Agri-environmental reporting - a national experience

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Abstract
Statistics Norway has gained experience in the compilation of annual agri-environmental statistics since the early 1990s. The main driving force has been the growing need for factual input to governmental policy development and monitoring of environmental performance at farm level. At the outset priority was given to the issue of nutrient run-off from agricultural land contributing to the pollution of coastal waters. Today, the annual report comprises indicators covering 10 environmental policy fields. Data are provided from several internal and external data sources, involving several institutions. The results are presented both in a yearly publication (paper and pdf) to the central government, as well as a more detailed web-presentation serving regional and local authorities.

Over time, the following aspects have been of vital importance:

• Strong user needs
• Sufficient resources to co-ordinate data provision
• Close co-operation between environmental and agricultural statisticians
• A step by step approach
• Sharing experience with other countries
• Support at European level

One should bear in mind that traditional agricultural data on livestock and land use are at the center of attention also for environmental assessments. Sometimes they need to be re-arranged by other regional units, or they may serve as indispensable input to the calculation of nutrient balances or emissions to air and water. Additional data collection should be restricted to areas where adequate administrative data sources are missing.

A future challenge is to combine the national needs with a growing demand of statistics at international level. At the same time the budgets for the production of agricultural statistics are shrinking, and we are constantly looking for more efficient methods and IT-tools; particularly in the area of geographic information systems. In this respect, we hope that the 2010 agricultural census will represent a leap forward.

1. Introduction
Statistics Norway started activities in the area of environment statistics already in the beginning of the 1970-ties. In the first few years, this did not affect the agricultural statistics as such. However, a few elements of environmental interest were included in the Census of Agriculture of 1979.

A more continuous effort on data collection and production of custom-made agri-environmental statistics was not established before 1992. From the late 1980-ties considerable resources were invested each year to reduce water pollution from agriculture, and the governmental ministries of agriculture and environment together developed a system to estimate and evaluate the effects of these efforts. Statistics Norway was approached to provide relevant statistics as input to the evaluation, and a yearly report on agri-environmental performance was initiated. In the first few years all attention was paid to agricultural activities causing soil loss and nutrient run-off, such as land use and agricultural
practices with regard to soil preparation and fertilising. These activity data served as vital
input to the modelling of nutrient run-off by water catchment areas. Gradually, other issues
were taken onboard, and the 2000-report also included information about organic farming,
emissions of greenhouse gases from agriculture and finally conversion of agricultural land to
other uses (conversion to roads, built-up areas etc.). Today, the annual report comprises
indicators covering 10 environmental policy fields.

2. Some features of Norwegian agriculture
To be able to put the system of Norwegian agri-environmental statistics into a perspective, a
few facts of Norwegian agriculture could be useful to bear in mind:
- Agricultural land covers only 3.4 per cent of the total land area, and Norway has the
  smallest area of agricultural land per capita in Europe
- The total size of the agricultural area remains fairly stable, whereas the speed of
  structural change is accelerating. In the last 20 years, the total number of holdings
  has decreased by more than 50 per cent
- Meadows and pastures cover 65 per cent of the agricultural land in use, whereas
  grain and oilseeds cover 31 per cent
- Like in other industrialized countries, the importance of agriculture to the national
  economy is declining. From 1970 to 2009, the agricultural share of GDP fell from 3.1
to 0.4 per cent
- In the same period, the employment in agriculture fell by almost 70 per cent
- The total production volume has remained on 1990-level

Figure 1. Number of holdings and their average size. Norway. 1959-2009

Food production in Norway is primarily restricted by the climatic conditions and the
availability of land resources suitable for farming. One of the most important objectives of
farming is to safeguard the national food supply. Consequently, protecting agricultural land
resources has high priority, and the agricultural sector has been effectively shielded against
foreign competition. During the last 15 years, the multifunctional role of agriculture has been
accentuated. Consequently, agricultural policy has given more weight to these factors, while
the focus on production objectives has been toned down.

3. Some features of Norwegian agricultural statistics
Until the early 1980-ties, the set-up of the official agro-statistical system in Norway remained
quite traditional. The backbone of the system was full censuses every tenth year and yearly
sample surveys in between. In addition, a number of more or less detached statistics on input, production, prices etc. from various sources were maintained. Gradually, administrative data systems for the management of governmental grants to agricultural holdings where exploited to relieve respondent burden on farmers. Other important reasons were to save money and in some instances to improve quality. Today, a larger part of the agricultural statistics is based on solid administrative sources, for instance all the data on land use and livestock. The most important remaining yearly survey is the sample survey of agriculture. During the last decade, the various datasets have been systematically linked into an integrated system, with consistency between micro- and macro level.

Even if UN-principles were indirectly followed, the statistical product was until the early 1990-ties almost entirely designed to answer to national user needs. International co-operation was more or less restricted to exchange of experience with the Nordic countries of Europe. When Norway in 1994 entered an economic agreement with EU, European statistical co-operation became much more important. Even though agricultural policy is exempted from the agreement, a considerable part of the EU legal acts in agricultural statistics is binding to Norway.

4. The importance of traditional statistics
One should bear in mind that traditional agricultural data on livestock and land use are at the center of attention also for environmental assessments. Sometimes they need to be re-arranged by other regional units, like watersheds or landscape regions instead of ordinary administrative area units. They may also serve as indispensable input to the calculation of nutrient balances or emissions to air and water. Additional data collection for environmental purposes should be restricted to areas where adequate administrative data sources or modeling are missing.

5. Yearly reporting of agri-environmental performance
5.1 The set-up
The main aim of the yearly report is to provide information in order to monitor achievements related to various agricultural policy areas and to assess effects of investments to improve environmental conditions within the agricultural sector. The report is made on commission for the Norwegian Agricultural Authority, and every year the content is adjusted to emerging needs of the authority and the Ministry of Food and Agriculture.

Data are provided from several internal and external data sources, involving several institutions. The statistics are presented both in a yearly publication (paper and pdf) to the central government, as well as a more detailed web-presentation serving regional and local management purposes. A considerable part of the information is based on re-arrangement of, or derivation from, existing agricultural statistics. Sometimes, supplementary questions have been added to existing surveys. Only as a last resort, separate surveys on particular issues have been held, like those on the use of pesticides in agriculture.

Within Statistics Norway, 4-5 persons are involved, using in total 1200 man-hours yearly for the preparation of the report. There is a close co-operation between agricultural and environmental statisticians, as well as between statisticians, scientific experts and policy makers.

5.2 Contents
Today, the report contains a background chapter on agricultural structures and ten chapters on various environmental themes. The report may be looked up at http://www.ssb.no/emner/01/04/rapp_jordbruk/rapp_200937/rapp_200937.pdf
Unfortunately, only a brief summary of the report is given in English. Annex I to this paper contains a more detailed list of indicators belonging to each theme.
Table 1: Themes and main indicators of the yearly report on agri-environmental performance

<table>
<thead>
<tr>
<th>Theme</th>
<th>Main indicator</th>
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<tbody>
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<td>Agricultural structures</td>
<td>Agricultural area in use (ha) and number of holdings</td>
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Data availability varies greatly between the various themes. Obviously, there is a plethora of background data on agricultural structures. Norway is also fairly well equipped with suitable data on organic farming, agricultural landscapes, use of pesticides, nutrient discharge to waters and air emissions. Biodiversity is the most difficult theme to illustrate with hard data. Waste and recycling is only restricted to particular types of waste, namely plastics and deliveries of hazardous waste.

Yearly statistics on the conversion of land is restricted to information on permits given by agricultural authorities at municipal level. For the time being, we miss data on the area actually transferred to non-agricultural uses a particular year.

The most conspicuous lack of data is in the area of fertilization and manure handling. There is a need for regional data to feed into nutrient balances and to calculate the potential run-off of nutrients by watersheds. More detailed data on manure handling is also important to improve the quality of air emission accounts.

5.3 Data sources

The current most important data sources are as follows:

- Statistical holding register Statistics Norway
- Yearly sample survey of agriculture Statistics Norway
- Statistics on area use and livestock Statistics Norway
- Survey on the use of pesticides in agriculture Statistics Norway
- Air emission inventories Statistics Norway
- Waste statistics Statistics Norway
- Municipality-State-Reporting Statistics Norway
- Land property statistics Statistics Norway
- Regional environmental programs Norwegian Agricultural Authority
- Sales of fertiliser and pesticides Norwegian Food Safety Authority
- Norwegian monitoring program for agricultural landscapes (3Q) Norwegian Forest and Landscape Inst.
- Calculation of nutrient discharge to water Norwegian Institute for Water Research

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Surveys on the use of pesticides in agriculture have been conducted for 2001, 2003, 2005 and 2008. A separate survey of pesticide use in greenhouses was held for the first time in 2008. The 3Q-program of the Norwegian Forest and Landscape Institute is based on area frame point sampling, and statistics for the whole country are updated every fifth year. The rest of the data sources mentioned are updated annually.

The topics of the yearly sample survey of agriculture changes from year to year. A larger part of the questions concerns traditional issues like labour input, investments, expenditures and forestry. Some environmentally related questions were included from he 1990-ties comprising tillage practices, fertiliser use, storage and use of manure, energy use, pesticide use and irrigation. However, the number of questions has been rather limited, and the frequency for updating has been somewhat arbitrary.

5.4 Lessons learned
5.4.1 The importance of strong user needs
User needs are the point of departure for development of agri-environmental indicators – as it is for all official statistics. Direct dialog with policy makers and researchers to carefully select indicators and reveal data gaps are absolutely crucial. An indicator is also much more meaningful if figures may be given in relation to a particular policy target.

5.4.2 Sufficient resources for data provision and analysis
Without continuous financial support from the agricultural authorities, we would have had to settle for much less activity in this field. Separate surveys to collect new data are very costly. Data provision from other institutions may also be time consuming, particularly if there is a need to come up with new data. Obviously there is a need for sufficient competence to be able to co-operate in a productive way. Fortunately we have been able to maintain a core of experienced staff members to serve this purpose.

5.4.3 Close co-operation between environmental and agricultural statisticians
From the very beginning, agricultural and environmental statisticians within Statistics Norway joined together to develop the yearly performance report. In the first few years, the initiative was on the environmental side. There were several reasons for this: they were more used to operate interdisciplinary, they had developed special skills in collating data from various sources, and they used modern tools to present results. In 1998, the main responsibility for the report was handed over to the agricultural statisticians, but still the environmental statisticians contribute to the chapters on air emissions and waste/recycling.

5.4.4 A step by step approach
The agri-environmental subject area is vast, and it takes quite a bit of patience and experience both to get an overview and carefully select the relevant bits and pieces. When the policy-makers, researchers and statisticians joined together in 1990 to develop a system of yearly performance reporting, it was soon decided to concentrate on one particular issue: Nutrient run-off from Norwegian agriculture affecting the coastal water of the North Sea. Even though, it took a lot of meetings, discussions and testing to come up with the relevant indicators and suitable data sources. Only gradually, other environmental themes were added to the portfolio.

5.4.5 Sharing experience with other countries
The Nordic countries of Europe (Finland, Sweden, Denmark, Island and Norway) have a long tradition of convening for methodological seminars in agricultural statistics. In the last 20

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1 Body responsible for the certification and control of organic farming establishments
years, environmental issues have always been a part of the agenda. Even if the significance of agriculture, as well as the agricultural policies, varies considerably between these countries, the statistical systems have so much in common that we can easily exchange ideas and practices. Presentation of national pilot projects on Eurostat working group meetings have also given valuable input from other countries.

5.4.6 Support at European level
Since the mid 1990-ties, Eurostat has continuously given priority to the development of agri-environmental statistics. The EU-list of agri-environmental indicators draws attention to the policy relevance on European level. Separate studies and national pilot projects with financial support from Eurostat have triggered a wide range of methodological work. Through the years, we have picked up quite a few ideas and guidelines from the activities taken place in both Eurostat and OECD. These activities add importance to agri-environmental statistics on the national level.

6. Future challenges
In the short run we need to improve the web-based version of the yearly environmental performance report. We also want to launch a project for developing a routine on yearly calculation of regional nutrient balances on nitrogen and phosphorous. Obviously this will reveal a need for more consistent statistical information on fertilization and manure handling at farm level.

A constant challenge is to serve both the national user needs and the growing demand for statistics at international level; particularly to feed into the 28 agri-environmental indicators identified by the European Commission. A recent exercise of data deliveries to 7 of these indicators clearly shows that we have a long way to go.

In the long run we need to come up with a system of more regular data collection and collation to provide consistent input to agri-environmental indicators, serving both national and international needs.

At the same time the budgets for the production of agricultural statistics are shrinking, and we are constantly looking for more efficient statistical methods and IT-tools; particularly in the area of geographic information systems. In this respect, we hope that the 2010 agricultural census will represent a leap forward.
## Annex I. Agri-environmental indicators in Norway

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<th>Main indicator</th>
<th>Other indicators</th>
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| **Agricultural structures**        | Agricultural area in use (ha) and number of holdings                           | - Area of various types of agricultural land (grain and oil seeds, other open fields, fully cultivated meadows, surface-cultivated meadows and infield pastures)  
- Reduction in the area of fully cultivated land  
- Number of holdings by size  
- Number of holdings by type of farming  
- Number of domestic animals of various kinds  
- Average size of agricultural area in use per holding  
- Share of the total agricultural area which is rented, by county |
| **Conversion of land**             | Agricultural area permitted to be transferred into non-agricultural purposes (ha) | - Cultivable land permitted to be transferred into non-agricultural purposes  
- Area approved for land reclamation  
- Share of agricultural area being drained |
| **Organic farming**                | Organic share of total production of meat, grain, egg and milk (per cent)      | - Number of holdings with organic farming  
- Organic farming area  
- Organic livestock, by type of animal  
- Number of organic products  
- Number of establishments manufacturing, importing or selling organic products  
- Organic sales as share of all retail sales of selected food products |
| **Biodiversity**                   | Stock of breeding bird species connected to agricultural landscapes (index)   | - Governmental support to maintain certain types of valuable habitats  
- Number of cows belonging to threatened livestock races receiving governmental support |
| **Agricultural landscape**         | Share of agricultural land properties with permanent habitation (per cent)    | - Share of the human population inhabiting land properties  
- Share of agricultural area out of operation  
- Holdings with mountain dairy farming  
- Number of domestic animals grazing outfield at least 8 weeks a year, by type of animal  
- Share of domestic animals of various kinds grazing more than 12 weeks a year  
- Average size of field plots  
- Regional support for maintaining certain landscapes, by type of activity  
- Relative change in number and size of fields, by county  
- Relative change in various linear and punctual landscape elements, by county  
- Hix-index for landscape diversity |
| **Fertiliser and manure**          | Total consumption of mineral fertilizer in agriculture (tonnes of N, P and K)  | - Calculated animal manure units, by type of animal  
- Average animal manure units per holding, by county  
- Amount of P in manure spread on meadows and pastures, by county  
- Amount of P in manure spread on open field, by county  
- Average amount of N and P in mineral fertilizer used per ha of grain and per ha fully cultivated meadows  
- Amount of sewage sludge used in agriculture  
- Total application of N and P in agriculture, by nutrient source (fertilizer, manure, sludge, bone meal) |
| **Use of pesticides**              | Risk of harmful effect to environment and to human health (index)             | - Amount of pesticides (active ingredient) used in agriculture, by main type of pesticide  
- Share of area treated at least once with pesticides, by type of crop  
- Average number of treatments, by type of crop  
- Total sales of pesticides, by main type of pesticide  
- Area provided with support for mechanical abatement of weeds |
| **Energy use**                     | Amount of energy used in agriculture (J)                                      | - Use of electricity in agriculture, in total and per holding  
- Use of diesel in agriculture, in total and per holding  
- Use of electricity and natural gas in greenhouses  
- Use of various types of fossil fuels and bioenergy in greenhouses |
| **Nutrient discharge to waters**   | Discharge of tot N and tot P from agriculture (tonnes)                        | - Risk assessment of Norwegian water bodies  
- Discharge of P and N to freshwater, by type of |
<table>
<thead>
<tr>
<th>Category</th>
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</tr>
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<tbody>
<tr>
<td><strong>industry and county</strong></td>
<td>Supply of tot-P and tot-N to coastal waters, by type of industry</td>
</tr>
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<td></td>
<td>Tillage practices on grain fields: Share of grain area ploughed in spring.</td>
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<td></td>
<td>Share of area with no tillage</td>
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<td></td>
<td>Share of grain area with soil cover during winter, by county</td>
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<td></td>
<td>Number of new ponds and wetlands established with governmental support</td>
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<td><strong>Air emissions</strong></td>
<td>Emissions of nitrous oxide (N\textsubscript{2}O) from agriculture (tonnes)</td>
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<td>Methan (CH\textsubscript{4}) and ammonia (NH\textsubscript{3})</td>
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<td>Emissions of CO\textsubscript{2}, SO\textsubscript{2}, NO\textsubscript{X}</td>
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