



DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS  
STATISTICS DIVISION  
UNITED NATIONS

**ESA/STAT/AC.108**  
UNCEEA/Prelim/9

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**Preliminary Meeting of the UN Committee on  
Environmental-Economic Accounting  
New York, 29-31 August 2005  
Two United Nations Plaza  
Conference Room 23<sup>rd</sup> floor**

**RESEARCH AGENDA  
ENVIRONMENTAL-ECONOMIC ACCOUNTING  
A CONSOLIDATED LIST OF ISSUES**

## Introduction

With the objective of the Committee to elevate the SEEA to an international statistical standard on environmental-economic accounting, the advancement of methodologies in environmental-economic accounting is an important element of work for the Committee.

The handbook of national accounting *Integrated Environmental and Economic Accounting 2003 (SEEA-2003)* has been issued as a white cover publication and will be published by five international agencies, namely the United Nations, the European Commission, the International Monetary Fund, the Organisation for Economic Co-operation and Development and the World Bank. The SEEA-2003 represents a major step forward in the harmonization of concepts and methods in environmental-economic accounting. However, it is not a statistical standard. In those cases in which there is consensus, the SEEA-2003 reports best practices. In those cases in which a variety of approaches exist, the SEEA-2003 presents a list of options, including a discussion on advantages and disadvantages of each option.

Since the issuing of the SEEA-2003, countries have gained further experience in the implementation of environmental-economic accounting. They have expressed the need to reach a consensus on some of the unresolved issues in the SEEA-2003 as well as on furthering research in new and emerging issues (e.g. measurement and valuation of ecosystems, etc.).

As a first step in developing a research agenda, a preliminary list of issues has been compiled on the basis of contributions received by countries and organization that were the major contributors of the SEEA-2003. Further input will be requested from both producers and users of environmental accounts. National accountants, balance of payments, financial and government statisticians will also be consulted with the objective of ensuring consistency with major standards like the 1993 SNA, Balance of Payments Manual – Fifth Edition (BPM5) and Government Finance Statistics (GFS) which are presently under review as well as of seeking their views on outstanding issues that were not solved during the revision processes because of time constraints. All issues regarding the update of the 1993 and the revision of BPM5 and GFS would have to be solved by the end of 2006.

Although the present list of issues is not exhaustive, it will nevertheless facilitate the discussion of the Committee in setting priorities, mechanisms for bringing forward the various issues, consultation processes and potential time lines.

The present issue list has been structured by chapters of the current SEEA 2003. Also consideration has been given to the policy relevance for environmental purposes when grouping the issues. For instance, new emerging aspects in the environmental-economic context such as international trade in emission schemes, waste and energy are taken into account. In the future, other criteria, such consistency with major statistical standards, for inclusion of issues in the research agenda might be added.

## **CHAPTER 3 - PHYSICAL FLOW ACCOUNTS (Statistics Denmark)**

### *1. Material Flow Accounts*

Material Flow Accounts concepts are in some cases not consistent with those of the national accounts. Differences between the two approaches should be elaborated and, when possible, consistency with the national accounts principles should be advocated. When it is not possible to achieve full consistency with the national accounts because of specific users' needs, bridge tables showing the differences between the SEEA and MFA should be developed.

### *2. Economy Wide Material Flow Accounting*

Economy Wide Material Flow Accounts present two aggregation issues: (a) aggregation across industries; and (b) aggregation over products. Industrial breakdown and thus the use of SUTs and I-O should be advocated for the derivation of MFA indicators. Should a single indicator of economy wide MFA be derived? Should standard aggregation methods of material/physical flows to assess the different impacts on the environment be developed so as to obtain a limited set of aggregated indicators, which would be more policy relevant?

## **CHAPTER 4 – HYBRID FLOW ACCOUNTS (Statistics Netherlands)**

### **Waste accounts**

#### *3. Waste accounts*

The terminology and classification of waste and waste products differ across countries. There is a need for standardizing methodologies to compile waste accounts and for harmonizing concepts and definitions used in waste statistics and waste accounts. The European Union Waste Statistics Regulation could serve as a starting point for developing waste categories, waste treatment methods and industrial classifications for the waste accounts.

#### *4. Link between waste accounts and MFA accounts*

Full MFA accounts include implicitly also the amounts of waste generated by the economy. Further, MFA accounts based on physical supply-use tables can be used to estimate the amounts of waste. Experiences with these links are so far quite limited and research into this field could be interesting.

### **Energy accounts**

#### *5. Energy statistics and energy accounts*

The SEEA-2003 does not elaborate in detail the compilation of energy accounts, although it reports the example of the Danish energy accounts. There is a lot of experience in the compilation of energy accounts, which are compiled on a regular basis by many countries. However, issues of consistencies of definitions and classifications used in energy statistics and accounts need to be addressed. Energy statistics and energy

accounts differ, for example, in the following situations: (a) treatment of energy use of non-residents and of residents abroad; and (b) allocation of energy uses by mobile sources. There is a need to elaborate the differences in concepts and definitions between energy statistics and accounting and to reconcile the two approaches. In cases in which both information compiled by the energy accounts and energy statistics is needed by the users, bridge tables should be developed.

*6. Link between SEEA accounts and Kyoto protocol inventories and other policy relevant concepts* (Statistics Norway)

There is a lot of political interest in developing emission accounts, especially of greenhouse gases, to respond to the demands of the Kyoto protocol. The energy accounts use the SNA framework and thus the concept of residence which differ from the concept used in the data needed to monitor the implementation of the Kyoto protocol. For example, emissions from mobile sources that take place outside the territory by resident units (e.g. emissions from ocean shipping by national ships abroad), are not included in the Kyoto aggregates. The energy accounts instead are particularly helpful to allocate the emissions from mobile sources. Users need information according to the SNA concepts and the Kyoto protocol requirements. Some countries already compile such bridge tables and however, standardized bridge tables should be developed so as to ensure that both users needs are met and avoid unnecessary duplication of work.

*7. Renewable energy resources*

Renewable energy resources (e.g. hydropower, solar energy, biofuels etc.) are becoming increasingly important. Several National Statistical Offices are developing statistics to include renewable energy in their energy statistics. Methodology should be developed to expand the energy accounts to include renewable energy so as to link this information to the economic variables.

**CHAPTER 6 – ACCOUNTING FOR OTHER ENVIRONMENTAL RELATED TRANSACTIONS** (Statistics Sweden)

*8. Environmental taxes and subsidies*

Environmental taxes and subsidies are broadly defined in the SEEA-2003. Recently OECD and Eurostat have tested a definition of environmental taxes in several countries. There is a further need to standardize the definitions of environmental taxes and subsidies keeping also into consideration the practical implementation of these concepts.

*9. Permits to access the resources (e.g. fishing and water rights) and emission permits*

There is a need for further development and standardization of concepts and methods for the recording of permits within the national accounts and balance of payments manual. The issue has to some extent been discussed by the Canberra II group but it could be useful to collect actual experiences and to add the perspective of environmental accountants and the environmental/physical dimension of permits in the discussion. The recent introduction of CO<sub>2</sub> emission trading scheme as a result of the Kyoto protocol will

without doubt increase the users demand for this type of information, which will be used for making analysis.

## **CHAPTER 7 ASSET ACCOUNTS AND THE VALUATION OF NATURAL RESOURCE STOCKS**

### **CHAPTER 8 SPECIFIC RESOURCE ACCOUNTS**

#### **Mineral Accounts** (Statistics Denmark and UNSD)

##### *10. Definition of physical reserves*

The terminology and classification used for physical reserves differs across countries. One issue is whether it is possible to aggregate over the different reserves (e.g. proven, probable and possible on the basis of probability of existence, etc.)? Should renewable energy resources be included in the accounts in terms of stocks?

##### *11. Valuation of stocks*

The net present value method has been identified as being the preferred method as compared to the appropriation method. Issues on how to implement the NPV method still remain unsolved. They include, e.g.:

- Calculation of the capital services on natural resources (i.e. resource rent): Should taxes and subsidies be included in the calculation of the resource rent? What rate of return to capital should be used? How to implement the capital service approach in this context by identifying the produced and non-produced assets in production? How should the resource rent be allocated to different products in case of joint production (e.g. in the case of a mine which produces silver and copper)? How to deal with heterogeneity (different quality and costs) of the reserves? How to deal with fluctuations in resource rents over relatively short periods of time? How to deal with negative resource rents (e.g. should a moving average be recommended)?
- Calculation of NPV? What discount rate to choose? How to calculate the lifetime of the reserve?
- How can constant price valuation of assets be obtained (e.g. using GDP deflator, constant rent from base period, etc.)?

##### *12. Valuation of changes in stocks and, in particular, depletion*

The following options have been put forward in the SEEA-2003. They include (SEEA-2003 Box 10.8):

- Option E1 Is consistent with the SNA. This records the value of the depletion in the other changes in asset account.
- Option E2 Partitions the actual payment into two elements. The part which corresponds to the decline in value of the asset is recorded as a capital transfer from the user to the owner as recompense for the decline in the asset's value; the rest is recorded as property income (rent) payable from the user to the owner in the distribution of primary income account.

- Option E3 Maintains the recording of the actual payment from the user to the owner as property income in the distribution of primary income account but treats this as rent gross of depletion. An element for the consumption of natural capital is shown in this account for the owner also to reduce the rent to a value net of depletion.
- Option E4 It is similar to option E3 but assumes that the consumption of natural capital allows for the discoveries made during the year as well as the extraction.

More discussion should take place to reach an agreement on the recording of depletion in the SEEA.

*13. Decommissioning costs and recording ownership of mineral-related assets*

The SEEA-2003 suggested more than one option in recording decommissioning costs and recording of ownership of mineral-related assets. The Canberra II group and the AEG have agreed with changing the current SNA treatment of decommissioning costs. The SEEA will have to be updated to reflect the changes in the 1993SNA Rev.1.

*14. Extension of the methodology used for oil and gas accounts to other mineral resources*

Most of the methodological work as well as compilation of mineral accounts has focused on oil and gas. Would the methods for, say calculating the resource rent, valuing the stocks, etc. be applicable also for other mineral resources?

*15. Confidentiality and the compilation of minerals and energy resources*

Several countries have raised the issue that although information on stocks is often available, it should be treated as confidential. Further international guidelines have to be made on how to deal with confidential information when compiling and publishing mineral accounts.

*16. Inclusion of financial wealth related to natural assets in the SEEA asset boundary (Statistics Norway)*

This issue is raised in the context of mineral accounts because in some countries a large portion of the national wealth generated by the extraction of mineral resources is invested in financial assets. For analytical purposes, the changes in wealth of a country from the exploration of mineral assets should reflect non-produced, produced and financial assets (e.g. Norwegian oil fund).

*17. Resource rent and “specific” taxes and subsidies (for example on oil extraction) in the national accounts (Statistics Norway)*

There is a question of whether these “specific” taxes should be treated as general taxes and thus excluded from the part of the resource rent that the government captures (as recommended by the SEEA-2003) or they should be treated as royalties. Here consistency with the GFS should be sought.

## Water accounting (UNSD)

### *18. Treatment of water in artificial reservoirs as a produced asset*

Considerable money is spent to build dams to retain the water from flowing downstream to the sea. Also, continuous control and management of the water resources is exercised both in the case in which the water is used for abstraction, purification and distribution, or for other uses such as hydro-electric power generation. Therefore, in line with the definition of cultivated assets in the SEEA and now agreed in the SNA revision process<sup>1</sup>, water in the reservoirs should be considered a produced asset. In parallel with the treatment of natural growth of cultivated forest and fish as produced asset, precipitation and inflows of water in the reservoirs should be considered as capital formation. As a result, water in the reservoir should be added to the classification of produced asset.

### *19. Treatment of illegal tapping*

In many countries, especially developing countries, illegal connections to the water distribution network from households and industries is frequent. The question is how to treat illegal tapping in the water accounts and, more in general, in the national accounts. The following two options come to mind:

- Water used as a result of illegal tapping could be considered a loss and thus included as part of water consumption. In this case, the flows in the physical supply and use table (PSUT) would correspond to the flows in the monetary SUT, but, for example indicators of water efficiency by industry would be misleading. Also, whom should the water consumption be allocated to? To the industry that collects, purifies and distribute water (ISIC 41)?
- Water used as a result of illegal tapping could be allocated to the end user. In this case, the production of water by (ISIC 41) is a legal activity but consumption is illegal. While the SNA discusses the treatment of illegal production (e.g. drugs), it does not explicitly mentions how to treat illegal consumption. If we allocate the water used as a result of illegal tapping to the users, the following questions arise: what value for the production of water should be used (e.g imputed at purchasers' price)? Should we impute some type of transfer from say ISIC 41 to the households or industries? How should these transfers be classified? (They cannot be social transfer as they are from a corporation to household)

### *20. Valuation of water*

Water is increasingly a scarce resource. International agreements such as the Johannesburg Plan of Implementation, the Water Framework Directive, etc. recognize that water is an economic good. How to value water in national accounts framework? A proposals of valuing water as a mineral asset and, in case this is not feasible using

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<sup>1</sup> Cultivated assets are defined as: “livestock for breeding, dairy, draught, etc. and vineyards, orchards and other trees yielding repeat products **whose natural growth and/or regeneration is** under the direct control, responsibility and management of institutional units. (SEEA -2003 para 7.58)

payments for water rights as proxy has been put forwards during the update of the 1993 SNA. The issue of water valuation has to be further considered.

### *21. Quality accounts*

Quality accounts are still experimental. They are important because water quality limits the use of water by the economy and the economy impacts the quality of water. However there are several measurement issues. Water quality is highly variable over time and space. The question is what aspects of water quality can be meaningfully presented in an accounting framework. How should quality classes be defined? How to aggregate across pollutants to obtain a quality index? How to aggregate over space and over time? What is the link between changes in quality of water and emissions?

### **Land** (Statistics Denmark)

### *22. Land valuation*

The 1993 SNA recommends, whenever possible, valuing the land separate from the building which lies on it. If the value of the buildings based on the perpetual inventory method calculation is deducted from the value of the combined asset, the land value captures all the market fluctuations and, in the cases in which there are big capital losses, it can be negative.

## **CHAPTER 9 VALUATION TECHNIQUES FOR MEASURING DEGRADATION CHAPTER 10 MAKING ADJUSTMENTS TO THE FLOW ACCOUNTS**

(Federal Statistical Office Germany)

### *23. Valuation of degradation*

The SEEA-2003 presents three approaches for the valuation of degradation, namely the damage cost, the maintenance cost and the modeling approach. The three methods represent different concepts and philosophical approaches to analysis. Although further research in this area would certainly promote a standardization process, which is needed, it does not seem plausible that these approaches can be reconciled. There is very little practical experience in the valuation of degradation in an accounting context. To date only few countries have experimented with the techniques recommended in the SEEA and no country has implemented the three approaches and compared the results in relation to environmental accounting. It is therefore suggested to adopt a pragmatic approach and put in place some pilot studies to experiment with the various approaches.

## **CHAPTER 11 – APPLICATIONS AND POLICY USES OF THE SEEA (All)**

### *24. Uses of the accounts*

The SEEA-2003 presents examples of how the accounts can be used for monitoring performances and for more analytical purposes. Examples of indicators as well as other ways to disseminate the results of the accounts (e.g. environmental-economic profiles, etc.) are presented. There is a general consensus of the need for developing additional standard dissemination techniques as well as for “educating” the users to the potential of



using the accounting approach for analysis and policy making. Linking the accounts to the indicators, including millennium development goals indicators, sustainable development indicators, will increase the policy relevance of the accounts and make them more “visible”. Moreover, there is a need to provide further guidance and examples on how to use the accounts for modeling (e.g. scenario modeling, decomposition analyses, etc.).

## **OTHER ISSUES**

### *25. Expansion of the SEEA to social aspects (Statistics Sweden)*

The SEEA-2003 addresses the inter-relationship between the economy and the environment. It does not cover the social aspect. It has been argued by some commentators that in order for the SEEA to be considered as the framework to measure sustainable development, it should be expanded to include the third pillar of sustainable development. In particular, the following three issues could be addressed in the expansion of the SEEA to include social aspects:

- (a) socio-economic issues already included in the national accounts, such as employment, education, gender, income, etc.;
- (b) socio-economic issues such as sickness caused by environmental degradation, work environment, traffic accidents, number of people with access to safe drinking water and sanitation, etc.
- (c) social issues which are important to measuring sustainable development in general sense only loosely linked with the economic or environmental spheres such as poverty, sickness, threat of violence, unemployment, etc.

### *26. Measurement of ecosystems (European Environment Agency)*

The SEEA-2003 in Chapter 8 – Section F describes the land and ecosystem accounts. It presents the basic accounts and supplementary accounts. The basic accounts are a standardized approach to land accounting and describe the interface between land use and land cover. Supplementary accounts are issue-oriented and take into account national and regional consideration and thus do not use standard classifications. At the time the SEEA-2003 was written there was little experience in the compilation of such accounts. However, measurement of ecosystems is becoming increasingly an area of interest by policy makers. The SEEA-2003 can offer the framework for building an information system to measure ecosystems, in particular in terms of bringing together information from different sources and harmonizing definitions and classifications used by different data collection activities (e.g. space agencies, environmental information systems available at the country and international levels, etc.). More practical and methodological work is needed in this area.

## **PRACTICAL GUIDELINES**

### **Ongoing activities:**

**Water accounts** (UNSD – expected end of 2005)

**Material Flow Accounts** (OECD, EEA)

## Mineral Accounts (Statistics Denmark and UNSD)

### Suggested new guidelines:

#### **Physical Input-Output Tables (PIOTs)** (Suggestion by Statistics Denmark)

PIOT's are described briefly in SEEA 2003, but a more elaborated description of how PIOTs can be constructed and used would be useful. Also analysis of how PIOTs can be used should be developed. New insights and analysis on advantages and disadvantages of PIOTs (in contrast to monetary IO) that have been developed recently should be taken into account.

### QUESTIONS TO THE COMMITTEE

- (a) *Does the Committee think that a revision of the SEEA-2003 should be envisaged? What is the opinion of the Committee of the following tentative timeline?*
- 2005-2007 Consultation process on the research agenda*
- 2006-2008 Address issues on the research agenda*
- 2008-2010 Writing the SEEA-2003*
- (b) *What is the Committee's opinion on the consultation process to develop the research agenda?*
- i. Should a "call for issues" be widely distributed?*
- ii. Who should be consulted (e.g. national and environmental accountants, environment statisticians, balance of payments, financial and government statisticians, users of environment statistics and accounts)?*
- (c) *What is the opinion of the Committee on criteria for inclusion of issues in the research agenda (e.g. new and emerging issues, consistency with major statistical standards, etc.)?*
- (d) *Does the Committee agree with the on-going activities in developing practical guidelines? What should be the priority areas for developing guidelines in the future?*