



System of
Environmental
Economic
Accounting

Session 2: Introduction to asset accounts in physical terms

Regional Training Workshop on SEEA Asset Accounts for Sustainable Development

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Why measure environmental assets?

“Conventional economic aggregates generated through national accounting, such as GDP, do not reflect the extent to which production and consumption activities may be using up environmental assets and limiting the capacity for these assets to generate ecosystem services in the future.”

-The Economics of Ecosystems and Biodiversity:
Guidance Manual for Countries (2013)

Policy relevance

Monitoring and management of natural wealth

- What is the contribution of natural assets to national wealth?
- Are we maintaining total wealth (produced and natural) over time, both in total and per capita?
- To what extent are we substituting produced assets for natural assets?
- Is resource rent recovered successfully by governments?

Asset definitions

- **Environmental assets** are the naturally occurring living and non-living components of the Earth, together constituting the biophysical environment, which may provide benefits to humanity.
 - > Individual components considered environmental assets in SEEA CF:
 - mineral and energy resources,
 - land,
 - soil resources,
 - timber resources,
 - aquatic resources,
 - other biological resources (excluding timber and aquatic resources), and
 - water resources.
- **Natural resources** (subset of environmental assets): include all natural biological resources (including timber and aquatic resources), mineral and energy resources, soil resources and water resources. All cultivated biological resources and land are excluded from scope.

Asset account considerations

- Coverage does not extend to individual elements embodied in the resources
- Territorial scope: limited to the economic territory in control of a country (usually includes EEZ)
- Measurement scope:
 - > In physical terms: broad, extending to include all of the resources that may provide benefits to humanity
 - > In monetary terms: limited to those individual components that have an economic value based on the valuation principles of the SNA
- Not considered in scope:
 - > volume of water in the sea
 - > volume of air in the atmosphere
- Primary role of land in the SEEA is to provide space

Classification of environmental assets in SEEA CF

Table 5.1

Classification of environmental assets in the SEEA Central Framework

1	Mineral and energy resources
1.1	Oil resources
1.2	Natural gas resources
1.3	Coal and peat resources
1.4	Non-metallic mineral resources (excluding coal and peat resources)
1.5	Metallic mineral resources
2	Land
3	Soil resources
4	Timber resources
4.1	Cultivated timber resources
4.2	Natural timber resources
5	Aquatic resources
5.1	Cultivated aquatic resources
5.2	Natural aquatic resources
6	Other biological resources (excluding timber resources and aquatic resources)
7	Water resources
7.1	Surface water
7.2	Groundwater
7.3	Soil water

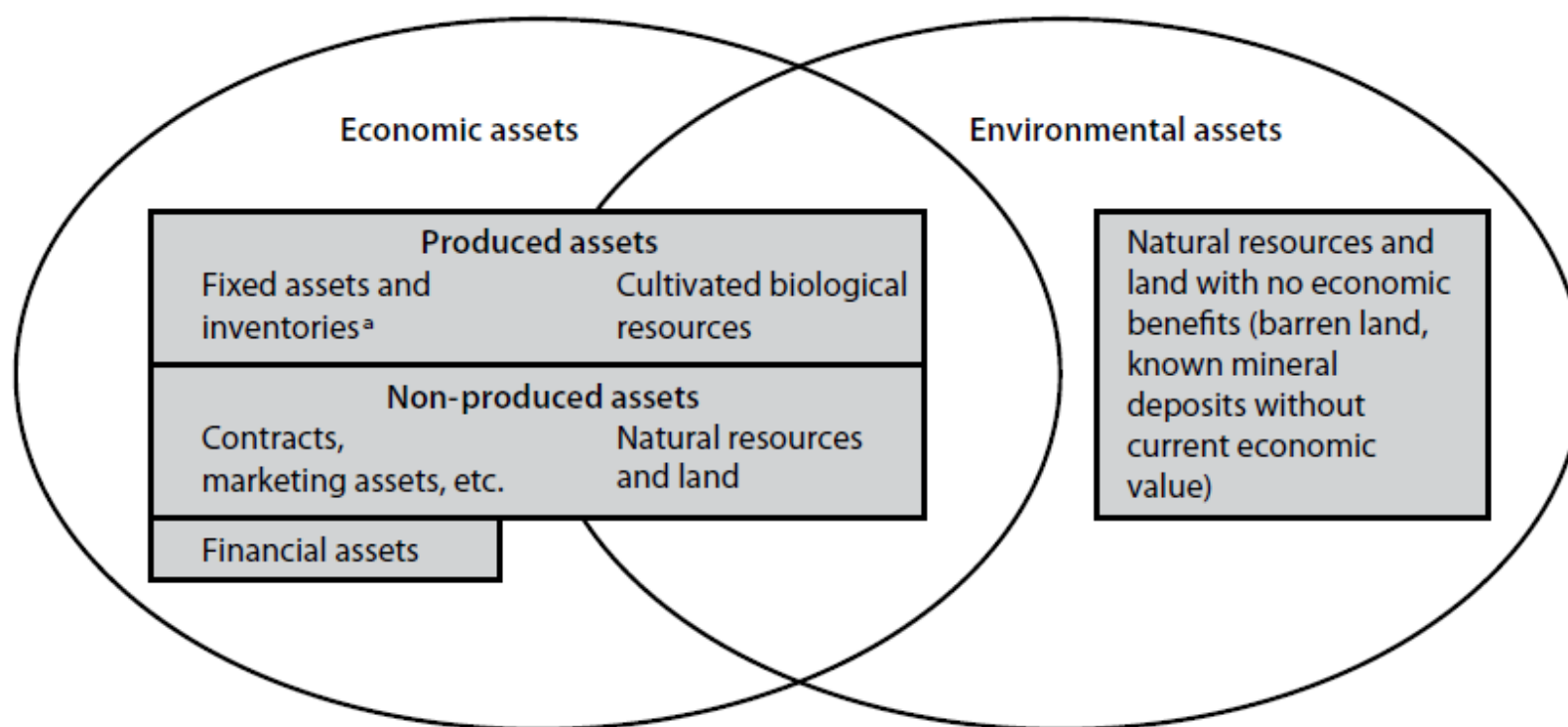
SEEA CF asset accounts

Asset accounts	Topics covered (detailed definition)
Mineral and energy resources	Physical and monetary accounts for minerals and energy stocks (oil, natural gas, coal and peat, non-metallic minerals and metallic minerals) (CF 5.3)
Land	Physical and monetary accounts for land, land cover, land use and forest (CF 5.6)
Soil resources	Area and volume of soil resources (CF 5.7)
Timber resources	Physical and monetary accounts for timber resources (CF 5.8)
Aquatic resources	Physical and monetary accounts for fish, crustaceans, molluscs, shellfish and other aquatic organisms such as sponges and seaweed as well as aquatic mammals such as whales. (CF 5.393) (CO ₂ , pollutants) (CF 3.9)
Other biological resources	Cultivated animals and plants including livestock, annual crops such as wheat and rice, and perennial crops such as rubber plantations, orchards and vineyards. (CF 5.10)
Water resources	Stock of water resources (CF 5.11)

Environmental and economic assets

Figure 5.1

Relationship between environmental and economic assets



^a Other than cultivated biological resources.

Physical Asset Account: Accounting Structure

Table 5.2

General structure of the physical asset account for environmental assets (*physical units*)

	Mineral and energy resources	Land (including forest land)	Soil resources	Timber resources		Aquatic resources		Water resources
				Cultivated	Natural	Cultivated	Natural	
Opening stock of resources	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additions to stock of resources								
Growth in stock	na	Yes*	Soil formation Soil deposition	Growth	Natural growth	Growth	Natural growth	Precipitation Return flows
Discoveries of new stock	Yes	na	na	na	na	na	Yes*	Yes*
Upward reappraisals	Yes	Yes	Yes*	Yes*	Yes*	Yes*	Yes	Yes*
Reclassifications	Yes	Yes	Yes	Yes	Yes	Yes	Yes	na
<i>Total additions to stock</i>								
Reductions in stock of resources								
Extractions	Extractions	na	Soil extraction	Removals	Removals	Harvest	Gross catch	Abstraction
Normal reductions in stock	na	na	Erosion	Natural losses	Natural losses	Normal losses	Normal losses	Evaporation Evapotranspiration
Catastrophic losses	Yes*	Yes*	Yes*	Yes	Yes	Yes	Yes	Yes*
Downward reappraisals	Yes	Yes	Yes*	Yes*	Yes*	Yes*	Yes	Yes*
Reclassifications	Yes	Yes	Yes	Yes	Yes	Yes	Yes	na
<i>Total reductions in stock</i>								
Closing stock of resources	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: "na" means not applicable.

* An asterisk indicates that this entry is usually not significant for the resource or is typically not separately identified in the source data. In practice, not all cells that reflect the possibility of an entry here should be shown separately in published accounts for each type of resource.

Physical asset account: considerations

- Structure: conforms with a balance sheet structure - opening stocks, closing stocks and annual variations
- Physical units: cubic meters, tonnes, barrels, etc.
- Main categories:

Additions:

- > Growth in stock
- > Discoveries
- > Upward reappraisals: changes due to updated information and/or quality
- > Reclassifications: change of purpose

Reductions:

- > Extraction
- > Normal reduction in stock
- > Catastrophic losses
- > Downward reappraisals
- > Reclassifications

Depletion

- **Depletion**, in physical terms, is the decrease in the quantity of the stock of a natural resource over an accounting period that is due to the extraction of the natural resource by economic units occurring at a level greater than that of regeneration
 - > For non-renewable natural resources: depletion is equal to the quantity of resource that is extracted
 - > For natural biological resources: only the amount of extraction that is above the level of regeneration is recorded as depletion
 - > Catastrophic losses are not recorded as depletion
- Note: not the same as **degradation**
 - > In terms of SEEA Ecosystem Accounting: Ecosystem degradation is the decrease in the value of an ecosystem asset over an accounting period that is associated with a decline in the condition of the asset during that accounting period

Physical asset account: Canada example

- Example of established crude bitumen reserves in Canada (in physical terms)

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Selected natural resource reserves
annual (data in thousands)

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Geography = Canada ¹

Asset type = Established crude bitumen reserves (cubic metres) ¹⁰

Stock	2010	2011	2012	2013	2014	2015
Opening stock	4,216,000	4,130,000	4,060,000	4,110,000	4,009,400	3,880,000
Additions	7,500	31,000	162,000	20,400	-3,740 ^r	77,253
Depletion	93,500	101,000	112,000	121,000	125,660	137,553
Closing stock	4,130,000	4,060,000	4,110,000	4,009,400	3,880,000 ^r	3,819,700

Symbol legend:

^r Revised

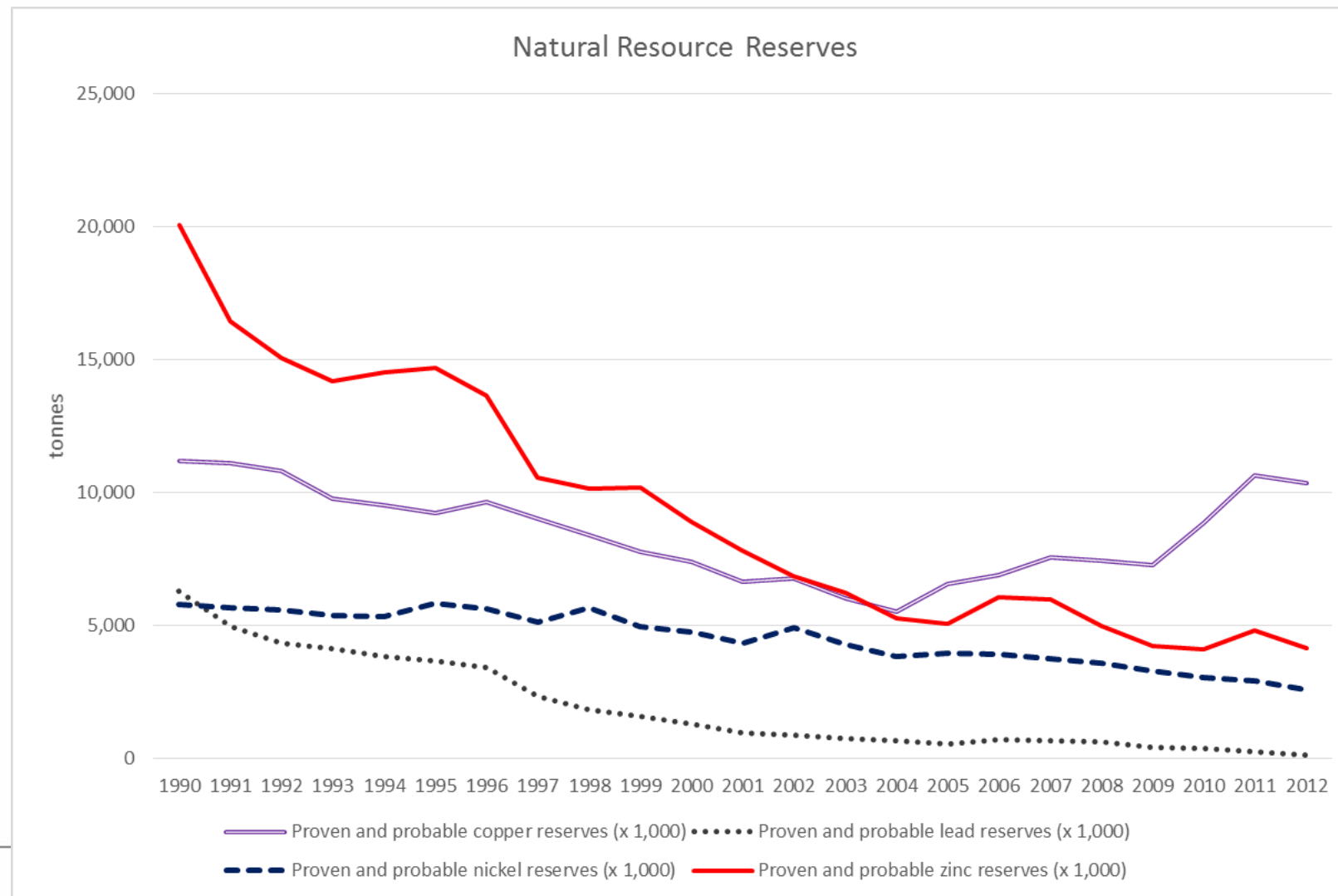
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Physical asset accounts: applications

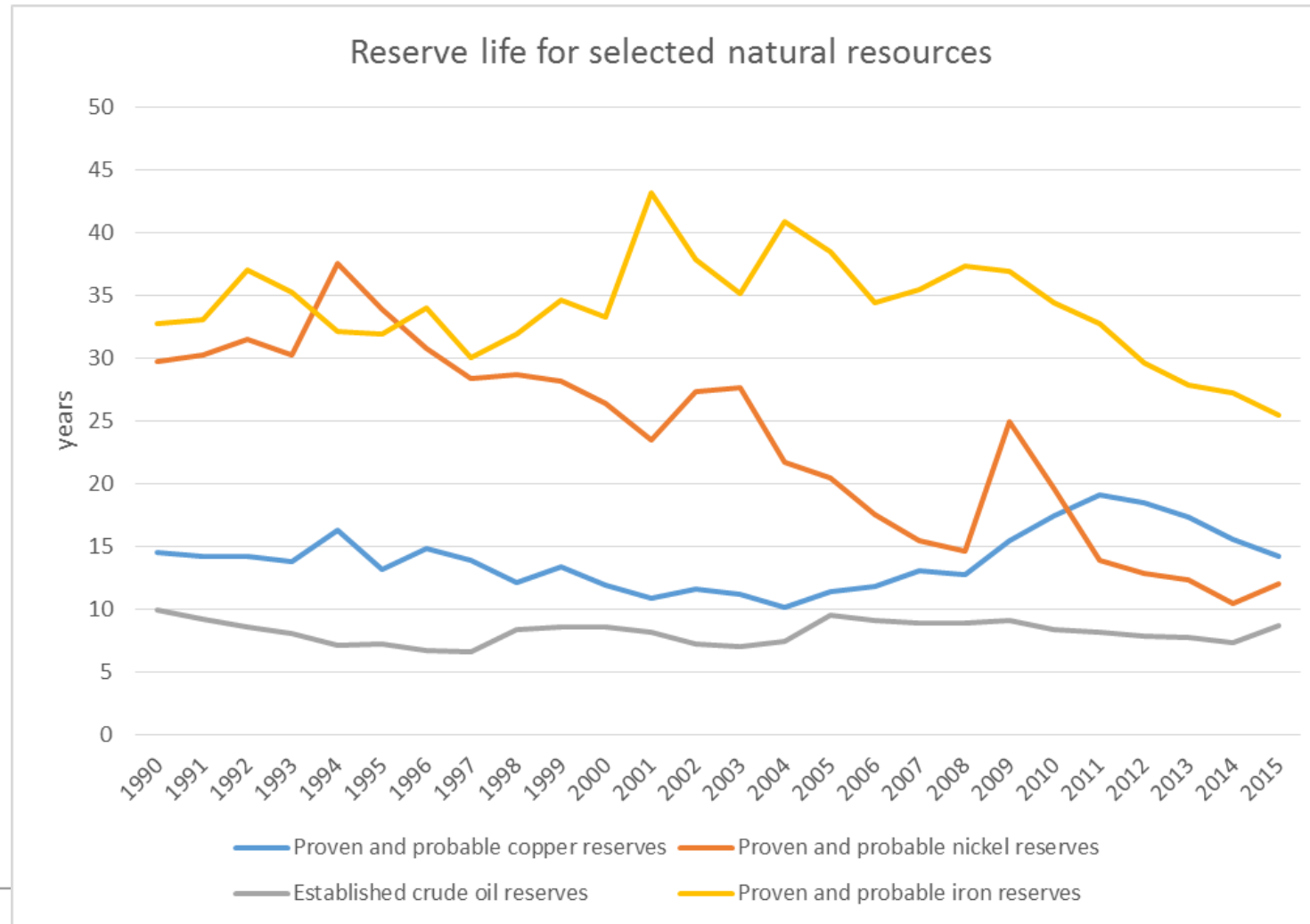
Physical indicators that relate to the management of natural resource stocks and their use in the economy:

- Are resource stocks growing / declining over time?
- Stocks of mineral and energy assets
- Remaining reserve life of energy and mineral assets
- Annual depletion of mineral and energy reserves
- Total natural resource base

Physical Stocks of Selected Natural Assets



Reserve Lives of Selected Natural Assets



Monetary asset account: accounting structure

- Structure: conforms with a balance sheet structure - opening stocks, closing stocks and annual variations
- Monetary units: \$, €, ¥, ...
- Same structure as asset account in physical terms with one additional category:
 - > 'Revaluation of the stock of resources' → changes in value due to price changes

Table 5.3

Conceptual form of the monetary asset account (*currency units*)

Opening stock of resources
Additions to stock of resources
Growth in stock
Discoveries of new stock
Upward reappraisals
Reclassifications
<i>Total additions to stock</i>
Reductions in stock of resources
Extractions
Normal loss of stock
Catastrophic losses
Downward reappraisals
Reclassifications
<i>Total reductions in stock</i>
Revaluation of the stock of resources
Closing stock of resources

Monetary asset accounts: Canada example

- Example of established crude bitumen reserves in Canada (in monetary terms)

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Table 153-0121 [1](#), [2](#), [10](#)

Value of selected natural resource reserves

annual (dollars x 1,000,000)

Data table

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Selected items [\[Add/Remove data\]](#)

Geography = Canada

Asset type = Established crude bitumen reserves

Stock	2010	2011	2012	2013	2014	2015
Reconciliation account opening stock [Ⓐ]	182,194.4	336,498.2	424,936.5	336,923.0	334,803.4	534,710.0 ^P
Reconciliation account additions [Ⓐ]	611.1	3,244.6	13,280.2	1,820.4	-515.5	1,799.0 ^P
Reconciliation account depletion [Ⓐ]	7,618.1	10,571.1	9,181.4	10,104.1	17,317.4	3,203.2 ^P
Reconciliation account revaluation [Ⓐ]	161,310.8	95,764.8	-92,112.4	6,164.0	217,739.5	-444,356.1 ^P
Reconciliation account closing stock [Ⓐ]	336,498.2	424,936.5	336,923.0	334,803.4	534,710.0	88,949.7 ^P

Symbol legend:

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^P Preliminary

THANK YOU

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