The SEEA 2003 – progress since 1993

Introduction

This short paper aims to give a very summary overview of the revised version of Integrated Environmental and Economic Accounting, usually referred to as SEEA 2003 and serves to point out the major differences from the earlier version published on an interim basis in 1993. It is fair to say that all these differences in fact consist of further elaborations of the initial system rather than changes in approach. However, the 2003 version of the manual is very much longer than the earlier version, now running to approximately 600 pages, and so contains much more detail and extensions not included earlier.

The SEEA is still a satellite account of the SNA. Thus the basic accounting structure is based on that of the SNA. A full description of this structure is given in chapter 2, "The Accounting Structure of the SEEA" and the relationship with the SNA is described in detail in Annex 9, "Relationship between the SEEA and the 1993 SNA". Anyone interested in this degree of detail should refer to these sections of the manual. The whole manual is freely available on http://unstats.un.org/unsd/environment/seea2003.htm

Four classes of flows and four domains

The SEEA 2003 uses throughout the notion that there are four different types of flows to be tracked. These are products, natural resources, ecosystem inputs and residuals. *Products* are goods and services produced within the economic sphere are used within it, including flows of goods and services between the national economy and the rest of the world. *Natural resources* cover mineral and energy resources, water and biological resources. *Ecosystem inputs* cover the water and other natural inputs (such as nutrients and carbon dioxide) required by plants and animals for growth and the oxygen necessary for combustion. *Residuals* are the incidental and undesired outputs from the economy which generally have no economic value and may be recycled, stored within the economy or discharged into the environment. Residuals cover solid, liquid and gaseous wastes.

Flows of these types are recorded between the national economy and national environment, between the national economy and the rest of the world economy, between the national economy and the rest of the world environment, between the rest of the world economy and the national environment and between the national economy and the rest of the world environment and between the national environment and the rest of the world environment. Flows between the rest of the world economy and the rest of the world environment are not considered in a system with a national focus and even for some national analyses, flows entirely within the national economy may be omitted.

These four types of flows and four domains interact in a manner which can be shown schematically as in Figure 1. These may alternatively be structured in terms of a supply and use table as in Figure 2.

Physical accounts

The first set of accounts the SEEA 2003 considers are accounts, structured in the supply and use format, which are expressed only in physical terms. As long as the same units are used for all flows, the rows and columns must balance pair by pair because of the conservation of matter. These accounts are essentially similar to the corresponding accounts in the 1993 SEEA but the typology of the flows is different (the 1993 SEEA dealt with environmental goods and services rather than natural resources, ecosystem inputs and residuals) and the articulation of the interactions between the national economy and the environment on the one hand and the rest of the world counterparts on the other is more precise.

Figure 1: A picture of the flows between the economy and the environment

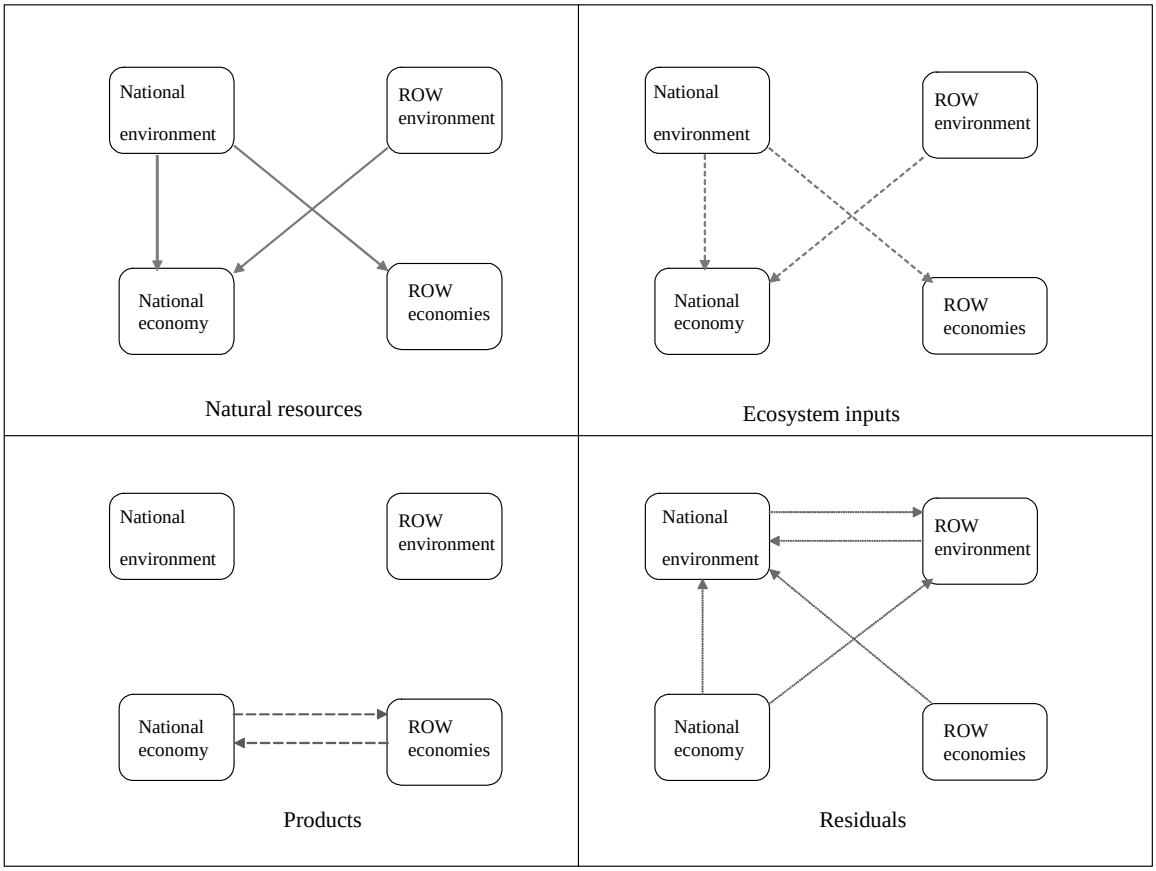

Figure 2: A supply and use framework encompassing these flows

	Commodities	Industry, Final cons	ROW	Environment
Commodities		Consumption	Exports	
Industry	Production			Residuals
ROW	Imports			
Environment		Natural resources		
		Ecosystem inputs		

Hybrid accounts

Since the 1993 SEEA was published, Statistics Netherlands has pioneered the use of a supply and use matrix similar to figure 2 but while the figures for natural resources, ecosystem inputs and residuals remain in physical units, the figures relating to products are in monetary terms. The rows and columns no longer balance because of the change in units for products, but it is useful to compare the physical value of, say, residuals for different products by value to obtain a measure of how pollution levels relate to industries of different importance to the economy in terms of output or value added measured in monetary terms.

Hybrid tables may exist for supply and use tables, input-output tables or SAMs and as a family of tables, these are often referred to as NAMEAs, national accounting matrices with environmental accounts, a term also introduced by Statistics Netherlands.

Economic flows related to the environment

The 1993 SEEA discussed environmental protection expenditure accounts but the SEEA 2003 goes into much greater detail in identifying those elements of the SNA which are directly related to environmental management. This means examining the whole of the sequence of accounts and not just elaborations of the production account as in supply and use tables. These flows are always considered only in monetary terms.

Environmental protection remains an area of interest and the SEEA now recommends that when environmental protection is undertaken as an ancillary activity, this should be "externalised" to be treated as a secondary activity, separately identifiable.

A set of goods and services are identified as being relevant to environmental protection, for example products used to minimise or restore the effects of pollution and a functional classification is introduced to set alongside the standard product and industry classifications.

A definition has been agreed on for environmental taxes. These are "taxes whose tax base is a physical unit (or a proxy of it) that has a proven specific negative impact on the environment". In the main these relate to energy taxes, transport taxes, pollution and resource taxes.

Another set of transaction to be identified from the sequence of accounts is that relating to new instruments associated with property rights over natural resources and ecosystem inputs. The include emissions permits, fishing quota and other similar use of the environment which is officially sanctioned. To date these are limited in number and value but it is supposed they may become more significant in the near future.

A last set of considerations relates to the disposal of products via landfill sites and where the disposal entails considerable expenditures, such as nuclear power stations and oil rigs.

Asset accounts

Asset accounts are another concept picked up from the 1993 SEEA but given much greater elaboration in the 2003 version. An asset account shows the link between opening and closing stock of an asset by means of addition of new capital, use of existing capital and changes which are not the result of economic transactions. This is of course similar to the articulation of the accumulation accounts in the SNA but whereas asset accounts in the SNA are usually constructed for all the assets of an enterprise or an institutional sector, in the SEEA, the interest is in all the assets of a particular type regardless of ownership.

Asset accounts can be constructed in both physical terms and monetary values. In physical terms the monetary value is irrelevant and so assets with zero value, for example land which is so remote and inhospitable as to be uneconomic, should be included in the asset boundary of the SEEA. In addition, the classification of assets in the SEEA is somewhat more detailed than the SNA though compatible with it.

The SEEA 2003 goes into considerable detail explaining how monetary values can be attributed to assets such as mineral deposits and standing timber. The approach used draws on the theory of capital services which is now starting to be applied to the measurement of fixed capital in the SNA. This means that detailed accounts for particular natural resources can be compiled and for some uses, accounts for significantly valuable resources provide sufficient information for further analysis. However, the information generated in compiling an asset account for, say, oil also produces the relevant estimates which would be necessary if the SNA macro-economic aggregates were to be adjusted for any depletion of natural resources which was taking place.

Valuing residuals

The techniques described so far have fairly broad consensus. This represents a considerable advance since 1993 not just in the level of agreement reached on broad principles but also the degree of detail in implementation which has also been agreed. This sense of agreement covers the valuation of natural resources and the compilation of asset accounts in monetary terms. Applying monetary values to residuals and addressing degradation of assets rather than depletion, however, remains the most difficult and most contentious area in environmental accounting, just as it was when the 1993 SEEA was being drafted.

The problems are diverse. Some people feel it quite unnecessary to attempt valuation at all. It is clear we are emitting too many green house gases even in physical terms; would the message be any clearer (possibly as clear even) in monetary rather than physical terms? Others feel valuation would be helpful but cannot agree what valuation basis would be most appropriate. Should we estimate how much it would cost to avoid the generation of residuals in the first place or estimate how much it would cost to restore the environment to its previous state after the event? Should we ignore both of these and simply try to quantify in monetary terms the damage caused by generation of residuals? Externalities are not measured in the SNA; why should they be in the SEEA? Would this not advocate using a pricing system for the SEEA which is incompatible with that in the SNA?

The strongest opposing points of view, however, focus around a different philosophical question. Is the problem that our accounting system needs changing because it does not adequately reflect what is happening in the economy, or is the problem that it is the economy itself which needs changing, not the accounting system? This dichotomy can be characterised by asking whether we need green accounts or a greened economy. The latter can at present only be simulated by means of a computing model, a technique which is frequently not within the remit of statisticians but is used rather by economists and analysts.

Adjusting the SNA macro-aggregates

As with valuing residuals, this was an area where consensus was not reached. It was possible, though, to dissect the overall problem into different segments. Essentially, the 1993 SEEA assumed that the end point of a set of environmental accounts would lead to a measure of domestic production adjusted for both depletion and degradation. The SEEA 2003 is more flexible. It suggests that no adjustments may be desired at the aggregate level, that adjustment for depletion only may be desired or for both depletion and degradation. (The option of adjusting for degradation but not depletion is arithmetically possible but economically implausible.) In addition, the SEEA 2003 spells out an alternative for adjusting domestic product for defensive expenditure.

As far as depletion is concerned, the first step is to regard part of the SNA gross operating surplus as the value of the extractions of natural resources, parallel to the capital services rendered by fixed capital, less a return to natural capital. A depletion adjusted measure of net operating surplus can therefore be calculated by deducting the extraction figure and then adding back the return to natural capital.

The second step is to consider whether natural growth or new discoveries or reappraisals of mineral resources should be deducted from extractions so that only the net level of extractions is used in the formula above. If all natural growth is regarded as offsetting extraction, then any growth in excess of extractions result in an increase in output and the distinction between produced and non-produced natural resources is moot. On the other hand, if natural growth is never set against extractions, sustainable extractions, where the level of off-take does not exceed natural replenishment, still result in a figure of depletion adjusted operating surplus lower than net operating surplus as if the situation were non-sustainable.

Just as figures for operating surplus and hence value added may be adjusted in either of these ways, so the figures for capital formation in the capital account should be adjusted in a similar manner.

Given that alternative pricing practices are described for valuing degradation, different values of domestic product can be determined. If a cost based approach to valuing degradation is used, the question being answered is "what would the value of net domestic product have been for the same level of activity if all the costs of environmental degradation had been incurred and internalised within market prices?" The greened economy modelling approach attempts to answer a quite different question "what level of GDP could be achieved if producers and consumers faced a different set of relative prices in the economy due to the existence of actual prices for environmental functions?" For the damage based estimates, most attention has so far concentrated on the impact of human health so the question answered under that option is "What is the impact of the level of NDP of environmental impacts on natural and man-made capital and on human health?" The formulations of these questions is intended to make clear what the different options imply for analysis of the resulting aggregates and in this sense are more focussed and specific than the alternative aggregate offered in the 1993 SEEA.

The way ahead

During the drafting process, extensive amounts of time were devoted to discussing the valuation of residuals and of adjusting the macro-aggregates. While it is true that these discussions lead to a greater understanding of the positions being taken, it was clear that convergence to a single preferred option was not possible. Nor is it likely that this will occur in the near future. On the other hand, increasingly little difference of opinion of other aspects of the accounting framework proposed remained. In some cases there was still some degree of uncertainty and the most fruitful line of development in the near future seems to be the furtherance of work in these areas where agreement is common.

Up to one third of the SEEA 2003 is occupied by descriptions of experience with the techniques described in the manual. In particular there are detailed accounts of accounting systems for mineral, land, water, fish and forests. In fact, entire manuals are already in draft taking the work on water, fish and forests further. Work is also in hand on developing material flow accounts, using the techniques of the purely physical accounts and on the development of hybrid accounts for particular natural resources.

Some of the topics covered in the SEEA will be fed into the revision process for the SNA. A minor example concerns the definition of a cultivated asset. More significant is the treatment of the disposal of large capital installations, the extension of the application of the capital services approach to the measurement of the contribution of capital to production and the treatment of environmental licences. Thus rewriting a manual on a satellite account has thrown more light on to the basic SNA also.