CHAPTER 2
Issue paper

DRAFT

Introduction

Chapter 2 discusses the following topics:

- definition of environmental assets: a definition of environmental asset is proposed to take into account the non-economic benefits that may be derived from the asset.
- classification of assets: a new classification of non-financial asset is proposed. Detailed classifications for subsoil assets and forest are presented
- asset boundary: practical recommendations for classifying an asset as produced and non-produced are discussed
- environmental assets, fixed assets or inventories
- physical asset accounts for all environmental assets, that is for economic assets, in the SNA sense and for all other assets which produce free services to production and welfare. It includes not only physical accounts related to quantitative aspects of the asset, but also accounts of ecosystems and other qualitative aspects.
- monetary accounts for economic assets
- valuation methods (economic): valuation of economic benefits, as in the SNA, is described. More controversial valuation methods of non-use benefits are discussed in Chapter 5
- accounts for subsoil assets, forest, fisheries, land and ecosystems and water are discussed in details. Classifications and tables for compilation are proposed.

The following topics need further discussion and coverage:

- treatment of depletion
- treatment of discoveries
- treatment of intangibles related to environmental assets (e.g. concessions for use of the assets, royalties, transferable quotas, etc.) and direct valuation of assets
- valuation of changes in stocks
- valuation of land separate from timber

Issues for discussion

- Categorization and classification of assets

Several new definitions and a classification of asset are proposed in Chapter 2. We would like to reach agreement on the definitions and discuss the classification presented below.

Would you agree with the following definition of environmental assets?

> **Environmental assets** are elements of the environment that contribute to human well-being by yielding either use or non-use environmental benefits to an individual or group of individuals.

Environmental benefits are defined as use and non-use benefits. Use benefits can be divided into two sub-categories: direct-use benefits and indirect-use benefits. Non-use benefits too can be sub-divided into existence, bequest and option benefits. Therefore the above definition include assets that serve as input of material, energy and space into production, as well as produce free services to production and welfare.

Environmental assets as defined above include: cultivated assets, natural resource stocks and environmental system assets.

Would you agree with the following definition of cultivated assets?

In the SNA,

> **Cultivated assets** are defined as livestock for breeding, dairy, draught, etc. and vineyards, orchards and other plantations of trees yielding repeat products that are under the direct control, responsibility and management of institutional units, as defined below.

The SNA definition is not easily operationalized. The following definition is to provide a better defined boundary between produced and non-produced natural assets.

> **Cultivated biological assets** are those that exist as the direct result of human activity (seeding of crops or trees, breeding of livestock, etc.) and whose growth to maturity is subject to human intervention on a regular, periodic basis.

This definition explicitly includes any biological resource that was not brought into existence through human activity or whose growth to maturity was not controlled in some manner by regular, periodic human intervention. It excludes, for example, timber tracts that are the result of tree-planting programs in remote forest unless these programs are followed up by regular silvicultural activities (thinning, spraying, fertilizing, etc.) over the life span of the resulting trees. Likewise, it excludes natural forests, even those, whose growth is fostered by silvicultural activities, since the trees they contain are of natural and not human origin.

Should all cultivated assets be considered environmental assets or should boundaries be defined?

Cultivated natural growth assets are often environmental assets as well as being produced assets. They provide services of carbon sequestration, watershed proection, protection against flooding, habitat of species, etc. However, some cultivated assets, such as fish stocks raised in fish farms provide economic benefits, but environmental dis-benefits. Fish farms do not provide habitat for species, as cultivated forest would, but produce a lot of waste, generally disposed of in the sea and thus having a negative impact on the environment.

Would you agree with the following definition of natural resource stock assets (and with the term used)?

> **Natural resource stock assets** are defined as those that provide materials, energy and space used in human activities and that are subject primarily to quantitative depletion through human use. They are sub-divided into three categories: sub-soil resources, biological resources and land resources.

Would you agree with the following definition of environmental system assets (and with the term used)?

> **Environmental system assets** are environmental assets that have the capacity for self-renewal, that render services to humans (which may include the provision of materials), and that are subject mainly to qualitative degradation (as opposed to quantitative depletion) through excessive use.

Would you agree in classifying some assets both as natural resource stock assets and as environmental system assets in physical accounts only?

According to the function they provide, certain assets may be classified as natural resource stock assets or environmental system assets. Insofar as they produce material and space used in production they are natural resource stock assets and insofar as they produce free services they are classified as environmental system assets. In the case of forest, for example, land and timber are natural stock assets, whether the forest as a whole, in its capacity of producing services of habitat, protection, etc. is an environmental system asset. Forestland would then be classified both as an economic asset and as terrestrail ecosystem. Special attention should taken to avoid double counting in monetary accounts.

Would you agree with the classification of assets provided in the Annex?

- Valuation

The chapter discusses valuation of stocks. It would be helpful if we could get some agreement on best practices on the following issues:

What is the preferred valuation method for valuing stocks of non-renewable and renewable natural assets?

Net present value, net price method and user cost (not discussed), direct valuation are the most common valuation methods to value assets.

Would you agree that Net price method I is a preferred valuation method with respect to Net Price II (Text Box 1)? Would you agree to suggest Net Price Method II (not including the normal return to capital) only in case of negative net rents?

Which interpretation of the normal return to capital do you prefer/use? And would you use a nominal or real interest rate?

1) opportunity cost of the investment in the produced capital assets. This opportunity cost could be estimated as the average real rate of return on investment elsewhere in the economy;

2) cost of financing the acquisition of the produced capital stock. In this case, use of the interest rate on bonds and/or the return on shares in resource industries. Financing costs could be estimated using either the *nominal interest* rate (reflecting actual payments made) or the *real rate* (adjusted for inflation by deducting the expected rate of inflation from the nominal rate). Use of a real rate requires the assumption that produced capital stocks appreciate in value with time, offsetting part of the interest cost. This gain in value is realizable only if the capital goods are sold however.

If using the net present value method, which discount rate to use? private or social? Should risk associated with future returns be considered in the choice of the discount rate?

Discount rate reflects time preference, risks associated with future returns and risks associated with increases in price. In general, risks associated with future returns are not included. A common assumption is that recent prices and costs remain constant. Also, the resource stocks chosen for the basis of valuation are conservative. Inflation is also excluded by considering a real discount rate. Private discount rates are in the range of 7-8%, social discount rate are in the range of 3-5%.

What is your opinion of taking a moving average of prices and/or cost and/or return to capital to avoid large fluctuations in the net prices?

When using net present value, how to value of changes in stocks?

One solution would be to use the net price method to value changes in stock, as there would be no need for discounting as the resources is rent is realized now.

- Changes in stocks

The 1993 SNA defines depletion as the reduction in value of deposits of subsoil assets, natural forests, fish stocks in the open seas and other non-cultivated biological resources as a result of the physical removal and using up of the assets.

The SEEA considers at the physical characteristic of the asset and defines it as: (a) for renewable resources, the part of the harvest, logging, catch etc. which exceeds the sustainable level of resource use; and (b) for non-renewable resources (mineral deposits), the quantity of the resource extracted.

The two definitions are not fully compatible as one looks at the loss in value of the asset caused by human intervention and the other at the permanent physical loss (including of the services provided) by human intervention.

Would you agree with the above SEEA definition of depletion?

In principle, would you agree to have depletion costs deducted from value added of the causing industry as in the current SEEA, even if no consensus is reached within the national accountants on the exact accounting techniques to do so?

The SEEA is a satellite system of the SNA and will not be a standard. We are therefore allowed more degrees of freedom that the 1993 SNA.

What is your opinion on the recent discussion on treating discoveries as a result of production and hence included in the production accounts? What about the treatment of forest and fish which comes into existence as a result of afforestation or expenditures to enhance fisheries? Should we treat these expenditures similarly to land improvement, that is as additions to the value of the land?

In the 1993 SNA and current SEEA mineral exploration, afforestation and expenditures to enhance fisheries, are considered as capital formation of the exploration, forest and fishing industry respectively. However, they do have an impact on the asset. The minimum that the SEEA-2000 should do is to identify this type of expenditures (Chapter 4) and try to link it with the stocks and changes in stocks of the asset. Recent discussion has taken place about the treatment of discoveries, which could be considered as the result of a production process and hence included in the production account.

- Selected natural resources accounts

Natural resources accounts are discussed in terms of the quantitative aspects of the asset, in both physical and monetary terms, and in terms of the qualitative aspects of the assets, in physical terms only. Land and water accounts are the most difficult to standardize as different accounts address different purposes. Core and supplementary accounts were suggested. Core accounts are those accounts that can be standardized and fully develop. Supplementary accounts are those accounts for which there is not enough experience for

standardizing them, or describe qualitative aspects which could be linked with SNA and SEEA concepts.

The following are selected general issues:

Coverage of physical asset accounts?

The coverage of some assets, in particular land and water is very limited in the SNA. To have a better of the relationship between the economy and the environment the economic as well as the ecological aspect of the asset has to be taken into account. However, how far should we go in the description of the qualitative aspects of the asset in order not to lose the link with SNA concepts?

> *Is the content of the land core accounts adequate? Should land use by industry be included as part of supplementary accounts?*

Asset classification:
For subsoil asset and forest an extended CNFA is proposed. For land and water, there is a need for more extended classification.

Some members of the group have proposed a more detailed classification of ecosystem as the notion of ecosystem is still used in a very vague way. In ecology, different hierarchical levels are distinguished (from ecosystem „earth“ to biotopes). However in a strict sense, ecosystems don't exist in reality in an isolated way (problem: fauna). The SEEA should define „ecosystem“ as a unit for statistical or accounting purposes. The suggestion is to use the word ecosystem in parallel to biotopes and to introduce the notion of landscape for spatially connected biotopes (as more heterogeneous units). Forest ecosystems would in this case include forest biotopes. Forest landscapes would include, for example, rivers, small villages, small units of agricultural biotopes, too.

Do you agree that soil should be treated separately? Should it be treated on the basis of the operational manual? Should valuation of soil erosion be included in Chapter 2 or 5?

Should more examples, reporting particular country experience be included?

ANNEX 1

1. Cultivated assets

1.1 Cultivated fixed assets
- 1.1.1 Livestock for breeding, dairy, draught, etc.
  - 1.1.1.1 Livestock (except aquatic animals)
  - 1.1.1.2 Fish stock and stock of other aquatic animals in fish ponds and farms
- 1.1.2 Vineyards, orchards and other plantations of trees yielding repeat products

1.2 Work-in-progress on natural growth products
- 1.2.1 Livestocks raised for slaugther
  - 1.2.1.1 Livestock (except aquatic animals)
  - 1.2.1.2 Fish stock and stock of other aquatic animals in fish ponds and farms
- 1.2.2 Crops and plants of cultivated forests
  - 1.2.2.1 Crops and other produced plants, not yet harvested (work-in-progress)
  - 1.2.2.2 Trees of timber tracts
  - 1.2.2.3 Other plants of cultivated forests

2. Natural resource stock assets

2.1 Sub-soil resources
- 2.1.1 Fossil fuels
  - 2.1.1.1 Proven
  - 2.1.1.2 Speculative
- 2.1.2 Metallic minerals
  - 2.1.2.1 Proven
  - 2.1.2.2 Speculative
- 2.1.3 Non-metallic minerals
  - 2.1.3.1 Proven
  - 2.1.3.2 Speculative
- 2.1.4 Ground water
  - 2.1.4.1 Proven
  - 2.1.4.2 Speculative
- 2.1.5 Other

2.2 Biological resources
- 2.2.2 Timber resources
  - 2.2.2.1 Hardwood
  - 2.2.2.2 Softwood
  - 2.2.2.3 Mixed wood
- 2.2.3 Fisheries resources

2.2.3.1 Pelagic fish
2.2.3.2 Groundfish
2.2.3.3 Shellfish
2.2.3.4 Other
2.2.4 Other biological resources

2.3 Land resources
2.3.2 Urban and built-upon land
2.3.3 Transportation and other networks
2.3.4 Agricultural land
2.3.5 Land for intensive forestry
2.3.6 Recreational land

2.4 Soil

3. Environmental system assets

3.1 Terrestrial systems
3.1.1 Forests
3.1.2 Wetlands
3.1.3 Montane regions
3.1.4 Prairies
3.1.5 Tundra
3.1.6 Other terrestrial systems
3.2 Aquatic systems
3.2.1 Marine
3.2.2 Coastal
3.2.3 Riverine
3.2.4 Lacustrine
3.2.5 Other natural aquatic ecosystems
3.3 Atmospheric systems

Draft Classification for subsoil assets

The following list proposes a four-level classification of subsoil assets. The categories should be adapted to national needs.

The classification levels are constructed in the following way:

- 1st level: The first level is found in annex 5 to SNA under list D: Classification of assets; Tangible Non-produced assets category AN.212, the group ‘subsoil assets’.

- 2nd level: This level may be found in the Annexe D to the present SEEA.

- 3rd level: This is the (4-digit) relevant part of the CPA product classification. The CPA is used in the European union for implementing their SNA version (ESA95) (with the exception for the classification of Natural Gas Liquids).

- 4th level: For metals the classification is the one used in UN Environment Programme: Environmental Data report 1993-94, figure 7.2.

The definitions are supported by reference to the HS (Harmonised system) classifications, in order to give as detailed description as possible.

1. Fossil subsoil assets

1.1	*Coal and lignite, peat*		
	1.1.1	Hard coal	HS 2701.1, 2701.2
	1.1.2	Lignite	HS 2702
	1.1.3	Peat	HS 2703
1.2	*Crude petroleum and Natural Gas Liquids*		
	1.2.1	Petroleum oils and oils from bituminous minerals, crude	HS 2709
	1.2.2	Natural gas liquids	HS 2711.11
	1.2.3	Bituminous or oil shale and tar sands	HS 2714.1
1.3	*Natural gas*		
	1.3.1	Natural gas, in gaseous state	HS 2711.21

Note: In the CPA classification, natural gas and natural gas liquids are grouped together. It is usual, however, to group natural gas liquids together with crude petroleum at an aggregate level. This is done in the UNEP Environmental data report and in the OECD Environmental data compendium (for instance in table 8.1b of the 1997 edition). 'Solids' in UNEP Environmental data report 1993-94 includes hard coal, lignite, peat and oil shale (1.1 + 1.2.3), 'Liquids' include Crude petroleum and Natural gas liquids (1.2.1, 1.2.2), 'Gas' is natural gas (1.3).

2. Metal and other ores

2.1	*Uranium and thorium ores*		
	2.1.1	Uranium and thorium ores	HS 2612
2.2	*Metal ores*		
	2.2.1	Iron ores	HS 2601.1
	2.2.2	Non-ferrous metal ores other than uranium and thorium ores	
		2.2.2.1 Copper ore and concentrates	HS 2603
		2.2.2.2 Nickel ore and conc.	HS 2604
		2.2.2.3 Aluminium ore and conc.	HS 2606
		2.2.2.4 Precious metal ores and conc.	HS 2616
		2.2.2.5 Lead ores and conc.	HS 2607
		2.2.2.6 Tin ores and conc.	HS 2609
		2.2.2.7 Zinc ores and conc.	HS 2608
		2.2.2.8 Manganese ores and conc.	HS 2602

2.2.2.9 Chromium ores and conc.	HS 2610
2.2.2.10 Cobalt ores and conc.	HS 2605
2.2.2.11 Molybdenum ores and conc.	HS 2613
2.2.2.12 Tungsten ores and conc.	HS 2611
2.2.2.13 Vanadium ores and conc.	HS 2615.909 (Eurostat version of HS)
2.2.2.14 Titanium ores and conc.	HS 2614
2.2.2.15 Lithium	(not explicitly referenced)
2.2.2.16 Other ores and conc.	HS 2615, 2617 except 2615.909 and Lithium

Note: It could be desirable to split the group 'precious metals'. On the most detailed level, the CPA aggregates 2.2.2.5-2.2.2.7 and 2.2.2.8-2.2.2.16.

3. Non-metallic mineral reserves

3.1	*Stone, sand and clay*	
3.1.1	Stone for construction	HS 2515, 2516
3.1.2	Limestone, gypsum and chalk	HS 2509, 2518, 2520.1, 2521
3.1.3	Slate	HS 2514
3.1.4	Gravel and sand	HS 2505, 2517
3.1.5	Clays and kaolin	HS 2507, 2508
3.2	*Other minerals*	
3.2.1	Chemical and fertiliser minerals	HS 2502, 2503.001, 2510, 3104.1, 2511, 2527, 2528, 2529.2, 2530.2-2530.9
3.2.2	Salt	HS 2501
3.2.3	Other mining and quarrying products, n.e.c	HS 2714.9, 7102.1, 7102.31, 7103.1, 2513, 7102.21, 2504, 2506, 2512, 2519, 2524, 2525, 2526, 2529.1, 2529.3, 2530.1, 2621

Note: It could be desirable to have a fourth level of classification also for the non-metallic minerals, for instance the one used by The US Bureau of Mines (see their Internet address http://minerals.er.usgs.gov/minerals/pubd/mcs/1997/). No natural aggregation is available for these physical values.

Draft Classification of forestland

2.1.3 Land (with ecosystems and soil)
- 2.1.3.1 Cultivated (economically used) land areas (with connected ecosystems)
  - 2.1.3.2.1 Land underlying buildings and works (includes parks in the city.
  - 2.1.3.2.2 Agricultural land
  - 2.1.3.2.3 Forest and other wooded land
    - 2.1.3.2.3.1 Available for wood supply

2.1.3.2.3.1.1 Coniferous
2.1.3.2.3.1.2 Broadleaved
2.1.3.2.3.1.3 Bamboo
2.1.3.2.3.1.4 Mixed
2.1.3.2.3.2 Not available for wood supply
2.1.3.2.3.2.1 Strictly protected
2.1.3.2.3.2.1.1 Coniferous
2.1.3.2.3.2.1.2 Broadleaved
2.1.3.2.3.2.1.3 Bamboo
2.1.3.2.3.2.1.4 Mixed
2.1.3.2.3.2.2 Under economic restrictions
2.1.3.2.3.2.2.1 Coniferous
2.1.3.2.3.2.2.2 Broadleaved
2.1.3.2.3.2.2.3 Bamboo
2.1.3.2.3.2.2.4 Mixed
2.1.3.2.3.3 Other wooded land
2.1.3.2.4 Recreational and other open land for economic purposes

[*The numbering refers to CNFA as in 1993 SEEA. The link with the classification proposed in Chapter 2 is straightforward. 2.1.3 and all subsequent numbering should be replaced by 2.3]*