From natural resources and environmental accounting to construction of indicators for sustainable development

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1. Introduction: the institutional history of natural resource accounting in Norway

Norway has a long history in trying to develop management tools for sustainable development. From the early development of natural resources accounts in the 1980s, through discussions of the usefulness of indices like “green GDP” to efforts of developing sustainable development indicators, experiences have been gained. The paper seeks to both describe the landscape and discussions associated with the key terms, and to communicate some lessons drawn from the Norwegian experiences. The conclusion focuses on the fact that whatever information is collected and organised to support the relevant decision-making processes, the final outcome should always be judged in terms of its impacts on policy processes. Thus, we issue a warning against large-scale development of information systems, without due regard to the final utilisation of the output.

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was seen as a potentially important part of the necessary tool kit, and from 1978 Statistics Norway was given task of developing such accounts for Norway. The aim was to ensure a better long-term natural resource management by:

- Providing new and better-suited data for monitoring natural resource use for long-term management purposes.
- Providing data in a form compatible with traditional economic accounts to facilitate integrated analyses of natural resource and economic issues.
- Avoiding double efforts in data collection and analysis.
- Developing a standard procedure for presentation of data and analyses on natural resources and the environment.

Statistics Norway is responsible for national accounting in Norway and also for the development and operation of some of the economic planning models employed by the Ministry of Finance and other ministries. Coordinating the work on the natural resource accounting with ongoing work on tools for economic planning turned out to be useful for a number of reasons:

- Locating the work on natural resource accounting to Statistics Norway has assured access to statistical expertise and closeness to primary statistics used in the development of the natural resource accounts.
- In Statistics Norway, the resource accounting framework was naturally based on existing economic standards and sector classification schemes, thus ensuring general consistency in the sectoral classification of economic and resource related data and statistics. In particular, the linkage to the UN System of National Accounts (SNA) has made it possible to integrate important natural resource variables and relations within already existing macroeconomic models.
- Use of a common set of standards and models in the analysis of resource issues has facilitated the communication between the ministries responsible for the management of the economy and the ministries responsible for the management of the natural resources; e.g. the Ministry of Finance and the Ministry of Environment, and precluded the development of competing data sets, models, etc.

The Norwegian system of natural resource accounting was established long before the SEEA and it is tempting to claim that at least some of Norway’s experiences during the earlier years have had an impact on the development of the SEEA.

This paper summarises these experiences with natural resource accounting and the parallel debate on how far one should go in synthesising and summarising the information contained in natural resources and environmental accounts into a single aggregate measure like “green GDP”. We will also briefly describe the latest development in Norway towards the establishment of a set of indicators of sustainable development, and address the relationship between accounting SEEA style and indicators. The paper ends with three warnings/recommendations.

2. The Norwegian accounting system

In the initial phase of resource accounting in Norway, considerable efforts were made to establish resource accounts for a large number of natural resources and environmental issues (Alfsen et al., 1987; Alfsen and Bye, 1990; Central Bureau of Statistics of Norway, 1981). Thus, accounts were developed for: energy, minerals, sand and gravel, forests, fish, land use, fresh water, air pollution and waste. The accounts were kept in physical units and regarding the material resources, consisted of three parts covering 1) reserves or capital accounts, 2) extraction, conversion and trade accounts, and 3) end use accounts of the resources. By “reserves” is meant discovered resources that are economically extractable with today’s technology. The general structures of the material resource accounts are as shown in Table 1.

A number of points are worth noting with regard to the structure of these accounts.

1. The accounts consist of more than the reserves accounts alone (often presented as “natural resource accounts” in the international literature). This is of importance when it comes to employing the accounts for management purposes. It is then of relevance to know who is going to be affected by a change of policy. The end use account is essential for this kind of analysis.

2. The sectoral structure of the extraction, conversion and trade accounts and the end use accounts followed the classification in standards for national accounts (SNA, Commission of the European Communities et al., 1993). This facilitated the inter-linkage between the resource accounts and the national accounts.

3. Although the accounts are kept in physical units, they were complemented with price information whenever market prices are available, allowing tables in monetary terms to be generated.

### Table 1 – Structure of the material resource accounts

<table>
<thead>
<tr>
<th>I. Reserve accounts</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Beginning of period:</td>
<td>Resource base</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reserves (developed, non-developed)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total gross extraction during period</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adjustments of resource base (new discoveries, reappraisals)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adjustment of reserves (new technologies, cost of extraction, transport, etc., resource price)</td>
<td></td>
</tr>
<tr>
<td>End of period:</td>
<td>Resource base</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reserves (developed, non-developed)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>II. Extraction, conversion and trade accounts (by sector):</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross extraction</td>
<td></td>
</tr>
<tr>
<td>– Use of resource in extraction sectors</td>
<td>= Net extraction</td>
</tr>
<tr>
<td>Import</td>
<td></td>
</tr>
<tr>
<td>– Export</td>
<td>= Net import</td>
</tr>
</tbody>
</table>

Changes in stocks

For domestic use:

Net extraction + net import + changes in stock

<table>
<thead>
<tr>
<th>III. End use accounts (by sector):</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic use</td>
<td></td>
</tr>
</tbody>
</table>
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