Statistics Netherlands

Report

Testing the compilation of the SEEA-AFF for the Netherlands

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1. Introduction and goal of the project

In commission of Eurostat the manual for compiling agricultural statistics according to SEEA concepts and definitions (SEEA-AFF) has been tested by Statistics Netherlands (Dutch: Centraal Bureau voor de Statistiek, CBS). The findings are presented in this report. The project aims at several different aspects regarding testing the SEEA-AFF. The main objective is to assess the possibility to compile the tables of the SEEA-AFF. In order to do so, it will be assessed which data sources are already available and which data is lacking or no longer collected in the near future. Furthermore, the value added of SEEA-AFF will be investigated and recommendations for potential extensions will be given. Although the focus during the project was on data sources of the Netherlands, where possible references to Eurostat tables are made to indicate data availability for other EU Member States. The lessons learned with regard to data compilation and value added of SEEA-AFF will be shared.

The FAO (FAO & UNSD, 2016) is currently working to develop a subsystem of the SEEA (System of Environmental-Economic Accounting) on Agriculture, Forestry and Fisheries (SEEA-AFF), in close cooperation with many international organisations, including Eurostat. The SEEA is set up according to internationally agreed standard concepts, definitions, and classifications. The SEEA framework follows a similar accounting structure as the System of National Accounts (SNA) in order to facilitate the integration of environmental and economic statistics. The SEEA Central Framework (SEEA-CF) was adopted as an international statistical standard in 2012 (UN et al., 2014).

The SEEA-AFF is a statistical framework in which the relationship between the environment and the economic activities of agriculture, forestry and fisheries are shown (FAO & UNSD, 2016). In SEEA-AFF several base accounts are described, which have been designed to bring data from ten primary domains, ranging from economic to environmental aspects, into an accounting structure that reflects the SEEA-CF and standard accounting approaches.

This report has been structured as follows: section 2 gives a short overview of the Dutch agriculture, forestry and fisheries sectors. With this in mind, conclusions and recommendations on the various base accounts can be put in perspective. Additionally, this section describes the main methods and data sources used. Section 3 will give the results for each base account. The relevance for each individual table is described, clarifications on the data is given, together with changes to the proposed structure of each table. Lastly, for each table recommendations for methodological issues, data collection, or implementation are given. Section 4 gives some main recommendations with regard to the four combined tables. In the last section conclusions, discussions and the main recommendations are presented.

Belonging to this report is an appendix which includes all SEEA-AFF tables compiled during the project. This appendix is presented in a separate (Excel) document.

2. Main methods and data sources

2.1 Agriculture, Forestry and Fisheries in the Netherlands

Looking at the Agriculture, Forestry and Fisheries (AFF) sectors in the Netherlands, these sectors have total added value of 1.8 percent of the total Dutch GDP (Statistics Netherlands, 2016e) and a total of 161 thousand jobs (full-time equivalents) (Statistics Netherlands, 2016d) in 2015. Although the added value in the Dutch economy is relatively small, Dutch agricultural products have a significant contribution in international trade. Dutch agricultural products are widely exported: 4 percent of total exports are agricultural products (Statistics Netherlands, 2016f). These are products such as ornamentals, seed onions and potatoes, greenhouse vegetables (such as tomatoes) and milk and milk products. The largest of the three AFF sectors is agriculture (output 28,573 million euro). Fisheries is small in the Netherlands (output 498 million euro) and forestry is almost negligible (output 264 million euro) (Statistics Netherlands, 2016e).

Both crop production and livestock farming are important for the Dutch agricultural sector. Livestock farming is dominated by intensive farming of poultry and pigs and more extensive dairy cattle farming. Concerning crop production, the Netherlands has a unique situation because of its use of greenhouses in the production crops such as tomatoes, bell peppers and ornamentals. This has implications for the compilation of the SEEA-AFF as will be described in section 3 of this report.

It should be recognized that further processing of agricultural products by the food processing industry is also relevant: in 2015 the food processing industries contributed with 2.2 percent to total Dutch GDP (Statistics Netherlands, 2016e).

2.2 Methods

To investigate the necessary data sources, meetings were organised with several experts on the different topics covered by the SEEA-AFF such as agriculture, pesticides, fertilizers, fisheries, land and water. These experts are both from Statistics Netherlands as well from Wageningen Economic Research (formerly LEI). As these experts are from a variety of backgrounds (environmental accounts, environmental statistics, agricultural statistics and national accounts), it is believed that a good overview has been created on which parts of the SEEA-AFF can be compiled and the existing data gaps.

Reference year for the compilation of the SEEA-AFF is the year 2012. This is the most recent year for which most of the data sources are available. Nevertheless, in some cases 2012 was not a good reference year. Either because data was not available for that year, or because data sources have been changed and another year gives a better idea of the data sources available in the future.

Since available data sources are collected for other purposes than SEEA-AFF, it is investigated which population, concepts and definitions are used and how these differ from the SEEA-AFF concepts. Where possible, data is adjusted to be in line with the concepts of SEEA-AFF. However, sometimes this was not possible because more research is needed or because it was demanding to adjust the data. In this case, this has been described in the respective section.

For many tables, the requested level of detail was not available. In some instances, it is believed that with some effort data can be produced on crop or product level. However, to produce the

detailed data was beyond the scope of the current project. The level of detail mostly available is on economic sectors as they are used in the Dutch national accounts, environmental accounts and most of the agricultural statistics. Those economic sectors relevant for the AFF sectors are:

- Arable farming, which is production of crops that will be used in industrial sectors for further processing.
- Horticulture, which is production of crops that will mostly directly go to final consumers.
- Livestock farming, which is production of livestock and livestock products.
- Other agriculture, which includes mixed farming and agricultural service sector.
- Forestry, which includes activities in forestry.
- Fisheries, which includes fishing and aquaculture activities.

In the sections below, data on the AFF sectors are often complemented with data from non-AFF sectors, such as the food processing sector which uses the output from the AFF sectors to produce final consumption goods.

The assumption made in this report is that the boundary of agricultural activity lies in explicitly those agricultural businesses selling and producing for the market. This means that, for example, so-called hobby farming and kitchen gardens are not part of the accounts in section 3. However, this might not be the relevant population boundary for the SEEA-AFF. Additionally, and related, one general issue with the methodology outlined in the manual of the SEEA-AFF (FAO & UNSD, 2016) is that the boundary between environment and economy has not been clearly set out. For example, if cultivated land is considered part of the environment one should account differently for extraction of crops and crops residues than if cultivated land were part of the economy. In the former case the flow from the environment to the economy is recorded as the harvest of crops, in the latter case it is recorded as the uptake of CO_2 by crops.

2.3 Commonly used data sources

Several data sources have been used in different tables. In this section, we will elaborate more on these data sources.

2.3.1 Material Flow Monitor:

The Material Flow Monitor (MFM) (Pol-de Jongh, Keller, & Delahaye, 2016) is produced by the environmental accounts team of Statistics Netherland. The Monitor consists of physical supply and use tables (in kilos). These tables show flows of products, residuals and natural resources to and from industrial branches within the Dutch economy, households (consumption), the environment and other economies (imports and exports). The physical use and supply tables are mainly derived from the monetary use and supply tables of the national accounts. The tables are complemented by additional data on physical flows that have no monetary value like residuals (e.g. waste and CO_2 emissions) and natural resources. The MFM follows definitions and concepts of the SEEA-CF and can therefore mostly directly be applied to the SEEA-AFF. The detailed tables of the MFM consist of the agricultural economic sectors as outlined in the previous section and holds data on approximately 50 agricultural products. This data source has been used for the accounts on crop products (section 3.1) and livestock products (section 3.2).

2.3.2 Agricultural Census:

In the Agricultural Census an overview is given on the structure of the Dutch agriculture, including data on farms, livestock and crops (Statistics Netherlands, 2016c), produced by the agricultural statistics team of Statistics Netherland in cooperation with Netherlands Enterprise Agency (RVO). The Agricultural Census is part of the Farm Structure Survey from Eurostat. The Dutch Agricultural Census is held every year. All firms that produce and sell agricultural products, with the exception of very small firms, are part of the census population. All firms in the population are obliged by law to take part in the census. From the Agricultural Census statistics on national, regional and municipality level are made for agricultural land use, acreage for different crops, number of firms, number of livestock, employment and financial data.

The Agricultural Census has been used in the compilation of the national accounts directly, with adjustments in concepts if necessary. At the same time, data from the Agricultural Census has also been used directly in the SEEA-AFF as described below. For example, the asset account of livestock (section 3.3), plantations (section 3.4) and the land use account (section 3.17) are (partly) be derived with data from the Agricultural Census.

2.3.3 The Netherlands Pollutant Release & Transfer Register:

The Netherlands Pollutant Release & Transfer Register (PRTR) (Government of the Netherlands, 2016) is a project in coordination of the National Institute for Public Health and the Environment (RIVM) where different institutions (including Statistics Netherlands, the Netherlands Organisation for Applied Scientific Research (TNO) and Deltares) cooperate. The aim of the project is to create a single database for all emissions to air, water and soil in the Netherlands. The register contains more than 350 pollutants, selected based on international reporting obligations (e.g. Kyoto Protocol and EU obligations).

Many of the different data sources used to compile the SEEA-AFF tables have their origin in the PRTR. For example, the nutrient cycles data used section 3.15, the SEEA-CF air emission accounts in section 3.14, and the SEEA-CF physical energy flow account in section 3.13 all have the PRTR as the source for data collection.

3. Base Accounts

3.1 Physical flow account for crops

3.1.1 Relevance

We were able to fill the table to a large extent with data. The supply and use of crops account is seen as relevant for the Netherlands as crop products are important for the Dutch economy. Although in terms of its share in GDP crop products have a low contribution, but in terms of exports crop products are relevant to the Dutch economy. Especially ornamental products, tomatoes, onions and seed potatoes are exported on a large scale.

3.1.2 Data availability

Data used in this table is taken from the Material Flow Monitor (MFM) (see section 2.3). The MFM data on crops is derived from international trade statistics, agricultural statistics, manure statistics and the national accounts.

Data that is not available at the level requested in the table is data on gross production, harvest losses and post-harvest losses. The MFM provides data on the total extraction of primary crops. This is similar to the total gross production. The difference between total crop supply and the extraction from the MFM would give an indication on the total harvest losses. More time is needed to investigate the possibility to use extraction data from the MFM to be used in this table. For post-harvest losses, information on waste of *animal and plant products* is available from the MFM but not on product level.

Data on the use of products, such as for energy production, is not available for each type of crop. However, information on the amount of biomass used for energy production would be available.

Information provided by the column *Used for energy products* is very interesting as this form of energy production might become more relevant in the future because of the transition toward sustainable energy production. However, data on this topic are not recorded in the Netherlands, as the production of energy products with crops is very small.

3.1.3 Clarification on used table entries

The category *Other cereals* includes mainly maize and barley. *Other vegetables* includes capsicum, cucumber, cabbage, mushrooms and some less important vegetables such as chicory. The main part of *Other fruit* are pears. *Import crops* is the category of crops that are mainly imported, including soy beans, legumes, cocoa beans, citrus fruit, tobacco, herbs, rice, nuts, cotton, etc. A very small part of these products is produced in the Netherlands, such as kidney beans. This clarifies some of the non-zero entries in the domestic supply of import crops. Fodder crops are mainly green maize.

In the lower part of the table, *Processed cereal products* includes flour, oil products, and alcoholic beverages such as beer. The *processed fruit and vegetable products* includes fruit juices, frozen vegetables, and canned fruit. *Other food products* includes cocoa products (paste, butter and powder) and tobacco products. *Other non-food products* includes thread and fabrics.

In line with the SEEA-AFF manual, the processed products are chosen to be based on the first step in the supply chain. This seems to be suggested by paragraph 3.25 of the manual (FAO & UNSD, 2016, p. 58):

"*The SEEA Agriculture does not aim to articulate the full value-added or supply chain associated with agricultural production; rather, it aims to identify the boundary around the first step in the chain from the agricultural industry to other producers.(…)".*

As an example, the supply and use of cocoa products (paste, butter and powder) are included in *Other food products*, but the supply and use of chocolate products are not.

3.1.4 Changes to structure of the original table

Some changes have been made to the structure of the rows and columns with regard to the original SEEA-AFF table. These changes are discussed here.

Row-entries:

The SEEA-AFF manual recommends to make use of the raw commodity equivalence (RCE) for the processed products. Conversion of products to RCE was beyond the scope of this project. Also, the value added of converted products is not completely clear. The manual suggest that this conversion is necessary in order to allocate the different uses of certain crops (e.g. fodder or energy production). However, by showing the user of the product (energy producer or cattle breeder) it already becomes clear what the use of the product will be.

Because processed products are not converted to RCE the raw products are presented in the upper part of the table and processed products in the lower part. The same row structure is used in the physical flow account of livestock products. If the raw commodity equivalent is not used we think this structure makes more sense than the structure of the original table.

According to the SEEA-AFF manual row-entries in the table are selected for the most important crop products in the Netherlands. Selection has been based on economic relevance. Some of economic relevant crops are not produced domestically. Therefore, the category *Import crops* is included which takes together the economic relevant crops that are not produced domestically.

The Dutch agricultural sector is unique because of its large share of ornamental products. Therefore, row-entries are added to account for this.

Column-entries:

The columns of agricultural and manufacturing industry of the supply are separated into different agricultural and manufacturing industries. The manufacturing industry has been divided into *Fodder industry* and *Food industry*, this in recognition to the aim of the table to provide a link between the agricultural industry and the consumption of food products. The column *Other* includes other manufacturing industries (besides food and fodder) and non-agriculture and non-manufacturing industries, such as services industry. Although entries in this column are small they are needed in order to balance the supply and use.

The column *Total output* is taken out, since it is unclear what the aim is of including this column.

The same level of detail in the different industries has been applied to the *Intermediate consumption* columns in the use table. This provides more insight into the use of crop products by the different agricultural sectors and manufacturing sectors.

The column *Gross fixed capital formation* has been added in order to stay close to the national accounts. Although this column is not very relevant for crop products (most entries are zero), for nurseries this column is needed in order to balance supply and use. In short, gross fixed capital formation accounts for the change in use of durable products (existing longer than one production process).

3.1.5 Recommendations

We would like do the following recommendation for this table:

- The boundary between economy and environment is unclear. If agricultural land is part of the environment, harvest should be recorded as flows from the environment to the economy. This issue has also consequences on how to record harvest losses.
- The production boundary of crops is not clearly stated in the SEEA-AFF manual. It is suggested to make reference in the manual to, for example, the Farm Structure Survey or the crop statistics to make the product boundary more clear.
- Align columns and rows more according to SEEA/SNA classification. This would imply not to include kind of use (e.g. energy production, food or feed) in the columns. Rather, the type of industry that uses (processed) crops (e.g. energy producers uses crops for energy production) should make this clear. Otherwise a new row entry should be introduced, e.g. wheat used for food production and wheat used for energy production.
- Provide more detail in the columns in order to make the role of the different industries more apparent, especially in intermediate consumption.
- Industries are allocated by ISIC category by determining the main economic activity. However, it is possible that, for example, agriculture has some minor production of processed goods, like cheese. Therefore, we would recommend not to block entries of agriculture for processed commodities or industry for raw goods by shading these specific parts in the table.
- The inclusion of the columns harvest loss, food waste, and post-harvest loss are serving the same goal. Namely, tracking how much of the crops is lost from beginning to end in the supply chain. Although this information is very interesting, it is difficult to collect. One needs very specific data if one wants to include it with different crops and crop products. One could take two approaches: first, by collecting detailed waste data. In the Netherlands, but also in other countries information on waste production is recorded. Although this information is not at the level of different crops, vegetable waste is often distinguished as separate category. Also according to SEEA and SNA products (including waste) should be recorded in the table rows and not the columns. It is therefore recommended that information on crop losses and waste is recorded as waste in a row-entry. Another approach possible is that of information from national accounts in the columns *Changes in inventories*. This seems to be suggested in the manual (section 2.4.8 of FAO & UNSD, 2016). However, this approach has not yet been investigated.
- The SEEA-AFF manual recommends to allocate products used by restaurants to household final consumption (FAO and UNSD, 2016, para.3.40). In the table above, this recommendation is followed. However, this is not in line with the guidelines of SNA where the restaurant industry is included in the service industry. We would recommend to separately identify restaurants in the table.
- Provide more information on how to deal with the extraction of crops from cultivated and non-cultivated land. Although this issue is negligible for the Netherlands it might make considerable difference in other countries whether one includes or excludes non-cultivated land.

- Although information is more difficult to produce, it might for some countries, especially the Netherlands, be relevant to look at differences between open-field horticulture and horticulture in greenhouses. Horticulture in greenhouses are a significant part of the Dutch horticulture and this sector is very different regarding environmental consequences. Taking up this issue in the manual would improve the SEEA-AFF.
- An addition to the table that would be of high interest for the Netherlands would be the flow of organic crop products. Organic farming gets a lot of attention because it has potential to economically grow in the future and to reduce environmental pressures. Unfortunately not much data on organic farming is available yet but maybe it would still be good to incorporate organic farming in the SEEA-AFF.

3.2 Physical flow account for livestock products

3.2.1 Relevance

The table is relevant for the Netherlands as livestock products are an important part of the Dutch economy, especially in terms of exports. Additionally, the large amount of livestock in the Netherlands results in environmental pressures especially with regard to manure production and methane emissions from enteric fermentation.

3.2.2 Data availability

Data used in this table is taken from the Material Flow Monitor (MFM) (see section 2.3). The MFM data on livestock products is derived from international trade statistics, agricultural statistics, and the national accounts.

No data is available of the meat waste produced by households for each type of meat. Only information on total animal and vegetable waste is available from the MFM. However, animal waste will also be discarded together with other waste, in which case it is recorded as mixed waste. Therefore it might be very difficult to estimate the amount of waste produced for each type of meat. Another approach that could be taken was already suggested in section 3.1 in the discussion around crop products.

3.2.3 Clarification on used table entries

The category *Other animals* includes sheep, goats, horses and asses used in the agricultural sectors. These animals are not the majority in the agricultural sector in the Netherlands. However, they might be very relevant in other countries and need a separate row-entry. Note that horses and other animals used in riding stables, for example, are not taken into account in the agricultural sector. The category *Other meat* includes meat produced from *Other animals*. *Other slaughter products* includes products such as fat, hides, and skins.

The category *Other animal products* includes other products taken from living animals (without slaughter) that are not eggs or raw milk. Most of this category is taken up by natural honey and raw wool.

The *Processed milk products* includes products that have a significant input of raw milk, such as milk and cream, butter and cheese.

The processed products are chosen to be based on the first step in the supply chain of final products as already described in section 3.1

Non-managed rearing of livestock and products from non-managed livestock are negligible for the Netherlands. Therefore, no attention has been paid to explicitly account for these products in this table, as was suggested by paragraphs 3.61 and 3.62 of the SEEA-AFF manual (FAO & UNSD, 2016, pp. 62-63). It is recognized, however, that for other countries such as Spain and Austria this could be more relevant to accounted for.

3.2.4 Changes to structure of the original table

Note that the units of the data in the table are all in million kilos, rather than partly in heads/number. This is mainly done for practical reasons since the MFM is produced in kilos. For animals, data is available in heads (see section 3.3) and for eggs and milk a recalculation method could be used to produce the data from the MFM into numbers instead of kilos.

Row-entries:

The SEEA-AFF manual recommends to make use of the raw commodity equivalence (RCE) for the processed products. Conversion of product to RCE was beyond the scope of this project.

Row-entries in the table are selected for the most important livestock and livestock products in the Netherlands. Selection has been based on economic relevance. The category *Processed wool products* from the original table has been left out since production of wool products is not significant in the Netherlands.

Column-entries:

The columns of agricultural and manufacturing industry on the supply side of the table are separated into different agricultural and manufacturing industries: for agriculture the three main activities are arable farming, horticulture and livestock farming and the remaining agricultural activities are categorized into *Other agriculture*, which is in the case of livestock products mainly mixed farming. The manufacturing industry has been divided into *Food industry* and *Other industry*, this in recognition to the aim of the table to provide a link between the agricultural industry and the consumption of food products. Other manufacturing industry and other industries are taken together.

In the use table, intermediate consumption has been divided between *Livestock farming*, *Food industry* and *Other (manufacturing) industries*. This gives a better overview of the use of livestock products in different production processes. For example, living animals are not only used for meat production in slaughterhouses: part of the living livestock is traded between different farms in the agricultural sector.

3.2.5 Recommendations

- Provide more information on how to deal with the extraction of products from wild animals. Although this issue is negligible for the Netherlands it might a make considerable difference in other countries whether one includes or excludes wild animals and products thereof.
- Provide more detail in the columns in order to make the role of the different industries more apparent, especially in intermediate consumption.
- It should be recognized that the supply of livestock and livestock products cannot be clearly allocated to either the agricultural or manufacturing industry. This is especially the case with processed products: for example, a small part of the processed milk products (for example cheese) are produced by the farms themselves rather than in the manufacturing industry. Therefore, we would recommend not to block entries of

agriculture for processed commodities or industry for raw goods by shading these specific parts in the table.

- It is recommended to have a different approach towards the *waste* column. In line with standards in environmental accounting, waste should be a row-entry instead of a column-entry. This way, one gives a clear overview of not only food waste by households, but additionally waste in the production process and the use of that waste. For example, one could add a row-entry called *animal waste*. This row would then give an overview of the suppliers and users of animal waste (note: one should in this case also add a column *Households* on the supply-side, to show the amount of animal waste supplied by households). Segregating the waste entry into different types of animal waste (e.g. animal waste from cattle or poultry) is, in our opinion, only feasible to achieve by estimation. Therefore, we suggest to add waste as a row entry and use *animal waste* as a single entry without any specification.
- The SEEA-AFF manual recommends to add the products used by the restaurant industry to the household final consumption (FAO and UNSD, 2016, para.3.40). In the table above, this recommendation is followed. However, this is not in line with the guidelines of SNA where the restaurant industry is included in the accommodation and food service activities (ISIC I).
- An addition to the table that would be of high interest for the Netherlands would be the flow of organic livestock products. However, this would not an easy task to achieve as data are not readily available.

3.3 Asset account for livestock

3.3.1 Relevance

As mentioned in the previous section, livestock is rather important for the exports of the Dutch agricultural sector. Therefore, an asset account of livestock is relevant.

3.3.2 Data availability

Data for the livestock asset account are taken from several different sources. Data on the opening and closing stock comes from the Agricultural Census (see also section 2.3). The Agricultural Census uses the reference date of April 1st. A proved method is applied to calculate the number of livestock on January 1st. The data for the number of animals slaughtered are from the Netherlands Food and Consumer Product Safety Authority and compiled by Statistics Netherlands.

The imports and exports data are taken from the International Trade statistics produced by Statistics Netherlands.

Information on the number of births, natural deaths, and other additions and reductions in the livestock is not available at Statistics Netherlands. However, in the Netherlands there are strict protocols regarding registration of cattle, pigs, poultry, sheep and goats. This data is collected by Netherlands Enterprise Agency (Netherlands Enterprise Agency (RVO), 2016a). Therefore, it would be possible to have more information on the livestock. The missing elements are for now accounted for by the inclusion of a balance column.

3.3.3 Clarification on used table entries

Data in this table is straight forward. The physical flow accounts of livestock (section 3.2) makes a distinction between mature and young animals for example piglets and pigs). In this table it is not possible to make this distinction because a piglet becomes a pig when it gets older, for example. Then a column has to be added that accounts for a transition between piglets and pigs, for example. This has not been done and the problem is solved by taking young and mature animals in the same categories. Although this might for policy decision not the best solution. Nevertheless, this problem does not occur for all animals. For example, veal calves are mostly slaughtered before they become mature.

3.3.4 Changes to structure of the original table

Because of the missing data on some additions and reduction to stock, a balance column has been added. Instead of using a balance column, one could also add a *Net Growth* column. This could be interesting in light of a quality indicator where the stock is divided by net growth. As this gives an indication of the average age of the types of animals, changes herein could be tracked over time.

3.3.5 Recommendations

- Similar to the physical flow accounts for livestock and crops, an interesting extension would be to account for organic livestock farming.
- It is recommended to make a distinction between young and mature animals. This information may have an effect on the carrying capacity of agricultural areas and estimates the potential output of livestock products and associated environmental impacts. However, this brings some practical problems to accounting which have to be solved (see section 3.3.3).
- Similar to the previous tables, the production boundary is not clear from the manual. The table has been filled with the animals that are part of the Dutch economy as defined in the national accounts, however could be extended to include animals left out by the national accounts (for example, horses held by consumers on riding stables).
- An extension more relevant for other countries than the Netherlands might be accounting for livestock assets that are not managed, for example wild animals which can be haunted. This would align this table with the asset account for fish (see section 3.9).

3.4 Asset account for plantations

3.4.1 Relevance

Dutch agricultural plantations is dominated by apple and pear orchards, although their significance in terms of added value is low comparable to the Dutch economy in total. However, it is relevant to monitor plantation assets on a regular basis to give insight into the potential production in the future. It is however unclear whether this should be done on a yearly basis.

3.4.2 Data availability

The data used in this table is derived Agricultural Census (see section 2.3). Other than with livestock, the reference date for plantations is 1st of May. It is believed that this date makes sense for this table as the best time of the year for apple and pear tree planting is the winter.

There is more source data available at Statistics Netherlands to complete this table, especially for apple and pear orchards. For example, data is available on the acreage of young apple and pear trees. Information on other plantations is also available every five years due to Regulation (EU) Nr. 1337/2011 (EU, 2011).

3.4.3 Clarification on used table entries

The category *Nuts* includes mostly walnuts (70%) and almonds (30%).

3.4.4 Changes to structure of the original table

Land use for plantations is not very large in the Netherlands. Besides, most plantations are orchards producing a few different types of fruit. Therefore it is chosen to use the specific fruits as row categories, and not an overarching category such as *orchards*. It is recognized that in other EU-countries classification of the plantations should be done on broader categories.

3.4.5 Recommendations

- It is recommended to include the age of the plantations, since this gives insight in the production potential of the plantations in the future and are seen as capital goods in the economy.
- An interesting extension for the Netherlands would be to include the acreage of land used for (non-)perennial flowers and nurseries.
- Maybe of less relevance for the Netherlands, but more relevant for other countries is accounting for non-cultivated/non-managed trees and shrubs if gathering of products thereof is significant. It is recommended to give this possibility in the SEEA-AFF.
- It is recommended that for some countries this table might be more relevant when it is included in the land use table (see section 3.17).

3.5 Physical flow account for forestry products

3.5.1 Relevance

Forestry and logging are less important economic activities in the Netherlands, so physical flow accounts for timber are not a priority for Statistics Netherlands. Therefore only an inventory of potential data sources is made but no data is collected.

3.5.2 Data availability

To fill this table with data in the future, consultation of Probos is required (Probos, 2013). Probos is an independent non-profit institute for forestry, forest products and services. This institute is the official Dutch national correspondent for various international institutions (amongst others UNECE, FAO, ITTO). On an annual basis, Probos compiles a Dutch timber balance for the Netherlands Environmental Assessment Agency (PBL) to evaluate the effectiveness of government policies. Probos also conducts Dutch Forest Inventories (NBI). The Sixth Dutch Forest Inventory (NBI6) was done in 2012 and 2013, commissioned by the Ministry of Economic Affairs. The previous inventory, Meetnet Functievervulling (MFV), was held in 2001-2005.

In the Dutch national accounts, forestry is recorded as a single activity: there is no subdivision of output by forestry activities, logging activities and other forestry industries.

When filling this table with data in the future for the Netherlands special attention is needed to monitor consistency between data according to Probos, Dutch national accounts and the SEEA and information derived from Dutch ecosystem accounting.

3.5.3 Clarification on used table entries

Not applicable.

3.5.4 Changes to structure of the original table

Not applicable.

3.5.5 Recommendations

- We would recommend including trees taken from uncultivated forests. These trees should be recorded in an additional column *Environment* in the supply table. In the current table only the round wood produced from uncultivated forests by logging activities is recorded. However, including the uptake from the environment would 1) balance the input and output of the logging activity; 2) give an indication of the amount of wood taken from cultivated and uncultivated forests; 3) provide a better link to the assets accounts with regard to forests. Also, the supply of timber for own-use by households can also be recorded in the *Environment* column.
- We would recommend to omit columns *Generation of energy products* and E*nergy* in the use table because 1) they do not provide any additional information and 2) this would reconcile the table with SEEA concepts.
- It is recommended to change the title of the table, since the products taken into consideration is broader than solely timber products. Although, Non-wood forest products are not relevant for the Netherlands.
- According to the table, bark and fuel wood can only be used for generating energy or for conversion into energy products. Therefore the columns *Generation of energy products* and *Energy* do not add information to the use table. Because fuel wood and bark are always converted to energy (products) they cannot be supplied by *Other industries* and, therefore, it is recommended that they are blacked out by shading them in the table.
- With regard to bark it is unclear from the manual whether this contains bark or wood chips for use in gardens and public parks (e.g. bark mulch for plant protection or wood chips for paving footpaths).

3.6 Asset account for forest resources

3.6.1 Relevance

In 2012, about 344 thousand ha (8 percent) of Dutch territory consists of forested areas, whereas 2,252 thousand ha (54 percent) was used for agricultural purposes (see section 3.17). Most of the forest is non-marketable and therefore not primarily used for active forestry. For the Dutch economy the relevance of forestry as an economic activity is limited. Therefore we did not collect data to fill this table. However, Dutch forests are considered important with regard to biodiversity, ecosystem management and tourism.

3.6.2 Data availability

Forestry is a minor economic activity in the Netherlands. Not enough data is available at Statistics Netherlands to make a clear distinction between land use and land cover of forests. To fill this table with data in the future, consultation of Probos is required (see also section 3.5). Probos conducts surveys on forestry and the timber sector in the Netherlands.

To fill this table with data for the Netherlands special attention is needed to monitor consistency between data according to Probos, Dutch national accounts and the SEEA and information derived from Dutch ecosystem accounting.

3.6.3 Clarification on used tables

Not applicable.

3.6.4 Changes to structure of the original SEEA-agri table

Not applicable.

3.6.5 Recommendations

No recommendations are made.

3.7 Asset account for timber resources

3.7.1 Relevance

See also sections 3.5 and 3.6. In the Netherlands, about all forests are planted and managed. Primary forest and naturally regenerating forest are virtually non-existent. Only an inventory of available data sources was done and no data was collected for this table.

3.7.2 Data availability

See also sections 3.5 and 3.6. The Sixth Dutch Forest Inventory (NBI6) was done in 2012 and 2013, commissioned by the Ministry of Economic Affairs. The previous inventory, Meetnet Functievervulling (MFV), was held in 2001-2005. According to Probos, the average living standing stock increased by 11 per cent from 194.6 m3/ha to 216.6 m3/ha. Standing and lying dead wood also substantially increased, from 3.6 to 6.4 m3/ha and from 5.3 to 6.8 m3/ha respectively (Schelhaas, et al., 2014).

Total annual felling amount to an estimated 1.3 million m3. About two third of the fellings take place in coniferous forest and one third in broadleaved forest. On the other hand, broad-leaved species account for around 75-80% of the regeneration. As a result, the percentage of coniferous is gradually declining in terms of surface area and stock (Schelhaas, et al., 2014).

3.7.3 Clarification on used table entries

Not applicable

3.7.4 Changes to structure of the original table

Not applicable

3.7.5 Recommendations

No recommendations are made

3.8 Physical flow account for fish and other aquatic products

3.8.1 Relevance

The fishing sector is relatively small in the Netherlands. The fish captured are mainly demersal fish (such as the plaice and sole) and pelagic fish (such as herring, mackerel and blue whiting). Additionally, brown shrimps are an important crustacean. Aquaculture is small in the Netherlands: there are some oyster and mussel farms (in 2012 around 7000 ha in total) (see section 3.17). Although the sector is small, issues and policies concerning over-fishing regarding this are still relevant for the sector.

3.8.2 Data availability

There are some major issues with this table and filling the table was rather difficult. Information is available on the amount of fish caught and landed in the Netherlands by foreign and Dutch ships and the amount of fish landed abroad by Dutch ships. An assumption is made that Dutch production equals the production by vessels sailing under the Dutch flag. Although this is not in line of the SNA or SEEA, other statistics are not available and it is common to use this procedure (EU, 2006). For example, if a Dutch owned vessel is sailing under a Belgian flag but lands its fish in the Netherlands, it is considered imports in the table above. Therefore, the flag is leading and not the ownership of the boat nor the waters of fishing. With regard to the latter: if a ship sailing under the Dutch flag catches fish in foreign water but lands the fish in the Netherlands this is not considered imports but domestic production.

Statistics Netherlands produces several different statistics about the fishing and aquaculture sectors. Some of them can be used in this table. First, two fish statistics are used for the columns *gross catch* and *nominal catch* in the supply table:

1. *Gross catch*: the amount of fish captured (worldwide) by Dutch flag-vessels (sailing under the Dutch flag at the moment of capturing) and landed in the Netherlands. Data is taken from the statistical data on landings of fishery products (EU, 2009a; EU, 2009b; EU, 2009c). This statistic is produced in live-weight equivalent. It is also available for the amount of fish captured by Dutch vessels and landed outside of the Netherlands. This is used in the column *Exports* in the use table.
2. *Nominal catch*: the amount of fish landed by Dutch flag-vessels in the Netherlands. Data is taken from the nominal catch statistic (EU, 2006). This statistic is produced in dead-weight. It is possible to recalculate this into live-weight equivalents, but this is time consuming. Data is also available on non-Dutch vessels which land their fish in the Netherlands. This data is used in the *Imports* column of the supply table.

Second, data on aquaculture production is available in several different statistics (EU, 2008). Here, oyster and mussels production are used because they are the most significant aquacultures in the Netherlands. Additionally, Statistics Netherlands produces data on (freshwater) fish aquacultures, but this is only marginal.

Third, information from the different fish statistics can be extended using trade statistics on fish products. There is an extensive data collection on imports and exports of fish products. However, it is unclear where the boundary between fresh fish and fish products lies. Besides, due to time constraints selection and organization of the international trade data has not been carried out during this project. Therefore, this data has not been included in the table and the columns imports and exports are not complete.

As can be seen from the table, only a very small part of the table can be filled using the available fish statistics. Especially on the use side (intermediate consumption and household consumption), information is lacking. Using data from the Material Flow Monitor more insight into the flows of fish products can be given because data is available both on the supply and use sides. However, the level of detail in the MFM is not extensive on different species. Nevertheless, the selection of the two commodities regarding fish (fresh fish and processed fish products) are shown in the table. Note that processed fish products include fish products supplied not only by the fisheries (e.g. frozen or boiled immediately after capturing), but also further processed fish products by the food industry. Question remains whether this should be included in the fish account at all (see recommendations).

Data is not available on the following:

- The different losses and wastes: harvest loss in aquaculture, post-harvest losses and food waste
- Recreational fishing (*Other catch*)
- Illegal, unreported and unregulated fishing activities. According to the national accounts specialist on fish at Statistics Netherlands it is assumed that this is rather small.
- Imports and exports: distinction between food use and non-food use. A distinction can only be made by classifying the different products with food and non-food purpose.

3.8.3 Clarification on used table entries

Data used to fill this table is from 2014, as since 2014 statistics on fish are extended compared to previous years.

The category *Other* includes all other species (fish, crustaceans, etc). The fish captured by Dutch vessels and landed abroad are mainly horse mackerel, sardine and sardinellas.

3.8.4 Changes to structure of the original table

The columns regarding intermediate consumption are changed to be better in line with industrial sectors rather than the actual use of products. Therefore, a distinction between fodder, food and other industries can be made.

For imports and exports, a distinction between food use and non-food use is not in line with the SNA/SEEA and therefore only one column for both imports and exports has been made.

3.8.5 Recommendations

- It is recommended to give more clarity on the difference between gross and nominal catch and what should be included in discarded catch. For example, it is unclear whether bycatch should be included in the discarded catch and how this should be accounted for.
- It is unclear what the production boundary is of the products that should be included in the table. Processed fish products are not explicitly mentioned in the entries of the original table. However, processed products are included in the tables of crops and livestock products. In paragraph 3.151 of the SEEA-AFF manual (FAO & UNSD, 2016, p. 79), it is mentioned that imports should include processed fish. However, much of the processing takes place on board of the vessels immediately after capturing and some processing is done after landing by the fish processing industry. It is recommended to give clear guidelines what the production boundary is of fish products.

- The columns food use and non-food use of imports and exports are not in line with SNA/SEEA. It is therefore recommended that only one column is included in the table for both imports and exports.
- Distinction between harvest and nominal harvest of aquaculture is not explained in the SEEA-AFF manual.
- The distinction between feed and other uses in intermediate consumption is not in line with SNA/SEEA: a distinction can be made between different industrial sectors such as e.g. fodder industry and food industries.
- The inclusion of discarded catch, harvest loss, food waste and post-harvest/catch losses should not be added as a column, rather as a row-entry in the table according to SNA/SEEA. Nevertheless, it is challenging due to lack in data sources and for the Netherlands this is not possible at this moment.
- Categorizing the different species in the ISSCPC classification as requested in the table is time consuming if this has to be done manually. Providing a table or reference that could be used to link fish species to the ISSCPC classifications might be helpful (at the time of writing this report he FAO website did not provide this information because of errors on the page). Another method could be the one used here: take a selection of species that are considered important and include the other species in the category *Other*.
- An interesting extension would be the addition of sustainable fish products, however, for the Netherlands this distinction is not made in the current statistics and this might be challenging.

3.9 Asset account for fish and other aquatic resources

3.9.1 Relevance

Although the fishing sector is relatively small in the Netherlands, concerns on overfishing exist. However, this table is not of added value for monitoring the state of the fisheries as the European Commission provides strict management of the European seas and fishing sector. Regarding geography and the international character of fishing, a European perspective on monitoring might also be better than a national perspective.

Many of the commercially fished species have quotas. These quotas are yearly revised based on new information on the stocks of fish. International Council for the Exploration of the Seas (ICES) compiles the data on European level. Wageningen Marine Research (formerly IMARES) conducts the research necessary for the Netherlands.

3.9.2 Data availability

At the moment there are no statistics produced at Statistics Netherlands that could be used to fill this table, with the exception of the data used in the physical flow account for fish products in section 3.8. Possible data sources can be found at Wageningen Marine Research and Wageningen Economic Research. Unfortunately, due to time constraints, we were not able to investigate the usability of these data sources.

3.9.3 Clarification on used table entries

Not applicable.

3.9.4 Changes to structure of the original table

Not applicable.

3.9.5 Recommendations

There are no further recommendations for this table.

3.10 Physical flow account for water abstraction

3.10.1 Relevance

Flows of water to and from the environment and within the economy are considered relevant in the Netherlands. Although water itself is not scarce, fresh groundwater stocks are under pressure due to competing uses. For agricultural purposes, it has proven to be a scarce resource during parts of the growing season, mainly in spring or summer. Crops in the Netherlands are predominantly grown under rain-fed conditions. In addition, fresh surface and groundwater is abstracted (pumped) for watering livestock and for irrigating crops and pastures. Normally these fresh water sources are replenished in the course of the year.

This importance is reflected in the compilation of water statistics and water accounts by Statistics Netherlands over the past few years. And more recently in the extension of our Materials Monitor with the dimension *water* (Delahaye et al., 2015). Water accounts provide information on water abstraction and on water supply and use by different industries and households. Integrating water data with economic and monetary information on water makes it possible to monitor water conservation policies and particular instruments. There are a variety of policies in place to reduce water pollution and protect ground and surface water bodies qualitatively and quantitatively.

The importance of the different types of water abstracted from water resources is described in detail in the available Dutch water statistics and culminating in the SEEA water accounts by Statistics Netherlands. Recently the Dutch Materials Flow Monitor is extended with the dimension *water* resulting in the Physical Flow Accounts for Water (PWFA) (Verschuren et al., 2016). Integrating physical water accounts data with economic information in national accounts makes it possible to monitor water use efficiency by industry. As a consequence this allows for monitoring conservation policies and particular instruments that relate to water abstractions and/or uses. There are at various levels policies in place that create incentives to reduce use and (groundwater) abstraction and protect ground and surface water bodies qualitatively and quantitatively.

3.10.2 Data availability

Statistics Netherlands has been compiling statistical data on physical water for decades (e.g. water consumption, water extraction and production and treatment of wastewater). Statistics Netherlands recently developed and compiled an (almost) fully integrated physical supply and use tables (PSUT) for water according to the concepts and definitions of SEEA-CF water accounts and with an industry disaggregation consistent with national accounts (Verschuren, et

al., 2016). The tables describe the exchange of water between the environment and the economy, both the abstraction from the environment as well as the return flows, including losses flowing back to the environment, and the exchange of water between the sectors within the economy. Data collection for this table is based on the PSUT Water.

Data on soil water related to the evapotranspiration (ET) is only available for two years, for 2009 and 2014 and are based upon externally obtained data, that are derived from satellite images. Compilation with a higher frequency is doable in the future as, for most part, underlying data are available. Collected precipitation (rainwater harvesting) is commonly applied in conjunction with glasshouses in horticulture, but data are not readily available. Amounts could possibly be estimated. Abstraction by household is limited, but unknown for the Netherlands. Amounts are by convention recorded as zero.

3.10.3 Clarification on used table entries

The amount of soil water specified here equals extraction (uptake of water by crops/plants in the plant material). It excludes, however, the large volume of the evapotransporation (ET). ET is obviously most important for crop growth, and therefore ultimately for the economic output of each of the agricultural subsectors. Abstraction of sea water by agriculture does not apply for the Netherlands.

3.10.4 Changes to structure of the original table

No changes to the structure of the original SEEA-AFF table were made.

3.10.5 Recommendations

- We recommend to use two row-entries for soil water: one entry on soil water that ends up in crops and one row-entry relating to evapotransporation.
- We think it would be useful to add information regarding quality of the water abstracted (fresh water, brackish water, salt water).

3.11 Physical flow account for water use

3.11.1 Relevance

See section 3.10 on the physical flow account for water abstraction.

3.11.2 Data availability

Data collection is based on PSUT (physical supply and use tables) of water (see section 3.10). The proposed table can only partly be filled with PSUT data. Hardly any data is available on the supply of re-used water: return flows are only available for total agriculture but not specified by crop. Not all types of water are included in the water abstraction table. Groundwater and surface water are included but soil water is not. As soil water also enters the system, and is used subsequently, it is not possible to balance the table in its present form. It is not possible to specify water used by type of crop. Livestock: urine and dung produced by farm animals are collected in dedicated manure and slurry storages and used as fertilizer. They are not part of regular waste water treatment.

3.11.3 Clarification on used table entries

No further clarification is needed.

3.11.4 Changes to structure of the original table

No changes were made to the original table.

3.11.5 Recommendations

- We recommend to present supply and use of water in separate tables that have identical entries for both rows and columns. The current table lacks accounting logic in that for the rows supply does not equal use and for the columns the input does not equal output. The reason for this is that not all relations/flows are represented in the table. We recommend adding the following accounting items as row entries: as part of the return flow an extra row containing water losses could be added. One example of these flows is run off during irrigation. Also, flows from and to the environment needs to be added as a column to enhance clarity. If for both supply and use the same entries are used it becomes easier to see the (im)balance of the supply and use of the rows and the input and output for each sector. Perhaps it is an option to condense table 3.6 from SEEA-CF (UN et al., 2014) and provide separate supply and use tables with no detail for other industries and more detail for agriculture.
- The top part of the table has many rows that seem not necessary to show (water abstracted by electricity is used by electricity, no need to show it here). Removing redundant rows makes the table easier to interpret.

3.12 Asset account for water resources

3.12.1 Relevance

In the Netherlands, SEEA-type water resources asset accounts are coherent with the PSUT for water. This allows to derive indicators, like several of the water related SDG's that compare the (fresh) water resources with the abstractions as determined in the PSUT for water. Fresh water resources (assets) are a valuable resource to a number of economic activities, particular in agriculture. Assessments have been made of the value of this water resources and related abstractions from it (Edens & Graveland, 2014). To get a better and more detailed assessment of water scarcity situations more spatial and temporal resolution is needed for the Netherlands. Water scarcity situations increasingly occur and are relevant particularly during the growing season in particular areas, on higher grounds located in the east of the country and often at the more sandy soils.

3.12.2 Data availability

In the Netherlands, there is no annual monitoring of stocks of water resources. However, in 2009, a survey was conducted as part of an Eurostat grant (Graveland & Baas, 2012). In 2016 this survey will be repeated and 2014 results are expected in early 2017. The results of the Eurostat grant project were used as a source to compile this table. Not all the details specified in the table could be calculated though.

Stocks (only opening stock could be estimated) are indicative. Additions to and reductions in stock are not available across the board, but for specific items only. As a result, the net change in stock of water resources and the closing stock of inland water resources could not be calculated. Imports (other addition to stocks) and exports (other reduction from stocks) of tap water and water in products are limited and therefore not included in the figures.

The addition of precipitation to the three types of water is doable, but has not been done yet. The suggested breakdown in types of surface water (e.g. Lakes; Rivers and streams; Artificial reservoirs; Glaciers, snow and ice) could not be made. Glaciers are not relevant for the Netherlands. No data is available for artificial reservoirs. The amount of soil water in the table is the minimum estimate out of an estimated range varying from 11 to 44 billion m3.

3.12.3 Clarification on used table entries

Note that the data are for reference year 2009.

Artificial reservoirs are mainly storage facilities for greenhouses in the Netherlands.

3.12.4 Changes to structure of the original table

A column was added that shows the total amount of surface water. In the next chapter some recommendations are made to make some changes to the structure.

3.12.5 Recommendations

- It is recommended to accommodate for additions and reductions in stock as a result of imports and exports of tap water and water in products.
- Combine evaporation and transpiration in a new item: evapotranspiration. Transpiration is a key item particularly for agriculture. This should be properly treated by using the correct terminology.
- Include a new category: water available for recharge of the aquifer as this is a key item for proper (ground)water management.
- Add a column for total surface water.
- Regarding the availability of (scarce) water resources for agriculture, it seems attractive to add more detail in terms of temporal (growing season) and spatial/regional detail (i.e. at sub-river basin level). Assessment of scarcity of fresh water resources within a specified territory, like in the 7 catchments (sub-river basins that align with the Water Framework Directive) could be useful.

3.13 Physical flow account for energy use

3.13.1 Relevance

This table is seen as relevant since the use of energy is an important policy domain. The Netherlands has an unique situation in terms of energy use in the agriculture: an important part of energy use by the sector is natural gas used in greenhouse horticulture. In greenhouses, natural gas is used by CHP installations to produce heat and electricity. Compared to energy use in the greenhouses, energy use by open field crops and livestock production is rather small. Therefore we do not consider of great importance to divide the energy use by crop or livestock

for this table. More relevant would be to make a distinction between greenhouse horticulture and other agriculture or between the four different agricultural sectors as in other SEEA-AFF tables (arable farming, horticulture, livestock farming and other agriculture).

3.13.2 Data availability

There are many different data sources available for the energy use in the AFF sectors, all differing on conceptual grounds. To stay as close as possible to the concepts of the SEEA-CF it has been decided that the Physical Energy Flow Accounts (see section 2.1 of Statistics Netherlands, 2014) is the best source for this table. Currently another Eurostat grant is used to test a new tool (PEFA-builder) for compiling the energy flow accounts (Eurostat, 2016c). Although there are some issues with the results, the data from the PEFA-builder are used to fill table 3.13. The data are experimental and need improvement, but it provides an indication of the structure of the energy flow accounts in the future. A major drawback of the new PEFA as a source for this table is that a distinction between the different agricultural sectors is no longer made because of a change in methodology of the underlying energy statistics. However, it is presumed that with some effort this distinction would be possible to make. Either through the use of source data from the Pollutant Release and Transfer Register (see section 2.3) or through the use of an allocation key.

Another drawback of the current PEFA-builder is that no distinction between the transformation and end-use of energy products is made. The prospect is that this will be taken into account in the new PEFA-builder expected to be released beginning of 2017.

Detailed data on the energy use disaggregated for the different crops is no longer available. As can be found on the Agro & Food portal of Wageningen Economic Research (Wageningen Economic Research, 2016), data was produced by Statistics Netherlands on the energy use disaggregated by different agricultural activities (e.g. pig farming, bulb farming, etc). However, this information will no longer be produced in the future because of the use of different data sources.

Crop-level data is not available at the moment. However, it might be possible to estimate this data by using a computational model. A methodology still has to be developed. Some difficulties could arise since farms often do not produce a single crop as they might rotate crop production or produce several crops at the same time.

3.13.3 Clarification on used table entries

As mentioned in the previous paragraph the data in the table is experimental and are only used to show the structure of the energy accounts in the future. For simplification it is assumed that the amount of energy used for transformation are the energy carriers used in the manufacturing of coke and refined petroleum products (NACE 19) and in the production of electricity (NACE D). It is recognized that this is not entirely correct. Other sectors might also transform energy products into other products. For example, the chemical sector produces plastics from fossil energy carriers and horticulture uses natural gas for cogeneration. With the new PEFA-builder coming in production beginning of 2017 this issue should be solved.

Peat and peat products are relatively small in the Netherlands and are categorized in other energy products.

3.13.4 Changes to structure of the original table

A few changes have been made to the structure. First, the column *Changes to inventories* was added to the table. This to stay in line with PEFA and this makes it possible to balance supply and use.

Second, on the supply side the column *Supply by Agriculture, Forestry and Fisheries* has been added. It might be interesting not only to look at the energy use of the AFF sectors, but also at the supply side. Farms are increasingly producing energy through, for example, biogas and CHP installations in greenhouses. For the Netherlands in 2012, the energy production by the AFF sectors can be attributed to forestry (waste products) and agriculture (electricity and heat products).

3.13.5 Recommendations

- It is recommended to include on the supply side of the table the production of energy by the AFF sectors (see above).
- It is recommended to include on the use side a column for changes in inventories (see above).

3.14 Physical flow account for greenhouse gas emissions

3.14.1 Relevance

This table is seen as highly relevant as the GHG emissions of the agricultural sector constitutes of around 10 percent of the total GHG emissions (Bruggen, et al., 2015). However, distinguishing the GHG emissions by product type is not considered very relevant and can only be done with considerable effort.

3.14.2 Data availability

Different data sources are available, all differing on basis of conceptual level. However, data on crop/product level is not available in any of the sources. It might be possible, with considerable effort or by making use of computational methods, to produce data on crop/product level in the future.

The first data source used in this table are the air emission accounts (see section 3.2 of Statistics Netherlands, 2014) which calculate the emissions of economic activities. This method follows the concepts of the SEEA air emissions account as proposed in the SEEA-CF. This data is used to make a distinction between different economic sectors (right-hand side of the table). For the AFF sectors, a distinction can be made between arable farming, horticulture, livestock farming, other agriculture, forestry and fisheries. From the SEEA air emissions account, the AFF sectors can be compared with other non-AFF sectors and households. An important note is that these emissions do not include the emissions from LULUCF activities. This source is annually available for the period 1990 – (year-1). In September the preliminary data is calculated and reported to Eurostat.

The second source of data used are the emissions of the national inventory. These are actual emissions in or above the Netherlands and its continental shelf. These figures are published in the report *Greenhouse Gas Emissions in the Netherlands 1990-2013 National Inventory Report (NIR) 2015* (National Institute for Public Health and the Environment (RIVM), 2015), using the Common Reporting Format (CRF). The National Inventory Report is an annual publication where

several different institutes cooperate (among others Statistics Netherland, Netherlands Organization for Applied Scientific Research (TNO), Netherlands Enterprise Agency (RVO) and National Institute for Public Health and the Environment (RIVM)). This report has been used to compile the left-hand side of the table. The data for agricultural activity are derived from IPCC 2006 guidelines (for the methodology on the CRF Agriculture, see Vonk et al. (2016). Therefore, the National Emission Model for Agriculture of the Dutch Scientific Committee of the Manure Act is used (Vonk, et al., 2016).

Data for the agricultural sector taken from the National Inventory Report to fill the left side of the table is also available on an European level. Through Regulation No 525/2013 via the indicator *Greenhouse gas emissions from agriculture (aei_pr_ghg)* as a sum of all greenhouse gasses (Eurostat, 2016a).

Data for LULUCF activities are compiled by Wageningen Environmental Research (formerly Alterra) and also published in the National inventory Report. The methodological report can be found on the website of the National Inventory Report (Netherlands Enterprise Agency (RVO), 2016b).

Data on GHG emissions from (total) energy use in the agriculture is not available. Only energy use from mobile machinery in agriculture is available separately for agriculture from the SEEA air emission accounts. In the National Inventory Report are, in line with the Common Reporting Format, GHG emissions from energy use reported on an aggregate level, and not for agriculture separately. It is presumed that this part of the table will be possible to fill with source data of already existing publications.

3.14.3 Clarification on used table entries

Two different sources are used in this table. Although they are both from the same underlying data. More research is needed into the differences that occur.

In the column *Synthetic fertilizers* the CO_2 emissions are from lime fertilization.

In the column gas-diesel oil energy use, the GHG from the use of mobile machinery is included. This is at the moment the only source of GHG emissions from energy use that can be specified to the agricultural sector.

Data in the column LULUCF activities Forest Land are the total net forest conversion of the Netherlands in 2012. A correction is still needed for the part which is not related to agriculture. This might be possible to do with more research.

The column *Other LULUCF activities* includes the LULUCF activities from (net changes in) grassland.

3.14.4 Changes to structure of the original table

There are several changes to the proposed structure of the table. First, a column has been added that accumulates GHG emissions from indirect emissions: in the Netherlands a considerable part of the N2O emissions are from indirect emission from *N leaching and run-off and from N deposition* from managed soils (National Institute for Public Health and the Environment (RIVM), 2015, p. 169). From the SEEA-AFF manual it is unclear whether indirect emissions should be taken into account.

Another activity not covered by the proposed activities is that of liming, which produces some CO_2 emissions in the Netherlands. This has been added to the column *Synthetic fertilizers*.

3.14.5 Recommendations

- There is a differentiation between the SEEA-CF air emission accounts and this table in dealing with LULUCF activities. It is recommended to describe the LULUCF more clear in the manual since knowledge of this is limited from the SEEA-CF. For example, it is unclear how the (total) LULUCF activities should be attributed to the agricultural sector. The approach taken here is that all changes in forest, crop and grassland are attributed to the agricultural sector. However, this does not have to be the case in reality.
- The SEEA-AFF manual does not mention *Other LULUCF activities* as a column, rather emissions from net changes in grassland (FAO & UNSD, 2016, para.4.61). Recommended is to make clear what is meant by *Other LULUCF activities* in the table.
- From the manual it is unclear whether indirect emissions attributed to the agricultural sector should be taken into account.
- Emissions of ammonia (NH3) are missing in the table and in the whole set of the SEEA-AFF. Ammonia emissions are relevant, especially in the agricultural sector.

3.15 Physical flow account for fertilizers

3.15.1 Relevance

This table is seen as highly relevant. Issues with (over-) fertilization are of great concern to policy makers and the public.

3.15.2 Data availability

Several data sources are used for this table. First, the nutrient balance for agricultural soil is considered. Underlying the nutrient balances are data on the amount of organic and inorganic fertilizers used on agricultural soils, data on the transport of manure to and from farms, manure processing industry and data on manure production. Starting in 2016, the nutrient balances are no longer published for K-fertilizers, since the relevance for the environment of K is much smaller than for N and P. The nutrient balances is an annual publication and correspond to the Eurostat table on *Gross Nutrient Balance (aei_pr_gnb)* (Eurostat, 2016b). A recent Eurostat grant was used to conduct research on the different statistics of fertilizers presented in the Netherlands by different institutes. The results of this research are published in Geertjes and Denneman (2016). From this project, different improvements in the coherence of the statistics on fertilizers and nutrient balances are planned. Of importance for the SEEA-AFF table on fertilizers might be the new flow chart for nutrient budget of nitrogen developed by Statistics Netherlands (Geertjes & Denneman, 2016, p. 19). This flow chart could be used to make the SEEA-AFF table more relevant and easier to compile.

Second, data of fertilizer use for specific crops is taken from the MAMBO-models which are designed and produced by Wageningen Economic Research (Kruseman et al., 2012). The database contains, among others, data on the use of manure and fertilizers in the production of different types of crops. Data is available both for nitrogen and phosphate fertilizers and manure. As the MAMBO-model is not run every year, the reference year differs: the use of inorganic fertilizers is available for 2012, while the use of manure is available for 2013. It should be noted that these data are received from a third party solely for the use in this report. It is therefore unknown at the moment whether, and at what conditions, this data will be available in the future.

Parts of the table on imports and exports of inorganic fertilizers is not yet been compiled. Wageningen Economic Research produces a yearly questionnaire that might be possible to use for this table. As was indicated in Geertjes and Denneman (2016), these statistics are in development. More investigation is needed on whether these statistics can be used to compile this SEEA-AFF table.

Data on the use of fertilizers in forestry, fisheries, other industries and households is not available (with the exception of collected manure in the manure-processing industry).

3.15.3 Clarification on used table entries

Two different sources are used in this table. Although they seem in general to be in line with each other, more research is needed into the small differences that occur.

Two categories for animal manure are available from the nutrient balance: manure from pastures and manure from sheds. It is assumed that manure from sheds is *collected manure* and that manure from pastures is the *urine and dung from grazing animals*.

For phosphor the nutrient balances are published in P total nutrients instead of P_2O_5 total nutrients.

It should be noted that because of its inclusion in the national laws on manure production, manure from non-agricultural animals, e.g. horses in riding stables, are included in this table. This brings some difficulties comparing this table directly with other tables, where non-agricultural animals are not included. Nevertheless, it is assumed that this is only a minor issue.

3.15.4 Changes to structure of the original table

No changes are made to the structure of the table as was proposed.

3.15.5 Recommendations

- The use of lime fertilizers could be added as an additional row entry in the table as this is relevant for the CO_2 emissions (see section 3.14).
- A distinction between different urea types would be relevant for the Netherlands on behalf of ammonia emissions.
- Translating results from the nutrient balances into this table is not as straightforward as it might seem at first sight. The nutrient balances give insight into the flows of the nutrients in the environment, while this table gives insight into the flows of fertilizers in the economy. It is recommended to give more practical guidelines on how the nutrient balances should be used in this table.
- It is recommended that EU Regulations on nutrient balances in the future take into account the aim of this SEEA-AFF table, making compilation easier.

3.16 Physical flow account for pesticides

3.16.1 Relevance

Due to the large agricultural sector pesticides are used widely in the Netherlands. The Netherlands are densely populated and this gives tension between the farmer's production process, human health and damage to the environment. Therefore data on the supply and use

of pesticides is very relevant. Also using a supply and use table for pesticides is relevant because two different data sources (one for supply and on for use) are confronted with each other.

3.16.2 Data availability

Supply data are produces by Statistics Netherlands and also available from Eurostat table *Pesticide sales (aei_fm_salpest09)* (Eurostat, 2014), on an annual basis, and are obligatory based on Regulation 1185/2009 (EU, 2009d).

The use of pesticides in agriculture are produced by the environmental statistics team of Statistics Netherlands. The aim of this statistic is to get an overview, on national level, of the use of different types of pesticides in the production of all relevant crops (Statistics Netherlands, 2016b). This statistic is based on the Agricultural Census, from which a sample of agricultural businesses is asked about the use of pesticides on a specific crop. The statistic is produced on an irregular basis. However, no longer than four years will be in between the recorded years. Categorization of the active ingredients is according to Regulation 1185/2009 and, therefore, should be comparable with the data on the supply of pesticides.

The use of pesticides by households is estimated to be 1 percent of total supply. Use by forestry and fisheries is not available, but assumed to be zero. Use by other industries than agriculture is not available. Additionally, data on changes in inventories is also not instantly available. In order to estimate these figures more research is needed.

Data is available on the imports and exports of pesticides in kg of total product, rather than kg of active ingredients. Because it will take considerable effort and restrictive assumptions to convert this data into kg of active ingredients this had not been executed during this project.

A main problem with the available data is that supply does not match the use of pesticides. Actually there is a considerable gab between supply and use. People of Statistics Netherlands have put considerable effort in trying to solve this problem but have not succeeded so far. Hopefully in the near future we can present a table in which supply equals use. It is unknown whether a similar supply-use gap exists in other EU Member States.

3.16.3 Clarification on used table entries

The selection of the crops included in the table is based on the important crops in the Netherlands (wheat, potatoes, onions, etc.) and relatively high pesticide use (such as apples, pears, open-field strawberries, etc.).

3.16.4 Changes to structure of the original table

With the exception of the different crops included in the columns and some changes to the pesticide products in the rows, no other changes to the structure are made.

3.16.5 Recommendations

- It is recommended to stay close to the pesticide product categories as published by Annex III to Regulation No 1185/2009 (EU, 2009d).
- Because of a lack of comparability between EU Member States of statistics on the use of pesticides from Regulation No 1185/2009, results of this SEEA-AFF table can also not be compared between different countries. It is recommended to take this into account with the implementation of the SEEA-AFF. In the future, with the development of a new Regulation on pesticide use, the wishes of the SEEA-AFF should be considered.

- It is recommended that, if there is a significant supply-use gap as is the case for the Netherlands, that a column is added in the table to account for this statistical difference.
- We recommend taking all of the important biocides into account.
- We recommend to look into the possibility to include alternatives for pesticides like biological crop protection and the possibility to include measures that are taken to keep livestock healthy, such as the use of antibiotics.

3.17 Asset account for land use

3.17.1 Relevance

The land accounts as proposed in the SEEA-CF are not produced in the Netherlands. Therefore, source data which can be easily applied to the tables of land use and land cover from the SEEA-AFF is lacking. Recently, Statistics Netherland, together with other institutions has started work on ecosystem accounting. This makes accounting for land use and especially land cover more important.

3.17.2 Data availability

Two different data sources are used in this table, which lack coherence in terms of concepts and methodology. First, for land use by agriculture, data is available from the Agricultural Census (see section 2.3). The Agricultural Census is held every year. This data is updated every year.

Second, for other types of land use (including waters) data is available from Bestand Bodemgebruik (*File Land Use*) as produced by the nature and environment team of Statistics Netherlands (Statistics Netherlands, 2016a). More research is needed on how this data source differs in terms of concept and methodology from the land use data of the Agricultural Census. Data from Bestand Bodemgebruik are available on an irregular basis. In 2018 the data for reference year 2015 will be published.

A third source is that of total hectares land used by aquaculture. This data is available from the fish statistics as described in section 3.8.

3.17.3 Clarification on used table entries

The opening stock is data for the reference period 2010 and the closing stock is data for reference period 2012.

Land use for production of green fodder crops is part of meadows and pasture. Other agriculture land use includes that of land belonging to the agricultural sector, but not necessarily producing agricultural products, such as yarns and barns, paved terrain, but also natural terrain such as forest.

Aquaculture is the production of oysters and mussels, as can be seen in section 3.8.

3.17.4 Changes to structure of the original table

There are several changes made to the original SEEA-AFF table. First, in the Agricultural Cencus the type of agricultural land use is distinguished based on farming activity, rather than crop type. The different categories of land use follow the categories more often used in this report (see section 2.2). An important element of the Dutch horticulture is the use of greenhouses.

Therefore, this category is added as an additional row-entry in the table. Other agricultural land use is also added to include other agricultural land use such as barns.

The second difference to the original table is that of including coastal waters, as this is a major category of Dutch land use. A small part of the coastal water is used for aquaculture.

3.17.5 Recommendations

- As is outlined in manual paragraph 4.116 (FAO & UNSD, 2016, p. 113) the focus of this table should be on land use for agricultural production. However, it seems that this table is similar to the land use account of the SEEA-CF. It is therefore recommended to change the structure of this table to focus on land use of the different types of agricultural products and activities. We believe that Statistics Netherlands will be able to produce a land use account for different crops and products, given that a method for dealing with crop rotation will be developed.
- It is highly recommended to carry out more research into the link between the different classifications that are used in the Agricultural Cencus, the Bestand Bodemgebruik and the SEEA-CF. For now, data shown in the table should only be seen as a demonstration of the appliance of available data sources.
- It is recommended to link this table with other tables of the SEEA-AFF as was done with land use for aquaculture. For example, land use for plantations could be taken from the table on plantations (section 3.4).
- It should be taken into account that some agricultural activities are not always land-related, for example mushroom cultivation and to a lesser extend greenhouses. An interesting extension of this table is to include an indicator that gives more insight into the amount of land-related agriculture compared to agriculture that is not land-related.

3.18 Asset account for land cover

3.18.1 Relevance

The land accounts as proposed in the SEEA-CF are not produced in the Netherlands. Therefore, source data which can be easily applied to the tables of land use and land cover from the SEEA-AFF is lacking. Recently, Statistics Netherland, together with other institutions has started work on Ecosystem Accounting. This makes accounting for land use and especially land cover more important.

3.18.2 Data availability

For this table, different data sources are used. Bestand Bodemgebruik (see section 3.17) has historically been used for accounting for land use, which makes using this data for the land cover table more difficult. However, from the first results of the ecosystem accounts, land cover data is available on a national scale, however, solely for the year 2013. This data has been used to fill this table. As funding is needed to regularly update the ecosystem accounts, it is unclear if and when data will be available for other reference years.

3.18.3 Clarification on used table entries

There are no clarifications needed.

3.18.4 Changes to structure of the original table

There are no changes made to the structure of the original table. However, some of the categories are not relevant for the Netherlands (e.g. permanent snow and glaciers, mangroves, etc.).

3.18.5 Recommendations

- Similar to the land use table, as is outlined in manual paragraph 4.116 (FAO & UNSD, 2016, p. 113) the focus of this table should be on land cover for agricultural production. However, it seems that this table if similar to the land cover account of the SEEA-CF. It is therefore recommended to change the structure of this table to focus on land cover of the different type of agricultural products. We believe that Statistics Netherlands will be able to produce a land cover account for different products, given that a method for dealing with crop rotation will be developed.
- It is highly recommended to carry out more research into the link between the different classifications that are used in the ecosystem accounts and the SEEA-CF classifications. For now, data shown in the table should only be seen as a demonstration of the appliance of available data sources.

3.19 Physical asset account for area of soil resources

3.19.1 Relevance

For the Netherland this account is not very relevant because the type of soil does not change very much. Therefore no attempt is made to fill this table. In the Netherlands there are no problems with regard to deforestation, erosion or desertification. Issues that are of concern to the Netherlands are salinization and settlement (due to an artificial kept low groundwater level) of agricultural soil. Therefore the changes in the quality of the soil are more relevant for the Netherlands. The question is what variables to use to measure the soil quality. This could for example be biodiversity of carbon content.

3.19.2 Data availability

Information is available in the Bodemkaart Database (Wageningen Environmental Research, 2016). Wageningen Environmental Research (formerly Alterra), a Dutch institute performing research on the green living environment, has data available on soil conditions from this database.

3.19.3 Clarification on used table entries

Not applicable.

3.19.4 Changes to structure of the original table

Not applicable.

3.19.5 Recommendations

- It is recommended to give some more guidance on how to measure the soil quality.
- As for land use and land cover accounts, this account is similar to the SEEA-CF account. It is recommended to give more focus on agriculture and agricultural soil in this table.

3.20 Monetary supply and use table AFF products

3.20.1 Relevance

This monetary supply and use table for AFF products is certainly relevant for the Netherlands, especially in terms of exports of agricultural products. Besides, this table gives a good overview of the monetary data of the AFF sectors. The proposed structure is consistent with the concepts and definitions of the national accounts and most data are readily available.

3.20.2 Data availability

As the table is in line with the supply and use tables of the Dutch national accounts, most data is readily available. However, not all specifications in the proposed table are available at the level of detail requested. In those cases we make estimates based on goods at a higher level of aggregation (combined with other goods). In the future we can sub-divide these aggregates, again, using more detailed information and other statistics (for instance economic accounts for agriculture). This was not done at present, given our limited resources for the current project.

3.20.3 Clarification on used table entries

Maize: we assume this to be grain maize. We classify silage maize as fodder in this table.

Wheat: grain only. We include other wheat as rye and barley in the category other crops.

Palm oil: in our opinion this is not a crop. Palm oil is a processed product and should therefore be classified in the category Vegetable oils and fats. This row entry does contain oil seeds and oleaginous fruits (CPA 01.11.9).

Sugar: also not a crop, but a processed product according to our view. This row entry does contain data on crops of sugar beet, however (CPA 01.13.71).

Fodder: consists mainly of green maize intended for silage.

Other crop: all crops in the Classification of Products by Activity (CPA) not mentioned in row entries before.

Eggs: including hatching eggs

Honey: not available separately, but included among other livestock products.

Other livestock products: all livestock products in CPA 014 not mentioned in row entries before.

For forestry products and fisheries products only the total is available in the Dutch national accounts.

Captured fisheries includes freshly caught fish processed at sea.

3.20.4 Changes to structure of the original table

The row entries of sugar and palm oil refer to products. We changed them in respectively *sugar beets* and *oil seeds and oleaginous fruits*.

Trade and transport margin and *Subsidies and taxes on products* are added. They should also be taken into account when calculating *Total supply at purchasers prices*, not just total output at basic prices and imports are valued at CIF.

3.20.5 Recommendations

- State clearly whether seed for sowing or propagating material is included in the crops or not.
- We suggest to add two column entries: *Trade and transport margin* and *Subsidies and taxes on products*. They should also be taken into account when calculating *Total supply at purchasers price*s, not just total output at basic prices.
- We suggest to remove the row entries referring to processed goods and replace them with the crops they are derived from (for example as was proposed in the table for sugar beet instead of sugar).

3.21 Production and income accounts AFF activities

3.21.1 Relevance

Production and income accounts for AFF activities are certainly relevant for the Netherlands as it gives a good overview of the monetary data of the AFF sectors. The proposed structure is consistent with the concepts and definitions of the national accounts and most data are available (on a slightly higher level of aggregation than asked for).

3.21.2 Data availability

As the table is in line with the supply and use tables of the Dutch national accounts, most data is available. However, not all specifications in the proposed table are available at the level of detail requested. In those cases we make estimates based on goods at a higher level of aggregation (combined with other goods). In the future we can sub-divide these aggregates, again, using more detailed information and other statistics (for instance economic accounts for agriculture). This was not done at present, given our limited resources for the current project.

3.21.3 Clarification on used table entries

Hunting and trapping are quasi non-existent activities in the Netherlands.

Relatively seen, forestry and logging are of little significance for the Dutch economy. As a consequence, Dutch national accounts do not show much detail in this respect. Therefore only the total forestry and logging is available. This also applies to data on fisheries. These are available only on a higher level of aggregation: total fisheries.

Data on *gross fixed capital formation* and *employment* are only available on a high level of aggregation.

3.21.4 Changes to structure of the original table

For the activities specified in the row entries of the proposed table, it is not possible to derive data on intermediate consumption and elements of income and capital accounts directly from Dutch national accounts. This can only be done including secondary activities. Therefore a column *Secondary activities* has been added, to illustrate the order of magnitude of the secondary activities involved.

In order to calculate gross operating surplus and gross mixed income, it is necessary to deduct taxes and subsidies on production. To make this clear, we added an extra column entry.

3.21.5 Recommendations

We recommend to add two columns: one for secondary activities (e.g. doing contract work for private land owners or nature conservation organisations) and one for taxes and subsidies on production.

4. Combined Presentations

A combined presentation of the data seems one of the most important aspects of a SEEA-AFF. It is considered very relevant since main economic variables can be confronted with environmental indicators. These kind of figures will make it possible for policy makers to make balanced decisions. Nevertheless, we think there is still a lot of ground to cover with regard to making clear to policy makers what the advantages are of integrated combined tables. We got the impression that a lot of individual issues are dealt with by different groups, institutes and policymakers and that there is no great urgency to confront different aspects like environmental and economic issues.

It is very unfortunate that due to time constraints we were not in the position to fill the combined tables. However, we had a critical look at the tables. One of the problems we encountered was that sometimes the variables used in the combined tables do not match with each other or with the individual tables presented in the chapter above. For example in combined table *#2 Food product consumption and waste* data should be added on nutritional levels of food products. However, this information is not available from any of the base accounts. Additionally, some data is available from the base accounts but at a different aggregation level as needed in the combined tables. For example, data on employment is available from the *Production and income account* (section 3.21) on activity (ISIC-level), but in the combined presentation *#1 Activity and product specific inputs* data is requested on product level. We recommend alignment of the different tables as good as possible in order to make it for users easy to apply the SEEA-AFF.

5. Conclusions, discussion and recommendations

Although agricultural does not play a big part in our economy it is regarded important for the Netherlands with regard to self-sufficiency and our cultural identity. In some aspects Dutch agriculture is very big for such a small country. Take for example the production of flowers and bulbs and the exports of animal products. Additionally, sectors related to the AFF sectors, such as the food processing industries, also have a significant contribution in the Dutch economy. On the other hand, Dutch intensive farming results in environmental pressures with regard to, for example, biodiversity and over-fertilization.

Because agriculture is important for the Netherlands, a lot of data on the sector is available. Despite of this it turned out quite an effort to collect and convert source data in order to fill the tables of the SEEA-AFF. Due to time constraints we had to stick with filling the tables most relevant for the Netherlands:

- Tables on crop and livestock products, plantations, fish products, water accounts, energy use, greenhouse gas emissions, fertilizers, pesticides, land use and cover and monetary accounts are discussed and filled as good as possible. More emphasize is put on making recommendations for further improvements and extensions than interpreting the actual data in the table. With regard to interpreting developments in time, they are considered of much greater value than data of a single year. However, producing time series was beyond the scope of this project.
- Tables on fish assets, forest accounts and soil resources are not filled because they are less relevant for the Netherlands.
- The combined tables are not filled due to lack of time but they are being discussed.
- We did not convert agricultural products into their raw commodity equivalent. This was considered to be too much of an effort to include this in this project.
- It is noted that the results of the individual base accounts cannot always be compared. Since the aim of the project was to assess different data sources, not enough research was done to make all individual records directly comparable. As an example, the production boundary of the national accounts for agriculture includes all agricultural firms that produce for the market. This excludes riding stables, which are included in a different sector. However, horses in the riding stables should be accounted for in the statistics on nutrient cycles as they are part of the national laws on manure production. Therefore, comparing the number of livestock in agriculture (section 3.2) and manure production (section 3.15) is not possible. All data should be interpreted as an indication of application of source data and considerable care should be taken when comparing the results of different tables.

5.1 Recommendations

The advantage of an accounting system like SEEA-AFF is that tables are set up according to the same definitions and concepts and that supply and use are confronted with each other. Therefore we think that most of the value added in the SEEA-AFF lies in the fact that: 1) different data sources are confronted with each other which will lead to better data; 2) different aspects of agriculture can be compared; and 3) comparisons between countries can be made more easily. For each table we have given recommendation for improvement. Here we give some general recommendations:

- For some of the tables it is not clear what exactly the boundary is between economy and environment. This makes it hard to decide which products and elements should be accounted for. For example, it is recommended to provide more information on how to deal with the extraction of crops from cultivated and non-cultivated land. If both types of land considered part of the environment, harvest should be recorded as flows from the environment the economy. If cultivated land is considered part of the economy the growth of crops should be considered flows from the environment to the economy. This issue also holds for livestock products and activities (such as hunting) and has consequences on how to record harvest losses.
- The link with SEEA-CF and national accounts could be improved. Try to use columns for economic activities and rows for different types of goods as much as possible. Also make clear where the border between the environment and the economy lies. Try to align this as much as possible with SEEA-CF. Additionally, taking into account the relevance for each individual country, dividing the agricultural sector in several different subsectors (e.g. arable farming, horticulture and livestock farming), gives more insight into the sector. This could be done not only on the supply side, but also on the use side (see e.g. sections 3.1 and 3.2).
- We would like to see some more guidance in the selection of products and industries. This is especially important for cross country comparisons. It might be good to give some guidance on the use of aggregated product or industry levels. We suggest to use as main activities (industry level): crop production, livestock raising and other agriculture. For the Netherlands we would split crop production in horticulture and arable farming. Other non-agricultural sectors can be left out as this makes the table easier for interpretation. For example, the transport and mining sector in the GHG emission table might not be relevant to show in this table.
- Some tables are not in concordance with each other. The combined presentations are not always in concordance with the base tables (see section 4). However, also some individual tables are not always in concordance with each other. For example, with regard to livestock and livestock products, in the upper part of the account on livestock products (see section 3.2) *chickens* and *other poultry* are distinguished. In the lower part of this account (meat) no meat from *other poultry* is distinguished. We think that aligning the classification of the tables with each other will make it easier for the user to implement and combine the information.

5.2 Possible extensions

The above discussion is mainly on potential improvement of the current tables. However we also see some possibilities for relevant extensions:

- Produce a separate table for the supply and use of secondary products including waste. Agriculture plays a substantial part in the supply (e.g. crop residuals, manure) and use (e.g. for feed) of biomass residuals and byproducts. Therefore, agriculture could play an important role in the Circular Economy, an item currently of great policy relevance in the Netherlands. The SEEA-AFF could be an instrument for monitoring this.
- In the Netherlands organic farming is becoming more and more important. Organic farming is considered to be better for the environment and produce more healthy and animal friendly food. We thing it would be a valuable addition to add variables or an additional table with regard to organic farming to the SEEA-AFF.

- Taxes, subsidies (for the good and the bad) and environmental expenditure play an important role in agriculture. We recommend adding a table on this subject.
- With regard to water we recommend to: 1) include aspects of water quality (biological and chemical quality, as monitored in the Water Framework Directive); 2) include emissions to water, particularly those relevant in agriculture (e.g. of nutrients (N & P) and heavy metals); and 3) Include aspects of salinization of soil and reduction of soil fertility.
- Many opportunities exist with the outcomes of the SEEA-AFF. For example, a direct application could be the agri-environmental indicators of Eurostat and its factsheets.

In compiling the tables we focused mainly on data available in the Netherlands. With regard to time we only took into account the Eurostat tables. Where possible, a reference to the relevant Eurostat table was made. However, it is recognized that more international data is available and due to time constraints it was not possible to investigate the availability and applicability of different international sources for the SEEA-AFF. Therefore it is hard to say to what extent other European countries can fill the tables of SEEA-AFF. One thing we have learned is that even when data is available (as was often the case for the Netherlands) it takes quite an effort to adjust the data in order to fill the tables. As mentioned above, improvements like aligning the variables in the tables of the SEEA-AFF might help in reducing the effort.

An important action we think is needed to implement SEEA-AFF at a greater scale is to make clear to policy makers and other users what the advantages are of integrated combined tables and how to use them.

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