Ninth Meeting of

The London Group on Environmental Accounting

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The London Group on Environmental Accounting was created in 1993 to provide an informed forum for practitioners to share their experience of developing and implementing environmental satellite accounts linked to the economic accounts of the System of National Accounts. It convened its first meeting in March 1994 in London, England. Participation includes representatives from statistical offices and international organizations. The meetings are hosted voluntarily by participants one at a time and each has provided facilities and secretarial functions for the meetings.

The London Group on Environmental Accounting may also be contacted on the Internet at:
http://www4.statcan.ca/citygrp/london/london.htm

Preface

Since 1994 **the London Group on Environmental Accounting** has provided a forum for practitioners to share their experience of developing and implementing environmental accounting linked to the System of National Accounts. The London Group plays a leadership role in defining and sharing international best practices in the field of environmental accounts.

On 22-24 September 2004 Statistics Denmark hosted the 9th London Group meeting at Eigtveds Pakhus in Copenhagen. The meeting was attended by 40 participants representing 23 countries and 6 international organisations.

The first session of the meeting was traditionally devoted to the progress made in individual countries and organisations since the previous meeting in Rome in September 2003. The other sessions focused on subsoil asset accounting, water accounting, social dimensions, material flow accounting and policy uses of environmental accounts.

This publication includes all the papers presented at the meeting as well as short summaries of the discussions.

The editing of this publication has been done by Head of Section Ismir Mulalic, National Accounts Division.

Statistics Denmark, April 2005

Jan Plovsing
Director General

Ole Gravgård
Chief Adviser

Participants

Aldo Femia, *Italian National Statistical Office ,Italy*
Alessandra Alfieri, *United Nations, USA*
Alexander Opitz, *Federal Statistical Office Germany, Germany*
Anders Wadeskog: *Statistics Sweden, Sweden*
Aneme Malan: *Statistics South Africa, South Africa*
Bent Thage: *Statistics Denmark, Denmark*
Carol Chouchani: *Cherfane ESCWA, Lebanon*
Christian Ravets: *EUROSTAT*
Estrella Domingo: *National Statistical Coordination Board, Philippines*
Evelyn Segakweng: *Statistics South Africa, South Africa*
Glenn-Marie Lange: *Columbia University, USA*
Grégoire Devaud: *Institut Français de l'Environnement, France*
Hussein Abaza: *United Nations Environment Programme, Switzerland*
Ilaria DiMatteo: *United Nations, USA*
Ismir Mulalic: *Statistics Denmark, Denmark*
Jana Tafi: *Water Data Centre / Moldova, Denmark*
Jean-Louis Weber: *European Environment Agency, Denmark*
Jean-Michel Chene: *United Nations, USA*
Jinnan Wang: *Chinese Academy for Environmental Planning, China*
Jukka Muukkonen: *Statistics Finland, Finland*
Julie Hass: *Statistics Norway, Norway*
Karl Schoer: *Federal Statistical Office Germany, Germany*
Laila Oulkacha: *Ministry of Environment, Morocco*
Maja Larsson: *Statistics Sweden, Sweden*
Martin Lemire: *Statistics Canada, Canada*
Michael Vardon: *Australian Bureau of Statistics, Australia*
Ole Gravgård: *Statistics Denmark, Denmark*
Osama Al-Zoubi: *Department of Statistics, Hashemite Kingdom of Jordan*
Raul Figueroa: *Instituto Nacional de Estadística Geografía e Informática of Mexico, Mexico*
Rayen Quiroga: *Economic Commission for Latin America & the Caribbean, Chile*
Robert Smith: *Statistics Canada, Canada*
Rocky Harris: *Department for Environment and Rural Affairs, UK*
S.K. Nath: *Ministry of Statistics and Programme Implementation, Government of India, India*
Sjoerd Schenau: *Central Bureau of Statistics, The Netherlands*
Stefan Schweinert: *Federal Statistical Office Germany, Germany*
Thomas Olsen: *Statistics Denmark, Denmark*
Viveka Palm: *Statistics Sweden, Sweden*
Yixuan Wang: *National Bureau of Statistics, China*

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Welcome speech by Bent Thage, Director, Statistics Denmark

It's a pleasure for me to welcome you all here in Copenhagen at this 9th London Group meeting. It is a pleasure for me to see so many participants from around the world gathered here with the purpose of bringing environmental accounting forward.

It is also a personal pleasure for me that the London Group meets in Denmark, because I have for more than thirty years been involved in the developments leading up to the environmental accounting activity which is now taking place in Statistics Denmark, and because it gives me the opportunity to express my appreciation of the work that the London Group is carrying out. We have participated in and supported the activity of the group since its start 10 years ago.

Without the work of the London Group, the SEEA 2003 would not exist. With the SEEA 2003 it has become obvious that a lot of experience has been gained on environmental accounting, and it is now possible to see more clearly what the state of the art is in environmental accounting and how we can relate it - and benefit from it - in official statistics, which is always a concern for a statistical office.

The SEEA 2003 is of course important on its own premises, but as one of those who has been involved in the development of national accounts for many years – and in the early discussions about environmental accounting as well – I find it fascinating to draw some parallels between the present relationship of national accounts to environmental accounting and the discussion that took place when the first SEEA and the 1993 SNA were drafted almost simultaneously 12 to15 years ago.

Here I'm thinking especially about the discussion on green GDP, which was ignited by the Brundtland Report that came out in 1987, and soon took on an almost religious character. According to this discussion there were two types of people in the world, the good ones, and the bad ones, and there were two alternative positions you could take on national accounts, either you were in favour of substituting the traditional national accounts with green national accounts, coming complete with a GREEN sustainable GDP, **or** you were completely opposed to such an idea. Now you could easily find out whether you belonged to the good or the bad folks. It so happened that there was a complete overlap between the good folks and those in favour of green GDP, and the bad guys were those in favour of traditional national accounting.

I believe that the outcome of that discussion – to stick to the traditional system of national accounts - and to see environmental accounting as an emerging satellite system where a lot of research and investigation was still needed – was a fortunate one, to which in all modesty I also contributed, and thus – I have to confess – being on the team of the bad guys – I was advocating old fashioned and slightly ridiculous ideas about official statistics being based on observed data.

Now, when we look at the present process of updating the 1993 SNA, it is interesting to note that the subject of the green GDP - and most other environmental issues for that sake - are completely absent from the discussion. Although some of the major changes proposed are more capitalising (such as research and development and military expenditures), it does not include the environmental assets that were so prominent in the earlier discussions.

I don't think that this is because environmental and resource issues are not important in national accounting. But I believe that the reason why the subject is not in focus in the present revision process of SNA is that it has been very well taken care of within

the comprehensive satellite system, that the SEEA 2003 constitutes, and because a lot of things are much clearer now due to the work done by you - the London Group.

It also shows that the idea of satellite accounting is an excellent tool to handle areas, that are controversial in relation to the national accounts – and it shows that the London Group so far has done a very professional and future-oriented job with the environmental satellite accounts.

Talking about the future - as a statistician I can not resist the temptation to make some observations about the size of new SEEA compared to the 1993 one – 575 pages compared to 185, and relate this observation to the historic development of the SNA, from less than 100 pages in the first edition in 1953, to 245 in 1968 and 715 in 1993. From these observations we can easily identify a factor of about 3 from one edition to the next. Hopefully, when the next edition of the SEEA – containing about 1700 pages, comes out in ten years time, we will have moved to the paper-free society, or the book itself will pose a considerable threat to the environment.

From the view point of Statistics Denmark the development of environmental accounts began many years ago, although we did not use that term. Already during the first energy crises in 1973 we combined input-output tables and physical energy matrices to calculate direct and indirect energy contents per unit of output and per direct and indirectly employed person. From the second energy crises in 1979 we did this on a current basis, using our system of annual IO-tables and energy matrices (only we were so naive that we did not know that this was called hybrid accounts). And later on Ole Gravgård developed among other things the Danish NAMEA and Physical input-output tables. So even though we have only a relatively small section dealing with environmental accounting it is one that we take pride in.

The importance we attach to environmental accounting is also reflected in the official Strategy 2006 of Statistics Denmark. Within my field of economic statistics, one of the objectives set by the Strategy is that (and I quote) “statistics on the environment and energy will be linked to the national accounts as satellite accounts. This will allow for better comparisons of economic and environmental development and will contribute towards the debate on sustainable development.” Seen in this perspective it has been very useful for us to participate in the London Group meetings during the ten years that has passed since the first London Group Meeting in London in March 1994.

This is the 9th time that the London Group meets. From the start in 1994 it was the idea that the London Group should provide a forum for practitioners to share their experience of developing and implementing environmental satellite accounts linked to the economic accounts of the System of National Accounts.

I’m convinced that if statisticians and researchers are going to do a good job and to bring things forward, it is necessary that they have a forum in which they can meet and exchange ideas and experiences.

Obviously, for experts in environmental accounting the London Group is an important, if not the most important forum. Therefore, I find it very useful that the London Group exist and meets on a regular basis.

This meeting is special in the sense that the London Group is at a crucial stage. During the process of the revision of SEEA, there was a clear goal and objective with the meetings, namely to discuss and bring forward the completion of the SEEA 2003.

Now, after this work has been completed, the role of the London Group is perhaps not quite as clear. The more diffuse situation in which the London Group has found itself at the meeting last year in Rome and now at the start at this meeting here in Copenhagen, doesn't mean that there is a lack of work or challenges for it to take on, but it means that the Group continuously needs to think about and discuss its specific means and objectives, and how it best can act as a forum to share experience of developing and implementing environmental satellite accounts and – very importantly - to take leadership in this field.

Three strategic areas were agreed upon last year at the London Group meeting in Rome and these areas were mentioned in the report of the London Group to the UN Statistical Commission in March this year:

- *The first* strategic area that was mentioned is that the London Group should consolidate work in areas that are already advanced.

- *The second* is to continue theoretical and practical development of environmental accounting.

- And *the third* is to assist in the implementation and use of SEEA 2003 to inform policy debates at the national and international levels in the individual countries.

These are of course very broad strategic areas, and to narrow it down it was decided as a first step to establish four sub-groups, each working with a specific subject. The four groups are water accounting, subsoil assets accounting, policy uses of environmental accounts and finally a group on the introduction of social dimensions in the SEEA in relation to sustainable development.

These four subjects are the main areas that will be discussed here during these coming three days. I'm confident that the presentation and discussions will be fruitful in bringing these areas forward, and that we will learn by listening and by discussing both during the sessions and during the breaks and social arrangements.

Agenda

Wednesday 22 September

1. Welcome and country updates (Chair: Ole Gravgård)

9.15-9.30	Bent Thage, Director, Statistics Denmark: *Welcome*
9.30-10.00	Alessandra Alfieri and Robert Smith: *Summary of the report of the London Group to the UN Statistical Commission and information on the UN Task Force on EEA*
10.00-10.20	Alessandra Alfieri*: Status of the publishing of SEEA – glossary and index*
10.20-10.50	Break
10.50-12.00	Participants: *Country updates - short presentations by countries/organisations*
12.00-13.00	Lunch
13.00-14:15	Participants: *Country updates - short presentations by countries/organisations*

2. Subsoil asset accounting (Chair: Martin Lemire – rapporteur: Thomas Olsen and Ismir Mulalic)

14:15-14:20	Ole Gravgård: *Introduction to the session*
14.20-14.45	Aneme Malan: *South Africa's experience in the compilation of mineral (physical and monetary) accounts*
14.45-15.15	Break
15.15-15.40	Kristine Erlandsen: *Overview of the Norwegian Asset Accounts for Oil and Gas, 1991-*2000 (presentation by Julie Hass)
15.40-15.55	Christian Ravets: Eurostat's work on oil and gas assets
15.55-16.15	Alessandra Alfieri: Mineral exploration: current discussion in *the Canberra II Group on non-financial assets*
16.15-17.00	Ole Gravgård: *Presentation of the results of a questionnaire concerning subsoil asset accounting*
	Discussion of the future work on subsoil assets

Thursday 23 September

3. Water Accounting (Chair: Alessandra Alfieri – rapporteur: Ilaria Di Matteo)

9.00-9.10 Ilaria DiMatteo: *Overview of water subgroup work*

9:10-9.30 Jean-Michel Chéné: Implementation of the Physical Accounts

9.30-10.00 Sjoerd Schenau: *NAMWA, the Dutch System of Water Accounts*

10.00-10.30 Viveka Palm: *Swedish water accounts by water district*

10.30-11.00 Break

11.00-11.30 Michael Vardon and Stuart Peevor: *Water Accounting in Australia – Use and Policy Relevance*

11:30-12.00 Jana Tafi: *Water accounts in the Republic of Moldova: pilot study, results and advantages*

12:00-13.00 Lunch

13.00-13.30 Ilaria DiMatteo and participants: *Discussion of further work on water accounting*

4. Social dimension in environmental accounts (Chair: Robert Smith – rapporteur: Julie Hass)

13.30-13.35 Viveka Palm: *Introduction to the session*

13.35-14.05 Norbert Schwarz, Alexander Opitz: *Income and Expenditure of Private Households in the Context of a SAM – Concepts and First Results for Germany*

14.05-14.35 Anders Wadeskog: *Households in the environmental accounts*

14.35-15.00 Break

15.00-15.30 Ismir Mulalic: *Embedding social dimensions into economic and environmental accounting and indicator systems*

15.30-16.00 Rocky Harris: *Monitoring the relationship between household consumption and environmental impact*

16.00-16.30 Maja Larsson: *New Socio-economic dimensions in the environmental accounts*

16.30-17.00 Viveka Palm and participants: *Discussion of further work on social dimensions in environmental accounts*

18.00 Visit to Christiania – an alternative community in Copenhagen

19.30 Informal dinner

Friday 24 September

5. Material Flow Accounting (Chair: Ole Gravgård – rapporteur: Thomas Olsen)

9.00-9.30 *Stefan Schweinert: Accounts for primary material flows by branches and material categories-methodological concepts, results and applications*

6. Policy uses of environmental accounts (Chair: Alessandra Alfieri – rapporteur: Michael Vardon)

9.30-9.35 Jean Louis Weber: *Introduction to policy use session*

9.35-10.05 Maja Larsson: *Swedish economic instruments - Environmental taxes and subsidies in the environmental accounts*

10.05-10.35 Viveka Palm: *Policy uses in the Swedish SEEA*

10.35-11.00 Break

11.00-11.30 Jean Louis Weber: *Indicators for Water and Land Issues*

11:30-12.00 Glenn Marie Lange: *Policy uses and application of water accounts*

12:00-13.00 Lunch

13.00-13.45 Jean Louis Weber and participants: *Presentation and discussion of some ideas for future* work

7. Summary of meeting and discussion of future work (Chair: Robert Smith – rapporteur: Rocky Harris)

13.45-14.15 *Summary of the sessions, discussion and conclusions for further work*

14.15-14.30 Break

14.30-15.15 *Summary of the sessions, discussion and conclusions for further work*

15.15-15.30 Alessandra Alfieri*: Suggestions concerning the relation between the UN task force and the London Group, discussion and conclusions*

15.30-16.00 Robert Smith and next host: *Other issues and discussion points (other issues for the London Group, next meeting, etc.)*

Session 1 Update by countries and organisations

Chair: Ole Gravgård, Statistics Denmark

United Nations E/CN.3/2004/19

Economic and Social Council

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Statistical Commission
Thirty-fifth session
2-5 March 2004
Item 5 of the provisional agenda[1]
Natural resources and environment statistics

Report of the London Group on Environmental Accounting

Note by the Secretary-General

In accordance with a request of the Statistical Commission at its thirty-fourth session,[2] the Secretary-General has the honour to transmit the report of the London Group on Environmental Accounting. The Commission is requested to review the work programme, proposed future plans and organization of the London Group.

[1] E/CN.3/2004/1.
[2] See *Official Records of the Economic and Social Council, 2003, Supplement No. 4* (E/2003/24), chap. I.A.

Introduction

1. In 1993, the United Nations Statistics Division issued *Integrated Environmental and Economic Accounting* (SEEA) as an interim handbook. In 1997, the Statistical Commission requested the London Group on Environmental Accounting to undertake a revision of SEEA. In 2003, the United Nations, the European Commission, the International Monetary Fund (IMF), the Organisation for Economic Cooperation and Development (OECD) and the World Bank issued, on the recommendation of the Statistical Commission, the final draft of *Integrated Environmental and Economic Accounting 2003* (SEEA-2003) on the Internet (http://unstats.un.org/unsd/environment/seea2003.htm) and as a "white cover publication". SEEA-2003 is currently being officially edited and a glossary and an index are being finalized.

2. Until 1997, the London Group served primarily as a forum for exchange of information on country experience in the compilation of SEEA. After a mandate was given to the London Group by the Statistical Commission to undertake a revision of SEEA, its meetings were fully devoted to the discussion of the draft chapters of SEEA-2003. At the conclusion of the final meeting on SEEA revision in Voorburg, the Netherlands, in 2001, it was recognized that despite the considerable progress in the area of environmental accounting presented in the revised SEEA, much methodological and practical work remained to be done. The London Group agreed that sharing country experience would continue to be a valuable way to advance theory and practice of environmental accounting. It also agreed that the Group should devote a significant portion of its efforts to advancing the theory and practice of environmental accounting. As a result of those considerations, the most recent meeting of the London Group, which was hosted by the Food and Agriculture Organization of the United Nations (FAO) in Rome (5-7 November 2003), was a combination of exchange of country experience and discussion of handbooks on best practices. Two handbooks, one on fishery resource accounting and another on water accounting, were presented. The handbook on fishery resource accounting will be submitted for publication by the United Nations, FAO and the United Nations University by the end of 2003.

3. The London Group spent much time in Rome discussing the lessons learned from the SEEA revision process and the future of the London Group. The present report reflects the conclusions of the meeting in two main areas; the London Group's future work plan and its organization.

Future work of the Group

4. The London Group will continue the work it began during the SEEA revision to provide leadership in defining international best practices in the theory and practice of environmental satellite accounting within the framework of the System of National Accounts. It will also continue to provide a forum for the sharing of national and international expertise and experience in this field. In order to achieve the above objectives, the Group has agreed to work in three strategic directions:

a) Consolidate work in those areas that are already advanced through the preparation of handbooks providing methodological and practical guidelines on the implementation of selected components of SEEA-2003 (e.g., water and mineral resources accounting);
b) Continue theoretical and practical development of components of environmental accounting that are not yet well advanced. This will be accomplished through ongoing discussion of specific issues selected by the London Group at its meetings. Discussions will take place between meetings and will involve those participants with the strongest interest and/or experience relating to the issue at hand;
c) Assist in promoting the implementation of SEEA-2003 in countries and the use of environmental accounts to inform policy debates at the national and international levels.

5. As a mode of operation to meet the first and second strategic directions above, the London Group has agreed to create working groups on selected topics. Four such groups were identified in Rome, one on water accounting (to be moderated by the United Nations Statistics Division), another on energy and mineral resource accounting (to be moderated by Statistics Denmark), a third on policy uses of environmental accounts (to be moderated by Statistics Sweden and the European Environment Agency) and a fourth on means of introducing social dimensions into environmental accounts as a basis for contributing to sustainability assessment (to be moderated by Statistics

Sweden). Electronic discussion groups on those topics will be established; the precise scope and objectives for their work will be determined by their members, but some of their objectives were discussed in Rome, as described below.

6. The working group on water accounting will:
   a) Review and provide input on the draft handbook on *Integrated Environmental and Economic Accounting for Water Resources*;
   b) Contribute to the electronic discussion group on terms and definitions related to water accounting established by the United Nations Statistics Division and Division for Sustainable Development with a view to harmonizing the definitions and classifications used in international questionnaires with the accounting framework;
   c) Prepare an issue paper on the expansion of the water accounting framework to social aspects;
   d) Contribute to the discussion on water indicators that will be a topic in the next *World Water Development Report*.

7. The working group on energy and mineral resource accounting will:
   a) Carry out a survey on country practices in the compilation of mineral resources accounting;
   b) Prepare guidelines on the compilation of subsoil asset accounts;
   c) Consider the discussions of the Canberra II Group on the Measurement of Non-Financial Assets as they relate to subsoil assets.

8. The working group on policy uses of environment-economic accounts will:
   a) Identify policy needs in relation to environmental accounting;
   b) Identify means to communicate with the user community so as to promote the usefulness of environmental accounts in the policy process;
   c) Identify current applications of environmental accounts in the policy process.

9. The working group on introduction of social dimensions will coordinate and prepare an issue paper on how a limited number of social variables could be included in SEEA to contribute to the analyses on sustainable development.

10. In terms of the promotion of the application of SEEA (the third strategic direction), the London Group stressed the importance of maintaining links between data producers and users. Environmental accounts have now reached a level of methodological development that justifies their entry into the mainstream. In particular, the accounts should be better integrated with existing environmental data-collection and indicator activities and could be used more frequently in the policy process. The London Group will seek opportunities to promote these objectives at the national and international levels.

Organization of the Group

11. The London Group was established in 1994 by the Office for National Statistics of the United Kingdom, Statistics Canada and the Statistical Office of the European Communities (Eurostat). It met for the first time in London (hence its name). During the London Group's initial period, the founding agencies and host countries provided coordination and planning of meetings (proceedings, agenda, communications, etc.). In 1997, a secretariat was established at Statistics Canada following a meeting held in Ottawa.

12. When the London Group took on the challenge of SEEA revision, additional coordination was required, which resulted in the involvement of the international agencies that would eventually publish the handbook (Eurostat, IMF, OECD, World Bank and the United Nations Statistics Division) in a formal coordinating committee for the London Group established in 1999. The committee also comprised Statistics Canada (as secretariat) and the previous and future host organizations to ensure continuity.

13. With the completion of SEEA-2003, the need for coordination is less urgent. At the meeting in Rome, it was agreed that a smaller coordinating committee would be retained, comprising Statistics Canada (as secretariat), the

future host organization and the United Nations Statistics Division. The committee is open to other member organizations as well if they wish to participate.

14. The role of the coordinating committee is to:

a) Coordinate the activities of the London Group, including the organization of its meetings and preparation of its proceedings;
b) Identify priority areas of work, in consultation with the members of the London Group;
c) Facilitate the creation and functioning of working groups on selected practical or theoretical topics;
d) Assist in the coordinating of environmental accounting activities at the international level by maintaining communication with the Intersecretariat Working Group on National Accounts and the Inter-Agency Working Group on Environment Statistics;
e) Promote the use of SEEA-2003 and environmental-economic accounts in general as a framework for data collection and indicators and for policy uses.

15. The London Group web site (http://www4.statcan.ca/citygrp/london/london.htm), maintained by its secretariat, played an important role during the revision of SEEA by ensuring that the international community was informed of the developments in the revision process and providing opportunities for commenting on draft chapters. At the most recent meeting in Rome, it was agreed that the web site will continue to serve as the main tool for the London Group to communicate with other organizations with an interest in environmental accounting.

Participation in the Group

16. The London Group is open to the participation of countries that are active in environmental accounting. Until 1997, its meetings were attended mostly by developed countries. During the SEEA revision process, developing countries with experience on environmental accounting were invited to attend the meeting with the financial assistance of the United Nations Statistics Division.

17. The practice of having a range of countries with various environmental concerns is considered useful and the group has encouraged the United Nations Statistics Division to continue funding the participation of developing countries.

18. In order to maintain its focus the London Group agrees that participation in its meetings will be limited to statistical offices and international agencies with active, well-developed programmes of environmental accounting. Experts on specific topics will be invited on an ad hoc basis.

Frequency of meetings

19. The London Group has agreed to continue meeting on a yearly basis. The next meeting will be hosted by Statistics Denmark and is tentatively scheduled for September 2004 in Copenhagen. The newly established working groups may decide to meet on an ad hoc basis, when necessary, to facilitate their work.

Points for discussion

20. The Commission may wish to review the London Group's work plan and the organization of its work.

AUSTRALIA

by Michael Vardon (Environment and Energy Australian Bureau of Statistics Canberra) and David Bain (National Accounts Research Australian Bureau of Statistics Canberra)

Introduction

Work on environmental accounting in the ABS occurs in two areas – the National Accounts Branch and the Environment and Energy Statistics Section. This report covers activities in both parts of the ABS.

The National Accounts Branch is responsible for the compilation of the Australia National Balance Sheet, which includes environmental assets. The Environment and Energy Section compiles the physical flow accounts (e.g. water and energy) and environment protection expenditure accounts. The two areas are both located in Canberra and have a very good working relationship.

Work on human and social capital is occurring at the ABS but not covered by this report. Various indicators are used in Measures of Australia's Progress (ABS Cat. no. 1370.0) and a paper on the human capital work will be release in the six months or so. For more information on this work please contact Hui Wei (hui.wei@abs.gov.au) or go to the *Social Capital* theme page on the ABS web-site: http://www.abs.gov.au/Websitedbs/c311215.nsf/20564c23f3183fdaca25672100813ef1/3af45bbd431a127bca256c22007d75ba!OpenDocument

Water Accounting

Latest release

The second edition of the Water Account, Australia (ABS cat. no. 4610.0) was released on 19 May 2004. This edition of the water account had a more detailed industry breakdown and was generally of a high quality than the first edition of the account. However, because of differences in climate, methodology, (improved) measuring and reporting, and some changes to definitions the first account cannot be strictly compared to the second.

The scope of the account is limited mainly to the physical flow (supply and use) of water in the Australian economy, but it also contains some information on water stocks, environmental flows and water trading. The second account has a different format from the first, with chapters addressing water supply and water use in different sectors.

Members of the London Group can download copies of the water account from the ABS website. To do this a "key" is needed and those interested should contact Michael Vardon (michael.vardon@abs.gov.au).

Next edition

The reference year for the next edition will be 2004-05. A paper titled "Improving the ABS Water Accounts" was presented to the Economic Statistics User Group, an ABS forum with representatives from the Reserve Bank of Australia (central bank), Department of Finance and Administration, the Treasury and other areas of government involved in economic policy and analysis. The full paper is available from Michael Vardon. The main priorities given in the paper are:

1. Develop consistent and comparable data sources to establish a time series and
2. Provide data regularly (four yearly, but ideally more frequently)
3. Reduce the time between the reference period and the publication of information (from three to two years)
4. Provide regional information on water use (at least for agriculture in the major irrigation areas)

5. Include information on the economics of water supply and use
6. Integrate ABS water accounts with other major water information sources (e.g. the Bureau of Meteorology)

To make significant improvements the ABS will need to undertake additional collection activity and take a more active role in liaising with other agencies, and in particular promoting the adoption of standards and coordinating reporting. To undertake 4 -6 above would require additional resources so it is by no means certain that the next water account will include those components (see the discussion under "The Future").

National Balance Sheet

The ABS continues to value environmental assets. The Australian national balance sheet recorded $4,190b worth of assets at 30 June 2003, of which $1,622b (39%) were economic environmental assets. The value of environment assets is presented below. More detailed information is available (e.g. estimates are available for each of Australia's states).

AUSTRALIA'S ENVIRONMENTAL ASSETS - 30 June

	1995	1999	2003
	$b	$b	$b
Rural land	68	105	145
Other land	558	730	1,205
Oil and gas	55	72	124
Other subsoil	38	68	138
Native standing timber	2	2	3
Plantation standing timber	6	7	7
Total assets	727	984	1,622

Source: Australian System of National Accounts, 2002-03 (5204.0).

While land accounts for 83% of the value of Australia's economic environmental assets, the value of rural land accounts for only 11% of the total value of land (see table). Subsoil assets account for 16% and timber (native and plantation) account for 1% of Australia's economic environmental assets. The value of environmental assets in current prices grew strongly during the 1990s, more than doubling between 30 June 1995 and June 30 2003. Much of this growth was due to rising prices and environmental assets only grew by 6% in chain volume terms during the same period.

The ABS is continuing to produce experimental estimates of GDP adjusted for the depletion and additions to environmental assets. Depletion adjustments have been made for subsoil and land assets, and in both cases these unambiguously lower the net values. If the value of discoveries is included in income in place of the value of mineral exploration, the net effect of that adjustment can be positive or negative. For more information please contact David Bain (david.bain@abs.gov.au).

Over the next few years the ABS will investigate the possibilities of developing experimental estimates for the value of water. Data will be a key limitation, but with the trading of water rights Australia now has a direct price for some water, in some areas.

The Future

The ABS environment accounting program is not as strong as it has been in the past. The program has suffered significant cut backs to budget and lost some key staff. As such, the environmental accounting in the ABS is currently limited to:

- Valuing of environmental assets on the balance sheet,
- Physical flow accounts for water

- Environment protection expenditure account for local government

Work on an energy account has been deferred until the second half of 2005, and it is highly unlikely that waste, minerals, fish, land or forest/timber accounts will be produced in the near future.

Funding to revitalise the environmental accounting program is being sought through government processes but the outcomes of this request will not be known until May 2005.

CANADA

Statistics Canada

Annually or biennially updated accounts:

- Asset accounts for oil, gas, minerals and timber (physical and monetary). Data series cover generally the period 1976-2001
- Energy use (1990-2000)
- GHG emissions (1990-2000)
- Environmental protection expenditures (biennial; up to 2002)

Work is under way to bring diamonds and offshore crude oil and gas extractions into the subsoil accounts.

Data for energy use and GHG emissions are presented for over 100 industries plus a wide array of household and government activities. Planning on increasing the timeliness of these accounts has started (from four to two years behind the reference year).

For the first time in 2002, environmental protection expenditures/revenues data have been collected on the sale of greenhouse gas technologies and the use of these technologies by Canadian businesses.

All asset accounts data are available electronically through Statistics Canada's socio-economic database (CANSIM). Data on environmental protection expenditures are available in the form of electronic reports while data for energy use and GHG emissions have been published irregularly at this point in time.

Irregularly updated accounts:

- Water extraction and use (latest year 1996)
- Land cover and use

Recent Projects

National Balance Sheets – For the first time in 2004, the value of natural resource assets (energy, mineral and resources) has been included in the National Balance Sheets Accounts. Annually, national wealth advanced 4.9% without natural resources – 7.1% if the increase in the value of natural resources is included. The value of energy resource assets accounts for more than 50% of the resource wealth in 2003.

Land Accounts – Work is progressing in three areas: 1) analysis of the amount and growth patterns of urban areas in Canada and their impact on other land uses, including wildlife habitat and agriculture; 2) development of a Canadian land cover change matrix covering the years 1990, 1995 and 2000 using guidelines as established by SEEA; and 3) analysis and production of various urban indicators related to urban transportation, land use mix and growth.

An analytical study on "The consumption of dependable agricultural land by urban and other non-agricultural land uses" will be released early in the next year.

General Social Survey 2003: Social engagement in Canada – Statistics Canada released in June 2004 the results of the 2003 General Social Survey. This is the first time that Statistics Canada has attempted to measure issues related to 'social capital' directly. Over the course of their lives, Canadians engage in many types of civic and social activities that play a vital role in the health and vitality of the nation. Preliminary findings of a new report show a

positive relationship between the various dimensions of this 'social capital' and the satisfaction people derive in their lives.

This social capital has attracted the interest of researchers and policy-makers. Many of them wish to develop a better understanding of how social networks and norms of trust and reciprocity may contribute positively to individual and social outcomes (a network-based approach as opposed to a functional approach, which includes all social resources that facilitate collective action under the rubric of social capital).

Statistics Canada has not played a major role until now in the "operationalization" of the concept of social capital in Canada. The "Policy Research Initiative", an independent organization that receives administrative support from the Privy Council.

Environment and Sustainable Development Indicators – The Government of Canada has committed to develop three of the indicators (out of the six) as recommended by the National Round Table on Economy and the Environment in the summer of 2003. These indicators are air quality, water quality and greenhouse gas emissions. Statistics Canada will be instrumental in developing new/modified statistical surveys and for supporting the efforts on reporting the indicators (notably by linking this information to existing economic data).

The National Round Table on Economy and the Environment (NRTEE) Initiative's on Environment and Sustainable Development Indicators was a three-year initiative (2001-2003) to develop a small set of national-level indicators that take account of those assets that are necessary to sustain a healthy economy, society and environment for Canadians. One of the main recommendations of the final report, with the development of the six indicators, is that Statistics Canada expands the System of National Accounts to track all forms of capital (natural, human and, over time, social) that will contribute to future growth.

CHINA

Research on GREEN GDP ACCOUNTING IN CHINA: REVIEW AND OUTLOOK

by WANG Jinnan, JIANG Hongqiang and YU Fang
(Chinese Academy for Environmental Planning, Beijing 100012, P. R. China)

Abstract: The background of the proposal of green GDP accounting in China was analyzed. The historic development of relevant researches and practices on green GDP in China was discussed from three stages, and existing problems pointed out. Four suggestions for the future work on green GDP accounting in China were provided.
Keywords: green GDP; environmental economic accounting; development; outlook; China

Background

The establishment of green national economic accounting system in China is based on the inherent shortages of traditional GDP measurement for economic development, current special national situations in China, and the development trend of green GDP accounting[3] in the international society.

Inherent shortages of traditional GDP accounting system

Traditional national economic accounting system (GDP) is undoubtedly correct and has played huge roles in the times when the resource and environmental problems have not affected the life quality and threatened social and economic sustainable development. However, with the rapid economic development and population growth, various resource and environmental problems, such as environmental pollution, ecological destruction, energy crisis and grain deficit, become more and more outstanding, which has weakened the welfare and even threatened the human existence. Under these circumstances, it is obviously unreasonable to still continue to use traditional national economic accounting system (GDP) to measure the economic development status.

Original national economic accounting system should be modified, mainly because it has some fatal shortages as follows: (1) It only records the consumption of man-made capital, but rarely or does not consider the input of natural resources and the resulting environmental problems; (2) It does not account the natural resources as national wealth; (3) It adds the environmental treatment costs into the GDP, but does not deduct the loss by environmental destruction from the GDP.

One country can realize rapid national economic growth in a short time, with the cost of depletion of its natural resources and pollution of its existence environment. However, the resulted serious consequence of this may be the lack of sustainable momentum for future social and economic development for the country, forming the phenomenon of "hollow-out" of resources and environment in the process of rapid economic development.

Development trend of green GDP accounting in the world

In last decade, common attention has been paid to resource problem and environmental problem in the world. Many experts, scholars, governmental departments and international organizations have been in an effort to deal with these problems, trying to account for the resources and environment and integrate them into national economic accounting systems. In 1992, the United Nations Conference on Environment and Development (UNCED) adopted *Agenda 21*. In Chapter 8 "Integrating Environment And Development In Decision-Making" of Section 1 of this document, it is pointed that: "The resulting systems of integrated environmental and economic accounting (SEEA) to be established in all member States at the earliest date should be seen as a complement to, rather than a substitute for, traditional national accounting practices for the foreseeable future. SEEA would be

[3] In China, the System of Integrated Environmental and Economic Accounting (SEEA) proposed by UNSD is usually called green GDP accounting. In this paper, the term of *environment* is a concept with narrow sense, mainly referring to environmental pollution and ecological system, not including the use and conservation of natural resources. This is totally different from the broad definition of *environment* in SEEA.

designed to play an integral part in the national development decision-making process." At present, green GDP accounting has become an irresistible international trend and will gradually become the important basis for formulating and implementing sustainable development strategy by different countries. It is even more important and urgent to China.

Specific situations of China in implementation of green GDP

Green GDP accounting is closely related to the basic situation of a country. China as a developing country is at the stage of rapid economic development. It has wide territory, huge population and is relatively lack in natural resources. At the same time, the soaring development of economy has resulted in rapid growth of exploitation and utilization of natural resources. The rapid economic development in China thus mainly depends on the competition of resource, competition of environment and competition of investment. At the back of this phenomenon of "Three Competitions" lie one-sided chase of GDP growth rate and ignorance of resource and eco-environmental costs. This has brought about negative effects and, in particular, serious "after-effect" as a result of destruction of resources and environment.

In order to radically improve the old extensive economic development pattern, the Government of China first proposed "a human-centered, comprehensive, coordinated and sustainable development view" and the new development strategy of "five syntheses and coordination". President Hu Jingtao of Chinese government pointed out that "we should study the method for green national economic accounting, explore an assessment system that integrates resource consumption, environmental loss and environmental benefit into economic development level, so as to establish and maintain the balance of human beings and the nature". This requires integration of resource and environmental costs into national economic accounting system, so as to radically change the achievement view of party leaders and administration leaders, promote the change of extensive growth patterns to intensive patterns with low consumption, low emission and low input, and thus truly carrying out the scientific development view in all the levels and fields of economic construction. Therefore, the establishment of green GDP accounting system in China fully embodies the political willing of top leaders of Central Government of China.

Development History

The work of green GDP accounting and environmental economic accounting in China began late compared to advance countries, but developed very fast. The achievements in this field are noticeable. The progress can be divided into three stages.

Initial Stage (from early 1980s to early 1990s)

Early in the beginning of 1980s, Chinese researches began to rethink and discuss the irrationality of resource and environmental prices which were far away from their values, and proposed the concept of cost of environmental pollution and ecological destruction. They also began some basic researches on green national accounting, such as environmental pollution loss research, environmental cost and benefit analysis, and natural resource accounting, etc. However, these have not reached the level of integrating the resources and environment into national economic accounting, there were also no practices, and enough attention has not been paid to by related state departments. The achievements at this stage are listed in Table 1.

Exploration Stage (from early 1990s to 2003)

With the rapid development of economy in China, the conflict between resource and environmental problems and economic development became further deepening. The researches on resource and environmental accounting and its integration into national economic accounting system were gradually highlighted. Many institutes set up research project teams, such as on resource accounting and environmental accounting, to carry out a series of theoretical researches on resource and environmental accounting, involving resource and environmental physical quantity and value quantity accounting methods and theories, shortcomings of existing national economic accounting system, and possibility of and forms, theories and methods of integrating resource and environment

into national economic accounting system. A series of practices were also performed. The implementation of these research projects has laid solid foundations for the construction of green GDP accounting system in China. The achievements at this stage are shown in Table 2.

Table 1

Resource and Environment Accounting Researches in China (from early 1980s to early 1990s)

Time	Researchers	Research contents
1981	Yu Guangyuan	Proposed the need to account the environment, called on carry-out of calculation economic loss from pollution and ecological destruction.
Sixth and Seventh Five-Year Plan Periods(1981~1990)	Chinese Research Academy of Environmental Sciences	Carried out several case studies, including calculation of economic loss of pollution.
1984	National Environmental Protection Agency	Held International Workshop on Environmental Cost-Benefit Analysis.
1985	Chinese Research Academy of Environmental Sciences	Carried out *Study on Projection and Countermeasures for the Environment in 2000*; accounted national economic loss from environmental pollution for the first time.
1987	Li Jinchang, et al.	Translated research reports, e.g. *Natural Resource Accounting and Analysis in Norway*.
1988	East-West Center of USA	Translated *Environment, Natural System and Development: Economic Assessment Guideline* into Chinese.
1988	State Council Development Research Center	Set up project team of Resource Accounting and Its Integration into National Economic System.
1989	National Environmental Protection Agency and WHO	Held International Training Workshop of Environmental Economic Assessment.
1990	Guo Xiaomin, et al.	Carried out research on account of economic loss from environmental pollution and ecological destruction, focusing on that from environmental pollution.
1990	Jin Jianming, et al.	Accomplished research of Ecological Destruction Economic Loss and Calculation Method for Typical Ecological Zones in China.

Table 2
Resource and Environment Accounting Research and Practice Progress in China (from early 1990s to 2003)

Time	Researchers	Research contents
1991	Li Jinchang, et al.	Published *Natural Resource Accounting for Sustainable Development*.
1994	Li Jinchang, et al.	National ecological environmental cost accounting.
1996	Chang Yongguan, etc.	Air pollution accounting in Chongqing City.
1997	Fu shouning, et al.	Ecological environmental loss in Three Gorges project.
1998	Zhang Kunmin, et al.	Pilot studies on genuine saving rate in Sanming and Yantai cities.
1998	Xia Guang, et al.	Published *Econometric Study on Environmental Pollution Economic Loss in China*.
1999	Zheng Yisheng, et al.	Environmental pollution loss in China in mid-1990s.
1999	Peking University	Carried out research project "Green Accounting for Sustainable Development", with pilot study in Ningxia Hui Autonomous Region.
1999	Wang Jinnan (CAEP)	Carried out studies on sustainable development and environmental economic indicator system.
2000	Wang Jinnan (CAEP)	Proposed "Initial Design Scheme of Environmental Resource Accounting Based on Satellite Accounts".
2000-	SEPA & World Bank	Conducted evaluation method study for environmental pollution loss in China and planned to carry out two provincial pilot studies.
2002	Wang Jinnan (CAEP)	Carried out study on environmental physical quantity accounting scheme in national economic accounting system, i.e. the scheme of environmental satellite account.
2003	CAEP & OECD	Carried out studied on environmental comprehensive indicator system and environmental performance evaluation.
2003-	CAEP	Carried out study on environmental economic I/O accounting model.
2003	State Statistical Bureau	In *China National Economic Accounting System* (2002), newly set up an annex account – Natural Resource Physical Quantity Accounting Table, and complied for trial national physical quantity table of land, forest, mine and water resources in 2000.
2003	China National Bureau of Statistics & Norwegian Central Statistics Bureau	Complied China energy production and usage accounts in 1987, 1995 and 1997.
2003	National Bureau of Statistics	Carried accounting pilots on items of forest, water, industrial pollution and environmental protection expenditure, etc. in Heilongjiang Province, Chongqing Municipality and Hainan Province; accomplished technical summary report and work progress report.
2003	Statistics College of Renmin University of China	Translated UN *System of Integrated Environmental and Economic Accounting 2003* (SEEA2003) into Chinese.

Piloting stage (from 2004 to present)

Since 2004, the proposition of scientific development view, ever-increasing over-investment of extensive production, promotion of new system of achievement examination and reform of national economic accounting, etc. all made carryout of green GDP accounting in China being paid unprecedented high attention, especially by Central Government and top leaders. Therefore, the green GDP accounting in China should be upgraded and normalized on the original basis, and gradually put into practical operation stage.

In this stage, there will be three most important works: (1) Integrated Environmental and Economic Accounting (Green GDP) Study jointly carried out by State Environmental Protection Administration (SEPA) and National Bureau of Statistics (NBS); (2) National Environmental Damage Evaluation and Survey carried out by the SEPA, which should provide good basis and platform for the first work; (3) Forest resource accounting project jointly carried out by the NBS and State Forestry Administration (SFA).

Integrated Environmental and Economic Accounting (Green GDP) Study includes physical quantity accounting, value quantity accounting, environmental protection I/O accounting and environmental-adjusted green GDP accounting. In March 2004, SEPA and NBS organized a work meeting on green GDP accounting, and formally initiated the project of Integrated Environmental and Economic Accounting (Green GDP) Study. According to the research intention of research on integrated environmental and economic accounting (Green GDP) reached by the two departments, the Technical Team of the project discussed in detail the cooperation programme and formulated the work plan. In June 2004, SEPA and NBS held *International Seminar on Establishing China's Green National Economic Accounting System* in Hangzhou. In September, the two departments jointly organized two expert appraisal meetings, especially for *China Resource and Environmental Economic Accounting Framework* and *China Environmental Economic Accounting Framework*. Currently, the *Guideline on China Environmental Economic Accounting Techniques* is under preparation, and pilot work of accounting in 10 provinces are planned to be initiated in 2005. The forest resource accounting work also enters into scheme design phase for survey techniques. This means that the establishment of green national economic accounting in China has achieved some advancement, and is going ahead step by step.

Existing Problems

In consideration of the actual situation in China, the work of green national economic accounting is not long, the accounting base is not very solid, and there are still some problems as follows.

Imbalance of research work

Although the researches on resource and environmental accounting have been carried out for long, there exists great difference among the researches for different resources and environments. For some resources, e.g. forest resource and land resource, the research develops fast and pilot work has begun, while for other resources, e.g. water resource, air resource, environmental degradation and pollution accidents, etc., the accounting develops slow, mature theories and methods are to be developed. This has constrained the overall progress of resource and environmental accounting and its integration into national economic accounting system. Therefore, from viewpoint of short term, the accounting of a complete environment-adjusted green GDP in China is impossible.

Theories and methods to be improved

Despite some advance in resource and environmental accounting theories and methods, they are still not perfect. Firstly, the resource value theories are not uniform, the value origin, value determination methods and value measurement models are not normalized and have big debates. This has become the biggest barrier of integrating resource and environment into the national economic accounting system with value quantity forms. Secondly, essential breakthrough has not been achieved in how to synthesize individual resource and environmental accountings (such as water resource accounting, forest resource accounting, mineral resource accounting and environmental pollution accounting) to form integral resource and environmental accounting system, and how to determine the accounting and expression methods of physical quantity and value quantity. Thirdly, the progress is also slow in how to integrate resource and environment into current national economic accounting system, although it is a very important and key work that will decide the transfer of research results into the productivity. If

breakthrough is not made in this issue, it will be difficult to actually integrate resource and environment into current national economic accounting system.

Lack of practicability of research achievements

Undoubtedly, some research achievements have been reached in resource and environmental accounting and its integration into national economic accounting system. However, most of these research achievements are still limited at professional communication stage and have wide gap with the practicability. This is possibly because of the lack of close cooperation between the academic community and the governments, as well as the lack of promoting power and wide practicability of the research achievements. Therefore, in order to increase the practicability, man should walk out of the pure academic circle, study in depth the real problems, strengthen linkage and cooperation among related departments, and speed up the pilot work of accounting.

Outlook of the Work

As the green economic accounting is a brand new research field, facing many difficulties, it is necessary to grasp the main contradictions and breakthrough points, work in a down-to-earth manner on step by step, and guarantee the work quality and smooth realization of the objectives. Currently, a framework of China's green GDP accounting has been set up. The next step is to, in addition to improve the current framework, speed up the local pilot work so as to verify the practicability of the theoretical framework. Besides, it is also imperative to strengthen international cooperation to establish a green national economic accounting system that keeps pace with the international society.

Further improve the green GDP accounting method

The green GDP accounting is a complex system, involving not only a complicated economic system but also various kinds of natural resource and environmental elements. As seen from the international research experience, green GDP generally begins with local accountings, or focuses on specific resource types or environmental problems. The statistical institutions within international organizations have timely summarize these local accountings and upgrade them into theoretical and methodological researches, which can serve as methodological direction on the green GDP accounting in China.

The improvement of China's green GDP accounting theories and methods can be considered from the following four aspects: (1) Further improving the theoretical framework of green national economic accounting. Currently, two relatively ideal frameworks, i.e. China Resource and Environmental Economic Accounting Framework and China Environmental Economic Accounting Framework, which are connected with China's national statistical accounting system and keep pace with the international society, have been formulated. However, there are still leave many detailed problems in the two frameworks. These problems are to be further improved in combination with pilot work. (2) Formulating technical guideline on physical quantity accounting for both the environment and the resources. (3) Formulating technical guideline on value quantity accounting for both the environment and the resources, which is a focus as well as a difficult for carrying out green GDP accounting. The value quantity accounting mainly includes two parts, i.e. natural resource consumption and environmental degradation. (4) Carrying out countrywide survey for environmental pollution loss accounting. The theories and methods of environmental pollution loss accounting will be accomplished on the basis of the national environmental pollution loss evaluation work already undertaken. This is a basic work for green GDP accounting.

Speeding up local pilot accounting work

As a new accounting system, green GDP has the problems of being not in line with traditional national economic accounting system and having difficulty in collection and analysis of statistical data. In addition, it requires huge data and involves many departments for data collection and thus will be difficult to promote. It is possible to first carry out some pilot work in some areas. This will be of realistic significance for the promotion of green GDP in China.

Therefore, SEPA and NBS determined to first choose several provinces (municipalities) to carry out pilot work on green GDP accounting and environmental pollution loss survey during 2004～2006, in order to earn experience for

establish national green GDP accounting and environmental pollution loss evaluation system. It has been planned to establish an initial framework of green GDP accounting system that is fit for China's own situations in 3 to 6 years. At the same time, the public awareness on green GDP will accordingly be enhanced.

The pilot work will be uniformly led by NBS and SEPA. In order to coordinate the surveys and guarantee the quality, NBS and SEPA have jointly established Steering Group and Working Group for green national economic accounting and environmental pollution loss survey. The pilot provinces (municipalities) are selected on a voluntary basis, and the environmental protection bureaus (EPBs) and statistical bureaus of the piloting provinces, autonomous regions and municipalities directly under the Central Government will establish corresponding steering institutions and technical support systems.

Accelerating construction of green GDP accounting system

The construction of green GDP accounting system will include four aspects: (1) Setting up the work platform for green accounting. This is mainly to strengthen the role of overall design and overall coordination in green GDP by NBS in order to construct a uniform resource and environmental accounting framework on which both environmental protection departments and statistical departments can carry out environmental accounting and resource accounting respectively. (2) Reforming existing environmental and resource statistics system to provide environmental and resource data for green GDP accounting and, at the same time, speeding up the "greening" process of national economic statistics system. (3) Speeding up construction of relevant regulations and standards (e.g. accounting framework, accounting technical guidelines, accounting result publishing, etc.). (4) Studying the way to utilize green GDP accounting to formulate green development policies, e.g. economic restructuring, environmental taxation, environmental compensation, and governmental performance examination, etc.

Strengthening international cooperation on green GDP accounting

Currently, a new-round wave of carrying out green national economic accounting has surged in the world. United Nations Environmental Programme (UNEP) and United Nations Statistics Division (UNSD) are setting up environmental and economic accounting group to promote green national economic accounting in developing countries. The World Bank, European Union, OECD, ADB, Norway, Korea, Japan and China Council for International Cooperation on Environment and Development (CCICED) have all expressed interests in cooperation with China in green national economic accounting. China would fully utilize this good international cooperation platform to establish its green national economic accounting that will keep pace with the international society.

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DENMARK

Statistics Denmark

Regular publishing of environmental accounts

- Energy supply and use
- Emissions to air
- Water extraction and use
- Environmental taxes and subsidies
- Asset accounts for oil and gas

Flow-data are broken down by households and 130 industries.

Other ongoing work

- Asset accounts for forests
- Valuation of land

Publication on input-output analyses

Yearly input-output publication now available in the English language: *Danish Input-Output Tables and Analyses – Imports, Employment and Environment*. The publication is available in paper as well as in PDF-format.

The publication contains input-output tables combined with tables on the economy and with tables on air emissions and the use of energy.

The publication presents data broken down by 130 industries and households as well as analytical results showing indirect flows (in Denmark and Global), causing final demands and different types of causing private consumption.

The publication also shows the Danish NAMEA-table which summarizes the Danish environmental accounts.

Online databank

Statbank Denmark. The database is free of charge and data on the Danish Environmental Accounts can be exported in several file formats or presented as diagrams. The English language version is found at: www.statbank.dk (National Accounts and Balance of Payments → Environmental Accounts).

Recent pilot projects/reports

- Danish Forrest Accounts 1990-2001.
- Waste Accounts for Denmark 1999

New projects

- Environmental Accounts for Water and Waste Water
- Implementation of a Material Flow System for Denmark
- Regional Environmental Accounts

Generally

Since the last London Group meeting in Rome the work has not been so much about developing new types of environmental accounts. The work has primary centred on the development of effective systems to the production of the Danish Environmental Accounts and on improving the quality of the accounts. The use of bridge tables has especially proved to be useful in this work with the Air Emissions Accounts.

Another important work, which has also involved other of our colleagues in the National Accounts Division as well as the Environment and Energy Division, has centred on continually to improve the consistency between the physical flows as described in the Environmental Accounts and the monetary values as described in the National Accounts. This work has especially focused on the Energy Accounts.

FINLAND

by Jukka Muukkonen, Environment and Energy Statistics

In the development of environmental accounting in 2003-2004 the main focus has been on material flow accounting. Special attention has been given to waste flows with respect to both physical flow accounting framework and Waste statistics regulation of the European Union. Air emission statistics and reporting have been developed as a part of the greenhouse gas inventory system.

A pilot study was made on correcting co-efficient for register based data on solid waste, emissions to air and waste waters. Pilot studies are going on for import and export of waste and for wastes of forestry activities. A study for OECD on waste prevention indicators based on material flow accounts and economic statistics was made in 2003.

A comprehensive presentation of the framework of physical input-output tables and actual tables by branches of industry (according to the NACE classification) has been prepared by Thule Institute of University of Oulu. Analysis based on those tables were done especially for waste flows, material flows of combustion including emissions to air, household consumption, capital formation and total material flows of the Finnish economy.

A project 'Eco-efficiency now and in the future' has been launched in Statistical Research and Development Unit of Statistics Finland. This project has produced preliminary eco-efficiency indicators at economy wide level, for primary production sectors and for some multinational forest industry companies.

Forest asset accounts have been developed as a part of asset accounts in the National Accounts. For monetary valuation of forest land and timber assets and flows, proper methods applicable for forest accounting and national accounting will be chosen and further developed as a close co-operation between environmental accountants, national accountants and the Finnish Forest Research Institute.

Establishment of the national greenhouse gas inventory unit at Statistics Finland has in most parts been accomplished. Close co-operation between this unit and environment and energy statistics will continue, especially in the reporting facilities and in calculation of emissions from manufacturing industries and energy production.

Statistics on environmental protection expenditures, environmental taxation, total material requirement, forest assets and flows of wood material, waste flows and air emissions have been published in annual Environment Statistics –compendium and Environment and Natural Resources –review.

FRANCE

by Grégoire Devaud, Institut français de l' environnement

Among what is called "environmental accounting", the more developed in France are still expenditure accounts. They are regularly produced. Elaborated within the SERIEE framework, they are published every year in a report and presented to the Commission of Accounts and Economy of Environment, chaired by the Minister of Environment. Besides this annual report, the Commission examines each year one or two special reports linking economy and environment. In 2004, the topic was "Enterprises and Environment". We are now working on "Agriculture and Environment" for the next meeting (spring 2005), and "Moving, transport and Environment" then "Social aspects of Environment" for the next year.

Though these monetary accounts have been realised for many years, they need to be improved in different ways :

- All the domains (according to CEPA) are not yet covered : soil and groundwater are the main missing domains. According to the French energetic choice, the elaboration of nuclear waste management accounts was a priority and we achieved it last year. Besides, these environmental protection expenditure accounts are complemented with some environment-related specific accounts : water abstraction and recycling.
- We also wish to improve the estimation methods for the accounts we elaborate. So, air, noise and biodiversity accounts are being revised, in particular, by exploring new sources of data. For instance, we prepare a survey to ask the motorway firms how much they spend for reducing noise and protecting biodiversity and landscape.
- Lastly, we plan to elaborate wastewater account ay the basin level to conform the European directive.

We are progressing too in linking physical and monetary data :

- We published regularly results on natural resource accounts for forest, with wooded land and forest products, and subsoil assets. Namea Matrix is also an analysis format we use now for air emissions.
- Besides our usual elaboration method for waste and wastewater expenditures, actually based on producers' sales, we are studying the possibility of measuring expenditures value with a method sharing quantities and prices effects in order to analyse evolutions' causes.
- As regards physical accounts, and especially in the field of water, considerable steps have been realized. After first accounts of quality and resources were tried out - they were presented last year at the London Group by P. Crouzet - first accounts of emissions of pollutants in water were calculated. A draft of a methodological note is being prepared. But test results have been produced right now, which cover the whole of the national territory.
- The search for a bringing together between physical and monetary data is also one of the objectives of a deep reorganization of Ifen. The production of the accounts was the task of a separate unit in the organization. Now, the experts in charge of the production of the accounts of the various fields are functionally associated to the specialists working on the physical aspects. A greater synergy between one and another is expected from it.

GERMANY

Federal Statistical Office, Environmental Economic Accounting

Physical flow accounts

Energy and air emissions

The data of the German Environmental Economic Accounting (GEEA) on energy and air emissions in a NAMEA-type breakdown are updated annually. Detailed data can be found in the Subject-Matter Series 19, Number 5 "Material and energy flow accounts" . Download from the Statistics Shop of the Federal Statistical Office in the internet (http://www.destatis.de/shop)
under the category 8 "Economic and environmental economic accounting".

Physical Input-Output-Tables (PIOT)

In a project financially supported by EUROSTAT Physical Input-Output-Tables (PIOT) were set up for Germany for the year 1995. The PIOT describe the flows of materials and energy within the economic system and between the economic system and the natural environment, including changes in the natural environment caused by human activities like using natural assets as source of raw materials and as sink for residuals. The PIOT consist of input-tables to show which sectors use which materials or pick up materials, of output-tables to show which sectors produce goods or give away materials and of material-integration-tables (Input-Output Tables) which show the material flows between the branches. The flows are measured in tonnes. A summary of the final report and the complete final report and the tables in German language can be downloaded under http://www.destatis.de/allg/d/veroe/proser4fumw2_d.htm. ("Physical Input-Output Tables of the Federal Statistical Office" and "Endbericht zum Projekt Physical Input-Output Table for Germany 1995")

Water and waste water

In the project "Environmental Accounts for Water and Waste Water (1991-1998)" financially supported by EUROSTAT data for water and waste water are presented in a NAMEA-type breakdown. On the basis of an estimation method water and waste water data were calculated for those years, for which no primary data are available. By another estimation model some important waste water emissions were also worked out. A summary of the project can be printed by the following download http://www.destatis.de/allg/e/veroe/gsrwa_e.htm .The complete project report as a printed working paper can be ordered by email (free of charge) from the following address: mailto:christine.flachmann@destatis.de Meanwhile data on water and wastewater flows have been updated until 2001.

Economy-wide material flow accounts

The data on the economy-wide material flow accounts are updated annually . In March 2004 a methodological revision of the German economy-wide material flow accounts from 1991 to 2001 on basis of Eurostat-Handbook "Economy-wide material flow accounts and derived indicators – A methodological guide", has been concluded. This project also yielded data on the supply and use of primary materials (raw materials and imports) in a NAMEA-type breakdown for the period 1993 to 2000. The report will be published in October and will as well be available in the world wide web (http://www.destatis.de).

Land Accounts

Work on land accounting continued by supplementing the previous concepts of area use by branches of production by a much more detailed NAMEA-type breakdown of the land use category of built-up and traffic area and by the implementation of a first methodological approach to address the land use category of agricultural land. The work was co-financed by Eurostat. The edited version of the final report is available as download http://www.destatis.de/allg/e/veroe/bodennutz_e.htm . Actual results of the built-up/traffic area by industry-matrix for the year of 2001 were presented in the annual press conference on environmental economic accounts in

November 2003. The report of this press conference is also available in English language and may be downloaded (http://www.destatis.de/download/e/ugr/prconfreport01.pdf).

Environmental protection expenditure accounting

The data on environmental protection expenditure are updated annually. A methodological revision and a more comprehensive coverage on the basis of the SERIEE concept has been finished by way of a project co-financed by Eurostat at the end of July 2004. The report will be published at the end of the year in a printed version as well as in the world wide web (both in German). Environment-related taxes are also published annually for the year before. Taxes related to transport are available in a NAMEA-type breakdown with about 2 years time lag.

Sectoral Reporting modules

In late 2001 GEEA started with the concept of integrating so-called sectoral reporting modules into the accounting framework. They are restricted to a specific sector of economic activities each (e.g. agriculture, transport, private households) and try to set up - as far as possible - the complete system of environmental-economic accounts for the sector examined. As such these sectoral reporting modules respond to the need to integrate environmental aspects into sectoral policy. Results from two projects co-financed by Eurostat for a reporting module "transport and environment" have been completed and available as download in German language (http://www.destatis.de/allg/d/veroe/ugrverk_d.htm). The project on transport and environment provides among others data for the transport sector in a NAMEA-type breakdown for a number of variables like energy use, emissions, land use, tonnes and person kilometres and environmental taxes.

A project on "agriculture and environment" (in collaboration with the Federal Agricultural Research centre) is under way. In the project the agricultural sector is distinguished by different agricultural production processes for which economic data, data on special material and energy flows and intensity indicators are presented. An interim report discusses main methodological problems and shows some first results. It was published in July 2004 and is available in German (http://www.destatis.de/allg/d/veroe/berichtsmodullawi.htm).
For the sector private households a project “private households and environment” was started to examine this specific sector according to its environmental impact.

Applications/methodological work

National Strategy for Sustainable Development

The National Strategy for Sustainable Development of the federal government was adopted in 2002 (http://www.dialog-nachhaltigkeit.de). The indicator set is comprised of 21 indicators selected to measure progress towards sustainable development A paper of the GEEA department on "The Role of the National Accounts and its Satellite Systems for the German National Strategy for Sustainable Development" (http://www.destatis.de/download/e/ugr/sustainable.pdf) describes which contributions accounting systems can make to underlay the sustainability indicators with supplementary information in order to provide a data basis for an integrated sustainability analysis. Within the forthcoming press conference of GEEA in November 2004 there will be presented special analyses according to those indicators of the National Strategy for Sustainable Development that are provided by GEEA. The report will be published in German with the day of the press conference (2 November 2004) and in English at the beginning of 2005.

Decomposition analysis

A second focus of applications of the accounting data is to analyse the observed changes in e.g. emissions within a certain period by means of a structural decomposition method. The paper "Decomposition analysis of carbon dioxid-emissions changes in Germany -Conceptual framework and empirical results" describes the theoretical background of this analytical tool and shows different methodological approaches before focusing on the method applied in German Environmental-Economic Accounting. The approach chosen is based on a method applied by

Statistics Netherlands but is extended to be applicable to more general cases. The paper can be downloaded (.pdf-file) under: http://www.destatis.de/download/e/veroe/fach_vero/dekomposition.pdf

Annual GEEA-reports

GEEA publishes annually a "Report of the German Environmental-Economic Accounts" with analysis and detailed tables. The reports show in a standardised way the complete picture of German environmental economic accounts. It is only available in German and can be downloaded under: http://www.destatis.de/allg/d/veroe/d_ugr03.htm. The report about the yearly press conference on GEEA which highlights different issues every year is also available in English: http://www.destatis.de/allg/e/veroe/e_ugr02.htm.

Modelling

During the last years the data of the GEEA have been used in a growing number of econometric modelling projects by research institutes, mainly on the basis of the PANTA RHEI model. Examples are scenarios in the fields of energy use, carbon dioxide emissions, land use or transport. Results from a modelling projects on transport will be presented at the press conference on GEEA in November 2004 which will be done jointly by Federal Statistical Office and the Environment Agency Germany (concerning the publication of the results look above under "National Strategy for Sustainable Development").

ITALY

Italian National Statistical Office, National Accounts, Environmental Accounting, Aldo Femia

General overview

After several years of methodological and experimental work, aimed at building the knowledge basis and the data sets required for the implementation of selected environmental accounts, EA in Italy is currently undergoing a phase of consolidation of production. In particular, time series of data for periods stretching out in the present millennium have been published or are about to be published and data collection and elaboration processes are being organised in a way suited to ensure regular and timely production of the main current products of the Italian EA.
Work on environmental accounting carried out at Istat has therefore continued, in the period following the Rome meeting of the London Group of last November, along the lines exposed on that occasion, which can be thus summarised:
- consistency with the European Strategy for Environmental Accounting and with the Italian Environmental Action Strategy for Sustainable Development;
- close link to the Eurostat work programme;
- focus on the modules for which harmonised methods, handbooks, compilation guides and standard tables have been agreed upon at the European level;
- concentration of efforts on Economy-wide Material Flow Accounting, NAMEA and EPEA modules implementation;
- dissemination of figures through the Istat web site and through contributions to the Istat environment statistics compendium and to the Report on the State of the Environment addressed to the Parliament by the Ministry of the Environment;
- description of methods in ad hoc publications;
- support to the experimental work aimed at integrating environmental and economic issues in public planning.

Economy-wide material flow accounting

In the first half of 2004, the economy-wide material flow accounts and related indicators already made available in 2003 for the 1980-1998 period (namely the DMI, DMC, PTB, TMR, TMC, PTBIF accounts and indicators) have been updated up to 2001. The data have been included in a report to Eurostat, who gave financial support to the project, and are currently being revised for publication on Istat's web site and Istat environment statistics compendium.
These indicators are now being calculated for 2002. For the same year, the calculation of the whole sequence of MF accounts described in Eurostat's methodological guide – now available with reference to 1997 only – is foreseen.
A study of the feasibility of a Physical Input/Output Table (PIOT) of the Italian economy has been finalised during the last months, leading to the formation of an ad-hoc Working Group for the experimental realisation of an Italian PIOT.
Finally, Istat is contributing – together with APAT (the Italian National Agency for Environmental Protection and Technical Services) – to the work carried out within the European Topic Centre on Waste and Material Flows, as well as to the meetings and activities promoted on this topic by the OECD, who has recently taken a lead role in MFA development.

NAMEA

In addition to the products mentioned in last year's update for Italy, a time series of NAMEA-air tables has been recently completed, covering all years from 1990 to 2000. These have been included in a report to Eurostat – who provided financial assistance – and will be soon made available to the public through Istat's web site and the Istat environment statistics compendium.

The coverage of air emission accounts for Italy has been enlarged in terms of pollutants: these now include ten air pollutants, namely CO_2, SO_x, NO_x, N_2O, NH_3, CH_4, CO, NMVOCs, PM_{10} and Pb (the latter two were not included before).
The methodologies used for emission allocation to activities have been revised and improved through work of a Working Group of experts from Istat, APAT as well as the Ministry of Productive Activities. E.g. emissions now refer to resident units, rather than to the Italian territory.
Besides air emissions, the data that are about to be published include the direct intake from nature by economic activity of four resources: endogenous steam, fossil fuels, minerals, biotic materials, providing a split by directly extracting activity of the MFA aggregate "Used domestic extraction".
In the tables, emissions and resource intake data are linked to households expenditure (by purpose) and to economic and social variables broken down by economic activity (production, value added, intermediate consumption; employment in full-time jobs and thousand persons).
Finally, an ad-hoc joint Working Group set-up with a local research Institute is about to finalise NAMEA-type air emission and resource intake accounts for Tuscany, referring to year 2000.

Environmental protection expenditure account

The available information basis is still not sufficient for a complete implementation of the EPEA. While working for the development of this basis – by studying sources and gathering data – the Institute works at the production of statistics on Environmental Protection Expenditure of the public and business sectors, on the one hand, and at the partial implementation of the EPEA for selected environmental domains on the other hand.
New results with respect to those presented in the Rome meeting concern the Central Government and the business sector.
As far as the Central Government is concerned, a time series of environmental protection expenditure aggregates consistent with the EPEA schemes has been calculated for the 1995-2002 period. Some additional aggregates relating to important environment-related activities, not entirely covered by the EPEA – such as management and protection of soil, sea and coastal zones – have also been calculated for the same period[4].
As far as the business sector is concerned, EPE data coherent with the EPEA and disaggregated by environmental domain according to the CEPA are now being regularly collected through the annual surveys on business economic accounts (concerning both SMEs and large enterprises); the first year of these data, referring to 2001, is already available[5].
These data, as the ones released in the past, have been and/or will be disseminated through the communication channels mentioned above in the "general overview" part, as well as through the 2004 OECD-Eurostat Joint Questionnaire.
As far as future developments are concerned, projects are being started for the construction of a time series of the EPEA tables for the wastewater and waste management domains, and of a complete SERIEE system of accounts for the water domain (i.e. including also the Resource Use and Management module of the system).

[4] A further data set that has been made available in the National Accounts framework concerns public expenditure classified by function (according to the COFOG). However, this data set is difficult to be used for EPEA purposes, mainly due to the inadequate breakdown by environmental domain.

[5] Previously, data broken down by environmental domain the were available only for 1997; these data were collected through the first survey on business EPE carried out in 1999 in the context of the Intermediate Census of Industries and Services.

MEXICO

Instituto Nacional de Estadística Geografía e Informática
By: Raúl Figueroa Díaz

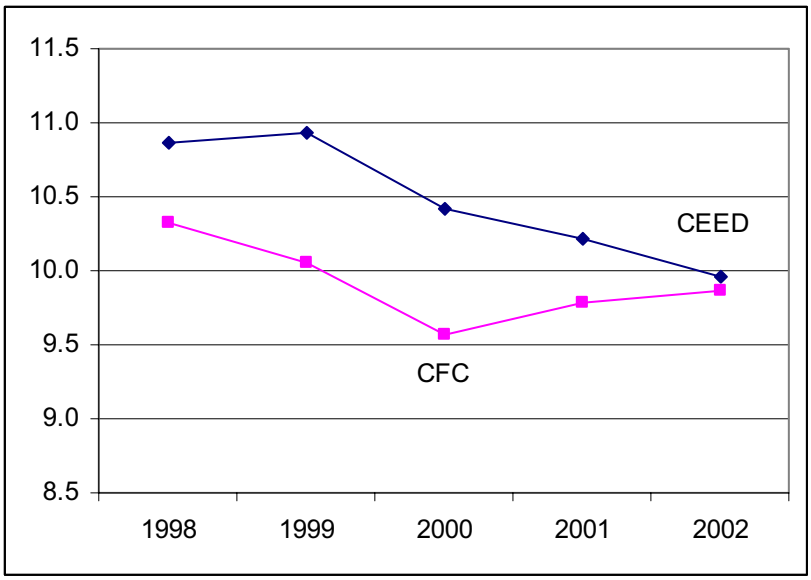
System of Economic and Ecological Accounts, Mexico (SEEAM)

Project that allow us to link information about variables of the System of National Accounts such as GDP, consumption of fixed capital, fixed gross capital formation, etc., with data referred about the state that keep natural resources: petroleum, water, air and land.

It includes, for the diverse environmental themes, boards where have registered physical units through environmental and economic assets balances or flows, barrels of petroleum, cubic meters of timber, hectares of forests, among others, as well as monetary accounts units in current prices.

Inside the objectives, there is a synthesis indicator identification such as Net Ecological Domestic Product (NEDP), defined like an economic growth measure under a sustainability focus, obtained from GDP less consumption of fixed capital and attributed costs by environmental use; these latter represent natural resources depletion and environmental degradation.

Participation of natural resources depreciations in the GDP, 1997-2002 average (in millions of current pesos)



Where:

CEED = Costs for environmental depletion and degradation

CFC = Consumption of capital fixed

At this point, and inside institution's mission, the project helps to satisfy information requirements of the different sectors among the society, providing and promoting the National System of Geographic and Statistical Information.

National and international Mandatory

The results obtained from the implementation of this project respond to the national and international demands for having synthesis indicators that reflect the damage caused to the environment because of the human activities, such as production, distribution and consumption of goods and services.

Within the national scope, the Ecologic or "green" GDP has been selected in the National Plan for Development 2001-2006 as one of the indicators "…in order to assure that the economic policy advances in the desired direction"[6], and that it reflects sustainable development.

Internationally, it responds to the mandatory signed in the 21 Agenda, in the sense of the instauration of ecologic and economic accounting systems for all of the member status, as a complement to the traditional systems of National Accounts[7].

Main sources of information

Each subject has its own specific calculation method, corresponding to the availability and credibility of the sources of information, as well as to the support provided by different public, private or academic institutions.

Regarding the previous point, we must recognize the support provided by the Environmental and Natural Resources Secretariat in Mexico (SEMARNAT), which has provided different kinds of information, collaborations, and advisory, as well as the publication of the "Inform on the Environment Situation, 2002", which compiling of environmental statistics, notes and considerations are a very important input for the present study.

It is important to point that a permanent exchange of information and similar projects feedback is realized with SEMARNAT, consulting with officers from different areas and organisms that depend on SEMARNAT, such as the National Ecology Institute (INE), The National Water Commission (CNA), The National Commission for the Use and Knowledge of Biodiversity (CONABIO) and the National Forest Commission (CONAFOR). The inputs necessary for the development of the project can be summarized in a subject scheme. The project is under a permanent process of actualization by incorporating the information that is generated every day, as well as the new recommendations for methodology and concepts.

Medium Term Tasks

- To identify new forms of valorization to improve the presented statistics
- Enlarging of the theme coverage that allow observing with greater accuracy the pressure that natural resources are under because of the economic activities.
- Reestablish the working groups with institutions related to environmental and natural resources issues in order to develop specific subject that result of common interest.
- Additionally, it is very important to incorporate regional studies, in order to have available specific information that works as a support for the decision making at a local level.

[6] Presidency of Mexico. National Plan for Development *2001-2006*, pag. 57

[7] *Vid* Agenda 21, Chapter 8, paragraph "D": *Establecimiento de sistemas de contabilidad ecológica y económica integrada.*

SEEAM Publications

PUBLICATION	COVERAGE	PERIOD OF GENERATION	PRINTING DATE
1. Integrated Environmental and Economic Accounting. A Case Study for Mexico	Reference 1985	November 1989-December1991	Dec-1991
2. System of Economic and Ecological Accounts, Mexico (Spanish), publication 1985-1990, inside the CD "Historical Statistics of Mexico"	Reference 1985-1990	January 1992-January1994	Feb-1994
3. System of Economic and Ecological Accounts, Mexico (Spanish), publication 1985-1992	Reference 1985-1992	March 1994-March1996	Apr-1996
4. System of Economic and Ecological Accounts, Mexico (Spanish), publication 1988-1996	Reference 1988-1996	May 1996-February 1998	Jan-1999
5. System of Economic and Ecological Accounts, Mexico (Spanish), publication 1993-1997	Reference 1993-1997	January 1998-February 1999	August-1999
6. System of Economic and Ecological Accounts, Mexico (Spanish), publication 1993-1998	Reference 1993-1998	January 1999-March 2000	Jun-2000
7. System of Economic and Ecological Accounts, Mexico (Spanish), publication 1993-1999	Reference 1993-1999	January 2000-Dec 2000	Dec-2000
8. System of Economic and Ecological Accounts, Mexico (Spanish), publication 1995-2000	Reference 1995-2000	January 2001-Feb 2002	Mar-2002
9. System of Economic and Ecological Accounts, Mexico (Spanish), publication 1996-2001	Reference 1996-2001	April 2002-March 2003	May-2003
10. System of Economic and Ecological Accounts, Mexico (Spanish), publication 1997-2002	Reference 1997-2002	May 2003-March 2004	June-2004

Internet Link:

http://www.inegi.gob.mx/prod_serv/contenidos/espanol/bvinegi/productos/derivada/economicas/sceem97_02.pdf

NEW ZEALAND

by Chase O'Brien / Jeremy Webb, Statistics New Zealand

Introduction

Statistics New Zealand began developing natural resource account estimates and methodologies from 2000. The funding was initially for a developmental set of accounts, but it was recently confirmed that natural resource accounts for selected resources will be funded and produced on an ongoing basis.

Structure and Institutional Arrangements

Statistics New Zealand is concentrating on the developing resource accounts that fill identifiable statistical needs. The accounts concerned are energy and water accounts. Forestry accounts are considered to be of slightly lesser importance, but will be maintained. Statistics New Zealand is also co-ordinating inter-agency initiatives to develop measures of sustainable development.

Statistics New Zealand released its Environment Statistics Strategy in March 2004. 8 The Strategy discusses New Zealand's environmental statistical goals and objectives, and clarifies Statistics New Zealand's national role in the provision of environmental statistics.

Energy Account

A physical stock account for energy was published in 2002. Physical flow accounts (monetary and physical) were published in early 2004. A monetary stock account will be released by September 2004, including estimates of renewable energy stocks.

The New Zealand Treasury has shown interest in using the flow accounts for carbon tax policy modelling. The flow accounts include emissions estimates by industry, at a greater level of industry detail than has previously been available in New Zealand.

Water Account

The water stock account (regional and national) was published in July 2004. A monetary water stock account will be published in December 2004.

Forestry Account

Statistics New Zealand has published physical forestry stock and flow accounts, and a monetary flow account. A monetary stock account should be published in October 2004.

Other Accounts

Statistics New Zealand has not yet developed land accounts and ecosystems accounts. Development of a land account should start in 2005.

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[8] The strategy, and all published reports and tables, are available from the Statistics New Zealand web site, www.stats.govt.nz

Physical accounts for Fish have been published, but due to the low quality of the data available for the physical accounts, the development of physical Fish accounts has been suspended indefinitely. A monetary stock account is being developed however.

Environmental Protection Expenditure accounts will be released with estimates for 2002 and 2003 (as well as the already published estimate for 2001). This update will be released later this year. The New Zealand tax department is proposing tax breaks for 'environmentally beneficial' expenditure.

Conclusion

New Zealand's environmental accounts are in a transition phase. The current published natural resource accounts are a developmental set of accounts that established the basic methodologies. From 2005 on, the accounts will be regularly updated and available in a more timely fashion. Statistics New Zealand believe that the usefulness of these outputs are becoming more accepted and recognized in New Zealand.

REPUBLIC OF MOLDOVA

Report prepared Jana Tafi with technical assistance of the "Water Data Centre" team

Implementing physical water accounts has demanded inter institutional information network, while in April 2004 the Minister of Ecology ordered the official creation of the Water Data Centre and inter ministerial working group, which is the basis for current operating of the Centre. Water Data Center is acting and settled under the authority of the Ministry of Ecology and Natural Resources with close participation the data holders: the Central services of the Ministry, the State Ecological Inspectorate, the Service of Hydro-meteorology, the geological survey "AGeoM", the public company "Apele Moldovei" and the National Centre of Scientific-Practical Preventive Medicine of the Ministry of Health.

On 13 May 2004, took place the first Workshop of the WDC partners concerning the presentation of the results achieved with Water Data Centre projects in the period 2003-2004.. The meeting was chaired by the Minister and covered by mass media (3 TV channels and 20 newspapers). Indicators derived from water accounts in physical and monetary units were shown as well their analytical and statistical capacities for policymaking decisions. The representative of "Apele Moldovei" presented relevant physical water accounts of Moldova for 2002: Main Table of Water Supply & Use (SEEA Table 8.3/8.5) and water flows between economic sectors (Table 8.4) with desegregated sub accounts tables by economic sectors:

Table 8.3/8.5 Water Supply & Use Table, thousand mc, Republic of Moldova, 2002

thousandcubic metres

		Agriculture	Fisheries	Energy	Mining	Manufacturing & Construction	Distribution/ irrigation water	Distribution/ municipal water	Sewerage	Governments&Services	Households	Rest of the World	Total
from the environment	**U1 Total abstraction**	**17840**	**4020**	**555810**	**5510**	**15900**	**58710**	**181150**		**381**	**20000**		**859321**
	from surface water	3493	4017	553357	13	10540	58706	102780		51			732957
	of which reservoirs/dams												
	of which lakes	*1680*	*1078*	*539840*	*9*	*1238*	*8266*			*50*			*552161*
	of which rivers	*1813*	*2939*	*13517*	*4*	*9302*	*50440*	*102780*		*1*			*180796*
	of which springs												
	from groundwater (wells, ...)	14347	3	2453	5497	5360	4	78370		330	20000		126364
	from other water (sea)												
	for own use												
	for delivery												
within the economy	**U2 Total water received**	**41667**		**7686**	**2**	**23166**	**85**	**2693**	**105391**	**19099**	**98412**		**298201**
	Water received by users	38629		7680	2	21947	85	2693		16026	98412		185474
	of which recycled water												
	Waste water for sewerage	3038		6		1219			105391	3073			112727
Total use		***59507***	***4020***	***563496***	***5512***	***39066***	***58795***	***183843***	***105391***	***19480***	***118412***		***1157522***
within the economy	**S2 Total water supplied**	**12163**		**774**		**9967**	**37956**	**135294**	**1301**	**11334**	**89412**		**298201**
	Water supplied to users	12080		130		2989	37955	135294	1301	61	3000		192810
	of which recycled water			*130*		*2989*							
	Waste water supplied to sewerage	83		644		6978	1			11273	86412		105391
to the environment	**S3 Total residuals & returns**	**25407**	**3464**	**557095**	**5512**	**19099**	**20829**	**48549**	**104090**	**8146**	**29000**		**821191,4**
	Lost water from irrigation (infiltration)	11901											11901
	Treated waste water	785		3072		3176			127038	868	4000		138939
	Untreated waste water	21	3464		5383	2280	17600		764	233	25000		54745
	Cooling water (energy)			532876									532876
	Water used for hydroelectricity												
	Water lost in transport			140			3236	**55280**					58656
	Other loss of water and adjustment	12700		21007	129	**13643**	-7	-6731	-23712	7045			24074
	S4 Consumption	**21937**	**556**	**5627**		**10000**	**10**						**38129,6**
	Evaporation and Evapotranspiration	21937	556	5627		10000	10						38130
	Direct discharge to the sea												
Total supply, residuals & consumpt		***59507***	***4020***	***563496***	***5512***	***39066***	***58795***	***183843***	***105391***	***19480***	***118412***		***1157522***

Table 8.4 Matrix of flows within the economy

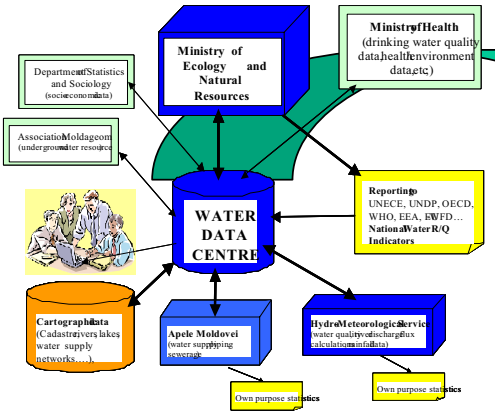
thousand cubic metres

	Agriculture	Fisheries	Energy	Mining	Manufacturing & Construction	Distribution/ irrigation water	Distribution/ municipal water	Sewerage	Governments&Services	Households	Rest of the World	S2 Total water supplied
Agriculture					18		5	83	57	12000		**12163**
Fisheries												
Energy					115	2		644	13			**774**
Mining												
Manufacturing	59		253				2656	6978	21			**9967**
Distribution/ irrigation water	37874				54			1	27			**37956**
Distribution/ municipal water	730		7428	2	21741	83			18898	86412		**135294**
Sewerage	2		5		1211				83			**1301**
Government&Services	2				27		32	11273				**11334**
Household	3000							86412				**89412**
Rest of the World												
U2 Total water received (use)	**41667**		**7686**	**2**	**23166**	**85**	**2693**	**105391**	**19099**	**98412**		**298201**

The Ministry of Health informed about their monitoring network related to quality of surface and drinking water: objects and ways of investigation, sampling, sanitary-chemical indicators derived from controlled measure points, data and indicators related to monitoring of water quality and their introduction into the database created during WDC project.
The geological institute "AGeoM" described the structure of the database on quality and quantity of groundwater resources, which has started to be filled up one year ago.

Water Data Centre in Moldova

Creation of a national database on water and implementation of physical water accounts in Moldova



- **Centralisation of all data on water in an information system run by the METD and partner organisations**
- **Based on NOPOLU System2 software of Beture-Cerec**
- **Incl. training of staff**
- **To implement water accounts**

The system of environmental accounts on water assist to

- Identify water availability for various uses, stresses on water, and qualitative and quantitative water scarcity;
- Measure of water pollution, protection and management and describe water quality in physical and monetary terms;
- Provide an information system which facilities the formulation and evaluation of policies and strategies of sustainable development.

Table 8.7 An asset account for water, Moldova,2000

Million cubic metres

		EA.131 Surface water			EA.132	EA.12-8, EA.2 (except 2.4)	Rest of the World and Sea	Total
		EA.1311 Reservoirs/ Dams	EA.1312 Lakes	EA.1313 Rivers	Groundwater	Land & soil		
Opening Stocks			**2744**	**5000**	**150000**	**500**		**158244**
Abstraction (-)	Total abstraction			752	168			921
	Sustainable use							*0*
	Depletion							*0*
Residuals & returns (+)	Lost water from irrigation				0	15		15
	Wastewater	0	0	264	74		0	338
	Treated waste water			*170*				*170*
	Untreated waster water				*24*	*50*		*74*
	Cooling water			533				533
	Water used for hydroelectricity							0
	Lost water in transport			69				69
Precipitation (+)			**363**	290		**23516**		24169
Inflows (+)				**17750**	1100			**18850**
Net natural transfers (+,-)		**0**	**0**	**2103**	**196**	**-2299**		**0**
Spontaneous Real Evapo-Transpiration (-)			416	333		**21278**		22027
Outflows (-)	To other country/basin			19420	1267			**20687**
	To the sea							**0**
Other volume changes	Due to natural disaster							0
	Discovery (+)							0
	Others							0
Net accumulation		***0***	***-54***	***504***	***-68***	***-46***	***0***	336
Closing Stocks		**0**	**2690**	**5504**	**149934**	**454**		**158582**

The **Physical water accounts** of quantities developed in Moldova offer an integrated view of water supply and uses by industry and by purpose, as well as of the flows of water from the environment to the economy, within economy, and from the economy back to the environment. Water supply and use as well as an asset account of the water resource are established for 1994, 1998 ,2000 and 2002.

Table 8.3/8.5 Water Supply & Use Table, Moldova, 2000

Million cubic metres

		Agriculture	Fisheries	Energy	Mining	Manufacturing	Distribution of water	Construction	Services	Government	Households	Rest of the World	Total
from the environment	**U1 Total abstraction**	**31,1**	**8**	**554**	**5**	**20**	**64,1**	**200**	**0**	**4,6**	**30**	**0**	**916,8**
	from surface water	6	8	554	0	11	64	158	0	0	0	0	801
	of which desalinated water	4	0	540		11	64	158	0	0	0	0	777
	of which rivers	7	7	14		10	55	108					197
	of which springs												0
	from groundwater (wells, …)	25,5	0	2,3	5	9	0	92		5	30		169
	from other water (sea)												0
	Re-used water												
	Soil drainage												
within the economy	**U2 Total water received**	**46,045**	**0**	**6,57**	**0,016**	**12**	**0**	**3,007**	**143**	**15,425**	**132**	**0**	**356,413**
	Water received by users	46	0	7	0	12	0	3		15	132	0	215
	of which recycled water				0	0							0
	Waste water for sewerage								143				143
Total use		**77,145**	**8**	**565**	**5**	**32**	**64**	**203**	**143**	**20**	**162**	**0**	**1279,01**
within the economy	**S2 Total water supplied**	**30,881**	**0**	**2,164**	**0**	**16**	**16**	**145**	**1**	**16,868**	**111**	**0**	**358,386**
	Water supplied to users	29,143	0	0,14	0	3	45	145	0,8	0	0	0	317
	of which recycled water			0,14		3							3
	Waste water supplied to sewerage	0,738		2,024		13			0	15,405	111		42
to the environment	**S3 Total residuals & returns**	**30**	**6**	**567,1**	**5**	**16**	**19**	**58**	**143**	**3,1**	**50**	**0**	**847,7**
	Lost water from irrigation (infiltration)	16											16
	Treated waste water	1,9		3		4			160	1			170
	Untreated waster water	9	6		5	4	24		1	1	26		76
	Cooling water			533									533
	Water used for hydroelectricity												69
	Water lost in transport	2,3		0,1	0	1	13	52		0,3			69
	Other loss of water and adjustment	2,1		21	0,1	7	-18	6	-18	0,8	24		23
	S4 Consumption	**26**	**2**	**5**	**0**	**9**	**6**	**0**	**0**	**0**	**9**	**0**	**58**
	Evaporation and Evapotranspiration	26	2	5	0								33
	Water discharge to the sea												25
Total supply, residuals & consumption		***77,181***	***8***	***564***	***5***	***32***	***64***	***203***	***143***	***20***	***161***	***0***	***1279,07***

Table 8.4 Matrix of flows within the economy, Moldova, 2000

Million cubic metres

	Agriculture	Fisheries	Energy	Mining	Manufacturing	Distribution of water	Construction	Services	Government	Households	Rest of the World	Total
Agriculture					0,004		0,006	0,738	0,099	20,034		20,881
Fisheries												0
Energy	0,003				0,137			2,024	0,02			2,184
Mining								0				0
Manufacturing	0,001		0,251				3,001	13				16
Distribution/ irrigation water	45,462											45,462
Distribution/ municipal water	0,559		6,319	0	12				15	111		145
Sewerage					0,6							0,6
Government	0,02				0,013			16		0,34		16,808
Household								111				111
Rest of the World												0
U2 Total water received (use)	**46,045**	**0**	**6,57**	**0**	**12**	**0**	**3,007**	**143**	**15**	**132**	**0**	**358,413**

If You have any data or information on water isssue, You can contact and to be our new partner, e-mail address WDC@mediu.moldova md

Water accounts are part of the System of Environmental and Economic Acoounts of the UN, (SEEA 2000) adopted by Eurostat

Project of the Ministry of Ecology and Natural Resources of Moldova, MENR

Supported by the French Ministries of Foreign Affairs and of Ecology and the French Embassy in Moldova

With the technical assistance of Ifen (the French Environment Institute) and Beture-Cerec

SOUTH AFRICA

Statistics South Africa

The National Accounts Division in Statistics South Africa (Stats SA) is responsible for the compilation of the gross domestic product, Supply and Use tables, Satellite accounts (i.e. Natural Resource Accounts and Tourism Satellite accounts) and Social Accounting Matrices (SAMs) for South Africa. The following paragraphs describe the past and present activities for both social and environmental accounting in Stats SA, these are the responsibility of the Application of National Accounts component.

Social Accounting

The final social accounting matrix for the 1998 reference year, constructed according to the recommendations of the 1993 System of National Accounts (SNA), was published in November 2002. Report No. 04-03-02 (1998) is available on Stats SA's website (http://www.statssa.gov.za). The previous SAM was for the 1988 reference year according to the 1968 SNA.

Subsequent to Report No. 04-03-02 (1998), Stats SA published an 'Overview of the 1998 Social Accounting Matrix' in May 2004 (also available on Stats SA's website). The purpose of this report is to provide an analysis of the 1998 SAM with the main focus on final household consumption expenditure and compensation of employees.

Stats SA aims to publish a SAM within 48 months after the reference year. The next SAM for the 2000 reference year will however be published in 2006 due to the rebasing and benchmarking of SA's national accounts in November 2004.

Current work being done on the SAM:

Project	**Due date**
Discussion document on 11 countries' experiences in the compilation of a SAM	31 March 2005
Position document on the inclusion of labour accounts the SAM for South Africa	31 January 2005
SAM for the 2000 reference year	2006

Stats SA has adopted a 3-phased approach in the development of natural resource accounts i.e.:

- Phase 1: Compilation of a position document. This document aims to establish whether the specific account is feasible for South Africa and is for internal use only.
- Phase 2: Compilation of a discussion document. If it is found, through the position paper, that the specific account is feasible it is constructed in a discussion document and published on Stats SA's website. Comments and suggestions on the document are then invited from our stakeholders.
- Phase 3: Compilation of an official report. The comments and suggestions from the stakeholders are included in the discussion document and published as official statistics in paper format as well as on Stats SA's website.

Table 1 shows the status of the accounts for the different natural resources for South Africa.

Table 1 – Natural Resource Accounts for South Africa

Type of resource	Status	Comment	Due date
Water	Official statistics[1/]	Contains physical accounts for 19 water management areas for the 2000 reference year.	January 2004
Minerals	Official statistics[1//]	Contains physical and monetary accounts for gold, platinum and coal for 1980 to 2001.	September 2004
Land	Discussion document[1/]	Contains land-use and land-cover accounts for South Africa for 1994/95.	September 2004
Water quality	Position document	Indicated that some aspects of water quality accounts can be compiled for 22 drainage regions in South Africa for 2000.	March 2004
	Discussion document	Contains water quality accounts for 22 drainage regions in South Africa for 2000.	March 2005
Energy use	Position document	Indicated that energy use accounts can be compiled for 8 types of energy in South Africa for 1995 – 2001.	March 2004
	Discussion document	Contains energy supply and use tables for 8 types of energy in South Africa for 1995 – 2001.	March 2005

1/ Available on Stats SA's website

An advisory group for both the SAM and NRAs were established with the aim to advise the division on the priorities of the stakeholders in the specific areas as well as to critique our work. To make sure that we consult with all our stakeholders annual workshops are held in addition to ad hoc presentations.

Please contact me if you need any additional information.

Kind regards

Anemé Malan
Manager: Application of National Accounts

E-mail: anememe@statssa.gov.za

SWEDEN (NIER)

National Institute of Economic Research (NIER), (see also separate report for the physical environmental accounts of Statistics Sweden)

The Environmental Economic Research Division at NIER produces analyses for Swedish environmental policy. Our work can be divided into three areas:
Methods for developing environmental accounts in monetary terms
Impact analyses of instruments of environmental policy
Theoretical and empirical analyses of efficient environmental policies

Current projects

Monetary environmental accounts

Monetary green accounting and ecosystem services

During 2003 a theoretical method for monetary environmental accounts was created (Gren, 2003). The method is used to calculate the value of changes in natural capital and sustainable use of natural capital. The starting point for estimation is the natural capitals production of ecosystem services. Given that monetary estimates are available for these services, it is possible to calculate the value of changes in ecosystem service provision. This is calculated as the discounted value of changes in future ecosystem services from the capital stock. The calculated value takes into account the ecosystems impact on the welfare of future generations and is defined as a natural capital accounting price. Empirically, the method has been applied to four kinds of natural capital; forest, agricultural landscape, wetlands and urban environment. The analysis has been extended to a ten year period (Gren and Svensson, 2004).

Health and air pollution

A theoretical model for including health problems from air pollution in environmental accounts has been developed (Huhtala and Samakovlis, 2003). The model includes a production externality in the form of air pollution, which causes both direct discomfort and indirect health effects through its impact on the productivity of the labour force. The results show that the valuation of discomfort should be included in the environmental accounts. Further, data from a National Environmental Health Survey have been linked with municipal data on air quality. Concentration-response functions have then been estimated to analyse the relationship between nitrogen dioxide and respiratory restricted activity days (Samakovlis et al., 2004). The aim is for the estimates to form the basis for valuation of the health effects. To be able to value the discomfort deriving from the problems, a contingent valuation (CV) study has been conducted. The results are now being compiled.

Environmental economic impact analysis

Economic effects for Sweden of limited carbon dioxide emission trade within EU

NIER has previously developed an applied general equilibrium model, EMEC, for analysis of the interaction between the economy and the environment. Recently, EMEC was used to analyse the economic impacts for Sweden of restricted carbon dioxide emissions when we have international emission trade. The study shows that Sweden will have significant welfare gains from participating in international emission trade within the EU. Sweden's national emission target could, however, be attained at significant lower costs if all production sectors as well as households could participate in the emission trade (Östblom, 2003a and 2003b).

Costs of climate policy when pollution affects health and labour productivity

Much of the debate over global climate change involves estimates of the direct costs of global climate change mitigation. Recently this debate has included the issue of ancillary benefits. These benefits consist mainly of health

improvements, since reducing greenhouse gases has the effect of also reducing other pollutants affecting human health and labour productivity. This analysis incorporates a linkage between air pollution and health effects into a general equilibrium model. Results from recent concentration-response and contingent valuation studies are used to model direct disutility and indirect welfare effects that negatively affects the productivity of labour. Three different scenarios for attaining the Swedish CO_2-target are compared with and without feed back effects on health and productivity. The results show that not including these feed back effects means overstating the costs of climate policy.

Evaluation of the Swedish climate policy 2004

The government has given the Environmental Protection Agency and the Swedish Energy Agency the task of producing material for evaluation of the Swedish climate policy in 2004. In this work, NIER has been given the roll of presenting the economic outcome of various scenarios. The model EMEC is used in constructing these outcomes, as well as for sensitivity analysis of alternative policy measures for attaining the goals of the Swedish climate policy.

Transport services in the EMEC model

As was claimed in the report "Economy of Natural Resources" by the Committee of Efficient Resource Use: “one of the most difficult problems to solve, when it comes to reducing pollutions harmful to the environment, is the energy use of the transport sector". A significant share of total fossil fuel consumption is taken by car fuels in Sweden today, but in contrast to the situation in many other sectors, the energy productivity of transportation by private cars has not increased in recent decades. Energy use and thereby also carbon emissions will continue to increase, should there be no important innovations in transport techniques. This project develops the households’ choice of transport services in the EMEC model to present a more detailed picture of the demand and supply for transport (Nilsson, 2004a).

A global CO2 market: efficiency and regional well fare

The question of how to distribute carbon dioxide emission permits is of debate in international negotiations on the issue of climate change. There are many principles discussed for distributing the permits. A few of the principles are founded on economic welfare theory and are both fair and consistent from an economic point of view, in contrast to ad hoc rules such as distribution of permits according historical emissions. The global model, GTAP-EG, was used to calculate the economic effects of fair distributions for various regions of the world but with a special focus on the effects for Sweden (Nilsson 2004b).

Analysis of economic instruments in environmental policy

Cost-effectiveness in Swedish policy for the Baltic Sea – an evaluation

This project evaluates the cost-effectiveness in Swedish policies to reduce nitrogen emissions to the Baltic Sea. Since the end of the 1980s, reduction in nitrogen loads to the coast is one of the environmental targets in Sweden. To reach this target, different regulations have been introduced for the sectors that contribute to emissions. In this project, measures for abatement of over-enrichment in the Baltic Sea were analyzed. The results show that the Swedish policy has been inefficient and a number of proposals for increased cost-effectiveness are presented (Elofsson and Gren, 2004a). In Elofsson and Gren (2004b), it is shown how the impact of measures in different drainage basins on Baltic Proper, can be calculated with the help of input-output analysis. The results show there is significant interdependence between different basins, implying that measures in all drainage basins must be compared with regard to their costs and effects if policy-makers want to develop cost-effective policies.

What is driving the EU burden-sharing agreement: Efficiency or Equity?

In accordance with the Kyoto protocol, the EU agreed to reduce its emissions of greenhouse gases by 8 percent compared to emissions in 1990. The Burden Sharing Agreement defined how the emission reductions are to be distributed among the EU Member States. This project investigated the factors that determined this distribution

(Marklund and Samakovlis, 2004). The results indicate that both cost-efficiency and equity were important aspects when Member countries' abatement burdens were agreed.

Efficient water management on local and national level

The EU Water Framework Directive (WFD) is currently implemented. The Swedish Commission on Water Administration (SOU 2002:105) suggests a re-organization of water management through the establishment of five water districts, where borders are defined by natural water drainage basins. These water districts are intended to manage all types of waters (groundwater, surface and coastal waters). The purpose of the project is to analyze economic effects of delegation of responsibilities for water management to regional governments. "Responsibilities" can, according to the WFD, imply authority to define environmental targets as well as policy instruments. One factor of importance is that local, national and international water quality may be affected by a single measure. The project will extend existing economic models for the Baltic Sea to include the impact on local water quality (Svensson, 2004).

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SWEDEN

Statistics Sweden, (see also NIERs report on monetary accounts and policy)

Regular publishing

Energy use
Emissions to air
Environmental taxes and subsidies
Environmental protection expenditure
Chemical product use
Waste for selected years

Most flow data are presented by households and 40 industries. For research purposes a further disaggregation is possible. The accounts are supplemented by input-output modeling results showing indirect flows. Time series are available from 1993 for most data sets.

Non regular publishing

Environment industry
Indicators for sustainable development: environment. economy and social data per industry
Water accounts, Land accounts, Forest accounts
Data presented per product group of final demand
Household accounts
Decomposition analysis
Regional environmental accounts
Material flow analysis

Publication strategy

Data are presented in a database available at www.scb.se/mi1202 (in Swedish) and www.scb.se/mi1202-en (in English). The website also contains reports and other information.

Environmental protection expenditure data is produced as a statistical message that is published in the middle of September every year.

An electronic news-letter (in Swedish) is issued regularly and is available at the web-site.

Analyses of data are presented in the publication series Miljorakenskaper that is jointly used by Statistics Sweden, National Institute of Economic Research (NIER) and the Swedish Environmental Protection Agency.

Reports that are commissioned from other institutes such as Eurostat or similar are often also available in pdf-form at the web-site.

Selected data is presented in the Statistical Yearbook.

Recent reports between 1993 and 2000

MIR2003:4 Environmental subsidies - a review of subsidies in Sweden

MIR2003:2 Water accounts 2000 - with disaggregation to Sea basins

MIR2003:3 Indikatorer för hållbar utveckling - baserade på miljöekonomisk och social statistik (Indicators for sustainable development based on environmental economic and social statistics)

Households in the environmental accounts, Eurostat report

Chemical product indicators by industry – fossil fuels, cement and other chemical products classified as hazardous to health or environment 1996-2001, Eurostat report

Structural decomposition of environmental accounts data – the Swedish case, Eurostat report

Land use by industry 2000, Eurostat

THE NETHERLANDS

Statistics Netherlands

New projects in 2003-2004:

Water accounts

This year, the Dutch system of water accounting (NAMWA) was further developed. In NAMWA the financial transactions registered in a country's economic accounting system (the National Accounting Matrix) are linked to related water use (extraction and discharge) and water pollution. One of the major challenges facing policy and water management nowadays is the implementation of the European Water Framework Directive (WFD). NAMWA offers opportunities to meet the data and information demand from the economic analyses in the WFD, not only on a national, but also at river basin level. This year the NAMWA was further extended with a) the addition of more pollutants, b) more detailed information on water use, c) a further breakdown of the of river basin level. Data are now available for 1996-2001. More information on the Dutch NAMWA will be presented during a presentation at the Copenhagen meeting.

Environmental taxes

A project was carried out to compose the different environmental taxes per NACE category for the years 1990-2003. A short article on environmental taxes was published on the CBS-website which received much attention in the Dutch media. In the coming years we are planning to regularly publish data on these taxes and to do some analyses with the data. Also we want to start some work on the environmental subsidies.

Energy accounts

In order to revise National Account data on fuels and energy, a project was carried out to integrate the energy statistics into the National Accounts. The integration of energy statistics with the NA offers numerous advantages. Apart from the wider range of source data that can be drawn on, the big advantage is that physical quantities of supply and use are now known which tally with the values posted in the NA. An inherently consistent system is thereby created in which energy statistics, the NA and related statistics such as the Pollutant Emission Register (PER - a set of air-pollution statistics directly linked to energy statistics) are all featured. In the past, these sets of statistics were, in part, produced independently of one another. With this integrated system, a more direct relationship can be established between major economic variables and environmental pollution, while derived input/output tables make it possible to analyse energy flows within the Dutch economy.

Future plans

Last year, we faced the danger that some important environmental statistics would have to disappear because of budget cuts. Fortunately, this was prevented and for the coming two years the continuation of the production of the environmental statistics is guarantied. Furthermore, we managed to get extra money to expand the system of environmental accounting in order to meet the new requests from Eurostat. In a few months time two more persons will start working on environmental accounts in the Netherlands. We are planning to start some new projects on energy accounts, water accounts, material flow accounting and Input – Output analysis / decomposition analysis.

UNITED KINGDOM

Perry Francis (Environmental & Household Satellite Accounts, Office for National Statistics) and Rocky Harris (Environmental Statistics, Department for Environment, Food and Rural Affairs)

ONS lead

- Continued biannual environmental multi-source topic report pulling together natural resources accounts, physical flow accounts and monetary accounts into a single web-based PDF publication.
- Publication in 2004 in *Economic Trends* of an article presenting an industry breakdown of UK environmental tax payments in 2001.
- Report on the impact of households on the environment through the direct and indirect generation of greenhouse gas emissions completed with summary article due for publication in October 2004 edition of *Economic Trends*.
- Review of material flows accounts focusing on timeliness, international comparability, comprehensiveness, policy relevance and accuracy of estimates of hidden flows scheduled for completion by end of the year.
- Improvements made to the estimates of Public Sector Environmental Protection Expenditure through establishing new data source at HM Treasury. Improvements also expected for the forestry and waste accounts.
- Establishment of a new cross-government working group to review the quality of the estimates of energy use and associated atmospheric emissions from transport sources, including those from aviation, shipping and “tank-tourism”.

Defra lead

- Further development of decoupling indicators, based more upon environmental accounts data, following responses to public consultation. Likely to include further work on the measurement of emissions associated with the production of imports, and on the interpretation of material flow accounts.

- Publication of research into environmental accounts for agriculture, covering both beneficial and damaging impacts from farming in monetary and physical terms.
- Publication of research into the environmental impact of 'food miles' - the distance that food travels from farm gate to plate, including overseas impacts.

EEA

European Environment Agency, prepared by Jean-Louis Weber

Since many years, and at least the creation of the environment statistics division (1986) and the involvement of the national accountants in the process with the London Group (1994), Eurostat has steered the development of economic and environmental accounts in Europe – and played a major role on the international scene. The EEA, which started its activities in 1994, rapidly expressed its interest for environmental accounting as a source of consistent information for carrying its own assessments. Therefore, the EEA was progressively involved in the process and became a member of the task force that drafted the 'European Strategy for Environmental Accounting' approved by the Statistical Programme Committee in 2003. Particular interest of the EEA at this stage was for the consolidation of the production of environmental protection expenditure accounts (the SERIEE methodology), Material Flows Accounts, sector accounts of NAMEA type, Water Accounts and Land Accounts. In this context, the EEA started its own activities, with present results in two domains.

Material Flows Accounts: In the European Union, the issue of resource use is increasingly reflected in the policy agenda. The 6th Environment Action Programme of the European Union identified Sustainable Use and Management of Natural Resources and Wastes as one of its priority areas (Articles 2 and 8). With respect to material and resource flows, the programme aims at "better resource efficiency and resource and waste management to bring about more sustainable production and consumption patterns, thereby decoupling the use of resources and the generation of waste from the rate of economic growth and aiming to ensure that the consumption of renewable and non-renewable resources does not exceed the carrying capacity of the environment" (Article 2.2). In order to pursue these general objectives, the European Commission is developing a Thematic Strategy on the Sustainable Use of Natural Resources (Article 8.2 (i)).
As a consequence of the policy requirements, the EEA has started working on MFA's since the end of the 1990's. This activity has benefited from previous Eurostat's work on MFA's, as well as from the expertise of EEA's network. In 2001, the EEA decided to expand the scope of work of its former European Topic Centre on Waste to include material flow analysis. Concerning material flow analysis, the key work objectives of the ETC/WMF include:
- provision of reliable and comparable data and information on material flows in Europe;
- reporting and publication of findings in reports produced by the EEA;
- further harmonisation of methodologies in the area of material flow accounting and indicators;
- support to policy makers in developing policy strategies and measures in the new policy field of sustainable use of natural resources.

Indicators from MFA, such as the Total Material Requirement, have been widely used by the EEA, e.g. in the indicators based report so-called "Environmental signals", with a special chapter in 2002.

Land and ecosystem accounts: The European territory is at the same time rich in high value ecosystems and landscapes, densely populated and rapidly changing. Key policies of the European Union have important impacts on the territory: the Common Agriculture and Rural Development Policies, the Regional Policy, which objective is to guarantee the cohesion of Europe, the Transport policy and the planned Trans-European Networks and, last but not least, the Environment policy, in particular related to Nature Conservation (Natura 2000) and the objective of halting losses of Biodiversity by 2010, river basins management (Water Framework Directive), Urban strategy under preparation or the Integrated coastal zones management strategy. This non-exhaustive list shows the necessity for Europe to have a common reference for describing its territory, from the point of view of the uses of land and their impacts on ecosystems and landscapes. This requirement is the origin of the so-called Corine Land Cover (CLC) map, which supplies an image of cities, agriculture, forests, wetlands and other natural areas. This image is based on a common methodology, implemented now in circa 30 countries. CLC is widely used and the 1990 image is being currently updated for the year 2000, as a joint programme of the European Union (involving the Commission directorates of Environment, Agriculture, Regional Policy and the Joint Research Centre) and the Member States (as well as candidate countries).
From the Corine database, the EEA has decided to implement European-wide Land and Ecosystem Accounts (LEAC). These accounts comply with the methodology of the SEEA for land and ecosystem accounts and have been tested in a joint research by the EEA (with the participation of its Topic Centre on Terrestrial Environment) and Eurostat. Core accounts of land cover have been produced for several countries, most of Europe being expected to

be covered by the end of 2004. Operational indicators have started to be derived from LEAC for Urban Sprawl, Agriculture land uptake by urban and infrastructures development, Conversion from pasture to arable land and permanent crops, Conversion of forests and semi-natural and natural areas to agriculture. As well, LEAC are used as a common reference for the ongoing assessment of the integrated coastal zones management policy of the EU.
Based on a geographical image, LEAC can be produced at various scales and fit the needs of the many users from the European to the local levels of policy making as well as for the citizens. Therefore, the decision has been taken to give a full access to LEAC on the EEA website, for complete downloads as well as for on-line and customized extraction by users of accounts, indicators, graphs and maps.
One important property of LEAC is the interconnection between land use and ecosystems.
As for land use, linkages between LEAC zonings and conventional statistics have been recently examined (e.g. for agriculture, forest or tourism). With the main exception of population statistics that are available at the municipal level, statistics are not currently centralised at the European level with an optimal level of geographical disaggregation for being integrated fully in LEAC. Work is continuing on this subject to identify appropriate levels of aggregation for reporting as well as alternate data sources and possibilities of modelling spatial distributions.
Ecosystem accounts are presently tested for wetlands. The challenge is to bridge land cover accounts and the various databases on fauna and flora for identifying possible problems of health (ecosystem distress).
The first results of land and ecosystem accounts have been presented as an EEA contribution last June in a workshop on Global Change and the Future of Ecosystems in Europe organised with the Millennium Ecosystem Assessment programme.

Future work

MFA's activity will continue, in cooperation with Eurostat and the OECD.

LEAC will expand their scope:
- Land cover accounts: full implementation and improvement of the system; feasibility study of possibilities of updating LEAC every 2 to 5 years, in-between 2 Corine land cover inventories (every 10 years by now), using medium resolution imaging instrument such as ENVISAT-MERIS
- Land use accounts: integration of statistics (demographic, social and economic) in the LEAC framework, with priority to land use functions such as housing, transport, agriculture and tourism.
- Ecosystem accounts: continuation of the pilot work on wetlands, integration with water accounts (see below), exploration of ecological corridors and dry grassland issues.
- Use of LEAC for modeling and scenarios building, in particular in relation to sector policies and the impacts of climate change.
- Use of LEAC for framing the assessment of the natural capital value of ecosystems (asset values, ecosystem services…) at the EU level and considering EU responsibility in a global perspective.

Water accounts: the development of water accounts in a river basin perspective is starting now at the EEA, as a component of spatial analysis. Priority will be given to accounts of the quality of rivers, the polluting emissions to rivers and groundwater, the availability of water resource for human use and ecosystems (assets, supply and use), ecosystem accounts (rivers and lakes, ecological corridors, water and wetlands, river basins and coastal water…).

EUROSTAT

Introduction

In 2004 EUROSTAT analysed its current activities, with a view to abandoning non-essential activities and focusing on core activities. The reduced Environmental accounting team had to deal with ***internalising*** a great workload and therefore also to ***focus*** on the following core activities:

- Material Flow Accounts (Training, update and publish EU 15 data)
- NAMEA air emissions (data collection and compilation guide)
- Expenditure Accounts (JQ data collection)
- Consolidation and data, exploiting the results achieved so far, and making them available to users (**D**atabase on **E**nvironmental **A**ccounting)
- Assist new Member States (training and PHARE concept for EA)

Environmental accounting aims to satisfy efficiently user demand for statistics needed for integrated economic and environmental policy making.
Eurostat proposal for environmental accounting is to define as main priorities at EU level the regular production and publication of data through a Eurostat environmental data base, and a closer integration of environmental accounts, environmental statistics and Sustainable Development Indicators.
Continued ***funding*** support by the European Commission's Directorate General for the Environment enabled a very substantial number of pilot applications and implementation projects covering virtually every Member State. A large number of projects (75 in the three last years) have been completed and a substantial number are ongoing. The Member States and Eurostat have been progressively successful in converting the results of these 'seed funding' projects into regular production of environmental accounts results.

NAMEA air emission accounts

Achievements from mid 2003 to mid 2004
NAMEA is a framework dividing the economy into industry and households categories, showing how each industry or the households contribute to a variety of environmental concerns. So far, the air emissions accounts are the most advanced area of environmental accounts.
The compilation guide has been finalised and is ready for publication. The comments from the Task Force are incorporated.
The questionnaire has been revised, including tables on energy balance. Eurostat sent out the questionaire at the beginning of June 2004 together with the forest questionnaire with the request to send back the filled questionnaire.
The usefulness of NAMEA as an instrument for SDI and further analyses will be discussed in a special session during the Plenary meeting with Member States in October and will present

- a more user-oriented presentation of results,
- integration of other modules of Environmental Accountig (like taxes and MFA) and SAMs (Social Accounting Matrix) in the NAMEA framework.

Plans for 2005
The results of the questionnaire will be published. If sufficient data are available, time series for E15 /EU25 will be calculated..
A NAMEA Task force is planned before Summer 2005.

Economy-wide material flow

Achievements from mid 2003 to mid 2004
An update of Aggregate material use in the EU covering the period 1980 – 2001 and a derived set of aggregate indicators has been finalised and is ready to publish.
A training workshop for the new Member States and less advanced countries in the field of Material Flows was organised together with the EEA's European Topic Centre for waste and Material Flows in Luxembourg in June 2004.
The resource productivity indicators will be presented and discussed in the Plenary meeting during a joint special session for environment statisticians and environmental accountants to explore the use of the MFA indicators for the production of indicators for sustainable development.

Plans for 2005
Future work will focus on improving the quality and comparability of the accounts. In the meantime, it is proposed to combine available national material flows accounts with estimates based on international data sources.
Following the international discussion on the future work on MFA accounts at the OECD Helsinki meeting, a Eurostat Task Force on economy-wide material flows will be organised in late autumn 2004, in order to further develop the Eurostat Guide and clarify methodological details (sources, methods, concepts).
The results of the Task Force (updated Guide, standard tables) will be published in 2005 and used by OECD as a basis for their MFA work.

Environmental expenditure statistics and accounts

Achievements from mid 2003 to mid 2004
The 2004 Joint OECD/Eurostat data collection process was started with some changes in the tables.A methodology for providing EU-15 estimates is already developed and was discussed with the countries at the March 2003 meeting. The estimation method is based on averages.
Plans for 2005
The industry data collection handbook will be finalised in autumn/winter 2004.
In order to show clearly the links and differences between the two systems, Joint Questionnaire and Expenditure Accounts, conversion guidelines have been developed. These use data from the extensive Worked Examples included in the SERIEE Compilation Guide published in 2002 and will be finalised and published as a Guide.
It is foreseen that first dissemination of results from the OECD/Eurostat questionnaire 2004 could be made by the end of 2004 with uploading of detailed data into New Cronos, and publication in the form of one or more Statistics in Focus is planned for 2005.
Eurostat will start work on a non-industrial data collection handbook and hopes to publish it by the end of 2005.
The next meeting of the Sub-group on Environment Expenditure Statistics is planned for 13 May 2005, covering also the related areas of the environmental accounts: Environmental expenditure accounts, Environment industry and Environmental taxes (next section).

Environmental taxes and environment industry

Achievements from mid 2003 to mid 2004
Following the recommendations of the ESEA TF, a proposal for the integration of environmental taxes into the NAMEA framework was developed and discussed at the last NAMEA Air Task Force meeting.

Plans for 2005
Eurostat plans to continue the production of environmental tax revenue statistics (without an industry breakdown) jointly with the DG Taxation and Customs Union, with annual updates based on tax data reported to Eurostat in the national accounts transmission programme.
Eurostat proposes to start in 2005 to collect data on environmental taxes by sending out the standard table, recommended by the NAMEA TF, for a first inventory of data available at national level, and for comparison of consistency with the aggregated environmental tax revenue data already produced. The proposed standard table consists of a cross-classification of the main environmental tax categories (total environmental taxes, energy taxes,

transport taxes, pollution taxes and resource taxes) with an industry breakdown following NACE 2-digit level plus households.

Following the recommendations of the ESEA TF, Eurostat will next year cooperate with DG ENV to investigate the possibility of supplying information on the environment industry.

Forests

Achievements from mid-2003 to mid-2004
The questionnaire has been revised, including tables on carbon balance. Eurostat sent out the questionaire on the beginning of June 2004 together with the NAMEA standard tables with the request to send back the filled questionaire.

Plans for 2005
The forest environmental accounts database will be loaded with the data collected through the previous questionnaire. Data from the new collection using the revised set of tables will be progressively integrated. A Statistics in Focus based on the results from the questionnaire will be produced in 2005.

Database and Website on Environmental Accounting

Achievements from mid 2003 to mid 2004

The existing and latest data from the different Environmental Accounting modules are being centralised and constantly introduced into the Database on Environmental Accounting. A website on Environmental Accounting (including MS reports and Eurostat handbooks, guides…) is being implemented.

Plans for 2005
The database will be updated in regular intervals and made public via New Cronos. The website will be made available free to public.

Environmental Accounts PHARE project

The Training Workshop on MFA showed up the need for training and guidance to set up Environmental Accounting in the new Member States. The PHARE project will finance in 2005 training workshops and pilot projects for and by new Member States.

Special session on use of Environmental Accounts for SDI

The Plenary meeting in October with Member States will include a joint session for environment statisticians and environmental accountants to explore the use os material flows and NAMEAs for the production of indicators for sustainable development. The following points will be discussed : resource productivity indicator, decomposition analysis, integrated NAMEA, environmental expenditure and taxes, eco-efficiency indicators.

UNITED NATIONS STATISTICS DIVISION

Since the last London group meeting in Rome in September 2003, the work of UNSD has focused in the following areas:

Methodological work:

- Revision and finalization of the handbook on Integrated Environmental and Economic Accounting for Water Resources in collaboration with the subgroup on water accounting of the London Group.

  Some chapters of the handbook were revised, taking into consideration comments received during the London Group in Rome.

- Finalization of the Handbook on Integrated Environmental and Economic Accounting SEEA-2003.

  UNSD has prepared a glossary of terms which has been circulated to the members of the London Group prior to the meeting for review. The official UN editing has been completed and changes have been incorporated into the handbook.

  It is expected that by early 2005 the handbook will be ready for printing.

- Contribution to the updating process of the 1993 SNA especially on those issues related to natural resources and environmental accounting (e.g. treatment of land improvements, water, cost of ownership transfer, mineral exploration, etc.)

Technical cooperation:

- UNSD, together with the UN Division for Sustainable Development, has continued to assist Morocco in the implementation of water accounts through a project which started in the fall 2003. The preliminary results of the compilation of the accounts for a pilot river-basin (Oum-Er-Bia) were presented during a Workshop organized by the Government of Morocco, UNDSD and UNSD in January 2004 in Morocco.

Coordination:

- UNSD has worked with the United Nations Environment Programme (UNEP) towards the formulation of a proposal to create a UN Committee on Environmental-economic accounting - comprised by international organizations and countries - which would raise the profile of environmental-economic accounting. A meeting was organized in Copenhagen, immediately before the London group meeting, as a preliminary consultation with countries and international organizations to discuss further the proposal.

In the future UNSD will continue the work on the development of water accounting and will investigate how data collected from international questionnaires could be used to fill in the tables of the water accounts framework. The longer term objective would be the harmonization of concepts, definitions and classifications used in international questionnaires with the water accounts. In addition, UNSD will start working on the harmonization of methodologies on mineral and energy accounts in close cooperation with the subgroup of the London Group.

ECLAC

United Nations Economic Commission for Latin America and the Caribbean ECLAC

Background

The Economic Commission for Latin America (ECLA) was established by Economic and Social Council resolution 106(VI) of 25 February 1948 and began to function that same year. The scope of the Commission's work was later broadened to include the countries of the Caribbean, and by resolution 1984/67 of 27 July 1984, the Economic Council decided to change its name to the Economic Commission for Latin America and the Caribbean (ECLAC); the Spanish acronym, CEPAL, remains unchanged.

ECLAC, which is headquartered in Santiago, Chile, is one of the five regional commissions of the United Nations. It was founded for the purposes of contributing to the economic development of Latin America, coordinating actions directed towards this end, and reinforcing economic relationships among the countries and with the other nations of the world. The promotion of the region's social development was later included among its primary objectives.

In June 1951 the Commission established the ECLAC subregional headquarters in Mexico City, which serves the needs of the Central American subregion, and in December 1966, the ECLAC subregional headquarters for the Caribbean was founded in Port-of-Spain, Trinidad and Tobago. In addition, ECLAC maintains country offices in Buenos Aires, Brasilia, Montevideo and Bogotá, as well as a liaison office in Washington, D.C.

The secretariat of the Economic Commission for Latin America and the Caribbean (ECLAC):

a) Provides substantive secretariat services and documentation for the Commission and its subsidiary bodies;
b) Undertakes studies, research and other support activities within the terms of reference of the Commission;
c) Promotes economic and social development through regional and subregional cooperation and integration;
d) Gathers, organizes, interprets and disseminates information and data relating to the economic and social development of the region;
e) Provides advisory services to Governments at their request and plans, organizes and executes programmes of technical cooperation;
f) Formulates and promotes development cooperation activities and projects of regional and subregional scope commensurate with the needs and priorities of the region and acts as an executing agency for such projects;
g) Organizes conferences and intergovernmental and expert group meetings and sponsors training workshops, symposia and seminars;
h) Assists in bringing a regional perspective to global problems and forums and introduces global concerns at the regional and subregional levels;
i) Coordinates ECLAC activities with those of the major departments and offices at United Nations Headquarters, specialized agencies and intergovernmental organizations with a view to avoiding duplication and ensuring complementarities in the exchange of information.

The 33 countries of Latin America and the Caribbean are member States of ECLAC, together with several North American and European nations that have historical, economic and cultural ties with the region. Thus a total of 41 members States; seven non-independent territories in the Caribbean are associate members of the Commission.

The Division of Statistics and Economic Projections is one of ECLAC's divisions, which mission is to help the countries of the ECLAC and to the international community in constructing, strengthening, and to harmonize the statistical and information systems necessary for the design, follow-up, and the evaluation of economic and social development policies and dynamics.
Statistics Division – Principal Objectives:
- To strengthen the statistical national capacities and harmonize the methodologies used in the national systems of statistical information, based on international and regional procedures.

- To promote the Statistical Conference of Americas as the regional forum of debate, interchange of experiences and cooperation.
- To systematize and to spread economic and social representative and comparable information at regional level.
- To cooperate with other multilateral organisms in the definition and diffusion of the methodological and operative recommendations on economic and social statistics.
- To support economic and social development research of the region making available to the public methodological references and documents of work.

Statistics Division – Principal areas of work:

- National Accounts: National and Satellites Accounts; External Sector; Price Statistics and PPAs.
- Emerging areas of statistics:
    - Environmental (Statistics, Indicators and Integrated Accounting)
    - Tourism
    - Health

      All currently under the Chief of National Accounts Unit
- Social Statistics: Householders Survey; Lines of poverty; Gender and equity; Millenniums Development Goals.
- Projection Center: Short term indicators database; Short and long run modeling; Factors of long-term growth.

Environmental management for sustainable development in Latin America faces important challenges in the next decade, noticeably the lack of reliable and up to date information for better decision-making. Information is relatively expensive in the region, so cost-effectiveness and efficiency are key target in the production of solutions to this need. Governments in the region are struggling through finance difficulties, and given the recent world economic slow down, money for environmental purposes tend to compete with social needs that are still perceived as more urgent than a sustainable environment.

This is where sound environmental statistics and indicators, and in some cases Environmental and Economic Accounting (EEA), are used to monitor the environment vital signs, in order to achieve better sustainable development policies and management.

Environmental Accounting provide policy makers with sign posts providing synthesized, processed, meaningful information that is necessary to prioritize and fine tune both direct and market environmental instruments for sustainability. National-scale environmental accounting is needed in our countries to guide transectoral national policy making, and so are sub-national scale for decentralized policy making. But our environmental accounting need to be tailor made, in accordance to national priorities, resources and specific sustainability problems. Proceeding in this sensible manner, we can also induce fuller commitment and increase future use of this first pilot sets of environmental accounting.

Different countries and agencies in LAC, have produced sets of Environmental Statistics, indicators and EEA, not necessarily co-ordinately, most of which are being used in different ways and by different institutions. Not withstanding, emerging initiatives of sustainability indicators, environmental statistics and EEA in our region are very important experiences that have been considered on ECLAC's work, including Mexico, Chile, Colombia and Brazil and more recently, Panama, Peru, Dominican Republic, Argentina, Nicaragua and Belize.

The Statistic Division has worked towards the development of environmental statistics for years, but has increased its volume and complexity of work through the REDESA project, particularly since 2003 and is currently preparing to make freely available to the public a regional environmental database (BADEIMA – Environmental Statistics and Indicators Database). At present time is working in the final version of the collection of data set from the countries in the region through a questionnaire of 65 key variables.

Current Activities

The ECLAC's Statistic Division is responsible for economic and social accounts, and it is progressively developing environmental statistics, increasingly embracing the EEA methodologies to both guide its work with environmental statistics and indicators. However, environmental statistics is not yet part of the regular working program of the Division, and thus still relies on project and program budgetary lines.

Most importantly, with the collaboration of experts and countries in the region, ECLAC's Statistics Division is carrying out a regional project for the development of environmental statistics (REDESA). Key regional field experts from Colombia, Mexico, Brazil and Chile provide expertise and know-how to the ECLAC team and to the Network, participating substantially in the elaboration of conceptual frameworks, methodologies and capacity building activities. We have been concentrating our work mainly in general statistics and to a lower degree, on integrated environmental and economic accounts.

In the field of general environmental statistics, throughout last year, significant progress was achieved in developing the experts and institutions directory (currently, 48 experts and 26 institutions are registered) and the document database (currently 35 documents are abstracted and reside in our site). A database of environmental statistics is in preparation and is expected to be available by the first quarter of 2005 (www.eclac.cl/redesa) , drawing from the available information from the countries and regional agencies, and is based on a set of selected key variables that can progressively grow in time. The team is networking with an increasing number of experts and institutions that either lead or participate in the process of producing environmental data for statistics, indicators and environmental accounts in each country. Constant communication and interchange of information, ideas and methodologies is at the core of the project. Most participants in the network find this to be one of the most important strengths of REDESA.

We also have included the methodology of EEA as an integral part of our capacity building and technical meetings activities, particularly in the last year. Covering environmental statistics, indicators and EEA, in the last year alone, three regional expert meetings were held and eight missions of technical assistance and identifying data sources have been carried out in the region, and 4 additional missions are planned for this and next year. In the field of capacity building, 5 programs were designed and developed in a modular fashion to accommodate national needs. Overall, more than 160 participants and 6 instructors were involved in these courses delivered in Peru, Bolivia, Ecuador, Colombia and Argentina. Finally, all products will be officially launched at the regional meeting of Environmental REDESA planned for April 2005 (to be announced).

In general, the project received positive feedback, and requests of the countries to sustain the network and provide capacity building and technical assistance are increasing. Therefore, ECLAC is working towards the continuation of these efforts and results in time. Nevertheless, the need for a more specific program of activities focusing on EEA in selected countries with stronger technical and data resources is perceived to be beneficial to catalyze these efforts within the region.

Obstacles to the implementation of EEA

To our understanding, the main obstacles for the implementation of EEA in Latin America could be summarized as follows. Please note that LAC countries are very heterogeneous, so some of the obstacles apply to some of the countries and not necessarily to all of them.

- Developing economies and its governments place a hierarchical first-rate importance on growth and social needs and tend to postpone environmental issues (and accounts) for the time being.
- Political support is more sensible to economic and social demands that compete for scarce governmental resources (human and financial).
- EEA is perceived as capable of making evident the complex connections amongst economic activities and environmental degradation, an image that can be adverse to macroeconomic expansive policies, currently strong in our region.

- Lack of basic environmental data in some countries, even when the will to develop EEA is strong. This makes the implementation of EEA more difficult.
- EEA is seen as a major technical and financial effort for the statistical and environmental offices. Somehow it can be perceived as a luxury some countries can not afford, and in this sense other parallel initiatives that are more cost-effectives, such as developing sets of environmental or sustainable development indicators, is preferred.
- Insufficient development of the System of National Accounts to further build satellite or integrated environmental accounting.
- EEA are simply unfamiliar to the less developed countries, which do not count on sufficient environmental data either.
- Insufficient development of technical capacities to develop and sustain a program of EEA.
- Insufficient financial resources.

Future Activities

ECLAC is committed to keep working with the countries in developing Environmental Statistics, Indicators and Environmental and Economic Accounts.

With regard to EEA, at the very least, ECLAC can follow up and disseminate the processes and results of ongoing EEA in LAC countries (Mexico, Colombia, Panamá and others).

ECLAC intends to disseminate the SCAEI and simplified training material within ECLAC and to the LAC countries, provided SCAEI is translated to Spanish. In this regard, REDESA is next to release the document: "Environmental Accounting: Concepts, Methodologies and Latin-American and Caribbean countries developments." (Available only in Spanish).

The following activities depend upon obtaining financial cooperation to be able to develop them with substantial technical capacities:

- Identify international partners, to cooperate with ECLAC both technically and financially to potenciate capacity building and technical assistance in EEA for selected LAC countries (sub regional sets).
- Explore the possibility of developing a pilot of EEA with of 4-5 countries[9] in order to systematize the experience and know how on EEA implementation. This pilot program can develop EEA in a progressive and partial way, including parts of the assets and flows for relevant environmental functions depending on productive structure and ecological dynamics at the national level.
- Sensitizing and providing a regional forum to develop high level users (Ministers, Congress and Regional Governments) on EEA, to induce demand and built political and financial support at the national level.

[9] The criteria for selecting these countries include level of development of the core SNA (1993), the availability of basic environmental data, and institutional capacities.

Session 2 Subsoil asset accounting

Chair: Martin Lemire, Statistics Canada

Summary of the session on subsoil asset accounting

Session organizer: Ole Gravgård, Statistics Denmark

Chair: Martin Lemire, Statistics Canada
Presenters:
Aneme Malan, Statistics South Africa
Julie Hass, Statistics Norway
Christian Ravets, Eurostat
Alessandra Alfieri, United Nations
Ole Gravgård, Statistics Denmark

Rapporteurs: Ismir Mulalic and Thomas Olsen, Statistics Denmark

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Presentations

Aneme Malan presented "South Africa's experience in the compilation of mineral (physical and monetary) accounts". The accounts, which were first presented in a discussion document in 2002 and as official statistics in 2004 include information for the years 1980-2004. An issue with the accounts is that they show large yearly fluctuations of stock values. The main reason being that figures are in nominal values; caution must then be taken while using the accounts. South Africa uses social discount rates of 3-5 percent. Attention was given to the difference between *volume sold* and *net changes in reserves*, since this is a distinction which is important for some of the subsoil assets in South Africa.

Julie Hass presented a paper by Kristine Erlandsen: "Overview of the Norwegian Asset Accounts for Oil and Gas, 1991-2000". Julie Hass told that two alternative sets of accounts are produced in Norway, one from Statistics Norway and one from the Ministry of Finance. This might be one reason why the accounts from Statistics Norway are not used so extensively. It is often a problem for Statistics Norway to obtain data for the accounting. Despite this, Julie Hass expected that there is a future for the oil and gas asset accounts in connection to national sustainable development indicators and national wealth calculations. Julie Hass also reported that work is going on on the harmonization of the definition of resources Several international organisations and institutions are involved in that work. Julie Hass presented figures which showed the development of the oil reserves together with the development of the value of the oil funds which aims at securing some of the oil wealth for future generations.

Christian Ravets presented Eurostat's work on oil and gas accounts. He presented the standard tables which Eurostat is sending out to member countries in order to collect information on oil and gas reserves. Furthermore, Christian Ravets presented the guidelines for producing the asset accounts. Eurostat's publications on subsoil assets can be found on Eurostat's web site.

Alessandra Alfieri gave a presentation on the current discussion concerning Mineral exploration in the Canberra II Group on non-financial assets. The issues dealt with by the Canberra II group include for example terminology and whether mineral exploration and the deposit itself shall be regarded as one combined or two separate assets.

Ole Gravgård presented a paper summarizing the results of a questionnaire concerning subsoil asset accounting. The questionnaire was prepared by the subgroup on subsoil asset accounting and was sent to all London Group members. Issues which were considered included the type of accounting carried out by countries, basis for the accounts, methods, challenges, dissemination and future plans.

Main points raised during the session:

Classification of economic reserves for subsoil assets is a problem, and countries use different classifications. Work is going on outside the London Group to harmonize the classification as regards physical stocks. Members of the London Group should be aware of this and follow the efforts.

For valuation of subsoil assets the Net Present Value (NPV) is the method preferred by countries. Although there is some confusion on the appropriate parameters to use for the NPV calculations, there seems nevertheless to be a consensus toward the use of a 4 per cent discount rate and an 8 per cent return to capital. However the question was raised whether the use of such rates can be made more dynamic reflecting the economic fluctuations and development.

Some members expressed that it would be useful if a database with meta-data is created, showing how the countries actually compile the subsoil asset accounts. A starting point for such work could be the results of the questionnaire sent out by the subgroup on subsoil assets and the Eurostat's work.

The question of fixed price calculations for subsoil assets was found interesting and important, although not much experience exists yet in this field.

In discussing the use of subsoil asset accounts, some European members felt that the only use of subsoil asset accounting was for reporting to Eurostat. However, others found that Eurostat's work on the standardization of tables, the collection of country data and the publication of country specific subsoil assets data is very useful.

In discussing the policy relevance of subsoil asset accounts it was mentioned that the explicit accounting for how the resource rent/revenues from extraction of subsoil assets is used is interesting and most relevant.

A non-exhaustive list of issues, some of which will be discussed at the next London Group meeting, include:

- decommissioning costs,
- future prices for measuring rent
- the treatment of renewables,
- reliability measures,
- the assumed extraction profile,
- the relationship between the fixed capital stock and the resource rent calculations,
- the distribution of the resource rent between owners/extractors,
- There was a broad interest in decommissioning costs.
- which discount rate to use
- the potential need for harmonization of the level of detail in the *change* parameters of the asset accounts
- the importance of producing indicators from the accounts.

It was regarded important to keep close contact to those working with and developing the national accounts. Regarding the work going on in the Canberra II group in relation to the revision of the SNA, the London Group did not feel that a coordinated response to specific issues relevant to environmental accounting was necessary at this point, but it was agreed that members should follow the work of the Canberra II group as well as the deliberations of the Advisory Expert Group on National Accounts. Furthermore, UNSD will act as a bridge between the London Group and the Canberra II group, and will distribute information to London Group members when appropriate.

The discussion of the future work of the subgroup of subsoil asset accounting was postponed to the session on conclusions and future work.

South Africa's experience in the compilation of mineral (physical and monetary) accounts

by Aneme Malan, Statistics South Africa

Statistics South Africa

SA's EXPERIENCE IN THE COMPILATION OF MINERAL ACCOUNTS

- Background
- Physical accounts
- Resource rent
- Monetary accounts
- Problems experienced
- Challenges

9th London Group Meeting

Statistics South Africa

Background

- Physical & monetary accounts (1980-2001)
  - Gold (39 mine operations)
  - Platinum (12 mine operations)
  - Coal (62 mine operations)
- Mining industry: R67 301 million to the total GDP (R983 448) in 2001 (7%)
- Discussion document – July 2002
- Official statistics – September 2004

9th London Group Meeting

Statistics South Africa

Measure of stock = Ecn proven reserves

451,3 – 456,8

Gold: Physical account for South Africa

Year	Opening stock (tons)	Prod (extrac) (tons)	Disco (tons)	Other volume change (tons)	Closing stock (sub-soil assets) (tons)	Volume sold (tons)	Net change invent (tons)	Closing stock (inc inv) (tons)	Years to deplt
1999	36 328,3	451,3	N/A	-	35 877,0	456,8	-5,5	35 871,5	79
2000	35 877,0	430,9	N/A	-	35 446,1	407,6	23,3	35 469,4	82
2001	35 446,1	394,8	N/A	-	35 051,2	388,0	6,8	35 058,0	89

35 877,0 – 430,9

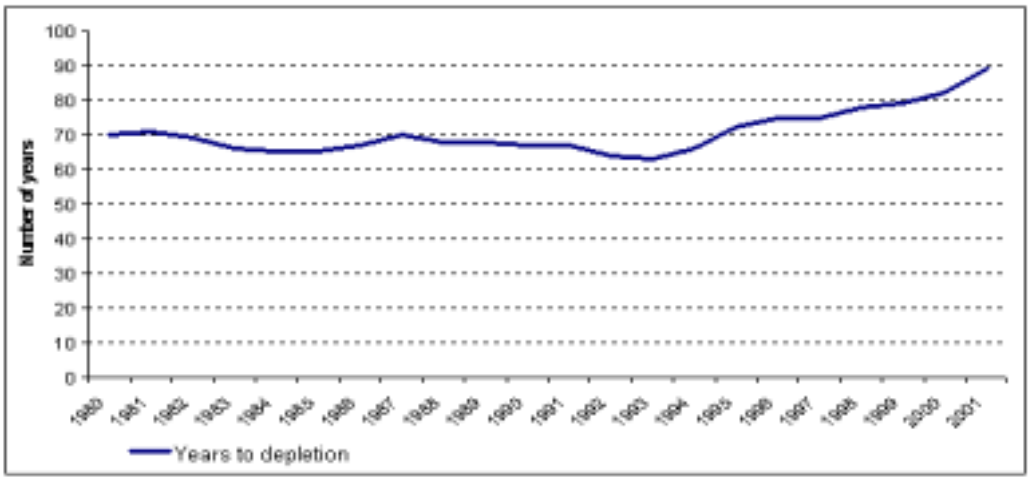
35 446,1 + 23,3

35 058,0 / 394,8

9th London Group Meeting

Statistics South Africa

Gold: Estimated number of years to depletion for South Africa



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Statistics South Africa

Resource Rent

- measure of the scarcity value of extractive resources as their finite stocks are reduced with extraction
- 1st step in developing monetary accounts
- value of output (@ producer prices) *minus* production costs

Nominal profit -

Average LT nominal interest rate
Minus prevailing interest inflation rate
Equal Rate of return to capital
Multiply fixed capital stock in mining
Equal estimates of nominal profits

Incl cost of II, compensation of employees; consumption of fixed capital and nominal rate on fixed capital investment (opportunity cost)

- average costs were used to calculate resource rent

9th London Group Meeting

Statistics South Africa

Gold: Resource rent and other calculations for SA at current prices (R million)

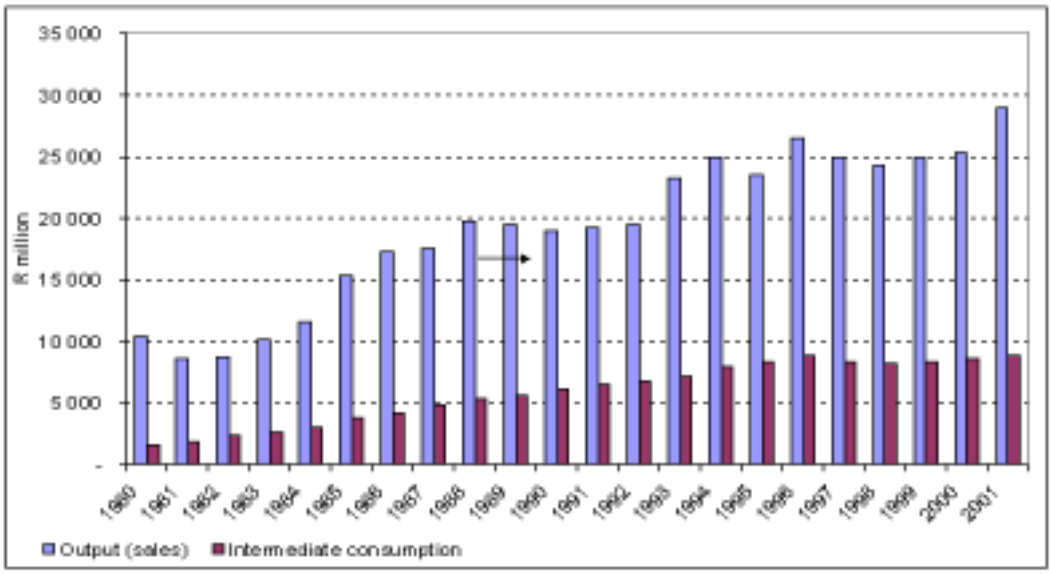
	1999	2000	2001
Output (sales)	24 990	25 272	29 011
Intermediate consumption	8 387	8 627	8 878
Consumption of employees (total)	9 100	9 809	10 904
Consumption of employees (male)	8 902	9 586	10 674
Consumption of employees (female)	198	223	229
Consumption of capital	4 370	4 734	5 113
Opportunity cost of capital (SDR 3%)	1 917	2 002	2 087
Opportunity cost of capital (SDR 5%)	3 195	3 337	3 478
Resource Rent (SDR 3%)	1 216	100	2 029
Resource Rent (SDR 5%)	-102	-1 198	638
Unit rent (SDR 3%)	2 397	318	5 286
Unit rent (SDR 5%)	-227	-2 779	8 810

Tot rent / volume of depletion for spec year

9th London Group Meeting

Statistics South Africa

Gold: Output and intermediate consumption: 1980–2001 (R million)



Statistics South Africa

Monetary accounts

Full environmental accounting used to calculating monetary accounts for SA.

This represents an attempt to accommodate all entries of the more comprehensive physical resource account in the 1993 SNA with monetary values assigned

9th London Group Meeting

Statistics South Africa

Gold: Monetary account for SA current prices (R million)

Year	Opening stock	Depletion	Reevaluation	Closing stock
1999	28 090	3 441	5 080	36 611
2000	36 611	261	-33 833	3 038
2001	3 038	4 389	55 335	62 762

Unit rent * volume of depletion

Value of opening stock
Less value of the depleted stock
Plus value of new discoveries, additions and other volume changes
Plus any revaluation due to time passing
Plus nominal holding gain

Valued at the change in the present value

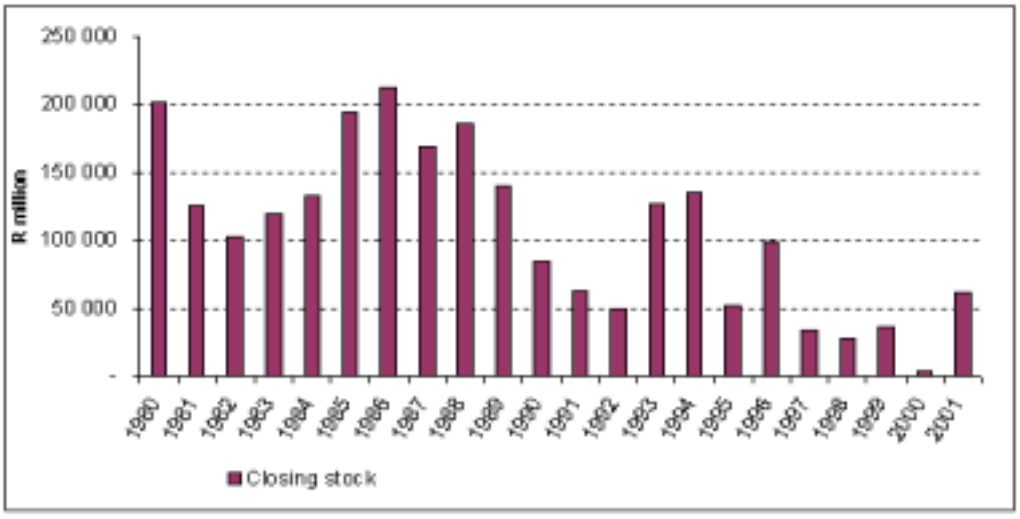
Valued by discounting for one year less

Calculated as a residual

9th London Group Meeting

Statistics South Africa

Gold: Value of closing stock for SA @ current prices (R mil)



9th London Group Meeting

Statistics South Africa

Problems experienced

- Data sources
- Presenting figures in nominal values (Monetary)
  - change measuring unit (R) to more stable currency
  - use a GDP deflator
  - present values as a ratio to GDP
- Social Discount Rate (SDR)
- Output = sales (data constraints NE SNA)

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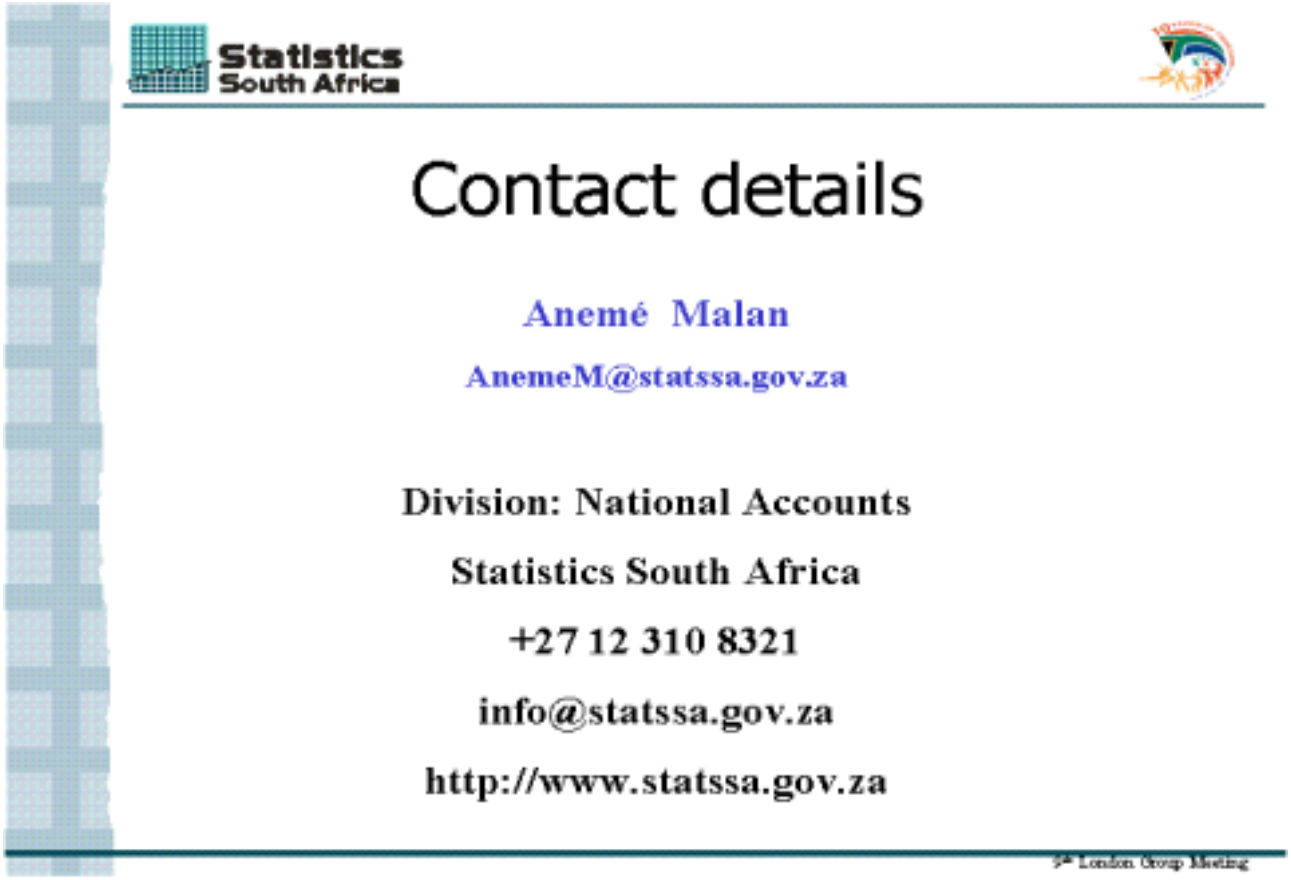
Statistics South Africa

Challenges

- International guidelines
- Staff with relevant skills/knowledge/experience
- Educating users
- Data
  - Extensive/comprehensive – required
  - Regular – trends
  - Published figures
- Feeding into policy issues

9th London Group Meeting


Statistics
South Africa
Contact details
Anemé Malan
AnemeM@statssa.gov.za
Division: National Accounts
Statistics South Africa
+27 12 310 8321
info@statssa.gov.za
http://www.statssa.gov.za
London Group Meeting

Statistisk sentralbyrå
Statistics Norway

Overview of the Norwegian Asset Accounts for Oil and Gas, 1991 - 2002.

by Kristine Erlandsen, Statistics Norway

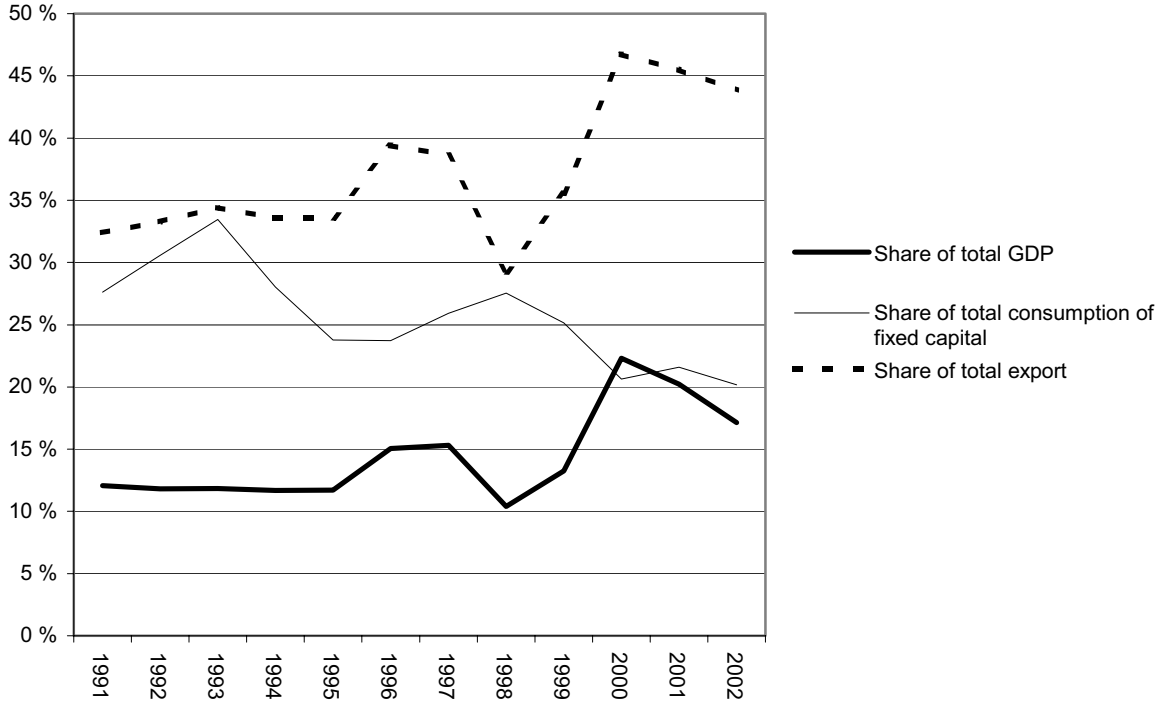
presented by Julie Hass ,Statistics Norway

Introduction

In the late 1960's oil was discovered on the Norwegian Continental shelf, and oil extraction started in 1971. The oil and gas industries are very important contributors to GDP in Norway (see table 1.1), and have been a driving force in Norwegian economic development for several decades. The oil and gas extraction from the Norwegian Continental shelf has increased extensively the last ten years. With a production of oil and NGL of 3.3 mill barrels per day in 2003 Norway was the third largest exporter of oil in the world.

Table 1.1:
Macroeconomic indicators for the petroleum sector in Norway

(Source: Norwegian National Accounts 1991 - 2002)



The oil and gas industries create considerable values for the Norwegian society. Remaining oil and gas reserves on the Norwegian shelf still have a large value, and it is therefore of great interest to have appropriate and solid methods to calculate the value of the remaining oil and gas resources. The purpose of the asset accounts for oil and gas is to be able to capture the economic importance of these natural resources.

Statistics Norway is now reporting assets accounts for oil/NGL (Natural Gas Liquids) and gas annually to Eurostat. The work with the asset accounts for oil/NGL and gas started in 1997, as part of the first phase of the NOREEA (NORwegian Economic and Environmental Accounts) Project.

This paper presents the results for the Norwegian assets accounts for oil/NGL and gas for the period 1991 to 2002, and gives an overview of the methods and sources used when calculating these assets accounts. The guidelines given by Eurostat task force on subsoil assets, presented in "Subsoil asset accounts for oil and gas - Guidelines for the set of standard tables", are primarily used as theoretical background for the calculations (see references).

Chapter 'Physical accounts for oil and gas' gives an overview of the items of the physical accounts of oil/NGL and gas resources in Norway, while chapter 'Monetary accounts for oil and gas' gives and overview of their value. Chapter 'Sensitivity analysis' presents alternative values of the closing stock of oil/NGL and gas for 2001 based on other assumptions than what is used in the standard calculations.

Physical Accounts for Oil and Gas

The stocks of oil/NGL and gas reserves are seldom known with certainty. There is uncertainty related to both the volume of oil/NGL and gas in the reserves and the profitability of exploitation.

Classification of oil and gas reserves

There is no established international classification system for the physical oil/NGL and gas resources, and the institutions compiling volume data for oil/NGL and gas are classifying the resources according to the data availability and their users' need. This might cause harmonisation problems between countries when comparing data in this area.

When focusing on the economical aspects of the oil/NGL and gas resources, it has been common practice to classify the oil/NGL and gas reserves according to the profitability of exploitation. The reserve sizes are therefore under constant revision as a result of changing economic and technological conditions and new discoveries. On this basis, the practice has been to classify the total reserves of oil/NGL and gas based on the degree of certainty that the reserves will be exploited. Eurostat recommends touse the following three categories when classifying oil and gas reserves:

- Proven reserves, which are reserves almost certain (90 percent or more) to be technically and economically producible given the current technology and relative prices.
- Probable reserves, which are reserves not yet proven, but are estimated to have more than 50 percent chance of being technically and economically producible.
- Possible reserves, which are at present not regarded as probable, but are estimated to have a significant, but less than 50 percent chance of being exploitable.

What data to include in the physical balance sheets and accumulation accounts

Physical accounts for subsoil assets include balance sheets accounts showing the stock at a certain time, and accumulation accounts showing changes in the stocks between two points in time.

ESA recommends to include only proven reserves in the subsoil asset accounts, while Eurostat recommends to include all "economical recoverable" resources, which they define as proven, probable and possible reserves, as well as undiscovered reserves. To include only proven reserves is according to Eurostat not representative of the overall volume of reserves of oil/NGL and gas present. This is explained by the often very high cost of proving new reserves, and oil companies will normally only define reserves as exploitable for a limited time of extraction (5-10 years).

Table 2.1 and table 2.2 in chapter 2.3 show one option (used when reporting data to Eurostat) to how physical data for oil/NGL and gas and changes in the reserve estimates between two points in time can be reported. The physical balance sheet account consists of the following elements:

- The *Opening stock,* which consist of discovered and undiscovered reserves, and should be equal to the closing stock of the previous year.
- *Extraction*, which refers to the volume extracted during the year, and should only come from proven economic developed reserves.
- *Other changes in volume*, which group together discoveries, revisions of previous estimates, and changes due to changes in price and classifications, i.e. it includes all changes in the stock level from the beginning to the end of the year, except extraction. If the data are available, discoveries should be shown separately. When undiscovered reserves are included in the stock estimates, discoveries will reflect a reclassification from undiscovered to discovered reserves.
- *Closing stock,* which refers to discovered and undiscovered reserves at the end of the year. Data on the closing stocks of the different sub-categories should be provided as well.

The Norwegian physical accounts for oil/NGL and gas

In Norway, the official stock estimates for oil/NGL and gas reserves are made by the Norwegian Petroleum Directorate (NPD), based upon reports submitted by all operating companies on the Norwegian continental shelf. NPD operates with 3 main categories (possibilities of dividing these categories into more detailed ones) of oil and gas reserves that combined are defined as "total recoverable resources". The three main categories are "Reserves", "Discovered resources" and "Undiscovered resources". The Norwegian figures reported as discoveries in table 2.1 and table 2.2, summarise the NPD resource classes of "reserves" and "discovered resources".

But NPD changed their way of categorising oil and gas resources in both 1984 and in 2001. The lack of continuity in the way NPD classifies the oil and gas reserves has caused difficulties for making comparable time series for the Norwegian oil/NGL and gas asset accounts. This is the reason why we are not able to report data for the period prior to 1984. The NPD also changed the classification system in 2001, so there is a break in the series in that year. This mainly affects the distribution between proven and other discovered reserves, while the total discovered and undiscovered reserves are comparable.

Table 2.1 and table 2.2 show the physical balance sheet and accumulation accounts respectively for oil/NGL and for gas for the period 1991 to 2001. These tables are identical with the data reported annual to Eurostat.

Table 2.1:
Physical balance sheet and accumulation account for oil/NGL in million tonnes, 1991 - 2002

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Opening stock: Discovered and undiscovered reserves	2918	2870	3494	3521	3494	3469	4123	4069	3868	3698	3732	3558
Extraction	-93	-107	-114	-129	-139	-155	-157	-151	-151	-159	-163	-150
Other changes in volume	45	732	140	102	114	809	103	-51	-19	192	-11	-3
Discoveries		40	4	55	42	42	93	50	42	29	25	9
Closing stock: Discovered and undiscovered reserves	2870	3494	3521	3494	3469	4123	4069	3868	3698	3732	3558	3405
Discovered reserves	1678	2250	2276	2287	2304	2946	2892	2710	2573	2597	2364	2211
Proven reserves									1423	1520	1551	1395
Other discovered reserves									1150	1076	813	816
Undiscovered reserves	1191	1245	1245	1207	1165	1177	1177	1158	1125	1135	1194	1194

Table 2.2:
Physical balance sheet and accumulation account for natural gas in billion standard cubic meters (Sm3), 1991 - 2002

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Opening stock: Discovered and undiscovered reserves	5059	4970	5167	5215	4957	5010	5489	5670	6087	6114	6355	6343
Extraction	-25	-26	-25	-27	-28	-37	-43	-44	-48	-50	-53	-65
Other changes in volume	-64	223	73	-231	81	516	224	461	75	291	41	-101
Discoveries		5	19	55	80	35	206	60	60	120	21	5
Closing stock: Discovered and undiscovered reserves	4970	5167	5215	4957	5010	5489	5670	6087	6114	6355	6343	6177
Discovered reserves	2740	2757	2805	2867	3000	3419	3600	3769	3796	3954	3833	3667
Proven reserves									1247	1259	2189	2117
Other discovered reserves									2549	2695	1644	1550
Undiscovered reserves	2230	2410	2410	2090	2010	2070	2070	2318	2318	2400	2510	2510

Table 2.1 and table 2.2 show that the extraction of oil/NGL and gas has increased from 1991 to 2002.

The extraction of oil/NGL has increased annually, except from 1997 to 1998 and from 2001 to 2002. But, the extraction levels of oil/NGL were both in 1997 and 2001 record high. The extraction of gas has been rising every year from 1993 to 2002, with a record high level of extraction in 2002.

The level of the closing stocks of oil/NGL and gas are both higher in 2002 compared to 1991. The closing stocks of oil/NGL showed a rising trend from 1991 to 1997. From 1998 and onwards, the closing stocks of oil/NGL have decreased, mostly due to high extraction levels and negative other changes in volume, and is in 2002 at approximately the same level as in 1992. The closing stocks of gas have increased substantially from 1991 to 2002. From 1999 to 2002, the level of the closing stock has been relatively unchanged, while at the same time there have been record high extraction levels of gas.

The development in the physical data seen in Norway is mainly due to improved knowledge of the geology of the continental shelf, which led to large upward reassessments of the stocks of both oil and gas.

Monetary Accounts for Oil and Gas

The monetary value of the stock of oil/NGL and gas reserves is an indicator of the national wealth that is associated with oil/NGL and gas. The monetary valuation is based on the estimates of the physical stock.

How to value oil and gas resources

In the national accounts, the preferred valuation method for assets is based on the prices obtained in market transactions at the time to which the balance sheet relates. Oil/NGL and gas fields consist of produced assets and non-produced assets (reserves before exploitation). Since no market transactions of subsoil assets in the ground take place in Norway, the reserves will have to be valued using an indirect method.

There are several indirect methods to choose from when valuing oil and gas resources. The method recommended by Eurostat is the present value method. Using the present value method, the monetary value of the oil and gas resources is calculated as the present value of the expected future net resource rent from oil/NGL and gas.

The present value at the beginning of the period t, PV_t, is expressed as:

$$PV_t = \sum_{i=t}^{t+1} \frac{R_i}{(1+r)^{i-t+1}}$$

where R_i is the net resource rent in period *i*, and *r* is the discount rate.
In order to use the present value method to value the oil and gas resources, it is necessary to calculate the resource rent for oil/NGL and gas, as well as to forecast future resource rent and to choose a discount rate .

Calculating the resource rent for oil and gas

Since oil/NGL and gas are exhaustible resources where the total possible extraction is limited, the resources have a so-called economic scarcity price called the economic rent or the resource rent that represents the net return to the subsoil assets. The resource rent is the net income from extraction, defined as the value of output less all costs of extraction.

There are various formulas for calculating the resource rent, see for example Lindholt (On Natural Resource Rent and the Wealth of a Nation A Study Based on National Accounts in Norway 1930-95, Discussion paper no 281, Statistics Norway, 2000), Brekke, Lone and Rødseth (Economy and Ecology - Tools for an sustainable policy, Notam Gyldendal, 1997) and guidelines from Eurostat (see references), all with small differences regarding how to define total value of both output and costs related to extraction.

The Norwegian asset accounts for oil and gas reported to Eurostat, are based on the definition of the resource rent recommended by Eurostat:

Output (basic "well head" prices)
+ Specific taxes less subsidies on products
– Intermediate consumption
– Compensation of employees
– Other non-specific taxes less subsidies on production
– Consumption of fixed capital
– Return to fixed capital
= Resource rent

An equivalent definition of the resource rent is:

Net operating surplus
+ Specific taxes less subsidies on products
+ Other specific taxes less subsidies on production
– Return to fixed capital
= Resource rent

Most of the variables are standard national accounts variables, except the return to fixed capital and the classification of taxes and subsidies into specific and non-specific. The national accounts data used for the oil/NGL and gas industry is equivalent to the NACE Rev.1 group 11.1 (Extraction of crude petroleum and natural gas).

Choosing a normal rate of return to fixed capital

Return to fixed capital is calculated by applying a normal real rate of return to the net stock of fixed capital in the extraction industry.

Eurostat sees the return to fixed capital as an opportunity cost of the investments in the assets, which can be estimated using the average real rate of return on investment elsewhere in the economy. Eurostat concluded that for European Economic Area countries, an 8 percent rate of return to fixed capital should be taken as the default value in the absence of more detailed information.

An 8 percent rate of return to fixed capital is used in the Norwegian data on asset accounts for oil and gas. The choice is supported in a Norwegian government report on Cost-Benefit analysis (Cost-benefit analysis, NOU 1997:27, The Norwegian Ministry of Finance) where 8 percent is suggested as a reasonable rate for projects with a certain degree of risk. Oil and gas exploration is included in the stock of fixed capital and is also given the 8 percent return.

Defining specific and non-specific taxes and subsidies

When calculating the resource rent using the definition given by Eurostat, net specific taxes are included in the resource rent. Also for the purpose of allocating the resource rent between the government and the extractor, net taxes should be divided into two groups: taxes specific to oil and gas extraction (including 'specific' taxes on production) and taxes of a more general nature. Eurostat defines specific taxes and specific subsidies as those that apply only to the oil and gas extraction industry, while non-specific taxes and subsidies apply to other industries as well.

The government's part of the resource rent consists, in addition to the specific taxes, also of taxes on income (and royalties). The remaining of the total resource rent is then the extractor's part.

In the Norwegian National Accounts, all other taxes on production paid by the oil and gas industry (NACE 11.1) and all other subsidies on production received by the oil and gas industry are defined as specific ones. Other taxes on production paid by the oil and gas industry in Norway consist of a tax on production, an area tax and a tax on CO_2-emission in the extraction industry. None of the taxes or subsidies on products paid or received by the oil and gas industry are considered to be specific ones.

Distribution of total resource rent between oil and gas

Because oil/NGL and gas are sold in different markets and normally have different production profiles, it is useful for valuation to estimate resource rents for oil and gas separately. The Norwegian National Accounts figures for production costs of the oil/NGL and gas industry (NACE Rev.1 group 11.1) are not divided between oil/NGL and gas. Because of this, additional assumptions have to be made in order to calculate separate resource rents for oil/NGL and gas. In the Norwegian assets accounts reported to Eurostat, the resource rent between oil/NGL and gas are divided in proportion to the output value.

Decommissioning costs

Decommissioning costs are still very low in Norway, but are expected to increase in the years to come. Decommissioning costs are included as part of the intermediate consumptions in the resource rent calculations. No further forecasts about future decommissioning costs are included in the calculations.

Norwegian resource rent for oil and gas

Table 3.1 shows the Norwegian resource rent calculations for the period 1991 to 2002. The figures for 2002 are based on preliminary figures from the Norwegian National Accounts.

Table 3.1: Resource rent for oil/NGL and gas resources in Norway, mill NOK, 1991-2002

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*
Current transactions												
Output (basic "well head" prices)	110648	112975	122588	125271	129162	179059	189567	138523	187393	350912	337977	295383
Intermediate consumption	20262	22559	26831	26040	22545	28755	26001	26522	29338	29308	31845	31755
Gross value added	90386	90416	95757	99231	106617	150304	163566	112001	158055	321604	306131	263628
Compensation of employees	7720	8500	9587	9937	9789	9921	10223	10489	11919	11949	12697	13654
Other taxes on production	10446	10628	10797	9359	9035	10287	9918	7546	7080	6669	6366	4821
Other subsidies on production	-3	-2	-15	-17	-16	-29	-119	-86	-28	-3	-3	-2
Consumption of fixed capital	25946	27989	30590	32959	34987	37129	39254	42536	46836	50075	52657	51643
Construction, equipment, etc. for extraction	20839	22162	24303	26628	28708	30707	32591	35287	39083	42722	45387	44958
Mineral exploration	5107	5827	6287	6331	6279	6422	6663	7249	7753	7353	7270	6685
Net operating surplus	46277	43301	44798	46993	52822	92996	104290	51516	92248	252914	234414	193512
Closing net stocks of fixed assets	273623	298764	328176	345085	360997	382020	414612	460471	492931	513298	538836	528106
Resource rent	36177	32037	31679	30081	34234	74374	83527	25807	62462	220146	199713	155224
= Net operating surplus	46277	43301	44798	46993	52822	92996	104290	51516	92248	252914	234414	193512
+ Specific taxes less subsidies on products	0	0	0	0	0	0	0	0	0	0	0	0
+ Other specific taxes less subsidies on production	10443	10626	10782	9342	9019	10258	9799	7460	7052	6666	6363	4819
- Return to fixed capital (8%)	-20543	-21890	-23901	-26254	-27607	-28880	-30562	-33169	-36838	-39434	-41064	-43107
Resource rent appropriated by the government	22660	21512	19570	20042	21345	34379	30447	8290	21426	88043	93560	90549
= Specific taxes less subsidies on products	0	0	0	0	0	0	0	0	0	0	0	0

+ Other specific taxes less subsidies on production	10443	10626	10782	9342	9019	10258	9799	7460	7052	6666	6363	4819
+ Rent (royalties) on subsoil assets	0	0	0	0	0	0	0	0	0	0	0	0
+ Specific taxes on income	12217	10886	8788	10700	12326	24121	20648	830	14374	81377	87197	85730
Resource rent for the extractor	13517	10525	12109	10039	12889	39996	53081	17517	41036	132102	106153	64675
= Net operating surplus	46277	43301	44798	46993	52822	92996	104290	51516	92248	252914	234414	193512
- Rent (royalties) on subsoil assets	0	0	0	0	0	0	0	0	0	0	0	0
- Specific taxes on income	-12217	-10886	-8788	-10700	-12326	-24121	-20648	-830	-14374	-81377	-87197	-85730
- Return to capital	-20543	-21890	-23901	-26254	-27607	-28880	-30562	-33169	-36838	-39434	-41064	-43107
Resource rent, oil, 8% rate of return	31458	28307	28297	27073	30814	66571	72199	20984	54579	191182	163807	124526
Resource rent, gas, 8% rate of return	4719	3730	3382	3008	3421	7803	11328	4824	7883	28963	35906	30698

The resource rent for oil/NGL and gas is very volatile, especially due to changes in oil and gas prices and due to assumptions made in relation to the normal rate of return to fixed capital. From 1991 to 1997, the resource rent for oil/NGL and gas more than doubles. But, from 1997 to 1998 it falls dramatically. This fall in the resource rent is explained by a 50.6 percent decrease in the net operating surplus from 1997 to 1998, which can be seen in connection with the reduction in the extraction level of oil/NGL combined with falling oil prices.

From 1999 on, the resource rent increases again, with historical high levels in 2000 and 2001. The value of output increases due to increased oil prices and high extraction levels, while extraction costs are relatively stable.

The division of the resource rent between oil/NGL and gas has not changed much from 1991 to 2002, but one can observe a change at the end of this period when the resource rent related to natural gas extraction is increasing. The share of the resource rent related to oil/NGL extraction is still the highest, with a share of 80 percent in 2002 against 87 percent in 1991.

The division of the resource rent between the government and the extractor has to a large extent varied between 1991 and 2002. This can directly be related to the level of taxes defined as specific ones to the extraction industry.

Forecast of future resource rent

Making a forecast of the future resource rent requires assumptions about the development of prices, extraction costs and the level of extraction. For accounting purposes, Eurostat has advised to use relatively simple and transparent assumptions. When making forecasts of the future resource rent, it is recommended to divide the resource rent into two components, rent per unit extracted and the level of extraction,

Future prices of oil/NGL and gas (rent per unit extracted)

Oil/NGL and gas prices vary considerable due to unpredictable activities and factors. Eurostat therefore recommends to assume a constant future resource unit rent (resource rent per unit extracted) when making forecasts of the future resource rent. Since fluctuations in the prices influence the resource rent and hence the value of the oil/NGL and gas reserves, it is recommended to use a constant unit rent equal to a three-year average of the unit rents (converted to the prices in the current year before the average is calculated). This will smoothen the price fluctuations.

We have followed the recommendations from Eurostat task force on subsoil assets, using a three-year average unit rent in constant prices when valuing the oil/NGL and gas resources.

Future extraction levels

If available, it is recommended to use explicit forecasts of the future extraction paths for oil and gas. If no specific information is available, the estimates should be based on a constant level of extraction, equal to extraction in the year the estimates refer to.

We have used a constant level of extraction (same as current year's extraction) when valuing the oil/NGL and gas resources.

The Ministry of Finance and the Ministry of oil and gas make production forecasts for oil and gas, but these predictions are so far not included as part of the assets accounts for oil and gas reported to Eurostat.

Choosing a discount rate

The discount rate reflects the investor's time preference and attitude towards risk. It is often assumed that governments have a lower rate of time preferences and less aversion to risk than private investors. It is thus appropriate to use a lower discount rate when present values are calculated from the government's point of view, rather than from the point of view of private investors.

The valuation of the oil/NGL and gas resources is highly dependent on the choice of the discount rate. Eurostat concluded that the rate of discount should be considered as a "social rate" of discount. A value of 4 percent was decided acceptable, since the governments in Europe are the legal owners of most of the oil and gas fields. 4 percent was estimated to be close to the average real rate on government bonds.
We have used a discount rate equal to 4 percent when valuing the oil and gas resources.

The Norwegian monetary accounts for oil and gas

A more detailed formula of the present value given in previous chapter can be presented as:

$$PV_t(rr_t, E_t) = \frac{rr_t e_{t+1}}{(1+r)} + \frac{rr_t e_{t+2}}{(1+r)^2} + \frac{rr_t e_{t+3}}{(1+r)^3} + \ldots\ldots + \frac{rr_t e_{t+n}}{(1+r)^n}$$

PV_t is the present value calculated at the end of year t, which is a function of the unit rent, future extraction and the discount rate. rr_t is the three-year moving average unit rent for year t, e_t is extraction in year t, E_t is the expectation in year t of future annual extraction from year t+1 until the stock is exhausted in year t+n, i.e. it is a vector (e_{t+1}, e_{t+2},….., e_{t+n}) and r is the rate of discount (which is assumed to be constant over time),

Table 3.2 and table 3.3 show the Norwegian monetary balance sheet and accumulation account for oil/NGL and gas respectively.

Table 3.2:
Norwegian monetary balance sheet and accumulation account for oil/NGL, mill nok, 1991-2002

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*
Opening stock	493633	546139	547380	483804	476560	621965	924600	863836	771859	1291812	2029712	2400423
Nominal holding gains and losses	18314	-82384	-80985	-31832	128464	177856	-58894	-55246	554333	683673	418625	-307094
Neutral holding gains and losses	14315	9284	10948	7257	12391	9951	20341	26779	16981	47797	77129	33606
Real holding gains and losses	3999	-91668	-91932	-39089	116073	167905	-79235	-82025	537352	635876	341496	-340700
Other changes in volume	43174	91694	25312	34286	31363	144083	16917	-19665	-3734	105868	20359	-66886
Extraction	-31187	-30287	-27572	-29149	-39877	-57060	-54093	-48623	-83544	-134895	-167022	-133926
Revaluation due to time passing	22205	22218	19668	19450	25455	37756	35305	31557	52898	83254	98748	81058
Closing stock	546139	547380	483804	476560	621965	924600	863836	771859	1291812	2029712	2400423	1973576

Table 3.3:
Norwegian monetary balance sheet and accumulation account for gas, mill nok, 1991-2002

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*
Opening stock	89763	100430	100234	81868	82690	103520	182234	208547	197836	331686	580275	763443
Nominal holding gains and losses	11467	-2151	-16082	-5268	17148	34674	-2299	-15455	106934	225419	141634	-49446
Neutral holding gains and losses	2603	1707	2005	1228	2150	1656	4009	6465	4352	12272	22050	10688
Real holding gains and losses	8864	-3859	-18087	-6496	14998	33018	-6308	-21920	102582	213146	119584	-60134
Other changes in volume	-799	1958	-2283	6092	3686	44061	28658	4777	27003	23324	41805	149301
Extraction	-4019	-4011	-3276	-3310	-4145	-7311	-8389	-7948	-13358	-23371	-30820	-35350
Revaluation due to time passing	4017	4009	3275	3308	4141	7290	8344	7915	13271	23217	30549	34532
Closing stock	100430	100234	81868	82690	103520	182234	208547	197836	331686	580275	763443	862480

The total value of the Norwegian oil/NGL and gas resources in 2002 is calculated to be 2 836 056 million NOK, with 1 973 576 million NOK related to the oil/NGL resources and 862 480 million NOK related to the gas resources. Although the physical reserves of the gas reserves (measured in oil equivalents) are bigger than the oil/NGL reserves, the total value of the natural gas resources is lower than the value of the oil/NGL resources. This is mainly due to the lower price of natural gas compared to oil/NGL and that the expected extraction path of natural gas is much longer that the expected extraction path of oil/NGL.

Sensitivity analysis

The calculated presents values are sensitive to changes in the assumptions made on the discount rate and normal rate of return to fixed capital. Table 4.1 gives example on how the value of closing stock of oil/NGL and gas differ due to different assumptions for 2001. The shaded cells represent the "standard" set of assumptions used in table 3.1, 3.2 and 3.3.

Table 4.1:
Value of closing stock of oil and gas, based on different assumptions (2001)

	Crude oil and NGL				Natural gas			
	Unit rent				Unit rent			
	3-year moving average			Current year	3-year moving average			Current year
	Rate of return			Rate of return	Rate of return			Rate of return
Discount rate	**6 %**	**8 %**	**10 %**	**8 %**	**6 %**	**8 %**	**10 %**	**8 %**
0 %	3 837 564	3 642 625	3 447 687	3 572 506	3 887 416	3 688 484	3 489 551	4 297 258
2 %	3 085 579	2 928 839	2 772 100	2 872 460	1 472 270	1 396 929	1 321 588	1 627 489
4 %	2 528 884	2 400 423	2 271 962	2 354 215	804 618	763 443	722 268	889 447
6 %	2 109 744	2 002 574	1 895 404	1 964 025	540 859	513 181	485 504	597 881
8 %	1 788 942	1 698 068	1 607 195	1 665 381	405 984	385 208	364 433	448 786

Concluding remarks

This paper gives an overview of the methods and sources that forms the basis for the Norwegian assets accounts for oil and gas. Only the figures for the physical and monetary accounts for the period 1991 to 2002 are included, even though figures back to 1984 are reported to Eurostat.

Although we are able to present assets accounts for oil and gas for the time period 1984 - 2002, there are some remaining challenges and problems related to these calculations. So far, the problems we are facing are overcome by following the recommendations given by Eurostat. But, further examination of the following issues will be in focus in the future work and development of the Norwegian assets accounts for oil and gas:

- Evaluate the effects of alternative predictions of future extraction levels. (In the ongoing project "Calculation of the Norwegian National Wealth" led by the Ministry of Finance, another extraction path than the one recommended by Eurostat is used).
- Evaluate the use of alternative rates of discounts.
- Evaluate the use of alternative normal returns to fixed capital.
- How to calculate the government's share of the revenues from oil and gas extraction? (Some problems are due to former state owned oil companies that now are being partly privatised).
- Evaluate alternative ways to incorporate decommissioning costs.

References

The following reports from Eurostat are the main sources used when calculating the Norwegian Asset Accounts for oil/NGL and gas:

Eurostat: Accounts for subsoil assets – results of pilot studies in European countries. Theme 2, Economy and Finance. European Commission, 2000

Eurostat: Natural Resource Accounts for Oil and Gas 1980-2000. Theme 2, Economy and Finance. European Commission, 2002

Eurostat: Summary of conclusions and results – revised version. Eurostat Task Force on Subsoil Assets. Luxembourg, September 1999.

Eurostat: Subsoil Asset Accounts for Oil and Gas – Guidelines for the set of standard tables, Revised version, Luxembourg, January 2003.

Mineral Exploration: current discussion in the Canberra II Group on non-financial assets

by Alessandra Alfieri, United Nations

Prepared for
The London Group Meeting
Copenhagen, Denmark
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Mineral exploration and mineral deposits

Issues under discussion by the Canberra II Group on non-financial assets

Outline

- Process of update of the 1993 SNA
- Mineral exploration in the 1993 SNA
- Issues discussed
  - Terminology
  - Mineral exploration and deposits one or two assets?
  - Valuation of exploration
  - Valuation of mineral deposit
  - Payments to the owner
  - In the balance sheet of which unit should the

Mineral exploration and deposits in 1993 SNA

- Mineral exploration is a produced intangible fixed asset
- Mineral deposits are tangible non-produced assets

Issues with current treatment

- Does it make sense to have discovery activity separate from the value of the resource?
- How should the exploration activity be measured?
- How should the deposit be valued and avoid double counting?
- In the balance sheet of which unit should the resource be recorded?

Recommendations for change

- Terminology
  - Use "mineral exploration and evaluation" rather than "mineral exploration"
  - Clarification of what expenditures should be included as part of mineral exploration and evaluation on the basis of recommendations from IASB.

  Coverage of expenditures very similar to 1993 SNA

Mineral exploration and deposits - One asset or two?

- Should mineral exploration and deposits be combined in one asset "developed natural asset"?

Implication: The combined asset becomes produced asset ⇒value of the deposit recorded as a produced asset

Only few countries supported this proposal

Valuation of exploration

- 1993 SNA: Seems to imply that the exploration should be valued at cost, even if carried out on behalf of a separate enterprise.
- SEEA-2003:
  - Own account ⇒ Valued at cost;
  - By a separate enterprise ⇒ valued at market price (full amount charged, including operating surplus)

Recommendations of the SEEA-2003 adopted

Valuation of mineral deposit

- Net present value of the resource rent
- Resource rent is the part of gross operating surplus not accounted for by the return to the fixed assets used by the exploiter, including mineral exploration and evaluation

Same as in SEEA-2003.

Payments to the owner

- Should be recorded as property income
- Sometimes the government (often the owner of the deposit) does not recover the full resource rent

⇒discrepancy between the valuation of the deposits based on NPV and that based on the revenues received by the owner.

Similar discussion in the SEEA-2003.

Attribution of the value of the deposit in the balance sheet

Option 1: extractor has a financial lease on the deposit.

Deposit recorded in the balance sheet of the extractor with matching financial loan from the owner to the extractor.

Option 2: Economic ownership of the asset is partitioned between the owner and extractor on the basis of how the resource rent is apportioned.

No agreement.

Do we have something to contribute to this discussion?

- Should we suggest to expand the definition of deposit to include not only “possible” but also ”probable” and possible reserves?
- Other?

Subsoil Asset Accounts
Results of a questionnaire
and points for further discussion

by

Kristine Erlandsen, Statistics Norway
Martin Lemire, Statistics Canada
Ismir Mulalic and Ole Gravgård, Statistics Denmark
Raymundo J. Talento, NSCB, the Philippines
Jeremy Webb and Chase O'Brien, Statistics New Zealand

presented by Ole Gravgård, Statistics Denmark

Introduction

In spring 2004 we sent out a questionnaire about subsoil asset accounting to members of the London Group. In total 49 people from 29 countries and organisations received the questionnaire. Nine countries responded by filling out the questionnaires.

The nine countries were:
Austria, Canada, Denmark, New Zealand, Norway, Philippines, South Africa, the Netherlands and United Kingdom.

Furthermore, Sweden and Germany answered that no subsoil accounting is carried out.

This paper summarises the information given by the nine countries in response to the questions.

Some of the countries and Eurostat kindly provided us with reports and documents concerning subsoil assets. A list of these reports and documents is found in the annex, but the reports and documents have not been reviewed by the subgroup.

Based on the survey, some further questions at a rather general level are raised in this paper. The aim is to facilitate a discussion on how the subgroup could continue its work, and which overall issues the London group regards as most important for the subgroup to take up. Others and more specific questions might be (more) relevant, and members of the London Group are encouraged to raise these during the discussion.

Type of subsoil accounting

Mineral and energy resources covered

The type of mineral and energy resources covered is very different in countries which participated in the questionnaire, because of different needs for those accounts and different types of resources countries are possessing.

All nine countries have accounts for energy assets, either for oil and natural gas or coal. Canada and New Zealand have accounts for both types of energy assets.

Metallic mineral assets are covered just in Canada, The Republic of Philippines and South Africa, and are under development in New Zealand.

Only Canada and The Republic of Philippines cover non-metallic mineral assets (potash, and limestone and sand and gravel, respectively). New Zealand is developing non-metallic mineral accounts for aggregate, limestone, dolomite, clay and other non-metallic minerals.

Canada covers the widest range of subsoil assets. Beside energy assets like crude oil, natural gas, crude bitumen, coal and uranium, Canada covers also several mineral assets: potash, gold, iron, zinc, silver, copper, nickel, molybdenum and lead. In Canada work is under way to include diamonds, and offshore extraction of crude oil and natural gas. Both activities are in their early stage of production. Consequently, the data are either not available or are confidential (particularly true with diamonds).

The Republic of Philippines covers also a wide range of minerals: gold, copper, chromate, nickel, manganese, iron, limestone, sand and gravel.

New Zealand covers coal, oil and gas and is developing minerals accounts for gold, silver, iron, aggregate, limestone, dolomite, clay and other non-metallic minerals.

Austria did pilot studies on subsoil focusing on mineral oil and gas as well as brown coal and lignite.

Norway covers oil and natural gas by their accounts. In the early 1980s, Statistics Norway produced physical mineral accounts covering oil, coal, chalk, quarts, sand and gravel and physical metal accounts covering lead, iron, aluminium, magnesium, copper, zinc and nickel. The production of these asset accounts terminated in the mid 1980s. The reasons for the decline of the accounting activities were primarily due to the fact that the Ministry of Environment, commissioning the accounts, was not given the responsibility for the management of the resources. Once the accounts were published, the Ministry ended up with no particular use of updated accounts. The managers of the resources had their own information collection systems and did not need the accounts to do their work. Besides, not all the accounts developed were considered to be of importance and the costs of maintaining and developing the accounts further were much higher than expected.

South Africa covers gold, platinum and coal assets.

Denmark, the Netherlands and UK cover oil and natural gas

Table 1.
The type of mineral and energy resources covered

	Oil and natural gas	Coal	Metallic minerals	Non-metallic minerals
Austria		lignite and brown coal		
Canada	x	x	gold, copper, nickel, iron, uranium, crude bitumen, zinc, silver molybdenum and lead	potash
Denmark	x			
New Zealand	x	x	developing gold, silver and iron	developing aggregate, limestone, dolomite, clay and other non-metallic minerals
Norway	x			
Philippines		x	gold, copper, chromate, nickel, magnesium and iron	limestone and sand and gravel
South Africa		x	gold and platinum	
The Netherlands	x			
United Kingdom	x			

Units of measurement

All nine countries have both physical and monetary accounts. However, for the Netherlands the monetary accounts seems not to be part of the current asset accounting, but based on pilot studies only.

The most common units of measurement are tonnes for solids, m^3 for liquids and gases in connection with physical accounts. Some countries like The Netherlands and New Zealand use also energy units of measurement for physical accounts, for instance joules.

For the monetary accounts current prices are generally used. However, Austria answers that stock value estimates are made in fixed prices.

Questions: Would it be interesting and useful to look more into the methods of fixed prices calculations of stock values?

Resource classification

Most countries use some kind of the McKelvey box principle as basis for their classification.

In New Zealand and Republic of Philippines proven plus probable were used as stock levels.

Physical coal stocks in New Zealand are classified using the JORC (Joint Ore Reserves Committee) code as this is the classification system used by the minerals industry in New Zealand and Australia. The JORC code is based on the modified McKelvey box and classifies minerals as proven and probable reserves and measured, indicated and inferred resources. JORC is very similar to the general resource classification recommended by SEEA. See www.jorc.org for more information. Petroleum physical stock accounts only include proven and probable reserves. Only proven and reserves are valued as assets.

United Kingdom use discovered (proven, probable, and possible) and undiscovered as resource classification. Undiscovered is given within lower and upper ranges.

Austrian classifications are based on Eurostat's questionnaire.

Table 2.
Resource classification

Austria	Classification based on Eurostat questionnaire
Canada	Developed reserves
Denmark	Proven (ongoing and approved), planned recovery, possible recovery
NZ, PH	Proven, Probable
Norway	Total recoverable (discovered resources and undiscovered)
South Africa	?
Netherlands	?
UK	Proven, Probable, Possible

In Norway the resource estimates in physical terms are made by the Norwegian Petroleum Directorate (NPD), which are based on reports submitted by the operating companies. NPD classifies the resource estimates by different resource classes. The total resource estimates is called "total recoverable resources", and can be divided into "reserves", "discovered resources" and "undiscovered resources". NPD no longer uses the "proven", "probable" and "possible" categories. In the physical balance sheets, respectively for oil/NGL and gas, the resources are divided into "discovered" (which refers to "reserves" and "discovered resources" classified by NPD) and "undiscovered" resources.

All physical figures on oil and gas in Denmark come from the Danish Energy Agency (DEA). DEA is operating with four classes of reserves: ongoing extraction, approved extraction, planned recovery and possible recovery. Fields with ongoing and approved extraction corresponds to the proven reserves.

Canadian subsoil assets are restricted to developed reserves of subsoil resources; that is, those reserves that can be expected to be recovered through existing installations (wells or mines) under existing operating methods and economic conditions. These reserves are defined as established in the cases of oil, natural gas and crude bitumen, as recoverable in the cases of coal and uranium, and as proven and probable for metals and potash.

The classification of metal assets used in the physical account in Canada is distinct from that in the monetary account. While the physical account records reserves on a metal-by-metal basis, the monetary account records reserves by mine type. The classification of mine used in the monetary account is based on the classification of mining industries in the North American Industry Classification System (NAICS):

- Gold and silver mines;
- Copper-zinc mines;
- Nickel-copper mines;
- Lead-zinc mines;
- Molybdenum mines;
- Uranium mines
- Iron mines

Classification by mine type rather than metal in the monetary account precludes arbitrary decisions regarding the share of mine development and exploitation costs attributable to each metal in poly-metallic mines.

The same applies to the Danish accounts for oil and gas, where the value is calculated for oil and gas as a whole since oil and gas are produced at the same platforms, and no separate data on exploitation costs exists.

Questions: Would it be useful to work more on the harmonization of the classification of reserves? Is it realistic to expect results in this field given that the information is obtained from other institutions than national statistical offices? What does it mean in terms of international comparison? Does this have a significant impact on the value of a resource for a given year if we take all reserves versus economic reserves only?

Geographic level

All countries are making calculations for subsoil assets at the national level.

Only Canada, The Republic of Philippines and New Zealand include a regional breakdown. In Canada monetary accounts are presented for all resources at national level plus regional (provincial) level for crude oil, natural gas, coal, gold and nickel. Physical accounts are also presented for all resources at the national level, but at the regional (provincial) level accounts for natural gas, natural gas liquids, crude oil, coal, copper, gold, lead, nickel, silver, sulphur and zinc are presented.

Subsoil assets accounts in The Republic of Philippines include a regional and provincial breakdown. Monetary and physical accounts for gold, copper, chromate, nickel, manganese, iron and coal are presented at national level. At regional level (Cordillera Administrative Region) physical and monetary accounts include tables for gold, copper and limestone. Only physical and monetary accounts for nickel and sand and gravel are presented at the provincial level (Province of Palawan).

New Zealand physical coal stocks are presented by region as well as nationally. Oil and natural gas is only commercially exploited in one region.

Question: Is there a need for work on guidelines for regional subsoil accounts?

Accounting items and completeness

Almost all countries include the entire set of accounting items: opening stock, additions and deductions, other volume changes, revaluation, etc., but the level of detail included vary somewhat between countries.

New Zealand faces difficulties in getting data for a detailed break down of the account's change variables. Thus, the two change variables in the physical stock account are: changes in stock due to extraction and changes in stock due to discoveries and reclassifications. In the monetary accounts the change variables are:
Extraction (resource rent) and other changes calculated as a residual.

Apparently, only the UK splits the revaluation item in the monetary accounts into revaluation due to time passing, and changes in rent.

South Africa includes a distinction between volumes sold and changes in inventories in their accounts.

Question: Is it sufficient that the overall accounting items are the same in different countries? Would it be useful to try to harmonize the level of detail? In that case: at which level?

Accounting period

All countries present annual data with lag in interval from 10 month to three years

Table 3
Years covered by the accounts

	Years covered	Time lag
Austria	1975-2000	
Canada	1977-2001	3 years
Denmark	1991-2002	2 years
New Zealand	1992-2001	3 year
Netherlands	(1986) 1996-2002	
Norway	Physical: (1984) 1985-2002 Monetary: 1980-2002	1 year
Philippines	1988-1998 (1996)	
UK	1981-	10 month
South Africa	1980-2001	

In the pilot study carried out for Eurostat, Austria presented accounts for the period 1975 to 2000.

Canada presents annual data, minimum 1977 to 2001. For the physical accounts, the time lag in Canada is approximately three years. However, the value of each asset at the national level is projected (based on "indirect" data like production) for two year (e.g. physical data are for 2001 while monetary data are for 2003) in order to integrate these data into the national balance sheets accounts (the 2003 balance sheets accounts were released in March 2004).

Danish subsoil asset accounts contain a time series from 1991 to 2002. The accounting lag is two years in the oil and gas accounts.

The Netherlands offer a partially time series for the period 1986-2002, and complete time series for 1996-2002. In the present publication of subsoil accounts, only some physical flows for oil and gas are published. For Eurostat some more details are collected to fill in the yearly Eurostat questionnaire.

In Norway physical balance sheets for crude oil/NGL and gas are calculated for the period 1984-2002, and monetary balance sheets for crude oil/NGL and gas for period 1985-2002. The economic accounts and resource rent calculations for Norway contain a period 1980-2002, with a time lag of one year.

UK presents annual time series from 1981 compiled with only 10 month lag.

In South Africa the current accounting period is 1980 to 2001.

In New Zealand the physical stock accounts have gaps in the time series due to limitations in source data and the monetary stock accounts are weak at the commodity level prior to 1996 due to lack of data.

In the Philippines the accounts covers 1988 to 1996 at the national level, while most of the regional accounts cover 1990 to 1998.

Renewable physical stock estimates for wind, hydro, biomass, etc.

Even though renewable energy is not regarded as subsoil assets, countries were asked about their plans for stock accounts for renewable energy.

New Zealand intends to include renewable physical stock estimates. The draft monetary energy stock account in New Zealand includes renewable asset valuations for hydro, geothermal, biomass and biogas electricity generation.

The methodology for valuing renewable energy stocks as assets is still being developed, but is based on a standard net present value approach. It is assumed that renewable energy can be classed as an asset - SEEA implies that this is the case, but does not state this directly.

The electricity industry in New Zealand is reliant on renewable energy such as hydro and geothermal. To value these resources, Net Operating Surplus (NOS) and Produced Capital (V) for the electricity generation industry was disaggregated and apportioned between renewable energy generation sources. Resource rent for renewable energy generators was calculated as RR = NOS – rV (where r is the rate of return on produced capital). The lifespan of renewable energy resources is assumed to be without limit and consequently the value of each renewable energy resource is calculated as the net present value of a constant stream of resource rent over a period of time that tends towards infinity.

Countries like Austria, Canada, Denmark, The Netherlands, UK and South Africa do not include at this time renewable physical assets and there is no plan to include them in the near future.

Question: Is there a broader interest in countries for building asset accounts for renewable energy? Should the London Group/subsoil asset group go into the development of methodology, etc. for such accounts?

Decommissioning costs

Besides Norway, countries have no experience with calculations for decommissioning costs. Decommissioning costs are included in the Norwegian calculations as part of the intermediate consumptions in the economic account for resource rent calculations. These costs are still very low in Norway, but are expected to increase in the years to come.

All respondents think that these costs are relevant. Decommissioning costs are relevant; because ignoring these costs will mean that net operating surplus in the extraction industry is overstated, implying too high a resource rent and asset value.

Even though Sweden doesn't have any subsoil assets accounts, they account for the costs of taking care of radioactive waste in the accounts. Thus, some experience with the treatment of decommissioning costs exists.

In relation to the ongoing work on a revision of SNA the Canberra II group has suggested that decommissioning costs should be treated in the national accounts in the same way as cost of ownership transfer on disposal of an asset. This means that the expected decommissioning costs will affect the net stock values of oilrigs, etc. and other capital-equipment for production of subsoil assets.

Questions: Will/should the Canberra II group's suggestion for treatment of capital costs have consequences for subsoil resource rent? Is there a need for the London Group to take up this problem and to deal with the decommissioning cost issue in general?

Guidelines in use

The SEEA-manual, the SNA and the Eurostat-manual on subsoil accounting are the three main guidelines used by the nine survey respondents as backgrounds for their subsoil asset accounting.

Two countries (NZ and PH) are only using the SEEA-manual (1993 or 2003 version) in building their subsoil asset accounts, while five countries (CA, NO, UK, DK and AT) are using other guidelines than the SEEA-manual in their calculations of their subsoil asset accounts.

The Eurostat-manual is in general used as a source for those European countries calculating subsoil accounts for oil and gas (NL, NO, UK, DK, AT). The Eurostat-manual on subsoil accounting is based on the guidelines given in the SEEA 2003 version.

The Non-European countries (CA, NZ, PH, and ZA) generally refer to more sources for their calculations than the European countries. In addition to the SEEA-manual and the SNA93, other sources are also mentioned as guidelines used in the calculations of subsoil assets accounts. This could be related to the observation that the Non-European countries calculate asset accounts for more subsoil assets than the European countries, which mostly calculate asset accounts only for oil and gas.

Usefulness of the SEEA

All countries that answered this question found the SEEA-manual clear and very useful when building subsoil asset accounts. It is worth mentioning that those countries that reported they did not use the SEEA-manual in the calculations of their subsoil asset accounts, also found the SEEA-manual generally clear with regard to subsoil asset accounting.

However, some topics were mentioned as missing or poorly covered with regard to subsoil and related assets:

- Methodology for renewable energy stock measurement
- Distribution of the resource rent between the owners of the subsoil assets
- Actual country examples

Questions: Is there a general feeling that there is a need to supplement SEEA with guidelines on renewable energy stock measures (cf. section about renewable physical stock estimates for wind, hydro, biomass, etc.), distribution of resource rent between owners, and actual country examples?

Organisation of the accounting

The subsoil accounts are in general compiled at the national statistical offices, where the responsibility lies either with the division for national accounts and/or the division for environmental accounts. However, it seems like most of the national statistical offices rely on other institutions for the supply of physical data on subsoil asset reserves, cf. section 0.

The Philippines differs from the other countries in how the accounting work is organised. At provincial level, the Palawan Council for Sustainable Development Staff (PCSDS) compiles the accounts with technical assistance from the National Statistical Coordination Board (NSCB). Data needed for the compilation of the accounts are requested from different concerned agencies at the provincial level. The Philippines has also created a Philippine Economic-Environmental and Natural Resource (PEENRA) Steering Committee, which consists of members from NSCB, various Ministries as well as different NGO's, business and labour sectors. The PEENRA and its subgroups serve as a forum for discussion of issues encountered by compilers, data producers and users of the data supplied by PEENRA.

Data issues

The data sources used for the monetary accounts were in most cases based on statistics from the different National Statistical Offices themselves, while the physical reserve data were obtained from other institutions and/or federal governments like:

- The Alberta Energy Resource Conservation Board, the Canadian Petroleum Association, the National Energy Board, Natural Resources Canada and the Alberta Energy and Utilities Board (CA).
- The Danish Energy Agency (DK)
- The Ministry of Economic Affairs (NL)
- The Norwegian Petroleum Directorate (NO).
- The Department for Trade and Industry (UK).
- The Department of Minerals and Energy (ZA)

The different national statistical offices compiling subsoil asset accounts all depend on physical reserve data from external sources. This might complicate the work with harmonisation of the physical accounts. Maybe the physical statistics collected by these institutions are collected with a particular purpose in mind and the ways in which they are structured are specified to this need and not to the subsoil asset accounting.

Problems in getting data

Confidentiality is mentioned as the main problem connected to obtaining data. For some countries this is due to small-scale activities and reorganisation within the organisations supplying the data.

The three countries not facing any problems in getting data, Denmark, UK and Norway, are all calculating asset accounts for oil and gas only.

Uncertain data and sensitivity analysis

In order to explain the uncertainties for users, the published accounts of the Philippines, New Zealand and the United Kingdom have an explanation on the data sources, data limitations, methods used in the accounts, and difficulties encountered in measuring the accounts.

Besides stating the limitations on data, Canada devised a certain measure on the degree of reliability(ies) (a relative measure of the reliability of the indicator based on data quality and conceptual and methodological soundness) of the accounts.

Denmark and Norway include also sensitivity analysis for the value of closing stock of oil and gas. A sensitivity analysis in Denmark is produced using different assumptions for the discount rate and the rate of return. This is done with discount rates of 0%, 3%, 4% and 5% and with rates of return on capital at 6, 7 and 8 per cent. Norway sensitivity analysis includes discount rates of 0%, 2%, 4%, 6% and 8% and with rates of return of capital at 6%, 8% and 10%.

Question: Would it be useful to develop common standards for reliability measures and sensitivity analysis?

Valuation

For the monetary accounts the valuation of stocks is mainly based on the *net present value method* and the *net price method.*

Table 4 gives an overview of the methods and parameters used for the valuation.

The net present value method appears to be the basic method used by almost all countries at present. The exception, the Philippines, has used net price and user cost (El Sarafy) methods, and is currently developing estimates using net present value.

The method used to calculate annual rent seems to be common to most of the countries. The method follows the definition of rent in the Eurostat guidelines for accounts for oil and gas (revised January 2003). Rent is typically derived from operating surplus (gross of taxes) by deducting capital costs.

An exception is the Netherlands, which measures the rent value as the amount appropriated by government through royalties. (However, a comparison of the value of appropriated rent with a value based on operating surplus and capital costs of the extracting industry showed that appropriated rent was a good approximation.)

Table 4.
Methods used for the valuation

Method:	Net Present Value Method			Net Price Method	Other Methods
Assump-tions:	Rate of return to fixed capital	Discount rate	Rate of extraction		
Canada	0%	4%	Constant	Net Price I: Uses positive return to fixed capital. Net Price II: Uses zero return to fixed capital	no
Denmark	8%	4%	Forecasts on future extraction	no	no
UK	8%	4%	Constant (?)	no	no
Netherlands		no		no	Rent appropriated by government
Norway	8%	4%	Constant (?)	no	no
South Africa		yes			no
Philippines		no		yes	El Serafy Method/ User Cost Method
New Zealand	8%	4%	Constant	no	NPV of expected resource rent calculated using the PIM method.

The terminology of rent calculation methods seems to be a bit confused. The confusion seems to stem from the wording of the 2003 SEEA which identified two types of capital cost estimates – perpetual inventory and capital services – as ways of deriving rent. However, the 2003 revised Eurostat guidelines are clear and concise, and reflect actual practice.

Despite some differences in the reason for choosing it, 8% seems to be a widely used rate of return on capital. This rate could be expected to be different in different economies or zones.

New Zealand posed this question: given mobile international capital, should rates of return on capital be similar between different countries? If there is a general consensus on the real rate of return on fixed capital (and 8% seems to be popular), then should other countries be generally encouraged to choose this consensus rate? (cf. also the questions on valuation posed in the next section).

A discount rate of 4% seems to be almost universal. (As with the return on capital, rates could differ among countries.)

The depletion profile seems to vary. Denmark, the U.K. and Norway have forecast data available for future extraction levels. Other countries project the last year's available data (or a moving average of the last three years) forward. The need for (and ability to successfully) estimate future extraction probably varies among countries – the difference in practice probably reflects this.

Challenges in building subsoil asset accounts

The survey respondents mention the following general challenges in building subsoil asset accounts:

- Lack of data
- Data quality issues
- Maintaining consistent sources of data
- Confidentiality issues
- Lack of expertise and experience

When it comes to valuation of stocks the following issues have been mentioned by one or more countries:

- Assumption about the future depletion profile
- Choosing a rate of return to capital
- Choosing a discount rate
- The treatment of capital in the rent calculation
- How to divide costs between oil and gas
- How to handle the government's share of the revenues from oil and gas extraction

Although facing many of the same challenges, the survey respondents seem to have overcome the challenges in different ways regarding lack of data and confidentiality problems.

Lack of input data to the physical accounts is in Canada managed by a network of contacts throughout federal and provincial government agencies and industry specific associations providing the necessary input data. South Africa makes use of consultants, while the Philippines conducted a case study of the activities where data were missing. New Zealand is encouraging new data collection or surveys.

Confidentiality rules are in Canada usually overcome by combining various minerals before publication. Austria contacted the enterprises and got the consent to use some of the information.

Challenges linked to the assumptions in the monetary asset accounts are in DK, NO and UK managed by following the Eurostat Task Force recommendations and the recommendations mentioned in the Eurostat-manual on subsoil accounting. For instance, for the return to capital and the discount rate the European countries use 8 and 4 per cent, respectively. This is in accordance with the Eurostat guidelines.

New Zealand has tried different methodologies and assumptions to overcome the challenges connected to the monetary stocks totals, and work is in progress to examining ways in which these estimates can be improved.

General question: How can the countries' experiences of overcoming the challenges be of use for other countries? Should the London Group serve as a forum for exchanging experiences in this field?

Questions on valuation: The net present value method is the preferred method for valuation of subsoil assets. Should the London group develop guidelines for the specific way to calculate the NPV, e.g. lay dawn guidelines for extraction profile, discount rates, return to capital? Should countries be generally encouraged to choose consensus rates?

Dissemination and use of accounts

Seven countries (Austria, Canada, Denmark, Netherlands, Norway, New Zealand, Philippines and UK) have disseminated their accounts.

Canada, Denmark, Philippines, New Zealand, and the UK disseminate their account through the Internet.

Denmark, Canada, the Philippines and South Africa have also disseminated hard copies of their account.

Austria and Norway disseminate their accounts through Eurostat.

Denmark, Norway and the Netherlands update their account annually and also disseminate it annually.

New Zealand and South Africa are intending to disseminate their accounts annually.

The United Kingdom on the other hand publishes their account biennially (spring and autumn) while the Philippines and Austria disseminate their accounts on an irregular/occasional basis.

In South Africa, the accounts are first published as a discussion document on their website. Subsequently, it is scrutinized by a technical advisory committee before it is published as official document on the website as well as in hard copy.

Question: Is dissemination of the accounts an issue for the London Group? If so, in what way?

Indicators based on the accounts

Two countries (Canada and Denmark) mention that they derive indicators from the Accounts. Canada has three indicators namely, *Natural Resource Wealth*, *Physical Quantities of Natural Resource Assets* and Total *Resource Base.*

Denmark mentions the *Production/Reserve ratio* (P/R ratio) as an indicator derived from the accounts.

Austria, New Zealand, South Africa, and the Philippines intend to derive indicators from the accounts in the future.

Question: Are indicators based on the accounts an issue for the London Group. If so, in what way?

Use of the accounts

For Canada, the monetary value of the subsoil assets was included in the National Balance Sheet for the first time at the end of March 2004. Moreover, an Ottawa based economic think tank has incorporated the account (the monetary figures) into a new index of economic well-being.

Information from the account of New Zealand, particularly, the provisional flow data was used to draft a paper on the implications of carbon tax policy by the New Zealand Treasury.

New Zealand natural resource asset valuations (including minerals and energy) are being used by a crown research institute (LandCare Research) for Sustainability Assessment Model (SAM) development. The SAM will be used to assess the sustainability of projects and businesses in New Zealand.

The published regional accounts done by the Philippines incorporated possible policy applications of the accounts

In other countries (Norway and the Philippines), other agencies/ministries seem to have a growing interest in the kind of data that the account provides.

South Africa mentions it is necessary to teach people about the use of the accounts.

Question: Should the London Group collect and/or develop examples of the uses of subsoil asset accounts?

Future country plans

Most of the survey respondents have developed subsoil accounts that largely cover their main economic subsoil reserves. Sweden does not produce subsoil accounts at all, although that is a deliberate decision due to Sweden's lack of significant oil and gas reserves. The Philippines have produced subsoil accounts for a number of minerals, but due to data limitations have not yet produced accounts for oil and gas. The Netherlands would like to develop monetary subsoil accounts to complement its physical accounts.

Because most of the respondents are already producing substantial subsoil accounts, and appear to be comfortable with the conceptual frameworks they are using, many countries are simply intending to produce regular updates of their existing accounts. Many countries are doing this already, while all the countries that have produced an initial set of accounts are also intending to supply them on a regular basis.

Given this, most planned future expansions to, or development of, existing national subsoil accounts are relatively minor, involving the filling in of gaps or building on existing work. Canada may be planning on doing the most in bringing diamonds and offshore crude oil and gas abstractions into its subsoil accounts. Norway is hoping to incorporate its monetary oil and gas estimates into the National Accounts, while the Netherlands would like to develop initial estimates of its monetary oil and gas reserves. New Zealand is investigating adding carbon accounts alongside the non-renewable energy accounts. Similarly, carbon flow accounts are being investigated.
As already noted, the Philippines has some gaps in its subsoil accounts due to data limitations, and at least three other respondents also noted data availability as an issue that affects the scope of their accounts. Some data gaps may be compounded by a lack of resources in the statistical agency concerned. New Zealand, for example, bases its subsoil estimates on already available data and is not funded to run any subsoil account specific surveys. South Africa also noted data availability and retaining experienced staff as issues. These data and resource issues are probably too country specific for the London Group to address however, particularly as most countries are developing reasonably comprehensive subsoil accounts despite these problems.

The Republic of Philippines will in the near future consider other accounts in the subsoil assets e.g. hydro, oil, gas and other minerals.

Obviously the survey responses may be somewhat biased towards countries that have already developed subsoil accounts. Note that most of the respondents are producing regular subsoil account updates, or are planning on doing so. It seems that most countries that develop subsoil accounts find them worth persevering with. We can possibly take from this that most countries with well developed national level economic and environmental statistics will find subsoil accounts a useful addition to their range of statistics, apart from special cases such as Sweden.

An overview of questions raised in this paper

Based on the survey, some further questions at a rather general level are raised in this paper. The aim is to facilitate a discussion on how the subgroup could continue its work, and which overall issues the London group regards as most important for the subgroup to take up. Others and more specific questions might be (more) relevant, and members of the London Group are encouraged to raise these during the discussion.

Would it be interesting and useful to look more into the methods of fixed prices calculations of stock values?

Would it be useful to work more on the harmonization of the classification of reserves? Is it realistic to expect results in this field given that the information is obtained from other institutions than national statistical offices? What does it mean in terms of international comparison? Does this have a significant impact on the value of a resource for a given year if we take all reserves versus economic reserves only?

Is there a need for work on guidelines for regional subsoil accounts?

Is it sufficient that the overall accounting items are the same in different countries? Would it be useful to try to harmonize the level of detail? In that case: at which level?

Is there a broader interest in countries for building asset accounts for renewable energy? Should the London Group/subsoil asset group go into the development of methodology, etc. for such accounts?

Will the Canberra II group's suggestion for treatment of capital costs have consequences for subsoil resource rent? Is there a need for the London Group to take up this problem and to deal with the decommissioning cost issue in general?

Is there a general feeling that there is a need to supplement SEEA with guidelines on renewable energy stock measures, distribution of resource rent between owners, and actual country examples?

Would it be useful to develop common standards for reliability measures and sensitivity analysis?

How can the countries' experiences of overcoming the challenges be of use for other countries? Should the London Group serve as a forum for exchanging experiences in this field?

The net present value method is the preferred method for valuation of subsoil assets. Should the London group develop guidelines for the specific way to calculate the NPV, e.g. lay dawn guidelines for extraction profile, discount rates, return to capital? Should countries be generally encouraged to choose consensus rates?

Is dissemination of the accounts an issue for the London Group? If so, in what way?

Are indicators based on the accounts an issue for the London Group. If so, in what way?

Should the London Group collect and/or develop examples of the uses of subsoil asset accounts?

Annex List of reports and documents

Berg, André van den and Ven, Peter van de:" Subsoil Assets: Net resource rent versus the government appropriation method - A comparison for the Netherlands.

Blix, Karin: "Danish Asset Accounts for Oil and Natural Gas 1990-96"; Statistics Denmark November 2000

Eurostat: Accounts for subsoil assets – results of pilot studies in European countries. Theme 2, Economy and Finance. European Commission, 2000

Eurostat: Natural ressource Accounts for Oil and Gas 1980-2000. Theme 2, Economy and Finance. European Commission, 2002

Eurostat, B1: Summary of conclusions and results – revised version. Eurostat Task Force on Subsoil Assets. Luxembourg, September 1999.

Eurostat, B1: Subsoil asset accounts for oil and gas – Guidelines for the set of standard tables, Revised version, Luxembourg, January 2003.

Office for National Statistics UK, Environmental Accounts branch: "The valuation of oil and gas reserves.

Statistics Canada: "Indicators and Detailed Statistics 2000 – Econnections: Linking the Environment and the Economy". Catalogue no. 16-200-XKF, Ottawa, 2001.

Statistics Canada: "Concepts, Sources and Methods of the Canadian System of the Environment and Natural Resource Accounts – Econnections: Linking the Environment and the Economy ". Catalogue no. 16-505-GPE, Ottawa, 1997.

Statistics New Zealand, Environmental Statistics Team: "ENERGY PHYSICAL STOCK ACCOUNT - 1992 to 2001, November 2002.

Statistics New Zealand, Environmental Statistics Team: "ENERGY FLOW ACCOUNT - 1996 to 1999"; Draft for comment. March 2004

Statistics New Zealand, Environmental Statistics Team: "ENERGY MONETARY STOCK ACCOUNT - 1987 to 1999"; Draft for comment. Statistics New Zealand, June 2004

Session 3 Water accounting

Chair: Alessandra Alfieri, United Nations

Summary of the session on water accounting

Session organizer: Ilaria Di Matteo, UN Statistics Division

Chair: Alessandra Alfieri, UN Statistics Division
Presenters:
Ilaria DiMatteo, United Nations SD
Jean-Michel Chéné, UNDSD
Sjoerd Schenau, Statistics Netherlands
Viveka Palm, Statistics Sweden
Michael Vardon, Australian Bureau of Statistics
Jana Tafi, Moldova Environment Ministry

Rapporteur: Ilaria Di Matteo, UN Statistics Division

Presentations

The objectives of the session were (a) to report the progress made by the subgroup on water accounting during the past year; and (b) exchange country experiences in the practical compilation of the accounts. The following presentations were made during the session:

Overview of the work of the subgroup on Water Accounting (Ilaria Di Matteo, UNSD)
Implementation of physical water accounts (Jean-Michel Chéné, UNDSD)
NAMWA, the Dutch System of Water Accounts (Sjoerd Schenau, Statistics Netherlands)
Swedish water accounts by water district (Viveka Palm, Statistics Sweden)
Water Accounting in Australia – Use and policy Relevance (Michael Vardon, Australian Bureau of Statistics)
Water accounts in the Republic of Moldova: pilot study, results and advantages (Jana Tafi, Moldova Environment Ministry).

The review of the work of the subgroup indicated that although progress had been made, the work was somewhat slower than expected. Some chapters of the handbook were revised, taking into consideration comments received during the London Group meeting in Rome.

The presentation of Jean Michel Chéné was based on the paper "Implementation of physical accounts" prepared by Jean Margat and Jean Michel Chéné. The paper was prepared in response to the recommendation from the last London Group meeting in Rome to include in the handbook a more detailed description of measurement issues encountered in the compilation of water accounts.

Statistics Netherlands and Statistics Sweden presented their experience in the compilation of water accounts at the river basin level. Specific issues relevant for the compilation of the accounts at the river basin level were discussed at length. In particular, methods for developing economic accounts at the river basin level from information collected for administrative regions were described. The main difference between the two methods lies in the criteria for allocating economic data: in Sweden data are allocated according to the percentage of the population in urban areas while in the Netherlands according to the number of employees.

Australia's presentation reviewed the major results and problems encountered in the compilation of water accounts for the year 2000-2001 which were recently published. Future plans in further developing water accounts in response to policy needs were also discussed.

Water accounts have been compiled in Moldova for the year 1994, 1998, 2000 and 2002. The presentation covered the methodology used, data sources and results. In particular, the introduction of specific questions in the

Household Budget Survey to obtain information on water use by households was discussed. The importance of institutional arrangement in Moldova for the successful compilation of the accounts was also stressed.

Summary of the discussion

The question on the links between international questionnaires on water statistics and water accounts was raised by many participants who wondered to what extent data collected in water statistics questionnaires (in particular, UNSD/UNEP and OECD/Eurostat) can be used to compile the accounts. It was recommended that the handbook on water accounts include a section on the compatibility and consistency between the information needed to compile water accounts and that collected by international questionnaires on water resources. In addition to the information in water statistics questionnaire, a lot of information on water resources is available from other sources (e.g. satellite images). It was suggested to look at the feasibility of compiling the accounts using existing data.

The compilation of water accounts at the river-basin level received a lot of attention. The implementation of the Water Framework Directive (WFD) and Integrated Water Resources Management (IWRM) is expected to require countries to provide this type of information. The construction of economic accounts at the river basin level was considered one of the major challenges in the development of water accounts at the river basin level. In order to advance methodological development in this area, an analysis, identifying advantages and disadvantages of the current methods used for allocating economic data to the river basin, should be undertaken.

Moreover, given the impact that the WFD and IWRM will have in countries, it was recommended that the handbook be fully consistent with those needs. Eurostat offered to review the handbook in order to ensure its consistency with the WFD.

The need for a well developed institutional set-up was considered essential for the success and long-term sustainability of the compilation of water accounting. Water statistics is often scattered in various organizations and each data producer should understand the advantage of organizing the information in a coherent and consistent framework. Sharing information would provide additional benefits to all the players involved in the development of the water accounts. Also, the need for informing the users of the possible potential uses of water accounts as well as for developing accounts responsive to the users' need was stressed.

Future work

Water was identified as a priority area by most of the participants of the London Group meeting. Participants recommended that the finalization of the handbook on water resource accounting should be the first and the most urgent priority of the subgroup. Countries stressed the need for a manual on water accounting that could assist them in the compilation of the accounts. In order to bring the handbook to a completion, it was suggested that UNSD, as a moderator of the subgroup, would (a) prepare a list of the outstanding issues, in order of priority, (b) identify volunteers for contributing to the drafting of text, and (c) develop a detailed timeline for the finalization of the handbook. UNSD offered to organize a meeting of the subgroup on water accounting in New York to review a complete final draft of the document. A revised draft based on the discussion in the meeting would then be posted on the internet for comments by a wider audience, beyond the London group members.

Overview of water subgroup work

by Ilaria Di Matteo, United Nations

Aim of the sub-group:

a) Finalization of the draft handbook on integrated environmental and economic accounting;
b) Further develop methods, concept and definitions in water accounting;
c) Expand the water accounting framework to social aspects related to water (in cooperation with the sub-group on social-environmental accounting;
d) Further develop the link of water accounting with indicators related to water.

Members:

Alessandra Alfieri, UNSD
Osama Al-Zoubi, Jordan
Jean Michel Chene, UNDSD
Philippe Crouzet, EEA
Ilaria Di Matteo, UNSD
Marianne Eriksson, Sweden
Christine Flachmann, Germany
Gerard Gie, In-Numeri
Glenn Marie Lange, Columbia University
Martin Lemire, Canada
Aneme Malan, South Africa
Jean Margat,
Thomas Olsen, Denmark
Mohamed H. Ordoubadi, The World Bank
Leila Oulkacha, Morocco
Christian Ravets, EUROSTAT
Sjoerd Schenau, The Netherlands
Francois Soulard, Canada
Jana Tafi, Moldova
Micheal Vardon, Australia
Jean Louis Weber, EEA

ANNEX Conclusions of the discussions on the water accounting handbook at the London Group (Sessions 3A- 3D)

The draft handbook *Integrated Environmental and Economic Accounting for Water (SEEAW)* currently being prepared by UNSD, UNDSD and Eurostat was discussed at the London Group meeting during 4 sessions (3a- 3d)at the London Group meeting in Rome (September 2003). The handbook was well received, below are some of the main issues that need to be addressed in the revision of the draft.

In Session 9, the London Group agreed to establish a sub-group of water accounts, which, as part of its terms of reference will deal wit the revision of the handbook. More detailed TOR for the sub-group on water accounting will be prepared shortly.

1. Produced assets
It was noted that it is important to include produced assets related to water (e.g. for water storage, distribution, treatment, etc.) in the handbook as they provide useful information on existing infrastructure and can be used to supplement indicators such as sustainable access to improved sources of drinking water and sanitations (two of the Millennium Development Goals Indicators) as well as for establishing the full cost of water. The discussion on produced assets could be placed, either in a separate chapter or in the chapter on monetary accounts, which now covers only supply and use tables.

2. Asset classification
The SEEA-2003 asset classification related to water, does not include glaciers, soil water, snow and ice. There was agreement to update the SEEA-2003 asset classification by including the three items above. The asset accounts tables presented in Chapter 3 should be modified accordingly. Some text should be added to explain the reason of the expansion of the asset classification: As for glaciers, although they do not change as a result of water abstraction, they are an important measure of water availability. Their size needs to be monitored, also in light of the discussion on climate change. Snow and ice and soil water are important in terms of flows. They affect the stock through melting of snow and ice and runoff. Adding snow and ice and soil water in the asset accounts tables allows for the presentation of gross figures of precipitation and evapo-transpiration.

3. Stock of river
Water in rivers is in constant movement. The issue of whether we can talk about the stock of a river was discussed. The stock of the river is the amount of water which is in the river at a certain point in time. Therefore the volume of the river bed was considered to be the correct measure for the stock. However, this measure, when available is of limited use and leaving it blank was also considered a viable option. Annual runoff is a flow measure (not a stock measure) and already appears in the asset accounts tables.

4. Water quality accounts
The chapter on quality accounts should be strengthened. The “extrapolation model” that can be used for the compilation of quality accounts should be described. In particular, data requirement for compiling the accounts should be explicitly discussed. Mr. Philippe Crouzet offered his contribution.

5. Measurement issues
The handbook at present discusses only marginally measurement issues related to water accounts. A more in-depth discussion on this should be developed.

6. Who should compile water accounts?
Water balances, as well as quality accounts should be a collaborative effort of environmental accountants and hydrologists. The former will provide the general framework and the latter will provide the necessary data to fill the tables. This will be discussed in Chapter 9, Implementation of water accounts, of the handbook.

7. Tables presentation
There was a suggestion to present the accounts in a hierarchical format depending on the capabilities of statistical offices and data availability. The text will present simplified tables. More elaborated tables, including the tables agreed by the Water Task Force of Eurostat will be included in the Annex.

8. Link with Material Flow Accounts
The handbook does not discuss the link between the physical supply and use tables with the MFA. Some issues are not treated in the same way in the MFA and in SEEAW. For example, water in reservoir is treated as a produced asset in MFA and as a non-produced asset in SEEAW.

9. Uses of water accounts
One of the objectives of the handbook should be to bridge the gap between hydrologists and accountants and educate users of the potential of the water accounting framework. More emphasis should be put on the chapter on uses and applications. The Total Material Requirement indicator should be mentioned, even if water is excluded from it.

10. Spatial considerations
The handbook should stress the importance of developing water accounts at the river-basin level and discuss possible ways of aggregating the water accounts compiled at the river-basin level nationally.

11. Link of water accounting to social aspects
There was general agreement that it would be useful to expand the existing framework to social considerations. The framework would thus become the tool for integrated water resources management. Experience on linking the social component to the accounting framework is still limited and requires research. It was suggested not to include it in the handbook. However, it was agreed that the newly established sub-group on water accounting prepare an issue paper to be discussed at the next London Group meeting.

12. Use of water accounting to identify the financing etc.

Conclusion on Electronic Discussion Group on Terms and Definitions related to Water Accounting

Participants recognized the importance of harmonizing concepts and definitions of terms related to water accounting. UNSD encouraged the London Group members to participate more actively in the discussion, in particular in view that the EDG's conclusions will be used in the handbook on water accounting. Moreover, there are plans to expand the EDG to water indicators that can be derived from the accounts. It was noted that it would be useful to include in the discussion issues related to measurement. The expansion of the EDG to water indicators and measurement issues could be one of the tasks of the newly created sub-group on water accounts.

Statistiska centralbyrån
Statistics Sweden

Water accounts by water district

by Viveka Palm and Marianne Eriksson, Statistics Sweden

Aim

The aim of this presentation is to reflect on the use of the water accounts. We will argue that the data and the methods are suited for a simplified table presentation and that the outflows from agriculture land are of vital importance to make the information system relevant for the users.

Introduction

This paper is based on experiences from a study (Report 2003:2 Water accounts 2000 with disaggregation to sea basins available at www.scb.se) and concerns further development of the Water accounts according to the tables proposed by the Eurostat task force on water Satellite Accounting.

Water satellite accounts have been presented earlier for Sweden for the year 1995 containing both physical and monetary data on water abstraction, water-use, discharge and direct emissions of pollutants to water, but on a national basis. The accounts were presented in a hybrid flow account(NAMEA)-type framework.

The EU Water Framework Directive (WFD) was adopted by the European Parliament in 2000. The aim of the WFD is to prevent further deterioration of all waters and to achieve their 'good status'. The measures specified in the WFD will be coordinated at the level of river basin district (RBD). The WFD will require more data for river basin districts and the water satellite accounts and the combined economic and environmental data by river basin have proven very useful. For that purpose the water satellite accounts are most useful presented at the level of river basin district.

In October 2001, the Government appointed a one-man committee to draw up a proposal on an organisation for the implementation of the EC framework directive in Sweden (Dir 2001:78). The committee took the name "The Committee on Swedish Water Administration". Its assignment also included analysing the prospects of introducing water charges in Sweden, proposing forms for environmental cooperation on water bodies and submitting a proposal regarding responsibility for supervision of contingency measures for water supply.

The objective of this project was to test methods of disaggregating data from the national water accounts to water districts. When the project started (spring 2002), it preceded the investigation on using the division to water districts in the project. After discussion with the Swedish EPA, we decided to use a division into eight basins that have been commonly used when presenting data on water issues.

In the proposal from the committee in Dec. 2002, Sweden is to be divided into five water districts. These districts are based on the river basins' connection with the major Sea basins.

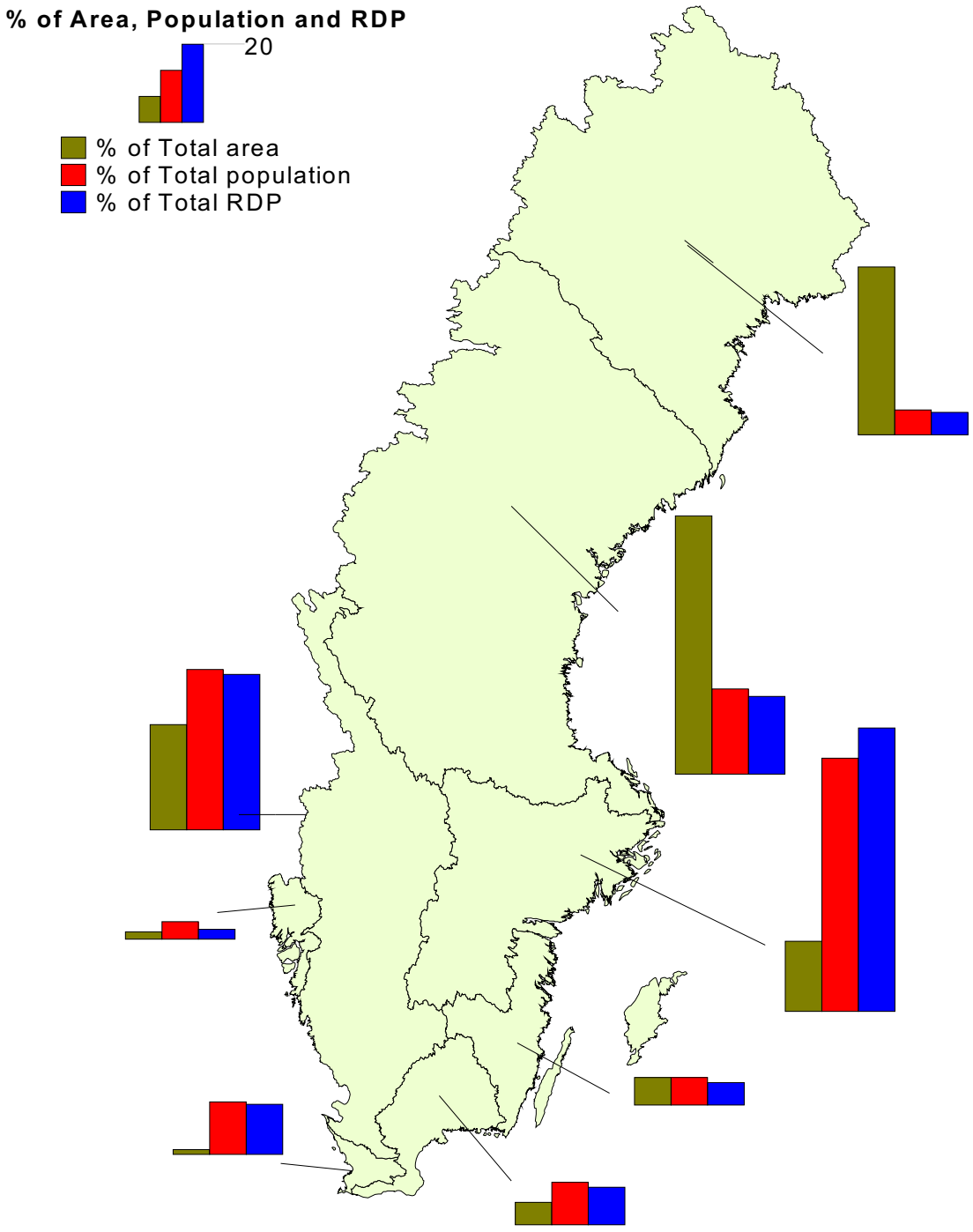
Some basic information about the eight Sea Basins is shown below.

Sea Basin	Total area, km^2[10]	Population	Regional GDP, million SEK
Bothnian Bay	114 249	344 000	69 283
Bothnian Sea	177 239	1 134 000	237 223
Baltic proper, north	48 560	3 397 000	855 270
Baltic proper, middle	19 582	374 000	70 021
Baltic proper, south	15 432	556 000	116 112
The Sound	2 939	696 000	153 881
Kattegat	71 150	2 134 000	468 694
Skagerrak	5 207	248 000	32 738
Total	450 295[11]	8 883 000	2 004 652

[10] Data source: Statistical report Na 11 SM 9701 www.scb.se/statistik/mi0999/mi0999tab1.xls

[11] Data Source: Statistical report MI 65 SM 0201 www.scb.se/sm/MI65SM0201_ikortadrag.asp

Figure 1.
Percentage of total area, total population and Regional Domestic Product by Sea Basin



Method and data sources

Physical data

Water abstraction and water use

Market-produced water from public, municipal waterworks

The trade association for Swedish water utilities, the Swedish Water and Waste water Association (Svenskt Vatten AB) has been collecting yearly statistics on municipal waterworks and municipal sewage treatment plants until 1997. Data collection began again in 2003.

Since there are no data for 2000, Statistics Sweden did set up an internal database to estimate data for 2000 for the purposes of this project. The database covers all municipalities and contains data on abstraction and use of water. The main information was retrieved from the Svenskt Vatten survey from 1997 covering:

- total population
- population connected to public water system
- population connected to public sewage system
- water abstraction from groundwater or surface water
- purchase or sale of water to other municipalities
- use of water in industry, households, public use e.g. schools or recreation purpose, own use in waterworks and losses

Non-market produced/self supply

Manufacturing industry

A special survey was carried out by Statistics Sweden on water use in the manufacturing industry in 2000. The survey covered the abstraction, use and discharge of water. A detailed postal survey was distributed to about 900 establishments who were asked to report data on water abstraction, use and discharge. These establishments belong to industries, which are known to be large water users from the 1983 and 1995 censuses. Water abstraction by other establishments was reported by a simplified postal survey.[12]

Households

In the real estate assessment register concerning one- and two-dwelling buildings and weekend and holiday homes, it is possible to retrieve information on whether a property is connected to the public water/sewage system or not. Furthermore, there is information on whether the property has private water supply/treatment of sewage water or lack water/wastewater facilities. Combining information from the real estate assessment register with the population register provides information on the number of people who are not connected to the public water and sewage system. For households not connected to public water systems, mostly outside urban areas, estimations on the quantities of abstracted/used water are made using the average use (189 litre /day[13]) by those connected to public water supply.

Agriculture

Agriculture uses water for irrigation and for livestock. In the European water account guideline, nitrogen and phosphorous flows from agriculture land are also included as supplementary data.

Water for irrigation

A survey on water used for irrigation in Swedish agriculture was carried out in 1985. No full-scale surveys have been carried out since then. In 1991, the Swedish Board of Agriculture was commissioned to investigate the future need of irrigation in agriculture and a questionnaire was sent to about 800 farming enterprises. The result from the

[12] See www.scb.se/sm/MI16SM0101_inEnglish.asp and www.scb.se/sm/MI16SM0201_inEnglish.asp

[13] The average use per person connected to the public waterworks. Water withdrawal and water use in Sweden 1995 www.scb.se/sm/MI27SM9901.pdf

last survey indicated only limited changes in the quantities used for irrigation compared to 1985, so we have therefore used the data from 1985. The data refer to quantities needed in a dry summer.

Water for livestock

The water needed for livestock is estimated by looking at the number of different animals and their yearly water needs. Data on the number of animals are taken from agricultural statistics. The data in the report refer to 1999, which is the year the latest survey covering all enterprises with more than 2 hectare of arable land or holdings with stocks of animals was conducted.

TRK – Transport, retention and source apportionment

In Sweden, a special project was performed in connection with the reporting to HELCOM, PLC-4, Recommendation 19/04. Yearly emissions of nitrogen and phosphorus were estimated for all known point sources, even those which do not produce environmental reports. Also diffuse leaching from various types of land was estimated based on very detailed data. Incorporating weather data for 30 years, model calculations of leaching and transport were performed and calibrated to most known measurements in Swedish rivers during this period. The "gross" (average) load, emissions and leaches, of phosphorus and nitrogen, was calculated for drainage areas larger than 1 000 km^2. For nitrogen, "net" loads were also calculated using a special hydrological nitrogen retention model, HBV-N. The project is presented on the Internet at http://www-nrciws.slu.se/TRK/index.html.

Wastewater and wastewater treatment

The information on this subject has been taken from the database connected to the publication MI 22 SM 0101 *Discharges to water and sludge production in 2000 – Municipal wastewater treatment plants and some coastal industry*. The report was made by Statistics Sweden on behalf of the Swedish Environmental Protection Agency (Swedish EPA) [14]

Under Swedish environmental protection law, special permits are required to perform certain activities which are potentially harmful to the environment. Establishments with these activities – which are more than 2 000 in number – are also required to report their emission data to the supervisory agency once a year. Estimates are usually based on results of measurement programs. The primary data for the statistics stem from these reports.

Some pollution sources not included in these statistics should be mentioned: No measurements of emissions are known for smaller plants but it is estimated they account for less than 10 percent of municipal wastewater and could therefore be assumed to make a similar contribution to emissions.

Slightly more than one million people are living outside urban areas. They usually depend on self -supplied water and use septic tanks or similar devices to dispose of their wastewater.

Monetary data

Public water supply and wastewater treatment

In Sweden, as in many other countries, the pricing system for freshwater and wastewater services is combined into one price for both services. Enterprises and households are normally charged one fee related to the amount of water they use, and in that fee the price for wastewater management is included. The fact that expenditure for both freshwater and wastewater is mixed together makes dividing the costs for each type of service difficult.

There are several sources of information on monetary data for the supply and use of water and wastewater treatment. There is no data source that provides all the necessary information, so a combination of several data sources is needed together with information on the physical volumes of water and wastewater.

[14] The report is available (in Swedish) at http://www.scb.se/publkat/publikation.asp?plopnr=239.

The main statistical sources were:

The municipal accounts

The municipal accounts are based on a yearly survey of all 289 municipalities in Sweden. The municipalities are asked to report their revenues, investments and expenditure for different domains (e.g. for production of water and wastewater treatment). The statistics are however aggregated so that a division between data for municipal waterworks and MWWTPs is not possible.

Business statistics

Business statistics at Statistics Sweden provide among other things information on costs and revenues within NACE 41 (Collection, purification and distribution of water) and 90001 (Sewage disposal). Among those companies, corporate municipal plants, either private or wholly owned by the municipality, are included.

The national accounts

In the national accounts (NA) there is information in the I/O matrix on the supply and use of water and wastewater services. In Sweden, compilations are made for the aggregated sector NACE 41 and 90001. The NA has so far used an older I/O model. When comparing costs for water and wastewater with quantities, the implicit price showed a considerable variation between different industries, which implies, that the data sources for this must be checked and improved.

Municipal tariffs for water and wastewater

The trade association for Swedish water utilities, the Swedish Water and Wastewater Association, Svenskt Vatten AB, has been collecting yearly statistics on tariffs (fixed price and variable) for an average household in a one-family building charged by each municipality. There is also information of the percentage of the tariff that will cover the cost for water and the percentage that will cover the cost for wastewater treatment. There is no collection of information on tariffs for industries. According to a quick Internet search, the tariff for industries differ a lot depending on the amount of water, size of the meter and in some municipalities also on the content of pollutants in the wastewater delivered to the municipal waster water treatment plant.

Expenditure for self-supply of water and of wastewater treatment

There is no information about expenditure for self-supply of water. When it comes to wastewater treatment, information on own-produced services for own use is difficult to obtain, other than for the manufacturing industry. The data in the report refer to ”Environmental protection expenditure in industry 1999/2000”[15].

Allocation to sea basins

Allocation of national data to sea basins was done mainly using four methods, listed here in the order of increasing complexity.

1. Environmental statistics are compiled for sea basins

In Sweden, there are 114 main drainage areas with outflow to the sea. The 114 drainage areas and costal areas situated in between can easily be aggregated to sea basins. The basic statistics concerning the ‘Abstraction and use of water in the manufacturing industry’ and ‘Discharges to water and sludge production in 2000 by municipal wastewater treatment plants and some coastal industry’ are compiled for drainage basins.

2. Information on real estate and population with geographical location of the basic data

The self-supply of water for households not connected to the public network was estimated using information from the real estate assessment register and the population register. The real estate register contains

[15] Environmental protection expenditure in industry 2000, MI23SM0101

information on x, y coordinates, which by using geographic information systems (GIS) can be allocated to a sea basin.

3. Allocation of municipality data to Sea basins

In Sweden, there are 289 municipalities and 85 per cent of the population live in localities/urban areas covering 1.5 per cent of the total land area. By using GIS, it is possible to combine digital maps for municipalities, localities and sea basins. 119 municipalities were entirely within one sea basin, 165 municipalities intersected with a minor part and 5 municipalities were split between two sea basins (Norrtälje, Heby, Nässjö, Uppvidinge, Tierp). For these 5, data were disaggregated according to the percentage of the population in urban areas. This method was used for data concerning the supply and use of distributed water, both physical and monetary data.

4. Using national data together with distribution keys

The survey on environmental expenditure in the manufacturing industry contains data on investments and expenditure for wastewater. The data refer to companies. One company can have several establishments in different sea basins. To disaggregate the national data, information from the special survey on water use in the manufacturing industry was used. The survey also contained information about the quantities of wastewater directly discharged to water bodies. That information was available by sea basin and industry. The total expenditure for each industry was allocated to sea basins in relation to the quantities of discharged water.

Results

Overview of the flows of water

Figure 2 shows the most important flows of water related to the technosphere. It also gives an idea of the many different data sources that must be used to give an overview of the supply and use of water. The many question marks also show the scarcity of detailed data.

The role of water resources in groundwater, surface water and sea-water as reservoirs for water abstraction are shown at the top of the figure. At the bottom of the figure, their role as recipients of (more or less) polluted water is illustrated. Flows between the boxes are measured in Mm^3 and refer to the year 2000.

There are a few boxes in-between, representing the main human activities relating to water. These are classified according to NACE codes. Two of the activities are directly based on the qualitative treatment of water: NACE 41 (Collection, purification and distribution of water) abstracts raw water, produces and distributes tap water and sells it to customers. NACE 90.001 (Sewage disposal) represents Municipal Waste Water Treatment Plants (MWWTP), which produce the service of wastewater removal and treatment.

Raw water for tap water production is taken both from groundwater and surface water. Public waterworks serve about 90 per cent of the population. It is mostly in rural areas that households have private water abstraction. Public waterworks supply 6 per cent of the freshwater used in the manufacturing industry and also supply water for public use. In total, there are around 2 000 public waterworks, of which 375 are responsible for 86 per cent of the water abstraction.

There are around 2 000 municipal waste water plants (MWWTPs), to which about 90 per cent of the population are connected. Almost 500 plants, which serve more than 2 000 people, treat about 90 per cent of the total wastewater. Standard sewage water is of course produced in every economic activity and it is usually taken care of by the MWWTPs. In addition to this, some process water is delivered from factories to MWWTPs.

The abundance of water in Sweden is apparent from the large industrial abstraction of water, especially surface water - 1 400 Mm^3 in 2000. These activities are concentrated to a few water-intensive process industries, notably the pulp and paper industry. Some large mining, steel and chemical plants are also quite water-intensive.

Point sources versus total load from diffuse sources of nitrogen

On a national basis the nitrogen net contribution to the sea has been estimated to 123 400 tonnes of nitrogen per year (TRK-report). This calculation is made based on measurement between the period 1985-1999. The total nitrogen load from waste water plants was 19 000 tonnes, or 15 % of the total load.

The TRK-project has also presents that 36 200 tonnes of nitrogen per year as modelled to be coming to Kattegat. Of these, 1 725 tonnes, slightly less that 5 percent, are estimated to be coming from the point sources to the coast.

The presentation according to guidelines

The data was first tested in the format for tables that was suggested in the European guideline. However, in some tables there were on two figures, showing the lack of detailed data in this rather complicated system. Therefore, it was chosen to present the data in a simplified form by aggregating the information. As a consequence, the information also became more condensed and easier for the interested to use. In this way it is easier to get an overview of the situation.

It is also evident that it is a long way before a water accounting system could be based on yearly data. Some flows such as the discharge of pollutants are more likely to be measured yearly, since there are environmental goals which are to be evaluated.

Further use of the data

After the report was finalised and spread, several people involved in preparing for the water directive have taken an interest in the figures. The Swedish EPA has asked SCB to participate in the work of setting up data structures for evaluating the management of the water district. In this work there has also been discussions on linking the data to an economic/demographic model of the Swedish counties. In this way it would be possible to simulate how the water use and discharges may vary depending on economic structure and population changes in the water districts.

Figure 2
Flow of water in the Swedish technosphere

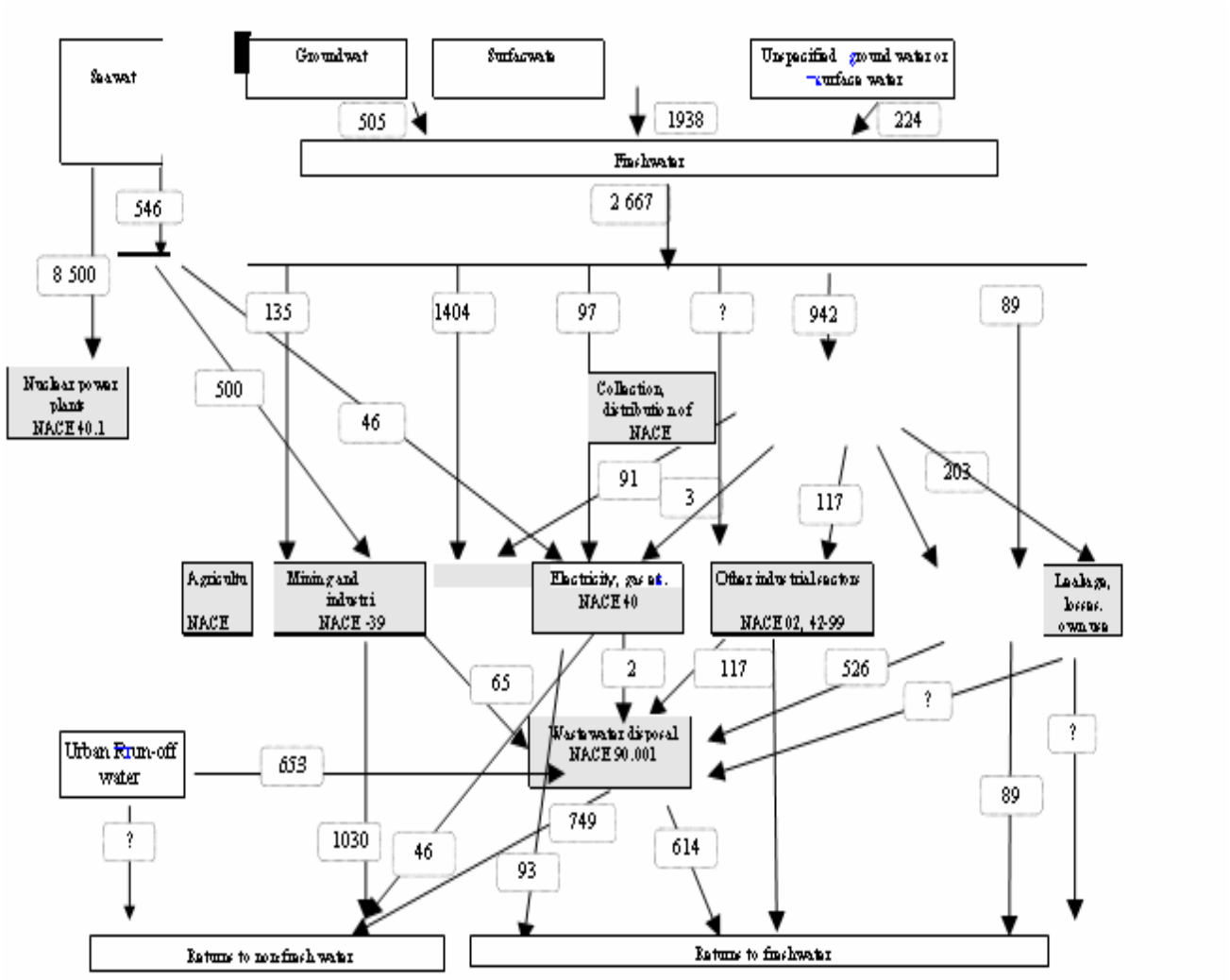


Figure 3
Use of water by Sea basin and industry 2000

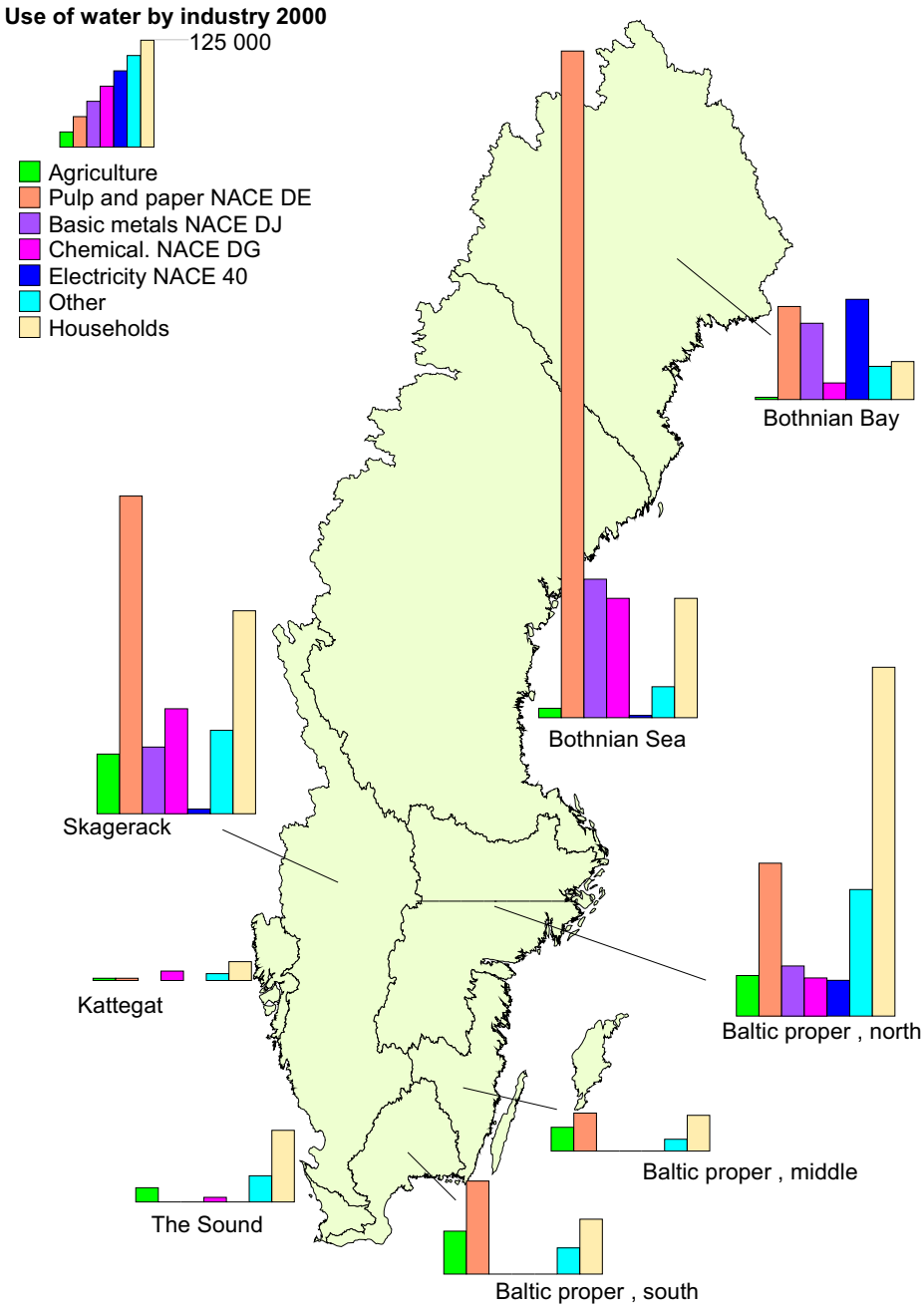
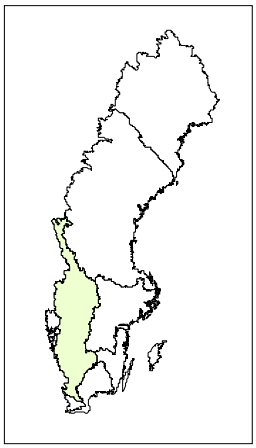
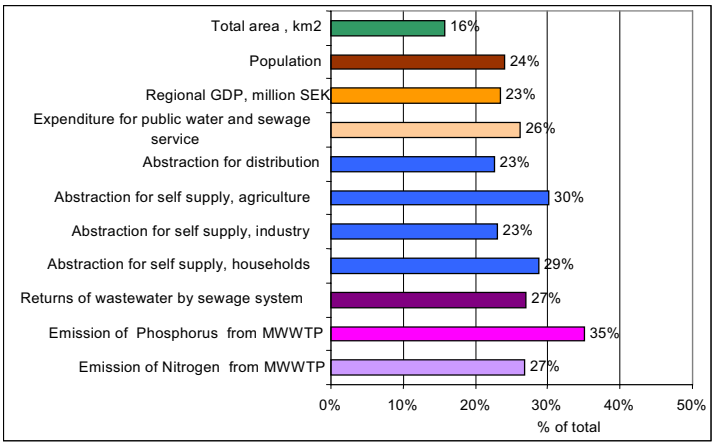


Figure 4.
Profile for Kattegat

Kattegat

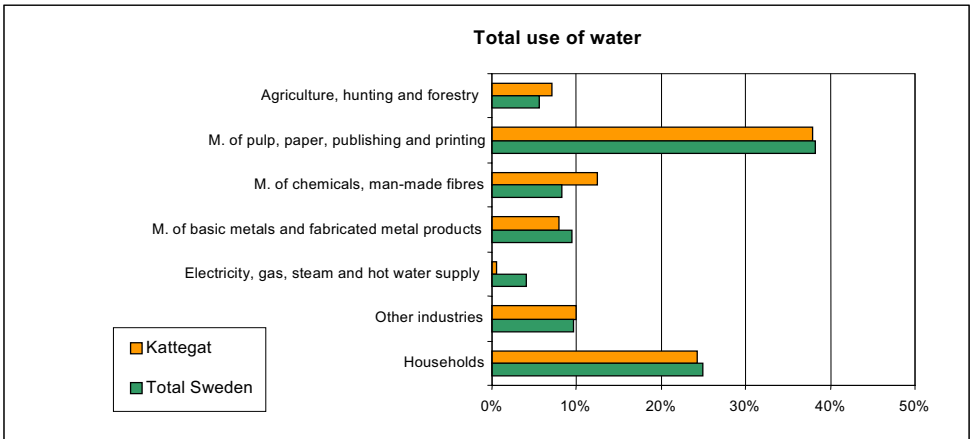




		Use of distributed water, 1000 m3	Self supply, 1000 m3	Total use, 1000 m3
A*	Agriculture, hunting and forestry		40 734	40 734
DE	M. of pulp, paper, publishing and printing	1 806	217 609	219 415
DG	M. of chemicals, man-made fibres	1 826	70 741	72 567
DJ	M. of basic metals and fabricated metal products	4 035	42 044	46 079
40	Electricity, gas, steam and hot water supply	474	2 671	3 145
	Other industries	44 357	12 920	57 277
	Total industries	52 498	386 719	439 217
	Households	114 917	25 619	140 536
	Total	**167 415**	**412 338**	**579 753**

Total expenditure for distributed water: 3422 Million SEK.

Waste water treatment service in the manufacturing industry:
Current exp.: 315 million SEK
Investments: 156 million SEK



Summary

1. Regionalization of the data to water districts is important to the users.
2. Simplified tables give a better overview of the situation and is more adapted to the actual supply of data.
3. The need for data collection on water use is not every year, but in a period of 3-5 years.
4. Point sources are not covering the main impact on the water quality. Therefore it is important to supplement the data with diffuse sources such as leakage of phosphor and nitrogen from agriculture land and deposition from traffic.
5. There is an interest to couple the physical data to driving forces in the same areas and thereby model the situation in the future.

Water Accounting in Australia: Use and Policy Relevance
by Michael Vardon and Stuart Peevor, Australian Bureau of Statistics

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CONTACT DETAILS

Michael Vardon, +61 2 6252 6470, michael.vardon@abs.gov.au

Stuart Peevor, +61 2 6252 7042, stuart.peevor@abs.gov.au

Australian Bureau of Statistics, Locked Bag 10, Belconnen ACT 2616, Australia

ABSTRACT

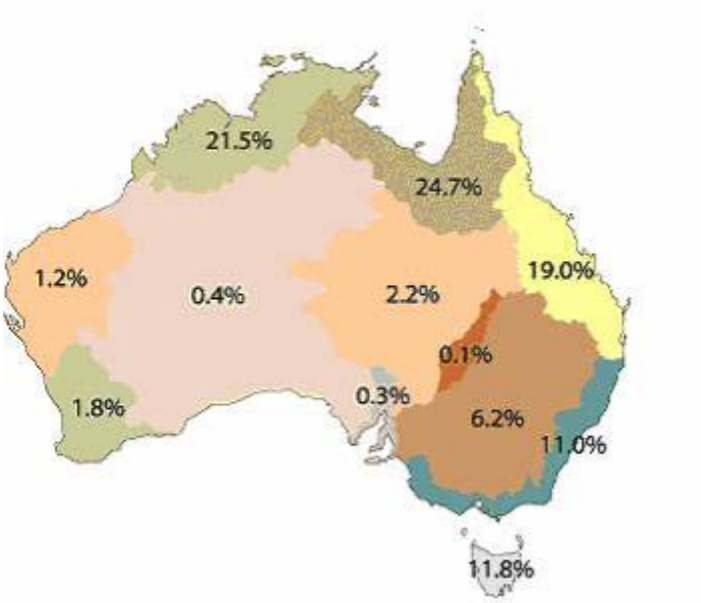
This paper broadly outlines the major policy issues facing Australia's water managers and what role the ABS water accounts have played in informing decision-makers. It starts by describing key aspects of water resources in Australia and then outlines the scope and coverage of the ABS water accounts. Selected results from the most recent water account are presented along with a brief summary of how the accounts have been used. Some of the issues faced by the ABS in compiling the water accounts are discussed and the ABS plans for water statistics in the future are presented.

INTRODUCTION

Water is a vital resource in every nation but in Australia water is scarcer than any other continent, except Antarctica. Australia also has the highest year-to-year variability of rainfall of all the continents and droughts are common (Linacre and Hobbs 1977). In addition, because Australia is a large country (nearly 7.7 million square kilometers) and spans nearly 33 ° degrees of latitude, there is enormous spatial and seasonal variation in rainfall. (see Bureau of Meteorology website www.bom.gov.au, NLWRA 2001).

Australia's surface water resources are divided into 12 drainage divisions (Fig. 1), which are further divided into 325 surface water management units. In addition there are 535 ground water management units. Mean annual run -off for Australia is 387,000 gigalitres (GL), but almost half (46%) is in the sparsely inhabited north of the country (NLWRA 2001).

Fig. 1.
Percent mean annual run-off by drainage division.

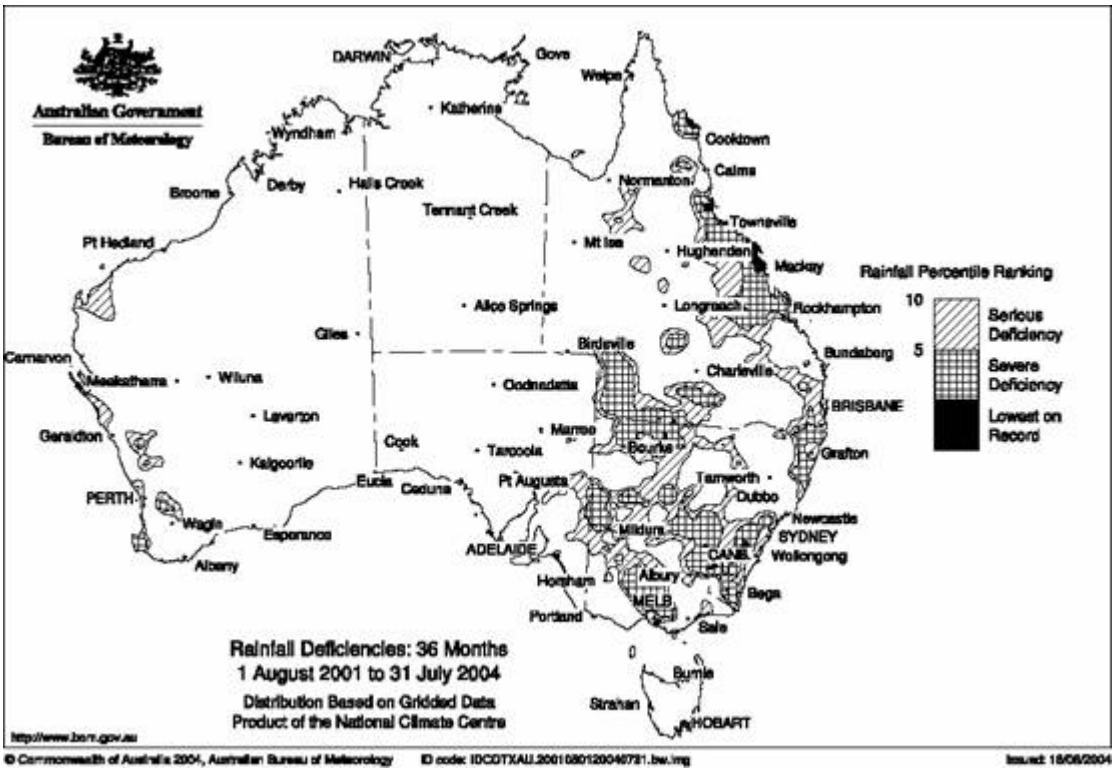


Source: NLWRA 2001 (after AATSE 1999)

Information on Australia's water resources, including information on water quality and water availability, has been summarised in the Australian Water Resources Assessment 2000 (NLWRA 2001). The latest water account from the ABS utilised some of these data, while the NLWRA (2000) made use of the first ABS water account.

At present water is the focus of intense interest to Australia's governments and the general public. This is partly because, southeast Australia, where the majority of the population is located (e.g. Sydney, Melbourne and Brisbane), has been in drought conditions for around three years (Fig. 2).

Fig. 2.
Drought in Australia, 3 years to 31 July 2004.



Definition of terms: *Serious rainfall deficiency*: rainfall lies above the lowest five per cent of recorded rainfall but below the lowest ten per cent (decile 1 value) for the period in question. *Severe rainfall deficiency*: rainfall is among the lowest five per cent for the period in question.

As a consequence of the drought, there are restrictions on the use of water by households and industry (including agriculture) in many cities and most irrigation areas. The impact of the drought on the economy in 2002-03 is estimated to have been around -0.9 percentage points on the volume growth of GDP between 2001-02 and 2002-03 (ABS 2004, Cat. no. 5206).

While the recent drought has focused attention on water in Australia, concern over water resources extends back several decades. In 1994 the Council of Australian Governments (COAG) embarked on a series of reforms aimed at delivering the efficient and sustainable use of water in Australia. Since then information on all aspects of water use and management has been keenly sought. A range of agencies have been involved in supplying data and the ABS has been one of these agencies. In particular the ABS has found that the two editions of the *Water Account, Australia* (ABS Cat. no. 4610.0) have and are being used at all levels of government, industry, by some sophisticated academic uses of information and by the media.

AUSTRALIAN WATER POLICY

Over the past decade COAG has played a pivotal role in the development of water policy in Australia. Recently (25 June 2004) the *Intergovernmental Agreement on a National Water Initiative* (COAG 2004) was signed by all but two Australian states. Paragraph five of the agreement contains a summary of the objectives:
"*The Parties agree to implement this National Water Initiative (NWI) in recognition of the continuing national imperative to increase the productivity and efficiency of Australia's water use, the need to service rural and urban communities, and to ensure the health of river and groundwater systems by establishing clear pathways to return all systems to environmentally sustainable levels of extraction. The objective of the Parties in implementing this Agreement*

is to provide greater certainty for investment and the environment, and underpin the capacity of Australia's water management regimes to deal with change responsively and fairly (refer paragraph 23)" (COAG 2004).

The agreement set outs a broad plan and timetable to achieve these objectives. Significantly the agreement calls for the compilation of annual water accounts (paragraph 82), although the exact nature of these accounts is yet to be determined.

The policy questions of the COAG water reform agenda are many and varied but include:

- Are new water access entitlements and planning frameworks achieving better outcomes (environmental, economic and social)?
- Is water flowing to the highest value users?
- Are water providers achieving full cost recovery?
- Are water markets open and efficient?
- Are water uses and the water supply infrastructure that supports this economically efficient and sustainable?
- Is there consistency in water pricing across sectors and between jurisdictions?
- Are environment and other public benefit outcomes being achieved?
- What are the economic, environmental and social impact of changes in water resources allocation and use?

Water policy in Australia is supported by many government agencies. At the national level, sources of information and guidance on information collection come from:

- Department of Environment and Heritage (DEH)
- Department of Agriculture Forestry and Fisheries (DAFF)
- National Water Commission (NWC)
- National Land and Water Resources Audit (NLWRA)
- Executive Steering Committee on Australian Water Resources Information. (ESCAWRI)
- Commonwealth Scientific Industrial Research Organisation (CSIRO)
- Australian Bureau of Agricultural and Resource Economic (ABARE)
- National Competition Council (NCC)
- Productivity Commission (PC)
- Bureau of Rural Sciences (BRS)
- Bureau of Meteorology (BoM)

As can be seen from the above list there are many stakeholders in water statistics in Australia, and at present a clear structure for coordination has yet to emerge. All agencies involved in water statistics are waiting to see how the NWC will evolve. The NWC will have representatives from the Australian and State/Territory Governments, but is not yet established but the plan is for it to be functioning by the end of 2004 (see COAG 2004).

To date most statistical activity, and particularly that outside of the ABS, has focused on hydrology and water quality, with relatively few organisations concentrating on the economic and social aspects of water use. In Australia, water accounting is currently not being attempted outside of the ABS.

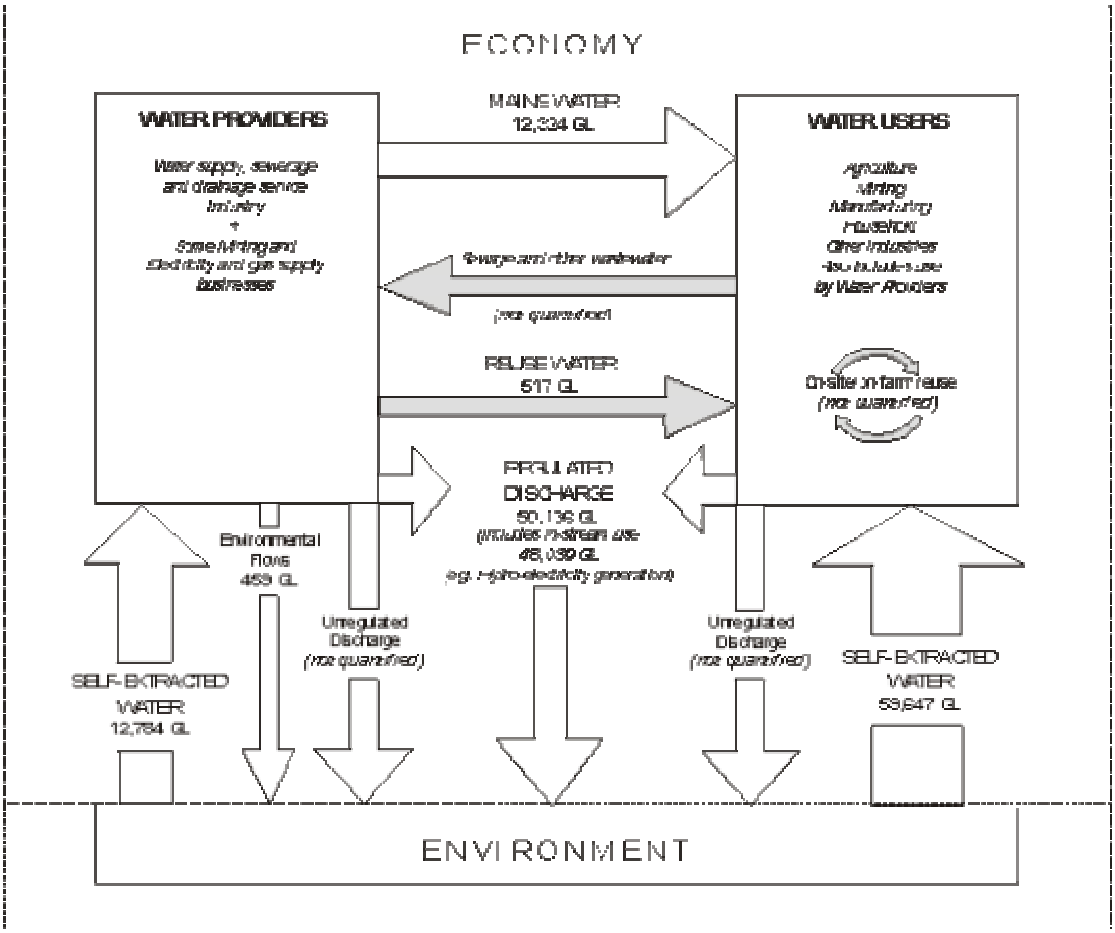
The ABS engages with many of these agencies in a variety of formal and informal avenues. For example, the ABS has recently established the Water Statistics User Group, which will advise the ABS on the statistical priorities relating to water. The advice from this group feeds into the ABS Forward Work Plan for Water (available from the authors). Similarly the ABS is represented on the National Land and Water Resource Audit (NLWRA) Advisory Council and the Executive Steering Committee of Australian Water Resources Information (ESCAWRI).

WATER ACCOUNT, AUSTRALIA

The Australian water accounts are based on the System of Integrated Economic and Environmental Accounting (SEEA).

The scope of the Australian water accounts is limited mostly to the physical supply and use (flow) tables, although information on water stocks is included. Fig. 3 summarises the physical water flows in the Australian economy.

Fig. 3.
Supply and use of water in the Australian economy 2000-01.



Source: ABS (2004). 2000-01 Water Account, Australia. ABS Cat. no. 4610.0.

The water accounts present information on the supply and use of water by industry for each Australian state and territory (except the Australian Capital Territory and New South Wales, which are combined). The industries used were those according to the Australian and New Zealand Standard Industrial Classification (ANZSIC). ANZSIC is aligned with the International Standard Industrial Classification of all Economic Activities (ISIC, see ABS 1993, ABS cat. no 1292.0). Summary data are presented in table 1. Other results can be found on the ABS website.

The first ABS water account (ABS cat. no. 4610.0), had as reference years 1993-94 to 1996-97 and was published in May 2000. This was the first time since the Australian Water Resources Council report on water use in 1985 (AWRC 1987) that comprehensive data on the water supply and use in Australia had been synthesised. The first water account was well received and was widely used by government policy departments and other information agencies. For example, by the National Land and Water Resources Audit (see NLWRA 2001).

The second ABS water account with the reference year 2000-01 was published in May 2004. The second water account had a modified format and included more detailed industry splits, more information on water stocks and drew on a wider variety of information to assist with data interpretation. It also included a chapter on current and emerging issues (i.e. environmental flows and water trading). A wide range of users, including government agencies, industry bodies and academic researchers, eagerly awaited the second account.

Table 1.
Water consumption by industry, 2000-01

	Aust. (total)	*NSW /ACT*	*Vic.*	*Qld*	*SA*	*WA*	*Tas.*	*NT*
	GL	GL	GL	GL	GL	GL	GL	GL
Agriculture	16660	7322	3725	3454	1302	565	222	70
Forestry (a)	27	4	4	2	1	12	2	-
Mining	401	52	7	109	12	195	21	5
Manufacturing	866	179	249	181	85	83	79	9
Electricity and gas	1688	59	1536	70	2	19	-	1
Water supply	1794	676	745	216	24	114	9	9
Other	1292	453	402	178	40	176	25	21
Household	2181	679	472	501	181	245	59	45
Total	**24909**	**9424**	**7140**	**4711**	**1647**	**1409**	**417**	**160**

- Forestry, fishing and services to agriculture

In the water account the main supply and use (flow) tables are found in one chapter of the publication. Other chapters examine different sectors of the economy and use other information to aid interpretation. For example, the chapter on agriculture contains a map showing the percent of crops and pastures that are irrigated (fig. 4) and a table of the gross value of irrigated agricultural production (table 2).

Fig. 4.
Percentage of crops and pastures irrigated, 2000-01.

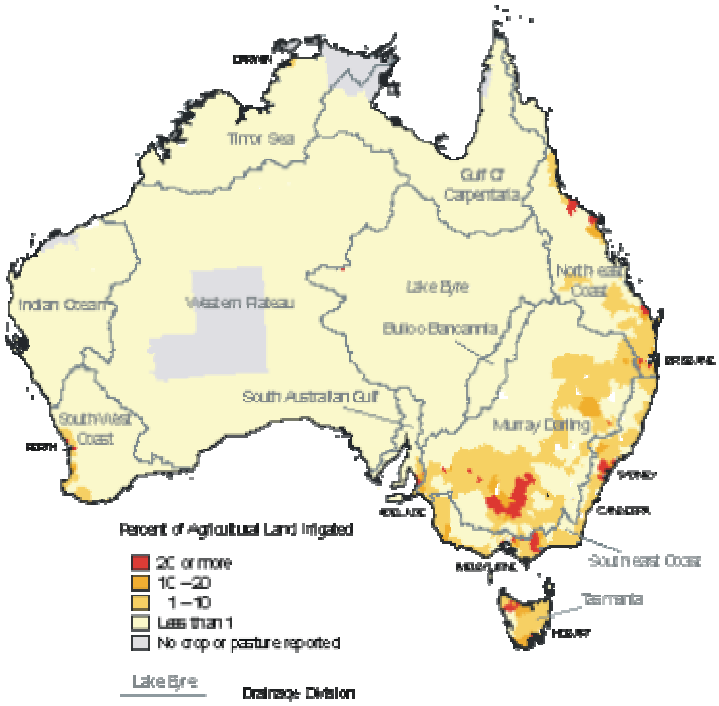


Table 2.
Gross value of irrigated agricultural production, 2000-01

	1996-97	2000-01							
					NSW/				
	Aust.	Aust.	ACT	Vic.	Qld	SA	WA	Tas.	NT
	$m	*$m*	*$m*	*$m*	*$m*	*$m*	*$m*	*$m*	*$m*
Livestock other agriculture*	-	1501	322	452	486	110	153	64	4
Dairy*	-	1499	178	956	123	126	38	78	0
Subtotal	*2540*	*2999*	*500*	*1408*	*608*	*236*	*191*	*142*	*4*
Vegetables	1119	1817	228	465	545	248	186	143	2
Fruit	1027	1590	223	370	584	235	102	45	31
Grapes	613	1355	225	328	15	685	82	9	12
Sugar	517	284	1	0	278	0	5	0	0
Cotton	1128	1222	848		373		1		
Rice	310	350	346	4	0	0	0	0	0
TOTAL AGRICULTURE	**7254**	**9618**	**2371**	**2574**	**2402**	**1405**	**567**	**339**	**49**

*Not separated in 1996-97

Data sources

Over a hundred sources of data were used in the 2000-01 water account. There were three ABS surveys used in the 2000-01 water account, namely the 2001 Environment Management Survey (of mining and manufacturing industries), the 2001 Agricultural Census and the 2001 Water Provider Surveys (= ISIC 41 and 90). Additional

information on water use was collected by the ABS from the electricity and gas and paper product industries. Three surveys by industry associations were also important. These surveys were conducted by: the Water Supply Association of Australia (WSAA); the Australian Water Association (AWA) and; Australian National Committee on Irrigation and Drainage (ANCID). All surveys were in respect on 2000-01.

Other data sources for the water account included lists of licensed water users supplied by state and territory government departments, list of licensed water discharges from state and territory environment protection agencies and information about regional water application rates for different crop types from state and territory agricultural agencies. Various data were obtained from the Bureau of Meteorology, Commonwealth Scientific and Industry Research Organisation (CSIRO), GeoScience Australia, the NLWRA as well as reports by university academics and industry associations.

USE OF THE WATER ACCOUNTS

The water accounts have and are been used by a range of people and agencies. Within governments they are being used for policy documents, including "*Securing Our Water Future Together*" (2004 Victorian Government Department of Sustainability and Environment). They have also been used by government agencies in economic analyses, for example Appels *et al* (2004).

The water accounts are also used by Australian industry. For example, representatives from the irrigation water supply industry (ANCID) and several large water providers have used data from the water accounts to measure their contribution, in terms of volume of water, to the water supply industry. Estimates of water consumption by ANZSIC from the water account have also been useful for water providers to better understand their customers' activity in particular to predict future demand for water.

The usefulness of water accounts is also recognised by their inclusion in the COAG (2004) agreement on water reforms. While the nature of the water accounts proposed is yet to be detailed, and it is likely that the scope will be limited for pragmatic purposes, their inclusion is an indication of their value to government decision-makers.

A number of academics have also made use of the accounts. For example, Lenzen and Foran (2003) used the first water account for an input-output analysis of water use in Australia, while Wittwer (2003) created an estimate of water use for the Murray-Darling Basin (a region of particular interest in Australia). Foran and Poldy (2002) used the water account to make projections about water use to the year 2050.

IMPROVEMENTS TO THE WATER ACCOUNTS

There are five areas where the water account can be improved:

- Comparability and time series
- Timeliness
- Provision of regional estimates
- Provision of comprehensive economic/financial information on water supply and use
- More integration with other data

The areas are outlined more fully below.

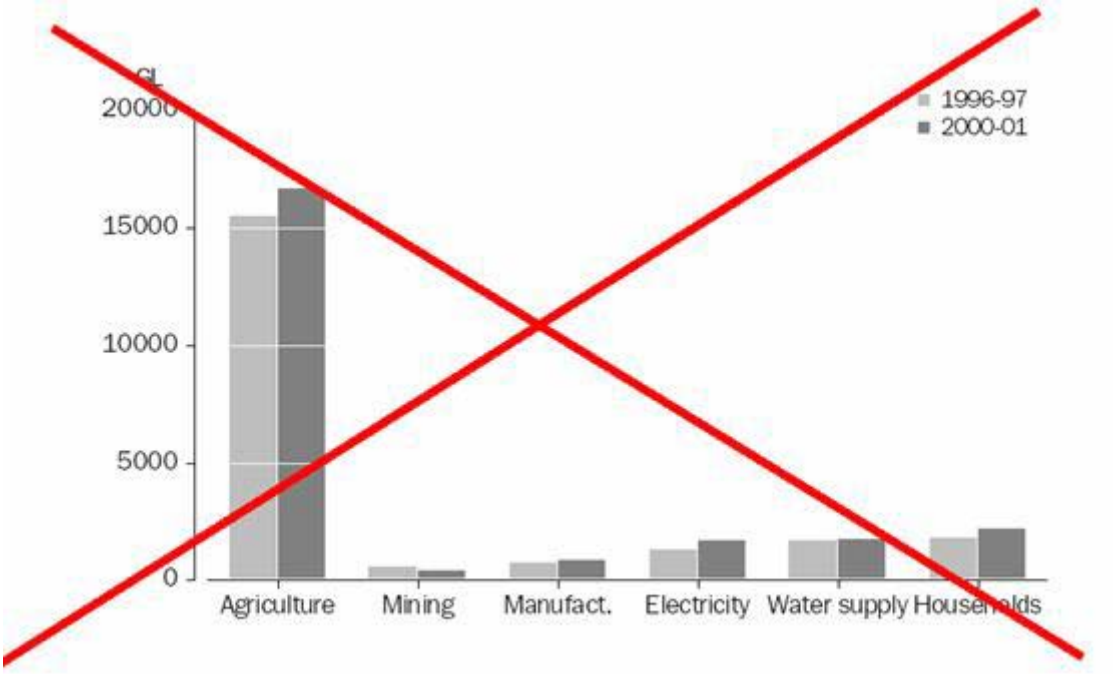
Comparability and time series

Data on water supply and use in Australia has been consolidated three times in the past two decades but unfortunately a true time series does not exist.

Data from 1985 in the AWRC (1987) report are not comparable to the data contained in either the first or second ABS water account. This is due to different concepts and classifications, data sources and methods being used. As the work was done by different agencies, in different decades this is not surprising.

What may be surprising to some is that much of the data in the two ABS water accounts are not comparable. Between 1996-97 and 2000-01 the measuring (i.e. increased use of water meters), monitoring and reporting of water supply and use improved considerably. There were other changes, particularly in the methods and data sources used by the ABS, with the second account using far less modeled data than the first. These resulted in higher quality estimates but a lack of comparability. It is also important to note that the climate plays an important in water use in Australia and that this too varied between the reference periods.

Fig. 4
Lack of a true water consumption time series



Timeliness

The first and second water accounts were produced approximately three years after the end of the reference period. This was due largely to availability of information and the large number of data sources to be reconciled.

Regional estimates

Almost all decision makers and researchers have stressed the need for regional water use. The regions for which information are usually required are water catchments or drainage divisions, which seldom match the geographies used by the ABS. ABS data can be modeled to match these boundaries but ideally the data would be collected in such a way as to allow direct estimates for specific regions.

Economic/financial information

Several organisations have highlighted the lack of information available on economics of water use in Australia. The water accounts have included information on the gross value of agricultural production from irrigated land, but ideally a net measure would be calculated and the relative contribution that water makes to production and

productivity would be identified. Information on the price paid for water and the value of water delivery and storage infrastructure is needed to assess whether water consumers cover the full cost of water supply. This is particularly relevant in rural areas where this has not been the case in the past (see PC 2003).

More integration with data currently out of scope with the water accounts

Currently the water accounts present data on the supply and use of water in the Australian economy. It is hoped that the ABS will eventually expand the theoretical scope of the water accounts to cover hydrological and meteorological aspects of water in the environment. While the ABS will not collect the data itself it seems reasonable to incorporate this data where (and when) it is available.

THE FUTURE

The planned ABS involvement in water statistics is outlined in the *ABS Forward Work Plan for Water* (available from the authors). In brief the ABS is proposing to produce water accounts at four yearly intervals as well as providing annual statistics on:

- The water supply industry
- Agricultural water use
- Energy and gas industry water use
- Household water use

Together these sectors represented just under 90% of water consumption in Australia in 2000-01. The annual statistics will need to be supported by increased ABS survey activity and in particular:

- Adding questions on water use to the annual Agricultural Survey (or the proposed Natural Resource Management Survey)
- Establishing an annual Water Provider Survey (of both water supply and use)
- Establishing an annual Electricity and Gas Industry Water Use Survey
- Possibly expanding the Environment Management Survey to cover the whole of the economy (only mining and manufacturing were covered in 2001)

This expanded survey program was put to the inaugural meeting of ABS Water Statistics Users Group (WSUG) in August 2004 and given broad support. The program will know proceed through internal ABS planning processes.

Also presented to WSUG was the *Draft Water Information Development Plan* (available from the authors). The draft plan broadly outlines the main suppliers and users of water data in Australia and seeks to put the ABS collectivity into the context of all water related information.

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Water accounts in the Republic of Moldova: pilot study, results and advantages" (Water Data Centre project/ Ministry of Ecology and Natural Resources of the Republic of Moldova).

by Jana Tafi with technical assistance of the "Water Data Centre" team

1. Moldova is a country with a rather high density of population, mainly orientated towards agricultural production: more than 126 persons live on 1 km2 and more than one third of GDP is produced by the agrarian sector of the economy. One of the actual problems lies in water security, which has turned into a national problem due to a deficit of water resources, accentuated by internal and external factors leading to pollution of water resources in the context of an abrupt climatic change having a negative influence on water reserves. The solution depends largely on providing society with reliable information on water resources and the level of its scarcity. At the end of the 90s , the necessity to check the availability and relevance of statistics for water resources as well as its correspondence to international and European standards, lead to implement the first pilot-study of the physical water accounts for 1994-1998.

2. On July 1998, an environment statistics project, steered by Eurostat, Ifen, (the French Environment Institute) being the principal operator has taken place in Moldova, the main action being a pilot study on water accounts. During the study, it was clear that one of the limiting factors to the physical accounts of water was the **absence of an informatics' database on water in Moldova.** The first physical water accounts were therefore continued within framework of the new project "Water Data Centre in Moldova", which started in October 2001 with technical support by the French Government. The aim of the project consisted of the **creation of a national Water Data Centre** making it possible to manage the whole data relating to water issues and implementing **physical water accounts** in Moldova. In January-June 2000 was organized the collection and according to this the filling of the first experimental tables 8.3/ 8.5 Water Supply and Use & 8.4 Matrix of flows within the economy for 1994 and 1998. For simplification, tables 8.3/8.5 of SEEA (Chapter 8) the way of work and of presentation results on these tables has decided to combine and been combined to create a single Table on Water Supply and Use, which is currently in use for assessment activities. Below are given examples of the Combined Supply and Use Tables, which describe water flows between the economy and environment and within the economy for 1994, 1998, 2000 and 2002.

Table 8.3/8.5 Water Supply & Use Table, Moldova, 1998

Million cubic metres

		Agriculture	Fisheries	Energy	Mining	Manufacturing & Construction	Distribution/ irrigation water	Distribution/ municipal water	Sewerage	Government	Household	Rest of the World	Total
from the environment	**U1 Total abstraction**	**69,1**	**36**	**724**	**5**	**30**	**70**	**288**	**0**	**19,8**	**25**	**0**	**1268,3**
	from surface water	43	36	722	0	15	70	186	0	0	0	0	1072,1
	of which reservoirs/dams												*0*
	of which lakes												*0*
	of which rivers												*0*
	of which springs												*0*
	from groundwater (wells, …)	26,5	0	2,1	5	15	0	102		20	25		196
	from other water (sea)												0
	for own use												
	for delivery												
within the economy	**U2 Total water received**	**51,4**	**0**	**17,2**	**0**	**10**	**0,1**	**7,3**	**213**	**7**	**199**	**0**	**505,7**
	Water received by users	51	0	17	0	10	0	7		7	199	0	293
	of which recycled water				*0*	7							7
	Waste water for sewerage								213				213
Total use		***120,5***	***36***	***741***	***5***	***41***	***70***	***296***	***213***	***27***	***225***	***0***	***1774***
within the economy	**S2 Total water supplied**	**0,2**	**0**	**8**	**0**	**28**	**51**	**226**	**0**	**33,3**	**159**	**0**	**505,7**
	Water supplied to users	0,2	0	8	0	7	51	226	0	1	0	0	293
	of which recycled water			*8*		*7*							
	Waste water supplied to sewerage					22			0	32	159		213
to the environment	**S3 Total residuals & returns**	**120**	**36**	**708,8**	**5**	**12**	**20**	**70**	**213**	**-5,9**	**65**	**0**	**1244,3**
	Lost water from irrigation (infiltration)	92											92
	Treated waste water												0
	Untreated waster water	11,8	28		5	12			213	2	65		338
	Cooling water (energy)			708,5									709
	Water used for hydroelectricity												0
	Water lost in transport	16,5	8	0,3	0		20	**70**					114
	Other loss of water and adjustment									-8	**0**		-8
	S4 Consumption	**0**	**0**	**25**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**24,7**
	Evaporation and Evapotranspiration	0		24,6	0								25
	Direct discharge to the sea			0									0
Total supply, residuals & consumption		***120,5***	***36***	***741***	***5***	***41***	***70***	***296***	***213***	***27***	***225***	***0***	***1774,7***

Table 8.4 Matrix of flows within the economy, Moldova, 1998

Million cubic metres

	Agriculture	Fisheries	Energy	Mining	Manufacturing & Construction	Distribution/ irrigation water	Distribution/ municipal water	Sewerage	Government	Household	Rest of the World	**S2 Total water supplied**
Agriculture	0,1					0,1						**0,2**
Fisheries												**0**
Energy			0,7				7,3					**8**
Mining												**0**
Manufacturing					7			22				**28**
Distribution/ irrigation water	50,5											**50,5**
Distribution/ municipal water			16,5		4				7	199		**226**
Sewerage												**0**
Government	0,8							32	0,5			**33,3**
Household								**159**				**159**
Rest of the World												**0**
U2 Total water received (use)	**51,4**	**0**	**17,2**	**0**	**10**	**0,1**	**7,3**	**213**	**7**	**199**	**0**	**505,7**

Table 8.3/8.5 Water Supply & Use Table; Moldova,2000

Thousand cubic metres

		Agriculture	Fisheries	Energy	Mining	Manufacturing & Construction	Distribution/ irrigation water	Distribution/ municipal water	Sewerage	Government&Services	Households	Rest of the World	Total
from the environment	**U1 Total abstraction**	**31120**	**8125**	**557960**	**5388**	**19731**	**63915**	**199800**	**0**	**4621**	**30000**	**0**	**920660**
	from surface water	5620	8125	555660	18	11241	63895	107510	0	1	0	0	752070
	of which reservors/dams	*4300*	*155*	*539841*	*0*	*1090*	*9159*	*0*		*1*	*0*		*554546*
	of which lakes	*0*	*500*	*0*	*0*	*0*	*0*	*0*		*0*	*0*		*500*
	of which rivers	*1320*	*7470*	15819	*18*	*10151*	*54736*	*107510*		*0*	*0*		*197024*
	of which springs	*0*	*0*	*0*	*0*	*0*	*0*	*0*		*0*	*0*		*0*
	from groundwater (wells, …)	25500	0	2300	5370	8490	20	92290		4620	30000		168590
	from other water (sea)	0	0	0	0	0	0	0		0	0		0
	for own use												*0*
	for delivery												*0*
within the economy	**U2 Total water received**	**46044,7**	**0**	**6569,5**	**16**	**12422**	**0**	**3006,6**	**143316**	**15427**	**131680**	**0**	**358481,4**
	Water received by users	46045	0	6550	16	11790	0	3007		15427	131680	0	214513
	of which recycled water				*0*	*0*							*0*
	Waste water for sewerage	0	0	20	0	632	0		143316	0	0		143968
Total use		***77165***	***8125***	***564530***	***5404***	***32153***	***63915***	***202807***	***143316***	***20048***	***161680***	***0***	***1279141,4***
within the economy	**S2 Total water supplied**	**20881**	**0**	**2183,3**	**45**	**16022**	**45462**	**145143**	**631**	**16808**	**111306**	**0**	**358481,4**
	Water supplied to users	20143	0	159,3	0	3254	45462	145143	631	373	0	0	215165
	of which recycled water			*159,3*		*3254*							
	Waste water supplied to sewerage	738	0	2024	45	12768	0	0	0	16435	111306		143316
to the environment	**S3 Total residuals & returns**	**30463**	**6069**	**557016,2**	**5359**	**16131**	**18393**	**57564**	**142685**	**3230**	**50374**	**0**	**887283,24**
	Lost water from irrigation (infiltration)	15433											15433
	Treated waste water	1830	0	3070	60	3830	0		160441	1000	0		170231
	Untreated waste water	8800	6069		5140	4030	23890		840	1010	26000		75779
	Cooling water (energy)			532865									532865
	Water used for hydroelectricity												0
	Water lost in transport	2300	0	120	0	1300	12920	**51380**		360	0		68380
	Other loss of water and adjustment	2100	0	20961	159	**6971**	-18417	6184	-18596	860	**24374**		24595
	S4 Consumption	**25821**	**2056**	**5330**	**0**	**0**	**60**	**100**	**0**	**10**	**0**	**0**	**33376,76**
	Evaporation and Evapotranspiration	25821	2056	5330	0	0	60	100		10	0		33377
	Direct discharge to the sea	0	0	0	0	0	0	0		0	0		0
Total supply, residuals & consumpt		***77165***	***8125***	***564530***	***5404***	***32153***	***63915***	***202807***	***143316***	***20048***	***161680***	***0***	***1279141,4***

Table 8.4 Matrix of flows within the economy, Moldova,2000

Thousand cubic metres

	Agriculture	Fisheries	Energy	Mining	Manufacturing & Construction	Distribution/ irrigation water	Distribution/ municipal water	Sewerage	Government&Services	Households	Rest of the World	S2 Total water supplied
Agriculture					4		6	738	99	20034		**20881**
Fisheries												
Energy	3				137			2024	20			**2183,3**
Mining								45				**45**
Manufacturing	1		251				3001	12768	2			**16022**
Distribution/ irrigation water	45462											**45462**
Distribution/ municipal water	559		6319	16	11637				15306	111306		**145143**
Sewerage					631							**631**
Government&Services	20				13			16435		340		**16808**
Household								111306				**111306**
Rest of the World												
U2 Total water received (use)	**46044,7**		**6569,5**	**16**	**12422**		**3006,6**	**143316**	**15427**	**131680**		**358481,4**

Table 8.3/8.5 Water Supply & Use Table, Moldova, 2002

thousandcubic metres

		Agriculture	Fisheries	Energy	Mining	Manufacturing & Construction	Distribution/ irrigation water	Distribution/ municipal water	Sewerage	Government&Services	Households	Rest of the World	Total
from the environment	**U1 Total abstraction**	**17840**	**4020**	**555810**	**5510**	**15900**	**58710**	**181150**		**381**	**20000**		**859321**
	from surface water	3493	4017	553357	13	10540	58706	102780		51			732957
	of which reservors/dams												
	of which lakes	*1680*	*1078*	*539840*	*9*	*1238*	*8266*			*50*			*552161*
	of which rivers	*1813*	*2939*	13517	*4*	*9302*	*50440*	*102780*		*1*			*180796*
	of which springs												
	from groundwater (wells, …)	14347	3	2453	5497	5360	4	78370		330	20000		126364
	from other water (sea)												
	for own use												
	for delivery												
within the economy	**U2 Total water received**	**41667**		**7686**	**2**	**23166**	**85**	**2693**	**105391**	**19099**	**98412**		**298201**
	Water received by users	38629		7680	2	21947	85	2693		16026	98412		185474
	of which recycled water												
	Waste water for sewerage	3038		6		1219			105391	3073			112727
Total use		***59507***	***4020***	***563496***	***5512***	***39066***	***58795***	***183843***	***105391***	***19480***	***118412***		***1157522***
within the economy	**S2 Total water supplied**	**12163**		**774**		**9967**	**37956**	**135294**	**1301**	**11334**	**89412**		**298201**
	Water supplied to users	12080		130		2989	37955	135294	1301	61	3000		192810
	of which recycled water			*130*		*2989*							
	Waste water supplied to sewerage	83		644		6978	1			11273	86412		105391
to the environment	**S3 Total residuals & returns**	**25407**	**3464**	**557095**	**5512**	**19099**	**20829**	**48549**	**104090**	**8146**	**29000**		**821191,4**
	Lost water from irrigation (infiltration)	11901											11901
	Treated waste water	785		3072		3176			127038	868	4000		138939
	Untreated waste water	21	3464		5383	2280	17600		764	233	25000		54745
	Cooling water (energy)			532876									532876
	Water used for hydroelectricity												
	Water lost in transport			140			3236	**55280**					58656
	Other loss of water and adjustment	12700		21007	129	**13643**	-7	-6731	-23712	7045			24074
	S4 Consumption	**21937**	**556**	**5627**		**10000**	**10**						**38129,6**
	Evaporation and Evapotranspiration	21937	556	5627		10000	10						38130
	Direct discharge to the sea												
Total supply, residuals & consumpt		***59507***	***4020***	***563496***	***5512***	***39066***	***58795***	***183843***	***105391***	***19480***	***118412***		***1157522***

Table 8.4 Matrix of flows within the economy, Moldova, 2002

thousand cubic metres

	Agriculture	Fisheries	Energy	Mining	Manufacturing & Construction	Distribution/ irrigation water	Distribution/ municipal water	Sewerage	Government&Services	Households	Rest of the World	S2 Total water supplied
Agriculture					18		5	83	57	12000		**12163**
Fisheries												
Energy					115	2		644	13			**774**
Mining												
Manufacturing	59		253				2656	6978	21			**9967**
Distribution/ irrigation water	37874				54			1	27			**37956**
Distribution/ municipal water	730		7428	2	21741	83			18898	86412		**135294**
Sewerage	2		5		1211				83			**1301**
Government&Services	2				27		32	11273				**11334**
Household	3000							86412				**89412**
Rest of the World												
U2 Total water received (use)	**41667**		**7686**	**2**	**23166**	**85**	**2693**	**105391**	**19099**	**98412**		**298201**

3. During the project, a set of intermediate interlinked sub-tables of water supply and use by sectors of economy has been constructed and implemented. It was very helpful in filling Main tables 8.3, 8.4, 8.5, taking into consideration national statistics capacity and experience. It makes the best use of the questionnaire of the national statistical survey about " Water Consumption" run by the public company "Apele Moldova" (National Water Agency).

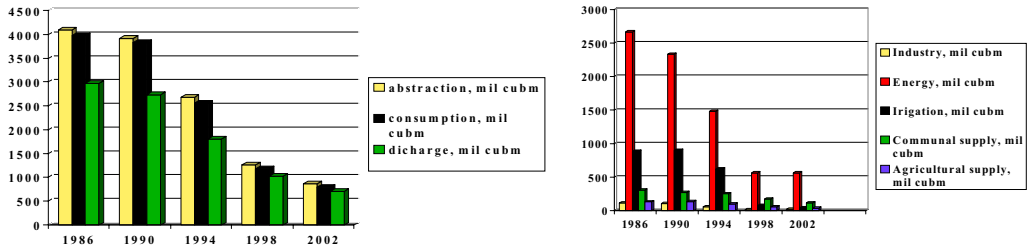
Sector Form

ISIC/ NACE Code	Total Sectors	Agriculture	Fisheries	Energy	Mining	Manufacturing & Construction	Distribution/ irrigation water	Distribution/ municipal water	Sewerage	Government	Household	Rest of the World
Water supplied to users	0	0	0	0	0	0	0	0	0	0	0	0
Large and medium enterprises	*0*											
of which recycled water	0											
Small enterprises	*0*											
Water received by users	0	0	0	0	0	0	0	0	0	0	0	0
Large and medium enterprises	*0*											
of which recycled water	0											
Small enterprises	*0*											
Waste water supplied to sewerage	0	0	0	0	0	0	0	0	0	0	0	0
Large and medium enterprises	*0*											
Small enterprises	*0*											
Waste water received for sewerage	0	0	0	0	0	0	0	0	0	0	0	0
Large and medium enterprises	*0*											
Small enterprises	*0*											

Water bodies	Total Inland Water + Sea	EA.1311	EA.1312	EA.1313		EA.132	EA.12 & EA.2 (except 2.4)	Total Inland Water	Sea
		Reservoirs/ Dams	Lakes	Rivers		Ground water	Land/Soil		
				Springs	Water streams				
Abstraction	0	0	0	0	0	0	0	0	0
Large and medium enterprises	*0*							*0*	
Small enterprises	*0*							*0*	
Waste water discharge	0	0	0	0	0	0	0	0	0
Large and medium enterprises	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Small enterprises	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Waste water discharge after treatment	0	0	0	0	0	0	0	0	0
Large and medium enterprises	*0*							*0*	
Small enterprises	*0*							*0*	
Waste water discharge insufficient treated	0	0	0	0	0	0	0	0	0
Large and medium enterprises	*0*							*0*	
Small enterprises	*0*							*0*	
Total Waste water discharge after treatment	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Large and medium enterprises	*0*	0	0	0	0	0	0	0	0
Small enterprises	*0*	0	0	0	0	0	0	0	0
Clean water discharge without treatment.	0	0	0	0	0	0	0	0	0
Large and medium enterprises	*0*							*0*	
Small enterprises	*0*							*0*	
Waste water discharge without treatment.	0	0	0	0	0	0	0	0	0
Large and medium enterprises	*0*							*0*	
Small enterprises	*0*							*0*	
Total Waste water discharge without treatment	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Large and medium enterprises	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	
Small enterprises	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	
Water lost in transport	0	0	0	0	0	0	0	0	0
Large and medium enterprises	*0*							*0*	
Small enterprises	*0*							*0*	
Other loss of water	0	0	0	0	0	0	0	0	0
Large and medium enterprises	*0*							*0*	
Small enterprises	*0*							*0*	
Consumption/ evaporation	0	0	0	0	0	0	0	0	0
Large and medium enterprises	*0*							*0*	
Small enterprises	*0*							*0*	
Consumption/ return to sea	0	0	0	0	0	0	0	0	0
Large and medium enterprises	*0*							*0*	
Small enterprises	*0*							*0*	

The survey on water is an annual postal report from economic agents; it is mandatory, organized and conducted since 1983 for all water suppliers and users. This survey gives data in m3 on withdrawals, supply, consumption, losses during use and supply, sewage drain as well as the volume of discharge of polluting substances in tons. In ten years, the number of economic agents increased from 5 000 to 193 000 units. Therefore, the National Water Agency has met difficulties in maintaining traditional statistical survey related to water consumption.

Graphs.
Water indicators, Moldova, 1996-2002



Source: Apele Moldovei

Apele Moldovei has recognized the existence of a problem concerning the quality of the survey on water consumption and reviewed its general approach: shifting from exhaustive collection of data to selective methods of surveillance, to use more calculation methodologies, as well water accounts, which would permit estimate water abstraction, supply and consumption in different sectors of the national economy.

In 2000, the first water supply and use tables as well water asset account detected unreliable patterns concerning abstraction water with water use by households.

It has decided to organize and carry out special ecological survey within a sample frame of households (House Budget Survey) to estimate water abstraction, consumption and pollution by the households. Due the results of the Survey only one third of population has connected to water supplied system and 30% to sanitation, others are drinking self-withdrawn water. Households' volume of water self-abstracted constituted 30-mil mc self-discharged 26 mil cm sewerages. In totally they consumed 162-mil mc water supplied or self pumped in urban and rural areas.

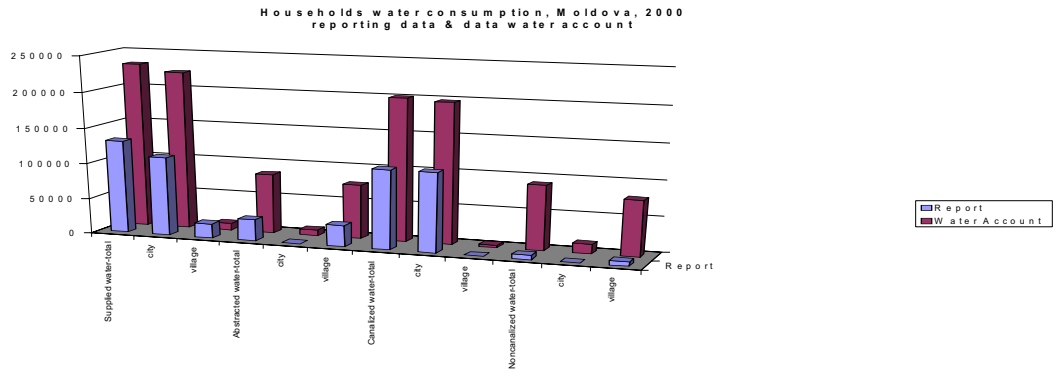
It was therefore possible to built new sets of intermediate interlinked sub-accounts of water supply and use detailing households, for defining possible ways to correct calculations.

ISIC/ NACE Code	**Total Sectors**	Agriculture	Fisheries	Energy	Mining	Manufacturing & Construction	Distribution/ irrigation water	Distribution/ municipal water	Sewerage	Government	Household	Services
Water supplied to users	0	0	0	0	0	0	0	0	0	0	0	0
Cities	*0*											
of which recycled water	0											
Villages	*0*											
Water received by users	131680	20034	0	0	0	0	0	111306	0	340	0	0
Cities	*111646*							*111306*		*340*		
of which recycled water	0											
Villages	*20034*	*20034*										
Waste water supplied to sewerage	111306	0	0	0	0	0	0	0	111306	0	0	0
Cities	*111306*								*111306*			
Villages	*0*											
Waste water received for sewerage	0	0	0	0	0	0	0	0	0	0	0	0
Cities	*0*											
Villages	*0*											

Water bodies	Total Inland Water + Sea	EA.1311	EA.1312	EA.1313		EA.132	EA.12 & EA.2 (except 2.4)	Total Inland Water	Sea
		Reservoirs/ Dams	Lakes	Rivers		Ground water	Land/Soil		
				Springs	Water streams				
Abstraction	30000	0	0	0	0	30000	0	30000	0
Cities	*0*							*0*	
Villages	*30000*					*30000*		*30000*	
Waste water discharge	26000	0	0	0	0	0	26000	26000	0
Cities	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Villages	*26000*	*0*	*0*	*0*	*0*	*0*	*26000*	*26000*	*0*
Waste water discharge after treatment	0	0	0	0	0	0	0	0	0
Cities	*0*							*0*	
Villages	*0*							*0*	
Waste water discharge insufficient treated	0	0	0	0	0	0	0	0	0
Cities	*0*							*0*	
Villages	*0*							*0*	
Total Waste water discharge after treatment	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Cities	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Villages	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Clean water discharge without treatment.	0	0	0	0	0	0	0	0	0
Cities	*0*							*0*	
Villages	*0*							*0*	
Waste water discharge without treatment.	26000	0	0	0	0	0	26000	26000	0
Cities	*0*							*0*	
Villages	*26000*						*26000*	*26000*	
Total Waste water discharge without treatment	**26000**	**0**	**0**	**0**	**0**	**0**	**26000**	**26000**	**0**
Cities	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	
Villages	*26000*	*0*	*0*	*0*	*0*	*0*	*26000*	*26000*	
Water lost in transport	0	0	0	0	0	0	0	0	0
Cities	*0*							*0*	
Villages	*0*							*0*	
Other loss of water	4000	0	0	0	0	0	4000	4000	0
Cities	*0*							*0*	
Villages	*4000*						*4000*	*4000*	
Consumption/ evaporation	0	0	0	0	0	0	0	0	0
Cities	*0*							*0*	
Villages	*0*							*0*	
Consumption/ return to sea	0	0	0	0	0	0	0	0	0
Cities	*0*							*0*	
Villages	*0*							*0*	

These actions made progress possible to update and to overcome data gaps. Data are more complete for 2000 and 2002 (main table 8.3/8.5) as well for detail of water flows between economic sectors (table 8.4).

4. There is another important point coming during the water account studies that demonstrated weak areas of statistics on water resources, derived water indicators, which qualitative side evokes doubts regarding data reliability. This peculiarity requests revision of data surveys and monitoring, data collection process and parallel changes of national methodologies to assess water indicators according to European standards.



5. Therefore, the role of **water accounts** is obvious, as one of the main means of study of environmental problems linked to the state and assessment of natural water resources. It contributed to defining governmental policies in the sphere of natural resources and determined directions for reforming and development of government bodies responsible for water protection. Mainly it has become particularly critical after Moldova has signed the International Conventions, having now to fulfill its obligation, providing transparent harmonized information system, informing in particular about international and transboundaries water resources.

Implementing physical water accounts demanded an inter institutional information network – a "Water Data Center", which is acting and settled under the authority of the Ministry of Ecology and Natural Resources. Main partners and data holders are the Central services of the Ministry, the State Ecological Inspectorate, the Service of Hydro-meteorology, the geological institute "AGeoM", the public agency "Apele Moldovei" and the National Centre

of Scientific-Practical Preventive Medicine of the Ministry of Health. The **Water Data Centre** is used for the current activities of the participating organisations involved in water management in Moldova: elaboration, implementation and follow up of the National Strategies, Governmental National Action Programmes on water issue, especially into the context of the national sustainable development. As well, the WDC is used for reporting on water data to the international organizations, compatible with the European standards.

Jana Tafi

Reference:

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Session 4

Social dimension in environmental accounts

Chair: Robert Smith, Statistics Canada

Summary of the session on social dimension in environmental accounts

Chair: Robert Smith

Presenters:
Alexander Opitz, Federal Statistical Office Germany
Anders Wadeskog, Statistics Sweden
Ismir Mulalic, Statistics Denmark
Rocky Harris, Department for Environment and Rural Affairs
Maja Larsson, Statistics Sweden

Rapporteur: Julie Hass, Statistics Norway

The focus of the presentations and the session in general was more towards mapping what is currently being done and what people are trying to develop, rather than to advocate the specific direction in which this new area should be going.

Introduction to the session

Viveka Palm made an introduction to the subgroup working on social issues in the SEEA framework. Sustainable development information systems require coordinated data of not only environmental and economic information but also social information. This is one reason why looking at incorporating social data into the SEEA can be considered a logical expansion. The subgroup made inventories over what is currently being tried in various countries and found four studies including socio-economic aspects, three studies with socio-environmental aspects, and three focusing on other social aspects such as social capital.

Plans for work in 2005 include finalizing the draft report. Contact with the Siena group who works on issues related to social capital will also be established in order to ensure that the London Group work is coordinated with them.

Income and expenditure of private households in the context of a SAM – concepts and first results for Germany.

Alexander Opitz explained that the motivation for this work was specifically to look at demographic changes in terms of an aging society. In Germany, as elsewhere in many industrialized countries, there are trends towards smaller households and more pensioners and this will result in changes in the demand for goods and services. Three modules were developed based on statistics that are currently available. These modules are for labor force, disposable income, and private consumption. Some of the problems encountered in combining these different data sets were missing data for certain groups, conceptual and definitional differences between, for example, the national accounts and the household budget definitions and random and systematic errors especially related to the household budgets.

Results were presented for the qualification (education) level of employees broken down by industries, income according to different household groups (for example size and type of job status), and uses of disposable income by household groups.

Future plans include building bridges between the different modules, developing time series information on consumption, developing material accounts for households and satellite accounts for health.

Households in the environmental accounts

Anders Wadeskog discussed his work on linking environmental pressures to household consumption. The methodology is based on an input-output methodology expanded by links to "other things." A diagram that shows the relationship between the different data sets – i.e., the national accounts I-O matrix, a consumption matrix, household budgets survey, household activity and emissions data – made it clear how these different sets of information can be put together. Again the focus is on different ways the data can be analyzed in order to provide information regarding how households impacts the environment.

Various ways of looking at household CO2 emissions were presented. Results included direct and indirect domestic emissions and emissions resulting in other countries due to imports. Results from a decomposition of private consumption into factors such as the emission intensity, actual changes, and structural changes were also presented. Different product groups, such as petroleum products, heating, construction, food and drink etc., were also examined in terms of their contribution to household CO2 emissions.

Embedding social dimensions into economic and environmental accounting and indicator systems

Ismir Mulalic emphasized four main points: (1) the need for clarification of sustainable development's social dimension and the definition of essential indicators; (2) the need for a definition of the term "indicator"; (3) SD indicators should be derived from systems where all data are based on the same definitions and classifications; (4) the system of national accounts and its satellites accounts are well suited for this purpose.

An interesting comparison of the UN's social indicators from 1954 and the 1997 Statistical Commission's minimum national social data set (MNSDS) revealed that basic information regarding the social dimension has not changed drastically during this period. It was also pointed out that a major problem in SD indicator sets is that the social dimension requires such a wide range of indicators that it is difficult to reasonably include this dimension in indicator sets with only a couple of indicators.

Monitoring the relationship between household consumption and environmental impact

Rocky Harris presented some of the topics discussed in relation to the UK government's Consultation on Sustainable Consumption and Production Indicators. There were two main categories: (1) consumption impacts on the environment and (2) patterns of consumption in relationship to social groups which was interpreted as elements between the economic and social pillars. Household consumption expenditures was shown in relationship to energy consumption, water consumption, waste not recycled and transport emissions. Also various types of CO_2 emissions broken down according to household groups as defined by the age of the head of the household were presented.

It was emphasized that consumers do not have many choices since they can only buy what is on the market. This fact, in some ways, emphasizes that the production side is much more "under control" in terms of decoupling whereas decoupling consumer impact has not yet been attained or even had much focus.

New socio – economic dimensions in the environmental accounts

Maja Larsson presented information Statistics Sweden has developed based on data from the household living conditions annual interview survey. The data was grouped and categorized according to industry groups. Three years of data was used in order to increase the number of observations in each category so that a minimum of at least 40 to 50 observations in each category was available. Indicators for 4 areas were developed. The four areas included: working environment, health, financial problems and material assets, social networks and political resources. Several of the indicators were presented broken down according to industry groupings.

A number of other ways of presenting the data such as environmental profiles, decoupling, breakdowns by level of education, by region, and by the age were also shown. One example, the profile of the construction industry, included information such as the industry's contribution to production value, employment, energy use, emissions. This information is often presented from the NAMEA accounts. What was new in the profile was the inclusion of information regarding accidents at work for men and women, states of health for men and women, membership in trade unions for men and women, and an evaluation of persons in economic crisis (also broken down according to men and women).

There was some question regarding whether the use of the household survey data was representative and could be generalized to industry groups or not. These types of methodological issues need to be considered in the further development of this type of work.

Some central topics during the discussion:

There was some skepticism expressed regarding the appropriateness of expanding environmental accounts to include the social dimension. It was emphasized however, that the presentations were showing how the interface between the environmental pillar and the social pillar of sustainable development could be probed. It was also pointed out that the interface between environmental and social aspects is the weakest area with respect to the work related to sustainable development and needs to be developed further before this interface can be adequately described in indicator sets.

Although no clear conclusions were drawn by the end of the session, there was a good deal of interest to see the different approaches being taken with regards to both systematized different sets of data (for example from Wadeskog and Opitz) as well as new approaches to analyzing current datasets (most of the presentations). In general there was an interest in developing this interface between the environment and social aspects since this is the least developed area with regards to sustainable development. It was also felt that the London Group's expertise could be used specifically in developing this new area in a consistent way that is linked to the environmental accounts.

Introduction to the session - social issues in the SEEA framework

by Viveka Palm, Statistics Sweden

Preface

At the London Group meeting in Rome in 2003, a number of participants voiced different needs to include some social issues in the accounting framework. Some issues raised were e.g. health information coupled to water accounting, social capital as a complement in sustainability indicator work and also inclusion of variables such as traffic accidents per industry. It was decided to form a sub-group to discuss and find out more about what types of issues that could be of interest and make an inventory of what has already been done. This paper is intended as such an inventory and is intended to be presented to the group at the meeting in Copenhagen in September for discussion.

The inventory and discussions so far have been made on email basis. The people who have been involved in the sub-group are the following:
Rocky Harris DEFRA, UK and Perry Francis ONS, UK,
Alexander Opitz and Norbert Schwarz, Destatis, Germany,
Ismir Mulalic, Statistics Denmark,
Martin Lemire and Rob Smith, Statistics Canada,
Bob Harrison, ABS, Australia
Alessandra Alfieri, UN
Viveka Palm, Statistics Sweden. Editor of the paper

Ideas and texts have also been kindly provided by Maja Larsson, Martin Villner and Anders Wadeskog at Statistics Sweden and by Eva Samakovlis at the National Institute for Economic Research.

Summary

The attempts at bringing in social issues in forms that give or may give opportunities for integration with the system of integrated environmental and economic accounts (SEEA) were grouped under three headings.

The first socio-economic group consists of well established practices that link social data with the system of national accounts and use ordinary statistics and classifications to make more detailed analyses of households and of the work force. Here we have three studies. One study is covering the link between economy and social issues in Germany. The two others, one from UK and one from Sweden, show different ways of presenting household related environmental economic information.

The second socio-environmental group consists of information on health aspects expressed either in physical or monetary forms. It is relatively easy to see the policy needs for these types of analyses. However, it is probable that the gathering of data will be a cumbersome task, as the effects on health are often difficult to trace to particular causes. However, there are areas where data are available such as traffic related death and injuries and work environment data. In the monetary study from Sweden a contingent valuation study was carried out in order to relate air pollution damage to bad health. Several models are using health valuation figures that where calculated in the Externe project.

The third and last group was intended to cover the social issues that are included in the discussions and strategies for sustainable development but have no clear coupling to the environmental or economic data sets. In this inventory we have only included three reports that deal with the notion of social capital. None of the studies intend to put a monetary value on the capital, but use other physical data to estimate and compare this resource. We have not covered any studies on human capital in the inventory. Contacts have been taken with the Siena Group, a UN City group on social statistics. They are coordinating efforts on harmonizing social capital surveys and will have a meeting on this topic in 2005.

To conclude, many policy issues can be seen that would benefit from an inclusion of social data into the SEEA. It may even help in the implementation phase of the environmental accounts if it can be shown that also social issues can be analyzed to some extent. A set of resource accounts that neglect the resources of people and societies is perhaps only of a limited value for the policy makers of many nations.

Aim

The aim of this paper is to make an inventory of some different approaches for adding social aspects to the environmental accounts and briefly reflect on how these can be integrated in the SEEA framework.

Introduction

The SEEA

Increasing national and global impacts and repercussions of economic activities on and from the natural environment call for the analysis of environmental and economic activities within a common framework. The existing situation has induced the United Nations to develop concepts and methods for integrated environmental and economic accounting as a basis for internationally comparable work in this field. An efficient analysis of environmental-economic relations necessitates having a data system in which the different parts are built on comparable concepts and can thus be linked to each other (SEEA, 1993).

As is noted in the recently finished handbook (SEEA 2003) there are several approaches to defining sustainable development and the SEEA may be helpful to inform some of them but not all. The concepts of human and social capital are left out of the handbook as it is a large undertaking to describe and suggest concepts for the relations between economic and environmental data in themselves. Still, the question on how to try and integrate all three areas in national analyses are pressing. National and international strategies for sustainable development are being formed. Also companies are incorporating more social data in their yearly reports. If it is possible to use similar classifications for social statistics, this would help towards making a framework of statistics that could be used for the creation of sustainable development indicators and for integrated policies.

Social statistics

In the mid 1960s a growing dissatisfaction with the amount and quality of social information available to government decision makers spawned what came to be known as the 'social indicators movement'. Initially this was a reaction against what was perceived as an overemphasis on measures of economic performance as indicative of social well-being (Carley, 1981). Since that time, the statistics on social issues has become a well-established tradition. Both subjective data, based on questions to people where they are asked to indicate the health and other essential quality of life issues, and objective data which is collected from registers or similar. What is still lacking is a unifying framework which allows to present the data in an aggregated fashion. However, it is clear that many aspects of the social indicators tend to relate to the same group of people. If you have a job and feel healthy you are likely to be lucky also in other dimensions such as relations, political power, economy. On the other hand if you are unemployed then you stand a greater risk of also being poor, lonely, etc.

Combining policy relevant information

When the debate on sustainability started, it was mainly the countries in the south that advocated the need for a social pillar. The first social sustainability indicators that were suggested were also mainly concerned with poverty and child health, and for some actors in the north it was perhaps felt that these problems were already overcome in more developed countries. Still, a closer look at national statistics in these areas will show that every country has its own problems to tackle, and with budget constraints the environmental and social agendas will to some extent be weighted against each other in every nation.

There is of course a fear that opening up the accounts for more social issues will drown them in statistics. The social statistics have a long history and is in many ways more elaborated and established than the environmental statistics. We would thus attempt to include certain important aspects but set up some limits to what could be seen as parts of an accounting system. In similar ways it can be said that there is much environmental and economic data that will never enter the SEEA, as the system mainly attempt to bring light on certain aspects of policy closely linked to production and consumption by economic agents.

Combining economic and environmental information in the SEEA has made it easier to investigate several policy relevant issues. For example, it has become possible to compare the environmental performance of industries within the nations and internationally. The system can also provide data to study the influence of taxes and subsidies or the import patterns on environmental performance. In many policy issues, social aspects are a vital part of the discussion. In particular, employment and health issues are often touched upon when environmental policy is discussed.

It can be said that social variables are already included in the environmental accounts, as employment is a vital part of the national accounting structure. This makes it possible to analyze for example how many people that may be

affected by a particular policy that addresses some particular industries. In Holland and in other countries social accounting matrices (SAM) have been created and linked with the environmental accounts, analyzing gender issues coupled to environmental policy and looking deeper into the environmental performance of households (de Haan, 2004). In some of the analyses coupled to environmental industry social aspects such as education, gender and regional issues on employment have also been addressed.

It can also be stated that the boundary between social and environmental issues is not so clearly defined. Working environment is an area which is sometimes included in the environmental policies, especially if it concerns chemical policy. For companies that report on sustainability issues, the work environment is certainly a part of their reporting.

However, there are also attempts to bring in other social issues, that will be part of the sustainability strategies for several nations and organizations. The reasons for including them in the framework would mainly be that it makes comparisons and analyses in general easier. The indicator sets that have been produced until now are a mix of statistics from different areas: economic, environmental, social and institutional. These sets are informative in many ways and have made it more clear what issues are regarded as belonging to the sustainability agenda. However, it has also been said that more streamlining and comparability would be good for future uses.

In UK a need for social decoupling indicators has been voiced as a part of the ambitious sustainable indicator system. A number of responses to the decoupling indicators consulted on last year flagged the need to tie in household consumption more closely with resource use/environmental impact. This may not strictly be social environmental accounting, but a first link between standard environmental accounting and social dimensions such as patterns of consumption/life style. It could include expenditure on say tourism and the ecological impacts of tourism for example. The link between the accounts and other life style aspects such as employment, work and traffic accidents, health, distribution, crime etc will also be important.

Method

There are some different outlooks on how social issues can be included and we will try to investigate them by bringing in some examples. One of the challenges is to integrate what is household or individual characteristics with the SNA production and consumption approach. This can e.g. be done by coupling people in the work force to the production through their working place. For children, retired, students and unemployed this is not possible. However, theses can be linked to the household “sector” or through other types of surveys covering travel, time, income etc.

1. The socio-economic aspects. Looking in more detail at issues which in principle are already included: employment, household properties, education, gender, income etc.
2. The socio-environmental aspects. Integrating closely related social issues with economy and environment: sickness caused by environmental degradation, work environment, traffic accidents, people access to nature, radon exposure, passive smoking, etc.
3. Other social aspects. Social issues that are vital to sustainability in a general sense on a society basis such as social capital. These can include data which are more loosely coupled to the economic sphere e.g. poverty, sickness, threat of violence, unemployment, political empowerment. If external effects of consumption would be included then also obesity and drug abuse could be included.

These wordings are not agreed upon, but used in this paper to point to the difference in which variables will be included dependent on what policy questions or type of data are at hand. Especially the third category could be renamed, and some of the data included there could perhaps be regarded as socio-economic.

In the following text we will briefly describe some attempts at measuring similar aspects in the environmental accounts or, in the third group, outside of the accounts.

Inventory

Socio-economic accounting

Germany: socio-economic accounting. Income and Expenditure of Private Households in the Context of a SAM

Like other Statistical Offices, the Federal Statistical Office of Germany already provides various information concerning social issues, based on registers or derived from household surveys. However, no comprehensive social reporting system has yet been in place. About two years ago, the Office therefore started building up a social reporting system based on national accounts. One of the projects is the calculation of a Social Accounting Matrix (SAM).

A SAM provides a comprehensive framework for linking together economic and social statistics. Concepts for a SAM were already developed in the fifties of the last century by Richard Stone. A description of a SAM is given e.g. in the European System of National Accounts (ESA 95) and more detailed in the Handbook on Social Accounting Matrices and Labor Accounts, European Commission 2003.

A SAM provides a conceptual framework for linking together economic and social statistics to disclose a comprehensive and disaggregated overview on the socio-economic situation. Furthermore, it can be used as a data base to analyze future developments. The strength of the SAM as an analytical tool arises from its consistency with national accounts and its flexibility in introducing different modules, classifications and statistical units. In June 2004 some first results for a SAM based on data of the year 2000 were published. For the time being, the main focus is on income and consumption of private households.

Ideas for a SAM are taken up by the SEEA and SNA93. Chapter 6 of the SEEA contains concepts for an extension of the SAM towards a hybrid flow account (NAMEA), a national accounting matrix including environmental accounts, by introducing additional modules in physical units. This chapter also proposes a further breakdown of the household sector by type, as well as an additional disaggregation of private consumption by purpose.

In its basic version, a SAM comprises the complete set of SNA accounts and additional disaggregated information on the flow of goods and services supplied by the input-output framework. The SAM is subdivided in sub-matrices for different kinds of economic flows (e.g. intermediate and final consumption, distribution of income, financial transactions). Taking such a matrix solely based on national accounts as a starting point, the schema can be gradually extended by further subdividing the rows and columns of the sub-matrices. Special emphasis is thereby laid on a disaggregation of the “sector” private households by socio-economic categories. However, by adding new modules to the SAM, it is crucial to ensure consistency with other parts of the system. This implies that all additional data from household surveys and other sources that is applied, has to be adjusted to ESA concepts.

The national accounting framework in Germany already comprises an additional breakdown of disposable income and its components by different kinds of households that is consistent with national accounts and could therefore be linked to the SAM. Within this module, households are classified by employment status of the chief economic supporter, and by size. During spring 2004, the research expanded towards a similar breakdown of private consumption by these groups of households. A suitable tool for describing consumption patterns is the classification of individual consumption according to purpose (COICOP). The objective was, therefore, a disaggregation of private consumption expenditures in a cross-classification by household groups and COICOP categories.

The compilation of this matrix is based on the sample survey of income and expenditure that has last been carried out in 1998. However, these results do not match national accounts data on private consumption expenditures by COICOP categories for private households as a whole. Therefore, adjustments and estimations were necessary to attain results that are compatible with national accounts. To some extent, the data based on the sample survey of income and expenditure could be adjusted to ESA definitions.

In addition, the consumption expenditures of high income households and population living in institutions such as prisons or nursing homes had to be estimated, as they were not included in the survey. The remaining discrepancies between the sample survey and national accounts data were adjusted by a mechanical reconciliation technique. In

a last step the results for 1998 were applied to aggregate national accounts data for 2000. Combined with the already compiled data on disposable income by household group, the results for private consumption also comprise saving by household group as a balancing item. However, saving could only be calculated as a residual.

The breakdown of private consumption is an important feature of the SAM, as it represents the link between detailed socio-economic information on the flow of income and disaggregated data of the flow of goods and services. This linkage allows, for example, to analyze the impacts of an assumed change in the structure of the population - say, a higher proportion of recipients of pensions – on consumption, production and income within the economic system on a meso-level. It is also possible to link the disaggregated monetary data on private consumption with the corresponding flows in physical units to cover environmental issues. However, a prerequisite for these applications would be a transition matrix which links the breakdown of consumption by purpose with a breakdown by product group.

The first results for the year 2000 can only represent a first step towards a more comprehensive analysis of consumption patterns in the scope of the SAM. At present, further work is done to improve the quality of estimations and to obtain more detailed data. We also plan to compile similar matrices on consumption by household group and purpose for further years. Such a time series would allow detailed analysis on long term changes and trends of consumption patterns. Furthermore, a detailed SAM module on income and consumption will be equally important for analyzing future economic developments like changes in labor demand.

Sweden: Household accounts
Statistics Sweden has developed physical environmental accounts since 1993. In the environmental accounts, so far, households have appeared as one of the components of final demand, thus linking it both directly and indirectly to environmental effects through what is consumed and how these goods and services are produced. This has made it possible to compare environmental pressures caused by households with pressures from other economic agents such as industries or the public sector.

A new report presents possible ways to elaborate the role of households in the environmental accounts and presents results, by using household/individual surveys to identify environmental effects generated by expenditure and activity patterns of different household types. A method named decomposition is used in the report to analyse what in private consumption that is changing over time. An international outlook regarding European Household Budget Surveys (HBS) and some European experience in the area is also presented in the report. (Households in the environmental accounts. Wadeskog and Larsson, 2004. Eurostat and SCB).

The purpose of this report is to illustrate some ways to use the environmental/national accounts together with household survey data to look at the environmental role of households. The bulk of this is devoted to linking Household Budget data to the results in the environmental accounts. The idea is that most member states that have developed environmental accounts can perform Input-Output Analysis and have access to more or less frequent data from Household Budget Surveys.

In addition to this an example of what can be done with the use of data from time-use surveys is provided. Many members states have done time use surveys in recent years. And although the direct links between the time use surveys and environmental/national accounts data is less direct than for Household Budget Surveys, they provide a rare opportunity to compare environmental pressures between the formal and the informal economy. The informal economy is defined as "..those economic services produced in the household and outside the market, but which could be produced by a third person hired on the market without changing their utility to members of the household ."

The analysis is centered around the Environmental accounts and its actual or potential links to other types of statistics that is likely to be found in statistical agencies.

At the core of this is the close relationship between the environmental accounts and the national accounts by way of classification and definitions. This means that all data that can be linked to the production accounts of the national accounts can be directly or indirectly linked to data in the environmental accounts. In most cases this works

through the allocation of some variable over the industries or components of final demand in the national accounts[16].

The first type of linkage is the one between the environmental and national accounts as such. Given that the data in the environmental accounts is published as direct environmental impact by actors in the economy, emissions are either allocated to production activities or to consumption activities. This means that all production related emissions are indirect emissions to consumption – it comes with purchasing a product for final consumption domestically or in another country through export from Sweden. Changes in these indirect emission between years then, at least in part, depend on changes in the volume and composition of private consumption.

The second type of linkage is going from the macro household (i.e. Private consumption in the national accounts) to individuals/households. This means, again, linking emissions to private consumption through the national and environmental accounts and then linking this to households via the household budget surveys. This makes it possible to allocate direct and indirect emissions according to all dimensions collected in the household budget survey, such as income, region, type of dwelling, number of children etc.

The other link between national-/environmental accounts data and micro data made in this report is more indirect. Linking private consumption and the associated emissions to time use in the household is done by making more or less enlightened guesses on how the purchases of products enter the different activities of the household as it is recorded in the time use surveys. Once this allocation is done the allocation of emissions follows through the emission intensities.

The general idea can be visualized as a set of matrices that are linked in the following way:

The first set of matrices (1.) comes from the National Accounts. They consist of the Use table converted to a product by product showing amounts of domestic inputs of products in making products for final demand. Adding the primary inputs and Value Added to the columns produces a production value for that product. Of the final demand matrix (3.) only Private consumption is used in this context. As all of these products are classified according to the NACE-system an additional matrix (4.) is used to convert private consumption of product according to NACE over to private consumption of products classified in COICOP.

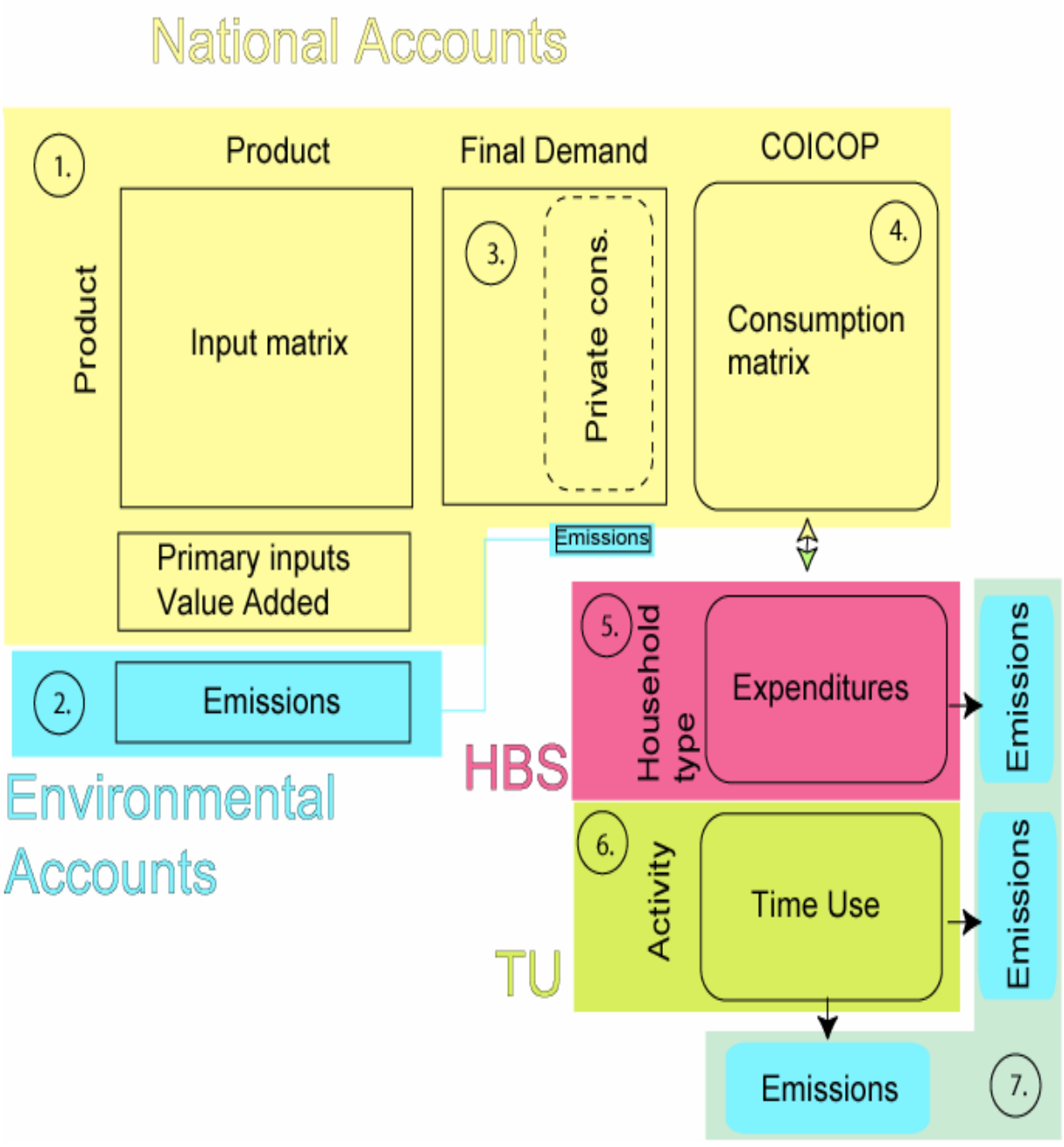
Environmental accounts contribute the direct emissions matrices (2.) that originally calculate the emissions per industry and final demand component. The direct emissions in production is converted from industry to product in the same way as the use matrix. This is then used to produce emissions coefficients per product produced, i.e. tons of CO2 per MSEK of Agricultural products produced.

Using input-output analysis emissions (2.) is then translated into emissions per product (COICOP), Household type or household activity (7.) by using data from the Household Budget Surveys (5.) or Time Use surveys (6.) to allocate the calculated emissions per product (COICOP).

An addition to the matrices above, matrices showing imports of products are also used to calculate hypothetical emissions in other countries from Swedish private consumption. These import matrices are identical in shape to the input/Final Demand matrices above.

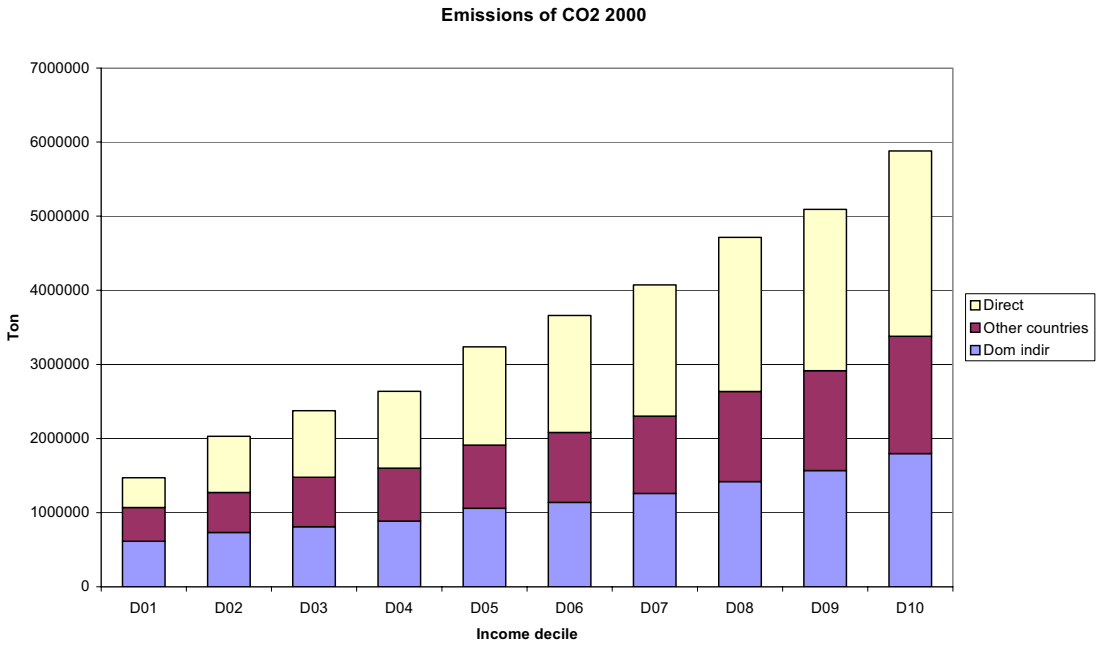
[16] For an example of this that includes social variables see SCB 2003 (MIRINDA)

Figure 1. Link environmental accounts, HBS and TUS



As an example of the results, in Figure 2 the total emission of CO2, caused by private consumption, is presented for 2000, per income deciles. The three components make up roughly one third each.

Figure 2. The total emissions of CO2 in 2000



The households are classified according to income deciles which is a common way of categorizing households. The ten deciles are grouped according to disposable income, where the first decile has the lowest income and the tenth decile has the highest. The total emissions caused by the different households in income deciles 1 to 10 is here directly related to its respective share of total expenditures.

The figure illustrates that rich households emit more than poorer. The CO2 emissions increase with increasing disposable income for all three kinds of emissions. The poorest tenth only emit 25 % of what the richest tenth emit.

The share of the indirect emissions tend to decrease and the direct emissions increase with rising disposable income. For households in decile 1 indirect emissions represent 42 per cent of the total emissions in the decile and for decile 10 about 31 per cent. The share of direct emissions in decile 1 is 27 per cent and 43 per cent in decile 10. The results indicate that the poor have a larger impact through their indirect emissions than by their direct emissions. The richer, in the tenth decile, have a larger impact by their direct emissions, for example heating their houses and driving cars.

The share of emissions to other countries from the Swedish import remain between 26 and 31 per cent in the different deciles. There is no major difference between the different groups according to disposable income.

UK Monitoring the relationship between household consumption and environmental impact

Environmental accounts are useful in identifying responsibility for the environmental consequences of economic activities. This can be analyzed in two ways, first by identifying the direct pressures resulting from production and consumption, and second by tracking the pressures through the supply chain in order to identify the indirect effects of intermediate or final consumption.

One of the strengths of the accounts is that there is a clear distinction between consumption and production, based on National Accounts principles. Inevitably most of the policy focus on sustainable consumption and production is on the latter, both because it is more effective to intervene higher up the supply chain, and because companies are generally more amenable than individuals to regulation and fiscal measures. Increasingly, however, Governments are concerned that the existing patterns of consumption need to be changed if the impact of household consumption on the environment is to be sustainable. In order to throw light on this issue, the environmental

accounts need to be extended to incorporate a number of social aspects relating to consumption.

A first extension, introduced within the Air NAMEA data collected by Eurostat, is to relate atmospheric emissions to household expenditure broken down into three elements:

- Travel/transport
- Heating and lighting
- Other

Each of these may be split further e.g. between the different types of energy used for heating and lighting, and between expenditure on different modes of transport.

An alternative approach is to analyze the relationship between the final demand for products and the emissions, waste and resource use associated with their production. This approach has been widely followed (Vaze, Denmark, the Netherlands, Sweden etc) and can be used to demonstrate the resource (generally CO_2) intensity of different products. The results are based on analytical input-output tables and involve a number of important assumptions about the linearity of the relationship between inputs and outputs within each industrial sector, about the homogeneity of each industry, and the processes used to produce imports.

Decomposition analysis is another tool based on analytical input-output tables that can be used to throw some light on the reasons for changes over time. An element of the analysis attributes changes in emissions to changes in the structure and level of consumer demand. However, such indicators and summaries tell us little about the drivers involved or how the environment might be affected by future changes in structure of society.

This aspect can be covered by extending the analysis to incorporate data on expenditure by households, coupled with data from social surveys which reveal the consumption and travel patterns of different types of households according to social variables such as region, income and household composition.

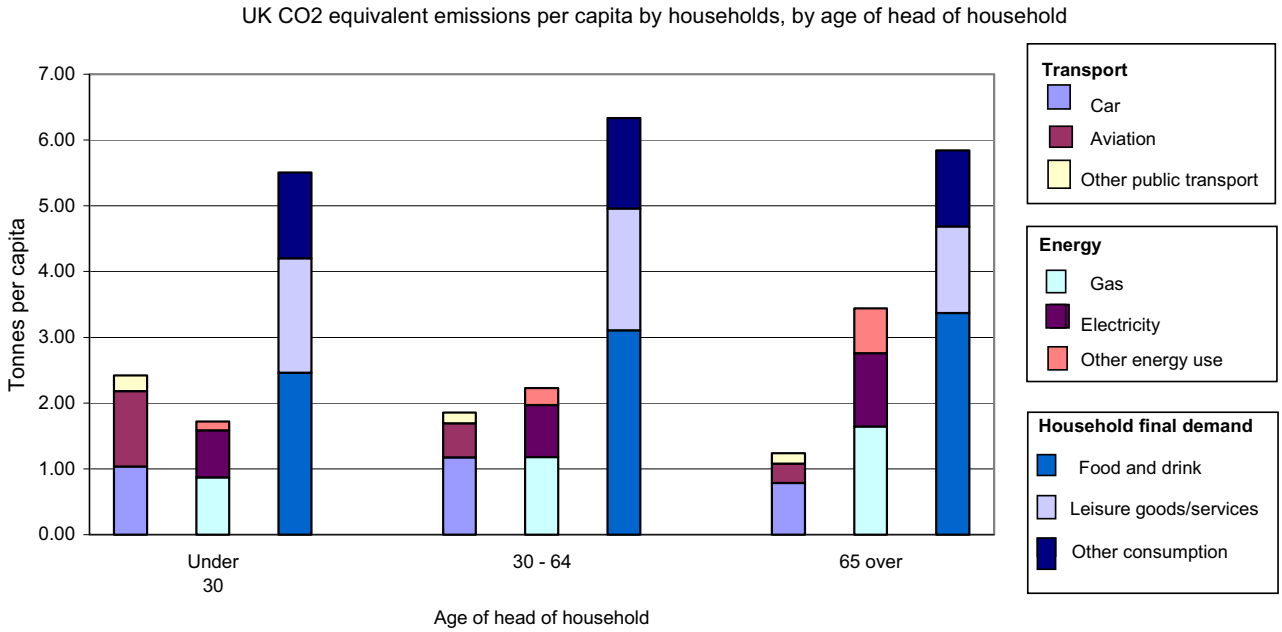
The extensions are all achieved by disaggregating and transforming the National Accounts data on Household Final Consumption Expenditure by product so that it corresponds with the estimates of expenditure classified by COICOP (Classification Of Individual COnsumption by Purpose), which is the basis on which household budget data is collected and presented. The survey information about household composition, household income etc can then be related to expenditure on products and the direct environmental effects of consumption. By using input-output analysis, the expenditures of different household types can also be linked to the emissions, waste and resource use associated with the production of the goods purchased by households.

The links between the survey data and environmental impacts can be made either in a top-down way, by grossing up the survey data and applying suitable emission or resource use factors, or by using a top-down approach which allocates out national totals using percentage shares derived from the surveys.

A number of indicators can be derived from such analyses. One of the key policy interests is in understanding how environmental impact is related to different patterns of consumer behavior, and what the impact will be of increasing disposable incomes, an ageing population, smaller household sizes, increased leisure time etc. Indicators which show whether household expenditure is decoupling from direct and indirect environmental pressures for particular social groups will be particularly useful in guiding government intervention and raising awareness.

As a first step, the Office for National Statistics in the UK produced estimates for 2001 based on the environmental accounts. The results (see Figure 3 below) show that young people tend to travel by air more than other types of household, households headed by people aged 30 to 64 account for most emissions relating to the general consumption of goods and services, and the more elderly households generate relatively more emissions from heating and lighting.

Figure 3



One of the advantages of this approach is that it is able to accommodate some information about the environmental impacts of trade, and hence meet some of the concerns that a shift in environmental burden from developed to less developed countries is not being taken into account in indicators of sustainable consumption and production. Potentially the environmental impacts of tourism and other leisure activities can all be taken into account within the framework. That said, such analyses require the assumption that emissions per unit of output from domestic production are the same as those relating to the production of imports.

This assumption is widely acknowledged by practitioners. However, one of the more hidden assumptions behind the approach is that the level of expenditure by different households on goods and services is directly related to the environmental impact, so that for example if one household spends four times as much as another on a particular product, it is responsible for four times the environmental damage associated with the production of that product. This may well be the case for purchases of standard items such as apples, but is unlikely to hold true for services such as business class air travel, where richer households will tend to spend on higher quality services that are more labor-intensive rather than resource-intensive to produce.

The assumption can be tested by using volume data rather than expenditure data, e.g. by using travel data to allocate transport-related emissions to different types of households. Time use survey data may offer another way of identifying the relationship between driver (expenditure) and pressure (emissions or resource use) at a sub-macro level.

The above analyses relate the environmental effects of consumption with social characteristics, by extending the environmental accounts to incorporate social information about the consumption activities of different types of households. There is potential for two further sets of related indicators within the ambit of Sustainable Consumption and Production, covering the social impacts of consumption (e.g. traffic deaths, obesity indicators) and the social impacts of production (e.g. work accidents, distribution of income). Whilst these might have more limited interest in terms of links with the environmental accounts and associated analytical techniques, there is some scope to incorporate them within a Social Accounting Matrix (SAM) which would link in with environmental accounts through other parts of the National Accounts matrices.

Sweden: Social variables by industry

Statistics Sweden is working on complementing the environmental data in the environmental accounts with selected social data on work environment and on general social aspects. In earlier reports issues such as traffic accidents and health has been presented by industry. This new report is investigating the fact that much of the social statistics is possible to tie to different industries, by using the information on where people are employed. Preliminary results also show differences in the distribution of social issues between various industries. The results can be used as national means by industry to inform the companies reporting on triple-bottom-line, thus wanting comparable data for economy, environmental pressure and working environment.

Socio-environmental accounting

UN: water accounts and health related variables
Within the water accounts there is a need for health data. Shortage of water and water with bad quality is causing health problems in many parts of the world and these aspects would be important to cover in a framework for physical and economic aspects of water management. Water is a key to sustainable development encompassing social, environmental and economic dimensions. The water accounts focuses on the interactions between the economy and the environment. They could be expanded to cover the social aspects connected with the availability, supply and use of water. For example, the sustainable water abstraction, which is one of the variables in the asset accounts, includes considerations on the minimum flow of water, which is necessary to maintain the ecosystem unchanged. In addition, water use by households can be disaggregated by gender and income level and can be linked to the time used to collect water. Furthermore, the millennium development goals indicators – proportion of population with sustainable access to improved water sources and sanitation could be added as memorandum items. The structure of the accounts could be used to look, for example, at the impacts of investment in infrastructure on the economy and, if additional information is added, on health.

Sweden: Health and air pollution project
The National Institute on Economic Research have developed a theoretical model for including health problems from air pollution in environmental accounts (Huhtala and Samakovlis, 2003). The model includes a production externality in the form of air pollution, which causes both direct discomfort and indirect health effects through its impact on the productivity of the labor force. The results from the model show that the valuation of discomfort should be included in the environmental accounts. Further, data from a National Environmental Health Survey, conducted by the Karolinska Institute, have been linked with municipal data on air quality. Concentration-response functions have then been estimated to analyze the relationship between air pollution and respiratory restricted activity days (Samakovlis et al., 2004). The model states how many extra days of respiratory problems arise if the level of nitrogen dioxide increases by one unit. The aim is for the estimates to form the basis for valuation of the health effects.
In order to be able to value the discomfort deriving from the problems, a contingent valuation (CV) study has been conducted. The questionnaire was sent out in November 2002 and the results are now being compiled (Samakovlis and Svensson, 2004). The results from the concentration-response analysis and the CV study has also been included in a general equilibrium model, developed at the institute, to include the feedback from air pollution to decreased labor productivity and reduced welfare from deteriorated health (Östblom and Samakovlis, 2004).

Monetary valuation in models

In a recent report on emissions trading based on the model E3ME some data on health problems from air emissions were calculated based on the Externe data set.

Social capital and other social aspects

General Social Survey 2003: Social engagement in Canada
Statistics Canada released the results of the 2003 General Social Survey. This is the first time that Statistics Canada has attempted to measure issues related to 'social capital' directly. A summary of the results is included below. The full report can be accessed at:
http://www.statcan.ca/english/freepub/89-598-XIE/2003001/pdf/89-598-XIE2003001.pdf

Over the course of their lives, Canadians engage in many types of civic and social activities that play a vital role in the health and vitality of the nation. Preliminary findings of a new report show a positive relationship between the various dimensions of this 'social capital' and the satisfaction people derive in their lives.

This report provides comprehensive information from the 2003 General Social Survey (GSS) on Social Engagement, which covered just under 25,000 Canadians aged 15 years and older. It was designed to further understanding by shedding light on the many ways in which Canadians engage in civic and social life. Some of the civic and social activities that Canadians engage in include donating their time and money to charity; becoming members of organizations; voting in elections and engaging in other political activities; attending religious services; and establishing social networks with friends, neighbors, co-workers and acquaintances.

This social capital has attracted the interest of researchers and policy-makers. Many of them wish to develop a better understanding of how social networks and norms of trust and reciprocity may contribute positively to individual and social outcomes. It was in this environment that the 2003 GSS on social engagement was developed. This survey collected comprehensive information on a wide range of activities in which Canadians are engaged.

Information was collected on Canadians' social contacts with family, friends and neighbors; their involvement in formal organizations, political activities and religious services; their level of trust in people and in public institutions; and their sense of belonging to Canada, their province and their community.

More research is necessary in order to explore this relationship between social engagement and well-being. However, preliminary findings show that people who derive their highest sense of satisfaction from life are those who describe their sense of community as very strong, those who are involved in one or more groups or organizations, and those who express confidence in their public institutions.

Sweden: An attempt at estimating social capital
In a report published by SCB 2003 (Rapport 98. Föreningslivet i Sverige, Vogel et al.,2003) several social capital measures are presented. The measures are all based on a yearly survey that started in 1974, where people in the age 16-84 are interviewed about their living conditions. As a complement to the interviews registers are used to get data on income, taxes and demographical data. The survey is not a standardized survey but rather a system of different surveys generating data on several welfare components (education, employment, work conditions, income, standard of living, housing, transport, leasure activities, social contacts, political resources, security and health). As a complement to the yearly questions, four special areas are covered and this data is gathered in 8-year intervals. In 1992 and 2000 the special study concerned political resources and especially the participation in organizations.

The data is not presented in monetary forms but rather as statistics on important variables. In one of the essays the number of people who are members of one or several organizations is the main variable. In another essay difference is made between *social capital* measured as members in organizations and social networks and *political capital*. The political capital is measured as the ability and will to vote, to trust in people, to take action against injustice, to discuss, to appeal against, talk in meetings or act together with other people. The data is presented by gender and age groups.

In the year 2000, about 90 percent of the people aged 16-84 are members of at least one organization, and 40% are active members, which are high figures in an international perspective. Men are slightly more active compared to women.

Australia: A framework for how social capital can be measured

In the publication, Measuring Social Capital - An Australian Framework and Indicators a framework is described. It provides a comprehensive description of the meaning of social capital and the way its various dimensions might be measured. The publication has been developed in consultation with a wide range of government and non-government agencies and research institutions. The paper is a contribution to national and international work on measuring social capital.

This framework is one of several produced recently by the ABS to simplify analysis of complicated topics. Such frameworks enable planners and policy makers to make better use of all the available statistics, and help the ABS to address gaps in data coverage.

The ABS has adopted the OECD definition of social capital: 'networks, together with shared norms, values and understandings which facilitate cooperation within or among groups'. This OECD definition is emerging as a common basis for international comparability.

The framework presents the various elements of social capital with possible statistical indicators and data items. It has four dimensions: Network qualities (Norms and Common purpose), Network structure, Network transactions and Network types.

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Income and Expenditure of Private Households in the Context of a SAM

by Alexander Opitz and Norbert Schwarz
Federal Statistical Office Germany

Concepts and First Results for Germany 2000

Introduction

Ageing society and intensifying international competition are two long-term developments that are likely to cause far reaching changes in the social and economic system in Germany and elsewhere within the next decades. Social and economic developments are, thereby, in many respects interrelated. Current political debates often merely focus on the future of the social welfare system, especially in terms of the burdens that the welfare state may represent for labour markets, economic growth and government budgets.

Yet, less attention is given to the impacts a changing ageing structure and a changing income distribution may have on the level and the structure of private consumption. The increasing necessity for an additional private coverage of social risks (e.g. health care, old age insurance) may also influence the level of consumption expenditures and saving, respectively. Private demand, in turn, effects production, labour demand and finally the distribution of income among different groups of households. The following scheme roughly illustrates how variations in the socio-demographic structure of the population initiate changes within the economic cycle.

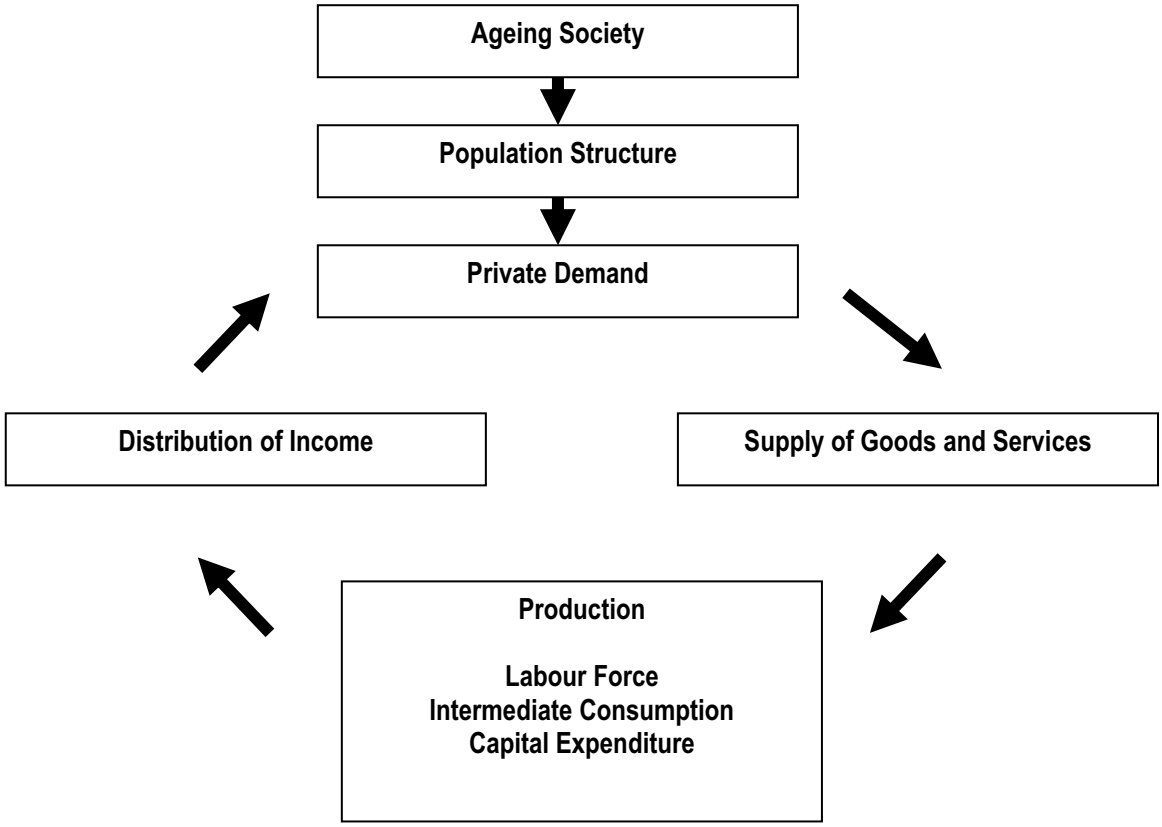

Figure 1. Interrelations between demographic change and private consumption within the economic cycle

However, an analysis of these interrelations requires a consistent framework that covers the circular flow of goods and services, as well as income on a meso-level. Concepts for such a framework are already developed and referred to as a Social Accounting Matrix (SAM). A SAM provides an organisational scheme for combining detailed information on private households (e.g. income by groups of households) with national accounts. The strength of a SAM arises from its consistency and its flexibility for extensions e.g. towards an integrated socio-economic and environmental accounting system. Ideas for the latter are outlined in Chapter 6 of the System for Integrating Environmental and Economic Accounting (SEEA). A SAM delivers a very condensed picture of the socio-economic (and possibly environmental) situation of a given year and can also be used as a data base for socio-economic modelling. Indicators derived from such a modelling framework are interrelated with each other and are thus suitable to describe consistent scenarios for a sustainable development.

A pilot-SAM for Germany with preliminary results for the year 2000 was published three months ago. The paper on hand centres on the SAM modules on private consumption, income and labour force. The following chapters cover compilation methods and first results related to these issues. The last chapter gives an overview on plans for the future and possible further extensions of the SAM.

Some case studies

Qualification of employees

As mentioned, changing socio-demographic structures will affect households' final consumption in future. This process is going to change the structure of the final demand and consequently the supply side in a market economy. Therefore, it will have a bearing on the production, and thus, on the demand for labour. In our view the structure of the labour force is one interesting aspect for economic analyses in the context of a SAM. Important structural factors are qualification, gender and age. With regard to the rapidly changing demand for labour, these factors also gain importance if viewed against the flexibility of employees to start a new occupation.

National and international discussion focuses increasingly on the qualification of the labour force. It is a generally accepted fact that qualification will become a key factor for economic success, especially in industrialised countries in future. With regard to international comparisons qualification should be classified based on the International Standard Classification of Education (ISCED). Consistency is equally important following up a SAM, which is conceptually based on national accounts.

A direct link is already given between generation of income (SAM) and labour force accounting in national accounts. In addition, the German Microcensus provides detailed structural information on the labour force every year. Figure 1 points out some differences in qualification between the branches. For example employees show the highest qualification level in the branches public administration and defence, social and other personal service activities. Qualification levels of men are still mostly higher than those of women across the branches, but changes are on the way.

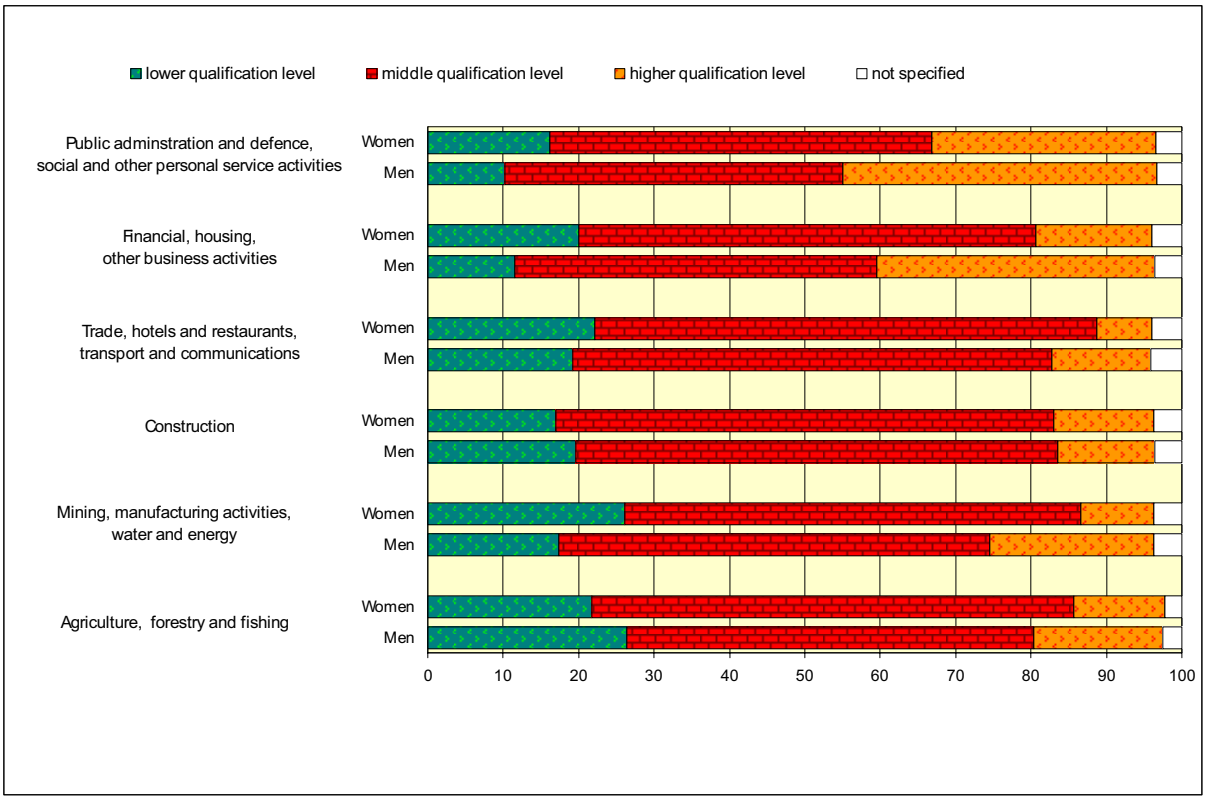

Figure 2. Qualification level of employees 2000 by industries

For analyses data have to be as detailed as possible. Our most detailed level is the NACE[17] two digit level for activities. The data are available for women and men, and also for different age groups. Due to small absolute frequencies of data on some age groups in the Microcensus we are not able to show data for each age group, we have to summarise some cohorts.

Income of private household by household groups

In accordance with the European System of National Accounts (ESA 95) and the System of National Accounts (SNA 93) the Federal Statistical Office calculates income of private households by household groups regularly. Concepts and calculations are based on national accounts. Households are allocated to household groups according to the basic income source of the main economic supporter of the household. The calculation is made for the following types of households:

- Households overall
- Households of employers
- Households of employees
- Appointee households (white collar worker)
- Households of civil servants
- Households of blue collar workers
- Non-active households
- Households of unemployment benefit receivers
- Retiree households
- Pensioner households (former civil servants)
- Households of welfare recipients
- Other households

[17] Classification of Economic Activities in the European Community

Table1 shows the average household income and the main constituent parts of household income for selected household groups. Compensation of employees along with property and entrepreneurial income add up to primary income. Received current transfer minus performed current transfer reflects secondary income distribution. Households of employers dispose of the highest disposable income (95500 Euro per year), second rank households of civil servants (47 500 Euro per year) and third appointee households (37 700 Euro). It is important to keep in mind that in accordance with national accounts some imputed income and some cash in transit are part of disposable income. For example imputed income of owner occupied dwellings is part of disposable income, but in fact not available for households. Especially cash in transit is important regarding a comparison between household groups. Most of employer and civil servant households insure themselves with a private health insurance. They receive cash in transit from their insurance for consumption of health goods, which is part of their disposable income. In contrast, members of the compulsory health insurance obtain social benefits in kind which are not part of disposable income.

Table 1.
Income and current transfer by household groups in 2000

Household group	Received income and transfer				Performed current transfer	Disposable income
	Received income and transfer in total	thereof				
		Compen-sation of employees	Property and entre-preneurial income	Received current transfer		
	Euro per household					
Households total	53 100	29 100	11 500	12 500	19 300	33 800
among households of:[1)]						
Employers	127 600	12 900	107 100	7 600	32 100	95 500
Civil servants	83 300	68 100	5 400	9 700	35 800	47 500
Appointees	70 400	61 600	4 200	4 700	32 700	37 700
Workers	54 900	47 200	2 700	5 000	24 300	30 600
Unemployment benefit receivers	29 800	7 400	2 500	19 800	10 000	19 700
Retirees	28 800	3 500	4 900	20 300	6 000	22 700
	%					
Housholds total	100	55	22	23	36	64
among households of:[1)]						
Employers	100	10	84	6	25	75
Civil servants	100	82	6	12	43	57
Appointees	100	87	6	7	46	54
Workers	100	86	5	9	44	56
Unemployment benefit receivers	100	25	8	67	34	66
Retirees	100	12	17	71	21	79

1) Key income source of the main economic supporter.

Structure and size of households are important factors for socio economic analyses. Figure 2 covers both aspects. The new OECD equivalence scale assigns the first person a weight of 1, every further person 15 years or older a weight of 0.5 and every person under 15 years living permanently in the household a weight of 0.3. In principle, there are only minor differences in the ranking order, but larger differences concerning the income level compared to household income.

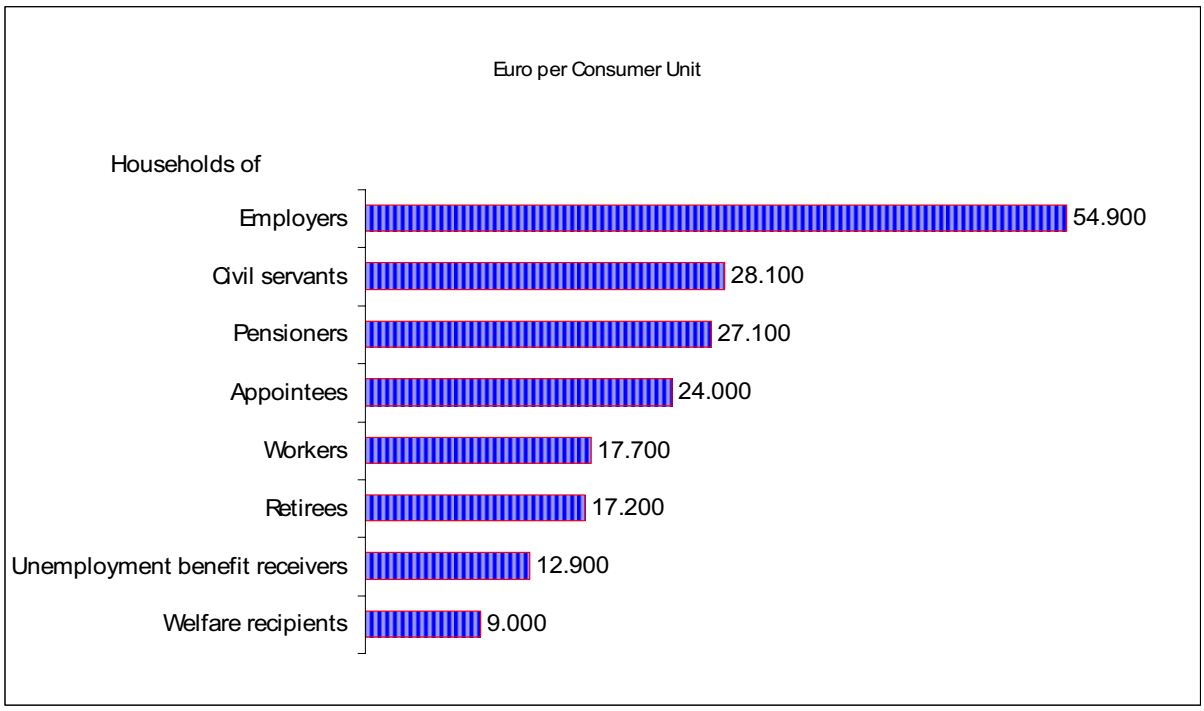

Figure 3. Equivalence weighted disposable income (new OECD-scale) 2000 by household groups

In our view, income of private households by household groups is a central component for a SAM, as well as for a socio-economic reporting system. On the one hand, income is relevant for all kinds of wealth analyses and on the other, it is important for economic analyses in the context of consumption and demand. Different household groups (and types of families, respectively) and accordingly households with different income levels have different consumption needs. Demographic changes, as well as changes in the industrial structure, will have an influence on income distribution. Changes in the industrial structure will reduce households of workers and in an aging society the number of retired people (households) is going to increase. The unbroken trend towards smaller households can influence the income distribution among households, especially in terms of equivalence income and the consumption needs. For example smaller households have to pay a (relative) high amount of their income for housing (see next chapter).

Differentiated information concerning the income distribution would be helpful because of great differences within one household group. For example appointees comprise high paid managers, as well as low paid sales assistant in the retail industry. Unfortunately data are not available in a breakdown by income levels in national accounts for the time being. Only household budget surveys can provide income distribution data. Yet, this information does not show a complete picture because of methodological problems like voluntary participation. Besides, time series are important for trend analyses. Based on ESA 95 we do have data from 1991 to 2002 and are planning to update this time series next year.

Consumption of private households

In the course of this year, accounting by household groups as described above was extended by an analysis of the use of disposable income, that is to say a socio-economic breakdown of private consumption. A module on private consumption by household group is an important feature of the SAM, as it represents the link between detailed socio-economic information on the flow of income and disaggregated data on the flow of goods and services. This connection allows analysing the impacts of an assumed change in the structure of the population – say, a higher proportion of recipients of pensions - on consumption, production and generation of income within the economic system. A changing population structure can both affect levels and structures of private demand. As the latter implicates structural changes in production, a subdivision of consumption by type of expenditure is crucial for socio-economic analyses in connection with the SAM. For describing consumption patterns, the Classification of Individual Consumption According to Purpose (COICOP) is the most suitable tool. A transition matrix from COICOP to NACE can be applied subsequently to link this information with the input-output section of the SAM.

For the sector Private Households as a whole, private consumption by COICOP categories is already part of the national accounting framework. In order to show private consumption in a cross-classification by household groups and COICOP categories, additional information from household budget surveys is necessary. The most encompassing survey of this kind is the German Household Budget Survey (HBS) which is carried out every five years. However, this information is not directly compatible with national accounts data on private consumption. Apart from the fact that household budget surveys are affected by random and systematic errors, this has two reasons. Firstly, the sample of the HBS does not comprise high income households (net income higher than 17.900 EUR in 1998) and population living in institutions such as prisons or retirement homes. Secondly, concepts and definitions differ between HBS and national accounts, e.g. regarding net (ESA) or gross (HBS) estimation of private insurance services. Therefore, adjustments and estimations are necessary to attain results that are compatible with national accounts data. Remaining discrepancies in levels between HBS and national accounts were adjusted by a reconciliation technique. Finally, the results of the HBS for 1998 were applied to aggregate national accounts data for the year 2000. Combined with the already compiled data on disposable income by household group, the results for private consumption also comprise saving as a balancing item. Like in national accounts, saving could only be calculated as a residual.

Table 2 and 3 summarise the results on consumption and saving as percentage of disposable income by household group and by household size. Regarding consumption, housing including extra costs is the largest expenditure position irrespective of household group, whereas households with low average income like worker (22 %) and non-employed households (28 and 30 %) show the highest shares (see table 2). It can also be seen that average expenditure shares for housing decrease with rising household size from 26 % in case of single-person households down to 19 % in case of households with four, five or more members (table 3). In contrast, expenses for food, beverages and tobacco increase with the number of persons in the household, whereas household groups with low disposable income showing the highest shares (e.g. 21 % in case of unemployment benefit receivers). These examples on varying expenditure patterns suggest that long-term changes in forms of life (like the unbroken trend towards single-person households) may lead to shifts in the demand for goods and services, and in turn, on production and demand for labour.

A look at the last row of table 2 and 3 shows that saving rates also vary strongly between different types of households. In principle, the results support the assumption that saving rates increase with rising disposable income, whereas employers save an exceptionally high share of their income (27 %) and unemployment benefit receivers and retirees show negative savings. Concerning employers we must consider that this group - different from employees - often have to cover old-age provisions by means of their disposable income. Average saving rates also increase with the number of persons in the household. This might, to some extend, be ascribed to rising household income resulting from additional potential income receivers, but also partly to falling consumption needs due to shared facilities. An analysis of saving rates by household types is, in our view, crucial, as saving determines the level of consumption and thus affects the aggregate level of domestic demand which is regarded as a key factor for economic growth. A re-allocation of income from low to high income households for instance could lower the overall level of consumption, as high income households tend to have higher marginal saving rates.

Table 2.
Uses of disposable income by household groups in 2000

Use of income	House-holds total	among households of:[1]					
		Employers	Civil servants	Appointees	Workers	Unemploy-ment benefit receivers	Retirees
	Euro per household and year						
Disposable income	33 800	95 500	47 500	37 700	30 600	19 700	22 700
	Uses of disposal income in %						
Food, beverages and tobacco	*14*	*10*	*12*	*13*	*17*	*21*	*17*
Furniture, clothing and footwear	*12*	*10*	*12*	*13*	*12*	*12*	*13*
Housing, water, electricity, gas and other fuels	*22*	*16*	*17*	*19*	*22*	*30*	*28*
Health[2]	*3*	*3*	*8*	*2*	*2*	*2*	*4*
Transport and communications	*15*	*13*	*16*	*18*	*17*	*16*	*14*
Leisure, entertainment and culture	*9*	*7*	*9*	*9*	*9*	*10*	*10*
Hotel and restaurant services	*6*	*5*	*6*	*6*	*5*	*5*	*6*
Miscellaneous goods and services[3]	*9*	*9*	*9*	*9*	*9*	*10*	*10*
Saving	*10*	*27*	*11*	*11*	*7*	*- 6*	*- 2*

1) Key income source of the main economic supporter.
2) Without social benefit of the compulsory health insurance but inclusive private settled benefits of private insurances.
3) Inclusive Education.

Table 3.
Uses of disposable income by size of household in 2000

Use of income	House-holds-total	Single-person household	Two-person household	Three-person household	Four-person household	Households with five or more persons
	Euro per household and year					
Disposable income	33 800	18 900	35 400	45 200	52 600	56 800
	Uses of disposal income in %					
Food, beverages and tobacco	*14*	*12*	*14*	*15*	*15*	*16*
Furniture, clothing and footwear	*12*	*11*	*13*	*12*	*12*	*11*
Housing, water, electricity, gas and other fuels	*22*	*26*	*21*	*20*	*19*	*19*
Health[1]	*3*	*4*	*4*	*3*	*3*	*3*
Transport and communications	*15*	*15*	*16*	*16*	*15*	*14*
Leisure, entertainment and culture	*9*	*10*	*9*	*8*	*8*	*8*
Hotel and restaurant services	*6*	*6*	*6*	*5*	*5*	*4*
Miscellaneous goods and services[2]	*9*	*10*	*9*	*9*	*9*	*9*
Saving	*10*	*6*	*8*	*12*	*14*	*16*

1) Without social benefit of the compulsory health insurance but inclusive private settled benefits of private insurances.
2) Inclusive Education.

Future plans

The first results described above can only represent a first step towards a more comprehensive analysis of consumption in the scope of the SAM. At present, further work is done to improve the quality of estimations and to obtain more detailed data for the year 2000. Results will be published by the end of this year.

However, analyses on the interrelation of demographic change, income and consumption should be based not on one reporting year but on a time series to comprise changes and trends in household market behaviour. Our plan for the next year is, therefore, to compile a time series on consumption that will cover the beginning of the 19nineties up to current years.

The data on consumption together with already existing time series on income by household group will also provide a basis for econometric models on the socio-economic impacts of demographic change in Germany. We started a collaboration with external institutions such as the Institute of Economic Structures Research (GWS) which is part of a newly established research network on socio-economic modelling at the University of Bielefeld. Within the intended division of work our project group will deliver important base data, whereas the modelling part will be taken over by experts of the research network. Corresponding co-operation projects are already planned for next year.

Concerning further extensions of our system our office works together with two research institutes to compile data on inputs and outputs related to private consumption in physical units. When completed, this information can be linked to the SAM module on consumption in monetary units. This would allow introducing environmental aspects into socio-economic analyses.

Although this paper stresses the potentialities of the SAM we also see some clear limitations. Due to its complexity the SAM is, in our view, mainly a scientific tool with strong emphasis on modelling applications. It is less useful for supplying the public with concise information on current developments. We, therefore, see the need for delivering comprehensible information on specific topics in addition to the all-embracing picture of the SAM. Satellite accounts can be very helpful for the analyses of specific topics in the context of national accounts. The Federal Statistical Office has compiled a satellite system on household production for the second time last year and we are currently planning an additional satellite system on health accounts. We believe that the SAM approach and satellite accounts are complementary parts within an integrated socio-economic and environmental reporting system.

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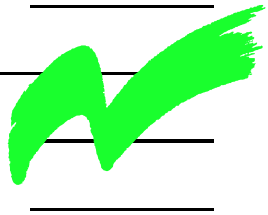

Embedding social dimensions into economic and environmental accounting and indicator systems - some aspects to consider-

by Ismir Mulalic, Statistics Denmark

Contact information:

Ismir Mulalic

Head of section
Environmental Accounts and Input-Output - National Accounts
Statistics Denmark
Sejrogade 11
DK-2100

Phone: +45 3917 3917
Direct: +45 3917 3667
E-mail: Imu@dst.dk

ABSTRACT and CONCLUSION

Danish sustainable development (SD) indicator set presents extensive assortment of social indicators, which are describing several social themes. However, policy analysis of sustainable development requires instruments for further analysis of the underlying mechanisms and reasons for changes in indicators. The present indicator set can to a lesser extent be used for such a purpose. The primary reason for this is that the indicators are often based on data originating from different statistical frameworks. Therefore, a new indicator set should be derived from a statistical framework where individual indicators are embedded into an underlying database from which they can be derived by aggregation.

The System of Economic and Social Accounting matrices and Extensions (SESAME) is such an information system that integrates economic, social and environmental statistics. It is a statistical information system in matrix format, from which a set of core economic, environmental and social macro-indicators can be derived. The system is driven by the kind of information required for monitoring and policy-making at the macro-level. Every indicator derived from SESAME is computed from a single fully consistent statistical system and each indicator uses the most suitable measurement unit of the phenomenon it describes.

The social dimension in SESAME is presented within a Social Accounting Matrices (SAM), which is characterized by several constraints in connection to social topics. For that reason, all future work on social indicators in SESAME demands clear clarification of SD's social dimension and definition of essential indicators which will present this dimension. Many social topics cannot be incorporated into SAM. A possible solution will be to add a range of supplementary tables to SESAME that will contain social topics, which cannot be incorporated into SAM. However, addition of different social indicators to SESAME will imply the problems with an increasing amount of social indicators. The path forward must be clarification of SD's social dimension and delimitation of social headline indicators.

Delimitation of social headline indicators demands a clear definition of term indicator. The indicators are, on the first hand, a communication tool directed at the general public and the media. However, the meaning given to the term "indicator" seems to differ significantly through the different topics of official statistics. It results in a growing amount of low quality indicators, without clear message and theoretical background.

I want to emphasize that I do not advocate for special statistical frameworks or specific methods. Different kinds of statistics and inventories all serve their specific purposes. However, the point is that indicators calculated from elements originating from different statistical frameworks are a bad idea since they might be misleading.

Introduction

We live in world of information. There is more information than ever, but it doesn't necessarily mean that we get better information than before. There is unfortunately a lot of pointless information. Vast amounts of different information can easily seem confusing. Even though we are able to use computers and new media, such as the Internet, ways to good and trustworthy information are more and more difficult. For that reason more people and institutions try to squeeze statistical information into the indicators. SD indicators are not an exception. There is a range of different SD indicators, but not all of them can be considered to posses a good theoretical foundation or to be reliable and of acceptable quality. This paper discusses a term 'indicator' in connection to social dimension of SD. Issues with social dimension are also addressed. The so-called System of Economic and Social Accounting Matrices and Extensions (SESAME) is presented as a possible solution to problems in connection to SD indicators.

The following chapter presents the social dimension as it is embedded in the current set of the Danish SD indicator set. The third chapter evaluates accounting systems including social dimension. Discussion about indicator systems including social issues is presented in the fourth chapter.

Social dimensions

Some ideas about social dimensions

After the United Nations was founded, focus was set on the conditions of people's living standard around the world. This increased the requirements for social statistical data. As a result, a comprehensive list of social indicators was presented by a committee of experts of the United Nations in the 1954. The 1954 expert group identified 11 indicators as priority indicators, cf. table 1. Because of competition between economic indicators and social indicators and the limited budgets of statistical bureaus, these social indicators were more or less forgotten for 43 years. Not until 1997, the Statistical Commission developed a Minimum National Social Data Set (MNSDS). The purpose of MNSDS was to consider further the statistical implications of the World Summit for Social Development. Even though the 1954 report was not used as a basis for the MNSDS, the parallel is notable. At first, both groups identified main social themes. These included population and development, eradication of poverty, expansion of productive employment and reduction of unemployment. The only two indicators included in the MNSDS and not on the 1954 list are: population estimates by sex and age and contraceptive prevalence.

It was not planned that the data should be used for international comparison. The MNSDS was also intended to be a minimum data set, and it was not planned that it could not be supplemented if necessary. By comparing the two sets of indicators it can be concluded that there has not been a significant change. According to Becker they both define indicators as a compromise between data availability and usefulness for analysis about which one can still find agreement internationally. However, computing social indicators, such as the MNSDS, is an important step in the right direction. On the other hand, a set of social indicators without an analytical framework lacks links to each other and to other important environmental and economic indicators. Becker wrote: *'The question, then, is the extent to which one can embed social indicators into a wider framework and analyze the relationship between social and economic phenomena,* (Becker 2000, p.404). Even though the purpose of these indicators is to highlight people's living standard, and not social dimension in connection to sustainable development, they can be used as starting point for future work with social indicators in connection to SD.

Social dimensions and sustainable development

Often SD has been recognized as an environmental issue, focusing on integration of environmental and economic dimension. Not until the past decade has the social dimension been generally recognised as the equal part of SD. One of the reasons for this is that a commonly accepted definition of the social dimension is not available because there is no consensus on what is to be understood by the 'social' in the first place.

Table 1:
Comparison of social indicators 1954 and 1997

Indicators of highest priority according to the 1954 Report of a UN-Expert Group	Minimum National Data Set (MNSDS) of an UN Expert group and as adopted by the UN Statistical Commission 1997
• Expectation of life at birth • Average expectation of life (at birth and) at various ages • Infant morality rate	• Life expectancy at birth, by sex • Infant morality rate, by sex • Child mortality, by sex • Maternal morality
• National average food supplies in terms of calories at the "retail level" compared with estimated calories requirements	• Monetary value of the basket of food needed for minimum nutritional requirement
• Proportion of children 5-14 years of age attending or enrolled in schools • Percentage of population literate, above some appropriate age, total and by sex	• Average numbers of years of schooling completed, by urban/rural, sex and, where possible, by income classes
• Proportion of economically active population unemployed • Percentage distribution of economically active where population by principal industrial and occupational categories	• Unemployment rate, by sex • Employment-population ratio, by sex and, where appropriate, formal and informal sector
• Macroeconomic items related to national income • Ratio of the index of change in national income (in constant prices) to the index of change in population	• GDP per capita • Household income per capita (level and distribution)
• Area per occupant • Number of persons per dwelling unit	• Number of people per room, excluding kitchen and bathroom
• Water supply - drinking water and for other purposes • Toilet facilities and sewage disposal	• Access to safe water • Access to sanitation
	• Population estimates by sex, age and where appropriate and feasible, ethnic group • Contraceptive prevalence rate

Source: Bercker, p. 405

Social dimension is clearly different from the environmental dimension. According to Lethonen, there exists two popular ways of addressing the social dimension of sustainability based on commonly conceptualisation of SD[18]: 'the capability approach' and the concept of social capital. However, according to the same author capabilities and social capital do not provide adequate tools for examining social dimension as part of SD. Therefore, the social dimension is difficult to analyse, and that is maybe why less attention has been paid to the linkages between the social dimension with the two other dimensions of SD, even if it can be argued that the core of SD is inherent in the trade-offs and interaction between incompatible goals of environmental protection and economic and social development. On the other hand, it doesn't mean that a suitable definition of social dimension is not available and that satisfactory ways of addressing the social dimension do not exist. It indicates that we need to focus even more on this issue, and draw social experts into future work.

A lack of a clear definition and delimitation of the 'social' caused that a large amount of social indicators was produced. The problem with this huge amount of social indicators is that it is impossible to draw an overall conclusion about the social part of SD.

[18] The Commonly conceptualisation of SD refers her to the Brundtlands commissions report, where three components of SD was highlighted: economic growth, environmental protection and social equity.

Denmark's dataset, which is used for the construction of indicators for SD[19], contains three dimensions:

i) Economy
ii) Environment
iii) Social factors

Eight subjects for measuring SD in Denmark are presented:

1) Economic development and employment
2) Poverty
3) Elderly society
4) Health
5) Change in climate and energy
6) Sustainable production and consumption patterns
7) Protection of natural resources
8) Traffic and use of area

Subjects number 1 (only part of 1 that describes employment), 2, 3 and 4 are presenting social dimension of SD. Indicators included in these three subjects are:[20]

1.2.1) frequency of occupation and employment
1.2.3) frequency of employment by men and women
1.2.3) unemployed men and women
1.2.4) frequency of employment by men and women >55 year
2.1) recipients of social benefits
2.2) recipients of pensions
2.3) development in social benefits
2.4) development in pensions
2.5) the occupational bread winner-burden
2.6) risk-of-poverty rate
3.1) the tree (populations pyramid)
4.1) premature mortality
4.2) life expectancy at birth by men and women
4.3) frequency of accidents at work
4.4) frequency of occupational diseases
4.5) fall-accidents for >64 by 1000 persons in the same age
4.6) daily smokers by men and women >14 years
4.7) number of deaths of asthma and bronchitis
4.8) removals to hospital with diabetes
4.9) removals to hospital with adverse health affect of chemical substances
4.10) number of tests with pesticide residues in fruit
4.11) number of tests with pesticide residues in vegetables[21]

It is not difficult to see that the social dimension of SD is described by means of a wide range of social indicators. However, a large number of indicators sets more focus on several specific socio-issues, and make overall consideration about social dimension not clear enough. For instance, indicators 2.3 and 2.4, or indicators 3.1, 4.1 and 4.2, can be joined together, without large consequences for indicators total information power. Another concern about this set of indicators can be other possible social themes that can be interesting for SD. Just to

[19] Statistics Denmark's publication entitled "Indikatorer for bæredygtig udvikling" (Indicators for sustainable development), presented in 2003, summarizes the current Danish set of SD-indicators. These indicators are the result of the EU Commission's strategy, which is already passed, "Strategy for Sustainable Development". It is important to mention that work on these indicators is still ongoing. These indicators are produced annually in Statistic Denmark. The list of SD-indicators should be seen as the beginning of a much more general set of indicators, which will be developed in due course. SD indicators set can be accessed at www.statbank.dk

[20] Statistics Denmark's publication entitled "Indikatorer for bæredygtig udvikling" (Indicators for sustainable development), presented in 2003 (can be accessed at www.statbank.dk).

[21] The first number in index refers to the number of earlier mentioned subjects, e.g. 2.1 refers to 'poverty'.

mention one, many are interested in leisure time. Indicator for leisure time can be very useful in many economic analyses of SD. Finally, we need to think about cultural differences if one set of SD indicators is expected to be implemented internationally. For instance, women who spend their time in the home are in some parts of the world defined as unemployed, while in other parts of world they are not. We need to bear this in mind, when an international set of SD indicators is discussed.

Accounting systems including social issues

Applied economic analyses of SD, and especially social dimension of SD, are often seriously troubled by the lack of a complete data framework. Even though, statistical institutions offer a wealth of different statistical information. A lack of data is not a problem as such. The main problem is the lack of integration of these statistics implying that all kinds of events, which are interrelated in reality, can only be studied in isolation. Solving this problem is the key for the construction of indicators for SD. The keyword is integration.

The Systems of National Accounts (SNA) is the basis for already existing and proven analytical tools that are related to the economical process. That is why SNA constitutes an excellent initial point. The SNA and its satellite systems Environmental-Economic Accounts (SEEA) and the Socio-Economic Accounts (SAM) form an extended accounting data set. As we know, the accounts provide the most complete and theoretically sound system for description of the stock and flows. Practically, the accounts are an effective tool for generating an underlying database by harmonising otherwise not fully coherent and incomplete data. It provides the basis for estimates which can close remaining data gaps.

Table 2
Review of accounting systems

	Reference	Characteristics	Economics facts	Environmental facts	Social facts
SAM	SNA	Presentation of interrelationships between structural futures of an economy and the distribution of income expenditure among household groups	National accounts incorporated into a matrix accountancy framework		Labour accounts by industry, by type of labour (male/female, skill level, etc.) and by household sub-sector
NAMEA	SEEA	Integrated environmental-economic accounts	Supply-use tables, IO tables, environment protection expenditures, stock values, etc.	Consumption of natural resources and pollution, stock of resources, etc,	
SESAME	SNA, Keuning 2000	Describe economic, social and environ mental aspects of human activities in an integrated framework	National accounts	NAMEA-types	SAM-types plus supplementary tables: labour accounts, time accounts, socio-demographic accounts, etc.

3.1 Social Accounting Matrices (SAM)

The desire for more integration of economic and social policies requires improved integration of social and economic statistics. For that reason, European Commissions' leadership group SAM prepared in 2003 'Handbook on social accounting matrices and labour accounts', with the purpose of helping the statistical offices to compile SAM.

SAM extends national accounts data with more detailed statistics on the compensation of employees, classified by the type of employees (e.g. educational skill, gender) and income distribution related transactions at the level of different household groups. SAM integrates labour market and income distribution statistics within national accounts framework. An overall simplified description of SAM is the national accounts incorporated into a matrix accountancy framework. SNA defines SAM as the presentation of SNA accounts in a matrix form which elaborates

the linkages between a supply and use table and institutional sector accounts. SAM is a matrix presentation of five types of accounts for the total economy: supply and use of goods and services, production, distribution of income, use of income, and capital transactions (UN 1993, SNA, chapter 20). Each account is represented by a row and column pair. Incomings are shown in the rows and outgoings are shown in the columns. By definition, the sum of incomings is equal to the sum of outgoings. However, some of these totals are not economically meaningful. Their main function in SAM, as matrix accounting form, is to ensure that all accounts presented are balanced, also that total incomings (rows) equal total outgoings (columns). For all categories of transactions distinguished in SAM it is clear which group of paying units has exchanged what with which group of receiving units. In addition, SAM contains broad-spectrum properties of a matrix presentation of accounts. Some of them are: an aggregate matrix presents 'bird's eye' view of an economy as whole, a detailed matrix presentation give us a possibility to apply multiple actoring and multiple sectoring in a matrix, its functional form offers good possibilities for experiments with alternative representations of transactions, its matrix form is suitable for mathematical treatment using matrix algebra, etc.

In many practical examples, SAM has been related to an analysis of interrelationships between structural features of an economy and the distribution of income expenditure among household groups. In addition, SAM has been associated with an institutional rather than functional breakdown of final use. The design and construction method of SAM is not yet internationally standardized.

However, the social dimension, which is elaborated in SAM, contains one not recommended characteristic. In many SD empirical analysis it is a priori assumed that the social themes incorporated into SAM are those which are central for SD. It implies that those themes represent the essential characters of the social dimension. That is a serious assumption about social dimension. However, a wide range of social themes can be interesting in the examination of social dimension. It is likely that some of these social themes cannot be incorporated into SAM. If we, for example, look at the Danish SD indicator set, there are several social indicators which cannot be incorporated into SAM, e.g. mortality, life expectancy, etc. Until now only labour accounts by industry, by type of labour (male/female, skill level, etc.) and by household sub-sector have been embedded in SAM. Nevertheless, SAM gives an excellent opportunity for further extending. Another possible solution to present social themes, which cannot be incorporated into SAM, would be to add a range of supplementary tables to SD accounting system, which will present these social themes. However, we still need clarification of head indicators which will present the social dimension. It can be concluded that future work on social indicators demands a clear clarification of the social dimension of SD and definition of essential indicators which will present this dimension.

System of Economic and Social Accounting matrices and Extensions (SESAME)

SNA's paragraph 20.29 says: *'in many cases, it is expedient to reconcile the SAM-figures and related data available from all kinds of dispersed resources…Such an extended set of tables (i.e. a "core" SAM and its various satellite tables) may be called: a System of Economic and Social Accounting matrices and Extensions, SESAME* .' Great support for developing and implementation of SESAME was given by Steven Keuning and his team at Statistic Netherlands. They presented the concept and some numerical examples of SESAME (Stahmer 2002, p.3).

SESAME is a statistical information system in matrix format. The system is driven by the kind of information required for monitoring and policy-making at the macro-level. SESAME yields a framework for an integrated analysis and modelling of social, economic and environmental issues. It is achieved with coupling of SAM and NAMEA. SESAME registers both value and its distribution among socio-economic household groups and categories of employed persons. SESAME implies the basic idea of present-day national accounts to a wider set of data. SESAME is extending this principle to a wider set of statistics, notably social and environmental accounts. In order to achieve a linkage between monetary and non-monetary data, the values are broken down into monetary changes and volume changes. The linkage with other data is typically established in non-monetary units as hours, calories, and joule and volume changes. In this way, the necessary connections are made without distorting the essential monetary SNA. Another important characteristic of SESAME is the possibility for its expansion with a range of supplementary tables. These additional tables contain series that are not incorporated into SAM and NAMEA, e.g. time accounts, labour accounts, socio-demographic accounts, etc.

Example of SESAME-type information

Table 3 shows as example on information derived from a system which has similar characteristics as SESAME. Part of the system, which is presented here, contains statistical framework adding social dimension to selected series derived from NAMEA framework. This framework is an outcome of cooperation between Statistics Denmark and the Institute of Local Government Studies.

Table 3 shows evaluation of environmental performance across different household types. An integrated modelling framework was set up here by combining family budget statistics, input-output tables, energy flow matrices, various types of emissions and associated environmental effects. Using this modelling framework, it was possible to relate differences in household types to differences in household consumption pattern and again to differences in environmental performance. Environmental performances were valuated by weighting different types of emissions into environmental effects for various pressure types. Here, focus is set on the greenhouse effect. Using DEA (Data Envelopment Analysis), these weighted environmental index effects were used to form one environmental performance score for various household types. It is necessary to make clear that derived indicators are not analogous to indicators which can be derived from complete developed SESAME statistical framework, because SESAME contains only statistics, while these indicators are modelling results. However, it is possible to analyse the interdependence between different topics and the simultaneous achievement of different goals, which is one of the crucial characteristics of SESAME.

Table 3:
Greenhouse effect score by family types, 1997

			kg per DKK 1,000 private consumption	Ranking
Low income	Young	Urban flat	83	(5)
		Urban house	91	(14)
		Rural house	96	(16)
	Middle-aged	Urban flat	87	(8)
		Urban house	94	(15)
		Rural house	110	(23)
	Elderly	Urban flat	91	(12)
		Urban house	109	(22)
		Rural house	126	(27)
Middle income	Young	Urban flat	83	(4)
		Urban house	90	(11)
		Rural house	110	(24)
	Middle-aged	Urban flat	84	(6)
		Urban house	98	(20)
		Rural house	106	(21)
	Elderly	Urban flat	88	(9)
		Urban house	98	(19)
		Rural house	113	(25)
High income	Young	Urban flat	66	(1)
		Urban house	97	(17)
		Rural house	85	(7)
	Middle-aged	Urban flat	81	(3)
		Urban house	91	(13)
		Rural house	98	(18)
	Elderly	Urban flat	79	(2)
		Urban house	90	(10)
		Rural house	113	(26)

Source: Modelling results by M. Wier and L.B. Christoffersen, AKF, Institute of Local Government Studies

Table 3 shows the greenhouse effect (columns) distributed among different households (rows). Households are grouped according to income, age and housing. The consumption of each households group is evaluated with respect to their contribution to the greenhouse effect.

Table 3 shows that different types of households have different environmental performances. It is not difficult to see that the households living in urban flats account for the smallest contributions to the greenhouse effect in Denmark. Another interesting thing is that higher income households contribute less per DKK 1,000 spent. This is partly related to the fact that the share of energy consumption out of total consumption decreases with increasing income.

In addition, table 3 can be used to understand problems connected to the greenhouse effect. Another useful characteristic of table 3 is that it makes it possible to analyse the interdependence between social and environmental topics, since the core of SD is inherent in the trade-offs and interaction between incompatible goals of environmental protection and economic and social development.

Indicator systems including social issues

General points regarding indicators

The meaning given to the term "indicator" seems to differ significantly through the different topics of official statistics. Discussions and different presentations at the 23rd Nordic Statistical Conference in August 2004 made it evident that common consensus about definition of concept of an indicator does not exist, and that we need to address this issue on all levels as soon as possible. Proof for such a conclusion was several indicators build on more or less different definitions of the term indicator that was presented at the 23rd Nordic Statistical Conference. Alenko presented a composite indicator (CI) which describes a country's status. CI is a linear combination of different variables. Many of those variables are also defined as indicators, e.g. indicators for welfare, environment, etc. Blöndal's approach to indicator issue was a distinction between quality and quantity. He pointed out that the demand for new indicators from international organisations is driving national statistical offices to collect even more data. However, because of limited resources the focus should be on the quality of the indicators rather than quantity.

What solution is the way forward? When we discuss indicators, we need to bear in mind that the indicators are often used to describe important problems in connection with policy issues (for example, SD) and that they can serve as an instrument for control of political measures. One can look at different elements when the criteria for establishing a good indicator is under loop, see Keuning (2003). Some of these elements are:

i) Sensitivity to the change indicators are intended to measure
ii) Capability of being updated on a regular basis
iii) Scientific quality
iv) Easily understandable

Those elements can also cause problems. On the one hand, one indicator should be easily understandable, and on the other hand, it should be part of a system which includes a limited set of indicators with satisfactorily scientific quality. It can cause that indicators become either not understandable, because many are not familiar with their terminology and theoretic foundation, or their amount gets too large. Sauli and Simpura call these phenomena for 'indicator-paradox'. However, these four elements can be used as starting point in the process of establishing a good indicator.

As a conclusion, it is proposed that clear definition and delimitation of term indicator are taken as starting point. Otherwise a huge amount of low quality indicators, without clear message and theoretical background, will be produced. This can seriously injure the quality of indicators.

Specific issues regarding sustainable development indicators

Several issues in connection to the current set of SD-indicators can be identified. The two most important one are:

1) too large number of indicators, and
2) lack of linkages between the three dimensions of SD.

We need to ask, will the current SD indicators set serve their purpose? According to Keuning (2003), the results in the EU member countries are so far only a disjointed shopping basket with numbers. It is almost impossible to make a meaningful synthesis of these indicators. The extremely wide range of measures causes a problem with the understanding of what is central for SD. The comparison between very large numbers of opposite signs makes an overall view about SD impossible. It holds especially for social indicators.

Problem in connection with a current set of indicators is also various indicators combining different information derived from different dimension of SD, which are not linked correctly, also which are not a part of the same statistical framework. A good example here is indicators which have GDP in the denominator, while the numerator is not consistent with the national accounts data. Some of the proposed Danish SD-indicators suffer from this problem. This brings us to the issue of missing links between the three dimensions of SD. It can be concluded that the key challenges of SD are inherent in trade-offs between its various dimensions. Links between the three dimensions of SD had to be established, otherwise trade-offs between SD dimensions will be lost. The problem is that much of the intellectual work so far has focused on individual dimensions. The trade-offs between dimensions have been more or less absent from analysis. However, there exist investigations of interaction between environment and economic dimension. Many had tried to find correlation between economical growth and environmental problems. NAMEA is an example of empirical analysis of linkages between these to dimensions. The least developed in this contest is the interaction between the social and environmental dimensions.

Specific issues regarding social indicators

Many issues regarding social indicators are connected to the lack of commonly accepted definition of the social dimension. Lack of clear definition caused a large amount of social indicators. The problem with this huge amount of social indicators is that it is impossible to draw an overall conclusion about the social part of SD. However, there exists a possibility that social dimension demands a large number of indicators. Still, a commonly accepted definition of the social dimension will be desirable, because any kind of conclusion regarding social dimension had to have its origin in a clear definition and delimitation of social dimension.

Social indicators are extremely sensitive to cultural differences. Cultural differences are reflected in many different sociological themes, because definitions of several terms can differ between countries. These definitions had to be evaluated carefully, and always kept in mind when an international set of social indicators are discussed. Definitions of sociologic terms, which cannot be harmonised internationally, can be, as far as possible, avoided from headline indicators. Help from experts on this field will be very useful here.

Finally, social indicators depend also on politics. Changes in politics during the past decade have shown that politics have a large impact on headline social indicators. Different social indicators are in focus, depending on the political situation. Focus can be set on employment, social benefits, mortality, etc. We need to bear this in mind in connection to selecting social indicators. However, the possibility to derive different indicators from SESAME by aggregation can be very useful here, because it gives us an opportunity to change headline indicators very cost-efficient and without distorting the character of the SD's statistical frameworks.

All future work on social indicators depends on our effort to clarify social dimension of SD and definition of essential indicators which will present this dimension. Since statisticians and economists don't posses the necessary knowledge about social issue, development of those indicators demands help of experts on social field. With sociologists' expertise on social field, and statistician knowledge about data (most on availability of data, but also estimation theory) development of social indicators, which would have the same quality as economic indicators, would be possible.

The link between accounting systems and indicator systems

Change in one SD issue influences the other goals of the overall strategy for SD. For that reason the SD policy analysis requires a possibility of further analysis of the underlying mechanisms and reasons for change. That is why the individual indicators should be embedded into an underlying database from which they can be derived by aggregation. Another important point is that the underlying data for the individual indicators should be part of a comprehensive framework that integrates all relevant topics. There are various advantages by using national account and its satellite accounting systems for SD statistical data system. The SNA and its satellite systems SEEA and the SAM form a most complete and theoretically sound system description of the stock and flows. Data from all three systems can be combined into logical and coherent accounting system called SESAME. A range of summary indicators can be derived from such a data set (e.g. GDP, population size, inflation, income inequality, environmental indicators, social indicators, socio-economic indicators, etc.). Whatever set of aggregates is preferred; they would all share two crucial features (Keuning 2000):

i) Every indicator is computed from a single, fully consistent statistical system
ii) Each indicator uses the most suitable measurement unit of the phenomenon it describes

The indicators derived from SESAME can be disaggregated in order to get an insight into the reasons for the development of the specific indicator and the interrelationships to other topics of the set. Indicators derived from SESAME are a useful tool for monitoring, because if some indicators show improvements and others show deteriorations, it is necessary to measure the trade-off between aims.

The problem with SESAME is that it doesn't tell us anything about goals of sustainability, or whether one country is on the sustainable path or not. Another issue is the possibility that some of the social topics, which will be included in the essential social indicators, cannot be incorporated into SAM. These topics will be added as supplementary tables to SD accounting system. It can cause that we get a growing range of different indicators which will result in a problem with the understanding of what is central for SD. In that case, we will face the same problems as those which we are facing today. For that reason clear clarification of the social dimension of SD and definition of essential indicators, which will present this dimension, had to be made, before any further work with social indicators in connection with SD can take place.

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Links:

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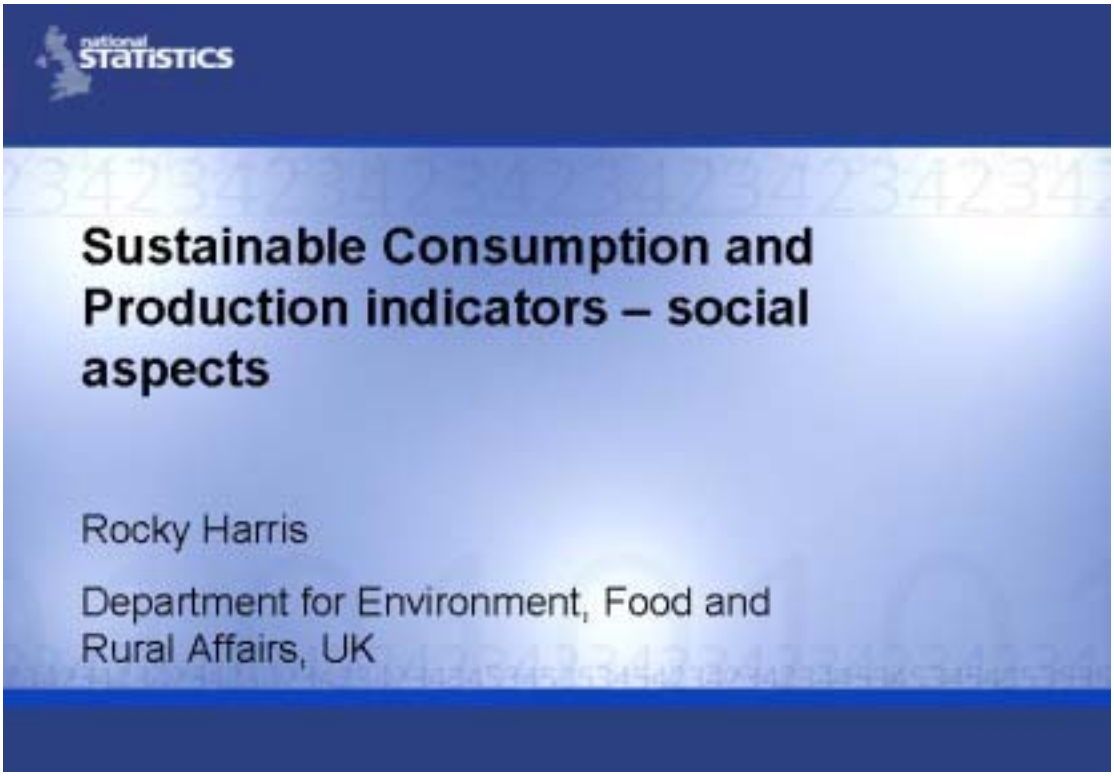
www.statbank.dk

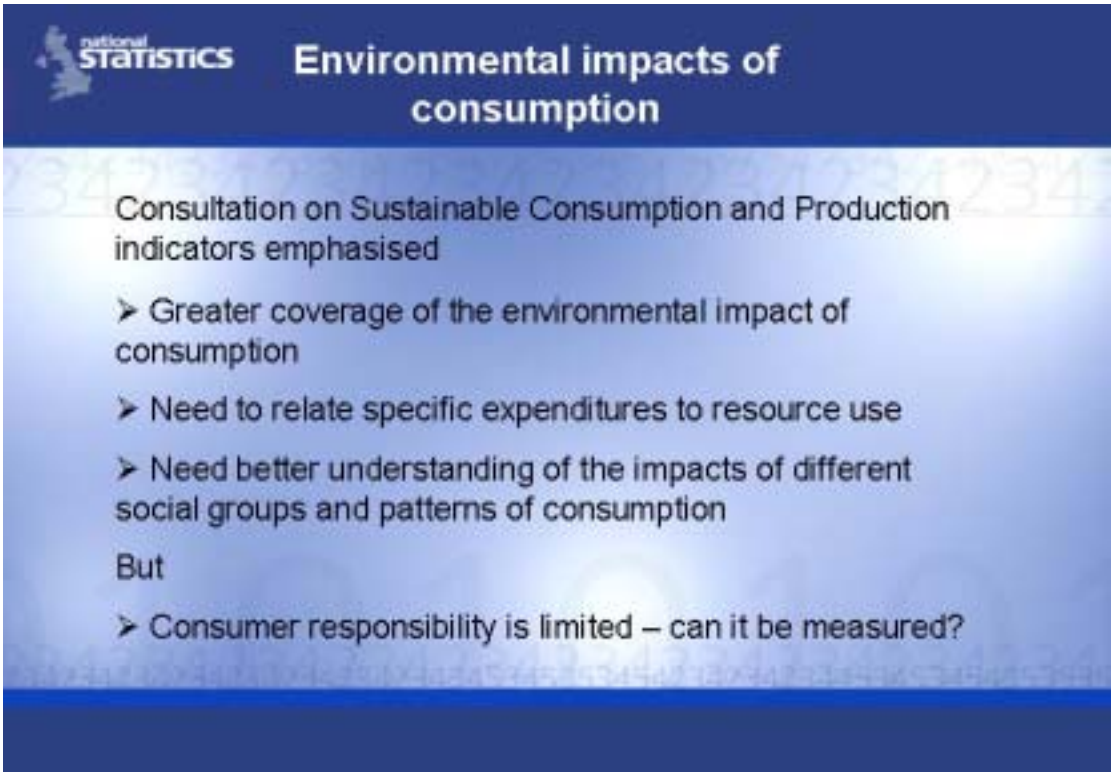
Monitoring the relationship between household consumption and environmental impact

by Rocky Harris
Department for Environment, Food and Rural Affairs

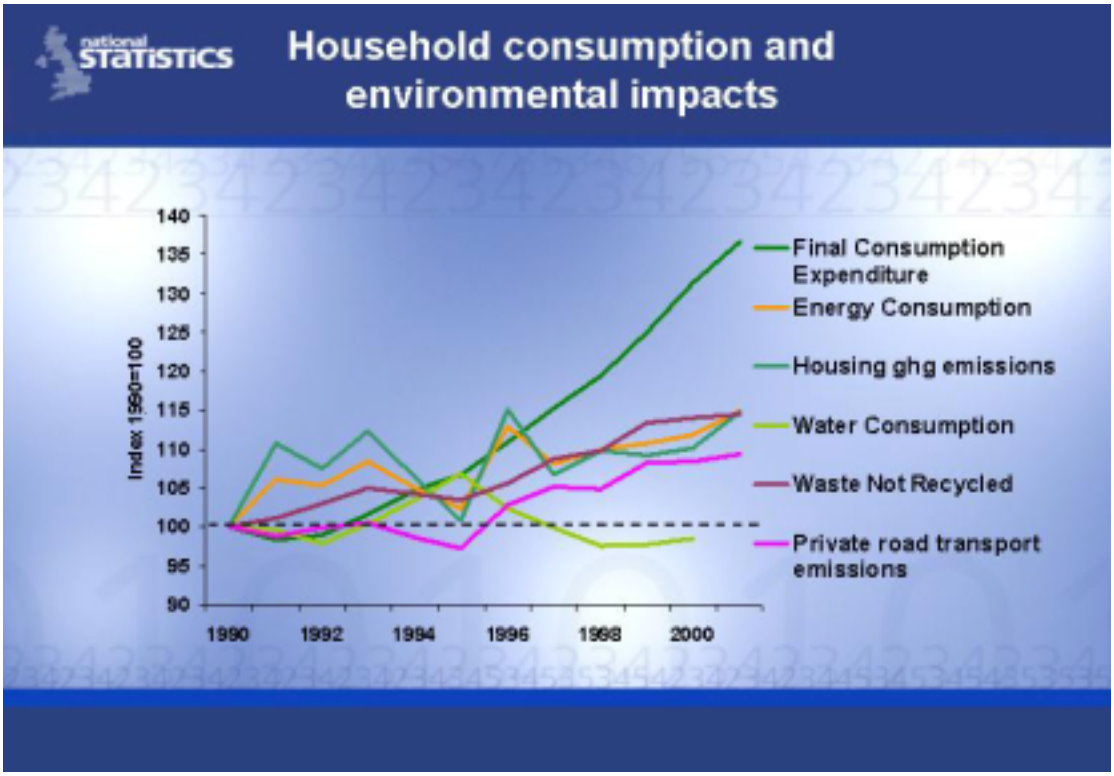


This presentation discusses the issues arising when trying to measure the social aspects of Sustainable Consumption and Production.

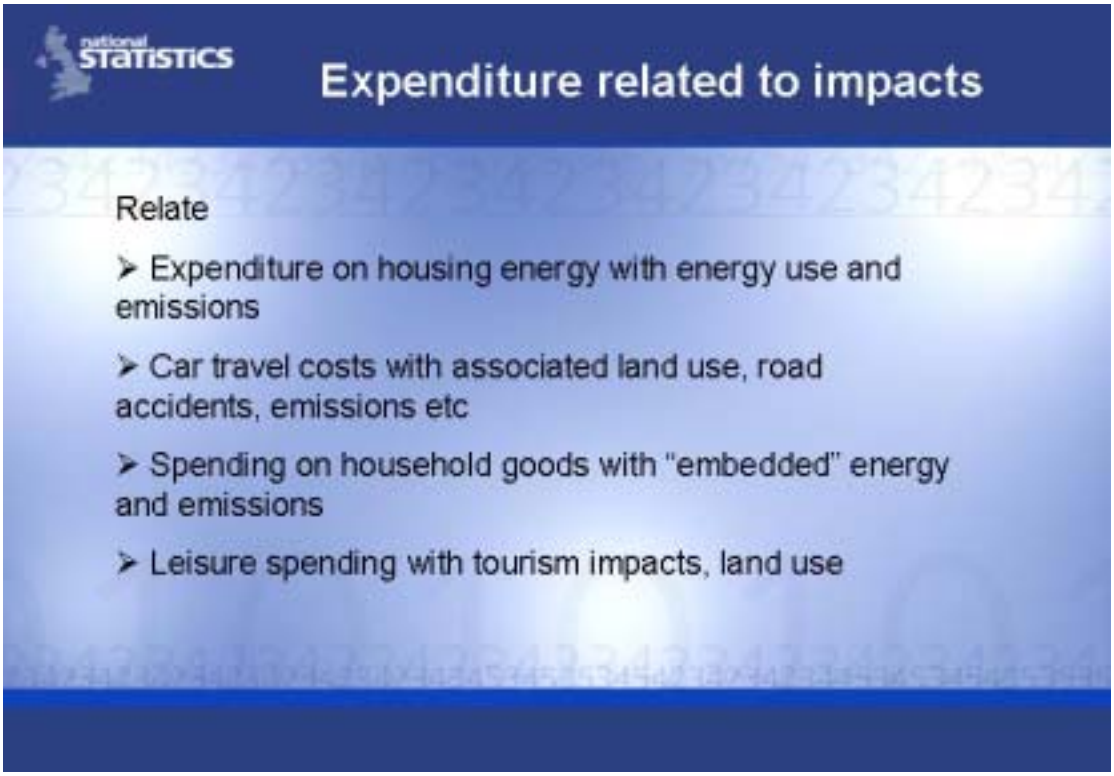
In September 2003 the UK Government consulted on a basket of twelve “decoupling” indicators, which were intended to monitor the extent to which increasing UK consumption and production activities were decoupling from harmful environmental impacts of use of natural resources.



The responses to the consultation highlighted the need for a greater emphasis on the impacts of consumption.

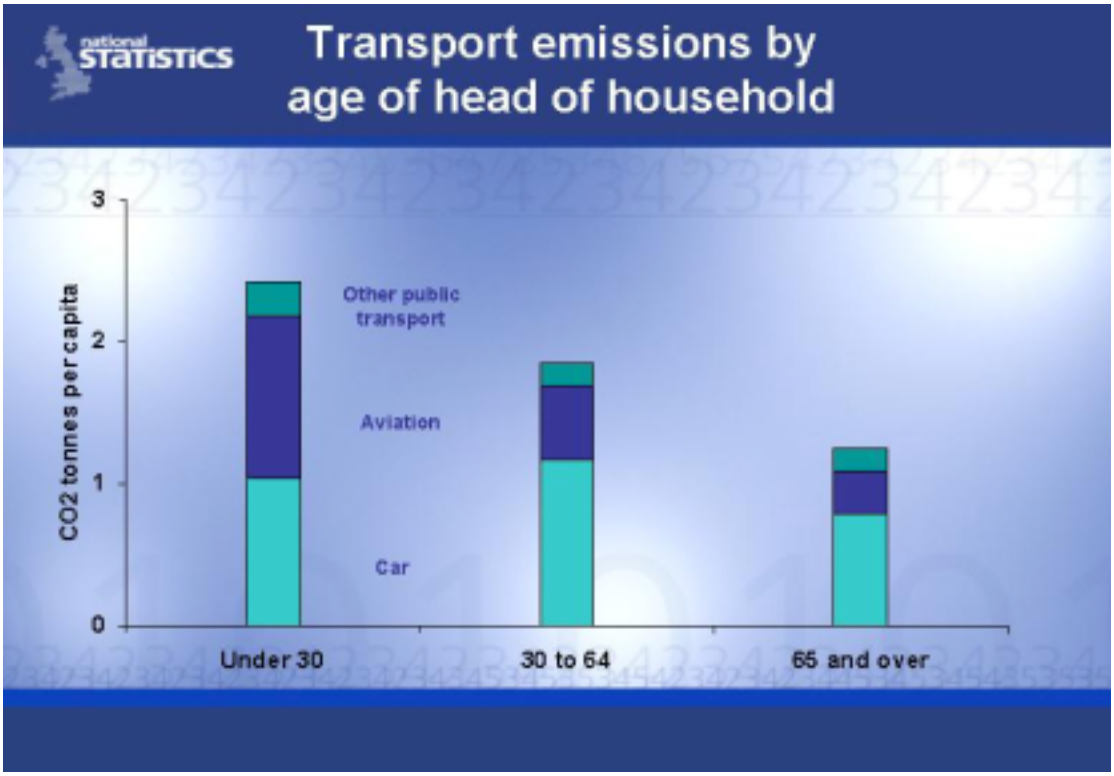


Part of the reason for this emphasis is the evidence that, unlike impacts from UK manufacturing activities, household impacts in the UK are rising. A better understanding of the drivers and forces behind these increases is needed.

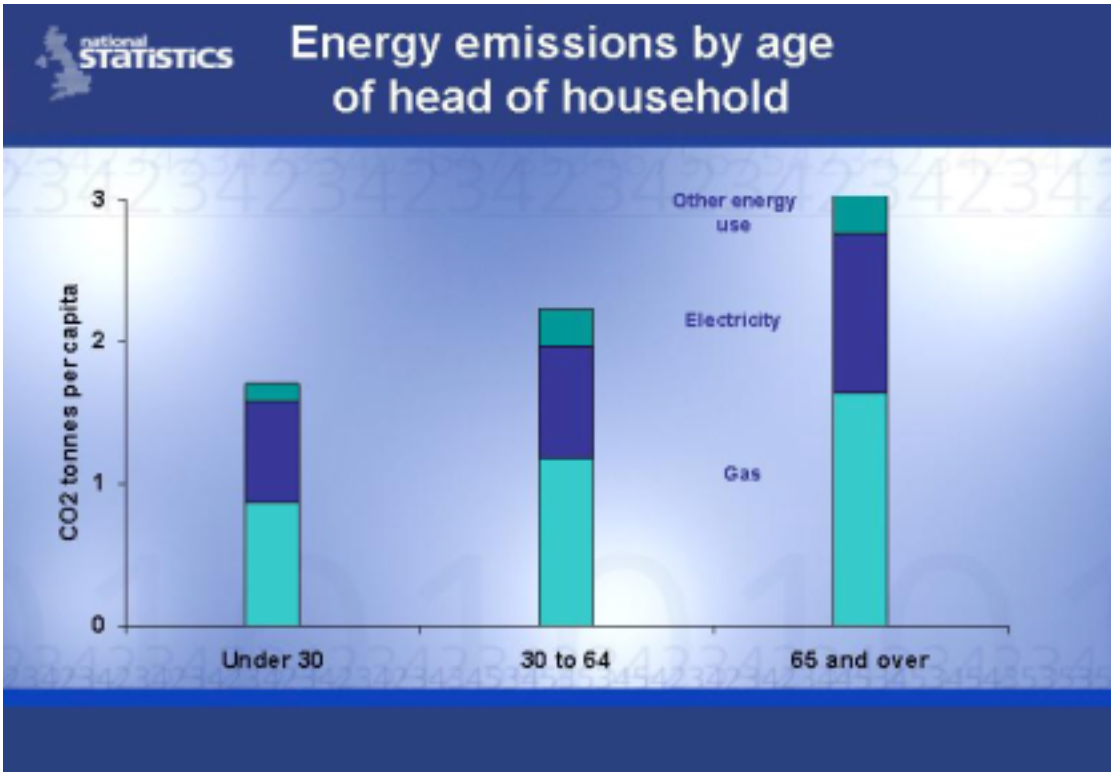


One suggestion is to link the impacts more specifically to particular household expenditures – an approach adopted within the NAMEA framework applied by Eurostat.. However, rather than explaining why these pressures are increasing, such indicators may simply be telling us something about the changes in unit prices.

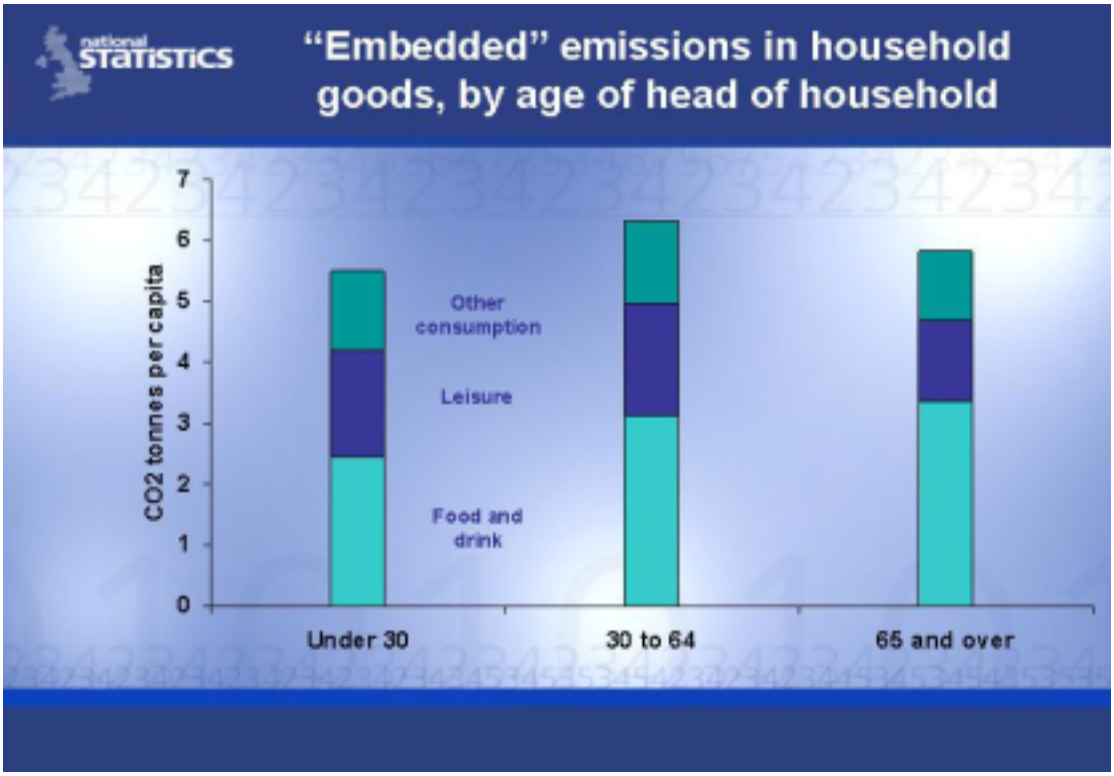
Another suggestion was to analyse household impacts by the socio-demographic characteristics of households. This approach should tell us more about the who is doing the polluting, although it may not help to explain the range of impacts that seem to occur (according to eco-footprinting studies) within social groups as a result of differences in lifestyle patterns. Unfortunately there is little evidence available within the UK at present. The following charts are taken from recent work carried out by the UK Office for National Statistics.



The first shows that households with relatively young heads of household tend to use aeroplanes and other forms of public transport rather more than their older counterparts.

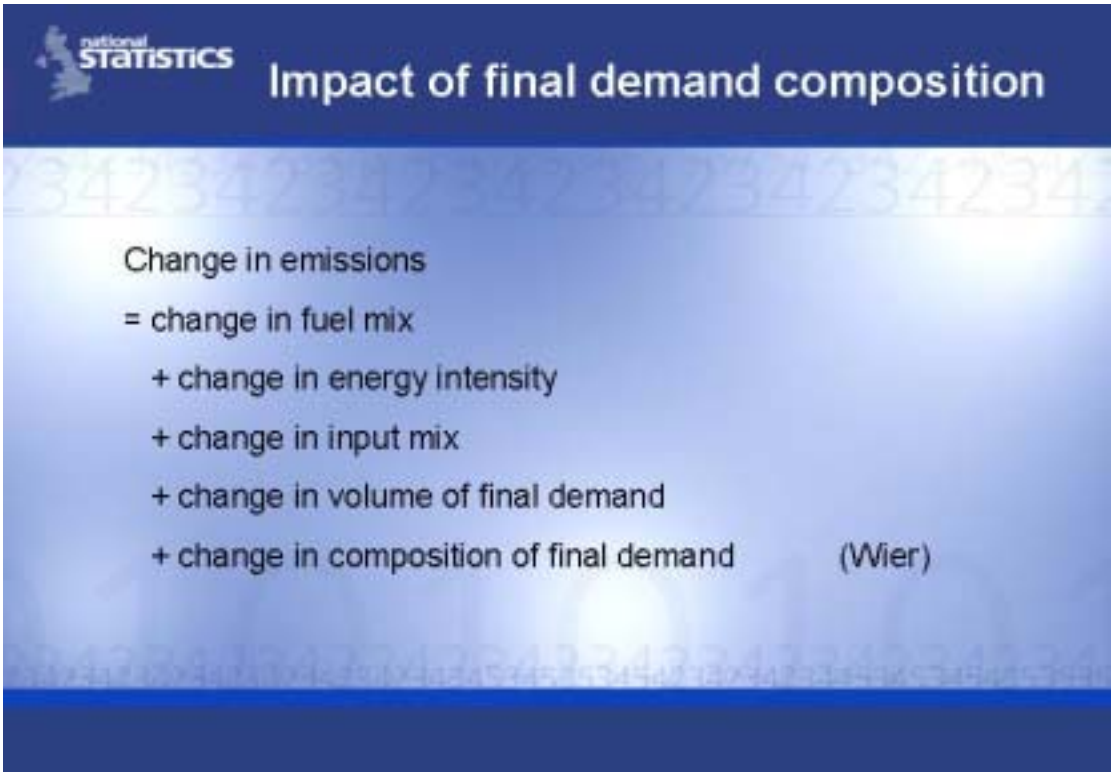


The second chart shows that the same households have a lower impact per head in terms of energy use in the home – this is where those over 65 who are responsible for higher levels of CO2 emissions.



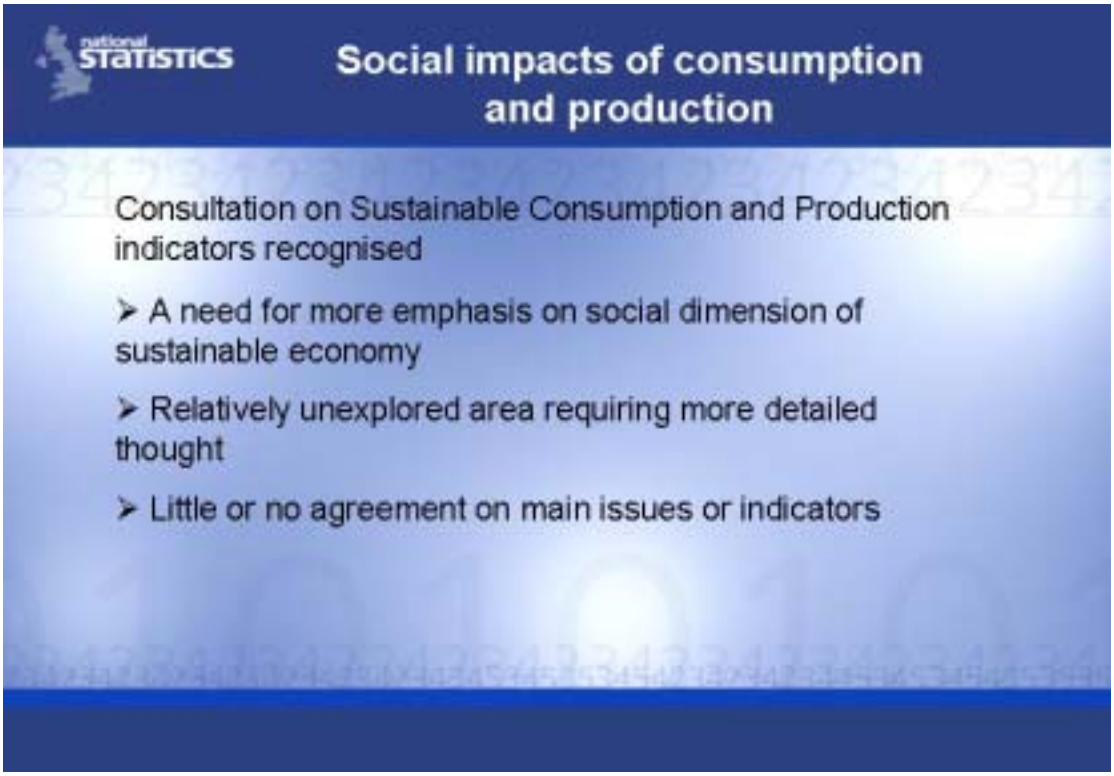
The "hidden" emissions relating to more general consumption are more evenly spread between different age groups, although broadly speaking those with heads of households between 30 and 64 are responsible for the highest levels of "embedded" emissions per capita.

One area that has not been explored within the UK is whether it is possible to isolate and quantify the impact of the "pattern of household consumption". One vehicle for analysing this element is decomposition analysis, which breaks out changes in the levels of CO2 emissions between different structural and economic drivers.

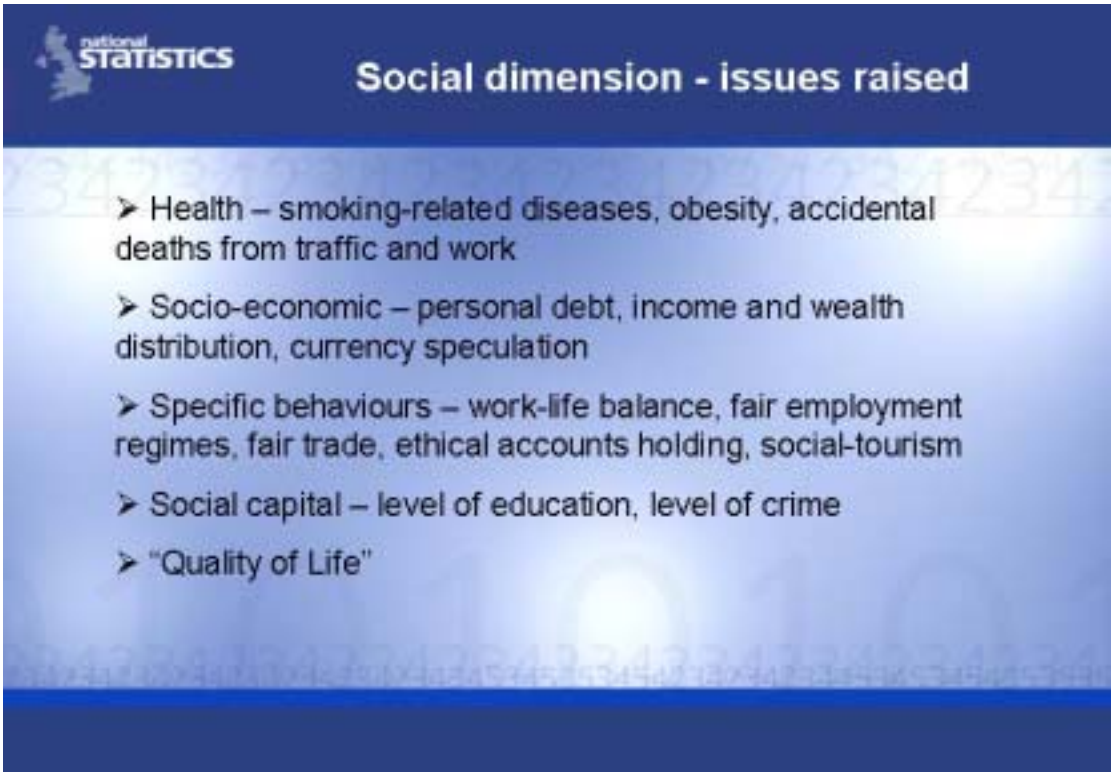


This formula is taken from a Danish example, although other attempts have been made, most notably by Mark de Haan for CO2 emissions in the Netherlands.

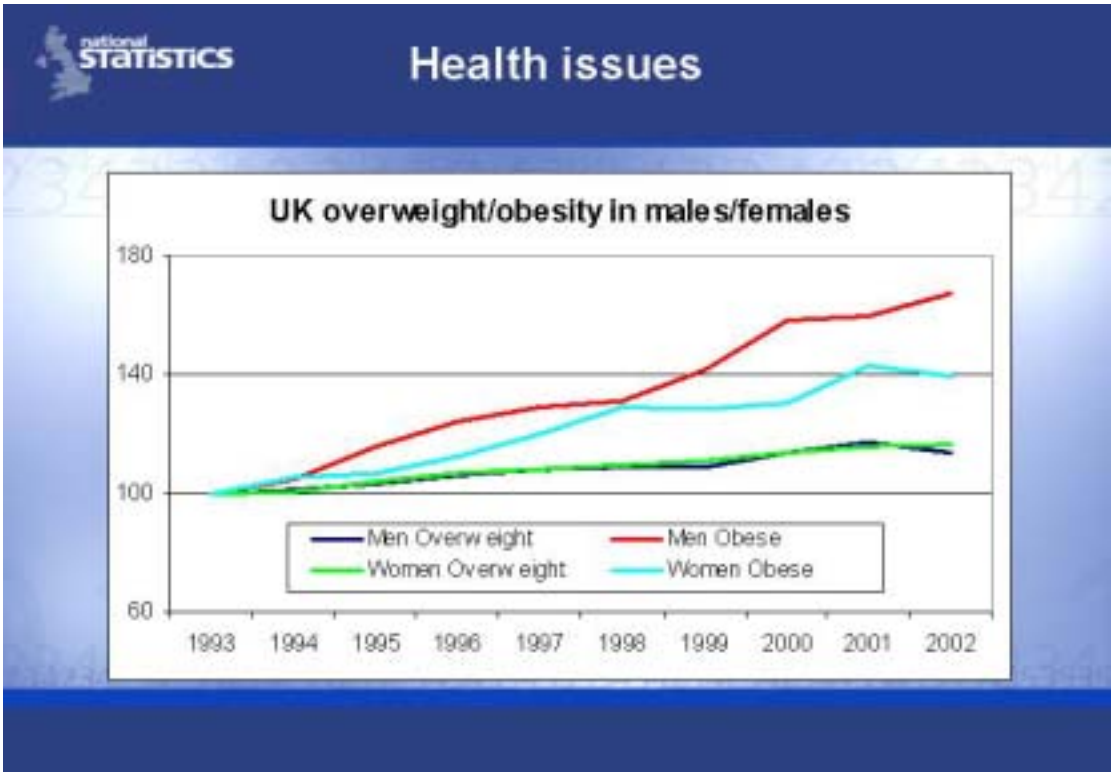
The Dutch and Danish analyses suggest that changes in the composition of final demand account for a relatively small downward part of the overall changes in CO2 emissions in each country. Whether this sort of analysis has implications for sustainable consumption policy is another matter, as real changes in household impacts might equally be brought about by purchases of less energy intensive goods from the same sector, rather than by switching purchases from one sector to another.



The consultation on Sustainable Consumption and Production indicators also produced a number of suggestions for measuring the extent to which the UK is decoupling increasing consumption and production activities from undesirable social consequences.

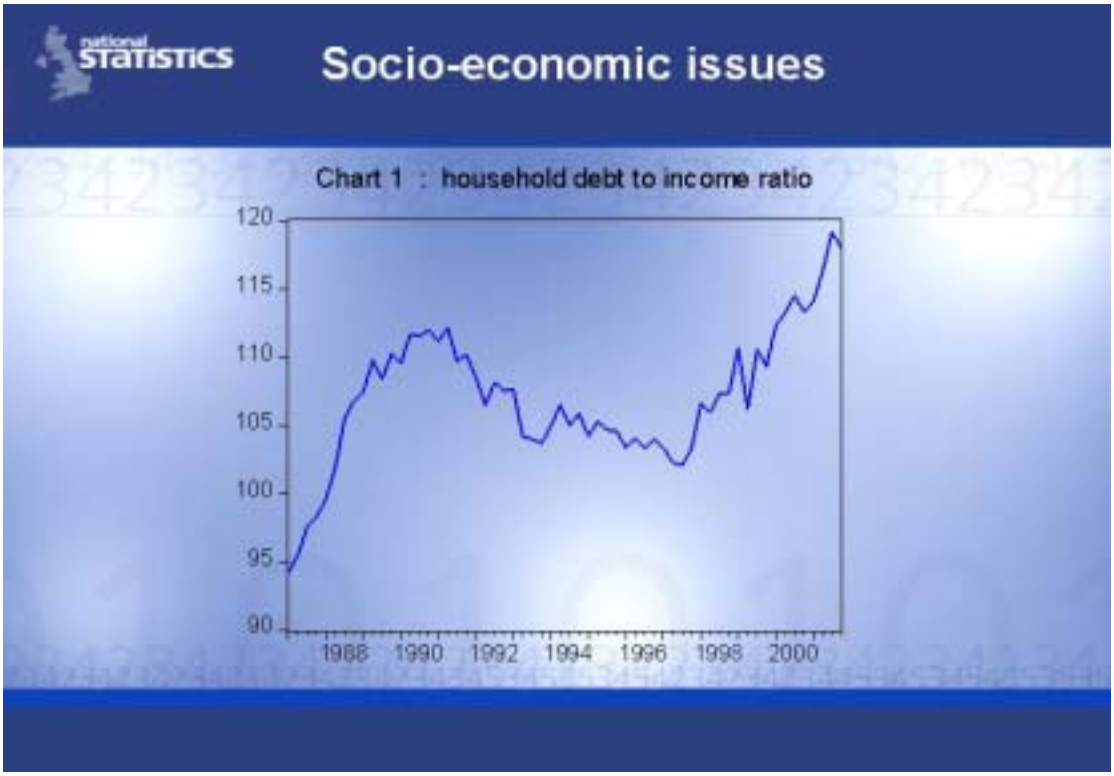


Unfortunately there was little consensus between the respondents about how exactly this might be measured. These are some of the main suggestions.



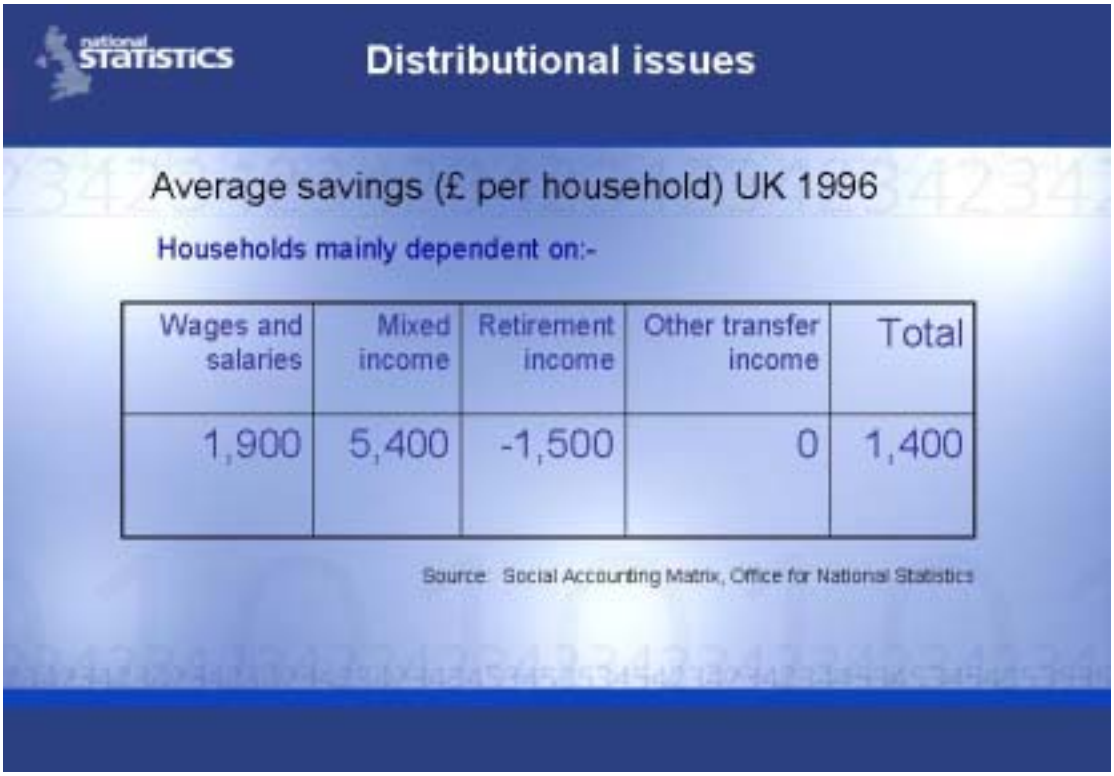
While many of these issues are significant in their own right, without a formal framework or structure there is a tendency to identify the "issue of the month" with little understanding of the relationships between drivers and pressures. One such issue is obesity, which is clearly an increasing problem.

At least we have some idea of what a desirable level of obesity is.



For another example, that of consumer debt, we have no such well-defined boundaries: it depends upon the relative burden of interest payments and the distribution of the debt. So that, whilst there is a concern that debt within the UK may be approaching unsustainable levels, it is difficult to identify the optimal level of debt that should be targeted.

It might be possible to explore distributional issues using Social Accounting Matrices. Work on this is at a very preliminary stage within the UK, with the first results shown below.



The table shows the relative levels of savings of different household types. We have some way to go before we can link this sort of analysis in with the environmental accounts.

These developments generally take us a long way from the formal framework established for the environmental accounts. Our general conclusion is that the accounts are well suited to a more detailed analysis of the environmental impacts of consumption activities, but do not have proven potential to throw light on the wider issues of the social impact of consumption and production activities.

Social indicators in the environmental accounts

presented by Maja Larsson, Statistics Sweden

Introduction

An ongoing project at Statistics Sweden is called *Social Statistics by industry - Introducing the social dimension into environmental accounts*. It is scheduled to be finished in December 2004, with a following report in the environmental account series. This paper presents some examples of diagrams from the coming report. (The full report can be downloaded at www.scb.se. It is named "Social statistics by industry – Introducing the social dimension into environmental accounts".)

One of the intentions of the SEEA is to serve as information system for the issue of sustainable development. It is designed to integrate the issue of economic growth with the environmental pressures and resource depletion that is a side-effect of the production and consumption patterns. The SNA provide the most widely used indicators of economic performance, growth, and the economic counterpart of social welfare. The SEEA provides information on the environmental pressure from the different actors that produce and consume goods and services and also information on natural resources. These actors are the different industries, the public sector and the households. However, in the various definitions or conceptualisations of sustainable development, social issues also play an important role.

Many of the policy interventions that are made for stimulating economic growth or protecting the environment have social effects. Therefore, it is of interest to investigate ways that can incorporate more social information into the SEEA. Some of the environmental concerns are also social, as the health aspects of chemical use, air pollution, as well as water quality or food quality. The working environment can be regarded as included in environmental issues but is often neglected because of lack of data. These areas are of importance in the different strategies for sustainable development that are being made. Hence, if it is possible to link such information to the SEEA, this could be of interest for the users.

There are three main purposes in the ongoing project:

▫ To choose suitable social data and present it in a form that is comparable to the environmental and economic data. It is also to investigate the possibilities for adding more social data to the SEEA.
▫ To discuss with the data providers what aggregation level and data quality is possible
▫ To complement the environmental accounts with also the social dimension of sustainable development.

Measurement of living conditions in Sweden

Statistics Sweden has conducted annual interview surveys among large samples of the population since 1974 (approximately 7000 persons annually). These surveys of individual and household living conditions (ULF)[22] are based on indicators in ten social themes:

- Education
- Employment
- Working environment
- Finances
- Housing conditions
- Transportation and communication
- Recreation
- Social participation

[22] ULF, Undersökningar av Levnadsförhållanden

- Health
- Social mobility

The survey results are published in social reports. In addition to the annual survey, there are four in-depth modules of more detailed interviews which are included in the main survey for two consecutive years, and are then repeated after an interval of eight years.

In the present environmental accounts project we decided to present social statistics in four different areas, namely;

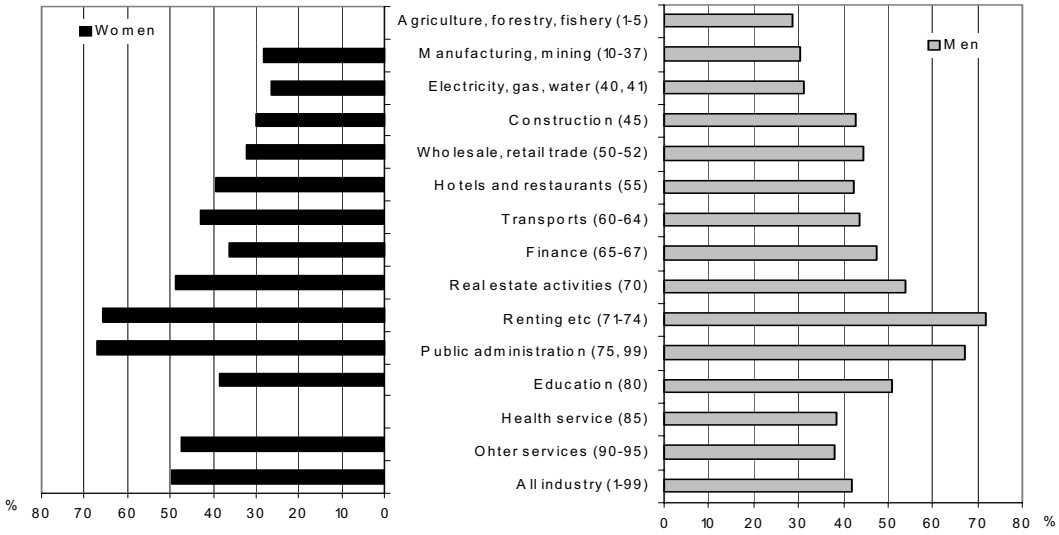
▫ Working environment (with 6 chosen indicators)
• Health (6 indicators)
• Financial problems and material assets (5 indicators)
• Social networks and political resources (5 indicators)

Example of diagrams in the report:

In the upcoming report we have chosen to present each indicator with the same three types of diagram (examples below). The first type, A, presents the indicator divided on 14 industries for the year 2000/02. The second type (B) shows the development between 1988 and 2002, but on fewer industries, only 6. In the last type of diagram (C) the chosen indicator is presented on 14 industries and by socio-economic group. They all shown the percentage of employed within each industry for each indicator. In short, data of unemployed and total population will also be included in the diagrams.

One of the indicators in the *working environment* chapter is "Mentally strenuous work"[23]:

Diagram A. Mentally strenuous work, 2000/02.

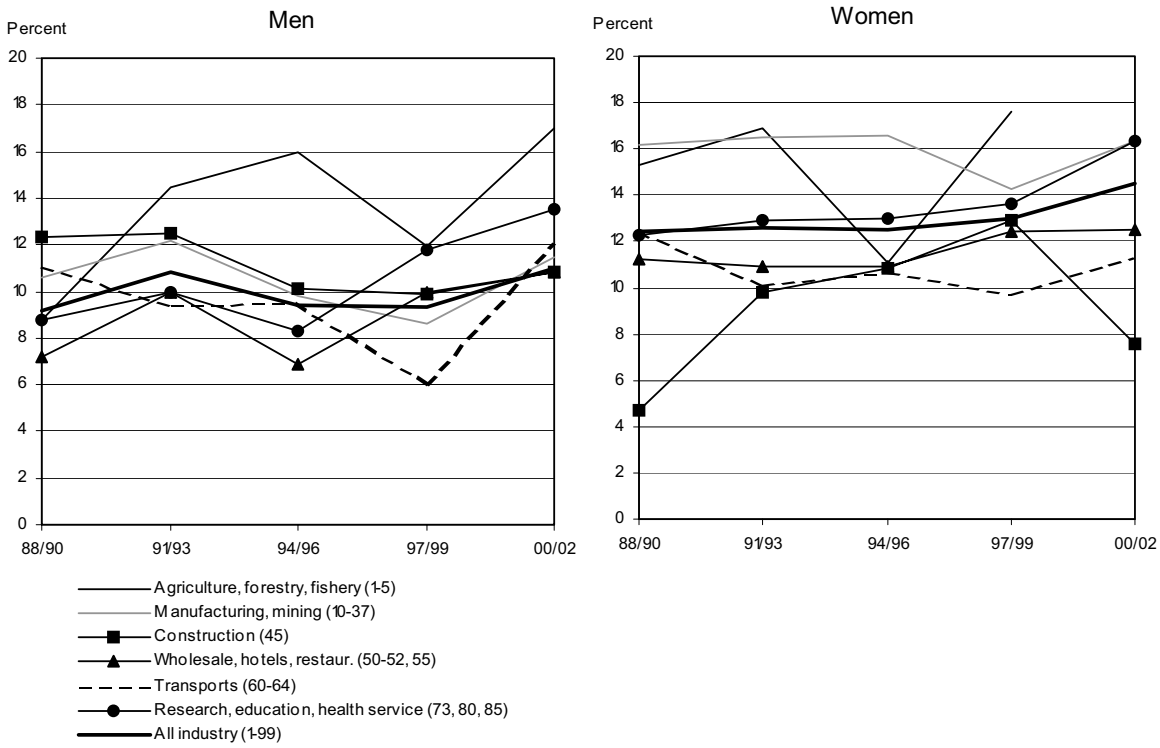


One of the indicators in the *Health* chapter is "Severe problems because of long illness"[24] (On next page):

[23] Have answered "yes" to the question: Is your work mentally strenuous?

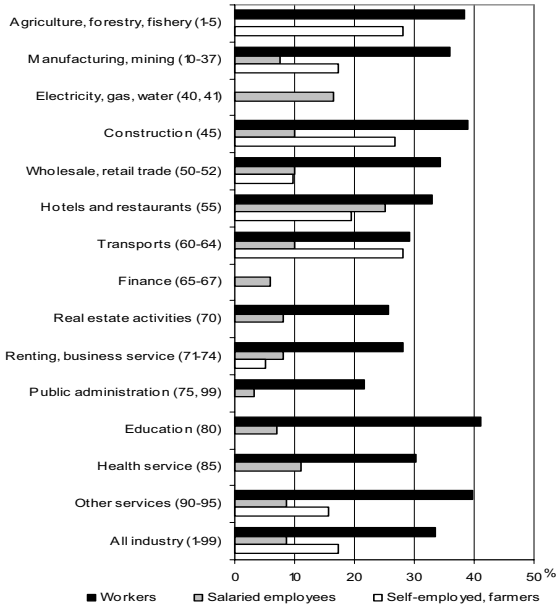
[24] Have answered "long illness" to the question: Do you have a long illness, pains due to a accident, a handicap or other weakness? and answered "all the time" or "occasionally" to the question: How often do you have problems due to long illness? and answered "severe" or "much severe" to the question: Are the problems insignificant, moderate, severe or much severe?

Diagram B. Severe problems because of long illness, 1988-2002



One of the indicators in the chapter on *Social networks and political resources* is "Lack the ability to appeal against a public authority"[25]:

Diagram C. Lack the ability to appeal against a public authority, 2000/02

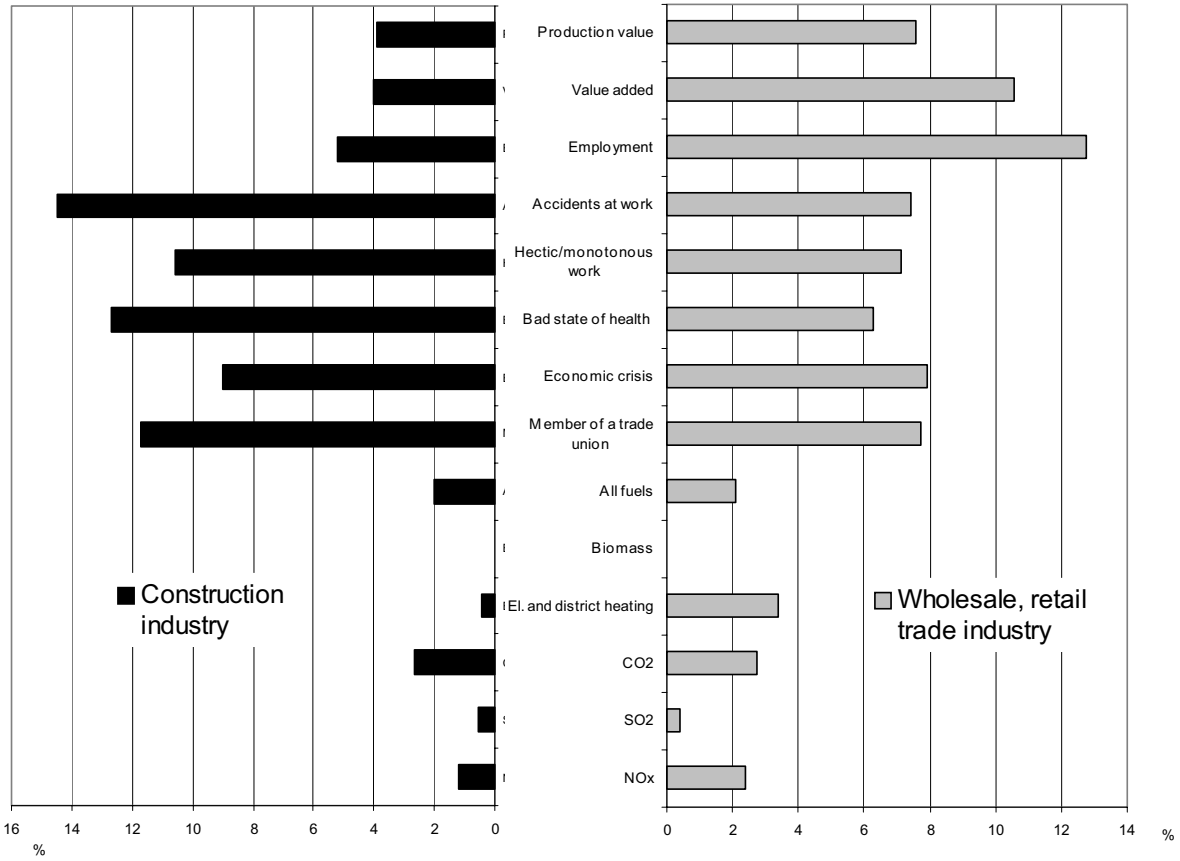


[25] Have answered "no" to the question: Are you capable of writing a letter and appealing against a decision taken by an authority?

Additional ways of presenting social data is by region, education level or age. Examples of this can be found in the report.

It is also possible to make different kinds of profiles, industry as well as environmental. One example of environmental profile is presented below.

Diagram D. Environmental profiles for the construction industry and the wholesale, retail and trade industry, 2000



In the diagram above, the values for “accidents at work”, “hectic/monotonous work”, “bad state of health”, “economic crisis” and “member of a trade union” are for 2000/02.

Session 5 Material flow accounting

Chair: Ole Gravgård, Statistics Denmark

Summary of the session on material flow accounts

Chair: Ole Gravgård, Statistics Denmark

Presentation: Stefan Schweinert, Federal Statistical Office Germany

Rapporteur: Ole Gravgård, Statistics Denmark

Presentations

Stefan Schweinert presented a paper written by himself and Karl Schoer on *Accounts for primary material flows by branches and material categories*.

The political background for the work on primary materials was seen as the initiative of the OECD for establishing an OECD-wide system material flow accounts, and the need for providing data for the headline indicator of the National Strategy on Sustainable Development.

The German system of physical flow accounts is built on a modular approach including various modules. The module for primary material flow shows supply and use of raw materials by economic activities and type of material (in tonnes). On the supply side domestic extraction of raw materials by type of raw material and imported products are identified. On the use side inputs of primary products by branches and by households are shown.

For abiotic materials at a level of 1 400 million tonnes in Germany two thirds are domestic extraction and one third is imported products. By material categories energy carriers make up one third of the total primary material input Also results of the use, the development and the intensity by branches were presented.

Decomposition analysis of the primary material use showed that economic growth and changes in material intensity have increased the use of primary materials from 1995 to 2001, but that this has been more than offset by a decrease in the use due to changes in the economic structure of the economy.

In his conclusion Stefan Schweinert said that: PMFA data can be used for various analytical purposes and that the advantage is that the compilation of data is quite easy. Future work to be done includes work on primary products like wood and agricultural products and calculation of indirect effects by combining physical data with monetary input-output tables.

Some central topics during the discussion

During the discussion following the presentation several members expressed that work on material flows should- like the German work - go in the direction of disaggregation and direct flows rather than aggregation and indirect flows.

Primary material flow accounts by branches and material categories for Germany, 1995 to 2001

by Karl Schoer and Stefan Schweinert
Federal Statistical Office Germany

Introduction

Objective of the paper

This paper presents first preliminary results of the new accounting module "Primary Material Flow Accounts (PMFA)". This module is part of the German system of material flow accounts. The PMFA supply data on primary material flows in a NAMEA[26]-type breakdown (branches and private households) and by material categories. The new sub-module enhances the data of the economy-wide material flow accounts[27] by providing a more detailed breakdown of the input side, i.e. of the extraction of raw materials from the domestic environment and of the imports of materials from the rest of the world. The breakdown by economic branches and private households facilitates to establish a link between the material inputs from the environment (and the rest of the world) to the economy and the causing economic activities. The cross-tabulation of economic activities and material categories helps to establish a closer relationship between economic activities and environmental problems as far as they are related to specific material flows. The paper concentrates on providing disaggregated accounting data for the head-line indicator "raw material productivity" of the German Strategy on Sustainable Development. In this paper the data are used to derive eco-efficiency indicators by branches for specific material categories and to study the relationship between economic development and use of primary material by a decomposition analysis. Both approaches, by linking environmental and economic topics, can be viewed as a contribution to an integrated analysis of sustainable development.

Material flow accounts and sustainable development

In the political field Material Flow Accounts (MFA) seem to draw growing attention. At the international level the recent initiative of the OECD environmental ministers and the OECD council for establishing an OECD-wide system of comparable material flow accounts may highlight the increasing importance of MFA. The data to be created by those efforts will among others serve as a statistical background for the so-called 3R-initiative (Reduce - Reuse - Recycle) which was announced at the G8 summit in June 2004 as a new high-level political initiative as part of a policy towards sustainable development. In 2003 the commission of the European Union launched a "Thematic strategy on sustainable use of natural resources".

Material flows are also an important issue for a policy on sustainable development at the national level in Germany. In the "National Strategy on Sustainable Development" quite a number of indicators out of 21 headline indicators are related to material flows, like the use of raw materials and energy (including the proportion of renewable energy sources) as well as to the emission of green house gases and air pollution. One indicator of the national strategy to be dealt with below in more detail is the indicator "raw material productivity".

Sustainable development requires a holistic policy approach. That type of policy puts much stress on the linkages between the different strategy topics. The subject of policy for sustainable development is rather co-ordination of the different sector policies with the objective of finding a balance between conflicting goals. Decisions on measures aiming on the improvement of one indicator in the same time have to consider the effects that may occur on the other relevant goals of the overall strategy for sustainable development. The rather complex analytical tools requires for that type of policy approach demand a homogeneous and coherent database depicting the interdependencies between different topics and related indicators. The System of National Accounts (SNA) forms together with its satellite systems Environmental-Economic Accounts (EEA) and Socio-Economic Accounts (SEA) an expanded accounting data set. Such an expanded data set is, by forming an integrated database, an ideal framework to meet the requirements for an analysis and for a policy on sustainable development. One central classification of the accounting system, which is shared commonly by all three sub-systems, is the NAMEA-type breakdown by economic activities. Others are the subdivision of consumption of private households by use categories and of the private households by household-types.

The MFA itself are one of the central modules of the Integrated System of the Environmental-Economic Accounts[28] (SEEA). In the German Strategy on Sustainable Development the indicators on material flows are embedded into the German MFA, i.e. they can be directly derived from the MFA by aggregation. Besides the MFA-indicators, a

[26] National Accounting Matrices including Environmental Accounts

[27] Statistical Office of the European Communities (2001): Economy-wide material flow accounts and derived indicators – A methodological guide, Luxemburg.

[28] UN/EC/International Monetary Fund/OECD/World Bank (2003): Handbook of National Accounting, Integrated Environmental and Economic Accounting 2003, Final Draft prior to official editing.

considerable proportion of the other indicators of the German National Strategy on Sustainable Development, like the indicators on land use, on transport, a number of economic indicators and some social indicators are already embedded or are on their way to be embedded into the accounting system.

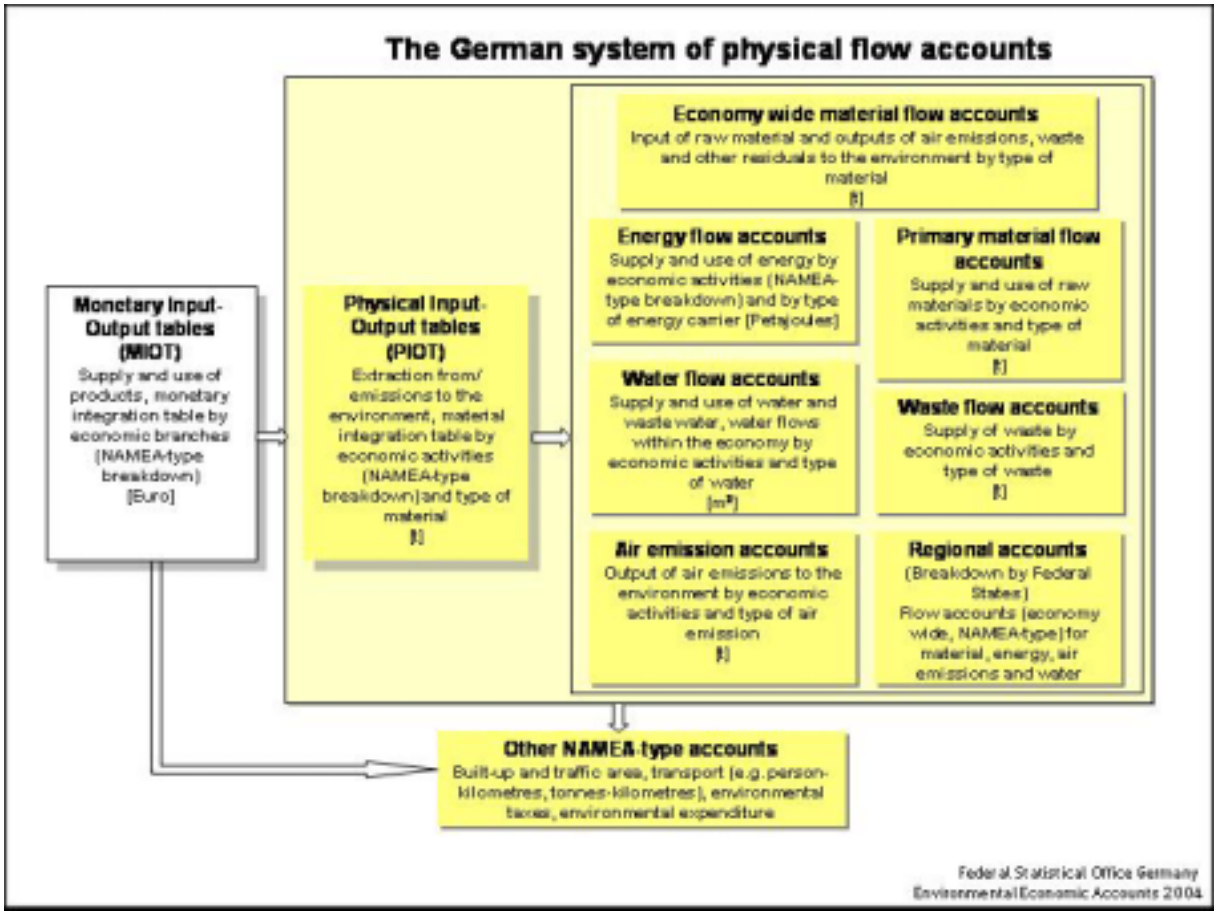
Methodological concept of German primary material flow accounts

The system of material flow accounts

MFA are an integrated part of a rather comprehensive accounting system (SNA, EEA and SEA). The PMFA are a sub-module of the system of MFA. The MFA, as a module of the EEA, are designed to describe the material flows that are associated with the economic production and consumption activities in physical units (mainly tons). They concentrate on material flows between the economy and the environment, but flows within the economy are also covered. As the definitions and concepts of the MFA are fully compatible with the demarcations of the national accounts, the physical data can be combined in hybrid analytical approaches with the respective monetary accounting data on the economy.

The MFA are the most advanced part of the German system of EEA. The system of the German MFA is shown in figure 1. The monetary input-output tables (MIOT) of the national accounts are the conceptual starting point of the material flow accounts. The physical input-output tables (PIOT) provide the conceptual framework for the system of material flow accounts. PIOT mirror the monetary tables in physical terms (tons and other units like joules regarding energy consumption), but in addition and as the most important feature they widen the scope of the monetary tables by including the material flows between the economy and the environment. The PIOT contain, like the MIOT, tables on the supply and use of products, but moreover include inputs from the environment to the economy (mainly raw materials, ecosystem inputs) and outputs from the economy to the environment (residuals: air emissions, waste and wastewater emissions and other outputs to the environment). The tables also comprise material integration tables in a detailed breakdown by economic production and consumption activities (NAMEA-type breakdown) and type of material. Such, they provide a most complete, systematic and rather detailed description of the material flows related to the economic activities. The first German PIOT was compiled ten years ago as the first approach of its kind world wide. The tables for the year 1990 were later complemented by another set of PIOT for the year 1995. In principle the PIOT are covering the whole system of physical flow accounts. But the calculation of PIOT is rather resource consuming so that PIOT can not be compiled on an annual basis, but only in longer intervals. Therefore a number of conceptually closely related sub-modules to the PIOT on important selected topics have been developed for the current observation on an annual basis.

Figure 1



As already mentioned, PMFA are one of these sub-modules. Others are the economy-wide material flow accounts as well as a number of NAMEA-type accounts like the energy flow accounts, the water flow accounts, the air emission accounts, the waste flow accounts and the regional physical flow accounts. All annual sub-modules together provide a rather comprehensive and coherent picture of the material interactions within the economic system as well as between the economy and the environment. The data can be combined with each other and with the respective data of the monetary accounts as well as with data from other modules of the environmental economic accounts.

The economy-wide material flow accounts comprise the whole physical economy and their system boundaries are fully compatible to PIOT. The accounts show inputs of material by material categories from the environment and the rest of the world to the economy and the outputs of material from the economy to the environment and the rest of the world on the level of the national economy.

The PMFA enhance the data of the economy-wide material flow accounts by providing a more detailed breakdown of main components on the input side, i.e. of the domestic extraction of used raw materials and the imports of materials.

The energy flow accounts cover the supply and use of energy by economic activities and type of energy carrier in joules. The air emission accounts show the output of air emissions by economic activities and by type of air emission. The waste flow accounts cover the supply of waste by economic activities and type of waste. Due to a fundamental change in the German primary waste statistics the time series could not be continued beyond 1995. But it is hoped that the issue can be taken up as soon as the statistical results according to the European waste statistics regulation are available. The water flow accounts show the input and output of water and the water flows within the economy in a breakdown by economic activities and type of water. Regional physical flow accounts by Federal States are being developed by a working group of the statistical offices of the German Federal States (Länder). The whole system of NAMEA-type material flow accounts is supplemented by a number of other NAMEA-type flow accounts in Germany. In that type of accounts issues like the use of built-up and traffic area, transport (e.g. passenger-kilometres, ton-kilometres), environmental taxes as well as environmental expenditures are covered.

Concept of primary material flow accounts

As already mentioned, the PMFA enhance the data of the economy-wide material flow accounts by providing a more detailed breakdown of the used domestic extraction of raw materials and the imports of materials. The sub-module, by providing a detailed breakdown by economic branches, helps to establish a link between material inputs (by material categories) to the economy and the causing economic activities.

Primary material is defined as the domestic extraction of used raw material and the imports. Unused materials, mainly mining overburden, are not considered. The input of water is also excluded from the PMFA and dealt with in specific water flow accounts. The output side of the MFA is widely covered by the sub-modules on air emissions, waste and wastewater. Compared to PIOT where all material flows which are occurring in the different steps of the production process are included, in the PMFA in principle only primary material - i.e. material entering the domestic economy - is regarded. The PMFA are comprised of supply and use tables for primary material. In addition a table on exported material – which is regarded as primary material from the point of view of the rest of the world - and use tables for primary products are included.

The supply tables on primary material contain the used raw materials extracted from the domestic environment by type of raw material and the imported products by homogeneous product groups. The use tables on primary material show the use of primary material by homogeneous production branches and private households.

As the raw material extracting or primary production branches (agriculture (excluding cultivated animals) and mining) play a special role in the production chain, the use tables for primary material have to be supplemented by use tables for primary products for analytical purposes. Primary products are comprised of domestic primary products and imported products. As far as the imports are concerned primary products are identical with primary materials. In the case of domestic flows primary products cover the output of the primary production branches, supplemented by direct extraction of raw materials by private households and by non-primary production branches.

The role of the primary production branches is to withdraw raw materials from the domestic environment. In a strict conceptual sense the raw material (primary material) is an input from the domestic environment to the primary production branches. The output of the primary production branches is already considered as a raw product (secondary material). All the other branches use the output of primary production branches together with other products in their production processes, in which they transform the inputs into other products and residuals.

Under an analytical perspective it is important to relate the use of primary material to the economic driving forces. That means the use of primary material has to be related to the economic demand. The most straightforward approach would be to calculate the ratio between the direct input of primary material of a single branch and its output at constant prices[29], e.g. measured as gross value added. Such a relationship may be needed for calculating sectoral eco-efficiency indicators or for a decomposition analysis. But according to the use table for primary material the primary production branches are the only users of primary material from the domestic environment. Relating the raw material input of these branches to their output is analytically rather meaningless, as the output of the primary production branches is the raw product in monetary terms (extraction costs plus resource rent) which should be widely identical with the input of used raw material in physical terms. However the “economic users” (the direct driving forces) are those branches which directly use the output of the primary production branches. In opposite to this, the primary production branches can be rather seen as agents acting on behalf of the direct users of the raw products. So what is needed from an analytical perspective is to put the relationship between the use of primary products by the “economic users” and their output in concrete terms. Such date can be provided by the use tables for primary products. For the analytical exercises done below, only the use tables for primary products are suitable. Therefore the use tables applied in this paper refer exclusively to primary products and not to primary materials.

The tables are subdivided into 72 homogeneous production branches and the following categories of used raw materials:

Table 1:

[29] A more developed alternative is to look at the cumulated inputs over the whole production chain for different products or categories of final demand. The cumulated inputs can be estimated by using the input-output model.

Classification of primary material

- Domestic extraction
  - Abiotic raw materials from the domestic environment
    - Fossil fuels
      - Coal, energetic peat
      - Crude oil, Natural gas
    - Metal ores
    - Other minerals
  - Biomass
    - Biomass from agriculture and hunting
    - Biomass from forestry
    - Biomass from fishing
- Imports
  - Abiotic products
    - Fossil fuels
      - Coal, energetic peat
      - Crude oil, Natural gas
      - Coking plant and mineral oil products
    - Metal ores and their products
    - Other mineral products
    - Chemical products
    - Machines and other equipment
    - Vehicles
    - Other products
  - Biotic products
    - Agricultural and hunting products
    - Forestry products
    - Fishery products

The imported products are also subdivided according to the degree of processing. Three steps are regarded: raw products, semi-processed and processed products.

The data of PMFA, like the other sub-modules, can be used for various analytical purposes. The system provides sectoral indicators like the use of primary material by individual economic branches. Combined with the respective monetary data sectoral eco-efficiency indicators (e.g. use of primary product per unit gross value added) can be calculated. Moreover decomposition analyses can be carried out, e.g. by breaking down the development of an indicator into the factors economic growth, structural development and efficiency of the individual branches. Another application is the calculation of cumulated inputs over the whole production chain for the different products or categories of final demand (indirect effects) by combining the physical data on inputs of primary material or products with the data of the monetary input-output tables. This approach can for example be used for estimating the indirect or hidden flows that are related to the direct import or export flows. A more complex manner of utilising this data is to apply them together with monetary data from the national accounts in environmental economic modelling approaches.

The first step of developing PMFA for Germany focused on providing disaggregated accounting data for the headline indicator of the National Strategy on Sustainable Development on “raw material productivity” (gross domestic product at constant prices per unit of raw materials).The exact definition of the denominator is: abiotic raw materials extracted from the domestic environment (used) and abiotic imports in tons. The data for the indicator is taken from the MFA module economy-wide material flow accounts. The definition corresponds to the MFA indicator direct material inputs (DMI), but is restricted to abiotic inputs, i.e. biotic inputs are excluded. The data and analysis presented below refer to the restricted definition of the strategy’s headline indicator.

Sources and calculation methods

The supply side of abiotic primary material is very well covered by data in physical terms. Different statistical sources are used for the calculation of domestic extraction of raw materials and the imports. For the compilation of domestic extraction of raw materials in a detailed breakdown by material categories mainly the surveys on mining and quarrying are used, supplemented by reports of professional associations and some other sources on materials and small establishments not covered in the official surveys. The figures for the import and export flows in a detailed breakdown by products can be obtained from the foreign trade statistics. The figures which are mainly available in different physical units have to be converted into kilograms. In the foreign trade statistics imported products are also subdivided according to the degree of processing into the categories “raw products”, “semi-

processed products" and "processed products" (plus other categories like "packing materials", "imported waste" and "other materials").

For the calculation of the use tables detailed internal data from the monetary input-output tables can be implemented.

Regarding the compilation of the tables on use of primary materials by homogeneous production branches and private households different approaches are necessary for raw material from domestic environment and for the imports. The domestic raw materials can be rather easily assigned to the respective primary production branches. No information is available on the direct extraction of abiotic raw materials by private households and by non-primary production branches. Therefore these flows which should be rather negligible where not regarded had to be neglected. The imported products were assigned to the using economic activities by the relationship of the monetary supply and use matrix (72 homogeneous product groups by 72 homogeneous production branches). In the future the assignment should be improved by using a more detailed breakdown for a number of product groups which are relevant in quantitative terms.

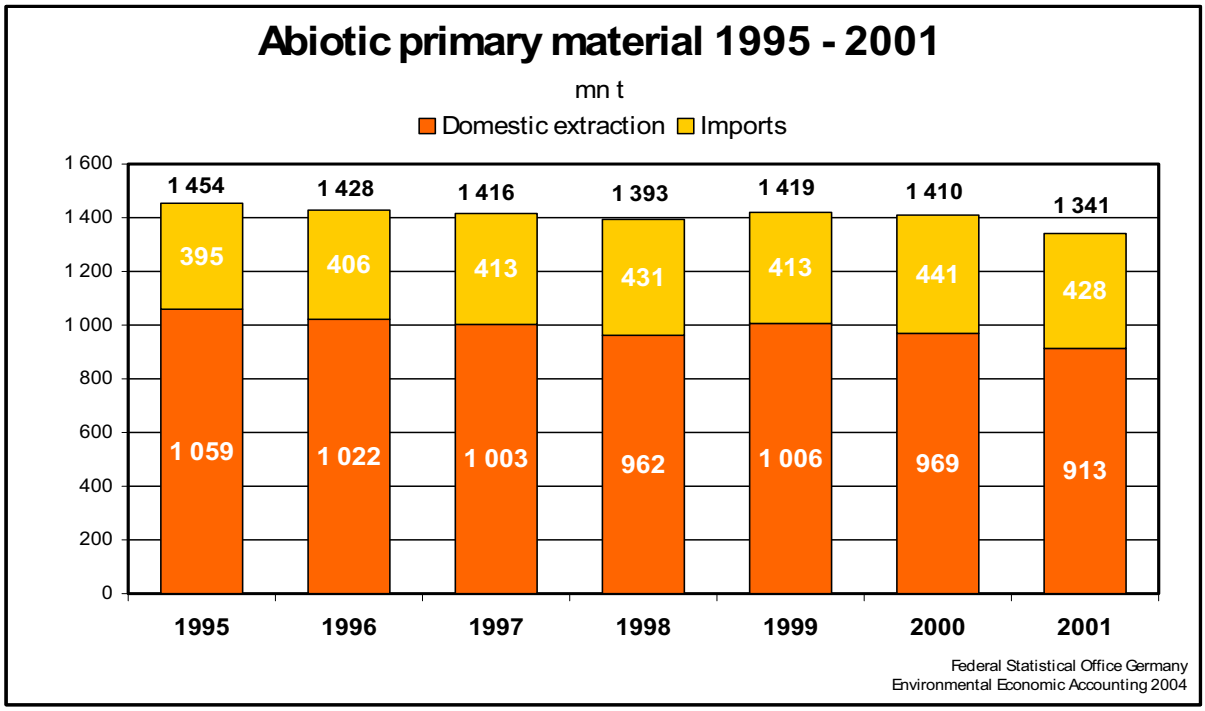
For the compilation of the use tables for primary products by homogeneous production branches and private households - as far as the imported products are concerned - the data are identical with the figures from the tables for primary material. But for assigning the output of the primary production branches to the economic activities a special approach had to be developed. As the monetary interrelationships from the MIOT on the basis of the 72 X 72 matrix are not sufficiently reflecting the physical relationships, much more detailed data had to be utilised. Therefore internal material from the national accounts on the use of raw product categories (about 30 out of approximately 2000 product categories) by economic activities in monetary terms were taken. The presented data should be considered as being temporary. As a next step the improvement of the above explained methodology is planned. In fact physical flows of different types of material through the economic branches are going to be shown instead of monetary flows.

Results

Supply of primary material und use of primary products by branches and material categories

As shown in figure 2 the supply or input of primary material was reduced by 113 million tons (-7.8 %) between 1995 and 2001. This reduction is caused by the decrease in the domestic raw material extraction by 146 million tons (-13.8 %) while on the other hand imports rose by 33 million tons (8.4 %).

Figure 2

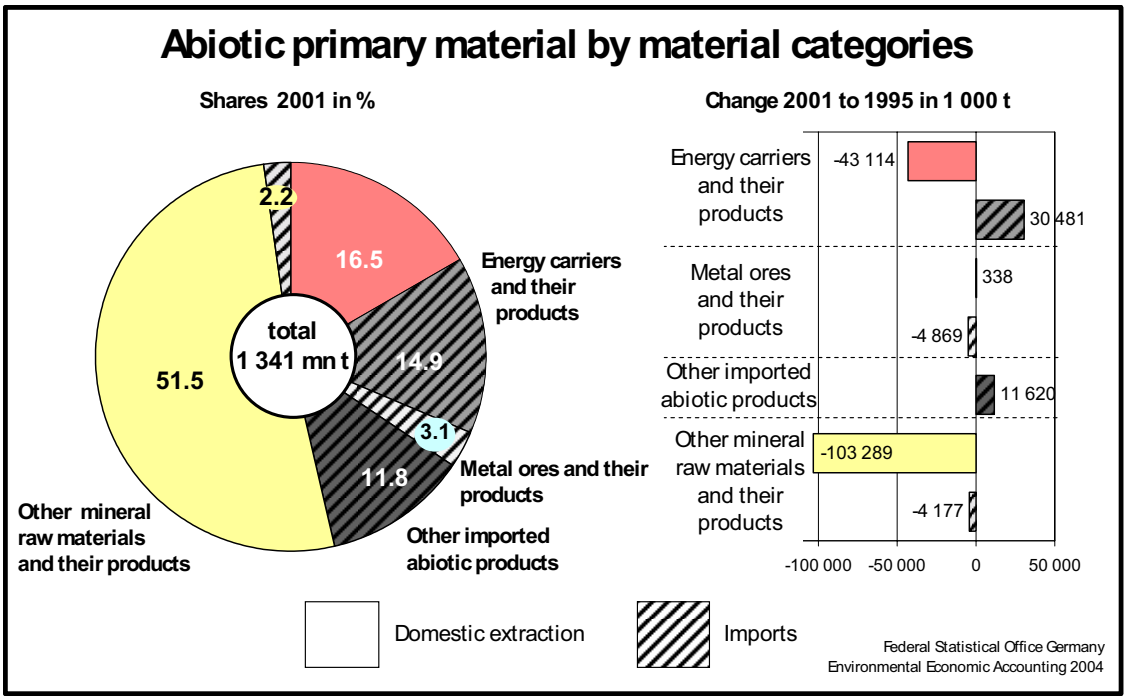


The exports of abiotic materials were increased by 47.4 million tons, i.e. the exports measured in weight units grew slightly faster than the imports.

A considerable proportion of the imported and exported materials are processed or semi-processed products and not raw products. The material rucksacks related to the extraction process of raw products and of the processed products remain in the producing country. Such the figures of the external trade flows reflect the pressure on the environment only partially. The total pressure effects can only be covered by estimating raw material equivalents for the imports and exports. The data of the PMFA in principle offer a data base for those calculations. But for arriving at reliable figures, further methodological research is required.

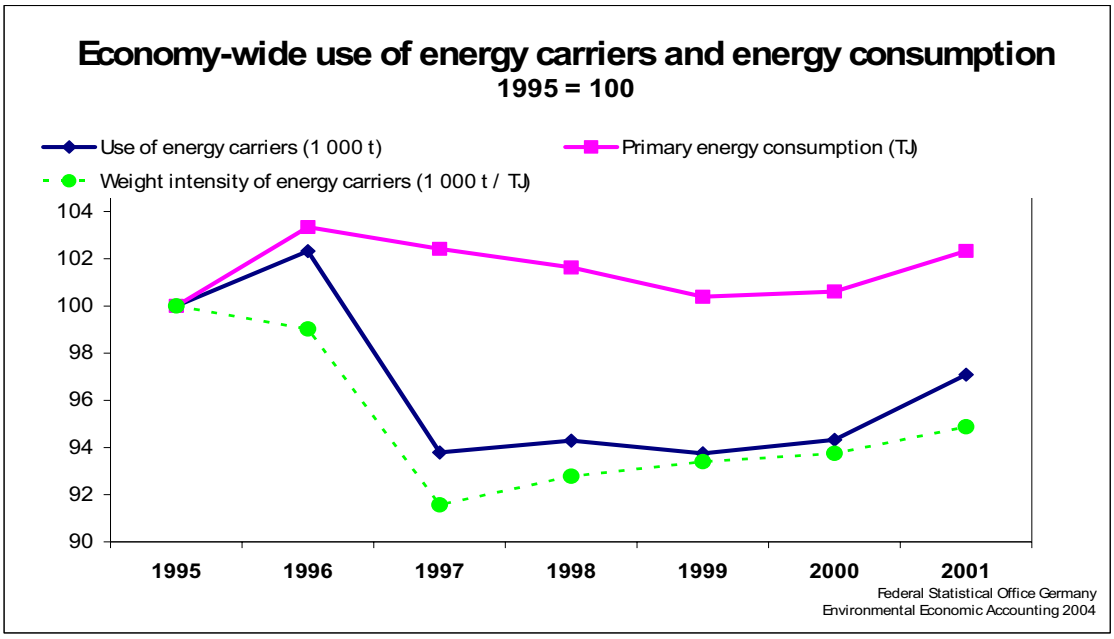
Figure 3 shows the subdivision of primary materials into material categories. Energy carriers (coal, raw oil and gas), metal ores and other mineral raw materials (sand, stones, gravel etc.) are abiotic raw materials that are domestically extracted as well as imported. Other imported abiotic goods are abiotic semi-finished and finished products. The pie chart shows the huge share of domestically extracted other mineral raw materials on the total primary materials (51.5 %). Looking at the changes from 2001 to 1995 both, domestically extracted and imported other mineral raw materials were being reduced over time. The decrease of other domestic mineral raw materials by 103 million tons made the highest contribution to the total reduction of 113 million tons. The amount of energy carriers from domestic extraction fell by 43 million tons. But this decrease was accompanied by an increase of imported energy carriers by 30.5 million tons.

Figure 3



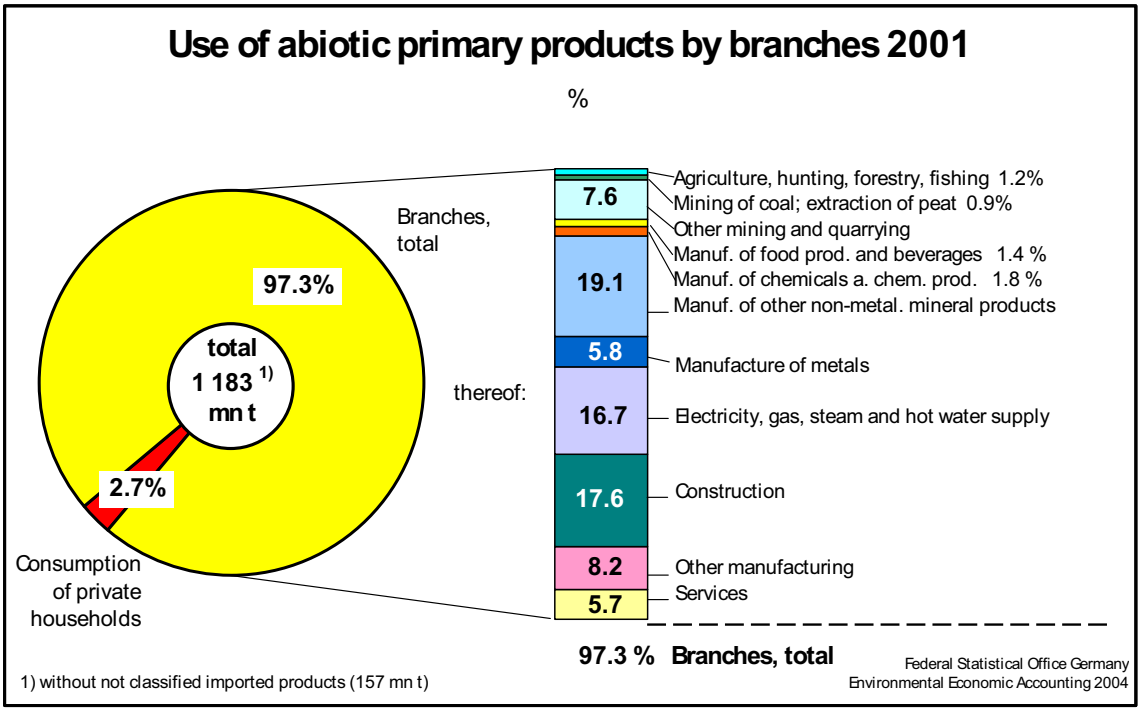
For energy carriers an exclusive representation in weight units can be misleading, as depending on the type of energy carrier, the relationship between the energy content measured in energy resp. work units (joules) and its weight can be quite different. Between different types of energy carriers the energy content in energy units in general is more relevant from the consumer's point of view and there exists a widely substitutional relationship between the different types of energy carriers. Figure 4 shows the development of the use of energy carriers in weight units and in energy units for Germany. Measured in weight units, a decrease of energy use by 2.9 % from 1995 to 2001 can be observed, whereas regarding energy units there was an increase by 2.3 %. The reason is a shift to a less weight intensive energy carrier mix, as it is reflected in the energy intensity, defined as the ratio between both variables described in tons per joules.

Figure 4:



The use of primary products by branches is shown in figure 5. A breakdown of the total direct use of primary products by economic activities shows a share of less than 3 % for the consumption of the private households, whereas the productions branches used more than 97 %.

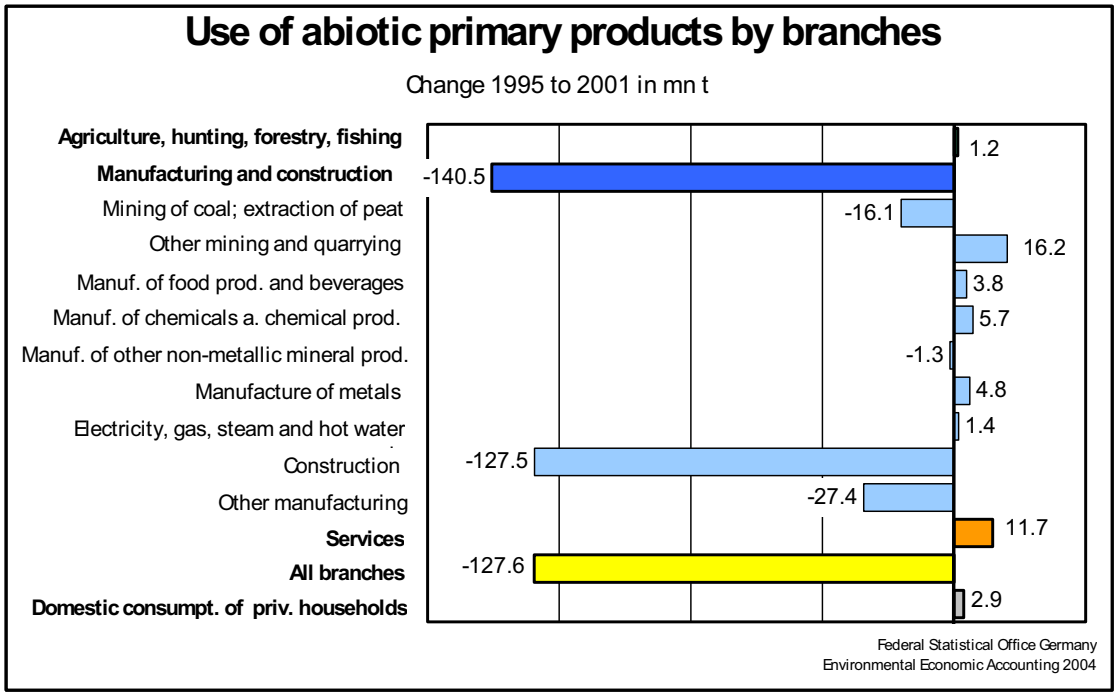
Figure 5



Among the production branches substantial direct users of abiotic primary products were “Manufacturing of other non-metallic products with a share of 19.1 % and “Construction” with a share of 17.6 % on the total of industries followed by “Electricity, gas, steam and hot water supply” (16.7 %) and “Other mining and quarrying” (7.6 %).

As shown in figure 6, the decline of the use of primary products in production processes between 1995 and 2001 (-128 million tons resp. -10.0 %) was dominated by the reduction of material use of the construction branch by 128 million tons (- 35 %), whereas the other branches in absolute terms only showed comparatively small decreases or increases.

Figure 6

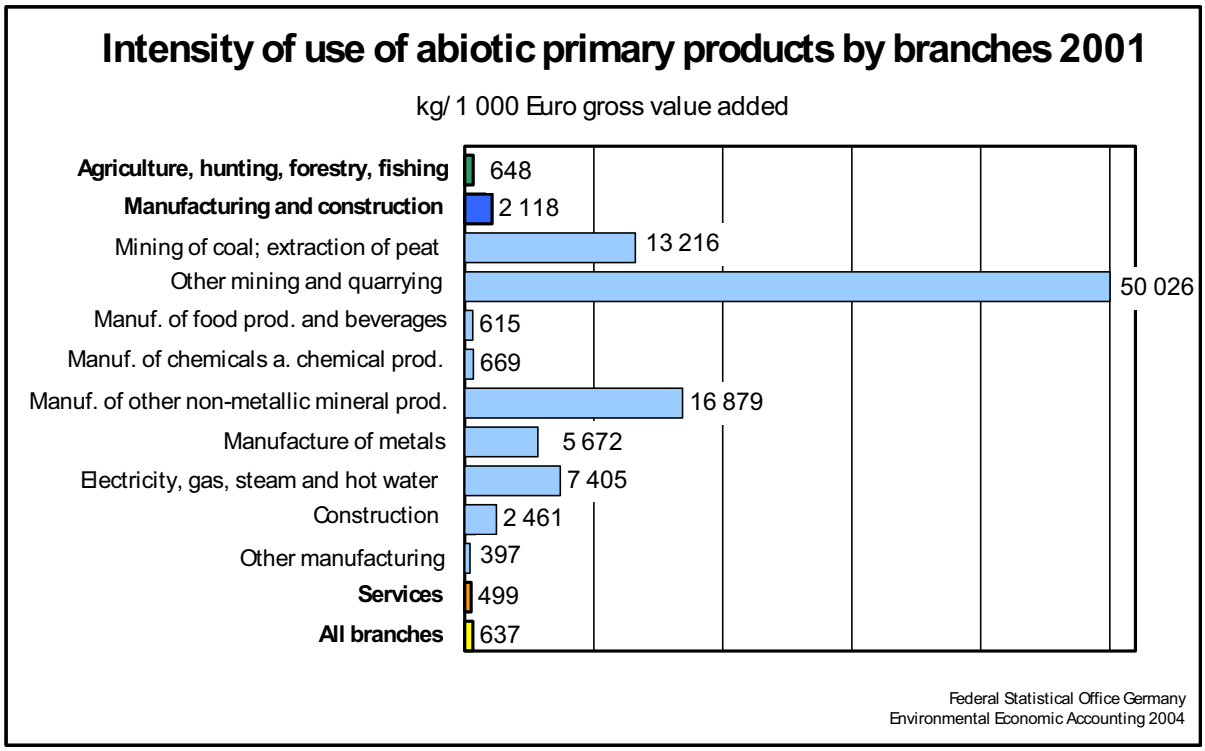


Intensity of use of primary products

In figure 7 the branch-specific use of abiotic primary products is related to its gross value added for the year 2001. The aim of the National Strategy on Sustainable Development is to double the economy-wide raw material productivity, i.e. the efficiency of the use of abiotic primary material has to be increased substantially. The development of efficiency can either be calculated by productivities, measured as gross value added or gross domestic product per abiotic primary products or by intensities (Primary products per gross value added). Figure 7 shows intensities.

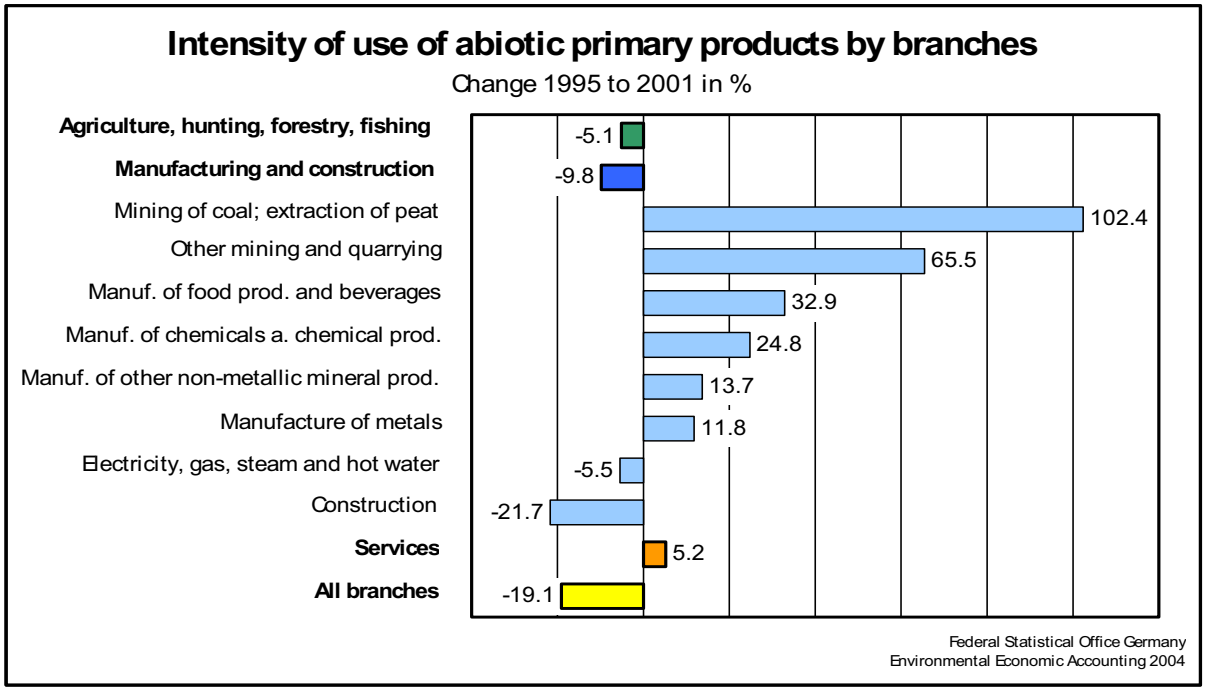
The primary product intensity in different branches is, depending on different technical conditions, quite heterogeneous. “Other mining and quarrying” achieved the highest primary material intensity with 50,026 tons per million Euro. Other production branches with high primary material intensity were “Mining of coal; extraction of peat” (13,216 tons per million Euro), “Manufacturing of other non-metallic mineral products” (16,879 tons per million Euro) and “Electricity, gas, steam and hot water (7,405 tons per million Euro). Against this, the average material intensity for all branches reached 637 tons per million Euro gross value added. This makes clear that the development of the economy-wide material efficiency is mainly dominated by the development of the share and the material efficiency of some few material intensive branches.

Figure 7



The development of the individual primary product intensities between 1995 and 2001 was non-uniform (see figure 8). While the intensity in the service branches rose by 5.2 %, the reduction in the manufacturing and construction branches achieved 9.8 %.

Figure 8



The overall development of the primary product intensity was mainly influenced by fluctuations in demand for raw materials for the construction industry.

Decomposition analysis

The data on use of abiotic primary products in a detailed breakdown by economic activities can also be utilised for estimating the influence of different factors on the overall development of the material use. A suitable instrument for this purpose is the decomposition analysis. Decomposition is a mathematical tool used to describe the degree to which the input or withdrawal of individual influencing factors may be responsible for trends in the dependent overall impact. The starting point is a depiction of the dependent value (in the present case the use of abiotic primary products) as a product of the observed influencing values. Decomposition analysis transfers this multiplicative starting equation into an additive equation that disassembles the observed time series showing the change of use of primary products into the effects of the individual influencing factors. Each individual effect describes how the use of primary products would have developed if only the factor under consideration would have changed[30]. The individual effects may have different signs: The negative effect of a factor may be compensated for by the positive impact of other factors. In the interpretation of the results, account should be taken of the limits posed by such an analysis. Thus, for instance, the influencing factors included in the analysis are externally defined, and it is presumed that the individual factors do not influence one another. To this extent, the results can merely provide a rough assessment of the magnitudes that are relevant in each case.

In the analysis below only the development of the use of primary products by production branches was analysed, as the share of the private households of less than 3 % can be rather neglected.

With regard to the production branches three factors in particular are considered to be of specific interest:

- material intensity of the individual homogeneous production branches as an approximate measure of the efficiency of material use. The intensity is measured as the ratio of the use of primary products per gross value added of the respective branch,

- the economic structure, expressed as the percentage of the branch-specific gross value added to the total gross value added, and

- economic growth, quantified by the development of the total gross value added.

In particular by distinguishing between primary product intensity (efficiency) and economic structure, it is possible to analyse the degree to which from a macroeconomic point of view the decreasing primary product intensity of the homogeneous branches impacts more by reducing the intensity of individual branches or via a structural change towards branches which use less primary products.

[30] See: Seibel S. (2003): Decomposition analysis of carbon-dioxide emission changes in Germany - conceptual frameworks and empirical results, Working papers and studies, European Communities.
http://www.destatis.de/allg/e/veroe/proser4senv_e.htm

Figure 9

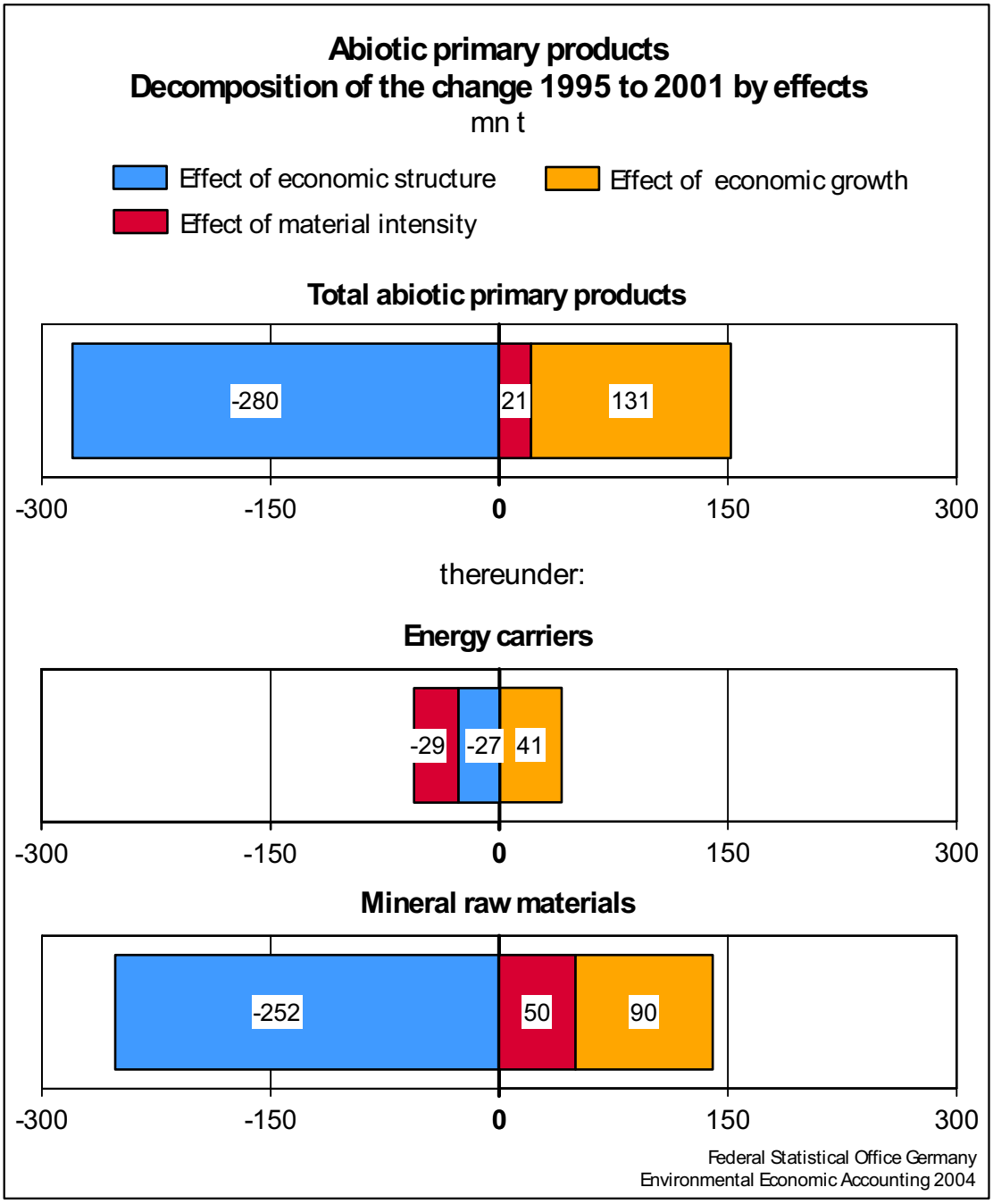


Figure 9 shows the results of the analysis differentiated into the total abiotic primary products used for production, of energy carriers and of mineral products.

Between 1995 and 2001 the total use of primary products decreased by 128 million tons. Both, economic growth and the development of material intensity led arithmetically to an increase of material use. The growth effect accounted for 131 million tons and the influence of the intensity effect was 21 million tons. Against this, the structural change led to an abatement of material use by 280 million tons. The abating effect of the economic structure is reflecting the increasing relative importance of less material-intensive branches and the parallel drop in material-intensive production branches, like manufacturing and construction. It is rather remarkable that the compound effect of the development of the material efficiency in the individual branches had a burdening impact on the overall material use. Hence, the improvement of the overall productivity goes back only to a structural effect.

Regarding the sub-categories energy carriers and mineral products a differentiated picture is revealed. For energy carriers the structural effect accounted for -27 million tons. The intensity effect led – in contrast to the development of total abiotic primary products – to a decrease in energy carrier use by 29 million tons against a growth effect of

41 million tons. The decreasing intensity effect for energy carriers goes mainly back to a shift to a less weight intensive energy carrier mix (see also chapter 4.1 and figure 4). The intensity effect and the economic structure effect overcompensated the economic growth effect and led to a decline of the use of energy carriers by 15 million tons.

The use of mineral products was reduced by 113 million tons between 1995 and 2001. The influencing three effects' characteristics are in size and direction similar to the underlying total abiotic primary products but with an even stronger burdening efficiency effect. The decrease in the use of mineral products goes back to a strong structural effect of -252 million tons. The decreasing overall efficiency had a burdening effect of 50 million tons. The growth effect accounted for 90 million tons.

Outlook

The supply and use tables for primary material and products are going to be kept as a tool for further and more detailed analyses of material flows, of which analyses for homogenous production branches and analyses of indirect material flows are most important. As a first step the data of the module will be completed by calculating use tables for biotic primary products like wood and agricultural products as well. Furthermore the calculation of the use-structure of the raw products will be improved.

Regarding analytical applications an important tool to be applied with primary material is the calculation of indirect effects by combining physical data with monetary input-output tables, e.g. for estimating raw material equivalents for imports and exports. That approach is already a proven standard tool with respect to energy use, air emissions and land use. But for primary products the standard model is not applicable, as the "average assumption" used for the calculation is not appropriate. The approach carries among others the assumption that the monetary use structure of the output of a branch represents the physical relations in a sufficient manner. But there are a number of "homogeneous branches" the output of which may not be homogeneous at all in weight terms and where the receiving branches do not use the "average output". One example may be the product group non-ferrous metals. The issue has to be investigated branch by branch in detail. For a number of relevant product groups the existing monetary input-output tables have to be enhanced by subdividing the cells symmetrically. Another issue to be solved in this connection may be the case of imported products which are not produced in the domestic economy. The production relations for those products are not represented in the domestic tables. Therefore the rucksacks can not be properly estimated by applying the input-output approach exclusively.

Session 6

Policy uses of environmental accounts

Chair: Alessandra Alfieri, United Nations

Summary of the session on policy use of environmental accounts

Chair: Alessandra Alfieri (UNSD)

Presentations:
Maja Larsson, Statistics Sweden
Viveka Palm, Statistics Sweden
Jean-Louis Weber, European Environment Agency
Glenn-Marie Lange, Columbia University

Rapporteur: Michael Vardon, Australian Bureau of Statistics

Introduction

Alessandra Alfieri (UNSD) and Jean-Louis Weber (EEA) introduced the session by stating that we need to be more active in promoting the use of environmental accounts generally and specifically to policy makers. We also need to be aware of the institutional settings in which environmental accounts are produced and used. For example, environmental accounts may be used by environmental areas within industry departments or by Departments of Environment. We need to understand how these different structures will affect the need for indicators. The question is what should we do in the London Group?

Presentations

Presentation 1. Environmental taxes and subsidies – Maja Larsson (Sweden)

OECD /Eurostat definition of environmental tax is easy to follow – the definition does not require an environmental benefit to be motivator of the tax. No universal definition of environmentally harmful subsidies. SEEA definition is very narrow, while OECD definition is very broad. Sweden uses the motivation for subsidies as the basis for definition, but Denmark uses effect of subsidies for definition.

Key points/conclusions
- Definition of taxes and subsidies is very important
- Data sources are not complete. SNA provides a good start but is not enough.
- Helpful subsidies and harmful subsidies should be netted out

During the discussion it was recognised that at present it was difficult to translate subsidies from SNA to SEEA and it was agreed that there was a problem definitions of environmental taxes, subsidies and penalties. As part of this it was recognised that the issue of motivation and effect had been resolved. It was agreed that Mr Ravets (Eurostat) would circulate the web address of the Eurostat Manual.

Presentation 2. Policy uses in the Swedish SEEA – Viveka Palm (Sweden)

The accounts are useful to policy makers if they answer frequent and relevant questions. Statistics Sweden recognises the need for more data to take account of environmental and social issues and Statistics Sweden is expected to coordinate more statistical activity related to the environment.

Institutional setting. Three organisations are involved in environmental accounts:
- Statistics Sweden – physical flows
- National Institute of Economic Research – valuation
- National EPA – State of the Environment Indicators

Statistics Sweden has an Advisory Board to recommend/guide their work on environmental accounting.

Statistics Sweden identifies the main users of environmental statistics and notifies them of developments and publications. Statistics Sweden also use press releases to promote publication in the media. A review of interest in environmental accounts showed several areas of policy interest.

Presentation 3. Indicators from Water and Land Use – Jean-Louis Weber (EEA)

Indicators should be small in number and stand alone, but say a lot. Environmental Accounts are a language. They are:

- An analytical and aggregation model
- Integration framework
- Good for cross checking and assimilating heterogeneous data sources
- Help different communities/disciplines understand each other

EU Water Framework Directive is important. One of its objectives is the halting of biodiversity loss. We need to translate DPSIR (Drivers-Pressure-State-Impacts-Response) to water and land accounts. For land accounts the main policy objectives relate to land use planning, in both rural and urban areas. There is the EU agricultural policy and the need to maintain rural landscapes.

Presentation 4. Policy Uses of Water Accounts – Glenn-Marie Lange (Columbia University)

The presentation covered the policy uses and applications of water accounting as outlined in chapter 11 of the draft water accounting handbook. It covered: key indicators; water management policy; critical issues (with space and time dimensions); and links between water.

For indicators, there is a need to resolve how these relate to other indicator projects and in particular the Millennium Development Indictors. For the links with other accounts, there is no coherent objective and the potential list of indicators is endless.

Two critical issues are the spatial and temporal scales of water accounts. In particular, water accounts ideally need to be for river basins and be seasonal. This would match the physical properties of the resource availability.

During the discussion it was suggested that one objective of the chapter should be to showcase what has already been done. It was recognised that indicators were useful for building relationships. It was also recognised that many indicators were already in use and that a focused set needed to be developed.

It was **suggested** that the chapter should have two parts. Part 1 should be conceptual tables and some very clear explanations and Part 2 should have options and examples of policy use.

Statistiska centralbyrån
Statistics Sweden

Environmental taxes and subsidies in the environmental accounts

Presented by Maja Larsson, Statistics Sweden

Introduction

In the international arena, the use of environmental policy instruments has increased. Environmental taxes have been discussed for many years and a definition has been elaborated by Eurostat and OECD (the Organization of Economic Co-operation and Development)[31]. The interest in potential environmentally harmful subsidies has also grown internationally. The work on examining subsidies that positively affect the environment has not yet attracted the same amount of interest. However, the OECD and EEA (European Environment Agency) have developed a database on economic instruments and voluntary approaches in the past few years, where environmentally motivated subsidies are included.

Environmental subsidies can be seen as affecting the economy in the same way as taxes, if subsidies are seen as negative taxes. They are important policy tools and it is thus important to compile statistics on them. The fact that taxes and subsidies are treated symmetrically in the national accounts is another reason to introduce environmental subsidies into the environmental accounts[32]. Another benefit that follows on from documenting environmental subsidies is the more general picture of policy tools that will emerge, which can help policy-makers when taking decisions in the environment area.

At Statistics Sweden we have carried out two projects concerning environmental taxes and subsidies. The resulting reports are;

1. Environmental taxes and environmentally harmful subsidies (*published 2000*)
2. Environmental subsidies – a review of subsidies in Sweden between 1993 and 2000 (*published 2003*)

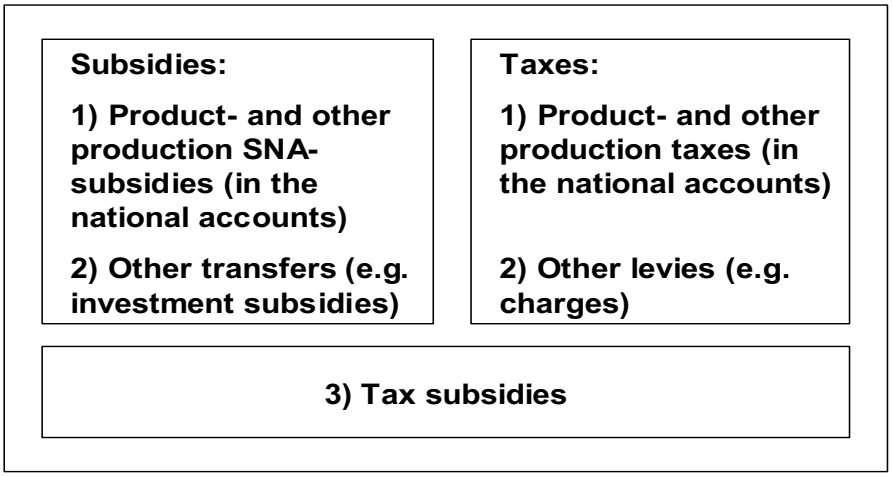
The second report from 2003 aimed to go one step further than the previous, with a wider documentation of subsidies, this time focusing on subsidies with a positive impact on the environment.

In the environmental accounts we now have information of environmental taxes, environmentally motivated subsidies and environmental harmful subsidies (However, the latter have not been updated or revised since the work in 2000).

The figure on next page illustrate how the different parts of a subsidy and tax can be covered, from an environmental accounts' (SEEA) perspective. Firstly, *product- and production subsidies/taxes* are collected from the national accounts. If there is a need to broaden the concept, other categories of subsidies and taxes may be included, such as for example *other transfers* like investment subsidies (see definitions). *Other levies* may be charges, not currently reported in the national accounts since the sums remitted are reimbursed to those liable to pay the charge. Both these forms of other transfers and levies may be important to follow, since they are important tools used for reaching environmental goals.

[31] An environmental tax is determined according to its tax base, which is the product, activity or substance that the tax rate is based on. A number of environmentally related tax bases has been identified from this definition.

[32] Eurostat [2001] *Environmental taxes – A statistical guide*



The environmental taxes have regularly been published since 2000. Obtaining information of the equivalent subsidies has not been as easy, since the definition of a subsidy used at the national accounts is somewhat narrow.

Definitions

Eurostat and the OECD have elaborated a definition of **environmental taxes** that has been accepted by the member states, making comparative studies possible between different countries in terms of tax structure, tax base, revenues, etc.

"…it has been chosen to single out the tax bases that seem to have a particular environmental relevance, and to consider all taxes levied on these tax bases as environmentally related regardless of the motives behind their introduction, their names etc."[33]

According to this definition, then, it is the tax base (e.g. fossil fuels) that determines whether or not they are environmental, hence not the explicit motivation.

A common opinion is that there is no universally accepted definition of a **subsidy** today[34]. Instead, there exist several definitions of what a subsidy is depending on the viewpoint and purpose of the analysis.

A subsidy is defined by the European system of accounts (ESA 1995 §4.30) as:

"…*current unrequited payments from government to producers with the objective of influencing their levels of production, their prices or the remuneration of the factors of production*"[35].

The Swedish national accounts follow the international standard for national accounts and define a subsidy in the same way (which we call SNA-subsidies). In this definition of a subsidy, some forms of payments are excluded, for example capital transfers[36]. This definition is therefore one of the most narrow used by economists, in that it covers only budgetary payments and only those to producers[37]. This means that, for example, transfers such as investment subsidies or support paid from government to the county administrative boards will not be included. We have therefore tried to use wider definitions by adding, for example, investment subsidies and subsidies paid to households to the total environmentally motivated subsidies. These are included in t*able A*.

We also tried to find a suitable definition of subsidies with a positive environmental effect.
There are mainly two different alternatives for a definition of an **environmental subsidy**, given a definition of what a subsidy is. When reporting their environmental subsidies, Denmark uses the definition *"In order to be an environmental subsidy, it has to reduce the use of one or more physical units that have a proven specific negative impact*

[33] OECD [1997], *Statistical framework on environmental taxes in OECD countries*.

[34] Steenblik, R. [2002] *Subsidy measurement and classification: developing a common framework*

[35] Eurostat [2001] *Environmental taxes – A statistical guide*

[36] ESA distinguishes between current and capital transfers and the difference depend on the nature of the receiving party and whether or not market producers are addressed. Eurostat [1995].

[37] Steenblik, R. [2002] *Subsidy measurement and classification: developing a common framework*

on the environment"[38]. The OECD, on the other hand, focuses on the subsidy's motive instead of on the environmental effect in their coming updated database on economic instruments, and therefore names the subsidy, "environmentally motivated subsidy"[39]. With regard to the difficulty in proving a subsidy's positive environmental effect, we decided on using the term "environmentally *motivated* subsidy". According to the OECD definition, it is the original motive of the subsidy that determines whether or not the subsidy is an environmentally motivated subsidy. The specific effect on the environment is therefore of less importance.

Subsidies in Sweden

In order to facilitate the documentation of the environmental subsidies, equivalent categories has been used for the subsidies as for the taxes. These are resource-related, energy-related, transport-related and pollution-related subsidies. No pollution-related subsidies have yet been found in Sweden.

Table A.
Environmentally motivated subsidies in Sweden, 1993-2001

Total environmentally motivated SNA and investment subsidies
Current prices, SEK million

	1993	1994	1995	1996	1997	1998	1999	2000	2001
Total SNA-subsidies	**369**	**367**	**1 276**	**1 090**	**1 806**	**2 875**	**2 628**	**2 182**	**2 306**
Resource SNA-subsidies	248	296	1 110	947	1 638	2 694	2 423	2 028	1976
Energy SNA-subsidies	121	71	152	141	165	178	191	154	314
Transport SNA-subsidies	0	0	14	2	3	3	14	0	16
Total investment and other subsides	**348**	**530**	**646**	**617**	**442**	**651**	**801**	**563**	**888**
Resource-related investment subsidies	0	0	39	70	64	118	87	26	172
Energy-related investment subsidies	178	288	321	303	160	281	451	220	299
Other resource-related subsidies	170	242	286	244	218	252	263	317	417
Total all subsidies	**717**	**897**	**1 922**	**1 707**	**2 248**	**3 526**	**3 429**	**2 745**	**3194**
Per cent of GDP in Sweden	0,05%	0,05%	0,11%	0,09%	0,12%	0,18%	0,16%	0,12%	0,14%

SNA-subsidies are taken from the national accounts. Investment subsidies/other subsidies are collected directly from the responsible authorities (For now: Swedish Environmental Protection Agency, the National Board of Housing, Building and Planning, the Swedish Energy Agency) as well as from the Swedish National Financial Management Authority (ESV).

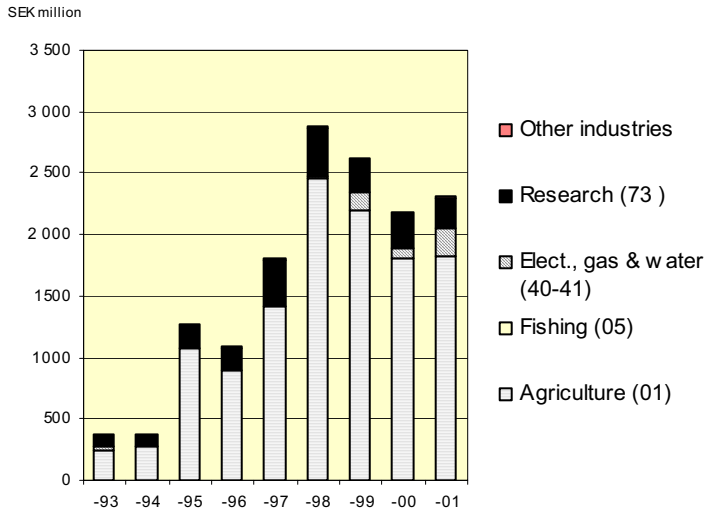
Since the definition of an environmentally motivated subsidy focuses on its motive and not its effects, the large amount of subsidies for public transportation and railways are not included in *table A*. The main motive for these subsidies are regional according to the budget proposals. Despite this, it is interesting to follow these subsidies in the future.

At the moment, only the SNA-subsidies in *table A* can be presented by industries. This distribution is showed in *diagram A*. In a project later this year we will try to distribute also the investment subsidies onto industries.

[38] Hornum [2000] *Environmental taxes and subsidies in the Danish NAMEA.*

[39] Braathens N. A. OECD and information from the OECD database on economic instruments. (http://autoeval.com/eea/index.htm)

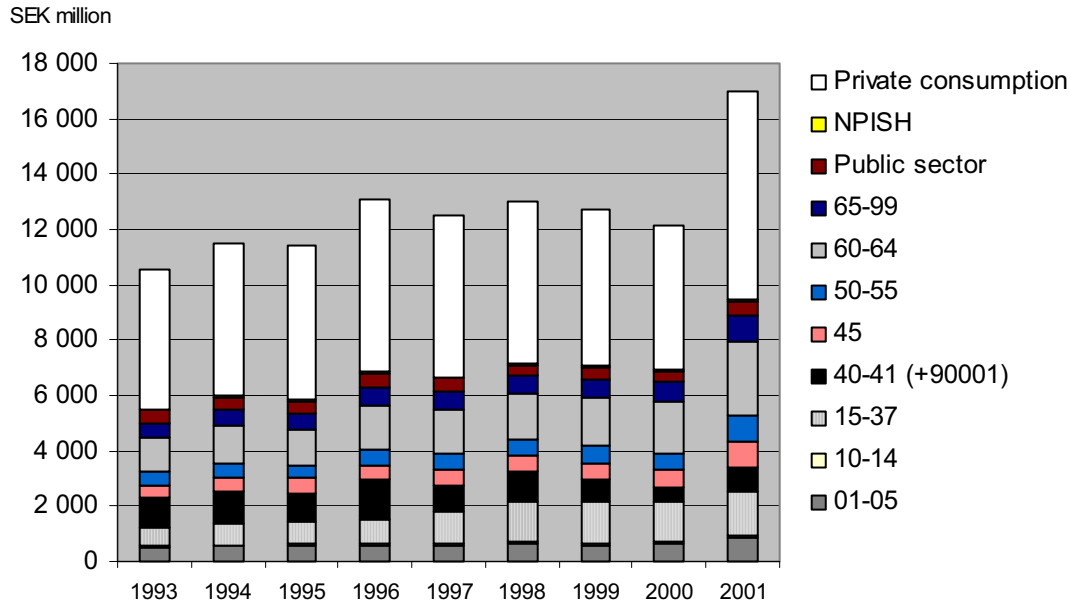
Diagram A.
Environmentally motivated SNA-subsidies by industries, 1993-2001



Environmental taxes in Sweden

All the current environmental taxes can be distributed onto industries. This can be presented in many different ways. Diagram B illustrate the CO2 tax between 1993-2001.

Diagram B.
Carbon dioxide tax by industries. 1993-2001

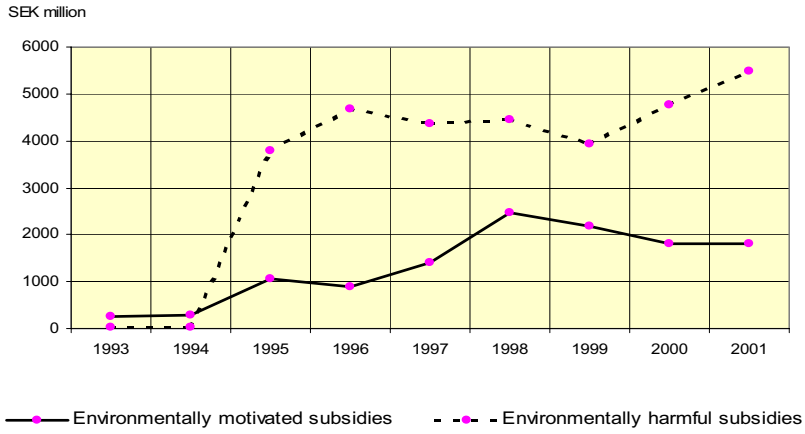


Environmentally harmful subsidies

The only work we have carried out on environmental harmful subsidies occurred in 2000. The starting point for the definition then was a report published by the Swedish Environmental Protection Agency in 1997, which selected some subsidies with a presumed potential negative impact on the environment. Diagram C presents an example of a possible comparison between “motivated” and “harmful” subsidies. All the environmentally harmful subsidies are

taken from the report in 2000. Hopefully we can work more with “harmful” subsidies and subsidies based on also other definitions in the future.

Diagram C.
Environmental SNA-subsidies in the agricultural and fishing sector (NACE 01, 05)



Policy uses in the Swedish SEEA

by Viveka Palm, Statistics Sweden

Key-words: users, analyses of instruments, industry profiles, modeling, web-site, sustainable development indicators

Introduction

In 1993, Statistics Sweden (SCB), the National Institute of Economic Research (NIER) and the Swedish Environmental Protection Agency (SEPA) were instructed by the Government to prepare a study covering the physical links between the economy, the environment and natural resources, the monetary reflection of these relations, and the state of the environment.

The environmental accounts at SCB are a system of physical accounts that are linked to the economic activities described in the national accounts. This system of environmental and natural resource statistics is linked to the industry, product and sector categories used in the national accounts, thus forming a satellite system of accounts.

Data that are produced every year
- Energy statistics
- Air emission statistics
- Economic statistics
- Employment statistics
- Chemical product indicators
- Input-output tables
- Environment industry

Data that is presented with approximately 3-5 years interval
- Natural Resource Accounting Statistics
- Water emissions
- Waste statistics

Data that awaits funding
- Material flow statistics

The data collection is complemented by special analyses, such as the underlying factors of trends, analyses of different aggregates of the data and of different regional analyses.

The aim

The aim of this presentation is to reflect on the institutional setting and the policy questions that have promoted the use of the physical environmental accounts data during this time. What can be done to enhance the use of data further?

Institutional setting

To start with defining what we mean by increasing the use of the data by making it more policy relevant. Our notion of policy use can be expressed as: 'putting the data in forms so that it answers frequent and relevant questions in the area'. In order to understand what questions are of importance several institutional groups and habits have been created.

At the start, the work was defined partly by a report made on Commission from the Swedish Government. The report covered many areas and recommended that data of particular topics should be generated. However, at the same time, it was acknowledged that an international practice would evolve and that a great deal of freedom must be left for the accounts to adapt to these new practices or standards. A reference group of researchers with interest in environment and economic topics was established. This group surveyed the first years of development and gave comments and recommendations on the work. Some of them were also directly involved in using the data in modeling efforts.

After a couple of years the group was not as active as in the beginning and new types of groups were formed to try and establish similar functions. The London Group has of course been one of these points of references. Other

important contacts have been those of prominent environmental accounts in other countries, e.g. Holland, Denmark, Norway, Finland, Germany and the UK, often under the realm of Eurostat Task Forces on various topics.

Today, Statistics Sweden has advisory groups to all the official statistics. The environmental accounts advisory group meet two times a year. The head of the advisory board, Mr Alf Carling, who is a senior expert on environmental economics with a large record of doing work for different government committees, is also available for consultation on a more regular basis. It consists of people from the department of finance, department of industry and the department of environment, the Swedish EPA, the NIER, the WWF, Stockholm University and a representative from Västmanland, one of the counties in Sweden. The participants are asked to contribute for a period of three years.

Besides these meetings, we also use reference groups for some of the reports that are produced. This has generated increased contacts to people in the authorities that we may not otherwise have worked together with.

Reporting

The data is published in **official statistical publications** that give a general overview of Swedish society. The data are also published free in data-bases on the web-site. Many of the publications are also available there. We have a common series of reports together with NIER and SEPA where we publish data and analyses to show what can be done.

An electronic **newsletter** (in Swedish) is produced about four times a year where new publications and new projects are described.

The use of **press releases** is a way to spread the main results of the development work to the Swedish media. Whenever a report is released from the environmental accounts, a press release is sent out, and is usually cited in many newspapers. The citations are collected by our press service so it is possible to see how it was presented.

Contacts with **government commissions** on relevant issues. SCB has an organized service to inform on the government commissions on various subjects. If the subject has connections to environmental accounting we make contacts with the people involved and inform them of data and analyses available.

Network for environmental economists and for LCA-practitioners
We participate in several networks and occasionally we present our work in seminars that are being arranged by these.

The main national Users and Uses

At Statistics Sweden a report was made in 2001, partly on the commission from Eurostat, to investigate and report on the users and uses of the Swedish Environmental Accounts. Some of the results from that report will be discussed. The data have found many different uses and the reports are read by a number of people who uses them to keep themselves updated on environmental accounting in Sweden.

NIER is a public organization that does analytical work for the parliament and other government bodies. Their Division for Environmental and Resource Economics has been a major user of the accounting data from the beginning of the work, and they have served on the steering committees that set up and managed the accounting work.

NIER have mainly used economic data, energy data and air emission data so far. For evaluation studies the forest account data has been used. A medium-term economic forecast model has been developed, which takes environmental aspects into account. The model uses environmental accounting data to link air emissions to productive sectors and assess the economic impacts of different environmental goals. It also is linked to transportation models, since transport is a major source of pollutant emissions and a key input into production. NIER have used this to assess the implications of Kyoto Protocol targets for economic activity. Their wish is to include more types of data, e.g. environmental taxes, in future work.

The Ministry of Finance routinely undertakes medium-term economic forecasts based on a general equilibrium model developed at NIER, which includes some environmental aspects as described above.

The Swedish Environmental Protection Agency is using information from the environmental accounts in many different ways. In 2001, we made a small email-survey asking its personnel who uses the environmental accounts and for what purpose. Many noted that they used it for general information on economic issues, and when preparing reports or speeches.

The Swedish Government has called for a number of studies based on the accounting data. They have created national commissions on climate change, the Committee on Environmental Objectives, the committee for growth and environment, green taxes and Producer responsibility, all of which have commissioned analytical work relating the economy and the environment. These commissions are central to the Swedish process for identifying key policy issues and analysing strategies to resolve them. Thus the accounting data are feeding into high-visibility public debates about tax policy, climate change, environmental policy and economic growth.

The Swedish Environmental Objectives Council (miljömålskansliet) has asked SCB to make a one-day indicator course for the people involved in setting up a system of indicators to follow up on the Environmental Quality Objectives. In this way we have had the opportunity of showing examples of possible analyses that can be made with the environmental accounts. The course has been very appreciated and up till now we have given it on about ten occasions and for approximately 80 people.

The Swedish delegation for sustainable technology (miljöteknikdelegationen), has used data on environment industry. The data is requested by many different actors, some with a regional perspective. For example, the information has been published on regional web-sites (Figure 3).

Figure 3. A web-site describing environmental products and services in Western Sweden.

The Swedish National Labour Market Administration (AMS), has used the estimations on the size of environmental industry in their analyses on employment potential and policy.

The Swedish Trade Union Confederation (LO), has been interested in the linkages between industries and environmental pressure on a seminar on environment and unions, which was held together with **The Swedish Society for Nature Conservation**.

The Office of Regional Planning and Urban transportation in Stockholm (RTK), has commissioned work on regional accounting, as a basis for their analyses.

The Swedish Environmental Research Institute (IVL) Swedish accounting data are being used by consulting firms that advise businesses on their environmental performance. One firm, IVL, has used the accounting data to produce indicators on energy use and pollutant emissions per unit of output for different industrial sectors to help individual firms assess their own performance relative to the norm for their industry, and to help them develop priorities for monitoring their environmental impacts.

The data is also requested by **journalists, universities, political parties, and writers**.

These are examples of national uses, but the data are also used in different international contexts that are not listed here. For a short description of the user needs recorded at the Eurostat ESEA Task Force see appendix.

Future work

The fact that many data sets are depending on the production of statistics from the national accounts has caused problems with the timeliness of the information. Due to extensive revisions and restructuring of the national accounts, the latest time series for air emission accounting data is e.g. for the year 2000. This problem will have to be dealt with, in order to make the information as useful as possible for policy work. A time lag of approximately one year for energy, emission and economic data would be more acceptable.

It becomes increasingly important to make the data available to the users by the means of databases. We already have the publications, which often contain the data that is available until now, on the SCB homepage. This increases availability, and is appreciated by our users. In the future we would like to be able to connect our data also to other national or international data sets.

Modelling work is deeply needed, in order to understand the coupling between the different areas that are part of the environmental accounts. One major topic will be to investigate the properties of different policy instruments. Other types of analyses will be necessary to understand how economic cycles, structural changes, technological changes and behavioural changes affect the outcome of the system.

Further development of the data collection will be necessary for many areas. Newly established areas such as subsidies, chemicals, water emissions, sustainable development indicators and environment industry are still being formed.

The possibilities for combining different types of resource accounts would be of interest. The use of separate resource accounts has not been that widespread, since different authorities already collect similar information for their own needs. However, an overall resource account may find policy uses that are not covered by existing statistics.

International co-operation is a necessary component in the work. The data needs to be internationally comparable. The environmental accounts are well suited for analyses of factors that work on an international level. In the future, we hope to be able to link the Swedish environmental accounts to our trading partners and thus give a more full perspective on the links between environment and economy.

Summary

The data have been used by a variety of actors in Swedish society and has made new analyses possible, which could not be performed with earlier statistics. Future work will, together with refining of the methods to produce the data that is now in the system, be concentrated on getting more timely data and on refining the underlying factors behind the changes in environmental performance.

It is important to present the results in forms that are available for readers without statistical backgrounds to enhance the uses of data. Reports with text and tables together are preferred for many of our users. This also means that recruiting people with expertise from research or policy uses can be valuable.

The areas that receive most interest in Sweden at the moment are:

- Economic instruments: taxes and subsidies, green tax reforms
- Indicators: accounting as a basis for sustainability indicators, social issues
- Chemicals policy: chemical product indicators
- IO-analyses: decoupling & decomposition analysis
- Resource policy: water accounts on catchment/ water district basis
- Sectoral policy: households and Integrated product policy measured from the consumption side
- Modeling: trade emissions, long term economic survey, water accounts

To increase the use of the SEEA it is important to increase and maintain contacts with the consulting and research community. In order to make contacts with large organizations with international policy goals on sustainable development, a coordinated effort would be preferred. Obstacles for use of environmental accounts data on the international level may be that established environmental reporting for international agreements often are based on a non-economic sectoral approach. Still, it is vital for making better policies that the environment economic interaction can be displayed.

Appendix

The EUROSTAT Task Force ESEA

The task force on the European Strategy for Environmental Accounting (ESEA) met 3 times in 2001 and 2002 to develop recommendations for environmental accounting. The focus was on identifying user needs and improving the links between policy needs and European environmental accounting to be achieved through efficient use of available data in priority areas where the statistical system has a comparative advantage.

The ESEA Task Force undertook a comprehensive review of uses and user needs at EU and national level. Identification of EU user needs was facilitated by the participation of DG Environment, DG ECFIN and the European Environment Agency in the work of the Task Force.

The policy trends relevant for environmental statistics and accounts were found to include:

- Problems that require longer-term attention and where regular observation of changes over time and in structure is important (e.g. energy use and climate change, transport, resource productivity), including observing sectoral developments over time (e.g., eco-efficiency of industries in time series).
- Policies are moving towards using State of the environment indicators as targets in some areas (e.g., biodiversity, water quality) thus requiring integrated data-sets that link the economic actors, the environmental pressures, the societal actions and the state of the environment,
- Integrated assessment of policies (cost – benefit analyses, joint analysis of economic, social and environmental consequences).
- The concepts of decoupling, eco-efficiency and resource productivity receive increased attention.
- The focus on theme-specific reporting (transport and environment, waste and natural resource use, etc.), address the contribution of economic development and structural change as key drivers of environmental change and on international aspects such as the environmental burden displaced through imports and exports. All these require integrated data sets.

Understanding user needs requires that statistical bureaus identify the longer-term visions of policy, translate these into specific data requirements and develop data sets for this demand. In practice, many concrete uses can only develop once the data are available.

Indicators for Water and Land Issues

by Jean-Louis Weber, European Environment Agency

Introduction

Policy makers very often ask for environmental information as INDICATORS. At the international level, well know sets of indicators have been established by OECD (environment and agri-environment), the Sustainable Development Commission, FAO (agri-environment), the European Commission (Sustainable development, Agri-environment, Transport-Environment…). The EEA maintains a "core set" of indicators and published regularly indicator based reports in the Signals series.

Indicators are strange objects. They need to be at the same time in small number AND give the appropriate details expected by the user. Indicators need to be explicit and stand alone AND express interactions. They need to be understandable by the general public, decision-makers (generally with cost-benefit considerations in mind) AS WELL AS by scientists.

Environmental accounts can help in solving some of these contradictions.

Accounts are a language. Not only there nomenclatures and definitions are technically useful for cross checking and integrating heterogeneous data sources, but they may help different communities in understanding each other, and in particular understanding the numbers that they use. In that respect, accounts are a sound basis (coherent, exhaustive, structured (nomenclatures, space), transparent…) for calculating monetary indicators related to environment and sustainable development issues as well as for bringing together indicators describing the various aspects of ecosystem condition.

Accounts are an analytical and aggregation model. Of course, the model is only valid when the conservation of value applies: material and energy (1st law of thermodynamics), land. The model doesn't work when systems meet the 2nd law of thermodynamics. It doesn't work either when different measurement units need to be used. However, when the accounting balances are relevant, they supply aggregated indicators (their totals) that can be detailed by sub-indicators related either to their composition or to the sectors (in the broader sense) involved.

Two examples, out of many, can illustrate the arguments. The first one is related to the potential of water accounts to supply a coherent set of descriptive indicators in which it is possible to do data mining for producing operational indicators according to the DPSIR framework.
The second one is about land cover accounts and their flexibility for producing tailored indicators for policy requirements or/and for detailing (downscaling) the indicators at the appropriate level for analysis decision-making. The example of 2 agri-environmental indicators will be commented.

Water accounts: a source for computing operational indicators

The table below is a tentative inventory of the descriptive indicators that can be derived from water accounts in reference to the DPSIR framework. The purpose of this table is to open a discussion on the subject-matter.

INDICATORS & TYPE			ACCOUNTING VARIABLES		COMPUTABLE INDICATORS	
			Natural Asset, Supply & Use, Emission (hybrid) accounts, Satellite accounts	Satellite accounts, SNA		
			Physical	*Monetary*	*Physical*	*Monetary*
DRIVING FORCES	*Socio-economic values*	**Consumption**	Water received by sectors and self-supply	Intermediate and final consumption of water (national accounts)	Accounting variables	Accounting variables
		Production, Supply	Operation of the water resource by the sectors, dams, Supply of water to sectors	Investments in dams, channels, irrigation schemes, sewerage...; running costs of water supply and prices; turnover of the distribution of water	Accounting variables	Accounting variables
		Other	Seasonal demands for amenities (sport, tourism, parks, private gardens…), Abstraction rights allocated	Turnover of sectors depending on water, Abstraction rights allocated	Accounting variables	Accounting variables
PRESSURE	*Use of the resource & Emissions*	**Use**	Abstraction from water bodies (by sectors), minus Water lost in transport and irrigation (returns); Artificial evapo-transpiration & direct discharge to sea (consumption of water)	Abstraction rights used, Value of the distributed water	Accounting variables	Accounting variables
		Emissions	Discharge of waste water, discharge of pollutants (fluxes)	-	Accounting variables	Non internalised costs (social costs) of the use of the water system as a sink
STATE	*Availability & Limiting factors, Water quality*	**Stocks**	Natural and semi-natural assets (reservoirs, lakes, channels, rivers, groundwater, water in soil…)	-	Accounting variables	Asset value of water in reservoirs
		Flows	Precipitation, runoff, infiltration, evapotranspiration; availability of the water resource	-	Accounting variables	-
		Quality	Quality of the available water resource by type of water bodies	-	Accounting variables	Damage costs (Restoration costs or Avoidance costs)
IMPACTS	*Vulnerability of economy, ecosystem and human life*	**Depletion of the resource**	Storage and transport of water; treatment before use	Transport and storage of water, Purification before use	Accounting variables & Seasonal stress, Local shortages, Stress on the river ecosystems	Accounting variables & Economic losses due to water shortages, to the maintenance of minimum flows in rivers
		Degradation of the environment	Quality of aquifers and rivers, quality/ health of water ecosystems	-	Accounting variables	Damage costs (Restoration costs or Avoidance costs)
		Health	Supply of polluted water to households	-	Accounting variables	Health costs related to use of polluted water
RESPONSES	*Society responses*	**Protection activities**	Sewerage and water treatment	Protection expenditure	Accounting variables	Accounting variables
		Changes in Process & Behaviour	Recycling of water, irrigation techniques, desalination of sea water	Costs and economic benefits	Accounting variables	Accounting variables & ecological benefits calculations
		Economic and legal instruments	Abatement of polluting discharges to water; minimum flows and reserves	Taxes, Incentives	Accounting variables	Accounting variables

Land cover accounts: a background dataset for delivering tailored indicator

Land cover accounts are currently implemented at the EEA. The purpose of land accounts is to observe, qualify and quantify the cover of land resulting from ecosystem and land use. Stocks of land cover are described as well as their change. A first set of land cover accounts is under construction using CORINE land cover data from 1990 and 2000. Within this accounting framework, assessments of ecosystem condition has been produced; for example, in the case of European wetlands, spatial data on the change in extension, fragmentation, connectivity and neighbourhoods can provide insights into the possible destruction and stress. These first variables are being supplemented by data on flora and fauna and by quantitative and qualitative data on water. Other spatial data included, are land use in agriculture, urban development and transport infrastructure, which will help to identify the sources of stress. These indicators are defined and implemented in the context of the general monitoring carried out by the EEA on urban sprawl and other land cover change as well as within specific projects such as IRENA, the set of indicators currently developed for agri-environmental issues in Europe by the Agriculture Directorate-General of the European commission with the support of the EEA, the Joint Research Centre of the EC and Eurostat. 2 indicators, related to the consumption of agriculture land by urban development and to the consumption of forest and semi-natural land by agriculture, are produced from the land cover accounts. Advantages are the immediate access to the components of these indicators: major flows and spatial distribution.

This flexibility of land accounts is illustrated with recents results from Italy (provisional):

- summary balance of consumptionand formation of land cover
- a graph summarizing the net change in land cover
- regional comparisons:
    - the whole coastal zone of Italy (10 km)
    - 5 regions
- 1 IRENA indicator

The land accounts being computed for 44 land cover classes, 35 land cover flows and using a grid of 3 x 3 km that allows addressing a range of spatial units such as administrative regions, river basins, mountain areas, coastal zones, ecological zones, ecological corridors etc… the publication of land accounts will remain limited to the needs of EEA reporting.

The results of land accounts will be fully made available on the EEA website with the aim of facilitating access to these data and approaches to a range of users, including researchers, central and local government and the wider public.

Presently, Land & Ecosystem Accounts (LEAC) databases are publicly available (provisional data for circa 15 countries) in a **test version**, including a tool for extracting accounts and producing indicators at:

http://eea.eionet.eu.int:8980/Public/irc/eionet-circle/leac/library

The examples below are proposed as an introduction to the discussion on this second point where the dissemination of relevant data is a key element in policy use.

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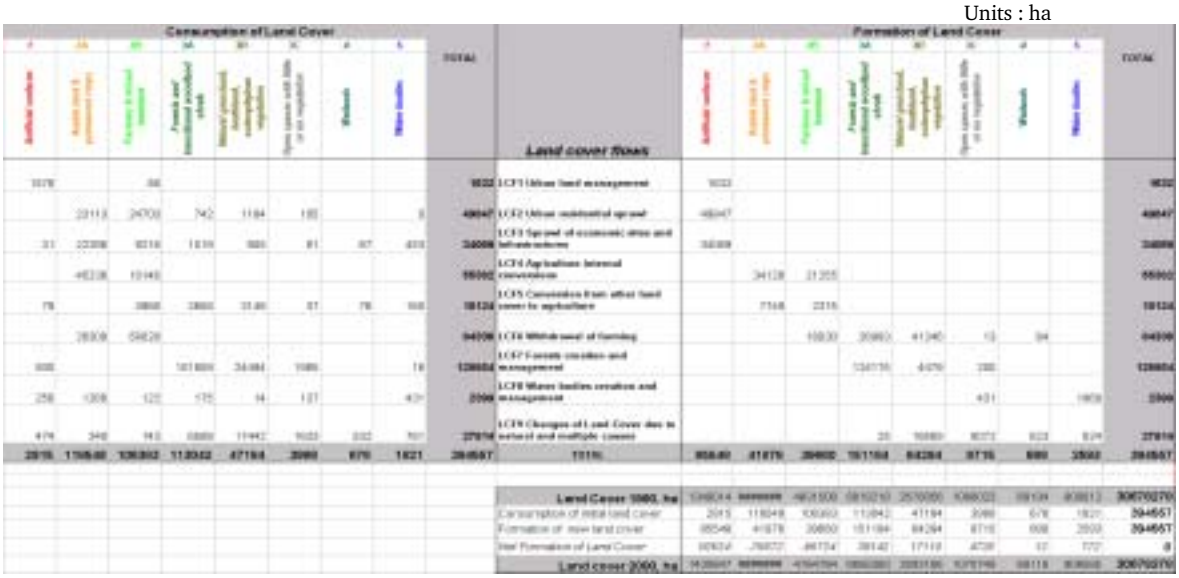


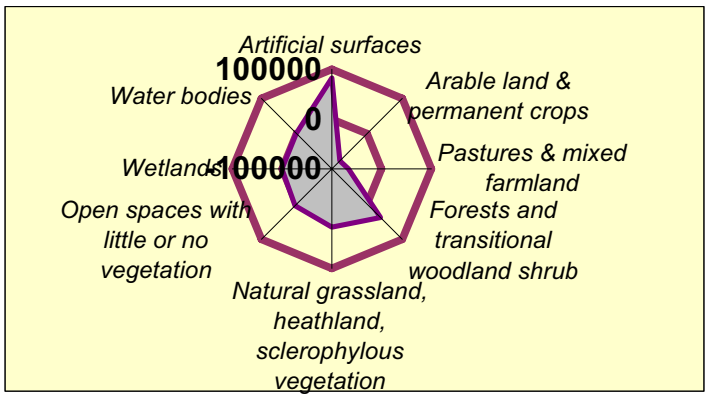
Summary balance of consumption and formation of land cover – ITALY 1990-2000

Units are ha and ha/year

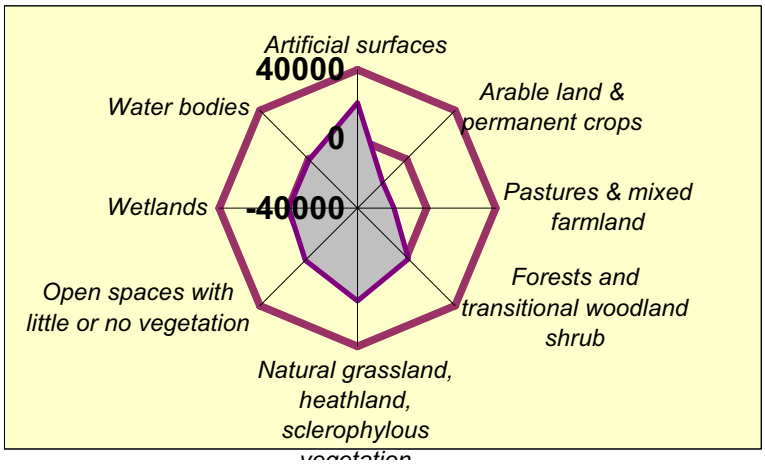
CORINE LAND COVER CLASSES ***Land cover flows***	2A Arable land & permanent crops	2B Pastures & mixed farmland	*TOTAL CHANGE OF THE PERIOD*	*MEAN ANNUAL CHANGE*
LCF511 Intensive conversion from forest to agriculture	1489		1489	*149*
LCF512 Diffuse conversion from forest to agriculture		1169	1169	*117*
LCF521 Intensive conversion from semi-natural land to agriculture	6090		6090	*609*
LCF522 Diffuse conversion from semi-natural land to agriculture		1061	1061	*106*
LCF53 Conversion from wetlands to agriculture	91	145	236	*24*
(1) Formation of agricultural land cover over forests & semi-natural land	**7670**	**2375**	**10045**	**1005**
LCF61 Withdrawal of farming with woodland creation	3044	23939	26983	*2698*
LCF62 Withdrawal of farming without significant woodland creation	23263	34089	57352	*5735*
(2) Consumption of agricultural land cover by forests & semi-natural land	**26308**	**58028**	**84336**	**8434**
IRENA 24a : Net Formation of Agricultural Land Cover over Forests & Semi-natural Land = (1)-(2)	**-18637**	**-55653**	**-74291**	**-7429**

Example of agri-environmental indicator produced from land accounts –
ITALY 1990-2000 (Negative numbers mean that, on the average, farmland abandonment is more important than the new extension of agriculture)

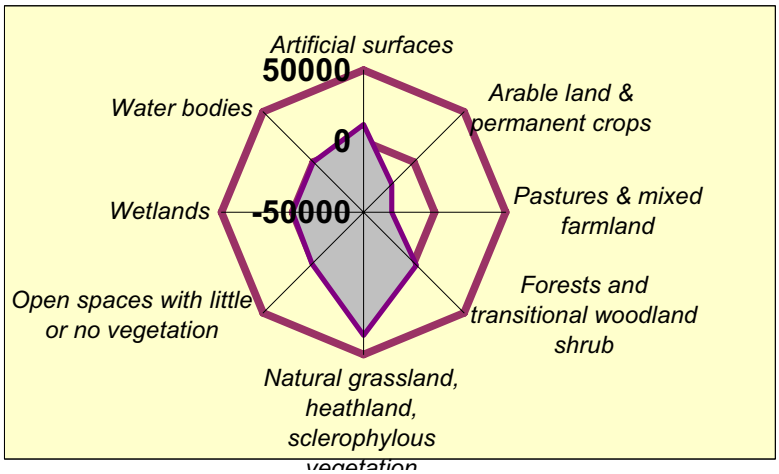
Units : ha



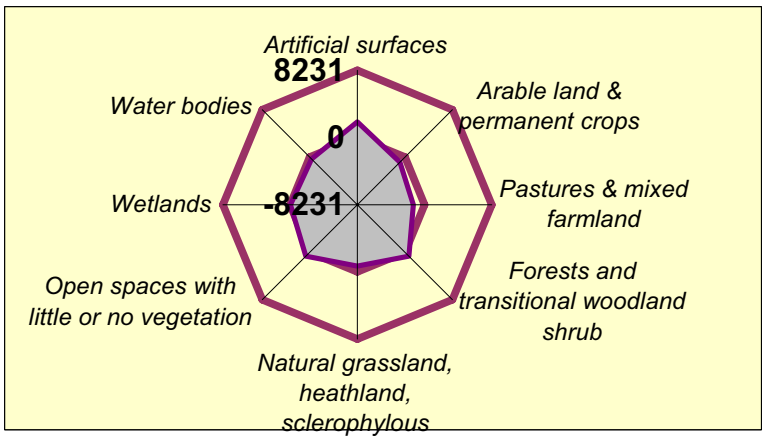
Net land cover change 1990-2000 – ITALY ALL



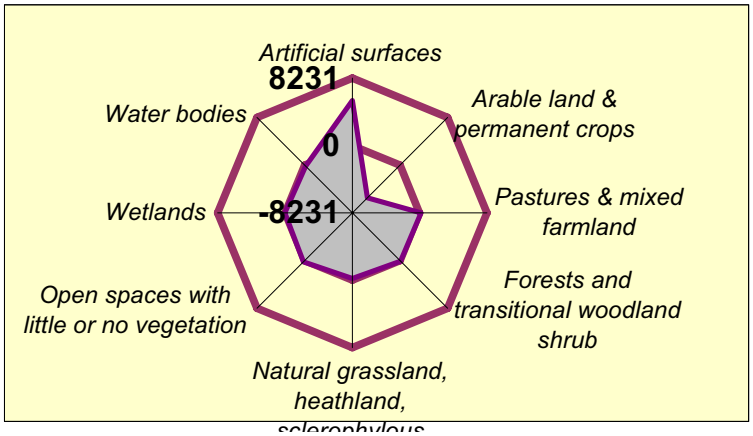
Net land cover change 1990-2000 ITALIAN_COASTS, Units : h



Net land cover change 1990-2000 SARDEGNA, Units : h



Net land cover change 1990-2000 BASILICATE, Units : h



Net land cover change 1990-2000 LOMBARDIA, Units : h

Session 7

Summary of meeting and discussion on future work

Chair: Robert Smith, Statistics Canada

London Group Meeting, Copenhagen 22-24 September 2004

Summary of the sessions, discussion and conclusions for further work

Chair: Robert Smith, Statistics Canada

Presenters:
Ole Gravgård, Statistics Denmark: Subsoil asset accounting
Ilaria DiMatteo, United Nations: Water accounting
Viveka Palm, Statistics Sweden: Social dimension in environmental accounts
Ole Gravgård, Statistics Denmark: Material flows
Jean-Louis Weber, European Environment Agency: Policy uses of environmental accounts
Alessandra Alfieri, United Nations: The relationship between the UN task force on Environmental Accounting, and the London Group
Robert Smith and Aneme Malan, Statistics South Africa: Other issues and arrangements for the next meeting

Rapporteur: Rocky Harris, Department for Environment and Rural Affairs, UK

Summary of presentations

Subsoil assets accounting

Ole Gravgård presented the conclusions of the first session. Further work was needed in the Sub Soil Assets Sub Group on classification issues and on the harmonisation of methodologies.

Other issues which were considered included decommissioning costs, the treatment of renewables, reliability measures, valuation (NPV is the preferred method), social discount rates, the return to capital, the assumed extraction profile, the relationship between the capital and the resource rent calculations, the treatment of negative resource rents and the issue of fixed price calculations.

Although UNSD would note the issue and support the contact between the London Group and the Canberra II group, it was up to individual members of the London Group to approach the Canberra II Group about issues with relevance for subsoil asset accounting.

Future work for the subgroup could cover the compilation of a database on different countries' results and methodologies based on the 2004 questionnaire on subsoil asset accounting that had been completed by member countries and work on guidelines.

In discussion **it was agreed** that due to London Group members´ scarcity of time and resources, the Sub Group needed to focus on specific issues such as for example decommissioning rather than aim to develop comprehensive new guidelines. However the Sub Group could aim at developing an annotated outline for guidelines for subsoil assets before the next London Group meeting. The Eurostat guidelines can be used as a starting point.

It was agreed that Ole Gravgård would write to Sub Soil Assets Sub Group members seeking contributions.

Water accounting

Ilaria di Matteo summarised the session on water accounting. The session reviewed the work of the subgroup and discussed country experiences in the compilation of the accounts. The focus of the subgroup in the short term is to prepare a final draft of the handbook on water accounting. A meeting of the subgroup is planned in New York to review the document. The final draft of the handbook will be made available for a wider consultation after the conclusions of this meeting are incorporated. A list of outstanding issues that need to be addressed in the handbook were identified during this session and members of the subgroup volunteered to address them.

Social dimension in environmental accounts

Viveka Palm summarised the views of the London Group on the links between environmental accounts and wider social and economic issues. The Group was most comfortable with linking household activities and environmental impacts, but had more reservations about the validity of linkages to wider sustainable development issues. The broad conclusion was to finalise the draft report presented at the meeting, and retain informally the Social Dimension Sub-Group as a forum for exchange of views on new developments. During the discussion, UNSD noted that the sub-group on water accounting had agreed, in the longer term to work on extending the framework to include the social dimension. This work would be coordinated with the work of the Social Dimension Sub-Group

Material flows

Ole Gravgård suggested that there might be a need for a Sub Group on Material Flows. In the discussion it was recognised that there was increasing interest in material flow accounting, with OECD being active and the European Environment Agency carrying out a survey of country experiences, but it was unclear what new work would need to be done by the London Group. It was possible that there were some specific issues related to the SEEA which were not being addressed by the OECD, but this was not yet clear.

It was agreed that communications between the London Group and OECD needed to be re-established, and that the OECD would be approached by the London Group Secretariat for a representative to take part in the next meeting.

Policy uses of environmental accounts

Jean-Louis Weber raised the question of London Group involvement in the definition of environmental (and environmentally-harmful) taxes and subsidies. A typology of taxes and subsidies was required and the Group could set out a framework of research in order to define the requirement more closely.

In discussion **it was agreed** that the issue should be taken up at the next meeting, when it should be possible to report on work being done by the OECD, and that in the meantime London Group members would keep each other informed of relevant developments.

It was agreed that policy uses of environmental accounts should be an agenda item at every future meeting of the group (for example, as a session devoted to this topic or during the round table), even though no work within a formal sub group on policy uses should be done within the London Group.

It was **agreed** that it was important to get the accounts recognised and it was **suggested** that the London Group should work with UNDP and the Human development report.

United Nations Task Force/Committee on Environmental Accounting

Alessandra Alfieri reported the results of the discussion of the two-day meeting on the proposal for the creation of a UN Committee on Environmental-Economic Accounting. Countries, international organisations and NGO's that were present at the two day meeting had pointed out that the creation of the Committeee was the way forward to mainstream environmental accounting and to raise the profile of the accounts as the tool to measure sustainable development. Five broad areas of work for the proposed Committee were identified: (a) coordination, (b) promotion of the accounts to the user's community, (c) methodology, (d) technical cooperation and (e) harmonization of data.

London Group members generally welcomed the proposal. They felt that higher level of support for environmental accounting was welcomed, and that improving its official status would help to ensure the continuity of the London Group. There was a general concern among participants whether, by undertaking methodological work, the proposed Committee might duplicate the work of the London Group on Environmental Accounting since the London Group provides a forum for the exchange of experience in the field and plays a major role in the advancement of methodology. London Group members placed great emphasis on the importance of maintaining the London Group as a forum for the exchange of information and ideas and for the discussion of definitions and methodologies. The London group agreed to serve as an expert body on which the proposed Committee could rely

for the development of methodologies and the review of documents prepared by other subgroups. It was recognized that not all expertise lay in the London Group and the proposed Committee might have to form technical expert groups dealing with selected issues. Such subgroups could comprise members of the London Group, as well as academia and other experts (scientists, economists etc.).

It was agreed that UNSD would report on progress at setting up the Task Force on Environmental Accounting to the next meeting of the London Group.

Other issues and arrangements for the next meeting

It was agreed that London Group papers, including Sub Group reports, presentations, country reports and formal proceedings of meetings would be put up on the London Group website, subject to authors' agreement.

Aneme Malan reported that South Africa had offered to host next year's meeting, in October 2005. It was expected that it would be possible to arrange a four day agenda. Statistics Canada were interested in setting up a Sub Group on ecosystem functions; the European Environment Agency would like to report on their work on ecosystem accounts, and there might be other ideas for sub groups emerging from other countries.

On behalf of the London Group as a whole, Robert Smith offered his warm thanks for the generous hospitality of Statistics Denmark in hosting this year's meeting.