Overview of Environment Statistics

FDES: Framework for the Development of Environment Statistics

System of Environmental Economic Accounting


Highlights of Presentation

- Decisions are becoming more **integrated**:
  - SDGs, green economy, climate change, biodiversity, nexuses
- Need **integrated**, ongoing, reliable information
- Environment statistics are produced by many agencies
  - **Fragmented** and require standardization
- **Official statisticians** have tools and capacity to standardize and integrate environment statistics
  - FDES guidance on **collecting** environment data
  - SEEA for **integrating** environmental with economic data

Observation on accounting:

If we managed our economy the way we manage our environment, we'd still be hunter-gatherers.

- Michael Bordt, 2015

Account for Natural Capital
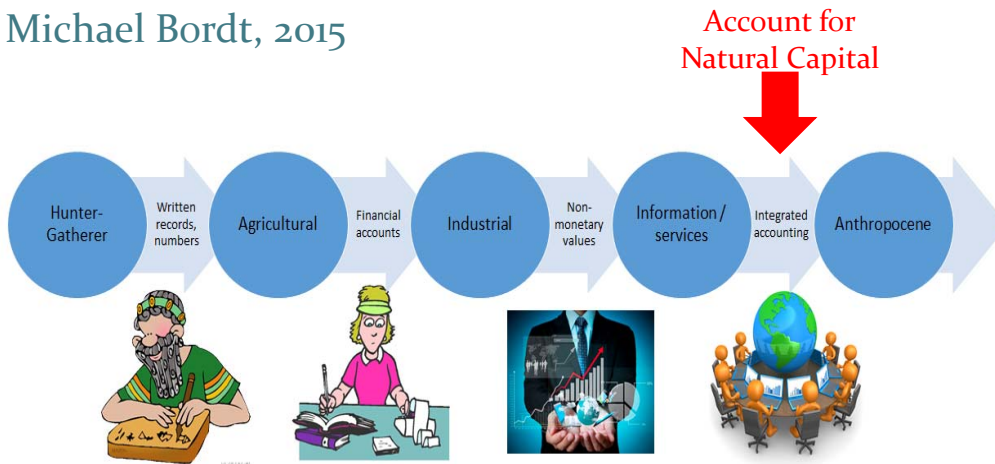
What's the problem?

- Decisions are becoming more **integrated**:
  - Sustainable development; green economy; climate change; biodiversity
  - Develop or conserve? Where to develop?
  - Short/Long-term benefits? Who benefits?
- Environment statistics are produced by many agencies
  - Therefore **fragmented** and require standardization
- NSOs have focussed on economic and social statistics
  - May not have people or institutional arrangements to produce environment statistics

Which of your countries have environment section in your NSO?

Decisions are integrated (Nexus)

- People need water, food and energy, while
  - limiting climate change
- **Viable** energy options may reduce
  - **equitable** access to water and food while adding to
  - **unBearable** climate change
- *Local optimization doesn't work any more!*
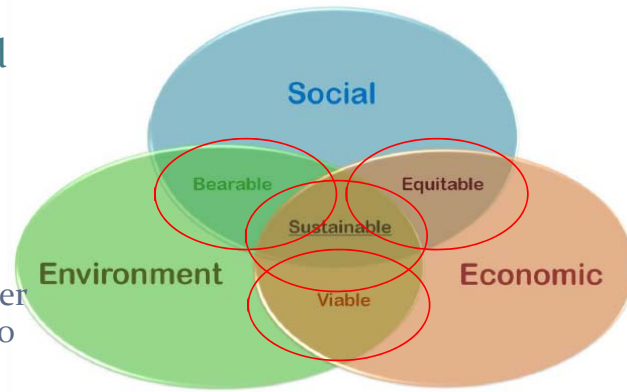
New **statistical tools** enable us to quantify these linkages and understand the trade-offs.


Why National Statistical Offices (NSOs)?

- "*Fundamental principles of official statistics*" foster:
  - Culture of quality, impartiality, confidentiality, relevance
  - Trust by government, business and civil society
- Tools and expertise to work with **complex** data
- Confidential data collection **processes** (surveys, accounts, administrative data) can be adapted for environment statistics
- Often custodians of the **National Statistical System** & **SDG** monitoring and reporting

Environment statistics are *interdisciplinary* and *inter-institutional*

Environment statistics are about:

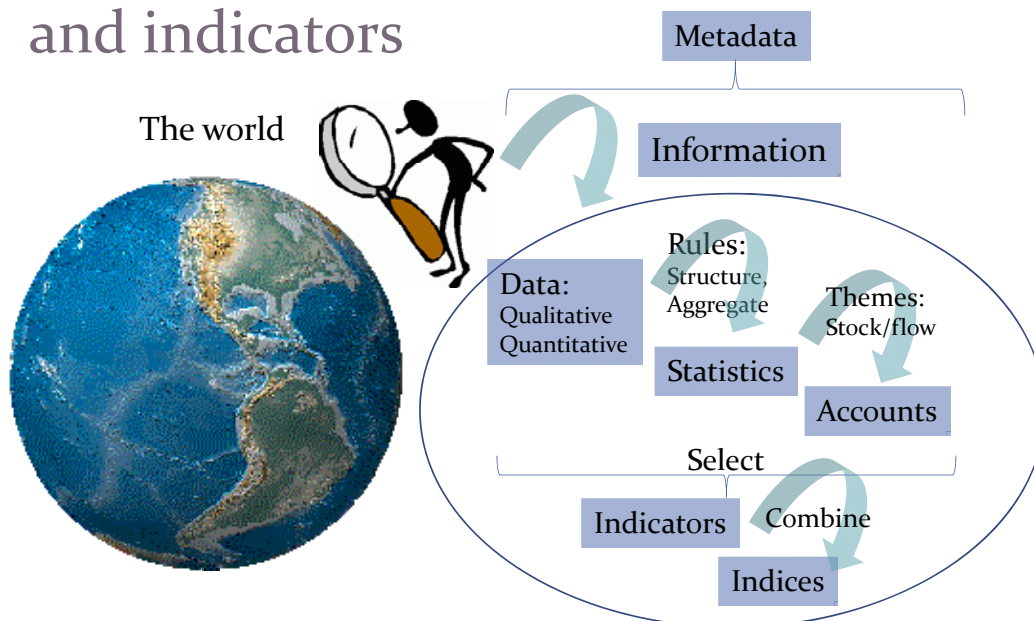1. the **state** of the environment,

2. our **dependence** on it,

3. our **impact** on it,

4, 5. it's **impact** on us (even negative ones), and

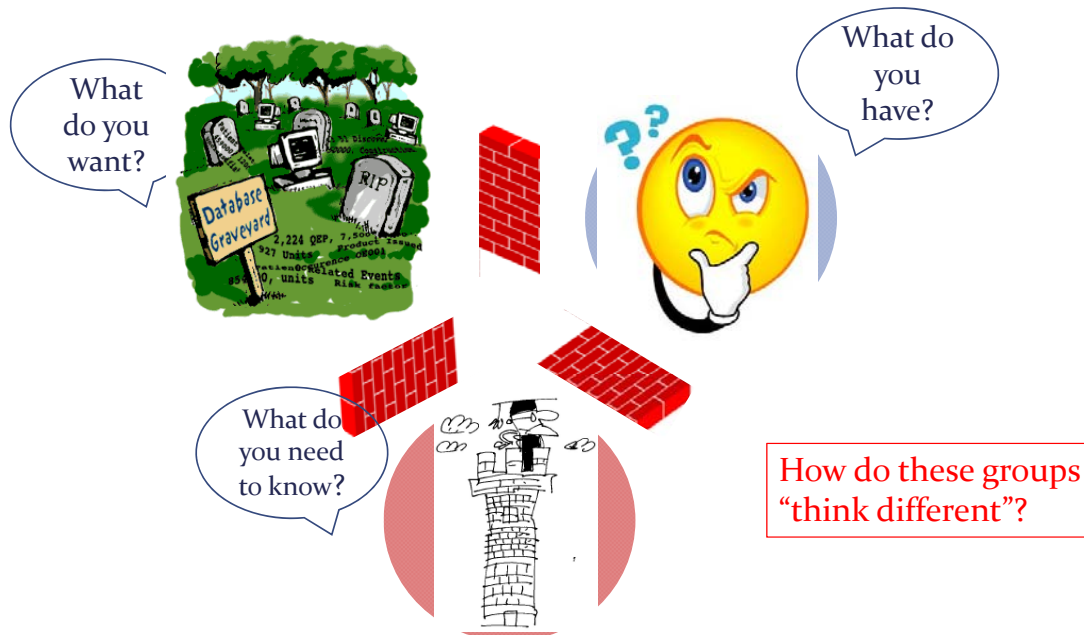6. how we **protect** and manage it.
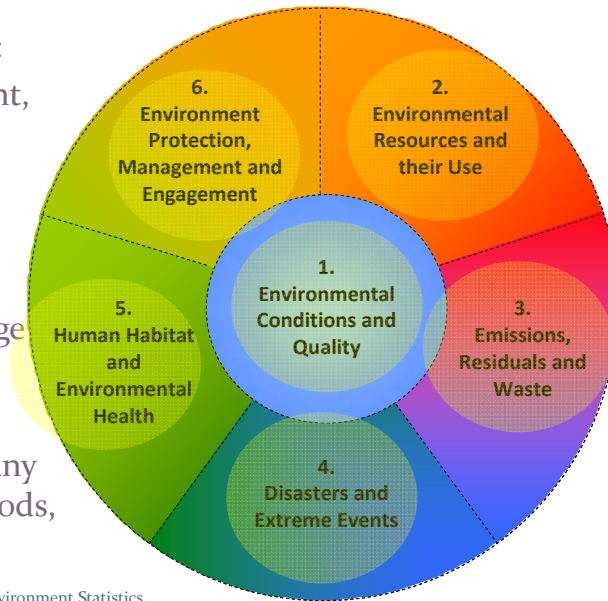
This information comes from many institutions using different methods, concepts and classifications.

FDES: Framework for the Development of Environment Statistics

6. Environment Protection, Management and Engagement

2. Environmental Resources and their Use

1. Environmental Conditions and Quality

3. Emissions, Residuals and Waste

5. Human Habitat and Environmental Health

4. Disasters and Extreme Events

Information, data, statistics, accounts and indicators

The world

Metadata

Information

Data: Qualitative Quantitative

Rules: Structure, Aggregate

Themes: Stock/flow

Statistics

Accounts

Select

Indicators

Combine

Indices

Three solitudes...

...or convergence?
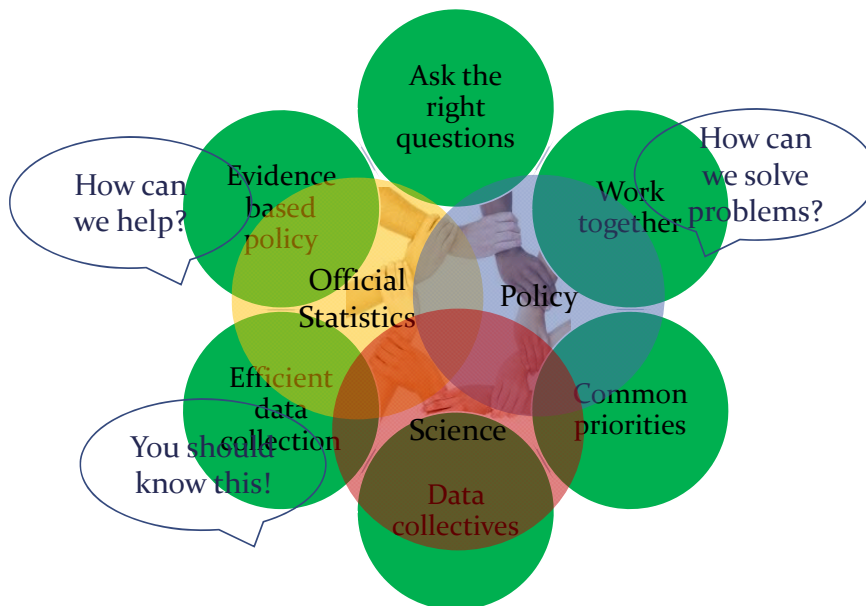
Official statistics are not the only input...

Science

Official statistics

Other

Personal

Political

Evidence

Social

What are some benefits and risks of official statisticians working closely with policy makers?
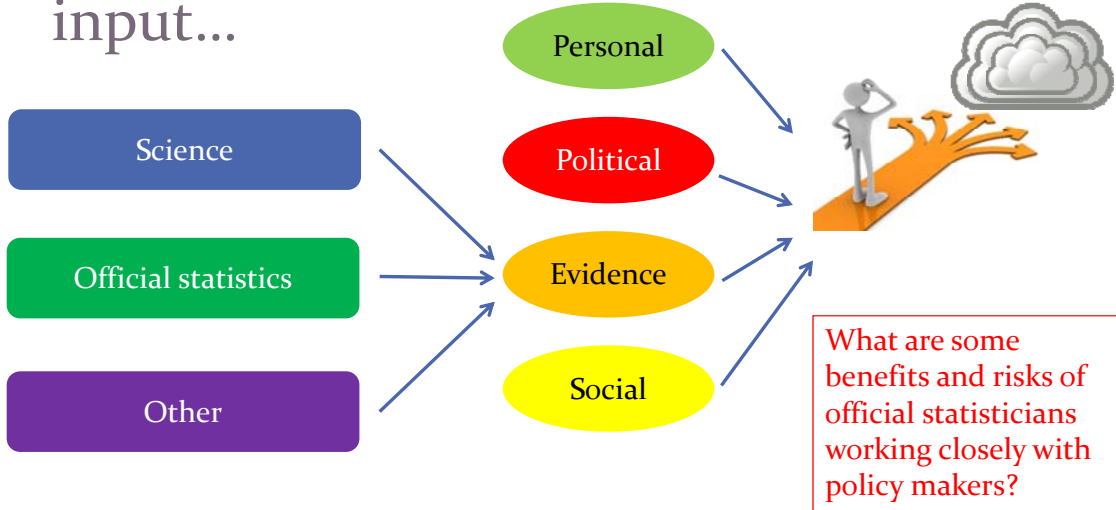
Good statistics are cheaper than bad decisions

Statistical tools for integration

SEEA: *System of Environmental-Economic Accounting* → Standards for measuring interactions between environment and economy

SNA: *System of National Accounts* → Standards for measuring the economy

FDES: *Framework for the Development of Environmental Statistics* → Basic statistics

GSBPM: *Generic Statistical Business Process Model* → Integrated statistical processes
DQAF: *Data Quality Assessment Framework* → Quality guidelines
NSDS: National Strategies for the Development of Statistics
Diagnostic Tool, Inventory Template → Strategic planning and assessment

National Planning

High quality indicators

Integrated accounts

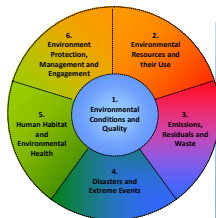Harmonized data (standards & processes)

Fragmented environmental, economic and social da

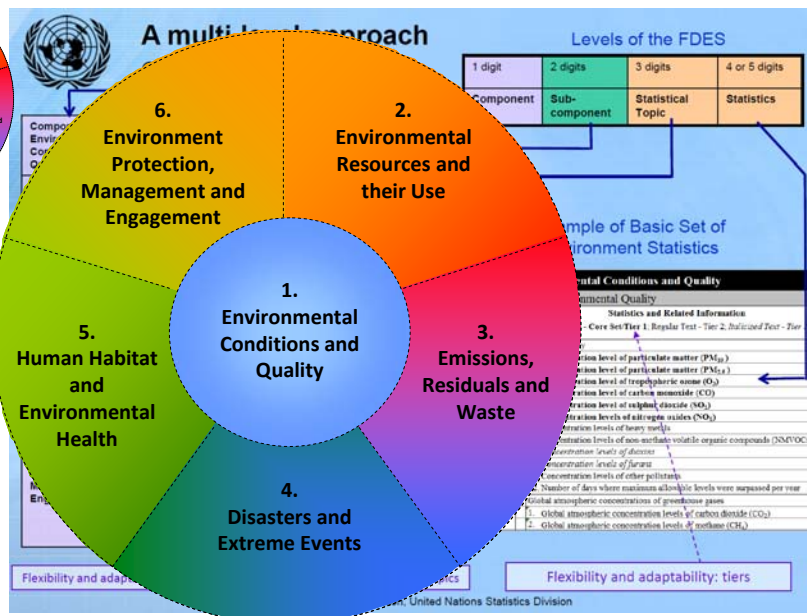## SDGs need registers, data and frameworks
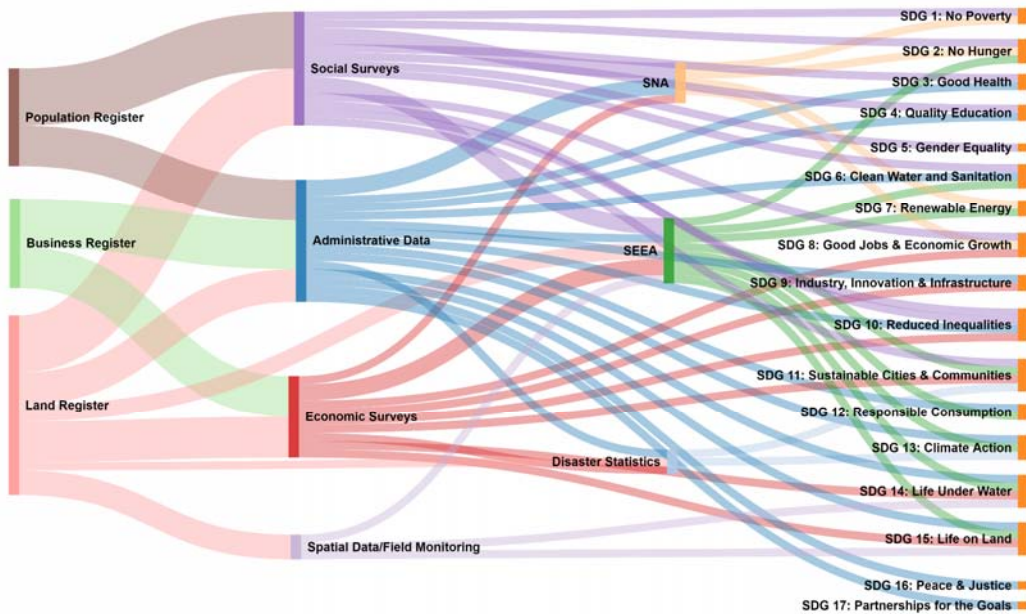
FDES Structure

FDES describes
the scope and
components of
environment
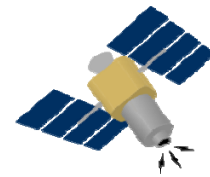statistics;
harmonizes data
with common
standards

→ SEEA
integrates these
data into
"accounts"

SEEA in the SNA

- *SNA 2008 p. 534*

- *29.104 As with the SNA, the SEEA accounts provide*
  - *a scorekeeping function from which **key indicators** can be derived and*
  - *a management function in that they can be used in the analysis of **policy options**.*

- If you want to know the importance of nature to the economy → SEEA

What is a "satellite account"?

Another observation on accounting

Indicators

Accounts

Economic Data
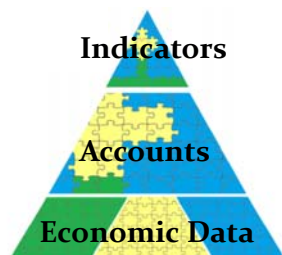
Economic statistics:
- Macro-economic **theory**
- Trusted **framework** (SNA)
- Accepted **indicators** (GDP...)
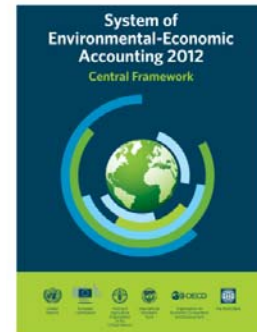- Statistical **infrastructure**

Environment statistics:
- **Many** theories
- Collected for **specific** purposes
- Few accepted **indicators**
- Little statistical **infrastructure**

Do you need "accounts" to produce coherent indicators?

SEEA is

- A **coherent** measurement framework linked to SNA:
  - Aligns concepts, classifications and methods
- Based on **accounting** principles & systems theory
- Flexible and modular
  - Select and adapt components to country needs
  - Don't need to be complete to be useful
- Since 1992, has been implemented, in part, by over 90 countries
- Is **NOT**: a model, database or analytical framework

SEEA does

- Provide guidance on producing "accounts" for:
  - Natural inputs to the economy,
  - Impacts of the economy on the environment, and
  - Expenditures to mitigate impacts
- Support sustainable statistical infrastructure to **regularly** produce relevant accounts and indicators
- Improve **coherence** by standardizing concepts, classifications and methods
- Reduce **overlaps** in data collection
  - "collect once, use many times"
- Improve **relevance** by linking to SNA

International platforms for integration

OECD Green Growth

CBD Aichi Targets

World Bank WAVES

Agenda 21, Rio +20, SDGs: *Integrate nature into decision making!!!*

IPBES, IPCC

UNEP TEEB, Green Economy, SCP

UNEP, FAO, UNDP: REDD+

UNDP Biofin

SEEA: Stocks and flows

Stocks (P & Q)

Minerals & energy
Land, Soil
Timber
Aquatic
Other biological

Minerals & energy

Water

Ecosystems + conditions

Environment

Flows (P & Q)

Materials

Energy

Water

Ecosystem services

National wealth

- National Balance Sheet
- Resource life
- "Critical" Natural Capital

Benefits/Costs

- SNA: Contribution of natural inputs to economy (rent)
- Depletion, degradation adjusted net savings
- Non-SNA: Contribution of natural inputs to well being
- Externalities (health, poverty)

Economy
Production
Consumption
Accumulation
Imports
Exports

P = Price (monetary value)
Q = Quantity (physical)

Residuals (Q)

Solid waste

Air emissions

Effluents

Ecosystem impacts

Mitigate & Manage (P)

Protection $
Goods & Services
Taxes & subsidies

Environment accounts and statistics

SEEA-CF (Central Framework)	• **Assets**	• Minerals & Energy, Land, Timber, Soil, Water, Aquatic, Other Biological
	• **Physical flows**	• Materials, Energy, Water, Emissions, Effluents, Wastes
	• **Monetary flows**	• Protection expenditures, taxes & subsidies

Where to start?

Priority concerns	Related accounts and statistics	Related SDGs
1. Forest degradation 3. Land degradation	Land Asset Account Ecosystem Account (Extent)	15 Life on Land
2. Water resources and quality	Water Account (Asset; Supply /Use) Ecosystem Account (Water)	6 Water 14 Life on Water
4. Climate change	Energy Account → Air Emissions Ecosystem Account (Carbon)	7 Energy 13 Climate
5. Solid waste management	Solid Waste Account	11 Urban 12 Consumption
6. Biodiversity loss	Ecosystem Account (Biodiversity)	14 Oceans 15 Life on Land
7. Impacts of mining on the environment	Land Asset Account Ecosystem Account (Condition)	15 Life on Land

Source: ADB Myanmar Environmental Performance Review 2012.

Asia and the Pacific SEEA Progress (preliminary)

Number of accounts (max = 33)
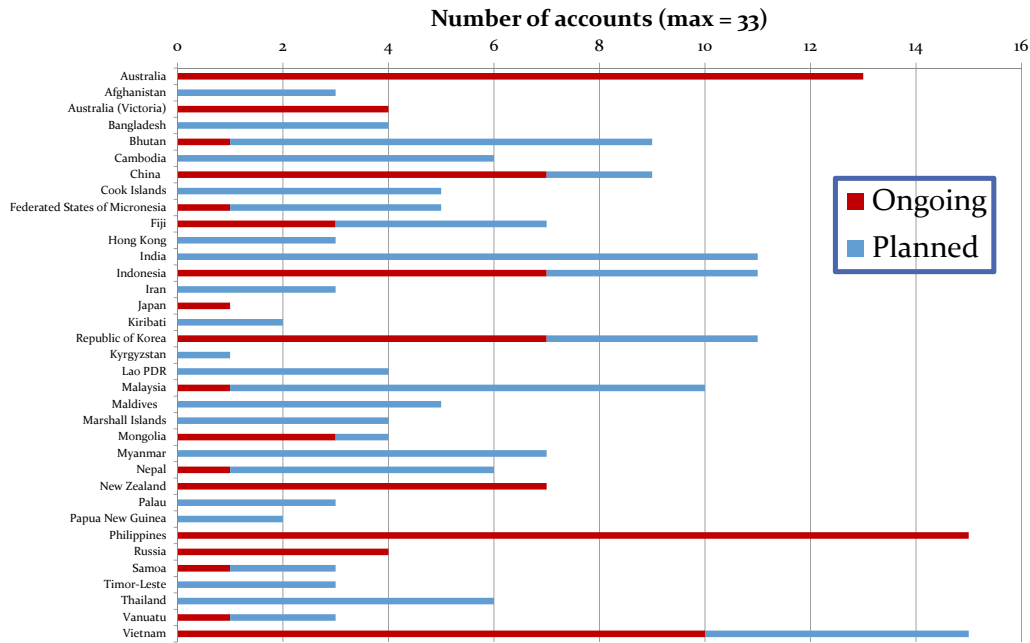
The details

Balancing nature's books

- Stock/flow → Assets, Supply/Use
  - **Asset Accounts:** Opening balances, additions, removals, closing balance
  - **Supply/Use Accounts:** Supplier → User
- Double/quadruple entry
  - Monetary and physical transaction between supplier and user
- Time of recording: **When** transaction occurred
- Consistent units of measure, concepts, classifications, methods & valuation rules

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What is an "account"?

Different data sources:
Household survey: 100
Municipal admin: 300
Industry survey: 175

One common theme:
Common unit of measure
Convert ($/month, litres/day, m³/month)

All users/uses

Rows add up

Water use account (m³/year)	Use of water					
	Agriculture, forestry and fishing	Electricity, gas, steam and air conditioning supply	Water collection, treatment and supply	Other industries	Households	Total use
Sources of abstracted water						
Inland water resources						
(A) Surface water	-	1,000	575	25	5	1,605
(B) Groundwater	250	-	-	-	10	260
(C) Soil water	10,000	-	-	-	-	10,000
(E) Sea water	-	-	25	-	-	25
(F) Total abstracted water	10,250	1,000	600	25	15	11,890
Abstracted water						
(G) Distributed water (to other economic units)			500			
(H) Use of water (from other economic units)	300	75	-	25	100	500
(I) Own use	10,250	1,000	100	25	15	11,390
Total use of water (abstracted and distributed water)	**10,550**	**1,075**	**100**	**50**	**115**	**11,890**

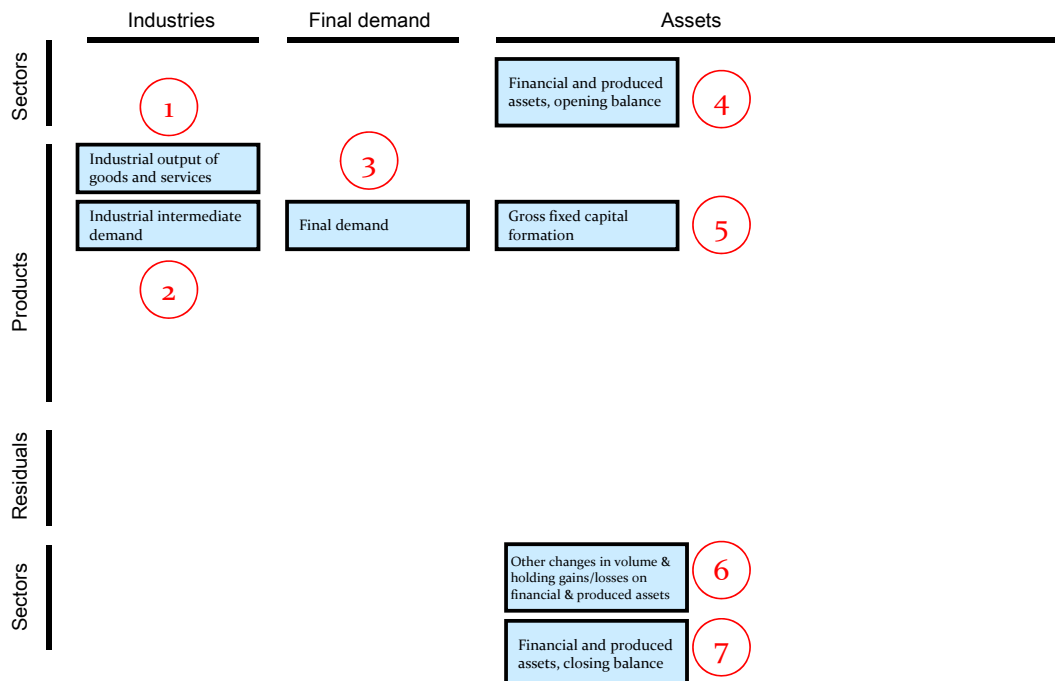**Columns add up**   **Total**

The SEEA and the SNA

- The SNA measures national economic activity, production and assets (wealth):
  - In **monetary** terms
  - By tracking transactions between **economic units** (businesses, households, governments)
- The SEEA measures environment/economy transactions:
  - Expands asset boundary (includes **physical** natural assets)
  - Distinguishes expenditures on **environmental protection**
  - Records **physical** quantities of natural inputs to the economy
  - Records **residuals** produced and consumed (and by whom)
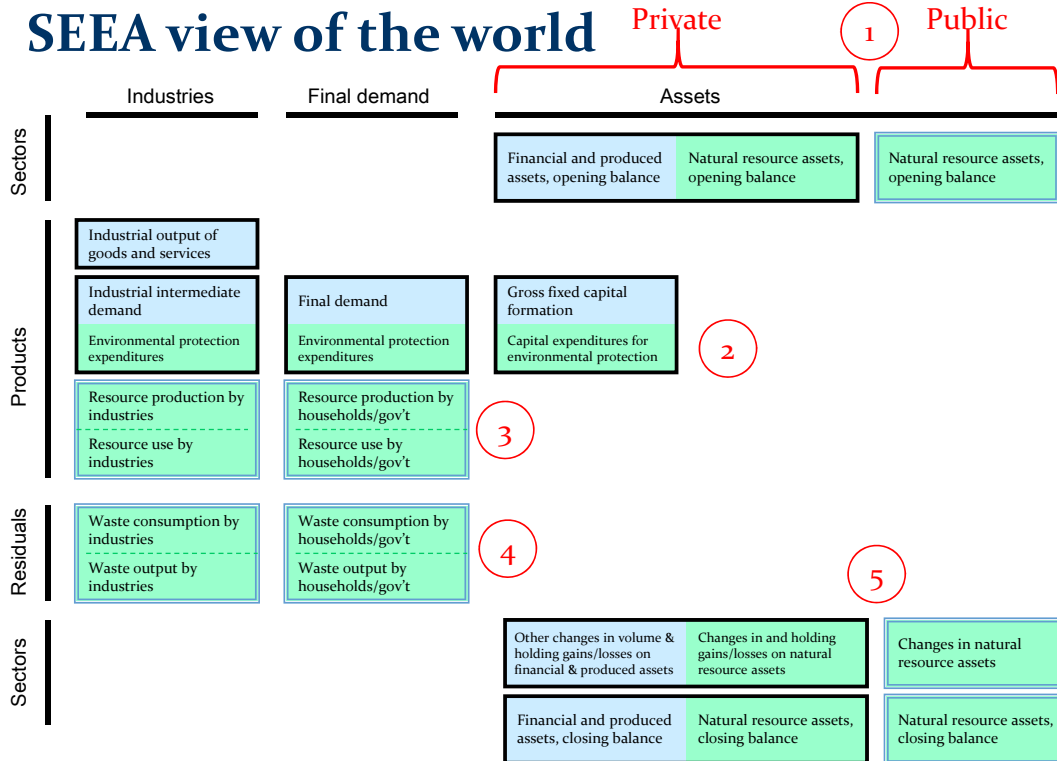 - Records changes in **private** and **public** natural assets

SNA view of the world

	Industries	Final demand	Assets
Sectors	①		Financial and produced assets, opening balance ④
Products	Industrial output of goods and services	③	
	Industrial intermediate demand ②	Final demand	Gross fixed capital formation ⑤
Residuals			
Sectors			Other changes in volume & holding gains/losses on financial & produced assets ⑥
			Financial and produced assets, closing balance ⑦

SEEA view of the world

Private   1   Public

	Industries	Final demand	Assets	

Sectors

Financial and produced assets, opening balance	Natural resource assets, opening balance		Natural resource assets, opening balance

Products

- Industrial output of goods and services
- Industrial intermediate demand
  - Environmental protection expenditures
- Final demand
  - Environmental protection expenditures
- Gross fixed capital formation
  - Capital expenditures for environmental protection   2
- Resource production by industries
- Resource use by industries
- Resource production by households/gov't
- Resource use by households/gov't   3

Residuals

- Waste consumption by industries
- Waste output by industries
- Waste consumption by households/gov't
- Waste output by households/gov't   4

5

Sectors

Other changes in volume & holding gains/losses on financial & produced assets	Changes in and holding gains/losses on natural resource assets		Changes in natural resource assets
Financial and produced assets, closing balance	Natural resource assets, closing balance		Natural resource assets, closing balance

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One environment: Two perspectives

Individual environmental assets & resources:

Timber
Water
Soil
Fish

Ecosystems: Biotic and abiotic elements functioning together:

Forests
Lakes
Cropland
Wetlands

SEEA Central Framework starts with economy and brings in information on natural assets, flows and residuals

+

SEEA Experimental Ecosystem Accounting starts with ecosystems and links their services to economic and other human activity

=

Together, they provide the foundation for measuring the relationship between the environment, and economic and other human activity

# Environment accounts and statistics

| SEEA-CF (Central Framework)	• Assets • Physical flows • Monetary flows	• 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 • Water • Energy • Agricultural, Forestry and Fisheries
SEEA-EEA (Experimental Ecosystem Accounting)	Adds spatial detail and ecosystem perspective	Extent, Condition, Ecosystem Services, Carbon, Water, Biodiversity
FDES (Framework for the Development of Environment Statistics)	Basic statistics for above plus...	• Extreme events and disasters • Human settlements and health • Protection, management & engagement

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SEEA-CF – The Accounts

- **Assets** (= stocks; physical and monetary):
  - Mineral and energy resources
  - Land, Forest
  - Soil
  - Timber
  - Aquatic resources
  - Other biological resources
  - Water

SEEA-CF – The Accounts

- **Physical flows**
  - Supply/use for materials (extract → consume)
  - Material flows (through economy) to final demand (e.g., GHGs)
  - Water supply/use
  - Energy supply/use
  - Residuals
    - Air emissions
    - Water emissions
    - Wastes (generated and used/recycled)

SEEA-CF – The Accounts

- **Monetary flows**
  - Environmental protection expenditures (demand side)
  - Environmental goods and services sector (supply side)
  - Resource use and management
  - Environmentally-related payments by & to government (fines, fees, taxes, subsidies, concession payments)

Environment accounts and statistics

SEEA-CF (Central Framework)	• **Assets**	• Minerals & Energy, Land, Timber, Soil, Water, Aquatic, Other Biological
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SEEA-EEA (Ecosystem Accounting)

- SDG Target 15.9: *By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts*

- "Experimental" = in progress

- Spatial framework of ecosystem units (30-100m)
  - *Extent* of ecosystem types
  - *Condition* of ecosystem asset
  - Classification and valuation of *ecosystem services*

- Links to SEEA-CF and SNA

- Tested in Australia, Canada, Mauritius, Netherlands, Philippines, pilot countries (Bhutan, Chile, Indonesia, Mexico, South Africa, Vietnam)

System of Environmental-Economic Accounting 2012
Experimental Ecosystem Accounting

SEEA-EEA Overview
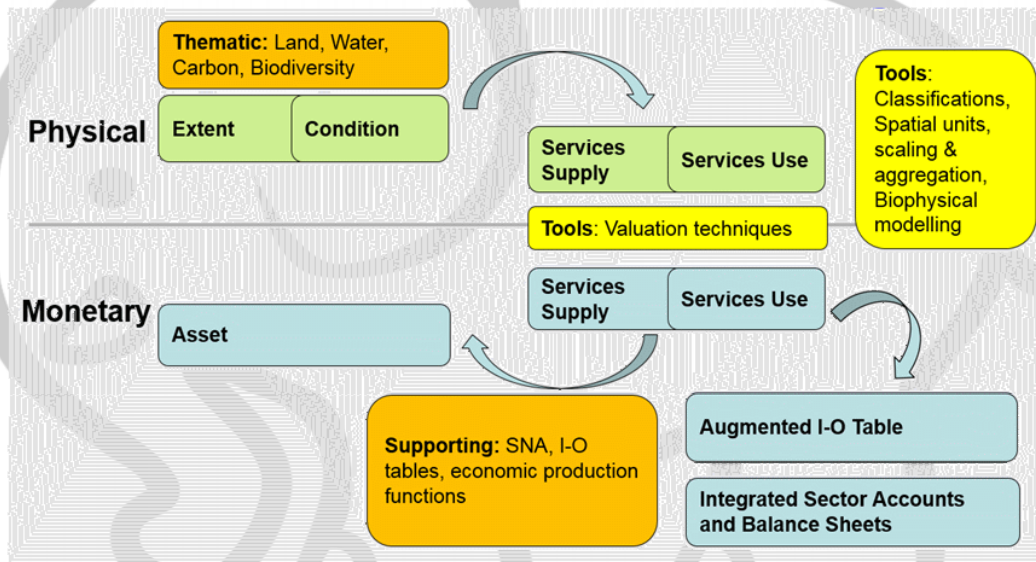
SEEA-EEA Accounts and tools
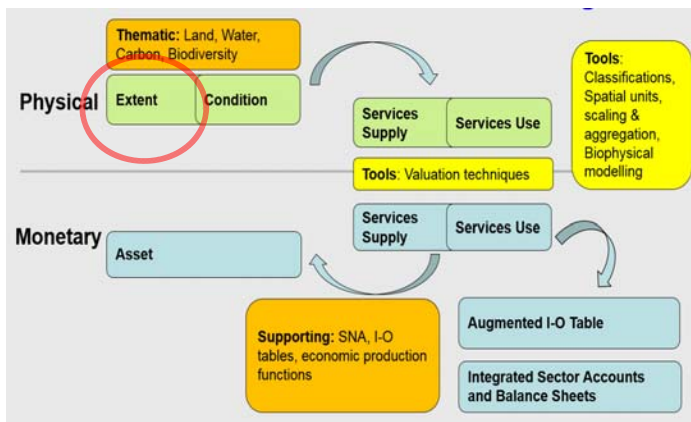
Extent account

- Ecosystem type + ownership and use
- Changes over time
- →General agreement on what exists on surface of country
- →Land cover change (where, why?)

SEEA-EEA Accounts and tools
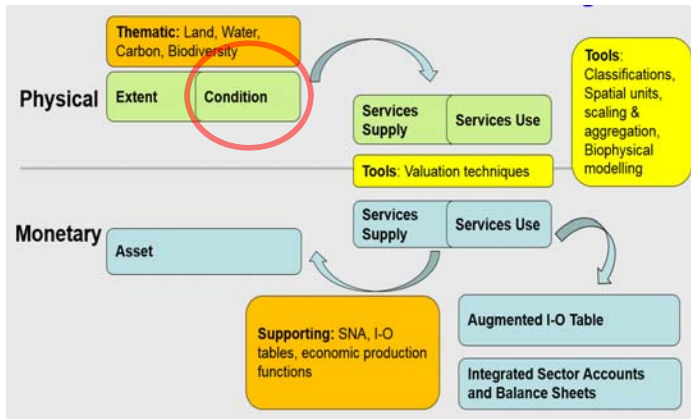
Condition account

- "Quality" and biophysical measures important to Ecosystem Services (ES)

→Overall condition, changes, location of changes
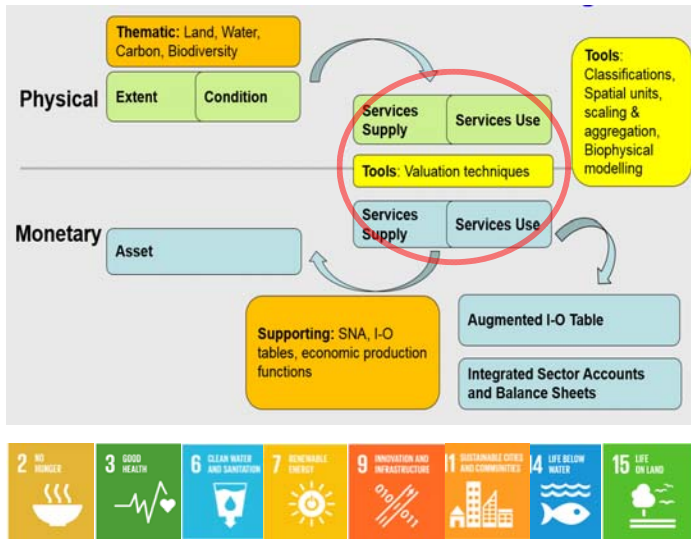
→Future flows of ES

SEEA-EEA Accounts and tools
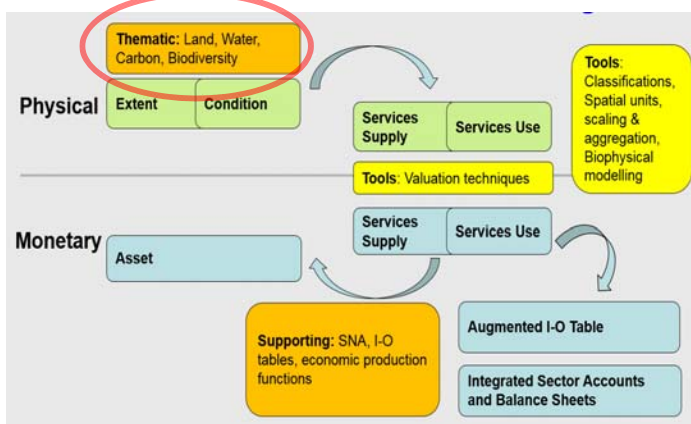
Thematic accounts

- Land (spatial detail)
- Water (spatial detail, quality, ecosystems as beneficiaries)
- Biodiversity (species ranges, characteristics, populations)
- Carbon (focus on biocarbon)

→Contribute to **Condition Accounts**

→Focus on specific issues

SEEA-EEA Accounts and tools

Ecosystem Services supply / use accounts

- Physical measures
- Use by beneficiaries
- **Valuation** to estimate monetary values

→Contribute to monetary **Asset Account** & links to SNA

SEEA-EEA Accounts and tools
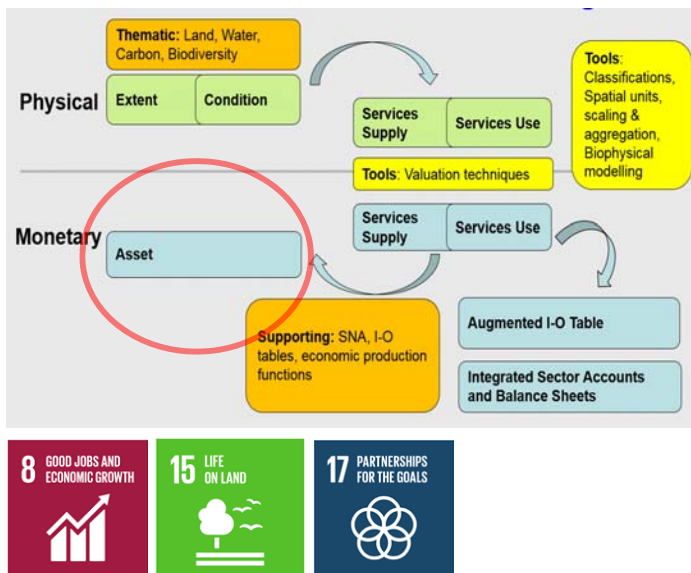
Monetary asset accounts

- Net Present Value of future flow of services
- → Trade-offs
- → Contribute to **Balance Sheets**

SEEA-EEA Accounts and tools
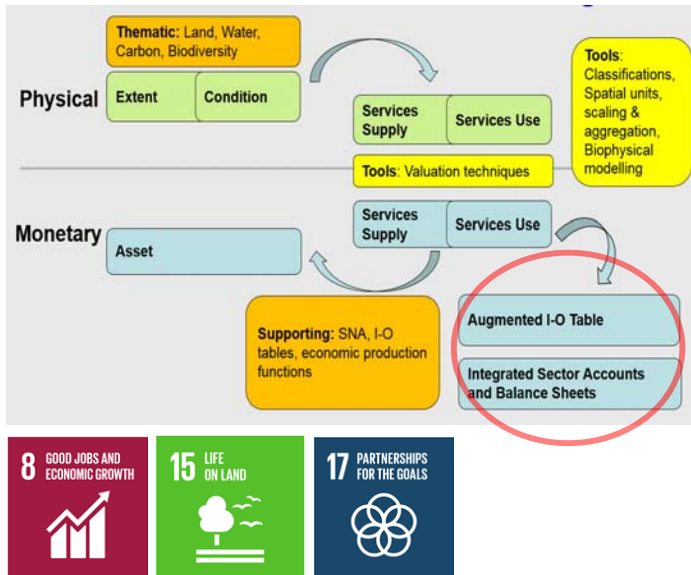
Links to SNA

- Ecosystem Services in economic production functions
- Degradation and depletion-adjusted aggregates (e.g., value added minus depreciation)
- → Trade-offs

SEEA-EEA Accounts and tools
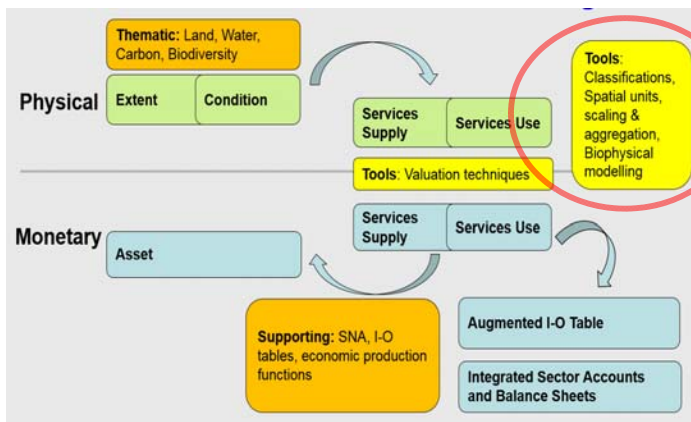
Tools

- Classifications (land cover, use, ecosystem services)
- Methods (Spatial units, scaling & aggregation)
- Biophysical modelling (future flows & filling gaps)

Stages of implementing environment stats

Diagnostic Tool

1. Strategic planning

Inventory Template

2. Build statistical and institutional mechanisms

- Institutional Framework
- Data sharing

5. Use accounts

Partnerships

- Frameworks
- Quality, process

4. Produce accounts

3. Strengthen National Statistical Systems
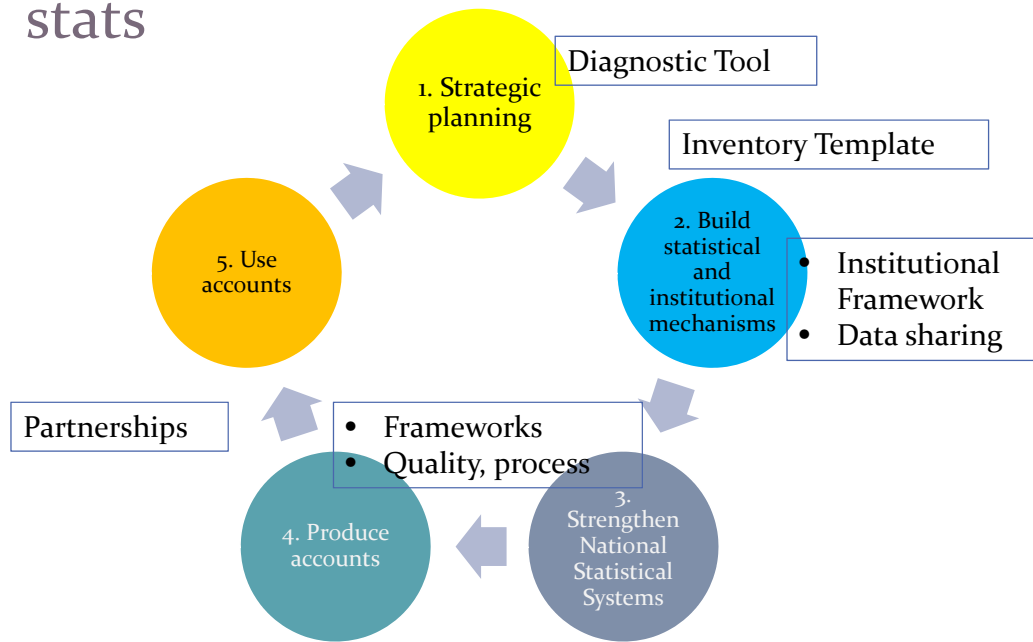
Implementing the measurement framework

1. Strategic planning (Diagnostic Tool): Iterative understanding of priorities and capacities

- National vision
- Engage NSS

A. Understand

1. Policy priorities
2. Institutions
3. Knowledge
4. Progress
5. Context

B. Do

6. Priorities for environment statistics

7. Constraints & Opportunities

C. Evaluate

= Work plan
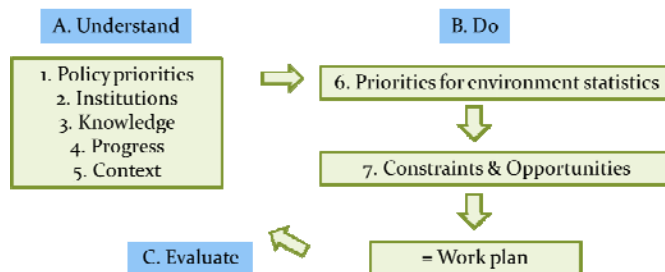
Implementing the measurement framework

2. Build statistical and institutional mechanisms

- Leadership
- Funding
- Monitoring
- Implementation plan
  - Data sharing
  - New surveys
  - New compilation

High Level Steering Committee
Members: Planning, Finance, Environment, NSO
Terms of Reference: Direct work of Technical Committee
- Link to policy priorities
- Integrate and advocate work plan with national and international work
- Coordinate proposals for funding; Allocate resources

Technical Committee
Members: Planning, Finance, Environment, NSO, Geospatial, Parks, Natural Resources, Agriculture, Foreign Affairs, Research
Terms of Reference: Coordinate technical aspects of work
- Internalize activities into planning documents

Subject-matter working groups
Land, Water, Carbon, Biodiversity & Ecosystems, SEEA-CF
Terms of reference: Inventory, acquire and develop data
- Design specific accounts, tables and indicators
- Coordinate with functional working groups to design and manage information system

Functional working groups
Policy: prioritize indicators and link to policy
Spatial: integrate spatial data, maintain standards
Data standards and dissemination: Lead design of information system, maintain standards and classifications, lead development of dissemination outputs

Implementing the measurement framework

3. Strengthen National Statistical Systems

- International guidance on statistical production
- Share data
- Centralize processes
- Quality guidelines

Generic Statistical Business Process Model (GSBPM)
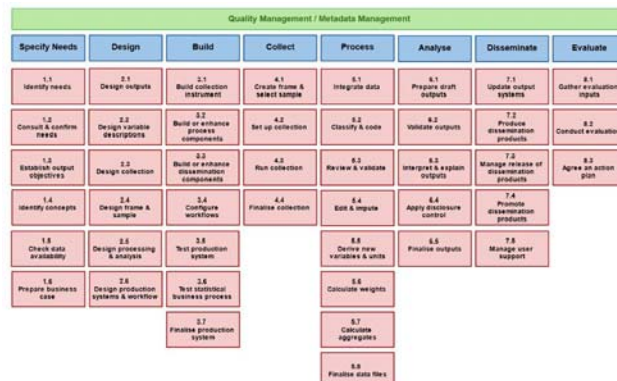
Documenting existing activities

Inventory template for environment statistics

- To document external statistical "supply chain"

Statistical activity 1 (Primary)
Needs→Design→Build
Collect
Validate
Process→Analyse
Output
Evaluate

Statistical activity 2 (Primary)
Needs→Design→Build
Collect
Validate
Process→Analyse
Output
Evaluate

Statistical activity 3 (Secondary)
Needs→Design→Build
Collect
Validate
Process→Analyse
Output
Evaluate
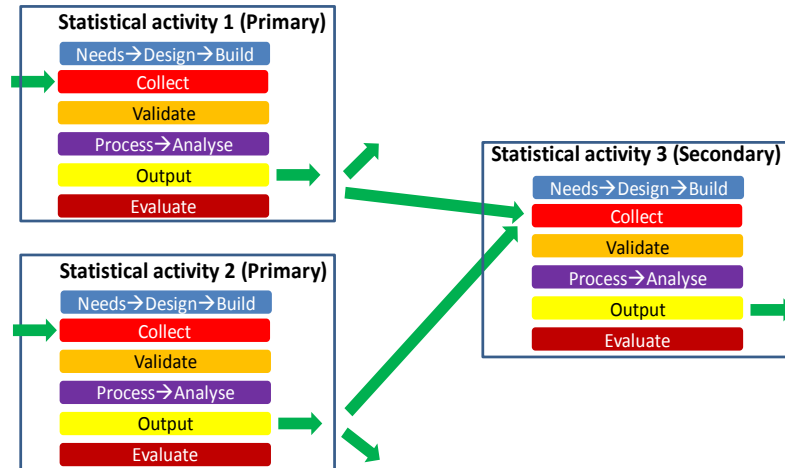
Implementing the measurement framework

4. Produce &
5. Use accounts

- Partnerships
- Get started
- Learn by doing
- Incremental improvement

- Among agencies and professions
- Along the production chain:
  data → accounts → analysis → policy

Need strong partnerships

Accounts will seldom be complete. There will sometimes be conflicting data. We can fill gaps later

Use what basic data are available now
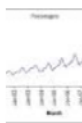
Accounts get better over time

The accounts will never be perfect, but will get better over time. The more often we produce accounts, the more useful they become

The best way to learn is to do
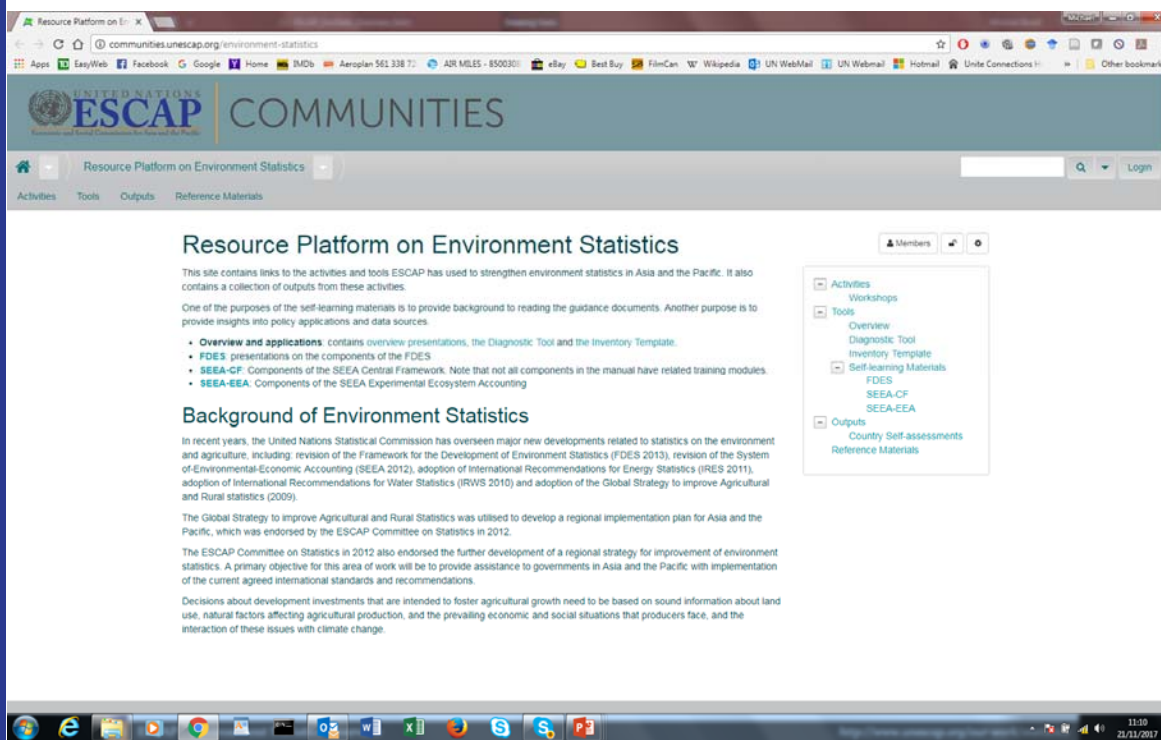
Experimental accounts are very useful and provide a reason for different groups to talk to each other

Take home messages

"Good statistics are cheaper than bad decisions."

- FDES guides the collection of basic environment statistics
- The SEEA is a measurement framework to "disentangle" environment data (➔ **Coherent**)
- Many countries are implementing SEEA as a way of harmonizing, prioritizing, estimating data (➔ **Feasible**)
- It is linked to the SNA and many SDGs (➔ **Relevant**)
- ESCAP provides technical assistance, training and work planning support

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- Questions?
- Comments?

References

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- World Bank. WAVES: https://www.wavespartnership.org/

Acknowledgements

- Thank you!

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