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Recommendations for Revision of SEEA

The Recommendations Made by the United Nations Committee of Experts on Environmental-Economic Accounting (UNCEEA) for the Revision of SEEA, 2003

Prepared by the SEEA Revision Editorial Board

Introduction

1. This paper provides detail regarding specific recommendations for Volume 1 of the revised SEEA. The process for developing these recommendations has been outlined in the Report of the Committee of Experts on Environmental-Economic Accounting to the Statistical Commission at its forty-second Session in February 2011 (E/CN.3/2011/7). The recommendations will set directions in a large number of areas for the drafting of the text of the revised SEEA Volume 1. The final text of the revised SEEA Volume 1 is to be presented to the Statistical Commission at its forty-third session in February 2012 after the completion of global consultation processes.

2. Twenty-one issues were identified as being the primary issues for consideration in the revision of the SEEA Volume 1 and recommendations on all except one issue are presented in this paper. A verbal update on progress in finalising recommendations associated with the one outstanding issue concerning the treatment of emission permits will be provided at the UNSC meeting.

3. Considerable efforts have been made to ensure internal consistency of the recommendations. Nevertheless there remain some issues of consistency between the recommendations that will be worked through in the drafting process. This was to be expected as each issue has been investigated and considered relatively independently over the past 3-4 years. As well there are some specific areas in which particular focus must be placed to ensure a full articulation of the relevant concepts and definitions can be provided. These areas include

- The definition and scope of environmental activities and the determination of environmental purpose
- The explanation and advice provided regarding the valuation of natural resources using net present value approaches
- The definition and classification of physical flows between the economy and the environment particularly in relation to emissions, waste and other residual flows.
- The definition of the physical production boundary particularly as it relates to the treatment of cultivated biological resources such as livestock, trees and crops.
- The definition of the SEEA asset boundary with particular regard for the asset boundary for SEEA Volume 1.
- The appropriate accounting entries when the ownership and use of natural resources is split between economic units.

4. A number of the recommendations relate to classifications relevant to environmental accounting. It has not been possible to finalise the details of these classifications although significant progress has been made on defining the scope, underlying principles, concepts and broad structures that are reflected in the recommendations presented in this paper. The finalisation of the classifications will take place during the next phase of the SEEA revision process and will be undertaken in consultation with the UN Expert Group on Social and Economic Classifications.

5. The paper is structured to provide a brief background to each issue (including separate reference to sub-issues as appropriate) followed by specific recommendations. Endorsement of the recommendations by the Statistical Commission is sought.

Issue #1: Harmonization of MFA with SEEA concepts

Issue Description
An important area of environmental accounting is the measurement of economy wide material flows (EW-MFA). This area of accounting differs from general physical flow accounting and accounting for flows of energy and water. Methods have been developed for EW-MFA but in certain areas they differ from the accounting approaches as presented in the SEEA-2003. For the revision of the SEEA the differences between EW-MFA methods and SEEA-2003 should be investigated in three specific areas: (i) the treatment of the growth of cultivated biological resources; (ii) the treatment of consumer durables; and (iii) the treatment of controlled landfills.

The following recommendations are made in relation to the harmonization of EW-MFA methods within the revised SEEA:

(i) That for the purposes of EW-MFA accounting described in the SEEA the harvest approach should be used to define the physical production boundary for cultivated biological resources consistent with the methods used for EW-MFA accounting. It is accepted that this recommendation regarding EW-MFA is an exception from the general SEEA treatment concerning the treatment of cultivated biological resources that is defined in relation to Issue #2.

(ii) The stock of consumer durables in physical terms should be included as a memorandum item to better understand the relationship between the use of consumer durables and emissions that occur after their operating life. This will not require any changes to the physical or monetary supply and use tables.

(iii) That controlled landfills should be considered as operating within the production boundary and hence flows into controlled landfills should be considered as flows between economic units. Flows from controlled landfills may be to other economic units or to the environment.

Issue #2: Classification of physical flows

Issue Description
The SEEA-2003 distinguishes between four types of physical flows: ecosystem inputs, natural resources, products and residuals. Ecosystem inputs and natural resources constitute flows from the environment to the economy. Products are flows within the economy and are classified according to CPC. Residuals cover both flows within the economy and from the economy to the environment. Furthermore, the definition of waste covers both products (with positive value) and residuals (with zero and negative value). The revised SEEA needs to define all of the relevant flows clearly and also outline the high-level classifications for the different inputs, products and residuals.

The following recommendations are made in relation to the definition and classification of physical flows in the revised SEEA. It is noted in relation to the following recommendations that the finalisation of terms and detailed aspects of definition and classification will be completed during the next phase of the SEEA revision process and will be open for global consultation when draft chapters of the revised SEEA are circulated for comment. The recommendations for this issue thus provide a direction for the revised SEEA rather than final conclusions on the issues.

(i) That natural inputs from the environment into economic production processes should be comprised of natural resources, non-fuel energy inputs (such as solar energy, hydro energy and geothermal energy), ecosystem inputs (such as oxygen and nitrogen) and unused resources from extraction processes (such as excavated soil and by-catch from fishing).

(ii) That products should be treated consistently with the 2008 SNA recognising (i) the need to account for physical flows associated with own account production and (ii) that products in the 2008 SNA have a positive economic value.

(iii) That residuals should be defined as comprising materials and energy (primarily in the form of residual heat) that are discarded or emitted. They may be discarded or emitted direct to the environment or be captured, recycled or reused by economic units.

(iv) That the physical flows associated with the growth of cultivated biological resources is considered the result of a production process within the SNA production boundary. An exception to this general treatment is recommended where economy wide material flow accounting is being undertaken (refer to Issue #1).

(v) That definitions of waste, wastewater, emissions and return flows should be provided. The definition of waste should include all materials collected by, or delivered to, a waste collection scheme and all materials discarded direct to the environment. Further clarification should be provided on the definition of waste that requires treatment before return to the environment following the model of the European Waste Framework Directive.

(vi) That products should be classified using the Central Product Classification (CPC) and high-level classifications should be developed as appropriate for natural inputs and residuals.

(vii) For classifying energy products two classifications are currently used: the CPC and the Standard International Energy Classification (SIEC) as presented in the International Recommendations on Energy Statistics. It is recognized that the use of two classifications is an issue for the integration of data for environmental-economic accounting. It is expected that this issue will be given the highest priority by the UN Expert Group on Classification.

(viii) That waste should be classified using CPC where the waste satisfies the definition of a product and using the EWC-Stat classification otherwise.

Issue #3a: Bridging energy accounts and energy balances

Issue Description
Energy statistics, energy accounts and energy balances are interrelated areas of information on energy. In principle energy statistics should serve the purpose of providing basic data for both energy accounts and energy balances. However since energy accounts and energy balances have been developed for different purposes in different contexts it has meant that directly comparing the information in the two datasets is not straightforward even though the same underlying energy statistics are often used. Therefore, there is a need to identify the relationships between concepts and terms used in these fields of measurement to ensure that statistical bridges can be constructed between different but closely related datasets. The main differences are the use of the territory principle in energy statistics and the residence principle in energy accounts and the definitions of transactions (e.g. supply, imports and exports are

defined differently). The revised SEEA should consider how best to describe the relationship between these related sets of statistics.

It is recommended that the revised SEEA describe the conceptual differences between energy accounts and energy balances (consistent with the description provided in the International Recommendations on Energy Statistics) with a focus on explanation of the differences between their scope, structure and data sources.

In addition the revised SEEA should explain the basic principles of bridge tables that allow compilers and users to understand the conceptual relationships between related datasets.

Issue #3b: Boundary issues in air emission accounts

Issue Description
The estimates of emission inventories follows the methodology developed by the IPCC that differs from the methods used to compile air emission flow accounts. For the revised SEEA a clear articulation of the boundary for air emission accounts is required taking into consideration the methods used to estimate emission inventories. It is noted that IPCC based emission inventories cover only greenhouse gas emissions whereas the SEEA air emission accounts should encompass all types of air emissions.

The following recommendations are made in relation to the boundary to be used for air emission accounts:

(i) Accumulation of carbon in living biomass should only be recorded in the forest asset accounts in relation to timber resources.

(ii) Air emissions should only be included when they are the direct result of economic production, accumulation or consumption. This scope includes emissions due to digestion (primarily methane) from cultivated livestock. Emissions from natural processes such as unintended forest and grassland fires and human metabolic processes should be excluded. Secondary emissions that occur when emissions from economic production or consumption combine in the atmosphere to create new substances should also be excluded.

(iii) Air emission accounts should record both emissions direct to the environment and emissions transferred between institutional units. Emissions transferred may include emissions captured for further treatment before release to the environment or emissions captured for long term storage. Air emissions that are released from storage and controlled landfill facilities that are not transferred to other economic units should be considered as emissions direct to the environment.

(iv) Emissions from capital equipment and consumer durables should be recorded as they take place over the operating life of the item noting that, in some cases, the most significant emissions are likely to take place at the time of discarding the item.

Issue #4: Renewable energy

Issue Description
Renewable energy has become increasingly important. The SEEA-2003 did not include any detailed consideration of renewable energy. Because of the high policy relevance, it is important that the recording of renewable energy in the physical and monetary flow accounts is addressed in the revised SEEA. Some have also argued that renewable energy should also be included in the asset accounts, whereby the stock is represented by the potential of renewable energy that is expected to be extracted depending on the technology.

The following recommendations are made in relation to accounting for renewable energy in the revised SEEA:

(i) Only energy that has been captured should be within scope of the SEEA thus excluding potential energy that may be captured in the future. The physical stock of renewable energy (e.g from wind, solar, hydro) should therefore not be included in the classification of natural resources or in asset accounts.

(ii) The value of renewable energy resources should be captured in the values of the underlying environmental assets (primarily land and water) on which mechanisms to capture the energy are built – for example wind turbines.

(iii) The partitioning the value of renewable energy resources from the underlying environmental assets should not be recommended as standard practice. However, given the high interest in information on energy from these sources it is recommended that where estimates of the value can be made and where recording of the physical flows of renewable energy are of interest these should be recorded as memorandum items to the SEEA asset classification. This recommendation applies to energy from hydroelectric sources and from other renewable energy sources.

Issue #5: Environmental goods and services sector (EGSS)

Issue Description
The environment sector consists of activities that produce environmental products to measure, prevent, limit, minimize or correct environmental damage to water, air and soil, as well as problems related to waste, noise and ecosystems. This includes cleaner technologies, products and services that reduce environmental risk and minimize pollution and resource use as well as activities related to resource management, resource exploitation and natural hazards. The environment sector cuts across conventional industrial classifications and therefore makes the data collection difficult. Recommendations concerning the environment sector should be incorporated in the revised SEEA.

The following recommendations are made in relation to the definition of an Environmental Goods and Services Sector (EGSS) in the revised SEEA:

(i) Relevant definitions and accounts for an EGSS should be described in the SEEA and should be consistent with the 2008 SNA concepts and definitions.

(ii) The term “sector” rather than “industry” should be adopted in the SEEA in line with the approach taken by ISIC to call alternative aggregation of economic activities, sectors (e.g. ICT sector, etc.)

(iii) The size of the EGSS should be defined with a scope equal to the production of environmental goods, technologies and services for the purposes of environmental protection and resource management. While the boundary might be extended to include other environmental activities listed in the SEEA-2003, most notably resource use activities, it is considered that the inclusion of resource use (for example mining activities) within the scope of an EGSS would reduce the relevance of the statistical material within an EGSS.

(iv) Only those environmental goods, technologies and services whose main purpose is environmental protection or resource management should be included. In determining the main purpose it is recommended that the primary focus should be on the technical nature of the product rather than on user or producer intentions. Advice on how the technical nature should be assessed will be included in the SEEA.

(v) Standard classifications relating to environmental protection and resource management activities should be used.

Issue #6: Environmentally related taxes

Issue Description
Environmental taxes are economic instruments that are increasingly being used. The SEEA-2003 provides a definition for environmental taxes. This definition should be revisited taking into consideration the use of the term "environmental taxes" in the policy purpose. A taxonomy of these taxes should be developed as well as mapping of what is considered environmental taxes and their terminology and recording in the 2008 SNA.

The following recommendations are made in relation to environmentally related taxes in the revised SEEA:

(i) A framework encompassing all environmentally related payments to government should be presented in the revised SEEA. The framework should include environmentally related taxes, rent, fees, penalties, fines and other payments relating to the use of assets owned by general government based on the definition of these transactions in the 2008 SNA.

(ii) The definition of an environmentally related tax should be "a tax whose tax base is a physical unit (or a proxy of it) of something that has a proven, specific negative impact on the environment".

(iii) Four categories of environmentally related taxes should be defined in the SEEA, namely energy taxes, transport taxes, pollution taxes and resource taxes. Within these categories taxes on sulphur should be categorised as pollution taxes.

(iv) Where the tax base of a VAT includes an environmentally related tax, the relevant proportion of the VAT should be included as part of environmentally related taxes.

(v) A standard list of environmentally related tax bases will not be recommended in the revised SEEA

Issue #7: Environmentally related subsidies

Issue Description
The SEEA-2003 does not provide a definition for environmental subsidies. A definition as well as a taxonomy of what constitute environmental subsidies and their recording in the 2008 SNA should be developed.

The following recommendations are made in relation to environmentally related subsidies and similar transfers in the revised SEEA:

(i) The scope of the transactions to be considered should be defined by the following 2008 SNA transactions: subsidies, social benefits to households, other current transfers, investment grants and other capital transfers.

(ii) Since the scope of these transactions is much broader than subsidies and given the specific meaning of subsidies in the 2008 SNA it is recommended that the term "environmentally related subsidies and similar transfers" be used to refer to the complete set of transactions of interest.

(iii) It is recommended that the environmentally related nature of this group of transactions should be based on whether the purpose of the transaction is for environmental protection or resource management. The SEEA will provide guidance on how this purpose should be determined. The transactions should be classified following standard economic classifications, such as ISIC.

(iv) In order to ensure that the definition of environmentally related subsidies and similar transfers is defined clearly the SEEA should discuss, but not define for measurement purposes, the concept of potentially environmentally damaging subsidies (PEDS). Without such a discussion it is possible that compilers may include transactions not consistent with the proposed definition or include implicit subsidies, such as the estimated value of preferential tax rates. Implicit subsidies are not transactions in the 2008 SNA since their value is not reflected in a transaction between economic units and hence they are outside the scope of the recommended definition and are excluded from the SEEA.

(v) The measurement framework for environmentally related subsidies and similar transfers should include transactions between all sectors, with special regard given to payments from general government and supra-national agencies.

Issue #8b: Emission permits

Issue Description
With the increased attention to climate change and different mechanisms being put in place, there is a need to discuss how to record the emission permits in the revised SEEA. The 2008 SNA recommends treating the payments for emission permits as taxes, and once acquired, as assets of the permit holder valued at their market price. Nonetheless a number of accounting issues remained unresolved from the 2008 SNA process. The revised SEEA should consider the outcomes from discussion among the national accounts community to resolve these issues and also consider whether any additional information is required in a SEEA context.

Global consultation on this issue has not been completed and therefore no recommendations can be presented in this paper. The work on this topic is being co-ordinated with work underway under the auspices of the Inter-Secretariat Working Group on National Accounts (ISWGNA). In early December 2010 the ISWGNA reached conclusions on the treatment of emission permits for the 2008 SNA and these outcomes are currently being communicated to the broader national accounts community through the SNA News and Notes.

Issue #9:Classification of natural resource use and management activities and expenditures

Issue Description
The SEEA-2003 presents the Classification of Environmental Protection Activity (CEPA). CEPA does not cover natural resource use and management activities and expenditures. Development of separate classifications for natural resource use and management activities and expenditures should be considered.

The following recommendations are made in relation to the classification of natural resource use and management activities and expenditures:

(i) There should be an integration of classifications regarding environmental activities within an overarching Classification of Environmental Activities (CEA). The CEA should be composed of three parts: a part covering environmental protection activities, a part covering resource management activities and a part covering resource use activities. All three parts must be distinguished at the highest level of the classification.

(ii) The scope of the parts of the CEA concerning resource management and resource use should be limited to activities concerning non-produced resources.

Issue #10: Classification of assets

Issue Description
The SEEA-2003 presents a classification of assets and its links to the 1993 SNA classification. Because of the changes in the classification in the 2008 SNA there is a need to revisit the asset classification. Furthermore, environmental assets are not clearly defined in the SEEA-2003. A definition should be developed, taking into account the changes in the definition of economic assets in the 2008 SNA.

The following recommendations are made in relation to the definition and classification of assets in the revised SEEA. It is noted in relation to the following recommendations that the finalisation of terms and detailed aspects of definition and classification will be completed during the next phase of the SEEA revision process and will be open for global consultation when draft chapters of the revised SEEA are circulated for comment. The recommendations for this issue thus provide a direction for the revised SEEA rather than final conclusions on the issues.

(i) The general definition of assets in the revised SEEA should include entities that can or could provide benefits to humanity now or in the future. The asset boundary set by this definition should be restricted to define the asset boundary to be used in SEEA Volume 1. For Volume 1 the asset boundary should be constructed as an extension of the asset boundary of the 2008 SNA with the extension pertaining to individual natural

resources. The extension should incorporate those individual natural resources (such as land and forests) that can or could provide economic benefits to humanity now or in the future. The Volume 1 asset boundary should also be described in physical and monetary terms with particular consideration of those entities that may have zero or negligible monetary value in the current accounting period. The Volume 1 asset boundary should exclude ecosystems. The measurement of these entities should be discussed in SEEA Volume 2.

(ii) The SEEA asset classification in Volume 1 should distinguish between "Land and associated surface water", "Cultivated biological resources" and "Natural resources" at the highest level of the classification.

(iii) Within the category "Natural resources" the following asset classes should be distinguished: "Mineral and energy resources", "Water resources", "Natural biological resources", and "Soil resources". These resources should be defined in a manner consistent with the general definition of assets.

(iv) Cultivated biological resources should be defined in a manner consistent with the 2008 SNA. Natural biological resources should be defined as all biological resources except cultivated biological resources.

(v) That the revised SEEA should align to the 2008 SNA concerning the treatment of assets. These revisions relate to changes in terminology, the classification of contracts, leases and licences, the treatment of land improvements, and the treatment of costs of ownership transfer.

Issue #11: Categorization of mineral and energy resources

Issue Description
The SEEA-2003 provides a categorization of energy resources based on the geological and economic characteristics of the deposits, into proven, probable and possible. This categorization is based on the McKelvey box. More recently, the United Nations Framework Classification for Fossil Energy and Mineral Resources (UNFC) - a new classification for energy and mineral resources - was endorsed by the United Nations Economic and Social Council (ECOSOC) which recommended its application worldwide. The UNFC, in addition to the geological and economic characteristics of the deposits, introduces a third dimension, which is linked to the project feasibility. The revised SEEA should consider the development of a categorization of resources in line with the UNFC.

The following recommendations are made in relation to the categorization of mineral and energy resources in the revised SEEA:

(i) That the categorization of mineral and energy resources should be based on the definitions and guidelines of the UNFC-2009.

(ii) The scope of mineral and energy resources should be defined as Known deposits consisting of Commercially recoverable resources: "Proven" (Class A), Potentially commercially recoverable resources: "Probable" (Class B) and Non-commercial projects: "Possible" (Class C). Speculative and potential deposits should be excluded because their quantities are not known with any degree of confidence.

(iii) For a resource to be categorized as either Class A or Class B there must be either a high or moderate level of confidence in the estimated quantities of the resource. Some

Known deposits are not considered assets in the 2008 SNA and therefore should be separately identified to aid reconciliation between SNA and SEEA data.

Issue #12: Valuation of assets

Issue Description
The SNA recommends the Net Present Value of resource rent as the preferred valuation method for resource stocks. The conceptual issues linked to the various resources need further investigation.

The following recommendations are made in relation to the valuation of assets in the revised SEEA:

(i) In estimating the value of natural resources in the revised SEEA the market value should be estimated using market based information where this is available. Where market based information is not available the use of Net Present Value approaches is recommended.

(ii) The revised SEEA should provide detailed advice on the estimation and application of Net Present Value approaches and their application to the valuation of stocks and flows of natural resources.

(iii) In relation to the valuation of fish stocks the treatment proposed in the SEEA-2003 concerning the use of market based quota information should be retained. More detail should be provided concerning the applicability of the proposed methods in situations where fishing is not being undertaken in a sustainable fashion or in situations where the market is deliberately constrained to allow for the growth in fish stocks. In these types of situations additional considerations are required in the application of Net Present Value approaches and there may be a reduced ability to use the market information directly to make estimates of the total market value of the fish stocks.

Issue #13: Recording of depletion for non-renewable resources

Issue Description
The SEEA-2003 provides multiple options for the measurement and recording of depletion. All these options need to be translated into unambiguous accounting recommendations. It is expected that these will together lead to clear cut recommendations on the compilation of depletion adjusted national accounts aggregates (product, income and saving). Aspects that need consideration include the identification the income element, the recording of mineral exploration and mineral deposits, the recording of additions and subtractions from resource stocks as well as revaluation; the recording of asset ownership; the recording of depletion.

The following recommendations are made in relation to the recording of depletion for non-renewable resources:

(i) The resource rent earned by extracting industries should be partitioned into an income and a depletion component and that the amount of depletion should be recorded in the generation of income account of the extracting industries.

(ii) To accurately define the value of mineral and energy resources and the amount of resource rent the estimates of mineral exploration and evaluation should be accounted for separately from the value of the underlying mineral and energy resources.

(iii) Discoveries of mineral and energy resources should be treated as other changes in the volume of assets.

Issue #14: Recording of depletion for renewable resources

Issue Description
The accounting recommendations on measuring resource depletion in the SEEA-2003 need to be extended to renewable resources taking into considering how to treat the natural growth of uncultivated assets.

The following recommendation is made regarding the depletion of renewable resources in the revised SEEA:

(i) A single entry for depletion of renewable resources should be defined that takes in account both the rate of extraction and the regenerative capacity of the stock based on biological models. Thus where the rate of extraction is consistent with long term resource sustainability the measured depletion would be zero. Growth above that required for long-term resource sustainability should be recorded as other change in volume of assets.

(ii) The amount of depletion should be recorded in the generation of income accounts of the extracting industries.

Issue #15a: The treatment of decommissioning costs

Issue Description
The SEEA-2003 suggested more than one option in recording decommissioning costs. According to the 2008 SNA, decommissioning costs (terminal costs) lead to the creation of a fixed asset that should be recorded as gross fixed capital formation in the asset accounts. Similarly, the asset account should in each period reflect a consumption of this fixed asset. The gross fixed capital formation is recorded at the end of the life time of the related asset, while the recording of the consumption of fixed capital takes place during the life time of the fixed asset. In order to estimate and record the consumption of fixed capital before the terminal costs actually takes place, it is necessary to estimate an expected terminal cost, which can be used as the basis for the calculation of consumption of fixed capital.

It is recommended that the revised SEEA follow the treatment outlined in the 2008 SNA and provide additional detail on the application of the approach in specific environmental situations.

Issue #15b: Recording the ownership of mineral related assets

Issue Description
One economic unit, the legal owner (usually the government), permits the extraction of mineral deposits, to be undertaken by a separate economic unit, the extractor. Usually the extractor will pay an amount, rent (often called royalties in the case of mineral resources), to the government for access to the resources. The issue arises as to how to allocate the resource rent that accrues from the extraction of the resources when the ownership of the underlying resource is split. This then flows to consideration of the appropriate estimates of the value of the resource on the balance sheets of the different economic units. The treatment of this issue in the 2008 SNA is not suitable for the SEEA as it does not permit the recording of depletion against the extracting unit and this is a key feature of the SEEA.

The following recommendations are made in relation to recording the ownership of mineral related assets in the revised SEEA:

(i) Focus should be placed on the extent to which economic ownership is shared between the extracting unit and the legal owner (generally the government) and on whether there is sufficient evidence to indicate the sale of an asset from legal owner to extractor following criteria defined in the 2008 SNA.

(ii) The net worth of the extractor and the legal owner in relation to mineral and energy resources should be equal to the value of the future income streams for each institutional unit that accrue due to the extraction of the mineral and energy resources. In total the net worth should be equal to the total value of the mineral and energy resources.

(iii) All of the measured depletion should be recorded in the generation of income account of the extractor.

(iv) Estimates of depletion adjusted saving for each institutional unit should be derived based on the share of depletion that is commensurate with each institutional unit's share of net worth in relation to mineral and energy related resources.

Issue #16: The treatment of water in artificial reservoirs

Issue Description
There is considerable investment to build dams to retain water and there is considerable loss of water through evaporation that is not attributed directly to the owners and managers of these water resources. Given the extent of management and economic activity associated with water resource, one possible accounting treatment is to consider that water in artificial reservoirs is a produced resource and hence inflows and outflows of water would be considered as changes in inventories. This proposed accounting treatment and its implications for the analysis of water resources should be considered in the SEEA revision process.

The proposed accounting treatment was considered coherent and would have clearly highlighted losses through evaporation in supply and use tables. However, on balance, it is recommended that the production boundary of the 2008 SNA with regard to water should not be extended in the revised SEEA as required under the proposed treatment. Hence water in artificial reservoirs should be treated as a non-produced asset consistent with its treatment in the 2008 SNA.

Issue #17: Recording of losses

Issue Description
Estimates of losses of energy and water (in extraction, storage, distribution and transformation) are important indicators of the efficiency of the relevant production processes and allow for a complete accounting of flows. To date however there have been differences in the way in which estimates of losses have been treated in water and energy accounts. The revised SEEA should consider the development of a general treatment of losses including consideration of the treatment of losses in physical and monetary terms.

The following recommendations are made in relation to the recording of losses in the revised SEEA:

(i) Within the context of the production boundary of the 2008 SNA, losses should be comprised of (a) flows of natural resources from the environment that are not available for further use in the economy because they are immediately returned to the environment and are not retained in the inventories of the extractor; and (b) products that do not reach their intended destination or have disappeared from storage.

(ii) Five types of losses should be defined: (a) losses during extraction/abstraction; (b) losses during distribution/transport; (c) losses during storage; (d) losses during conversion; and (e) losses due to theft. Losses due to theft should be recorded separately as they are not losses returned to the environment.

(iii) In the monetary flow accounts of the revised SEEA the treatment of losses should be consistent with the treatment of losses in the 2008 SNA.

(iv) In physical terms all losses should be recorded in the physical supply and use tables. In the derivation of measures of output in physical terms losses during extraction/abstraction should be netted off total amounts extracted. For losses during distribution, losses during conversion and losses due to theft, output should be derived net of these losses. Losses during storage may impact on measures of output or intermediate consumption. Losses of finished goods from storage should be deducted in the derivation of measures of output. Losses of materials or supplies from storage should be added in the derivation of measures of intermediate consumption.

Issue #18: Valuation of water

Issue Description
Water is an increasingly scarce resource. International agreements such as the Johannesburg Plan of Implementation, the Water Framework Directive, etc. recognize that water is an economic good. The SEEA revision process should consider whether techniques for valuing water can be described.

Water accounting issues have been considered under a number of SEEA revision issues. It has not been possible to reach a conclusion on standard techniques for valuing water. The potential techniques link directly to the measurement of the quality of water that in turn is related to the measurement of ecosystems. It is recommended that the valuation of water be discussed in the revised SEEA Volume 2.

Issue #19: Land use and cover classifications

Issue Description
From a statistical standards perspective no classifications on land use or land cover have been adopted internationally. However, a significant amount of research and compilation work has been undertaken on these topics by many countries and at an international level. Leading international agencies in this area include the UN Food and Agriculture Organisation (FAO) through their longstanding collection of agricultural land use data and their development of the Land Cover Classification System (LCCS); the European Environmental Agency (EEA) through their work on ecosystem accounting and the assessment of land cover change; and Eurostat through their projects on land cover and land use – LUCAS and INSPIRE. The SEEA should give clear advice on the definition of land use and land cover, propose relevant classifications and aggregate structures suitable for environmental accounting purposes and articulate the linkages between different classifications and structures.

The following recommendations are made in relation to the classification of land use and land cover in the revised SEEA:

(i) A clear distinction between land use and land cover should be made whereby land cover refers to the observed physical and biological cover of the earth's surface and land use reflects the arrangements, activities and inputs undertaken in a certain land area.

(ii) A SEEA land use classification should be finalised based on existing land use classifications and recent research work taking particular note of the potential overlap between land cover and land use concepts and terms, the treatment of land not in use, the distinction between mining and construction, and the treatment of conservation areas.

(iii) The Land Cover Classification System version 3 (LCCS 3) developed by FAO should be adopted as the basic land cover classification system.

(iv) An aggregated structure for land cover data should be defined based on LCCS 3 and aggregated with the objective of defining high level categories that best suit environmental accounting and analysis.

Issue #20: Recording of soil and its valuation

Issue Description
Soil has only marginally been addressed in the SEEA-2003. Although soil appears in the asset classification, there is very little text addressing the issues on how to measure changes in soil quantity and quality. Losses in the productive capacity of land due to soil depletion and degradation is an important issue to be investigated.

It is recommended that the SEEA Volume 1 should include a discussion of measurement issues concerning soil accounting in both physical and monetary terms. The discussion should define soil depletion and degradation and provide a framework for the valuation of soil within the context of the valuation of land.

Issue #21: Forest accounts

Issue Description
Classification of forests The SEEA-2003 presents a number of classifications for forest based on the FAO (TBFRA2005). Since then the FAO classifications have changed. In addition, classifications put forward by the IPCC should also be considered. The revised SEEA needs to analyse these classifications and develop a proposal for the revised SEEA taking into consideration the existing classifications. *Carbon sequestration* Carbon sequestration has become increasingly an important issue. The SEEA-2003 briefly discusses accounts for carbon sequestration by forest and discussion of this issue is needed in the revised SEEA.

The following recommendations are made in relation to the classification of forests and carbon sequestration in the revised SEEA:

(i) In defining the classification of forests particular focus should be placed on describing the distinction between cultivated and non-cultivated timber resources which is a key distinction in the 2008 SNA. In this regard the treatment of forests should be aligned with the general treatment of natural resources as recommended under Issue #10: Classification of assets.

(ii) The classification of forests should be aligned with the classifications used by the UN Food and Agricultural Organization for their Forest Resource Assessment as well as aligning to as great an extent as possible with the definitions and treatments in the 2008 SNA and other information on forests.

(iii) The forest accounts in the revised SEEA should cover accounting for carbon in timber resources in the SEEA Volume 1. However, other matters concerning carbon accounting and a description of measurement issues concerning forest ecosystems should be included in the SEEA Volume 2.