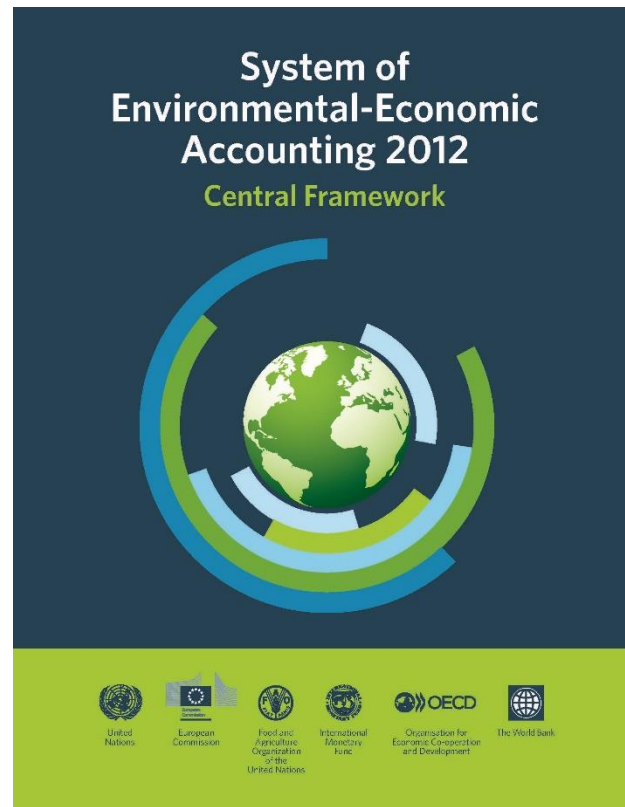
- SEEA accounts integrate numerous data sources, combining economic information with environmental information on areas such as
 - Energy
 - Air emissions
 - Agriculture and forestry
 - Ecosystems and many more
- These data sources are combined to produce an integrated set of accounts and develop policy relevant indicators



From data silos to integrated information



One Environment: Two Perspectives



CENTRAL FRAMEWORK *Assets*



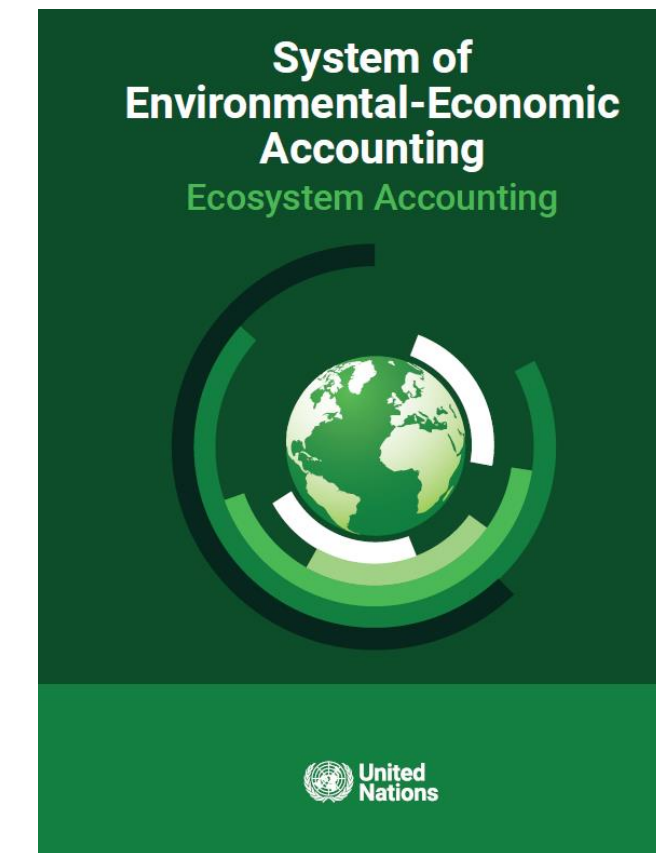
Timber



Water



Fish



ECOSYSTEM ACCOUNTING *Services*



Forests

e.g. flood control



Rivers

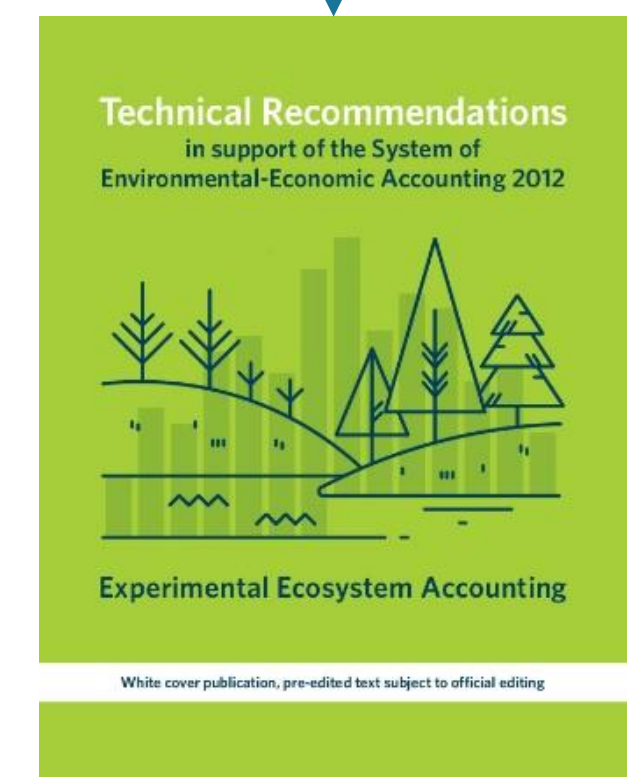
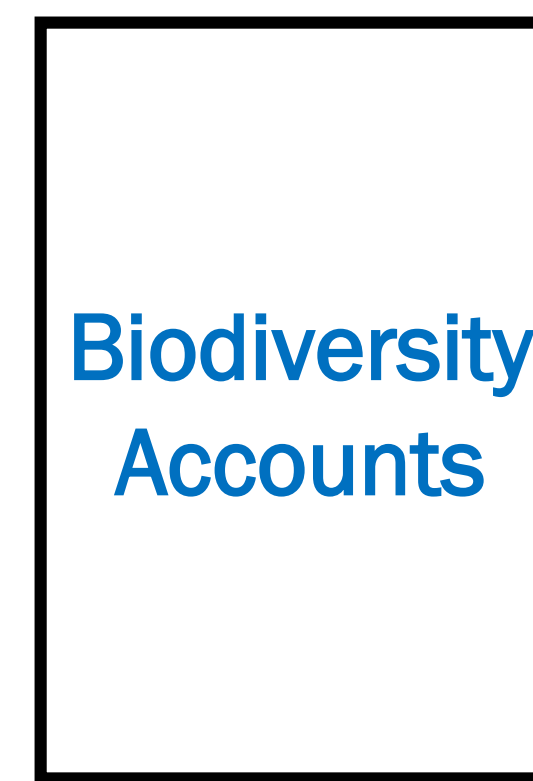
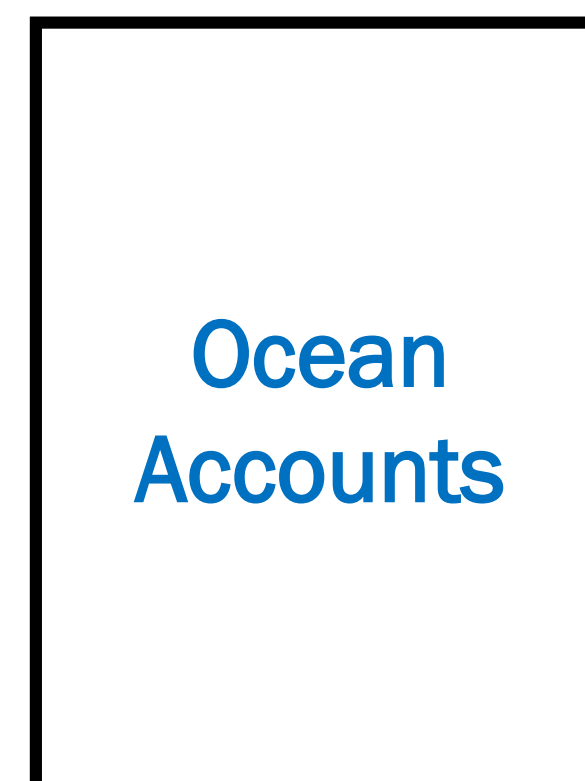
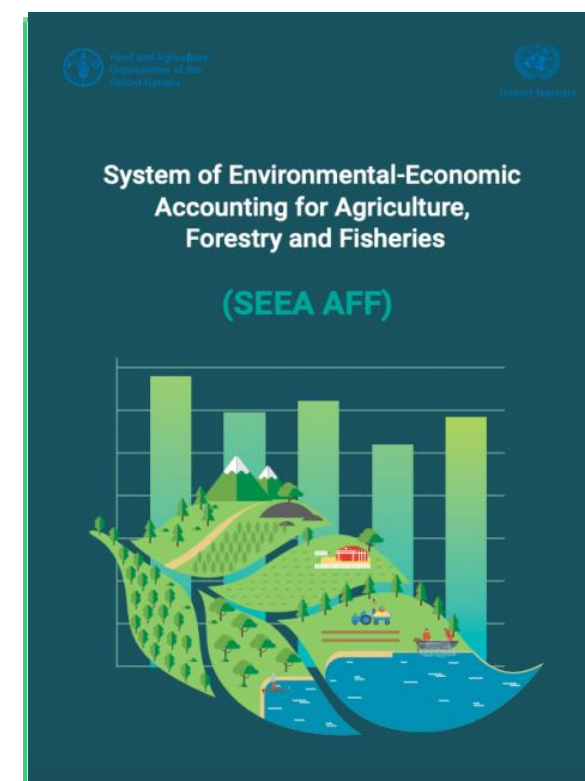
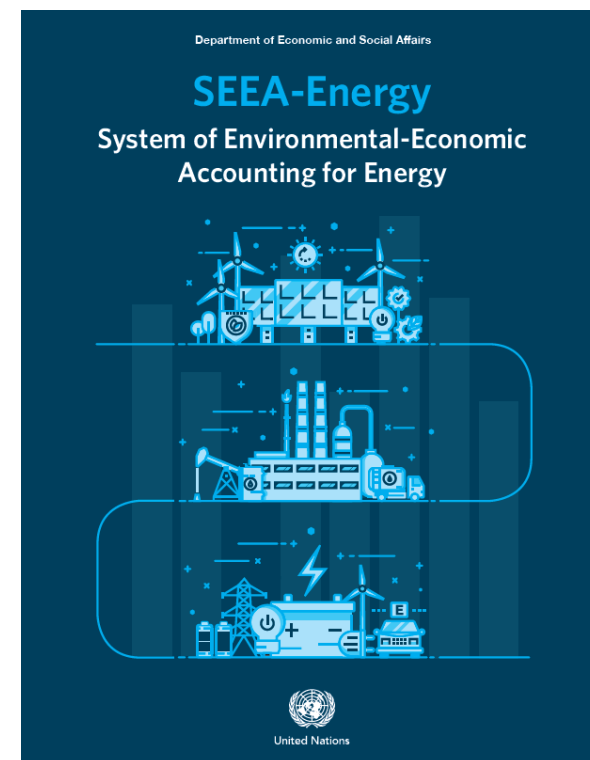
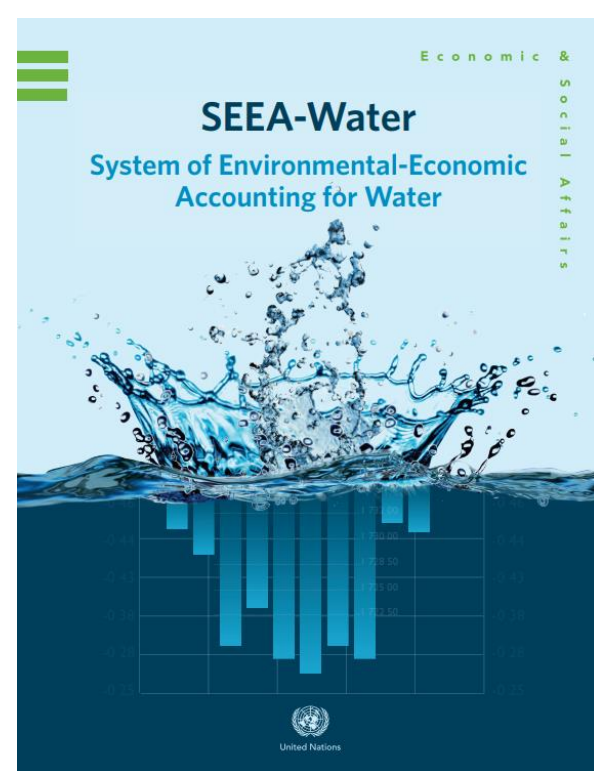
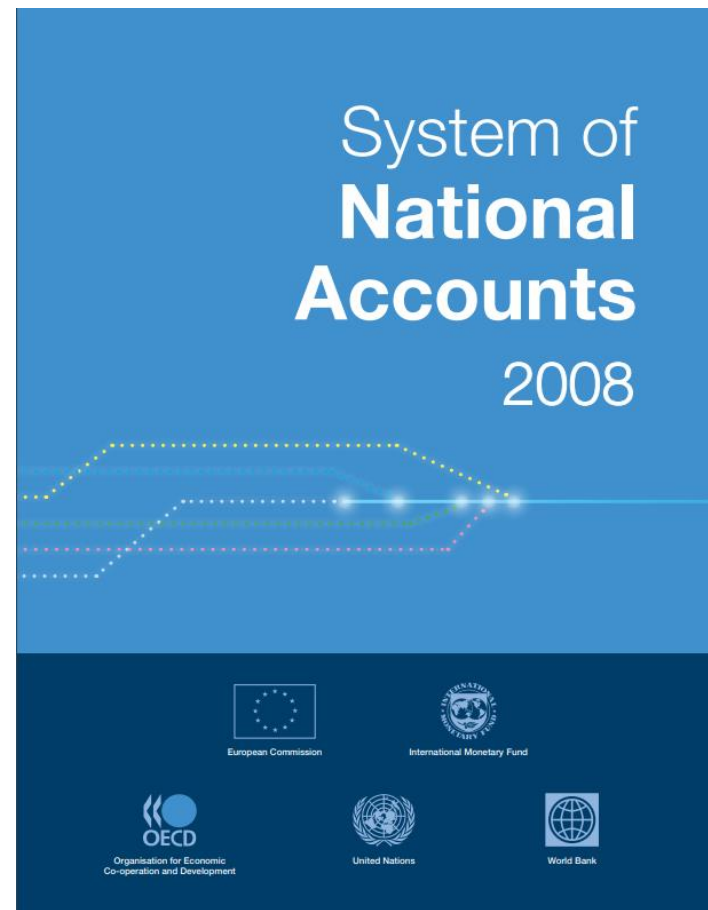
e.g. water purification



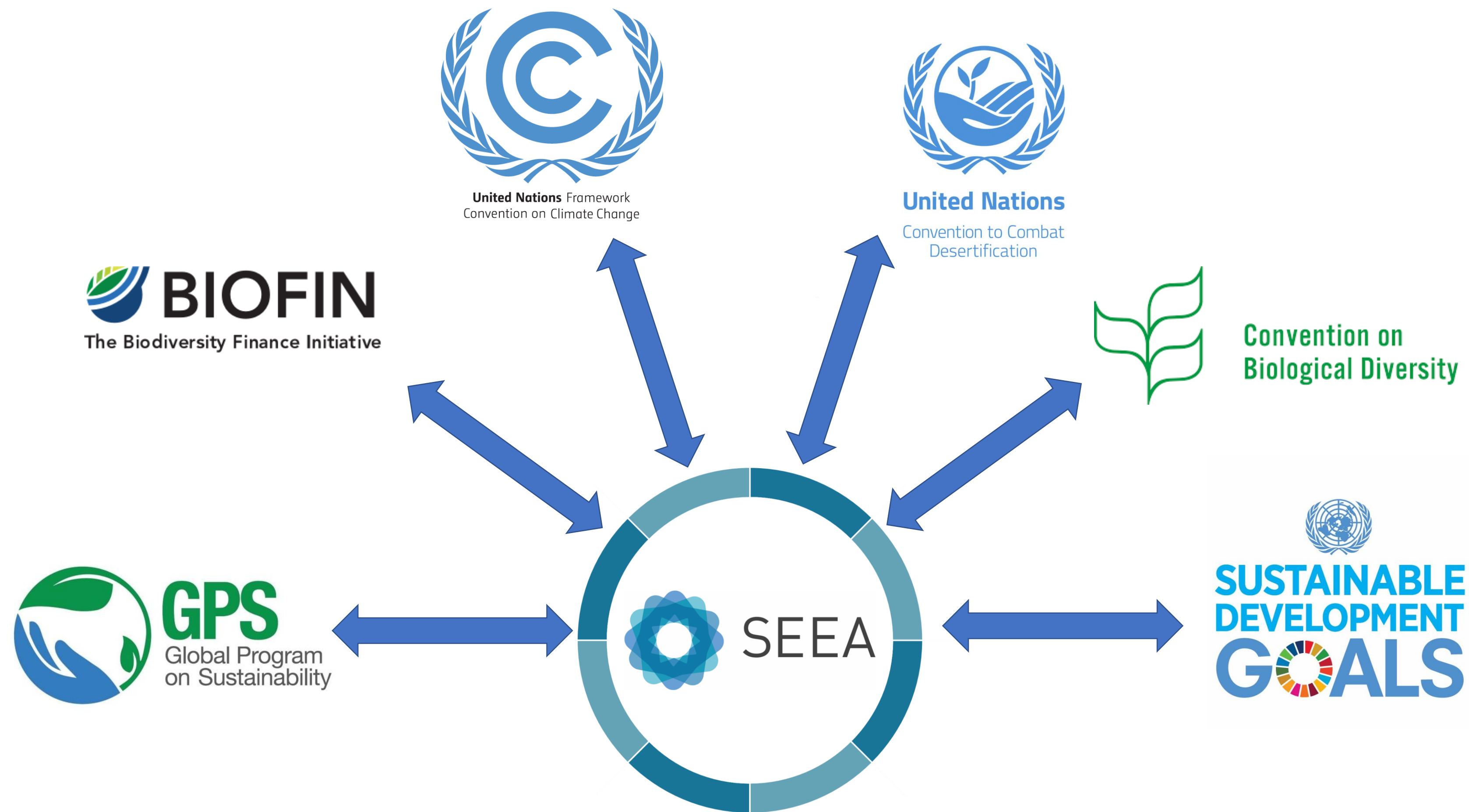
Coasts

e.g. recreation

SNA and SEEA – statistical standards



The SEEA supports multiple ongoing initiatives



The SEEA supports the SDGs

The SEEA provides information for 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

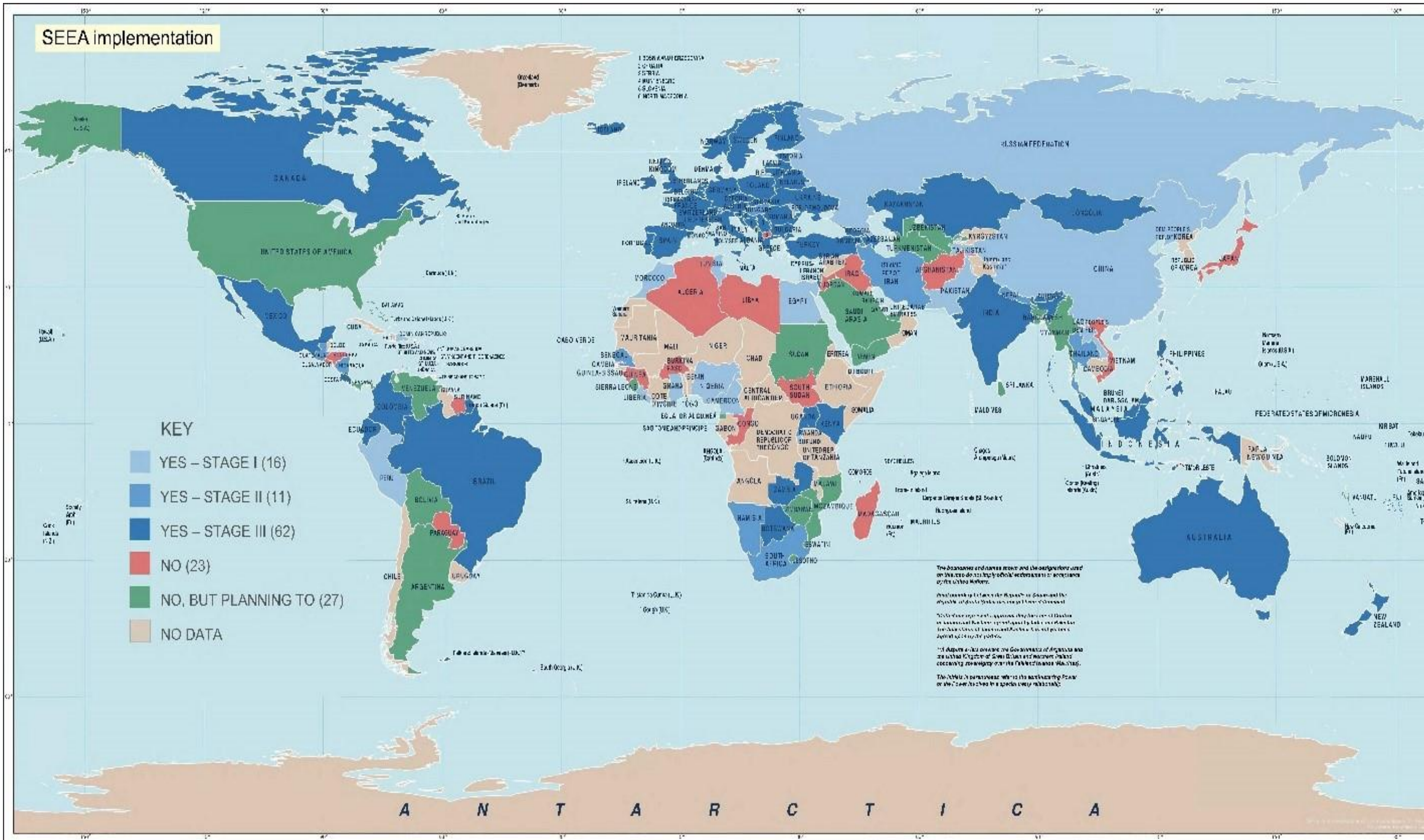
GOAL 12: Responsible Consumption and Production

GOAL 14: Life Below Water

GOAL 15: Life on Land

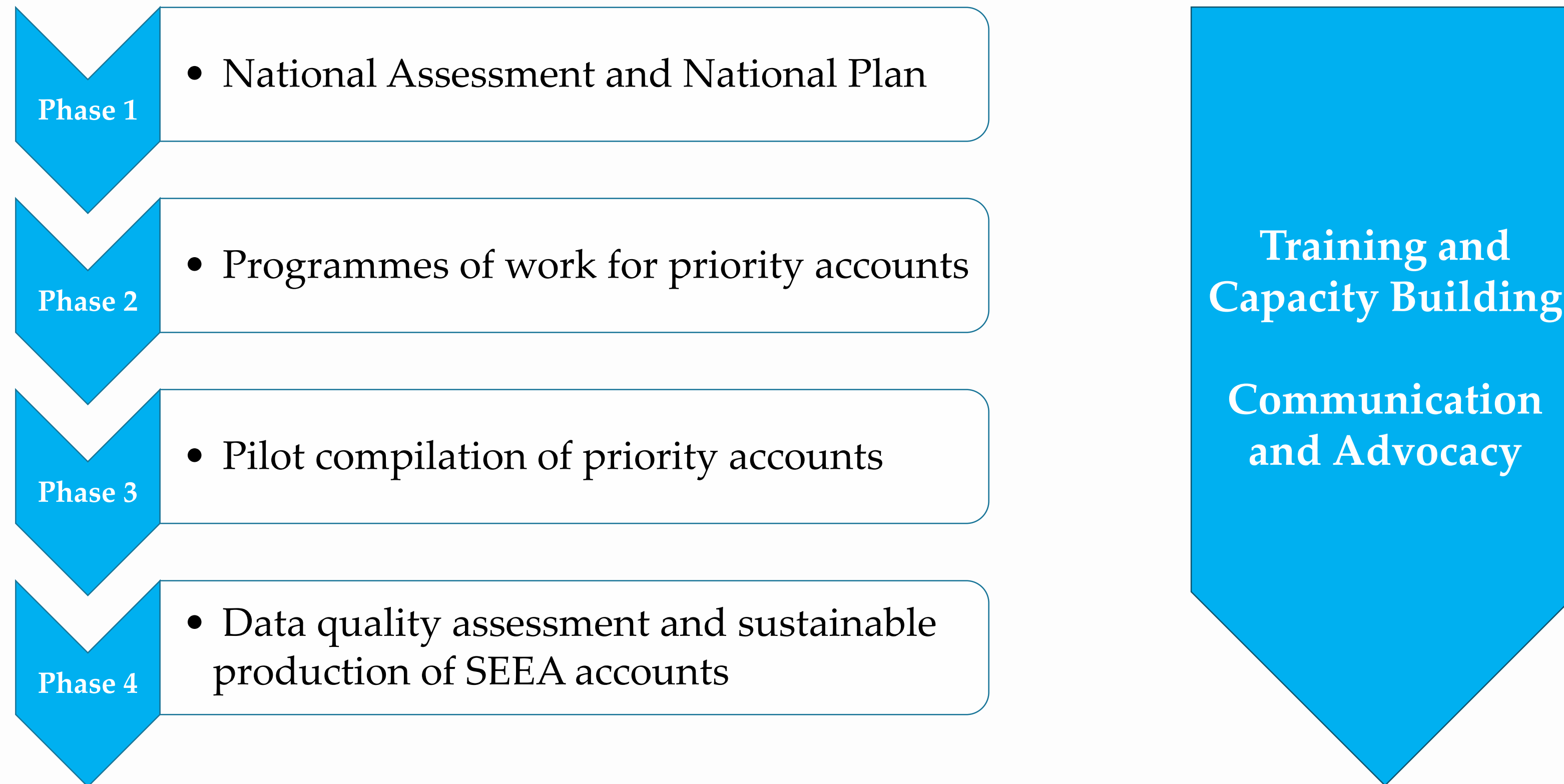


Status of SEEA implementation

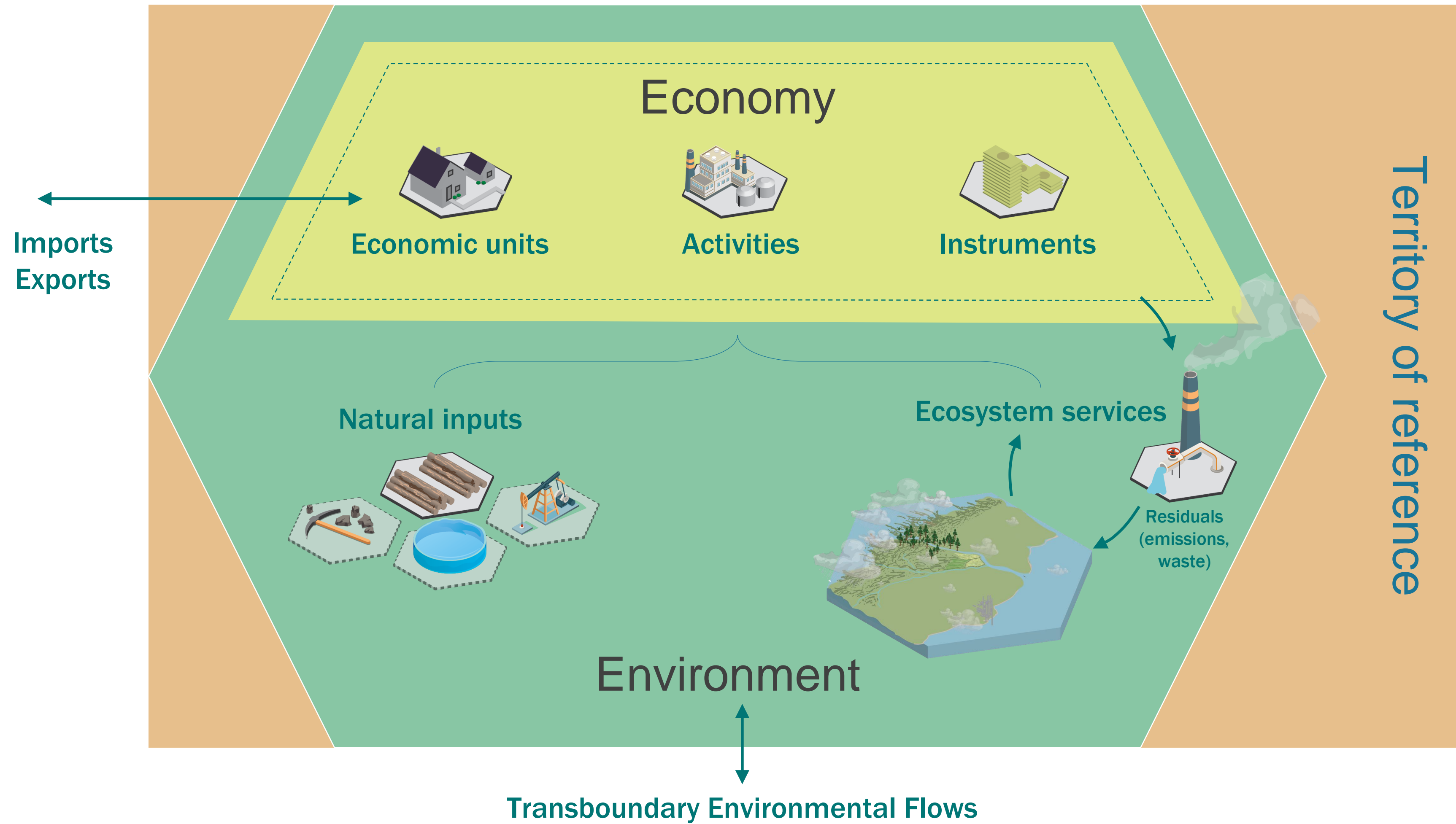


- > 2020 Global Assessment for Environmental-Economic Accounting and Supporting Statistics
- > 89 countries implementing the SEEA Central Framework
- > 34 countries compiling SEEA Ecosystem Accounts
- > 27 countries planning to start implementation of the SEEA

Approach to National Implementation



SEEA Conceptual Framework



SEEA Central Framework

1. Stock accounts for environmental assets: natural resources and land

- physical (e.g. fish stocks and changes in stocks) and/or monetary values (e.g. value of natural capital, depletion)

2. Flow accounts: supply and use tables for products, natural inputs and residuals (e.g. waste, wastewater) generated by economic activities.

- physical (e.g. m³ of water) and/or monetary values (e.g. permits to access water, cost of wastewater treatment, etc.)

3. Activity / purpose accounts that explicitly identify environmental transactions already existing in the SNA.

- e.g. Environmental Protection Expenditure (EPE) accounts, environmental taxes and subsidies

4. Combined physical and monetary accounts that bring together physical and monetary information for derivation indicators, including depletion adjusted aggregates

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 CF – Asset accounts

- Present stocks and flows of individual environmental assets in physical and monetary terms
- Record changes due to growth, extraction, catastrophic losses, revaluation etc.
- Valuation using market price concepts
- Classification of environmental assets
 - > Mineral and energy resources
 - > Land
 - > Soil resources
 - > Timber resources
 - > Aquatic resources
 - > Other biological resources
 - > Water resources

Simplified water asset account, the Netherlands, 2014

Mio m ³	Fresh surface water	Ground water	Soil water	Total
1. Opening Stocks ¹⁾	11,300	950,000	27,500	988,800
Increases in stocks, total	85,211	7,275	29,274	121,759
2. Returns	10,907		67	10,974
3. Precipitation ²⁾	2,469		29,206	31,675
4. Inflows	71,835	7,275	0	79,110
4.a. from upstream territories	71,835	508		72,343
4.b. from other resources in the territory ³⁾	0	6,767	0	6,767
Decreases in stocks, total	94,974	1,019	17,515	113,509
5. Abstraction ⁴⁾	8,471	1,019	15,205	24,695
6. Evaporation/Actual evapotranspiration ⁵⁾	2,512		2,310	4,822
7. Outflows	83,992	0	0	83,992
7.a. to downstream territories	0	0		0
7.b. to the sea	77,225	0		77,225
7.c. to other resources in the territory ³⁾	6,767	0	0	6,767
8. Other changes in volume	9,763	-6,256	-11,759	-8,251
9. Closing Stocks ¹⁾	11,300	950,000	27,500	988,800

SEEA CF - Physical flow accounts

Physical flow accounts describe the physical flows of water, energy, and materials between the economy and the environment and within the economy

- Air emissions, water emissions, solid waste
 - natural resource inputs (energy, water etc.)
 - Material flows within the economy
- Physical supply and use tables (PSUT) : structure based on monetary supply and use tables from SNA

Total greenhouse gas emissions by industry section and group, 2017-2019

	2017	2018	2019
Agriculture, forestry and fishing	48,767.4	48,200.5	48,585.6
Mining and quarrying	21,955.5	21,801.2	21,785.5
Manufacturing	85,654.3	84,381.3	83,654.7
Electricity, gas, steam and air conditioning supply	98,661.6	94,407.5	88,395.1
Water supply; sewerage, waste management and remediation activities	25,984.0	26,294.8	26,210.8
Construction	14,051.8	14,239.4	13,827.1
Wholesale and retail trade; repair of motor vehicles and motorcycles	16,918.8	16,522.5	16,056.0
Transport and storage	80,967.2	87,112.0	79,546.2
Accommodation and food services	3,581.4	3,626.6	3,595.7
Information and communication	887.8	856.3	844.3
Financial and insurance activities	267.6	262.7	260.3
Real estate activities	977.0	983.9	979.9
Professional, scientific and technical activities	1,917.9	1,883.1	1,861.3
Administrative and support service activities	3,404.3	3,394.4	3,363.5
Public administration and defence; compulsory social security	4,711.0	4,898.0	4,765.1
Education	2,808.0	2,848.9	2,565.2
Human health and social work activities	5,452.7	5,952.4	5,469.2
Arts, entertainment and recreation	1,050.9	1,057.2	1,049.9
Other service activities	974.0	982.8	972.9
Activities of households as employers; undifferentiated goods and services-producing activities of households for own use	50.5	50.7	46.8
Consumer expenditure	144,353.3	148,814.4	147,687.9
Total greenhouse gas emissions	563,397.2	568,570.5	551,523.0

Source: UK Environmental Accounts: 2021

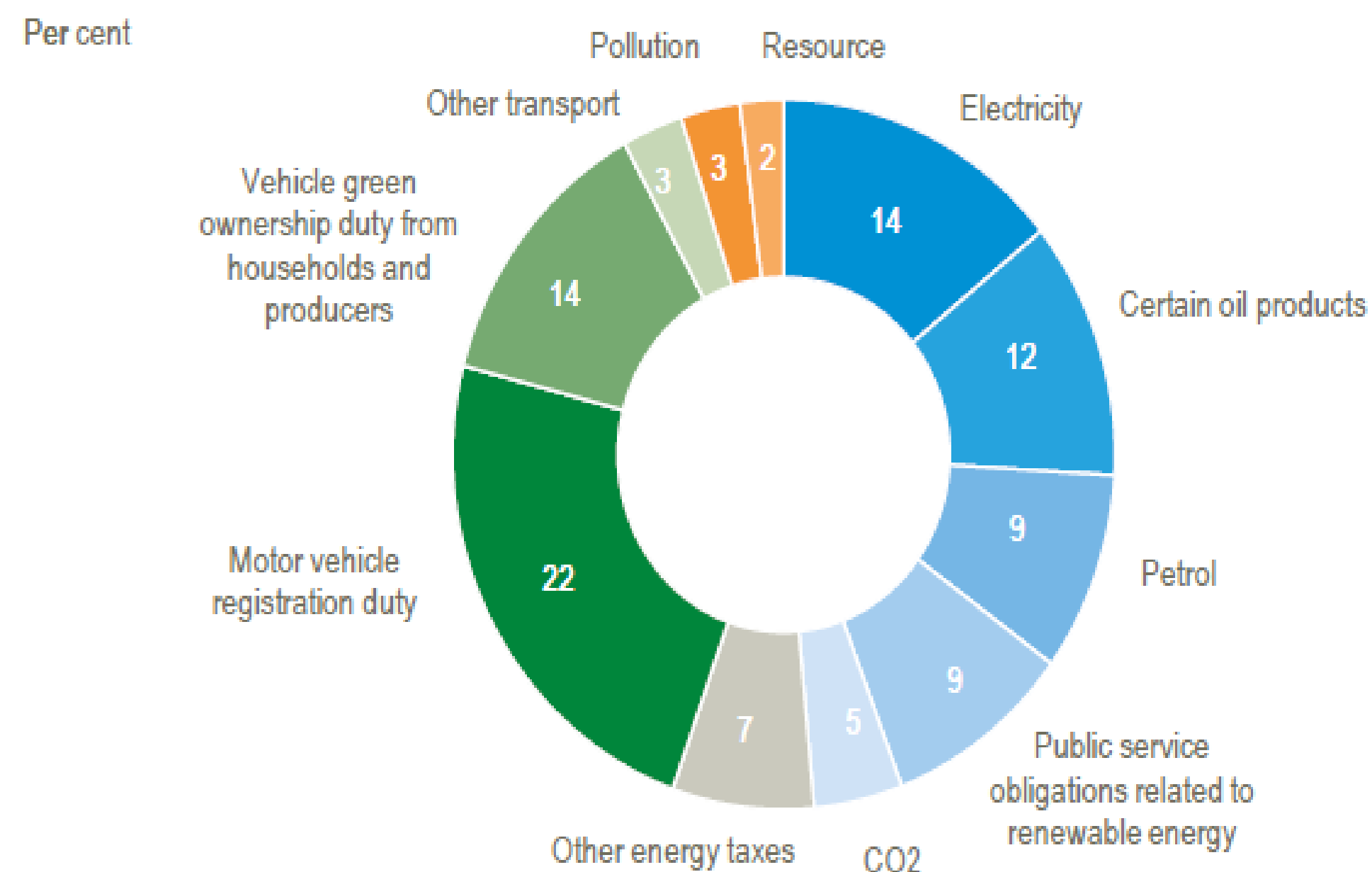
<https://www.ons.gov.uk/economy/environmentalaccounts/bulletins/ukenvironmentalaccounts/2020#glossary>

SEEA CF - Environmental activity accounts

Accounting transaction for environmental activities on protection, management and regulation

- > EPEA: Environmental protection expenditures accounts
- > EGSS: Environmental goods and services sector (supply side)
- > Resource use and management
- > Environmentally-related payments by & to government (fines, fees, taxes, subsidies, concession payments)

Environmentally related taxes by environmental type in Denmark, 2016

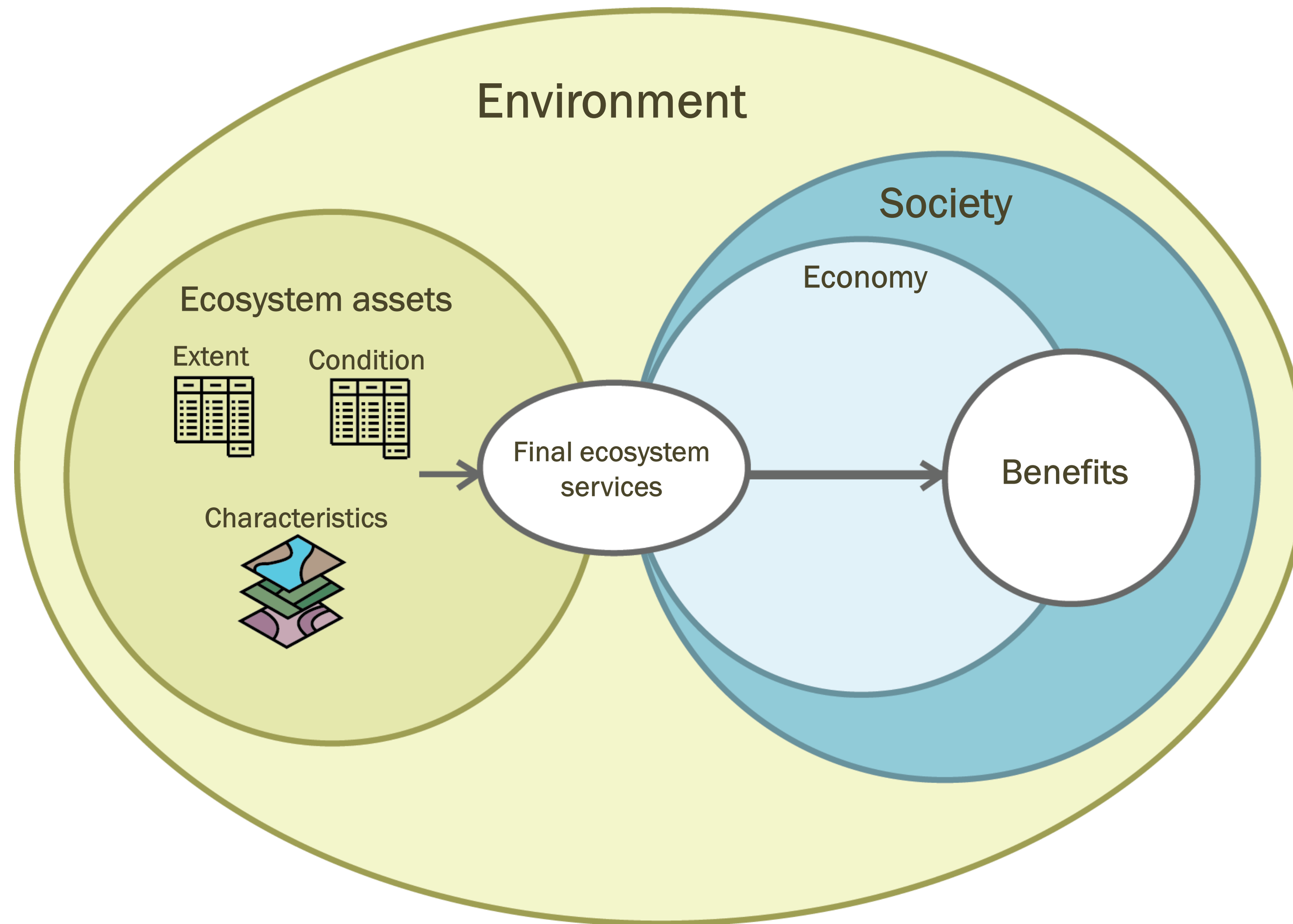


Turnover from environmental goods and services, by environmental purpose in Denmark

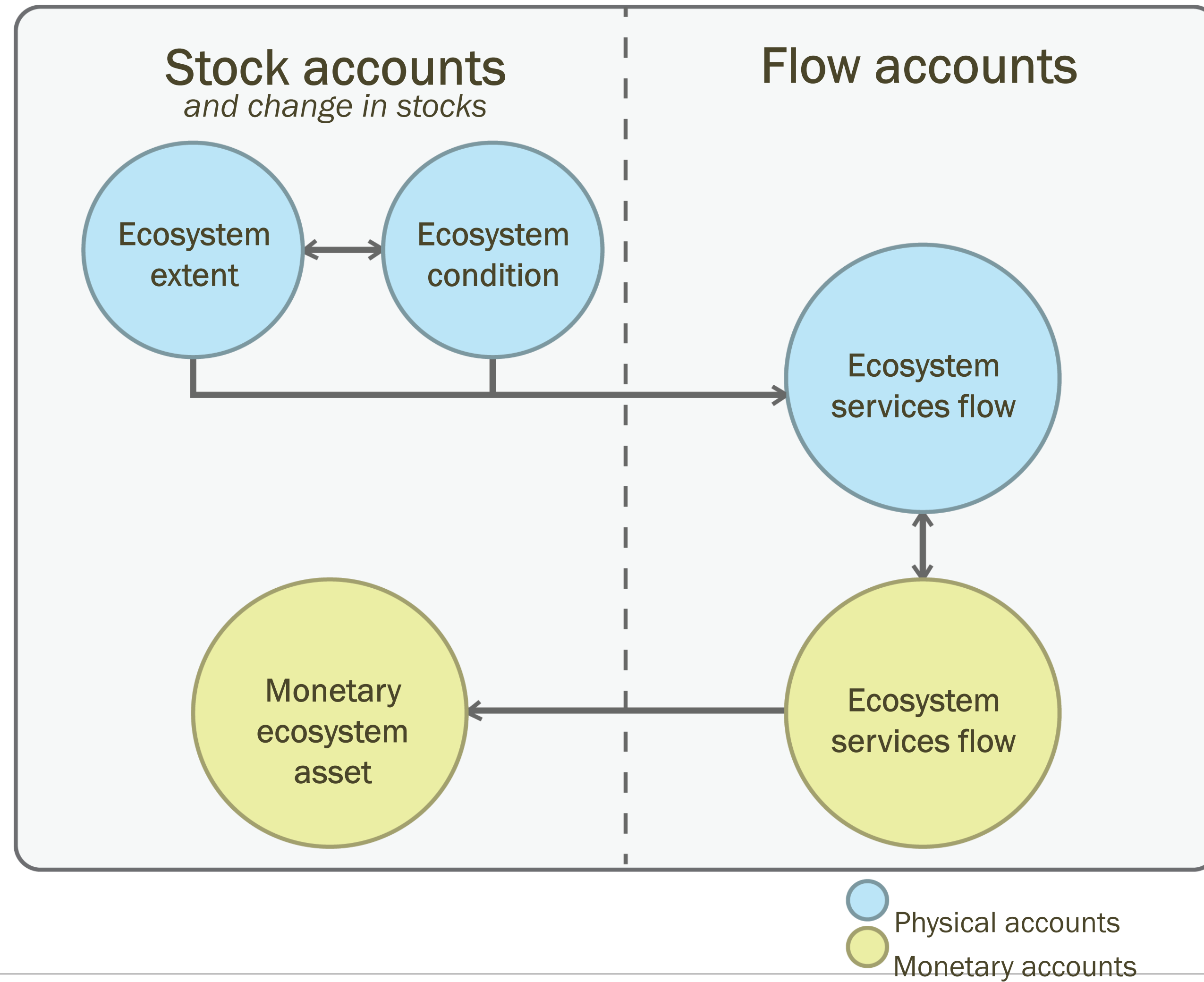
	2014	2015	2016
	DKK million		
Environmental goods and services, total	174 159	198 019	213 705
Environmental protection, total	48 375	57 071	59 017
Protection of ambient air and climate	5 746	7 762	8 358
Wastewater management	14 771	19 344	19 312
Waste management	18 612	19 058	19 745
Protection of soil, groundwater and surface water	6 915	8 209	8 794
Noise and vibration abatement	886	1 013	1 064
Protection of biodiversity and landscape	410	535	536
Environmental research and development	530	416	429
Other environmental protection activities	505	733	778
Resource management, total	125 784	140 948	154 688
Management of water	2 069	2 962	2 839
Management of forest resources	4 015	4 487	4 601
Production of energy from renewable resources	86 694	96 808	110 458
Heat/energy saving and management	24 355	27 343	27 382
Minimisation in use of raw materials	2 834	3 536	3 556
Management of minerals (iron, metals and glass)	1 886	2 200	2 214
Research and development for resource management	2 107	2 221	2 288
Other resource management activities	1 824	1 391	1 350

Source: Green National Accounts for Denmark 2015-2016
<https://seea.un.org/content/green-national-accounts-denmark-2015-2016>

Overview of SEEA Ecosystem Accounting



SEEA Ecosystem Accounting - Core Accounts



SEEA Ecosystem Accounting

- ❑ One integrated document, remove “Experimental”
- ❑ Chapters 1-7 on accounting framework and physical accounts adopted as an international statistical standard
- ❑ Chapters 8-11 on valuation
- ❑ Chapters 12-14 on applications and extensions
- ❑ Next
 - SEEA EA Implementation Strategy
 - Guidelines for biophysical modelling, valuation, scenario analysis
 - Implementation guidelines and technical notes
 - ARIES for SEEA (<https://seea.un.org/content/aries-for-seea>)

Section: A

Introduction and overview

- Ch.1: Introduction
- Ch.2: Principles of ecosystem accounting

Section B

Accounting for ecosystem extent and condition

- Ch.3: Spatial units for ecosystem accounting
- Ch.4: Accounting for ecosystem extent
- Ch.5: Accounting for ecosystem condition

Section C: Accounting for ecosystem services

- Ch.6: Ecosystem services concepts for accounting
- Ch.7: Accounting for ecosystem services in physical terms

Section D: Monetary valuation and integrated accounting of ecosystem services and assets

- Ch. 8 Principles of monetary valuation for ecosystem accounting
- Ch. 9 Accounting for ecosystem services in monetary terms
- Ch. 10 Accounting for ecosystem assets in monetary terms
- Ch. 11. Integrated and extended accounting for ecosystem services and assets

Section E: Complementary valuations, thematic accounting and indicators

- Ch.12: Complementary approaches to valuation
- Ch.13: Accounting for specific environmental themes
- Ch.14: Indicators and combined presentations

Example – Ecosystem extent accounts

Ecosystem extent accounts in Brazil (2000-2018)



The ecosystem extent accounts (2000-2018), by biomes, show that Brazilian terrestrial biomes lost about 500 thousand km² of their natural areas, due to conversion into modified areas such as land used for crops and grazing.

2050 Goals, milestones and Targets	Headline indicators
<p>Goal A: The area, connectivity and integrity of natural ecosystems increased by at least [X%] supporting healthy and resilient populations of all species while reducing the number of species that are threatened by [X%] and maintaining genetic diversity;</p> <p>2030 Milestones: (i) The area, connectivity and integrity of natural systems increased by at least [5%]. (ii) The number of species that are threatened is reduced by [X%] and the abundance of species has increased on average by [X%].</p>	<p>A.0.1 Extent of selected natural ecosystems (forest, savannahs and grasslands, wetlands, mangroves, saltmarshes, coral reef, seagrass, macroalgae and intertidal habitats)</p> <p>A.0.2 Living Planet Index</p> <p>A.0.3 Red list index</p> <p>A.0.4 Species habitat index</p> <p>A.0.5 The proportion of populations maintained within species</p>

Example: Ecosystem services flow accounts

First-level indicators	Second-level indicators	Third-level indicators	2016	2017	Net change	
Provisioning services	Food/material provisioning	Agricultural /forestry/hay/ aquatic /seafood products	1405.6	1389.4	-16.2	
Summation of provisioning services			1405.6	1389.4	-16.2	
Regulating services	Global climate regulation services	Carbon sequestration	20.3	20.4	0.1	
	Local climate regulation services	Regulating temperature	117.7	126.1	8.4	
	Air filtration services		Absorbing sulfur dioxide	20.9	19.4	-1.5
			Absorbing fluoride	0.3	0.2	-0.1
			Absorbing nitrogen oxides	3.9	3.4	-0.5
			Dust retention	380.4	347	-33.4
	Water purification services		Inorganic nitrogen purification	0.2	0.4	0.2
			Active phosphate purification	0	0	-
			Chemical oxygen demand (COD) treatment	4.7	7.3	2.6
			Petroleum disposal	0	0	-
	Water flow regulation services		Conserving water resources	3688.4	3374.5	-313.9
	Mitigation services		Farmland protection	42.1	38.5	-3.6
			Flood mitigation	31.3	26.8	-4.5
	Soil and sedime retention services		Soil retention	18.5	17.2	-1.3
Nursery population and habitat maintenance services		Biological conservation	3050.9	3011.9	-39	
Summation of regulating services			7379.6	6993.1	-386.5	
Cultural services	Recreation-related services	Agricultural tourism	74.3	94.4	20.1	
		Forest tourism	54.9	50.5	-4.4	
		Water conservancy tourism	14.6	21.7	7.1	
		Marine tourism	59.9	61.1	1.2	
		Urban tourism	152.2	184.3	32.1	
Summation of cultural services			355.8	412	56.2	
Total			9141	8794.5	-346.5	

Highlighted pilot results:

- Regulating services accounts for 60% of total ecosystem services in Guangxi

- The total value of ecosystem services (GEP) as % of GDP in Guangxi

> 2016: 56.7%

> 2017: 49.4%

Project overview “Environmental-Economic Accounting for Evidence-Based Policy in Africa and Asia”

- Supporting countries in strengthening the institutional and technical capacity for the development of an integrated system in support of sustainable development
- Work with 4-6 countries: **Malaysia**, Mozambique, **Philippines**, Senegal
- Duration: until mid-2023
- Outcomes:
 - > Outcome 1: Strengthened institutional and technical capacity of NSOs to develop strategies for SEEA implementation in response to policy needs and to produce SEEA accounts as part of their regular statistical production process.
 - > Outcome 2: Strengthened national capacity of project countries to use SEEA accounts for monitoring sustainable development and formulating integrated, evidence-based policies.

Project activities

- Activity 1: Development of a National Plan for Advancing Environmental-Economic Accounting
 - > Assessment of statistical capacity for the implementation of SEEA, development of a National Plan, and roadmap to using the SEEA for SDGs and other international initiatives
 - > Designed in collaboration with stakeholders
- Activity 2: Compilation of one or two account(s)
 - > Based on priorities identified in Activity 1
 - > Tentatively start with land account in 2021 and move to ecosystem extent account in 2022; Compilation led by national statistical offices, in collaboration with stakeholders, and with technical assistance
- Activity 3: Organization of workshops and training seminars
 - > National and regional workshops
 - > Technical training and training on policy applications

Project sustainability

- Production and application of environmental-economic accounts and indicators
- Promoting inter-agency platforms among stakeholders for data sharing and production of results
- Mainstreaming the SEEA in the regular production process of the statistical system
- Communicating results
- Use of accounts in evidence-based decision making

THANK YOU

seea@un.org