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

Knut H. Alfsen*, Mads Greaker

Research Department, Statistics Norway

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ABSTRACT

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

Norway is among the fortunate countries that are richly endowed with natural resources of many kinds. Historically, exploitation of forests and fish has been important sources of income. Around the beginning of the 20th century energy resources like hydropower and, more recently, petroleum resources have contributed significantly to the industrialization of Norway. Being a sparsely populated country with only 4.6 million people distributed over 304 280 km² of land (resulting in only approximately 15 people per km²) Norway is also well endowed with natural and environmental resources like clean air and water and unspoiled nature.

After a period of rapid economic development following the Second World War, voices of concern were, however, beginning to be heard on behalf of the environment in the late 1960s. Pollution levels in the air, water and soil became steadily more noticeable, and ever more of the inherited pristine environment

succumbed to economic development and deteriorated. At the international level, several important books from Resources for the Future, together with more popular titles like *The Silent Spring* (Carson, 1962) and *Limits to Growth* (Meadows et al., 1972) provided background for this concern. The UN Conference on the Human Environment, which took place in Stockholm in 1972, was in many ways the manifestation that these concerns were having an impact on the arena of international politics. In the same year Norway established one of the world's first Ministries of Environment, thus marking the growing concern and a will to act.

At the outset the level of ambition for the new ministry was high, i.e. it was envisaged to be more or less on par with the Ministry of Finance. While the Ministry of Finance manages and controls the fiscal resources of the country, the Ministry of Environment should in a similar manner manage and control the physical resources of the country. Consequently, a search for suitable management tools for natural resources and the environment was initiated. Natural resource accounting (NRA)

* Corresponding author. P. O. Box 8131 Dep., N-0033 Oslo, Norway.
E-mail address: kal@ssb.no (K.H. Alfsen).

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

I. Reserve accounts	
Beginning of period:	Resource base
	Reserves (developed, non-developed)
	Total gross extraction during period
	Adjustments of resource base (new discoveries, reappraisals)
	Adjustment of reserves (new technologies, cost of extraction, transport, etc., resource price)
End of period:	Resource base
	Reserves (developed, non-developed)
II. Extraction, conversion and trade accounts (by sector):	
	Gross extraction
	– Use of resource in extraction sectors
	= Net extraction
	Import
	– Export
	= Net import
	Changes in stocks
For domestic use:	Net extraction + net import ± changes in stock use:
III. End use accounts (by sector):	
	Domestic use

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