

Roma, 25-26 maggio 2026

## WORKSHOP

### CHALLENGES IN THE MEASUREMENT OF NATURE IN OFFICIAL STATISTICS

#### Session 1 - From Environmental And Territorial Statistics To Ecosystem Accounting

# THE CONTRIBUTION OF OFFICIAL STATISTICS TO MEASURING NATURE

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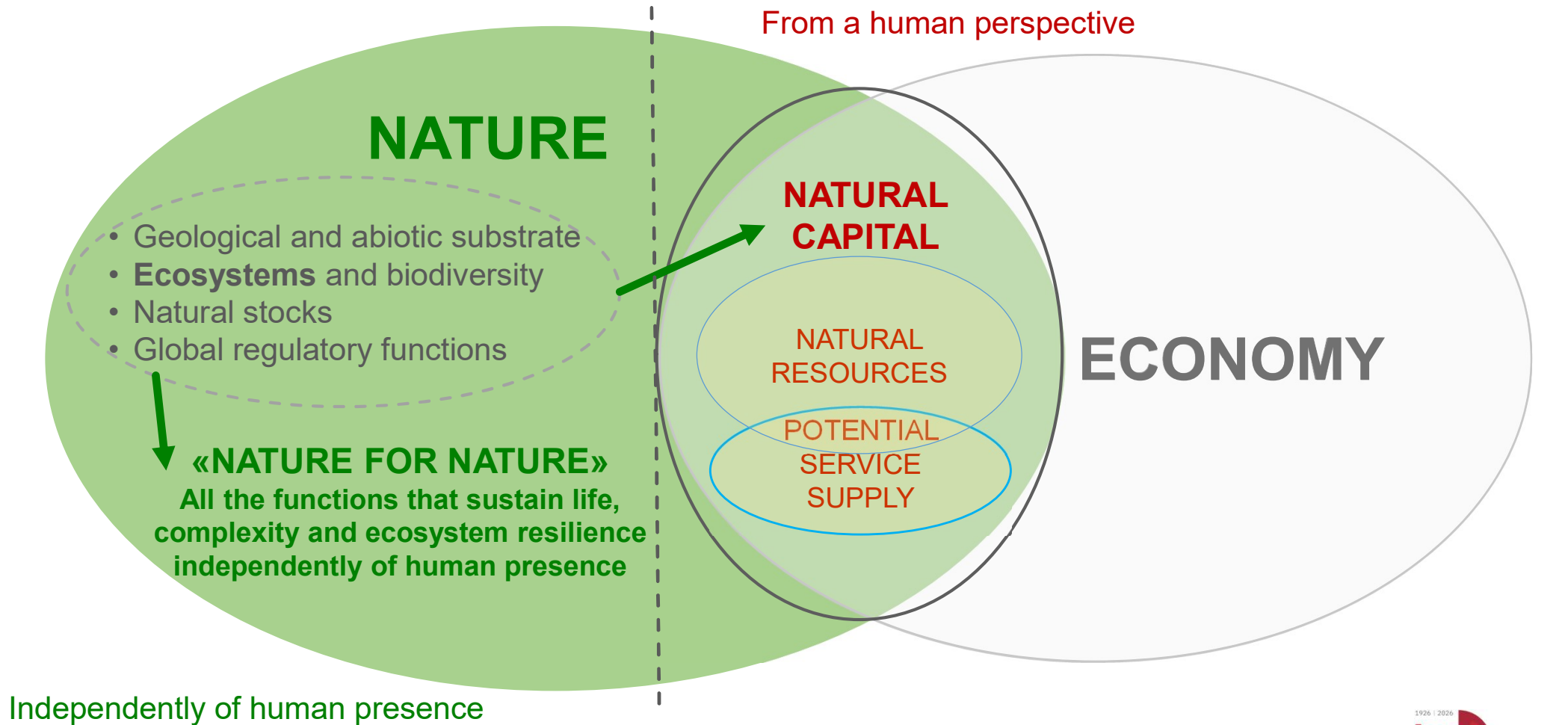
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# Outline

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- Nature, Natural Capital and Economy
- Nature Through Official Statistics: From Invisible to Measurable
- Measuring Nature ↔ Making Nature Count
- Ecosystem Accounting (SEEA EA)
- Integrated governance: the Italian experience
- Key Challenges

# Nature, Natural Capital and Economy



# Nature Through Official Statistics: From Invisible to Measurable

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## GOAL

- **To make nature measurable**

What do we want to measure through official statistics?

- **Natural resource stocks, the quality of those stocks and the flow of services they provide**

## MEANS

- **Official statistics measurement: in Italy through the National Statistical System (Sistan)**
  - Direct surveys (e.g. Forest inventories CREA)
  - Administrative data (e.g. Cadastral records; Protected area designations MASE/ISPRA)
  - Statistical registers and their integration (e.g. LUCAS, CORINE Land Cover registers; Forest inventory and satellite-derived biomass integration ISPRA; Cross-institutional biodiversity data integration ISPRA, CNR-IRET)
  - Models and estimates (e.g. Ecological and biophysical models spatially explicit; INCA model, ARIES, InVEST)
  - Statistical processing of remote sensing and geospatial data (e.g. Copernicus LMS EC ESA: NDVI index;
  - Statistical harmonisation: interoperability across national and international systems
  - On the frontier: emerging opportunities and challenges in data acquisition and validation through new remote sensing systems and the integration of AI.

# Measuring Nature ↔ Making Nature Count

- **The concept of Natural Capital**

**Stocks** and **Implicit quality**, understood as the productive **capacity to generate** returns in the form of **service flows**.

- **The Ecosystem Accounting – SEEA EA framework**

**Stock:** Ecosystem Extent (EE); **Explicit Quality:** Ecosystem Condition; **Service flows:** Ecosystem Services

	SEEA-CF	SEEA-EA
Unit of analysis	Resource / flow	Ecosystem asset / space
Approach	Single resource	Integrated and spatial
Focus	Physical flows	Stocks, condition and services
UN standard	2012	2021

The SEEA EA adopts a **spatial approach** (accounts built from georeferenced maps of natural assets), since the **benefits that a society receives from ecosystems depend on where they are located in the landscape relative to beneficiaries — an element that radically distinguishes it from the SEEA CF**

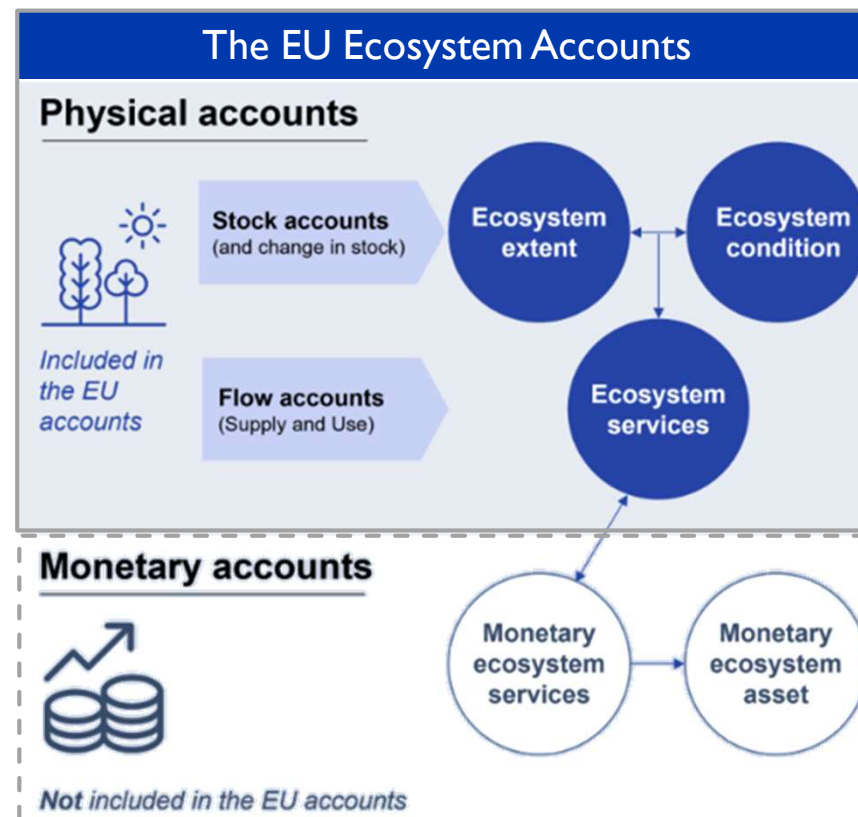
# Ecosystem Accounting (System of Environmental-Economic Accounting EA)

- The SEEA-EA (chapt. 1-7) was adopted as a **UN international statistical standard in 2021**. It establishes the physical indicators for ecosystem accounting and **comprises the following accounts**:

Statistical  
standard

- 1. Ecosystem Extent Account** Measures the surface area of ecosystem types and their individual assets. *Fundamentum: how much natural capital is there?*
- 2. Ecosystem Condition Account** Measures the quality and functional integrity of ecosystems through biophysical indicators (biodiversity, biomass, soil quality, water quality, etc.). *What is the state of the stock?*
- 3. Ecosystem Services Accounts** Service flows measured in physical units (optionally monetary) (tonnes of C sequestered, m<sup>3</sup> of water filtered, etc.). **Distinguishes between supply (capacity) and actual use (flow).**

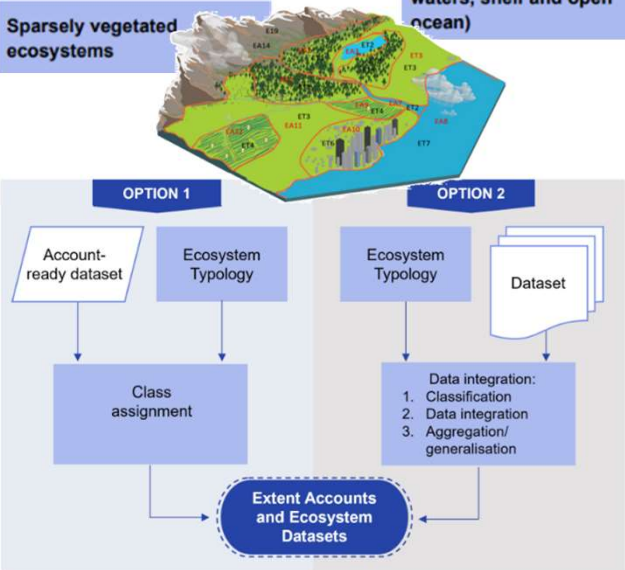
- 4. Monetary Ecosystem Services Accounts**
- 5. Ecosystem Asset Accounts**



# Ecosystem Accounting in a Nutshell

## ECOSYSTEM TYPE EXTENT

Settlements and other artificial areas	Inland wetlands
Cropland	Rivers and canals
Grassland (pastures, semi-natural and natural grasslands)	Lakes and reservoirs
Forest and woodland	Marine inlets and transitional waters
Heathland and shrub	Coastal beaches, dunes and wetlands
Sparsely vegetated ecosystems	Marine ecosystems (coastal waters, shelf and open ocean)



## ECOSYSTEM CONDITION TYPOLOGY

Group A: Abiotic ecosystem characteristics
Class A1. Physical state characteristics: physical descriptors of the abiotic components of the ecosystem (e.g., soil structure, water availability)
Class A2. Chemical state characteristics: chemical composition of abiotic ecosystem components (e.g., soil nutrient levels, water quality, air pollutant concentrations)
Group B: Biotic ecosystem characteristics
Class B1. Compositional state characteristics: composition / diversity of ecological communities at a given location and time (e.g., presence / abundance of key species, diversity of relevant species groups)
Class B2. Structural state characteristics: aggregate properties (e.g., mass, density) of the whole ecosystem or its main biotic components (e.g., total biomass, canopy coverage)
Class B3. Functional state characteristics: summary statistics of the biological, chemical, and physical interactions between the main ecosystem components (e.g., primary productivity, community age, disturbance frequency)
Group C: Landscape level characteristics
Class C1. Landscape and seascape characteristics: metrics describing mosaics of ecosystem types at coarse (landscape, seascape) spatial scales (e.g., landscape diversity, connectivity, fragmentation)

## EC VARIABLES and NRR Relevance

Variable description	Group / Class	NRR relevant
1.1 Green areas in cities and adjacent towns and suburbs	Biotic / Structural state	Yes
1.2 Concentration of particulate matter (PM) with a diameter up to 2.5 µm	Abiotic / Chemical state	No
2.1 Soil organic carbon stock in topsoil in cropland	Abiotic / Chemical state	Yes
2.2 and 3.2 Common farmland birds index	Biotic / Compositional state	Yes
3.1 Soil organic carbon stock in topsoil in grassland	Abiotic / Chemical state	No
4.1. Deadwood	Biotic / Structural state	Yes
4.2. Tree cover density	Biotic / Structural state	No except methodology
4.3 Common forest bird index	Biotic / Compositional state	Yes
11.1. Share of artificial impervious area cover	Abiotic / Physical state	No

## ECOSYSTEM SERVICES

USE	Economic units				
	Intermediate consumption <sup>52</sup>	Household final consumption	Government final consumption	Gross capital formation	Exports
Ecosystem service					
Crop provision	Main use	Not possible	Not possible	Not possible	Not possible
Pollination	Main use	Not possible	Not possible	Not possible	Possible
Wood provision	Main use	Not possible	Not possible	Not possible	Possible
Air filtration	Possible	Main use	Possible	Not possible	Possible
Global climate regulation	Not possible	Not possible	Sole use	Not possible	Not possible
Local climate regulation	Possible	Main use	Possible	Not possible	Possible
Nature-based tourism related	Not possible	Main use	Not possible	Not possible	Main use

Reporting item	Settlements and other artificial areas	Cropland	Grassland	Forest and woodland	Heathland and shrub	Sparsely vegetated ecosystems	TOTAL SUPPLY
Ecosystem Service Flow	-	-	-	-	-	-	-
Reporting item	Inland wetlands	Rivers and canals	Lakes and reservoirs	Marine inlets and transitional waters	Coastal beaches, dunes and wetlands	Marine ecosystems	TOTAL SUPPLY
Ecosystem Service Flow	-	-	-	-	-	-	-

## Ecosystem Accounting - Some key points of the framework

- **From single-resource physical flows to multiple ecosystem services** The SEEA CF considers physical flows between the economy and the environment for individual resources; **the SEEA EA treats ecosystems as integrated spatial units capable of simultaneously producing multiple services.**
- **The logic of the SEEA EA aims at recording nature's stocks and flows with the same consistency as national accounting.**
- **The SEEA EA adopts a spatial approach. Geography is constitutive, not accessory:** the same ecosystem type generates different services depending on its location, extent and relationship with surrounding human activities.
- ★ The **definition, spatial representation, and extent assessment** of ET is **crucial for the overall EA**
  - **The conceptual chain:** stock (ecosystem asset) → condition → service supply → use → value.
- ★ **Condition as a bridge** EC account adds three key dimensions: **Quality of the stock**, independently of the services they supply; **Trend and degradation signal**: providing an early warning mechanism for policy; **Decoupling condition from use**
- ★ The SEEA-EA explicitly distinguishes: **service potential** (what a healthy ecosystem could provide), **actual supply** (what it actually provides given its current condition), **use** (what households, businesses and public administrations concretely draw on), and **benefit** (the value for beneficiaries).
- ★ The distinction matters because **a degraded ecosystem delivers less than its potential, and a supplied service may go unused** - yet its option and existence value remain real.

# Integrated governance: the Italian experience

## Ecosystem Accounts require integrated governance

- An inter-institutional working group has been established



- International Coordination
- Cross-institutional Knowledge Sharing

**Bridging the Ecology–Economy Divide.** Inter-institutional collaboration requires a shared language across disciplines, ensuring that decisions at every level draw on the most relevant expertise — both from natural capital measurement and economic accounting

# Key Challenges

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- How to exploit **new data sources**
- How to better **integrate** national sectoral environmental statistics and other sources into ecosystem accounting
- How to **enhance the connection between** Ecosystem Accounts and National Accounts
- Strengthening **inter-institutional governance** to ensure coordination and continuity
- **Reconciling EU framework** implementation: **Ecosystem Accounting** and the **Nature Restoration Regulation**

thank you for your attention

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