Ecosystem Accounts in Mexico: a collaborative approach to implementation

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• Background
  • SEEA in Mexico

• Ecosystem Accounting
  • The NCAVES pilot project
  • The Mexican approach to measuring ecosystem condition

• SNIEG and the collaborative approach

• Lessons & next steps
1991
INEGI
Publication of the Green GDP pilot study, using data from 1985

WORLD BANK/UNSD/INEGI
Environmental-Economic accounts & derived macroeconomic aggregates in Mexico

1996
INEGI
System of Environmental Economic Accounts.
Data from 1985 onwards

SEEA - MX
SATELLITE ACCOUNTS
Forest resources, underground water, soil degradation, solid waste, air and water pollution, energy, circular economy

TOTAL COST OF ENVIRONMENTAL DEGRADATION AND DEPLETION, AS % OF GDP
6.8%
5.5%
4.5%

2003 2013 2019
THE NCAVES PROJECT

• 2017-2021
• Funded by the European Union
• Technical coordination by UNSD and UNEP
• Brazil, China, India, Mexico and South Africa

Improve the measurements of ecosystems and the services these provide

Incorporate biodiversity and ecosystems to the economy, and to the bases for policy design and implementation

Contribute to developing internationally-agreed methodologies, and their application in countries with high biodiversity
The NCAVES Project

- Publication of NCAVES Report, Policy Brief & Roadmap (Oct 2021)
- National Forum (Dec 2021)
- Bilateral follow-up meetings with the environmental & economic sectors
  - Central Bank (Banxico)
  - Tourism (SECTUR)
  - Finance (SHCP)
  - Economy
  - Biodiversity, wetest, water authorities
ECOSYSTEM ACCOUNTS

Geo-Statistical, integrated framework to **organize** biophysical data, **define and measure** ecosystem services, **register** changes in ecosystem assets and **analyze** linkages with economic activity and well-being

Source: INEGI, based on White paper on SEEA EA (2021)

* Marine and atmospheric assets are under revision
Accounts in **physical units & monetary units**
EXTENSION ACCOUNTS

Measure changes in ecosystem Mide los cambios en la extensión de los ecosistemas

INPUTS

• Classification systems
• National maps of land use & vegetación
  • Satellite imagery
• National inventory of forests and soils

PROCESS

Compilation and analysis of change to estimate extension increases & decreases in ecosystems (km²)
Define el nivel de integridad del ecosistema. Relaciona los atributos medibles del ecosistema: Estructura, función, composición.

Indica las condiciones físico-químicas: Humedad, Temperatura, Elevación, Altura de los árboles, diámetro de los troncos, cantidad de fotosíntesis.

Nivel de integridad y funcionalidad, Set of environmental conditions whereby an ecosystem develops: humidity, temperature, elevation, sunlight, etc.

Measurements on the organisms populating an ecosystem: tree height, trunk diameter, photosynthetic activity, etc.

Condition of the ecosystem, compared with its highest potential level of integrity and functionality to provide services.
ECOSYSTEM CONDITION ACCOUNTS

• **State of conservation (vegetation).** - INEGI Vegetation and Land Use Series → Successional stage or state of conservation of the vegetation: primary (or relatively well preserved) and secondary (or degraded).

• **Human Footprint Index.** Pressure indicator that is calculated by estimating/evaluating both the extent and intensity of the transformation caused by various human activities.

• **Ecological Integrity Index.** characterizes "the potential of natural landscapes to support ecological integrity in the maintenance of biotic and abiotic apex predator interactions" (CONABIO, 2009).

• **Ecosystem Integrity Index.** - Evaluates ecosystem based on information obtained from the Forest and Soil Inventory (2004 & 2018) and satellite images. Integrates a conceptual model (based on 3-layers) using machine learning techniques.
**CONDITION ACCOUNTS**

**ECOSYSTEM INTEGRITY INDEX**

State of an ecosystem, resulting from its ability to self-organize, accordingly with local physical/chemical factors and biological processes

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**INPUTS**

- Land Use and Vegetation Maps 2001-2014
- Classifications distinguishing primary & secondary vegetation
- National Inventory of Forests and Soils
- Data from remote and local sensing, cameras, traps & other instruments

**PROCESS**

Estimation of the **Integrity Index**, by ecosystem type, using ecological and landscape criteria (structure & function), considering physical/chemical and human pressure factors — including some not considered in the SEEA-EA
ECOSYSTEM CONDITION: INTEGRITY INDICES

ECOSYSTEM INTEGRITY INDEX

INTEGRITY INDEX, BY ECOSYSTEM TYPE
ECOSYSTEM ASSETS ACCOUNTS

**PROVISION**
Services to crop production
SADER, SIAP & INEGI

**PROVISION & REGULATION**
Water provision
CONAGUA, IMTA & INEGI

**REGULATION**
Carbon storage & sequestration
INECC & CONAFOR

Polinization
SADER, SIAP, CONAFOR, CONABIO & INEGI

**CULTURAL**
Sustainable and Nature Tourism
SECTUR & INEGI
Valuation of Ecosystem Services

- Sustainable and nature tourism: 0.22%
- Pollination: 0.20%
- Supply to agricultural production: 1.00%
- Carbon storage: 1.49%
- Carbon sequestration: 0.15%
- Water: 0.05%
Evolving National accounting to generate information that better allows measuring well-being and Sustainable Development

Traditional approach

NEW PARADIGM
Incorporates the measurement of environmental assets and well-being

Towards a wellbeing approach

Ecosystem services

- Goods and services
- Producers
- Consumers
- Produced capital
- Financial capital

Natural capital

- Education
- Employment
- Civic engagement
- Social connection
- Training

Traditional National Accounting

Health
A systematic, collaborative approach based on Mexico’s SNIEG
National System of Statistical and Geographic Information

SNIEG

Information Subsystems

- Demographic & Social
- Economic
- Geographic, Environmental & Land Use
- Government, Public Security & Justice
INSTITUTIONALIZATION

• Inter-institutional and interdisciplinary collegiate work within INEGI and through the National System of Statistical and Geographic Information (SNIEG)

• Coordination tools available to the Mexican State

• Collaboration with the academic, private and social sectors

• International collaborations
What are the intended policy applications?

- Contribute to the design, implementation, evaluation and monitoring of public policies.
- Environmentally adjusted (“Green”) GDP as an indicator to measure progress in the sustainability of the country, used in environmental sectoral plans.
- Ecosystem accounting to value the complexity and health of ecosystems, and their contribution to the economy and wellbeing, to promote their protection, conservation and restoration.

- National Development Plans (PND)
- Environmental Sector Plans (PROMARNAT)
- Forestry National Plan (PRONAFOR)
- Hydric National Plan (PNH)
Further research & development

- Stronger links between biophysical & valuation accounts
- Non-monetary concepts and methodologies
- Mainstream geospatial/EO dimension
- Additional accounts and services (e.g. biodiversity, coastal protection)

NEXT STEPS

Implementation

- Institutionalization (cross-cutting)
- Continued involvement of academia and business
- Studies at local level
- Policy scenario analyses
- Harmonization with relevant multilateral processes
Thank You!

INEGI
Graciela Márquez – President
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Environment Ministry (SEMARNAT)
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Institute of Ecology A.C. (INECOL)
Miguel Equihua
Ooctavio Pérez-Maqueo
Evaluación de Índices de condición
Transferencia de conocimiento
Propuestas de valoración integral de almacenamiento y secuestro de carbono
Demanda ajustada por la oferta de polinización
Ampliación del estudio de los servicios ecosistémicos

Creación de subgrupos de políticas públicas y valoración
Inclusión de la degradación en la valoración del aprovisionamiento en la agricultura
Apertura de la canasta de servicios a la agricultura con la valorización de la polinización
Costos y valores monetarios de los servicios de los ecosistemas
16 ponentes de 12 instituciones nacionales e internacionales.

- Embajada de la Delegación de la Unión Europea en México
- Secretaría del Medio Ambiente y Recursos Naturales (SEMARNAT)
- División de Estadísticas de Naciones Unidas (UNSD, por sus siglas en inglés)
- Comisión Económica para América Latina y el Caribe (CEPAL)
- Secretaría de Hacienda y Crédito Público (SHCP)
- Secretaría de Turismo (Sectur)
- Banco de México (Banxico)
- Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (Conabio)
- Instituto Nacional de Ecología y Cambio Climático (INECC)
- Comisión Nacional Forestal (Conafor)
- Secretaría de Relaciones Exteriores (SRE)
- INEGI

Su finalidad fue discutir los alcances y retos futuros para el desarrollo interinstitucional de la Contabilidad de Ecosistemas y su incorporación dentro de los procesos de decisión de política pública.
Ecosystem Integrity (2018)

Heterogeneous throughout the Mexican territory

Low integrity in man-made ecosystems (cities, agricultural land)

Higher integrity in shrublands and conifer forests