

The System of Environmental - Economic Accounting (SEEA) Ecosystem Accounts as enabler of data and model integration to improve decision-making Using Earth Observation for Ecosystem Accounting

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Sustained data for sustainable development Mobilising the data revolution

- The monitoring of the MDGs taught us that data are indispensable elements of the development agenda.
- Despite improvement, critical data for informed policy making on development are still lacking.
- New technology is changing the way data are collected and disseminated.
- Data should be open, easily accessible and effective for decision--making.

A World That Counts: **Mobilising the Data Revolution for Sustainable Development**, Nov. 2014 UN SG Independent Expert Advisory Group on data revolution for sustainable development

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- Global Action Plan for Sustainable Development Data launched at UN WDF in Jan 2017 and adopted at UNSC-48 in March 2017.
- modernizing NSOs is essential to achieving the 2030 SDGs.
- Integrating geospatial and statistical data is a necessity.

First UN World Data Forum on Sustainable Development Data 15-18 January 2017 Cape Town, South Africa.



United Nations

FORUM

Satellite fleet



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Advent of steady satellite data streams

Big Data Era

High Performance Computing Infrastructures









for the benefits of all

leaving no one behind

Building on ICT advances

The European Copernicus Programme





→ Know more: <u>https://copernicus.eu</u> and <u>https://sentinels.copernicus.eu</u>

International collaboration to scale up EO innovation for the full achievements of the 2030 Agenda on Sustainable Development



Ecosystem Accounting underpins the Multilateral Environmental Agreements

UN Convention to Combat Desertification (UNCCD)

UNCCD 2018-2030 Strategic Framework

Strategic Objective 1: to improve the conditions of ecosystems





Convention on Biological Diversity (CBD)

Post 2020 Global Biodiversity Framework (GBF) and its monitoring framework

> GLOBAL BIODIVERSITY FRAMEWORK

UN Framework Convention on Climate Change (UNFCCC)

UNFCCC Paris Agreement Glasgow Climate Pact





Ramsar Convention on Wetlands

Ramsar Strategic Plan (2016 – 2024) Conservation and wise use of all wetlands





UN SEEA Ecosystem Accounting

International standard on Ecosystem Accounting that regulates the production of statistical accounts on ecosystem extent, condition and services, underpinning the development of monitoring frameworks of other MEAs.







Sustainable Development Goals (SDGs)

UN CLIMATE CHANGE CONFERENCE



SDG Target 6.6 Protect and restore water-related ecosystems



SDG Target 14.2 Sustainably manage and protect marine and coastal ecosystems



Ensure conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems.



EO 4 ecosystem accounting

Virtual event

28 Nov-1 Dec 2022

https://eo4ea-2022.esa.int











Ecosystem Accounts are inherently spatial accounts

that strongly depend on the availability of spatially explicit datasets, including Earth Observations.

The emergence of **EO data streams at appropriate scales** combined with **advances in digital technologies** offer **unprecedented opportunities for countries** to efficiently monitor the **extent** and **conditions** of their ecosystems, determine **ecosystem services** and implement their **national ecosystem accounting**.

EO in Statistical Accounts

- Requires a **change of mindset in NSOs** to use Earth Observation and Big Data more widely.
- Requires **integration of many strands of expertise** including statisticians, ecologists, national mapping agencies, geo-spatial and EO experts.
- Needs to have spatially explicit accounts **consistent in space and in time.**
- Importance to have a **precise estimation of the uncertainties** for official statistics.
- Need to have **regularly updated accounts** that allows to track the "intrinsic" variations of the subject accounts.

EO Enabling Elements

- Need to adopt a **data flow strategy** similar to the SDGs.
- Request from the statistical community to have "Accounts Ready Data" which can simplify their integration into official statistics.
- Need for practical methodological guidelines (datasets, tools and models) with operational examples to help countries integrating EO within their national systems on ecosystem accounting.
- The importance to have adequate infrastructures (data factory following FAIR principles) to enable country appropriation of EO technology in ecosystem accounting.

EO opportunies & challenges in SEEA-compliant Ecosystem Accounting



Ecosystem Extent Account

- Classification is the **backbone of** ecosystem accounts.
- Need reliable and comprehensive mapping of ecosystem types (EO need to go beyond LC/LCC and support IUCN GET/ EUNIS typology classification).
- How to exploit the large quantity and variety of in-situ data collections available in MS on ecosystem types?
- Monitoring changes in extent of ecosystem types bring another level of complexity.
- Strong need to automate the production of ecosystem extents and their changes.

Ecosystem Condition Account

- derivation of reliable EO-based metrics on ecosystem conditions and of their distance from a reference condition.
- Need for condition indicators in terms of biotic and abiotic characteristics and for ecosystem structure, function and composition.
- Importance to monitor the conditions of ecosystems outside of protected areas (less reference information).
- Needs to find a compromise between simple and rapid assessment based on remote sensing products wrt accuracy needed for statistical accounting.

Ecosystem Services Account

- Ecosystem Service is a priority for most countries (needed in multiple policy frameworks such as UNFCCC)
- Conceptual Framework for Ecosystem services (provisioning, regulating and cultural services) well established but use of EO is still marginal.
- Need to integrate EO data with other spatial datasets in spatial ES modelling to derive flows of ecosystem services .
- How to leverage the use of modelling tools and platforms (e.g. ARIES for SEEA) to estimate reliable ecosystem services accounts.

EO integration in SEEA EA workflows





Ecosystem Accounting in terrestrial ecosystems





→ THE EUROPEAN SPACE AGENCY

Ecosystem Accounting in agroecosystems





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Ecosystem Accounting in wetland ecosystems

•eesa

http://globwetland-africa.org



Ecosystem Accounting in mangrove ecosystems

esa



∧ MANGROVE BLUE CARBON

Show layer

More Info

Total organic carbon stored in **Nigeria's** mangroves is estimated at **1,127.95** Mt CO₂e with **94.25** Mt CO₂e stored in above-ground biomass and **1,033.70** Mt CO₂e stored in the upper 1m of soil.



https://www.globalmangrovewatch.org









CAMBRIDGE	IUCN
HARA HEAR	NASA







Take home messages

 The uptake of Earth Observation in SEEA EA can benefit from the availability of a steadily increasing flow of satellite data of suitable characteristics and from the emergence of affordable digital solutions to address the size and complexity of such large data sets of satellite observations.

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- Within many national governments, there is a recognition of the need to link statistical information and geospatial information (including Earth Observation) to improve national data on SEEA EA, its disaggregation, and the evidence on which decisions are made.
- Despite the growing awareness among NSOs that traditional statistical techniques must be complemented with geospatial information to meet the ambition of the SEEA EA, the uptake of Earth Observation in SEEA EA has been unevenly adopted by countries.
- A number of challenges still need to be adequately tackled by countries to fully embrace the EO
 potential in national statistics on SEEA Ecosystem Accounting. The challenge of synthesising multiple
 and heterogeneous data sources, and designing adequate methodologies that harmonise EO with statistical
 data according to the rigorous standards of official statistics, is key for the NSOs.
- There is a need for a stronger collaboration between statisticians, ecologists and EO experts, to enable the potential of EO to be fully realised within the SEEA EA.

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Thank you

Cesa