

**CASE STUDY OF THE PREPARATION OF
NATIONAL ECONOMIC ACCOUNTS: NORWAY¹**

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1. NATIONAL ACCOUNTS AND ECONOMIC PLANNING

National account statistics give an overall view of the economy in a country. It gives a systematic, consistent and statistical description of the economy as a whole and the inter-relationship between the different economic sectors and between the total economy and the rest-of-the-world.

Within the national accounts the society is separated into activities and sector accounts which are all parts of the overall national accounting system, thus giving information on each economic sector as well as the linkage between the different economic sectors. The accounts themselves present in a condensed way, a great mass of detailed information, organized according to economic principles and perceptions about the working of an economy.

The national accounts system provides a set of concepts, definitions and classifications within a broad accounting framework, and is designed for purposes of economic analysis and policy-making. The national accounts, therefore, serve as an essential basis for economic policy in a country. In many countries, the national accounts have performed a dual function. First, the accounts serve to monitor the performance of economic policy. Secondly, the data and the underlying framework are fed into econometric models that are used for national budgeting, macro-economic planning, forecasts and various economic analyses. Integrating supply and use of tables on an annual basis in the national accounts, and arranging the basic economic statistics in order to fit in with the purposes of the national accounts, provide for a useful empirical basis for constructing such econometric models.

In the national accounts, valuation is restricted to market values. The accounts do not take into account biological resources. The use of the natural environment for economic purposes is not taken into account in the calculation of costs in the national accounts and therefore not reflected in gross domestic product (GDP). There can be examples where the national accounts show an increase in the value produced by fishing and the company's own financial statement show a profit, where there are in reality losses and a reduction in the value produced if one takes into account the cost that accompanies over-exploitation of biological resources. This is a cost that compared with the conventional methods after some years, will manifest itself in reduced production value and losses (Nordic Natural Resource and Environmental Accounting, Nordisk Ministerrad 1996).

¹ Draft of possible guidelines on fisheries for the FAO System of Economic Accounts for Food and Agriculture
Appendix to Socio-Economic Information for Fishery Management and Development

2. SUPPLY AND USE TABLES

The 1993 UN System of National Accounts (SNA) includes an integrated set of supply and use tables. They provide a detailed analysis of the process of production and the use of goods and services and the income generated in that production. The concepts and definitions of the supply and use tables of the SNA are the same as in the rest of the System. Its role is primarily related to the goods and services accounts and to the shortened sequence of accounts for industries.

In complement to the full sequence of accounts for institutional sectors, which covers all kinds of accounts in the System, the supply and use tables serve to provide a more detailed basis for analyzing industries and products in the System through a breakdown of the production accounts, the generation of income accounts, and the goods and services accounts.

The supply and use tables serve both statistical and analytical purposes. They contain information which show inter-relationship between producer and user, thus providing a framework for checking the consistency of statistics on flows of goods and services obtained from different kinds of statistical sources. The supply and use tables are also appropriate for calculating much of the economic data in the national accounts and for detecting weaknesses. This is particularly important for decomposition of values of flows of goods and services into prices and volumes for the calculation of an integrated set of price and volume measures.

The supply and use tables are data-oriented in nature, while the symmetric input-output-tables are constructed from having made certain analytical assumptions, usually from the supply and use tables. The symmetric input-output tables serve as a tool for various analytical purposes related to production, thus the input-output data are conveniently integrated into macro-economic models in order to analyze the link between final demand and industrial output levels, or the link between industrial input and output levels etc.

The goods and services accounts play a fundamental and important role in the national accounting system. The supply and use balances are derived on this basis. They show for the economy as a whole and for groups of products, the total resources in terms of output and imports, and the use of goods and services in terms of intermediate consumption, final consumption, gross capital formation, and exports. By incorporating the production and generation of income accounts, an overall framework is obtained for depicting the production sphere.

3. ACCOUNTS ON FISHERIES

According to the System of Economic Accounts for Food and Agriculture (SEAFSA) 1996 (Annex 2.8), a proper system of accounts should provide policy-makers with reliable measure of the contribution of the fishery industry to the national well-being. For the fisheries sector, SEAFSA may be regarded as a framework for analyzing the mutual relationship between production activity, income originating from production, and the use of income for consumption and capital accumulation.

Capture fisheries are essentially different from farming in that much of the output of the individual farming households may still be considered as one productive unit, whereas this is not generally true fishing. The household can be important in some types of fishing in certain countries, but generally some members of fishing households have other occupations than fishing, and members of a fishing units do not have to belong to one household. A characteristic fishing unit may catch several species of fish, but does not catch anything other than fish. Hence, in this sector, the characteristic fishing household will be almost impossible to investigate.

Since there is no characteristic institutional unit to investigate, the economic accounts should be compiled for the fishery industry. Establishments are units which are identified only for the purposes of measuring production. An establishment is intended to be a unit whose production is as homogenous as possible and ideally it should be engaged in only one single type of production activity. However, the total output from establishments will in practice, tend to include some output from secondary activities. Establishments are conceptually distinct from institutional units. If an institutional unit contains only a single establishment, the production account for the establishment will be the same as for the institutional unit. It is the institutional unit <<that is capable, in its own right, of owning assets, incurring liabilities and engaging in economic activities and in transactions with other entities>> (1993 SNA paragraph 4.2).

The only accounts that can be compiled for establishments are production and generation of income accounts. The production account will give the total output from fisheries, distributed on different fish species, the value of intermediate consumption, and the value added from fisheries. The generation of income account will show how value added from the fishing activity is distributed between compensation of employees, taxes and subsidies on production and mixed income or operating surplus (gross).

Although production and generation of income accounts only can be compiled for establishments, it is possible to collect additional data for the establishments. In line with the recommendations of the 1993 SNA, data for gross fixed capital formation for the fishery industry should be collected, broken down by type of asset. Numbers of persons engaged in fishery, split as self-employed (owners and unpaid family workers) and employees, should also be collected, and estimation on hours worked should be made. However, hours worked in fisheries is not a well-defined variable and may be very difficult to estimate.

Included in the accounts of SEAFSA, are also goods and services accounts. These should be compiled for individual fish species or a designated set of fish species. The goods and services accounts show on the one hand, the fish species produced and imported during the year, and on the other hand, the uses of the fish species. The total supplies is by definition equal to the total uses. In general, output from domestic establishments plus imports equals intermediate consumption plus final consumption expenditures plus exports plus gross capital formation. The output from domestic producers include, in addition to output from fisheries, trade and transport margins on the product. On the resources side, value added tax is also included and if output is recorded at basic prices, other taxes/subsidies on products also have to be included. The goods and services accounts will give the inter-relationship between the output from the fishing activity and the other economic industries/sectors. The production and goods and services accounts should be compiled both in current and constant prices, while the generation of income account is compiled in current prices only.

4. SOURCES OF DATA AND METHODS OF ESTIMATION

According to the recommendations of the 1993 SNA, the industry classification of the national accounts should be based on ISIC Rev. 3 (UN Statistical Papers, Series M No. 4, Rev. 3). Fishing is classified as ISIC-class 050 group 0500, and includes fishing on a commercial basis in ocean, coastal or inland waters. It also includes fish farming, breeding, rearing, cultivation of oysters for pearls or food and service activities related to marine and freshwater fisheries and to operators of fish hatcheries or fish farms. Excluded is processing of fish on vessels or in factories abroad, which is classified as manufacturing (ISIC-class 1512 processing and preserving of fish and fish products).

Fishing in ocean, coastal or inland waters differs from the production in fish farms. For both industries the product is fish, but the production processed is very different. In ocean fishing, vessels will be the important capital asset, and hence, fuel expenditures and repairs and maintenance of the fishing boat and gear will be important intermediate consumption items. In aquaculture, the production machinery and equipment will be different from what is used in ocean and coastal fishing. Intermediate consumption in aquaculture will mainly consist of fingerlings and animal feed (the fry or fingerlings will be produced and used in the same industry). The work-in-progress will be important in aquaculture. Since the production process in fisheries and aquaculture is so different, for analytical purposes it will be advisable to establish separate production accounts for the two industries.

Any definition of the fishery sector is fragmented in many ways. Fish go through many processes before being consumed and to place the boundary of this industry at the point of any transaction is difficult. It is statistically most convenient to adopt the industry definition when drawing the borderliness between what is fisheries and other industries. For policy purposes it is not satisfying to analyze only the fishing activity. The activity of the processing and preserving industry is also important. For instance, the country's revenues from exporting fish consist both of the revenues from exporting fish directly, as well as exporting fish indirectly as processed products. It is important to design the accounts for fisheries according to the particular economic features of the industry, while being compatible with the national accounts.

To reduce the statistical problems of recording the accounts, the production boundary for fisheries should cover all the fishing activity on a commercial basis in ocean, coastal or inland water. The household's fishing for own final consumption fall within the production boundaries in the SNA, and should be taken into account in the SEAFSA. The fishing for own final consumption should be calculated either in the production account for market production (the commercial fisheries), or in a production account for non-market production (non-commercial fisheries).

The sources of data for the compilation of SEAFSA include fishery censuses, surveys on economic results for fishing vessels, catch statistics, manufacturing statistics, external trade statistics, surveys of fishermen, register of fishermen, register of fishing vessels, license register, household budget surveys and government accounts. When compiling the accounts, it is often necessary to use several of the available sources. Some of the sources consist of data with complete coverage of the fisheries, while others consist of data with incomplete coverage.

Generally, fishery censuses will be used as benchmark information, while current calculations will be based on different surveys and information from registers. Manufacturing statistics, external trade statistics and household budget surveys will contain data to be utilized in the goods and services accounts when compiling intermediate consumption and final use figures. In Norway, all boats which are used in commercial fishing are registered in the Vessel Register by the Directorate of Fisheries. The boat owner is obliged to report his boat to the register, and to report sale or condemnation of the boat if the boat for any reason is removed from fishing activity. Information from the register of fishing vessels is important for determining the population of fishing boats, and for estimating gross fixed capital formation. The Norwegian municipal register of fishermen comprises persons engaged in sea fisheries, whaling or sealing. Crew onboard the boats are included in the register whether they directly take part in fishing or not. To be registered in the municipal register, the fishermen have to exceed a certain minimum time about their participation in fisheries and income from fisheries. The register gives information to be used for the compilation of employment in fisheries. In some fisheries, participation is conditioned by license from the Norwegian authorities. The Directorate of Fisheries records such licenses.

Market output

According to SNA 1993, goods and services produced for sale on the market, may be valued either at basic prices or at producer's prices. The preferred method of valuation is at basic prices. The basic price is <<the amount receivable by the producer from the purchaser for a unit of good or service produced as output minus any tax payable, and plus any subsidy receivable, on that unit as a consequence of its production or sale>> (1993 SNA paragraph 6.205).

The market output from fisheries can be compiled by using either economic results for fishing vessels or using information from catch statistics. In Norway, the Directorate of Fisheries compiles catch statistics. Most of the information comes from the sales associations which have statutory protection for first-hand sales of fish. The information from the sales associations also comprises Norwegian catches landed abroad. In some fisheries the boat owners are obliged to keep catch journals. This concerns trawling of cod fish and catch of small whales. The catch statistics from the Directorate of Fisheries are detailed, showing the catches and landing of all fish species both in quantity and value. Sealing, seaweed, oysters and mussels are not covered by the catch statistics, neither are unregistered sale of fish or fishing for own final consumption.

Another source for compiling the market output from fisheries is the data from surveys of the economic results for fishing vessels. In Norway, a survey is conducted only for vessels defined as <<whole year operated vessels>>. The results of this survey are published by the Norwegian Budget Commission of Fishery every year. It gives information on the income from fishing and the income from other sources (e.g. transportation of goods). Income from sources outside fishing is of minor importance in Norway.

In Norway, the catch statistics are considered as most reliable, thus giving the value of landed fish in the production account. In the catch statistics, the value is based on producer's price (VAT excluded). A certain product tax is levied on the first-hand value of landed fish and by correcting for this tax, the basic price is obtained. The production value is distributed on specific products as cod, herring and capelin, mackerel etc. (Table 1).

The catch statistics do not include unregistered catches, which comprise fish sold directly to the consumers by the fishermen. Imputations for unregistered catches are made, even though by nature it is difficult to estimate. In Norway, studies show that unregistered catches are now of minor importance. In countries where there are no sales associations with statutory protection for first-hand sales of fish, unregistered sales can be important. A fishery census can give a benchmark estimate on the value of unregistered sales, and this estimate can be extrapolated to other years as a fixed proportion of registered sales.

Production for own final use

The value of fixed assets being produced on own account, is supposed to be included in the production account. Data for own account production of fixed assets is difficult to obtain without any census or sample survey. If data are available from a census, this can be used as a benchmark estimate and extrapolated to other years on the basis of estimates on man-week/hours and hourly wages for similar economic activities. Benchmark estimates can also be extrapolated in proportion with gross fixed capital formation. Fixed assets produced for own gross fixed capital formation are valued at their estimated basic prices or alternatively by their cost of production (1993 SNA paragraph 6.48).

In Norway, the households own account production is compiled in a separate production account. The figures are based on quantity data from the fishery census and extrapolated to subsequent years by assuming a small decrease in quantity every year. The quantity is converted to value by using the same prices as for comparable registered landed fish after correcting for product taxes (and subsidies). According to SNA 1993 (paragraph 6.219) <<output produced for own final use should be valued at the average basic prices of the same goods or services sold on the market, provided they are sold in sufficient quantities to enable reliable estimates to be made of those average prices>>. The production account in Table 1 includes both households own account production and market production.

Intermediate consumption

Intermediate consumption consists of the value of the goods and services consumed as inputs in the production process. It should be valued at purchasers' prices, where deductible value added tax is excluded.

Various items may be classified as intermediate consumption. The composition of the intermediate consumption depends on the technical level of the production process, on whether the fishing is inshore or in distant water. In Norway, where the mechanization degree is high, items such as repair and maintenance costs and fuel consumption are the most important sub-categories included in intermediate consumption. The distinction between maintenance and repairs and gross fixed capital formation is however, not clear-cut. According to 1993 SNA (paragraph 6.161), ordinary maintenance and repairs are distinguished by whether:

- a) they are activities or current costs that cannot be avoided if the fixed assets are to continue to be used; and
- b) they do not change the fixed assets or its performance, but simply maintain it in good working order or restore it to its previous condition in the event of a breakdown.

In Norway, repair and maintenance costs contribute to over 40 % of total intermediate consumption, and fuel is about 30 % (Table 1). Data for estimating the value of the different intermediate consumption items can be available either from sample surveys of the costs in fisheries or from surveys of the economic result in fisheries. Benchmark estimates can be based on figures in fishery census and extrapolated to other years by the sample surveys. Purchased repair services related to fishing vessel and gear, can alternatively be extrapolated on the basis of manufacturing statistics. In Norway, manufacturing statistics will contain output data on <<repair work on fishing vessels>>. The supply of repair services will consist of output from domestic industries and imports of repair services. Since there should be no changes in inventories for repair services, the supply and use have to balance, and hence, intermediate consumption of repairs is made equal to total supply.

In Statistics Norway, natural resource accounts are worked out regularly for energy. These are material accounts that show the use of the energy resources by industry. The resource accounting framework is based on existing economic standards and industry classification, thus ensuring general consistency in the sectoral classification of economic and resource related data statistics. As the national accounts use the same industrial classification, data from the resource accounts are utilized to extrapolate the quantity of fuel. The price basis is direct statements from the oil companies as well as price regulations for mineral oil products. The estimates of fuel expenditures made in this way are compared with the estimates based on the survey of economic results in the fisheries. If the estimates differ, corrections can be made. Due to different rebate-agreements, the price information will be a work point and may therefore be adjusted.

Certain goods and services used by enterprises or establishments do not enter directly into the production process but are consumed by employees working on that process. In such cases it is necessary to decide whether the goods and services are intermediate consumption, or remuneration in kind to employees. <<In general, when the goods and services are used by employees in their own time and at their own discretion, for the direct satisfaction of their needs and wants, they constitute remuneration in kind>> (SNA 1993 paragraph 6.153). If the employees are obliged to use the goods or services in order to enable them to carry out their work, they constitute intermediate consumption. This means that clothing and footwear of a kind which ordinary consumers do not choose to purchase or wear, and which are worn mainly at work, should be treated as intermediate consumption. The same are special meals or drinks provided to fishermen on active duty. From the employer's viewpoint it is immaterial whether such expenses are treated as remuneration in kind or as intermediate consumption. However, reclassifying such items from remuneration in kind to intermediate consumption, changes the value added and hence the GDP as a whole.

Consumption of fixed capital

According to SNA 1993, it is recommended that consumption of fixed capital is compiled in conjunction with estimates of the capital stock. These can be built up from data on gross fixed capital formation in the past combined with estimates of the rates at which the efficiency of fixed assets decline over their expected service life. The method is called the perpetual inventory method, or PIM. A description of this method is given in <<A System of Economic Accounts for Food and Agriculture>>, FAO Statistical Development Series 8, page 88.

Compensation of employees

Compensation of employees is recorded under uses in the generation of income account and is defined as the total remuneration, in cash or in kind, payable to an employee in return for work done by the latter during the accounting period. No compensation of employees is payable for the work done by members of a household within an unincorporated enterprise owned by the same household (1993 SNA paragraph 7.21). Unpaid family workers are treated as self-employed. It is not self-evident whether a worker is an employee or self-employed. Some workers paid by results may be employees while others may be self-employed. It is necessary, therefore, to clarify the nature of the employment relationships in order to fix the boundary between compensation of employees and other kinds of receipts.

In Norway, the municipal register of fishermen comprises all persons who are engaged in sea fisheries, whaling or sealing. Crew on fishing boats are included even if they do not take part in fishing directly. Normally the fishermen on boats, including the crew, are paid by result, and neither the owner of the vessel nor the employee, pay social contributions on the same basis as other employers or employees. Instead there is a product tax levied on the first-hand value of landed fish. In Norway, it was decided to treat fishermen and crew on fishing vessels as employees, and the owners of the unincorporated enterprises in which they work, as self-employed persons. Self-employed persons receive mixed income and not compensation of employees. The tax mentioned is in the national accounts treated as a product tax and not as part of compensation of employees. Compensation of employees has two main components, namely:

- a) wages and salaries in cash and kind; and
- b) social contributions payable by employers to Social Security Schemes or to private funded social security schemes.

Data for compensation of employees can be obtained from surveys of the economic result in fisheries. Alternatively, the register of fishermen can provide data about the number of fishermen. Labor force data, if available, can also give information about the number of employees and hours worked. Combined with average wage rates in fisheries, estimates of wage and salaries can be compiled. Estimates for social contributions can be compiled using information from government statements or law regulations.

Taxes on production

Taxes on production are unrequited payments made by enterprises to government units. They are taxes on products payable on products when they are produced or sold. These are usually proportionate to the quantity or value of products sold. Other taxes on production consist mainly of taxes on the ownership or use of land, buildings or other assets used in production or on the labor employed (SNA 1993 paragraph 7.49).

When production is valued at basic prices, all taxes (subsidies) on products payable (receivable) on the goods produced are deducted from (added to) the value of that output at a producer's prices. In this case, the taxes (subsidies) on products are not to be recorded under uses in the generation of income account.

However, if output is valued at producer's prices, the taxes (subsidies) on products have to be recorded under the generation of income account for an industry. Invoiced VAT is never included in the value of the output, and will therefore, never be recorded under the generation of income account for an industry or institutional unit. Tax data are generally available from the government offices collecting taxes, but it can be difficult to allocate the sum of taxes to local kind of activity units. Estimates of taxes on production paid by the fishery industry may be compiled on the basis of suitable indicators.

Subsidies

Subsidies are current unrequited payments that government units make to enterprises on the basis of their production activity or the quantity or values of the goods which they produce or sell. Subsidies are equivalent to negative taxes on production. The data source for estimating subsidies are government income and expenditure statements. More detailed data can be available from the Ministry responsible for the implementation of subsidies schemes, if such schemes exist for the fishery sector. If production is valued at basic prices, only other subsidies on production, not subsidies on products, shall be compiled in the generation of income account.

Mixed income and operating surplus

Operating surplus or mixed income is the balancing item in the generation of income account and defined as:

value added (net),
less (-) compensation of employees,
less (-) other taxes on production (included taxes on products if output is valued at producer's prices)
plus (+) subsidies receivable (included subsidies on products if output is valued at producer's prices)

Value added should be valued net, after deducting consumption of the fixed capital. If consumption of fixed capital is difficult to measure, value added may be valued gross in the generation of income account. The operating surplus, or mixed income, will then be valued gross.

Mixed income is the term reserved for un-incorporated enterprises owned by members of household, in which the owner or other members of the household, may work without receiving wages or salary. For the fishery industry, the balancing item of the generation of income account will consist mainly of mixed income. If fishing vessels are owned by other institutional units than households, the balancing item will be the operating surplus.

According to SNA 1993 paragraph 10.33, gross fixed capital formation is measured by the total value of a producer's acquisitions, less disposals of fixed assets. New fixed assets acquired by purchase are valued at purchaser's prices. The purchaser's prices include all transport and installation charges, and costs incurred in the transfer of ownership.

Purchases of existing fixed assets are also valued including transport, installation and other costs incurred by the purchaser, while sales of existing fixed assets are valued after deducting any cost of ownership transfer incurred by the seller. Fixed assets produced for own gross fixed capital are valued at basic prices or alternatively by cost of production.

In the fishery industry, gross fixed capital formation by type of assets include:

- a) fishing vessels,
- b) machinery and equipment (fishing gear),
- c) computer software, and
- d) boat houses.

Fishing vessels and fishing gear will be the most important assets. The main source for estimating gross fixed capital formation in fisheries are data collected through fishery census or sample surveys. The censuses will give the benchmark estimates by type of assets, while the sample surveys can be used to extrapolate gross fixed capital formation to other years. Alternatively, purchases of fishing vessels can be estimated by using data from supply and use tables in the overall national accounting system. Manufacturing statistics provide data for domestic supply of new fishing boats, while external trade statistics provide data for imports of new and old fishing boats. The exports of fishing boats, new and old, will also be available from the external trade statistics. Assuming that existing fishing boats sold domestically always are sold or purchased within the fishery industry, the acquisitions less disposals of fishing boats can be compiled as domestic production of fishing boats plus imports less exports (commodity flow method). In Norway, the Vessel Register by the Directorate of Fisheries can also be used to estimate of new boats and sales or purchases of existing boats.

Major renovations of existing boats which increase the productive capacity of the boats or significantly extend their previously expected service life, shall be treated as gross fixed capital formation. Major renovations of boats can be estimated in the same way as purchases of boats, as total domestic production plus imports less exports. Alternatively, benchmark estimates can be extrapolated by using data from sample surveys, if such exist.

If no data for gross fixed capital formation of machinery and equipment (fishing gear) are available, the benchmark estimate can be extrapolated by using the growth of purchases of fishing boats (in fixed prices) as indicator. Gross fixed capital formation in current prices is obtained by inflating the estimate in fixed prices with a price index for machinery and equipment.

The number of goods and services in the national accounting system will differ from country to country. The SNA 1993 recommends that the product classification should be based upon the Central Product Classification (CPC). At the 3-digit level there is only one product, while at the 5-digit level there are four products related to fisheries (fish, crustaceans, other aquatic products, and pearls). In Norway, seven fish species are specified as follows.

- a) salmon and trout (not important in fishery industry, but important in aquaculture),
- b) herring and capelin,
- c) cod,
- d) mackerel,
- e) other fish species,
- f) shrimps and shellfish, and
- g) other ocean products.

In addition, there is one item containing all fish species produced in own account fishing. In Norway, Classification of Products by Activity (CPA) is used for classifying the products. The breakdown of product is, however, also made taking into account which fish species are important for the Norwegian economy and at the same time trying to make the products as homogenous as possible.

Use of goods and services, both intermediate consumption and final uses, shall be recorded at purchaser's prices. The components of the purchaser's prices can be recognized as (SNA 1993 paragraph 15.26):

Basic price of the product as output,
 Plus (+) taxes on the product,
 Less (-) subsidies on the products,
 Plus (+) trade and transport margin in delivering the product to the purchaser (valued at basic prices).

The taxes/subsidies on products include both taxes/subsidies payable/receivable by the producer and the wholesalers and retailers. The product taxes also include non-deductible value added tax (VAT).

The domestic output given in the goods and services accounts should be fully consistent with the supply in the production accounts. The preferred method of valuation is at basic prices. The output of wholesale and retail trade is measured by the value of the trade and transport margins realized on the goods they sell. The margins are also valued at basic prices and should be done for each product. The compilation of the goods and services accounts is shown by the numerical example given in Appendix.

Changes over time in the values of flows of goods and services can be factors into one component reflecting changes in the price of the goods and services concerned and one component reflecting changes in their volume. One method to be used is to deflate every product flows in the goods and services accounts. In this way value added can be measured at constant prices by subtracting intermediate consumption at constant prices from output at constant prices. This is called the <<double deflation method>> (SNA 1993, chapter XVI).

5. ENVIRONMENTAL ACCOUNTING

The World Commission for Environment and Development has recommended that accounts of natural resources and state of the environment are developed and presented in addition to traditional national accounts. The UN Conference on Environment and Development in Rio de Janeiro in June 1992 emphasized natural resource and environmental accounting as important tools to obtain a sustainable development. The fifth environmental program of EU, which was adopted in 1992, also emphasizes the necessity of developing environmental accounts, and the goal is that environmental accounts shall be established in the Member States before the year 2000.

UNStat is developing a satellite system to the SNA, called System of Integrated Environmental and Economic Accounts (SEEA). A preliminary version of such a handbook was published in 1993, *Integrated Environmental and Economic Accounting*. SEEA consists of several different parts, with both physical and monetary accounts. The first step is to link environmental data expressed in physical units with the national accounts system. The second step will be the monetary accounts which are based on the physical accounts to evaluate the impact in economic terms.

SEEA comprises four sections which all have parts that can be combined with the traditional national accounts (see *Integrated Environmental and Economic Accounting 1993* chapter C3), these are:

- a) Disaggregation of the traditional national accounts so as to better illustrate environmental aspects (monetary accounts only) (part A);
- b) Description of the interrelationship between the environment and the economy in physical units (part B);
- c) Estimate of costs for use of natural assets (monetary accounts) (part C); and
- d) Extending SEEA further with, for example, the effects of using environmental services and the activities carried out by the households (part D).

Environmental accounts for fisheries should concentrate on part A and B. Part A provides the basic framework for the SEEA. It contains a description of the production and consumption activities (supply and use tables) and the accounts of non-financial assets. The assets accounts comprise opening stocks, net capital formation, other volume changes, revaluation due to market price changes and closing stocks. Part B comprises physical accounts shown as natural resource accounts and material/energy balances. Natural resource accounts show how nature is utilized or affected by the economy and also show the changes in natural resources, e.g. through economic influence. Apart from the flows into and inside the economy, the material flow consist of the flows of residuals leaving the economy and in turn the impact on the natural environment.

The Norwegian Ministry of Environment was established in 1972, and a search for suitable management tools for natural resources was initiated. Natural Resource Accounts (NRA) were seen as an important part of the necessary tool kit and from 1978 Statistics Norway was given the task of developing such accounts for Norway. The purpose of these accounts was to provide better and more long term planning of the exploitation of natural resources, and emphasis was put on the resource aspect.

The first NRA established for energy, minerals, forest, fish and land use in the early 1980s. Today there is less interest for natural resource accounts in Norway, and in their original form accounts are only worked out regularly for energy. The stock part of the accounts for fish and forest (woods) are also updated regularly (Sæbø 1994).

The Norwegian resource accounts are mainly material accounts. They comprise accounts for reserves in nature and for the material flow of resources from extraction until their use. Figure 1 shows the structure of the Norwegian material resource accounts (Alfsen 1996). Reserves of biotic resources are usually called stocks. In the Norwegian case, the stock accounts show how the stocks change due to recruitment and growth, revaluation (because of better knowledge) natural death, and extraction.

Some points which are worth noting with regard to the structure in Figure 1:

- a) The account consists of more than the reserves accounts (not for fish at the moment). This is essential when it comes to using the accounts for management purposes. It is important to know how they are going to be affected by a change of policy. The end use accounts are essential for this kind of analysis. The end use accounts should be consistent with the use side of the goods and services accounts (in the traditional national accounts), except that the former is in physical terms while the latter is in monetary terms. However, year to year changes for the different uses should be the same irrespective of whether the analysis is done according to the NRA or according to the goods and services account in constant prices.
- b) Although the accounts are kept in physical units, they are complemented with price information whenever market prices are available, allowing tables in monetary terms to be constructed. These should be consistent with the figures in the goods and services account in the traditional national accounts.
- c) The industrial classification of the extraction, conversion and trade accounts and end use accounts follow the SNA classification, thus facilitating a linkage between the resource accounts and the national accounts.
- d) A biotic resource like fish requires a relatively detailed reserve account with the specification of age structure and the localization of different fish stocks. The end use account is, however quite simple, since relatively few industries utilize fish as input for their production.

The Norwegian experience is that by using the same framework for analysis of both economic and environmental policies, consistency in behavioral and other key assumptions are secured. Furthermore, linking physical resource accounts and environmental statistics to economy-wide models provide for better and more comprehensive information on the value of natural resources and environmental services than through more partial studies. Recognizing this, it is important that the natural resource accounts are organized according to the classification standards (industry and product classifications) used in the national accounts. Another experience is that the end use of the resources should also be accounted for. This is important in order to be able to say something about who is going to be affected by a change in resource policy, how they may react to a change in policy and how this will in turn affect the resource depletion.

Valuation of the fish resources is problematic, since the value of the resources to society will depend on expectations about the future technological development as well as the development in process and extracted volumes. According to Alfsen (1996), these expectations will fluctuate very much and he recommends that the accounts are kept in physical units, and that additional valuation exercises are carried out as analytical projects when the need arises.

Country situations vary both regarding the endowment of natural resources and stage of economic development and regarding the political system and institutional set-up. For this reason, it can be difficult to set up a natural resource accounting system entirely according to international standards or other country schemes. It can be wise to think through which problem one is facing and whether a suitable natural resource account is likely to be useful for formulating a rational resource policy. <<International comparability is of course enhanced by following standards in natural resource accounting, but this is seldom a major concern within the context of natural resource and environmental management>> (Alfsen 1996, page 21).

REFERENCES

Alfsen, Knut H. (1996): Why Natural Resource Accounting? Documents 96/18, Statistics Norway

Keuning, Steven J. and de Haan, Mark (1996): What's in a NAMEA? Recent results of the NAMEA - Approach to Environmental Accounting. Paper presented at IARIW Special Conference in Tokyo, Japan 1996

Sæbø, Has Viggo (1994): Natural resource accounting - the Norwegian Approach. Notater 94/9, Statistics Norway

Nordisk Ministerråd (1996): Nordiska naturressurs - og miljøräkenskaper (Nordic Natural Resource and Environmental Accounting), delrapport 1, TemaNord MILJØ 1996:563, Nordisk Forlagshus

FAO: A System Economic Accounts for Food and Agriculture, FAO Statistical Development series 8, Rome 1996

Handbook of National Accounting: Integrated Environmental and Economic Accounting, UN Series F, No. 61 New York 1993

Inter-Secretariat Working Group on National Accounts (Commission of European Communities, IMF, OECD, UN, World Bank) System of National Accounts 1993

Fishery Statistics 1991-1992, Official Statistics of Norway, Statistics Norway 1995

GOODS AND SERVICES ACCOUNT

An example

1. The supply side:

- From the production accounts the output of fish, at basic prices alternatively at producer's prices, are known both for market and own account producers.
- Imports are given in the external trade statistics, valued at c.i.f.-prices.
- In the example there are no import duties, but these can normally be estimated using information from the customs office.
- Taxes less subsidies on products are generally available from the government offices collecting the taxes and responsible for implementing the subsidies schemes. Normally, it will be known whether the taxes/subsidies should be allocated to one or several products. A tax which is levied on first-hand value of landed fish, can be allocated to the different fish species in proportions with the first-hand values. Normally, it will be known whether the product taxes are paid by the producer or by the wholesaler/retailer.
- Value added tax by product have to be estimated. The compilation will be done at the use side of the goods and services account.
- Trade and transport margins by products will normally have to be estimated on the use side of the account.

2. The use side:

- From manufacturing statistics intermediate consumption of fish will be known or can be estimated. If the surveys are carried out periodically, the benchmark estimates can be extrapolated to other years on the basis of output manufacturing establishments assuming a fixed input-output ratio. Intermediate consumption will be valued at purchaser's prices excluding deductible VAT. The value of intermediate consumption of fish should be consistent with intermediate consumption in the production account for processing and preserving of fish, etc.
- Intermediate consumption in industries such as hotels and restaurants can be difficult to allocate by products. Normally, total input costs only will be available. To estimate the breakdown by specific products it can be necessary to carry out periodically sample surveys of the costs in the hotels, restaurants etc. The benchmark estimates can be extrapolated to other years by using the industries' total intermediate expenditures. Intermediate consumption of fish in hotels, restaurants, hospitals etc. is probable of minor importance in the goods and services account.

- Household final consumption expenditure can be estimated from the household budget surveys.
- Exports of fish will be available from the external trade statistics.
- An alternative method of obtaining data on the use of fish is to carry out periodic surveys within the sales associations. The surveys should be designed to cover all users, both in manufacturing and other industries, for households and for exports.
- Changes in inventories can be difficult to estimate on the basis of surveys. If it is possible to establish information on all the various kinds of uses, reconciliation of both the supply and use side of the goods and services account is necessary. Changes in inventory may be considered one of the weakest estimates, and if one chooses to make a less sophisticated balancing method, changes in inventories may be derived residually. However, even if the changes in inventories are derived residually, it will be necessary to analyze the data and perhaps compromise on one of the other flows.

3. The allocation of the purchaser price:

a) *Value added tax*

The VAT rate is known from the tax regulations. VAT on products can be compiled by the following formulas:

- i) $VAT(i) = X_i (1 - 1/(1 + a_i))$
- ii) $VAT(j) = \sum VAT(i)$

where X_i is the purchaser value for user i , a_i is the VAT rate for user i (= zero if deductible VAT) and $VAT(j)$ is total VAT on product j .

In the numerical example in Table 4, VAT rate is 15%. Exports are exempted from VAT. For manufacturing and restaurants the purchaser value is exclusive deductible VAT, and VAT on immediate consumption for these industries will therefore be zero. In Norway, hospitals are not in a position to deduct VAT on intermediate consumption. In the example, one fourth of the aggregate intermediate consumption in hotels, restaurants, hospitals etc. is assumed to be input in hospitals. The households' purchases from market producers are 450 and own account production (consumption) is 50. VAT are not levied on households and production for own final consumption and this should be taken into account when compiling VAT on households consumption expenditures. TOTAL VAT on fish is estimated to be 62 in the numerical example.

b) *Trade and transport margins*

Data on trade and transport margins by product (or product groups) and user will normally have to be obtained from sample surveys. In the example in Table 4, margin rate for fish delivered to manufacturing is zero, for deliveries to other industries the margin rate is 0.25, for fish delivered to households the rate is 40% of the first-hand value of landed fish, for exports the margin rate is 10%. The margins for each product flow can be estimated by:

- i) $M(i) = [X_i/(1+a_i)] (1-1/(1+m_i))$
- ii) $M(j) = \text{sum } M(i)$

where M_i is the margin for user i , X_i is the purchaser value for user i , m_i is the margin rate for user i , and $M(j)$ is the total margin on product j .

There will be no trade margins on fish catches for own consumption. This will have to be taken into account when compiling the trade margins on households consumption expenditures.

c) *Product taxes and subsidies*

In the example, there is a general tax levied on the first-hand value of landed fish, irrespective of whether the fish is landed in Norway or abroad. No tax is levied in fisheries for own final use. The tax is allocated to all users, except changes in inventories, in proportion with their purchaser value less VAT and trade margin (will be consistent with the first-hand value on each flow).

d) *Basic prices*

On the use side of the account, values at basic prices are derived as a residual (purchaser value less VAT less trade and transport margin less taxes plus subsidies on products).

Balancing the goods and services accounts

The supply at basic prices is known from different sources, so are the uses at purchaser's prices (except changes in inventories) and the total product tax (except VAT). VAT and trade and transport margins are compiled on the use side of the account. What balances the account is the item of changes in inventories, compiled as total supply at basic prices (including trade and transport margins) plus taxes less subsidies on products (including VAT) less all the uses at purchaser's prices.

Table 1. Production account for the fisheries industry* - Norway 1993
(Million Kroner)

USES		RESOURCES	
Intermediate consumption (valued at purchaser's prices):		Market output (valued at basic prices):	
Fuel and oils	679	Salmon and trout	16
Repairs of fishing vessels	675	Herring and capelin	829
Repairs of machinery and equipment	345	Cod	1990
Food	141	Mackerel	517
(provided to fishermen on the boat			
Salt, bait, package, etc.	137	Other fish species	1733
Different equipment	148	Shrimps and shellfish	613
Different services	234	Other ocean products	384
		Income from other sources	21
		Output for own final use:	
		Fixed assets produced for own use	14
		Fish for own final consumption	159
Total intermediate consumption	2359	Total market and non-market output	6276
Value added, gross	3917		
- Consumption of fixed capital (not available in Norway at the moment)			
= Value added, net (not available in Norway at the moment)			

* Includes both market production and households production for own final consumption (non-market)

Table 2. Generation of income account for the fishery industry - Norway 1993
(Million Kroner)

USES		RESOURCES	
Compensation of employees	1478	Value added, gross	3917
Taxes on production	239		
Subsidies on production	-342		
Mixed income and operating surplus, gross	2542		

**Table 3. Gross fixed capital formation for the fisheries industry - Norway 1993
(Million Kroner)**

Acquisitions of:	
Vessels	
Machinery and equipment	370
Fixed assets produced for own use	166
	14
Sales of existing vessels	-271
Gross fixed capital formation	279

Figure 1. Structure of the Norwegian material resource accounts

I. Reserve accounts	
Start of period	Resource base Reserves (developed and non-developed) Total gross extraction during the period Adjustments of resource base (new discoveries, reappraisals) Adjustments of reserves (new technologies, cost of extraction, transport, etc., resource prices)
End of period	Resource base Reserves (developed and non-developed)
II. Extraction, conversion, and trade accounts (by industry)	Extraction net + Imports - Exports + Changes in stocks = For domestic use
III. End use accounts	End use by economic sectors (industry, households and exports)

Table 4. Account for fish (e.g. cod) at current prices

RESOURCES

	Basic prices	Taxes less subsidies on products (payable by the producer)	Trade and transport margin (basic value)	Taxes less subsidies on products (payable by the wholesaler/retailer)	Value added tax	Purchaser prices
Output from fisheries (market)	2300					2300
Output for own use	50					50
Imports	200		267			200
Trade and transport margins						267
Value added tax		60			62	62
Product taxes less subsidies		(57)				60
Total	2550	60	267	0	62	2939

USES

	Basic prices	Taxes less subsidies on products (payable by the producer)	Trade and transport margin (basic value)	Taxes less subsidies on products (payable by the wholesaler/retailer)	Value added tax	Purchaser prices
ISIC 1512 Processing and preserving of fish and fish products	684	16				700
ISIC 1514 Manufacturing of vegetable and animal oils and fats	195	5				200
Intermediate consumption in industries such as hotels and restaurants, hospitals, etc.	76	2	19		3	100
Households final consumption expenditure	323	6	112		59	500
Exports	1333	31	136			1500
Changes in inventories	-61					-61
Total	2550	60	267	0	62	2939