Compilation of forest accounts for the Netherlands

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1. Background and general objectives

1.1 Introduction

Forest accounts are currently being proposed as an amendment to Regulation (EU) No 691/2011. There are many good reasons for that; on the one hand, forests provide us with wood and biomass, which are crucial in society and form an important input for a range of products used in the economy. Simultaneously, the production and trade of these goods result in economic activities, hence employment. The scale of production is directly related to the size of forested areas and the quality of the produced wood. The European Forest Account (EFA) include all of these aspects, and provides a lot of insights about them. For the Netherlands, the forest accounts have not yet been developed by Statistics Netherlands. Therefore, this report describes the first version of the forest accounts for the Netherlands.

Forests provide us with wood and biomass, and hence economic productivity and employment. Moreover, forests provide a range of other ecosystem services which are systematically assessed in the System of Environmental Economic Accounting Ecosystem Accounts (SEEA EA). Ecosystem services include e.g. air and water filtration, climate regulation, protection against flooding, providing space for recreation and tourism. Forests play an important role in climate regulation particularly through carbon uptake and storage, and this has resulted in increased interest in protecting and increasing forested areas in Europe. Yet another topic of interest is the increased demand for biomass for energy production. Finally, forests and forest protection are recognized as crucial in the light of stopping biodiversity-losses.

1.2 History – role of Probos

In the past, the EFA questionnaire has been filled out for the Netherlands by Probos. The Probos Foundation[1] is a Dutch knowledge institution committed to gather, process, develop and communicate about sustainable forest management in the Netherlands and abroad. Probos has a lot of expertise and available data, and since the proposed amendment to the EU Regulation, Statistics Netherlands collaboration with Probos has been enhanced.

Probos has been compiling forest and wood statistics for decades on behalf of the Ministry of Agriculture, Nature Management and Food Quality. Probos also conducts the National Forest Inventory (NFI). Consequently, Probos has much available data, for example about the production and use of wood. These forest and wood figures support the development and implementation of forest policy in the Netherlands.

1.3 General objectives

Forest accounting has thus far received very little attention in the Netherlands and therefore information is scattered. Forest accounts have not yet been developed for the Netherlands by Statistics Netherlands, so the need for this type of data and data organization is clear. Hence, a systematical analysis of available data needs to be carried out so that the different tables can be filled with the most reliable data.

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[1] Over Probos - Probos

In order to comply with the newly proposed EU Regulation, the aim of this report is to fill (as much as possible) the questionnaire of the EFA for the Netherlands based on available data. This will provide information on production and trade in wood and wood products, the size of woodland areas and changes therein, the volume and value of standing timber, as well as economic information for the forestry and logging industry. Additionally, by filling the questionnaire data gaps and possible other challenges will be identified for further research.

The structure of this report is as follows. This general introduction is followed by the second chapter, which will give an introduction about the European Forest Accounts. Chapter 3 will provide definitions of the main concepts from the questionnaire. In chapter, 4 the data sources and methodology used to fill in the questionnaire are described. Chapter 5 will provide information about the policy area concerning forestry and the actors involved. The results can be found in the questionnaire and are globally discussed in chapter 6. While conducting the research some data gaps and limitations were found, these are also discussed in chapter 6. The concluding remarks and suggestions for further research are provided in chapter 7. This is followed by a reference list and an annex in the last two chapters.

2. Introduction of the European Forest Accounts

The European Forest Accounts (EFA) are subdivided into three parts:

- In the first part (A), asset accounts are presented in four tables; two consisting of the area of wooded land (in physical and monetary terms), and two consisting of the timber assets on wooded land (in physical and monetary terms).
- The second part of the questionnaire (B) focuses on the economic activities of the forestry sector.
- The third part of the EFA questionnaire (C) focuses on the physical material flows of wood in the rough.

In this chapter, the structure and contents of the EFA are described. Since no Eurostat EFA handbook is available yet, the forest accounts definitions of stocks and flows are those of SEEA Central Framework and the SEEA for Agriculture, Forestry and Fisheries (SEEA AFF), FAO/FRA 2015, the CPA Ver. 2.1 (2015) and the JFSQ 2020. The definitions of types of wooded land in the EFA are described in chapter 3. The data sources and methods needed to fill the EFA are identified and described in chapter 4. During this project, the focus was primarily on the priority cells of the EFA questionnaire according to Eurostat, which are required to be reported. These cells are shaded in grey in the tables of the questionnaire.

A: Assets

As mentioned above, the asset accounts of the EFA consist of four tables: two focusing on the area of wooded land and two focusing on the amount of timber on wooded land. These four tables are measured in both physical and monetary terms. The physical asset account for wooded land (A1a) forms the core table of the EFA, to which other questionnaire tables (A1b, A2a, A2b) are connected. Tables A1a, A2a and A2b are identified by Eurostat as core tables. In the following part, the account structure and definitions are described for the physical asset account for wooded land (A1a and A2a).

Table A1a. "Area of wooded land, in 1000 ha".

Table A1a of the EFA questionnaire refers to the area of all wooded land for the reference period. It also provides information on the changes between the opening and closing stocks, or respectively afforestation or deforestation. Wooded land is subdivided into three categories: 1) Forests (further divided into forest available for wood supply and forest not available for wood supply); 2) Other wooded land; and 3) Other land with tree cover available for wood supply. Entries for forest and other wooded land are given priority by Eurostat.

Table A1b. "Area of wooded land".

Table A 1 - Wooded land	Validate questionnaire	Restore table color															

(b) Area of wooded land, in million national currency																	
Country: NL Netherlands																	
Year: 2020 Currency: EUR																	

	Assets (stocks and flows)	Opening area (December t-1)	Standard footnote	Explanatory footnote	Afforestation and other increase	Standard footnote	Explanatory footnote	Deforestation and other decrease	Standard footnote	Explanatory footnote	Revaluation (+/-)	Standard footnote	Explanatory footnote	Statistical re-classification (+/-)	Standard footnote	Explanatory footnote	Balancing item (2) (+/-)	Standard footnote	Explanatory footnote	Closing area (December t)	Standard footnote	Explanatory footnote
Code	Description																					
1	Forest																					
1.1	Forest available for wood supply																					
1.2	Forest not available for wood supply																					
2	Other wooded land																					
2.1	Of which available for wood supply																					
3	Other land with tree cover available for wood supply [(1)]																					

Table A1b of the EFA questionnaire refers to the area of wooded land for the reference period, only represented in monetary terms (in million national currency) rather than the physical assets (table A1a). Following the same structure and subdivisions, table A1b is directly related to table A1a. The only exception to this is the column 'Revaluation'. This entry serves the purpose to account for any changes in the monetary valuation of wooded land between two periods that is not the result of changes in the area of wooded land (due to afforestation or deforestation).

Table A2a. "Timber on wooded land, 1000 m3 over bark".

Table A 2 - Timber	Validate questionnaire	Restore table color															

(a) Timber on wooded land, in 1000 m3 over bark																	
Country:																	
Year:																	

	Assets (stocks and flows)	Opening stocks [(3)] (December t-1)	Standard footnote	Explanatory footnote	Net increment [(4)]	Standard footnote	Explanatory footnote	Removals [(5)]	Standard footnote	Explanatory footnote	Irretrievable losses [(6)]	Standard footnote	Explanatory footnote	Statistical re-classification (+/-)	Standard footnote	Explanatory footnote	Balancing item [(2)] (+/-)	Standard footnote	Explanatory footnote	Closing stocks [(3)] (December t)	Standard footnote	Explanatory footnote
Code	Description																					
1	Forest																					
1.1	Forest available for wood supply																					
1.2	Forest not available for wood supply																					
2	Other wooded land																					
2.1	Of which available for wood supply																					
3	Other land with tree cover available for wood supply [(1)]																					

The EFA questionnaire contains three physical (1000 m3 over bark) tables for timber. The first one (A2a) covers the asset accounts with stocks and changes in stocks for timber on wooded land. The second (C1a) and third (C1b) cover the use and supply of wood in the rough. The latter two will be described later in this chapter under 'Material flow'. Entries for forest and other wooded land (grey shaded cells) are given priority by Eurostat.

Table A2a provides information on the changes between the opening and closing stocks of timber in wooded land, divided into forest, other wooded land and other land with tree cover available for wood supply. Forest is divided into forest available for wood supply and forest not available for wood supply. Additions in stocks are due to net increment in the annual volume growth of live trees. According to the EFA explanatory notes, the volume of growing trees includes the stem and the larger branches that can be used for timber, measured at a minimum diameter at breast height. Withdrawal from stock can be due to the removal of timber or losses, for example, due to natural disasters or residuals left behind in the forest. Finally, changes in stock can occur due to changes in statistical re-classification.

Table A2b. "Timber on wooded land, in million national currency".

Table A 2 - Timber																					
(b) Timber on wooded land, in million national currency				Validate questionnaire		Restore table color															
Country: NL Netherlands																					
Year: 2020 Currency: EUR																					

Assets (stocks and flows)		Opening stocks (December t-1)	Standard footnote	Explanatory footnote	Net increment	Standard footnote	Explanatory footnote	Removals [3]	Standard footnote	Explanatory footnote	Irretrievable losses	Standard footnote	Explanatory footnote	Revaluation (+/-)	Standard footnote	Explanatory footnote	Statistical re-classification (+/-)	Standard footnote	Explanatory footnote	Balancing item [2] (+/-)	Standard footnote	Explanatory footnote	Closing stocks (December t)	Standard footnote	Explanatory footnote
Code	Description																									
1	Forest																									
1.1	Forest available for wood supply																									
1.2	Forest not available for wood supply																									
2	Other wooded land																									
2.1	Of which available for wood supply																									
3	Other land with tree cover available for wood supply [1]																									

Table A2b of the EFA questionnaire refers to the amount of timber on wooded land for the reference period, represented in monetary terms (in million national currency). Table A2b is therefore the monetarized asset accounts with stocks and flows of timber of wooded land (i.e. table A2a), following the same structure and subdivisions. The exception on this is the column 'Revaluation', to be able to account for changes in the monetary assets of timber between two periods which is not the result of net increment, removals or irretrievable losses. Entries for forest and other wooded land (grey shaded cells) are given priority by Eurostat.

B: Economy
Table B 1. "Economic aggregates of the forestry and logging industry".

Table B 1 (Former table 3c) Economic aggregates of the forestry and logging industry

in million national currency [former Table 3c]
Forestry and logging industry only

Validate questionnaire	Restore table color

Country: NL   Netherlands
Year: 2020   Currency: EUR

If the data do not allow you to report on the forestry and logging industry only, as separate from other industries, please explain this in the "Comments on the compilation of the table" below.

Code	Description	Million NAC	Standard footnote	Explanatory footnote
1	Total output (at basic prices) [P.1]			
1.0	Of which output for own final use [P.12]			
1.1	Goods characteristic of the forestry and logging activity			
1.1.1	Trees, tree plants and forest tree seeds			
1.1.1.1	Live forest tree plants (02.10.11) and tree seeds (02.10.12)			
1.1.1.2	Forest trees (02.10.30) [1]			
1.1.2	Wood in the rough (02.20.1)			
1.1.2.1	Logs [2]			
1.1.2.2	Fuel wood (02.20.14 and 02.20.15)			
1.1.4	Non-wood products (02.30) [3]			
1.2	Services characteristic of the forestry and logging activity [4]			
1.3	Other products from connected secondary activities in the local KAU [5]			
1.4	Other products (*)			
2	Total intermediate consumption [P.2]			
2.1	Goods input			
2.1.1	Trees, tree plants and forest tree seeds [6]			
2.1.2	Energy, lubricants [7]			
2.1.3	Fertilisers and soil improvers			
2.1.4	Plant protection products and pesticides [8]			
2.2	Services input			
2.2.1	Services characteristic of the forestry and logging activity [4]			
2.2.2	Regular maintenance and repair of equipment [9]			
2.2.3	Maintenance of buildings (*)			
2.2.4	Financial services (FISIM) [P.119]			
2.3	Other goods and services used as inputs (*)			
3	Gross value added (at basic prices) [B.1g]			
3.1	Consumption of fixed capital [P.51c]			
3.2	Net value added (at basic prices) [B.1n]			
3.2.1	Other taxes on production [D.29]			
3.2.2	Other subsidies on production [D.39]			
4	Factor income			
4.1	Compensation of employees [D.1]			
5	Net operating surplus [B.2n] and Mixed income [B.3n]			
5.1	Net property income [D.4] [10]			
5.2	Net entrepreneurial income [B.4n]			
6	Gross fixed capital formation (excluding deductible VAT) [P.51g]			
6.1	Buildings, structures and land improvements			
6.2	Machinery and equipment			
6.3	Plant resources yielding repeat products			
6.4	Other GFCF(*)			
7	Net fixed capital formation (excluding deductible VAT) [P.51n]			
8	Changes in inventories [P.52]			
8.1	Work-in-progress on cultivated biological assets [AN.1221] [11]			
8.2	Other changes in inventories (*)			
9	Capital transfers (net) [D.9]			

Code	Description	Thousand AWU	Standard	Explanatory footnote
10	Total labour input [L] (in 1000 harmonized AWU) [12]			
	Total labour input in 1000 national AWU			
	Number of working hours per year in national AWU			
10.1	Of which self-employed (in 1000 harmonized AWU)			
	Self-employed in 1000 national AWU			
	Number of working hours per year in national AWU for self-employed			

Table B1 is to be compiled for the transactions of the forestry and logging industry, as recorded in national accounts). The national accounts transaction code is reported in square brackets after the transaction name, whenever it exists. This table records the output related to the land reported in Table A1, i.e. output from all activities that take place on wooded land. Note that not all of the output is recorded: only the output from the forestry and logging industry following the classification NACE Rev. 2 (Eurostat 2008c) is recorded. It includes secondary activities in this industry. It excludes the activities of other industries. Table B1 is highlighted as a core table by Eurostat.

Table B2. "Output by economic type and institutional producing sector, in million national currency".

Table B 2 - Output of the forest and logging industry by type
Output by economic type and institutional producing sector, in million national currency
Forestry and logging industry only

Validate questionnaire | Restore table color

Country: NL   Netherlands
Year: 2020   Currency: EUR

Economic aggregates (current transactions)		31 Own final use [P.12]	Standard footnote	Explanatory footnote	32 Market	Standard footnote	Explanatory footnote	33 Non market	Standard footnote	Explanatory footnote	99 Total	Standard footnote	Explanatory footnote	41 of which: Households [S.14]	Standard footnote	Explanatory footnote
Code	Description															
2	Output (at basic prices) [P.1]															

Table B2 supports table B1 by identifying the units producing the output of the forestry and logging industry and separating the "commercial" part of the output to facilitate the evaluation of products (different prices are applied; Eurostat, 2013). In the left part of the table, the output, as recorded in Table B1, is distributed according to its type: market output, output for own final use and other non-market output. In the right part of the table, the output is distributed according to the institutional sector to which the producer unit belongs.

Table B3a. "Supply of wood in the rough by all industries, in million national currency".

Table B 3 - Monetary supply and use of wood in the rough
(a) Supply of wood in the rough by all industries, in million national currency

Validate questionnaire | Restore table color

Country: NL   Netherlands
Year: 2020   Currency: EUR

SUPPLY Economic aggregates (current transactions)		51.0 Forestry and logging industry (Division 02)	Standard footnote	Explanatory footnote	51.1 Other Industries (if any)	Standard footnote	Explanatory footnote	51 Supply of products by industries	Standard footnote	Explanatory footnote	61 Imports (CIF)	Standard footnote	Explanatory footnote	62 Total supply (at basic prices)	Standard footnote	Explanatory footnote	63 Trade and transport margins	Standard footnote	Explanatory footnote	64 Taxes less subsides on products	Standard footnote	Explanatory footnote	65 Total supply (at purchasers' prices)	Standard footnote	Explanatory footnote
Code	Description																								
1.1.3	Wood in the rough (02.20.1)																								

Table B3b. "Use of wood in the rough by all industries, in million national currency".

Table B 3 - Monetary supply and use of wood in the rough
(b) Use of wood in the rough by all industries, in million national currency

Validate questionnaire | Restore table color

Country: NL   Netherlands
Year: 2020   Currency: EUR

USE Economic aggregates (current transactions)		51.0 Forestry and logging industry (Division 02) (if any)	Standard footnote	Explanatory footnote	51.1 Other industries	Standard footnote	Explanatory footnote	51 Use of products by Industries	Standard footnote	Explanatory footnote	71 Final Consumption	Standard footnote	Explanatory footnote	72 Capital formation	Standard footnote	Explanatory footnote	73 Exports (FOB)	Standard footnote	Explanatory footnote	74 Total use (at purchasers' prices)	Standard footnote	Explanatory footnote
Code	Description																					
1.1.3.20	Wood in the rough (02.20.1)																					

These two tables are meant to record all output and consumption of wood in the rough from any industry that may be producing or consuming the timber reported in Table A2. They are an extension of Table B1, which refers only to the forestry and logging industry. Table B3 follows the format of the 'Supply and use' table of national accounts (Eurostat, 2013): output by product and by industry at basic prices.

C: Material flow

Table C1a. "Supply of wood in the rough by all industries, in 1000 m3 over bark".

Table C 1 - Physical supply and use of wood in the rough

(a) Supply of wood in the rough by all industries, in 1000 m3 over bark

Validate questionnaire   Restore table color

Country: NL   Netherlands
Year: 2020   Currency: EUR

SUPPLY - Physical aggregates (current transactions)		51.0 Forestry and logging industry (Division 02)	Standard footnotes	Explanatory footnote	51.1 Other industries (if any)	Standard footnotes	Explanatory footnote	51 Supply of products by industries	Standard footnotes	Explanatory footnote	60 Imports	Standard footnotes	Explanatory footnote	99 Total supply	Standard footnotes	Explanatory footnote
Code	Description															
1.1.3	Wood in the rough (02.20.1)															
1.1.3.1	Logs															
1.1.3.1.1	Coniferous wood (02.20.11)															
1.1.3.1.2	Non-coniferous wood, except tropical wood (02.20.12)															
1.1.3.1.3	Tropical wood (02.20.13)															
1.1.3.2	Fuel wood															
1.1.3.2.1	Fuel wood of coniferous wood (02.20.14)															
1.1.3.2.2	Fuel wood of non-coniferous wood (02.20.15)															

The supply table presents the supply of wood in the rough. A distinction is made between logs and fuel wood. Two types of wood are considered: coniferous wood and non-coniferous wood. With regard to non-coniferous logs, tropical wood is distinguished. A distinction in types of wood is not considered a priority by Eurostat (non-grey shaded cells). Each type of wood is allocated to a CPA classification code. With regards to industries, a distinction is made between 'Forestry and logging industry (NACE 02)' and 'Other industries'.

Table C1b. "Use of wood in the rough by all industries, in 1000 m3 over bark".

Table C 1 - Physical supply and use of wood in the rough

(b) Use of wood in the rough by all industries, in 1000 m3 over bark

Validate questionnaire   Restore table color

Country: NL   Netherlands
Year: 2020   Currency: EUR

USE - Physical aggregates (current transactions)		51.0 Forestry and logging industry (Division 02) (if any)	Standard footnotes	Explanatory footnote	51.1 Other industries	Standard footnotes	Explanatory footnote	51 Use of products by industries	Standard footnotes	Explanatory footnote	71 Final consumption and capital formation	Standard footnotes	Explanatory footnote	72 Exports	Standard footnotes	Explanatory footnote	99 Total use	Standard footnotes	Explanatory footnote
Code	Description																		
1.1.3.20	Wood in the rough (02.20.1)																		
1.1.3.1.20	Logs																		
1.1.3.1.1.20	Coniferous wood (02.20.11)																		
1.1.3.1.2.20	Non-coniferous wood, except tropical wood (02.20.12)																		
1.1.3.1.3.20	Tropical wood (02.20.13)																		
1.1.3.2.20	Fuel wood																		
1.1.3.2.20.1	Fuel wood of coniferous wood (02.20.14)																		
1.1.3.2.20.2	Fuel wood of non-coniferous wood (02.20.15)																		

The use table is similar to the supply table. Final consumption is a separate category that includes incineration of fuel wood by households. Instead of imports, exports are recorded in the use table. The following chapter discusses the definitions to compile these tables for the Netherlands.

3. Definitions

Various concepts need to be understood in order to correctly fill in the EFA questionnaire. These concepts are therefore defined below. The described definitions apply to the entire questionnaire. The definitions are provided for the concepts found in the rows of the questionnaire. The concepts found in the columns of the questionnaire are explained, when required, in chapter 4 about data sources and methodology, due to practical reasons.

3.1 Forests

In the EFA, the definition of forest land is based on the definition provided by Food and Agriculture Organization (FAO) (2012). FAO defines forest as: ''*land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ*''. Here, forest canopy cover, also known as canopy coverage or crown cover, is defined as the proportion of forest covered by the vertical projection of the tree crowns.

The delineation of forest land in the EFA follows a land-use perspective, meaning that forests do not include wooded land predominantly under agricultural (e.g., agroforestry) or urban land-use (e.g., city parks and gardens). Forest land does include forested area that are temporarily unstocked (due to, e.g., forest management practices or natural disasters) as long as they are expected to be regenerated within 5 years. According to the FAO definition, forest area further includes windbreaks, shelterbelts or corridors of trees with an area of more than 0.5 hectares and a width of more than 20 meters. Finally, the FAO states that the area of forest (and other wooded land) should be measured inclusive of small access roads, water bodies and other small open areas.

In the EFA, forest land is divided into two sub-classes: forest available for wood supply (FAWS) and forest not available for wood supply (FNAWS).

FAWS is defined in the EFA Regulation as: ''*forests where any environmental, social or economic restriction do not have a significant impact on the current or potential supply of wood. These restrictions can be established by legal rules, managerial or owner's decision, or because of other reasons*''. According to the national accounts in the Netherlands, FAWS is an approximation of all cultivated forest.

FNAWS is defined in the EFA Regulation as: ''*forests that are not considered available for wood supply. These are forests where environmental, social, economic or legal restriction prevent any significant wood supply*''. FNAWS are an approximation of non-cultivated forests. FNAWS includes forests that severely restrict wood supply for environmental conservation, forests where physical productivity or wood quality is too low, and forests where harvesting and transport costs are too high to justify wood harvesting.

3.2 Other Wooded Land (OWL)

The definition of OWL is provided by FAO (2012). The FAO defines OWL as: ''*land not classified as forest, spanning more than 0.5 hectares; with trees higher than 5 meters and a canopy cover of 5-10% or trees able to reach these thresholds in situ; or with a combined cover of shrubs, bushes and trees greater than 10%*''. Similar to the demarcation of forest land in the EFA, OWL does not include land predominantly under agricultural or urban land-use. In addition, OWL is distinguished from forest land

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by the lower (< 10%) canopy cover. Consequently, OWLs are sparsely vegetated wooded areas, such as savannahs or open taigas.

3.3 Other land with tree cover available for wood supply (OLWTC)

Eurostat states that the category OLWTC is included in the EFA to ensure that all land with tree cover used for timber production is included. In the EFA, Eurostat states that OLWTC entails the wooded area under agricultural land-use. This includes areas of agroforestry, short-rotation forestry and short-rotation coppices on agricultural land. Orchards of fruit- and nut trees and similar non-timber plantations on agricultural land are excluded from the category OLWTC.

With the above-stated definition of OLWTC, the EFA diverts in the definition of OLWTC from the definition by the FAO. In the FAO (2012) definition, OLWTC refers to the land that satisfies the definition of forest concerning area, canopy cover and tree height but has a different land-use than forest. Following the FAO definition, it includes wooded area on agricultural land, as well as wooded areas in parks, gardens and other urban settings. However, these categories are not included in the EFA's demarcation of OLWTC.

3.4 Roundwood

Roundwood (wood in the rough) is defined in the JSFQ as: All roundwood felled or otherwise harvested and removed. It comprises all wood obtained from removals, i.e. the quantities removed from forests and from trees outside the forest, including wood recovered from natural, felling and logging losses during the period, calendar year or forest year. It includes all wood removed with or without bark, including wood removed in its round form, or split, roughly squared or in other form (e.g. branches, roots, stumps and burls (where these are harvested) and wood that is roughly shaped or pointed.

Types of wood: Wood in the rough specified as logs and fuel wood are all based on the CPA classification 02.2.

CPA 02.20 is divided into a more detailed level of wood in the rough, similar to the classification in the EFA:

- A PRODUCTS OF AGRICULTURE, FORESTRY AND FISHING
  - 02 Products of forestry, logging and related services   Detail
    - 02.2 Wood in the rough   Detail
      - 02.20 Wood in the rough
        - 02.20.1 Wood in the rough   Detail
          02.20.11 Logs of coniferous wood
          02.20.12 Logs of non-coniferous wood, except tropical wood
          02.20.13 Logs of tropical wood
          02.20.14 Fuel wood of coniferous wood   Detail
          02.20.15 Fuel wood of non-coniferous wood   Detail

Not included in the supply and use tables of the EFA are CPA 02.1 "Forest trees and nursery services".

- 02 Products of forestry, logging and related services   D
  - 02.1 Forest trees and nursery services
    - 02.10 Forest trees and nursery services
      + 02.10.1 Live forest tree plants; forest tree seeds
      + 02.10.2 Forest trees nurseries services
      + 02.10.3 Forest trees

However, wood provision measured as an increment of forest trees is considered as a first economic product in the supply chain. This product is considered CPA 02.10.3 "Forest trees". However, this CPA code is not included in the supply and use tables.

4. Data sources and methodology

This chapter discusses the data sources and methodology used to compile the EFA tables for the Netherlands. The chapter first discusses the data sources for forest (4.1), the distinction between FAWS and FNAWS (4.2), OWL (4.2) and OLWTC (4.3) for tables A1a/b and A2a/b, as these tables are closely linked. Data sources and methods used to compile tables C (4.5) and B (4.6) of the EFA questionnaire are thereafter further discussed. Specific information about how to fill tables B is provided in the Annex. As the data can be taken straight out of the National Accounts, the detailed information in the Annex is only provided for table B.

The main source used to fill the other tables (A and C) of the questionnaire was the Dutch National Forest Inventory (NFI). The NFI is conducted by Probos. Probos obtains this data by conducting surveys, but they also use data from Statistics Netherlands such as the International Trade statistics and other sources.

Since 2019, an annual publication has been published by Probos with detailed information on wood use in the Netherlands. This is due to the annual LULUCF reporting requirements. Probos makes their data publicly available on their website and they also report to various international organizations such as FAO, The International Tropical Timber Organization (ITTO) and United Nations Economic Commission for Europe (UNECE). As mentioned in the introduction, Probos filled out the EFA questionnaire, but they also fill out surveys such as the JFSQ (Joint Forest Sector Questionnaire), JWEE (Joint Wood Energy Inquiry), SoEF (State of Europe's forests) and the FRA (Forest Resource Assessment). The frequency of the data delivery varies greatly, for example, the JFSQ is filled out annually while the FRA is conducted only every 10 years. Due to Probos' expertise, many of the decisions on how to fill the EFA questionnaire are made based on the suggestions made by the experts from Probos.

4.1 Forest

Table A1a

The area of forest land is derived from the NFI. Although other forest area statistics are available in the Netherlands, NFI data was used to compile the forest asset tables. NFI data is the leading source of forest information in the Netherlands and is used for international reports, including the FAO-FRA. Consequently, the aim is to align the data in the EFA as closely as possible with the NFI to ensure consistency in the forest statistics of the Netherlands.

The estimation of forest area is not part of the Dutch NFI itself. The most recent NFI derived data comes from LULUCF (Land-use, land-use change, and forestry) reporting of the Netherlands by Wageningen University. The Dutch reporting of the LULUCF sector is done for the UN Framework Convention on Climate Change (UNFCCC). As part of the LULUCF reports, a land-use map (*Basiskaart Natuur*; BKN) was made for the Netherlands comprising the main land-use types – including forests – for the years 2017 and 2021 (reflecting the reporting cycle of LULUCF) (Arets et al., 2022). Furthermore, a land-use change matrix between 2017 and 2021 was compiled based on the BKN to determine the changes between different land-use types between the two reference years.

The data from the LULUCF report by Arets et al. (2022) is used in NFI-7 to determine the total area of forest land, the area of afforestation (and other increases) and deforestation (and other decreases) between 2017-2021. Afforestation and deforestation were determined by measuring the changes in

land-use areas. All areas that changes from forest to other land-uses were identified as deforested area, and vice versa. All areas that changed from other land-uses to forest between the two periods were identified as afforested areas.

Data from the Dutch NFI is not annually available, as NFI publications only appear every 5 to 6 years. For forest area, the same problem occurs given the periodicity of LULUCF reports. Given the periodicity of these data sources, linear interpolation was used in order to derive estimated annual data to align with the EFA questionnaire.

Differences with the EFA

In Dutch forestry statistics, the definition of forest slightly differs from the definition of the FAO (2012) and EFA. In the NFI-7 (Schelhaas et al., 2022). In the NFI-7, forest land is defined as: ''*all land with woody vegetation, now or expected in the near future (e.g., clear-cut areas to be replanted or young afforestation areas)*''. Forests are further defined as areas: exceeding 0.5 ha with a minimum width of 30m; with a tree cover of at least 20% (or the potential to achieve this); and with a minimum tree height of at least 5 meters (or the potential to achieve this) (Arets et al., 2022). Also similar to the EFA definition, the NFI-7 demarcation of forest land includes small objects such as forest roads, firebreaks and smaller areas than 6 meters within the forest, as well as windbreaks and shelterbelts of trees.

However, the definition of forest land used in the NFI differs from the FAO definition of forest used in the EFA:

- *Crown cover*. According to the FAO definition, wooded land is considered forest at a crown cover of at least 10%, whereas the NFI follows a 20% crown coverage threshold. However, no corrections to the NFI data are made in this report. According to Probos, forest area with a crown cover of 10-20% is negligible in the Netherlands.
- *Minimum width*. Although the NFI defines forests based on a minimum width of 30m, a threshold of 25m is used in practice (Arets et al., 2022; Schelhaas et al., 2022). This is due to the used spatial data to determine the area of forests in the BKN, which consists of a raster dataset with a raster resolution of 25m by 25m. Eight adjacent raster cells of 25m by 25m (0.0625 ha) depict the minimum area of forest land (Kramer et al., 2022). However, using this method means that an area of wooded land can be classified as forest while not complying with the minimum width of 30m. According to Probos, with the use of 25m the required minimum width of 30m is sufficiently approached.

Despite the differences between the NFI data and the EFA definition, the NFI data is still used to fill in the EFA. According to Probos, it is assumed that the differences in definition due to the criteria of crown cover and minimum width led to insignificant differences in the approximation of the forest area in the Netherlands. Therefore, we conclude that the use of NFI data is suitable to fill in the EFA.

Table A1b / Table A2b

The area of forest land of table A1a is used to determine the monetary value of the area of forest land for EFA table A1b. No registry for the price of forest soil in the Netherlands does exist. According to Probos, the Department of Agriculture & Rural Property of the Dutch real estate organisation NVM reports that the price of forest is very stable at an average price per ha of € 10.000, excluding the timber that is on the soil. The average asking price per hectare of forest soil including the trees is

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estimated at € 18.000 per hectare. The asking price per ha excluding the timber is multiplied by the total area of forest (in ha) to get an estimation of the monetary value of forest land.

Table A2a

Data on the opening stock in physical units are provided by Probos. They estimate this by multiplying the area of wooded land with a factor of "m^3 timber per Ha" (see table 12.1, page, 75). For 2022, they come to a factor of 222 m^3/Ha of the life stock of trees by interpolation between figures from NFI6 and NFI7. Stocks of dead trees are not considered, because it is assumed that dead wood will not be removed from the forest.

Net Increment in stocks: Net annual increment of timber is defined as the average annual volume growth of living trees, calculated from the stock of living trees (growing stock) available at the start of the year minus the average annual mortality. Only increment in FAWS is considered an economic product. In this case only do ecosystems contribute to the economic activity of 'growing of standing timber'.

Data on increments can be taken from the NFI7 (chapter 14, page 84). Total increments (table 14.2) and m^3 increment per ha per year (table 14.1) are determined. The increments given are estimated by interpolating data collected for the NFI6 and NFI7. In the EFA, the total increment is estimated by multiplying the factor (m3/ha/Y) with the total area of forest of table A1a. Currently, the mortality of trees is not taken into account in the increment estimate.

The EFA A1a table on the area of wooded land does not have the variable "net increment", like is requested in A2a. In A1a "afforestation and other increase" needs to be reported.

It should be noted that there is a difference between the EFA and the data from the NFI. According to the EFA explanatory notes the volume of growing trees includes the stem and the larger branches that can be used for timber, measured at a minimum diameter of 0 cm at breast height. In the NFI, the minimum diameter at 130 cm height needs to 5 cm in order to take the trees into account. Thus newly planted trees are taken into account when the meet this requirement. The data used to fill in the questionnaire are taken from the NFI and therefore we do not follow the EFA guidelines in this respect.

Removals: Removals are estimated as the volume of timber resources removed from wooded land as defined in table A2a. For the Netherlands, in practice, all removals are allocated to come from forest land. Removals from OLWTC are included in "forest" because they cannot be distinguished at this moment. No OWL exists in the Netherlands. They include removals of trees felled in earlier periods and the removal of trees killed or damaged by natural causes. In the EFA, removals are estimated by Probos by multiplying the total area of wooded land in table A1a with a factor of the m3/ha/Y average removal (table 15.3, page 89, NFI7). According to the footnotes of the EFA, the removals can be estimated by taking the removals reported in the JFSQ and convert them to over bark data (conversion factors provided in JSFQ). However, for the Netherlands this approach is not possible because the JFSQ includes also roundwood removals from areas not classified as forests, like build up land. As the latter is not part of table A2a, we cannot use the JFSQ figures. Note that the supply and use tables (C1a and C1b) go beyond the scope of table A2a and include roundwood regardless of origin.

To fully account for the change in the volume of timber resources over an accounting period, it is necessary to deduct felling residues. These residues are associated with the fact that, at the time of felling, a certain volume of timber resources is rotten, damaged or in excess in terms of the size

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requirements. Felling residues exclude small branches and other parts of the tree that are also excluded from the scope of timber resources.

Irretrievable losses: Losses should be recorded only when there is no possibility that the timber resource can be removed from the forest. Irretrievable losses include losses due to natural disasters but also felling residues. Mortality of trees should not be recorded here because it is already part of the net increment.

In the EFA's, no figures were estimated by Probos for irretrievable losses in the Netherlands. In the NFI, data are available on the vitality of trees. Vitality of trees can be affected by wind, insects, and drought of fires. Vitality is measured as a percentage of disturbance that has taken place at certain sample points. These figures are not translated into m^3 losses of wood. Wageningen Environmental Research (WEnR) does have a database on irretrievable losses but it is not used in the EFA, because irretrievable losses do not occur very much in the Netherlands.

Statistical re-classification: Refer to changes in the volume due to changes in use/status of the corresponding land area (Forest, Other wooded land and Other land). They are recorded twice: as a decrease in the row corresponding to the initial category and, as an increase in the row corresponding to the final category. They may also refer to the occasional fellings of standing timber located on land 'not available for wood supply'. In this case, a positive flow is recorded in the column "Statistical reclassification", which is the counterpart of the negative flow recorded under "Fellings". Reclassifications may also occur as a result of changes in management practice that shift timber resources from cultivated to natural or vice versa. No data are reported in the previous EFA on reclassification. They refer to changes in the volume due to changes in use/status of the corresponding land area. They are recorded twice: as a decrease in the row corresponding to the initial category and, as an increase in the row corresponding to the final category. They may also refer to the occasional fellings of standing timber located on land 'not available for wood supply'. In this case a positive flow is recorded in the column "Statistical reclassification", which is the counterpart of the negative flow recorded under "Fellings".

Table A2b

Similar to table A1b, one value is used for the monetarization of the timber stock. This value, 57,99 euro per 1000 m3 timber, is the average timber value as estimated by Probos. No further subdivisions based on FAWS or FNAWS or type of timber is considered for this table.

4.2 Available / Not Available for Wood Supply (FAWS / FNAWS)
Table A1a/b and A2a/b

To make the distinction between FAWS and FNAWS, the report by Probos in Alberdi et al. (2019) is used. In this report, NFI data across Europe was used to estimate area and above-ground biomass in European forests *not* available for wood supply using a harmonised definition, based on environmental, social and economic restrictions. In Alberdi et al. (2019), Probos states that the proposed harmonized definition is not sufficient (yet) for the Netherlands. According to the harmonized definition, all forest areas in protected areas should be categorized as FNAWS. However,

in the Netherlands, in such protected areas (e.g., National Park de Hoge Veluwe), timber production does occur.

Therefore, Probos proposes another estimation based on the applied methodology for the reporting cycle of Forest Europe (SoEF 2020), using NFI-6 plot data on ownership, harvesting rates and nature management data. Based on this criteria, the total share of FNAWS was calculated for the total forest area in the Netherlands for the year 2015. 19.06% of the forest area in the Netherlands is considered FNAWS. Consequently, 80,94% of the forest area in the Netherlands is considered FAWS. These percentages are applied to the total area of forest to get the (estimated) area of FAWS and FNAWS to report for the EFA. The same distribution key was used for the afforested and deforested areas, assuming that the deforestation and afforestation rates are the same between FAWS and FNAWS.

4.3 Other wooded land
Table A1a/b and A2a/b

In the Netherlands, areas that fit the EFA definition of OWL are not registered as such. One of the reasons for this is that wooded areas with a canopy cover of 5-10% (as stated in the EFA definition of OWL) are negligible in the Netherlands. Therefore, although small areas in the Netherlands that fit the characteristics of OWL might be included in the forest area, the percentage of this is assumed to be insignificant. Consequently, OWL in the Netherlands is reported as zero. This also aligns with other international reporting for e.g. FAO-FRA (2020).

4.4 Other land with tree cover available for wood supply
Table A1a

Data from Statistics Netherlands was used to estimate the area of OLWTC. For the Integrated Farming Statistics (IFS), Statistics Netherlands reports the area of short-rotation forestry (8-20 years) and short-rotation coppices (<8 years). Data collection for these categories is part of the annual agricultural census. The following coppices make up the area of short-rotation forestry and short-rotation coppices (in Dutch):

- Gewascode 1936:   Blijvend bos met herplantplicht
- Gewascode 863:   Bos zonder herplantplicht
- Gewascode 864:   Bos aangeplant in het kader van de set-asideregeling.
- Gewascode 662:   Bos (SBL regeling)
- Gewacode 794:   Woudbomen met korte omlooptijd (excl. Wilgenhakhout)
- Gewascode 795:   Wilgenhakhout
- Gewascode 1940:   Voedselbos

No data for agroforestry is known at Statistics Netherlands yet. Therefore, the OLWTC data is currently an underrepresentation of the OLWTC area in the Netherlands. However, Statistics Netherlands is currently working on agroforestry data, estimated to be published Q3 2023 for the first time. Only the area of OLWTC is known: no information on the afforestation or deforestation of OLWTC is available. Hence, only net changes of OLWTC can currently be reported.

Table A1b and A2a/b

Besides the area of OLWTC, specific data for OLWTC is not available. Furthermore, OLWTC is currently not included in the NFI. Consequently, no estimates on the amount of timber or monetary value can currently be made for OLWTC.

4.5 Physical supply and use tables

The JFSQ questionnaire is the basis for tables C1a and C1b of the EFA. Data in the JFSQ are similar as data reported by FAO and Eurostat. The source for figures in all these tables is Probos. Statistics Netherlands provides data on international trade of wood. Probos filled tables C1a and C1b of the EFA and provided them to Statistics Netherlands. Not only wood from forest, but also wood from build up area are included in these tables. As a consequence the amount of wood produced in table C1a does not match with removals of timber in table A2a. In table A2a only forest is taken into account.

Is still not clear to us what concept should be applied to estimate figures for the supply and use tables. Our idea, based on concepts of the SEEA and ESA (European System of Accounts[2]), is that the total supply of wood should be equal to the sum of (i) the volume of net increment of wood from all land with **cultivated** wood and (ii) the volume of removals of wood from all land with **uncultivated** wood. In practise this approach is currently not taken: wood harvested in both cultivated and non-cultivated forests and other land are recorded as domestic supply of roundwood. Eurostat agrees with the latter approach and believes this is the right concept that should be applied. Currently we are in discussion with Eurostat to clarify this issue.

Supply table (C1a)

Wood in the rough (roundwood) consist of industrial roundwood and fuel wood (including wood for charcoal). Industrial roundwood consist, among others, of sawlogs and veneer logs and pulpwood. Production of wood only takes place by NACE 02 and not 'other industries'. From the point of view of Probos this has a practical reason. Probos does not know exactly who produces roundwood. Probos does know who owns areas of wooded land but not how much wood is extracted from these lands per type of owner. Only by a rough estimate can Probos produce figures per type of supplier. However the practical approach of Probos fits with the functional approach taken by the National accounts. According to the Dutch supply and use tables of the national accounts only NACE 02 produces "forestry products". Forestry products are not produced by any other industry by definition. This institutional approach is similar to the approach of agricultural products that is recommend in the ESA: agricultural products are, by definition, only produced by agriculture.

Imports consist of international trade codes (CN Classification), which are mainly sawlogs. These are linked with CPA codes that are taken into account for domestic supply. Trade data are provided by Statistics Netherlands and adjusted by Probos in order to improve the data.

The supply of wood in the rough under bark is recorded in the JFSQ. However, in the EFA, supply of wood needs to be reported over bark. In order to convert "under bark" to "over bark" conversion factors can be used. These factors are available in the JFSQ questionnaire. If all separate wood types are converted to wood over bark they do not add up to the estimated totals anymore. Therefore, the figures in the EFA were estimated by converting the JFSQ figures on total wood in the rough and fuel

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[2] European system of accounts. ESA 2010 (europa.eu)

wood to 'over bark'. The amount of logs (over bark) are estimated by subtracting fuel wood from the total wood in the rough. In order to differentiate logs in coniferous and non-coniferous it appears that the non-coniferous wood is taken from the JFSQ (and converted to over bark). Next the coniferous wood is estimated by subtracting the non-coniferous wood from the total logs. The imports are taken directly (under bark) from the JFSQ and are not converted to "under bark".

Use table (C1b)

Data on the use of roundwood under bark for non-energetic purposes are reported by Probos[3] for coniferous, non-coniferous and tropical wood. For the EFA these figures are converted to 'over bark'. Data are taken from a Probos survey and estimated as averages over three years. In this survey the use of wood for energetic purposes is not presented separately for roundwood. Only firewood used by households and the use of woody biomass is reported. The survey is used for the Probos publication "Houtproductie en gebruik in Nederland"[4]. Use of coniferous and non-coniferous wood can be taken from table 3.2 of this publication. The total use of fuel wood can be taken from table 3.13 (no distinction is made between coniferous and non-coniferous wood). One reason these figures differ slightly from the figures in the EFA is because in table 3.13 all wood is expressed in a moisture content of 50%.

A distinction between the use of roundwood by NACE 02 and other industries is not provided by Probos. In EVA no use of roundwood by NACE 02 was reported. This is consistent with the national accounts. Data reported on the use of forest products in the national accounts by NACE 02 represent provided services and not actual physical wood products.

With regard to the category "final consumption and capital formation" the amount of roundwood used by households can be allocated to final consumption. Roundwood used by industry is always intermediate consumption. Roundwood is never considered an investment. Stocks of roundwood can be allocated to "final consumption and capital formation". No data on additions or subtractions of wood stocks in the economy are found. The monetary data in the national accounts are not sufficient to be used as a proxy because a strong data source is lacking. In the future the physical data collected for the EVA might be used to improve the monetary data in the national accounts.

Similar to imports in the supply table, exports are derived from the JFSQ. However, the exports in the EFA do not always match the figures in the JFSQ. The amount of fuel wood seems to match, but the total of amount of exports not. The reason for this mismatch is due to adjustments that need to be made to balance supply and use.

4.6 Economic accounts

The economic accounts of the Eurostat European Forest Accounts (EFA) provide information on the economic aspects of forestry and the forest-based sector. These accounts include data on the

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[3] https://www.probos.nl/rapporten-2021def/1759-houtproductie-en-gebruik-in-nederland-in-2020
[4] Houtproductie en -gebruik in Nederland in 2020 - Probos

production, consumption, and trade of forest products and services, as well as on the economic value of forest resources and their contribution to the overall economy.

The forestry sector provides a range of goods and services, including timber, non-timber forest products and recreation opportunities. In order to accurately capture the economic contributions of the forestry sector, national statistical agencies collect data on various aspects of forestry activity and incorporate this information into the national accounts. This includes data on forest area, timber production and trade, and employment in the forestry sector. Tables B of the questionnaire focuses on economic data. When countries use the national accounts as a data source for the EFA questionnaire, it is possible to provide a comprehensive and reliable picture of the economic contributions of the forestry sector across the European Union. This is mostly due to the use of standardized industry codes in the National Accounts, which allows for consistent and comparable data across different countries and time periods. It provides a comparable range of economic indicators, such as gross value added (GVA) and trade balances.

From the National Accounts, most data can be found in the supply and use tables (SUT's). The supply and use tables related to the forestry account provide detailed information on the inputs and outputs of the forest sector, as well as the interconnections between the forest sector and other parts of the economy. For example, the tables might show the monetary value of the wood that is harvested from forests and how that wood is used in various industries such as construction, furniture manufacturing, and paper production.

In addition to the data collected through the supply and use tables, the National Accounts also provide valuable insights into employment trends in various industries. It provides information on the number of hours worked by employees in different sectors of the economy, broken down by gender. The data also makes a distinction between employees and self-employed individuals. Employees are individuals who work for a business or organization and receive a regular wage or salary in exchange for their labour. Self-employed individuals, on the other hand, work for themselves and are responsible for generating their own income.

Besides the SUT's and the data on employment, data on investments is required, which is also part of the national accounts. Data on the gross investments in fixed assets contains the expenditures on capital goods that are used for more than one year in a production process. This includes, for example, a building, a home, a vehicle, or a machine. This is in contrast to goods or services that are used up during the production process, such as iron ore or intermediate consumption. Fixed assets may decrease in value over the years due to wear and tear or because the technology becomes outdated (economic depreciation). This is called consumption of fixed capital (also known as depreciation). In gross investment, this is not subtracted from the value of the investment, whereas in net investment it is.

Detailed information on how to fill out Part B of the EFA questionnaire can be found in the Annex. This information is particularly important as it specifies the exact relationship between the National Accounts data and how to report this information in the questionnaire of tables B. By reporting the National Accounts data in a consistent manner between countries, a greater comparability of data is created, as the same reporting standards are being followed.

5. Consistency with existing policy provisions in the policy area

The interest in forests protection has increased because they play an important role in climate regulation, particularly through carbon uptake and storage, and in stopping biodiversity loss. It

resulted also in increasing forested areas in Europe. The interest in forest also grew because of the increased demand for biomass for energy production.

A lot of research is done about forests and there are various policies written about forests based on research. Monitoring forests by the EFA further supports researchers and policymakers. First the international policy area is described, followed by the European policy area and lastly the National policy area of the Netherlands.

5.1 International policy area

There are various international policies about the environment and sustainability. For example, the Paris Agreement on Climate Change, the Global Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets that promote sustainable forest management, protection and restoration efforts. Some examples will be described below.

United Nations

The UN Strategic Plan on Forests 2030 has set reducing forest loss and degradation as a priority. The UN Strategic Plan has set targets to reverse the loss of forest cover worldwide and increase global forest area by 3% by 2030[5].

The UN 2030 Agenda for Sustainable Development include strengthening efforts to manage forests sustainably, because forests play an important role in achieving various Sustainable Development Goals (SDGs). In the two figures below the European Commission showed how Forest goods and services support the SDGs and how deforestation has an impact on the SDGs[6].

Figure 5.1. Forest goods and services supporting the UN Sustainable Development Goals (COM/2019/352 final).

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[5] EUR-Lex - 52019DC0352 - EN - EUR-Lex (europa.eu)
[6] EUR-Lex - 52019DC0352 - EN - EUR-Lex (europa.eu)

1	Income from forest products
2	Nourishment from wild fruit and game
3	Medicinal plants
6	Freshwater for drinking and irrigation
8	Sustainable and inclusive economic growth and decent work for all
10	Reduced income inequality
12	Sustainable consumption and production patterns
13	Carbon capture and storage
15	Biodiversity
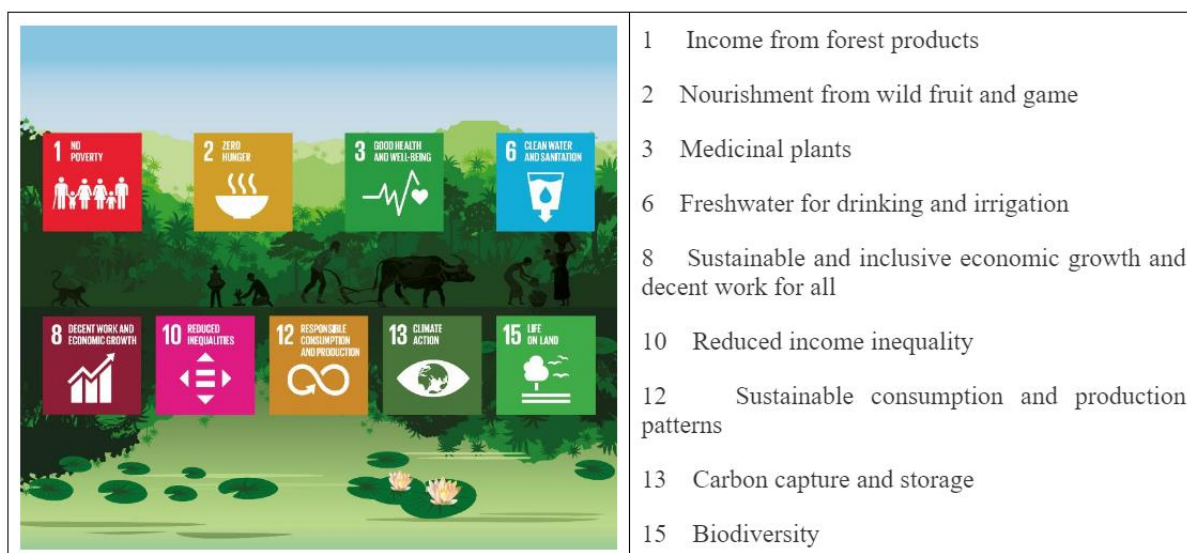
Figure 5.2. Impacts of deforestation on Sustainable Development Goals (COM/2019/352 final).

1	Increased vulnerability to extreme weather
2	Loss of rainfall and crop pollinators
3	Respiratory illness due to forest fires
6	Unsustainable management of water resources
8	Unsustainable economic growth and lack of decent work
10	Income inequality
12	Unsustainable consumption and production patterns
13	CO2 emissions
15	Biodiversity loss
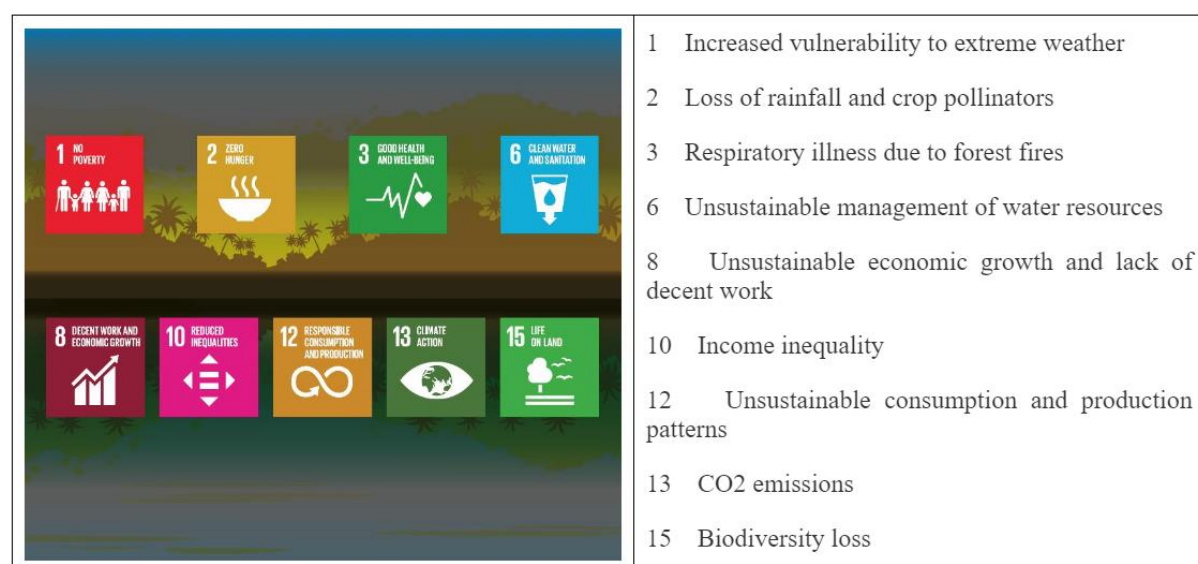
The Kunming-Montreal Global Biodiversity Framework (GBF).

In December 2022 the UN Biodiversity Conference (COP 15) took place. This conference resulted in the adoption of the Kunming-Montreal Global Biodiversity Framework (GBF)[7]. The GBF aims to reduce threats to biodiversity loss, restore ecosystems and protect indigenous rights. It is about sustainable use of nature and making the tools and solutions main stream. Concrete measures are drawn up to end nature loss and restore nature instead. The GBF states that 30% of the planet and 30% of degraded ecosystems must be put under protection by 2030.

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[7] COP15 ends with landmark biodiversity agreement (unep.org)

The GBF contains four goals and 23 targets[8] and replaces the Strategic Plan for Biodiversity 2011-2020 and its Aichi Targets[9].

5.2 European policy area

In the European Union much attention is given to forests in policy, such as the European Green Deal, the European forest strategy and the EU decision and regulation for the Land Use, Land-Use Change and Forestry (LULUCF) sector. These three examples will be explained below.

European Green Deal

Climate change and environmental degradation is affecting Europe and is causing an existential threat. In December 2019 the European Green Deal[10] was presented by the European Commission, with the aim to transform the EU into a modern, resource-efficient and competitive economy. The objectives include that by 2030 net greenhouse gas emissions should be decreased by at least 55%, compared to 1990 levels. Additionally, the EU will be the first climate-neutral continent by 2050. Moreover, 3 billion additional trees must to be planted in the EU by 2030. The Green deal also ensures that economic growth is decoupled from resource use, and that no person and no place is left behind. One of the priorities of the Green Deal is the protection biodiversity and ecosystems[11]

The overall objective of this conducted research for the Regulation is to extend the scope of the European environmental economic accounts to provide better information for the European Green Deal[12].

The proposal for the forest accounts module[13] is in line with climate and forest resource policies. The Commission presented the new European Forest Strategy 2030[14] as part of the European Green Deal and as one of its flagship initiatives as one of its flagship initiatives. It is perceived in the EU Forest Strategy that forests and the contribution of forestry (and the entire forest-based value chain) play a key and multifunctional role in achieving a sustainable and climate-neutral economy by 2050.

European Forest Strategy

The European forest strategy[15] is a key initiative of the European Green Deal and builds on the EU biodiversity strategy for 203016. This strategy contributes to achieving both the biodiversity objectives as well as the objective to reduces greenhouse gas emission by at least 55% by 2030 and be the firsts climate neutral continent by 2050. This strategy recognizes that forests and the entire forest-based

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[8] COP15: Nations Adopt Four Goals, 23 Targets for 2030 In Landmark UN Biodiversity Agreement | Convention on Biological Diversity (cbd.int)
[9] The Global Biodiversity Framework's "30x30" Target: Catchy slogan or effective conservation goal? | International Institute for Sustainable Development (iisd.org)
[10] A European Green Deal (europa.eu)
[11] Protecting the environment and oceans with the Green Deal (europa.eu)
[12] COM(2022) 329 final 2022/0210 (COD) Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Regulation (EU) No 691/2011 as regards introducing new environmental economic accounts modules
[13] COM(2022) 329 final 2022/0210 (COD) Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Regulation (EU) No 691/2011 as regards introducing new environmental economic accounts modules
[14] COM(2021) 572 final of 16 July 2021
[15] Forest strategy (europa.eu)
16 Biodiversity strategy for 2030 (europa.eu)

value chain play a central and multifunctional role in achieving a sustainable and climate neutral economy by 2050.

 The objectives of the EU forest strategy are to improve the quantity and quality of EU forests and strengthen their protection, restoration and resilience. Climate change has brought about weather extremes and this strategy aims for Europe's forests to be adapted for these new conditions.

This is required in order to keep on benefitting from the socio-economic functions delivered by forests. This new forest strategy will also support forest-based bio-economy within sustainability boundaries.

This strategy aims for protection, restoration and enlarging of the EU's forests to fight climate change and biodiversity loss and to have resilient and multifunctional forest ecosystems.

This will be done by the following aspects[17]:

- promoting the sustainable forest bioeconomy for long-lived wood products
- ensuring sustainable use of wood-based resources for bioenergy
- promoting non-wood forest-based bioeconomy, including ecotourism
- developing skills and empowering people for sustainable forest-based bioeconomy
- protecting EU's last remaining primary and old-growth forests
- ensuring forest restoration and reinforced sustainable forest management for climate adaptation and forest resilience
- re- and afforestation of biodiverse forests, including by planting 3 billion additional trees by 2030
- providing financial incentives for forest owners and managers for improving the quantity and quality of EU forests

It is stated that the new strategy focusses on strategic forest monitoring, reporting and data collection. Additionally, improved knowledge about forests is required and therefore this strategy also focusses on creating a strong research and innovation agenda. The strategy also focusses on implementing an inclusive and coherent EU forest governance framework and boosting the implementation and enforcement of existing EU rules.

The forest accounts module supports the EU forest strategy for 2030 and the future forest monitoring initiative and connects forest policies with policies on climate, energy and the bio-economy.

LULUCF
One of the sectors for which countries are required to report their emissions and removals of greenhouse gas emissions is Land Use, Land-Use Change and Forestry (LULUCF)[18]. It is only this LULUCF sector for which net removal of CO_2 from the atmosphere is possible because of carbon sequestration in biomass (wood, plants) and soil. It is stated in the Paris climate agreement to realize negative emissions after 2050. Therefore, it is required to have more measures that increase CO_2 removal. Therefore, the importance of the role of the LULUCF categories increased and this led to new regulations by the European Commission to monitor, report and assess the performance of the LULUCF sector.

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[17] Forest strategy (europa.eu)
[18] Land Use, Land-Use Change and Forestry (LULUCF) | UNFCCC

The EU decision (529/2013/EU) and regulation (841/2018/EU) provide guidelines for monitoring and reporting the performance of LULUCF. The EU decision and regulation indicate how greenhouse gas emissions from land use, land use change and forestry should be monitored and how this should be reported[19]. The growing challenges related to LULUCF also increased cooperation with organizations and institutions such as the Food and Agriculture Organization of the United Nations (FAO), The Collaborative Partnership on Forests (CPF) and The United Nations Forum on Forests (UNFF).

Nature restoration law

On the 22nd of June in 2022, the European Commission adopts a proposal for the Nature Restoration Law[20]. It is the first law that is continent wide. This law is proposed to restore ecosystems for people, the climate and the planet. The law is a key element of the EU Biodiversity Strategy[21].

The objectives are as follows; restore ecosystems, habitats and species across the EU's land and sea areas in order to:

- enable the long-term and sustained recovery of biodiverse and resilient nature.
- contribute to achieving the EU's climate mitigation and climate adaptation objectives.
- meet international commitments.

The proposal contains targets about pollinating insects, urban ecosystems, marine ecosystems, river connectivity, forest ecosystems and agricultural ecosystems. The latter two apply most to the research of this report. The target about forest ecosystems contains: achieving an increasing trend for standing and lying deadwood, uneven aged forests, forest connectivity, abundance of common forest birds and stock of organic carbon. The target about agricultural ecosystems contains: increasing grassland butterflies and farmland birds, the stock of organic carbon in cropland mineral soils, and the share of agricultural land with high-diversity landscape features; restoring drained peatlands under agricultural use. It is expected that the EU countries submit National Restoration Plans to the European Commission within two years of the Regulation coming into force. These plans should show how they will deliver on the targets. The EU countries are also required to monitor and report on their progress. Therefore, the EFA could be useful.

The ecosystem accounts module provides data to describe progress in one of the six priority objectives of the environment action programme to 2030[22,23]: protecting, preserving and restoring biodiversity and enhancing natural capital. This module also contributes to monitoring implementation of the EU nature restoration plan, part of the EU biodiversity strategy for 2030.

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[19] LULUCF - WUR

[20] The EU #NaturecRestoration Law (europa.eu)

[21] https://environment.ec.europa.eu/strategy/biodiversity-strategy-2030_en

[22] COM(2022) 329 final 2022/0210 (COD) Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Regulation (EU) No 691/2011 as regards introducing new environmental economic accounts modules

[23] Decision (EU) 2022/591 of the European Parliament and of the Council of 6 April 2022 on a General Union Environment Action Programme to 2030 (OJ L 114, 12.4.2022, p. 22).

5.3 National level

On the national level there are two important policy regulations from the government, the Nature Conservation Act ('Wet Natuurbescherming'[24]) and the Forest Strategy ('Bossenstrategie'[25]). These will be outlined below.

Wet Natuurbescherming

In 2017 the Forest Act ('Boswet'[26]) was replaced by the Nature Conservation Act. Rules for protecting plants and animals in the Netherlands are described in this act. It is put in place to ensure that different plant and animal species will not become extinct. It focusses for example on conservation, management and restoration of landscapes of national or international importance. It also focusses on the sustainable management of wood stands (houtopstanden).

The law specifies that the objectives for the Natura 2000 areas must be quantified, for as much as possible. In addition, special national nature reserves must be protected. Furthermore, insight must be provided about the decisions made about changing the designating Natura 2000 areas and special national nature areas.

Based on national and international rules and regulations provinces determine the policy about nature protection for their area. Provincial policy must be focusing at preserving and, if possible, strengthening biological diversity and the sustainable use of it. Provinces also provide permits and exemptions for activities near nature reserves. If the activities concern the Netherlands as a whole, then the Ministry of Agriculture, Nature and Food Quality (LNV) provides the permits and exemptions, according to the Nature Conservation Decree ('Besluit natuurbescherming'[27]).

The Netherlands Environmental Assessment Agency (PBL) will publish a scientific report once every four years to describe the current situation and expected developments with regard to nature, forest and landscape. Once every two years PBL publishes a scientific report about the state of affairs of the policy implementation, the progress and new developments of nature, forest and landscape. Perhaps the questionnaire could provide PBL with further insights.

On 1 January 2024 the 'Omgevingswet[28][29]' will enter into force and the Nature Protection Act will be included in it to simplify and merge the rules for spatial development. De Omgevingswet will provide guidelines for rules and measures to protect nature.

Bossenstrategie

The government of the Netherlands and provinces have agreed in the Climate Agreement ('Klimaatakkoord'[30]) that they will draw up a Forest strategy ('Bossenstrategie'[31]) together. This has

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[24] wetten.nl - Regeling - Wet natuurbescherming - BWBR0037552 (overheid.nl)

[25] Uitwerking ambities en doelen landelijke Bossenstrategie en beleidsagenda 2030 | Kamerstuk | Rijksoverheid.nl

[26] wetten.nl - Regeling - Boswet - BWBR0002357 (overheid.nl)

[27] wetten.nl - Regeling - Besluit natuurbescherming - BWBR0038662 (overheid.nl)

[28] Omgevingswet | Rijksoverheid.nl

[29] Omgevingswet gaat in op 1 januari 2024 - Eerste Kamer der Staten-Generaal

[30] Klimaatakkoord | Klimaatakkoord

been done at the beginning of 2020. In this strategy, the ambitions and goals about the forests in the Netherlands in 2030 are described. Moreover, in this strategy is described how these ambitions will be realized. A project group[32] has been set up to monitor the progress of actions. Perhaps the EFA questionnaire could provide insightful information to this project group.

The main ambition is that the government aims for a future proof forest. The coming decade an integral approach is required for fighting climate change and improving biodiversity. The main focus of the Forest strategy is on the coming decade, however it has set its horizon for the coming century. The goal of the Forest strategy is that the actions that will follow from it will contribute to healthy, future-proof and socially valued forests. The government strives for an expansion of the forest area and improved quality of the forest. Furthermore, in the Forest strategy it is stated that the government aims for an increase in the number of trees outside the forest, such as in the rural area and the urban environment. This is needed as part of a healthy, green living environment. The aim is also to move towards a more sustainable use of forests and trees.

The government and provinces are going to explore how to realize 10% more forest in 2030. They will also compensate for all forest clearing that is necessary for the management of the Natura 2000 areas. The compensation is done for as much as possible outside the Netherlands Nature Network ('Natuurnetwerk Nederland', NNN). They also support the ambition of the Delta Plan for Biodiversity Restoration ('Deltaplan Biodiversiteitsherstel') which aims to realize 10% green-blue veining in rural areas. One can think about wooded banks, ditches, verges and rows of trees to do this. It is a long term plan.

The Forest strategy also supports the development of agroforestry. It is an interesting development with the chance of enhancing the connection between agriculture and nature. Agroforestry in the Netherlands will increase as for the long term, various organizations set the ambition to realize 25,000 hectares of agroforestry.

The Forest strategy also includes the ambition to encourage high-quality use of wood. Moreover, it is mentioned that the government wants to reduce wood for energy purposes. By this, they are also in line with efforts stimulating bio-based construction, which links with circular economy and sustainable carbon capture in materials.

Some provinces are creating specific forest strategies for their own province or have already adopted one. In these plans, the provinces further develop the national ambitions and goals and they make the national ambitions and goals concrete. The Netherlands has set the ambition to plant an addition of 37.000 ha forest in the Netherlands. Staatsbosbeheer will plant 5.000 ha of new forest. Staatsbosbeheer manages a total of 270.000 ha off natuur in the Netherlands of which 95% is publicly available[33].

[32] https://open.overheid.nl/documenten/ronl-d6ac7db2-0d36-45b0-9507-f76638a48c0d/pdf

[33] Ministerie van LNV presenteert nieuwe Bossenstrategie (staatsbosbeheer.nl)

5.4 Actor map

An actor map for the Netherlands has been made to define the field in which the EFA is operating. The relationships with different data sources, institutes and publications are mapped out. In general: yellow box indicate data sources, blue and green boxes indicate were data are shown together according to certain definitions and concepts, purple boxes indicate platforms where data is published. The arrows show the input from one area to the next and the black gives some content on the kind of data. Some meta-data is provided on periodicity, owner and of the data availability.

From this picture it can be concluded that the EFA operates in a field were similar data are provided by different actors. In order not to confuse users it is important to show the relations between the figures and show for what purpose what kind of data is needed.

Figure 3. Actor map of the Netherlands in the EFA field.
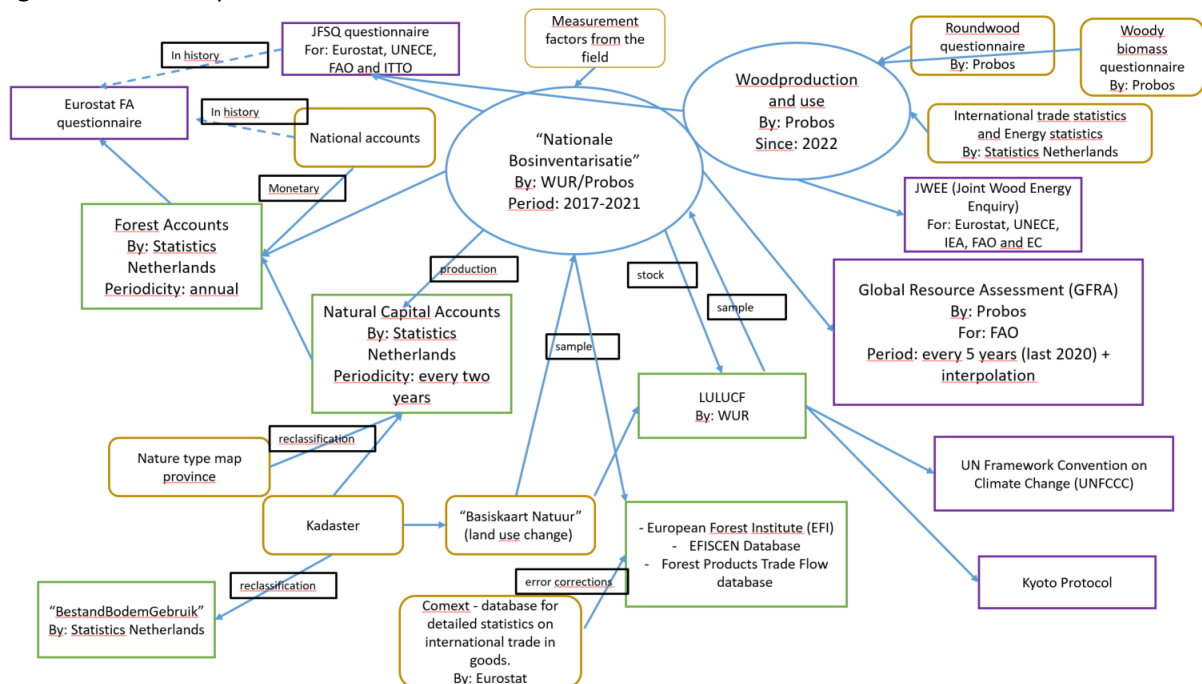
6. Results and discussion

The aim of this report is to fill the questionnaire of the EFA for the Netherlands for as much as possible. Therefore, research was conducted on how to fill the questionnaire. The result can be found in the questionnaire attached to this report. In this chapter the results will be discussed. First the overall results of each table will be reported and this is followed by further information about data gaps and limitations in chapter 6.1.

For table A1a on wooded land all the priority cells (grey shaded cells) could be filled. There is also some information available about 'Other land with tree cover available for wood supply' for the Netherlands, which was not a priority cell. It was also possible to fill table A1b on wooded land in monetary terms, although this was not priority. It was also possible to fill almost all priority cells for table A2a and A2b about timber on wooded land. Irretrievable losses remained empty, but irretrievable losses are very rare in the Netherlands. The monetary tables (Table B1, B2, B3a and B3b) were based on the data from our National Accounts. Most of the priority cells could be filled, except for output of non-wood products, capital transfers and output by households (Table B2). C1a and C1b on physical supply and use of wood in the rough could be filled based on information from Probos. Currently, production of wood only takes place by NACE 02 (Forestry and logging industry) and not by 'other industries' according to Probos, therefore the column about other industries industry remained empty in table C1a. What stood out was that the supply and use are not balanced yet, this is an example of a current data gap that needs to be explored further.

6.1 Data gaps and limitations

In this project, several data gaps and limitations are identified when filling in the EFA questionnaire. Some data gaps have already been mentioned. This chapter further discusses the main data gaps and limitations for the Netherlands regarding the EFA.

NFI (National Forest Inventory) and BKN (Basis Kaart Natuur)

Although the NFI data is seen as the leading forest statistics for the Netherlands, there are some limitations to its use for the forest accounts.

Estimations of forest area

The NFI used the BKN dataset to estimate the area of forests. To construct the BKN, spatial data consisting of the cadastral vector dataset (Top10NL) is categorized using the IPCC land-use classifications and rasterized to a 2,5m by 2,5m grid resolution (Kramer et al., 2022). This raster is then further aggregated into a 25m by 25m raster resolution using a majority-rule. This method entails that for each 25m by 25m grid cell, the land-use classification is allocated to the most common land-use category of the 100 2,5m by 2,5m cells located within the larger 25m raster cell.

Rasterizing data lowers processing time, making it easier and faster to perform different spatial calculations and use other GIS tools. However, the precision of the spatial demarcation of features – and therefore the area of this – becomes lower. Aggregating by majority-rule from 2,5m to 25m may lead to the incorporation of geographic objects that do not fit the definition of the category forest.

Examples of this are grasslands, buildings of infrastructure bordering forests that are too small to become the major land-use in a 25m cell, but are larger than the 6m threshold stated by the FAO definition. Also, the borders of forest areas may be overestimated or underestimated, depending on the borders of the raster cell. Consequently, the 25m BKN estimate of forest area likely diverts from the estimate made at a different raster resolution (e.g., 2,5m or 10m), and should therefore be seen as an estimate, rather than the *true* forest area. Information regarding the influence of rasterizing approaches to the estimation of total forest area are currently unknown.

Periodicity

The NFI reports occur every 5 to 6 years. The BKN, used for the estimation of forest area, is made at a 4-year cycle based on the LULUCF reporting obligations. This means that annual forest data from the NFI or BKN is not available. To derive annual data for EFA reporting of opening and/or closing stocks, afforestation and deforestation, inter- or extrapolation of data has to be performed consequently. As a result, the reported annual data in the EFA is an approximation and may divert from the actual changes occurring in wooded areas in the Netherlands over the two reporting periods.

Additionally, the method of inter- or extrapolation of data means that a deviation of a trend cannot be accounted for. For example, for the reporting of forest area for EFA reporting year 2020, interpolation was used for BKN data of 2017 and 2021. However, the next BKN update is expected in 2025. To illustrate, this means that for the EFA with reporting year 2024, forest area data will be used by extrapolating data based on trends from t-7 to t-3. Using this method, the uncertainty in data would increase significantly. This problem also occurs for other NFI data, given the 5-year report cycle where inter- or extrapolation of data must be performed. Estimations of missing data points could be improved by taking the annual change in forest area into account using different data sources, such as data of Statistics Netherlands on ecosystem accounting.

Use of source data

Kramer et al. (2022) further state some limitations in constructing the BKN. One of the limitations is the use of cadastral data. For the development of the 2021 map of BKN, the most recent cadastral data available on 1 January 2021 was used. As a consequence, the Top10NL update of September 2020 was used. However, the September 2020 release of the Top10NL depicts the topographic 'situation' of 2019 (after correction using aerial photographs). Although in the reports of LULUCF and the NFI it is stated that the BKN of 2021 depicts the forested area in the Netherlands in 2021, while in reality it thus depicts the forested area for the year 2019. However, no corrections are made in either the LULUCF or NFI reports for this.

Available / Not Available for Wood Supply (FAWS / FNAWS)

Probos (in Alberdi et al., 2019) have made estimates of the area of FNAWS and FNAWS in the Netherlands based on NFI-6 plot data. The NFI-6 was conducted in 2012-2013. Consequently, the assumption that 19,06% of all forest in the Netherlands is FNAWS is based on data that is more than 10 years old. Therefore, it is likely that the distribution key is inaccurate to represent the current situation in the Netherlands. Consequently, reports of area of FAWS and FNAWS should be

considered as rough estimates. To improve the reporting of FAWS and FNAWS, regular updates for the share of FNAWS to the total forest area should be made.

Other land with tree cover available for wood supply

According to Eurostat, OLWTC consists of the wooded area under agricultural land-use, comprising of short-rotation forestry, short-rotation coppices and agroforestry. Unfortunately, no data on the area of agroforestry is known at Statistics Netherlands. Therefore, the reported area of OLWTC is an underestimation of the total area of OLWTC in the Netherlands.

According to Eurostat, the category OLWTC is included in the EFA to ensure that all land with wooded areas used for timber production is included in the accounts. However, in the Netherlands, wood from urban areas also is used by the forestry sector, while wooded areas in urban settings is not covered by the EFA. It is shown by Probos that half of the wood removals (*houtige biomassa*) in the Netherlands come from the build-up environment. However, wooded areas in the build-up environment are not part of the forest accounts, meaning that a substantial amount of wood supply is not covered by the forest accounts. Furthermore, data from the JFSQ cannot be used, as in this questionnaire all wood supply in the Netherlands is covered, including wood from the built-up environment.

Furthermore, no NFI data is available on OLWTC, including the amount of timber for example. Consequently, this entry is currently left blanc. Data known by Probos for this category is currently allocated to forest. Therefore, if it wishes to specify the timber estimates of OLWTC, the timber estimates of forest will be reduced. As a result of this, the amount of forest in the EFA will deviate from the amount of forest reported elsewhere by Probos, e.g., in the JFSQ.

Monetarization

To estimate the monetary assets of wooded land and timber in the Netherlands, a single conversion factor is used. Since no registry for the price of forest soil in the Netherlands exists, only an average estimate of the monetary value per hectare is known by Probos. However, no information is thus known to the different values of wooded land and timber depending on location, type of tree or management type. As a result, only rough estimates of the monetary value of wooded land and timber stocks can be provided.

National accounts

While we were able to fill in all the required cells of the questionnaire tables B, there were still some gaps in the data due to the lack of information in the voluntary cells. These cells mainly provided breakdowns of the required cells and were not mandatory to fill in. An example is the breakdown of the output value for wood in the rough into logs and fuel wood in table B1. This data was not present in the national accounts.

7. Conclusions

Currently, forest accounts are being proposed as an amendment to Regulation (EU) No 691/2011. This followed from increased awareness on the importance of forests. For example, forests provide us with wood and biomass, and hence economic productivity and employment. Moreover, forests provide a range of other ecosystem services which are systematically assessed in the SEEA EA. Additionally, forests play a crucial role in climate regulation and stopping biodiversity loss. The EFA gives a lot of insights to these issues. The first version of the forest accounts for the Netherlands conducted by Statistics Netherlands is described in this report.

The objective of this project is to fill (as much as possible) the questionnaire of the EFA for the Netherlands. Research has been conducted to fill the questionnaire and this led to the following conclusion. Data is scattered and various different data sources were used to fill the questionnaire. Due to aspects such as definition and periodicity this is a complex matter. However, most of the priority cells could be filled, especially tables B about the economic accounts of the EFA could be filled nicely based on only one source, the National Accounts. Therefore, Statistics Netherlands can comply with the EU regulation. Nonetheless, when filling in the questionnaire some data gaps and limitations were discovered and these are described in this report. To resolve some of the data gaps and limitations, further research is required. Some suggestions are made below.

8. Further research

While filling out the questionnaire various aspects came to light for further research. This includes improvements for known limitations (as described in chapter 6), the need to fill in data gaps or enable more detailed analysis. The points for further research are described below.

Firstly, it is interesting to explore the possibilities to create a continuous time series for the EFA, and to see from which year this is possible. For this project, only the 2020 data is used. However, data for previous years are relevant to explore to identify trends over time regarding the forest accounts.

Multiple points for further research are identified for the asset accounts of the EFA. The first suggestion is to improve the data for the minimum width of land which determines the forest area, because the NFI and the BKN define forest based on a minimum width of 30m, while in practice a threshold of 25m is used. This is the case because the used geodata to determine the area of forest consists of a raster dataset with a cell size of 25m by 25m. This leads to a possible overestimation of area of wooded land classified as 'forest'. It would be interesting to further research if this method can be improved.

Further, the estimation of FAWS and FNAWS in the Netherlands could be improved. Currently, a general distribution key is used. Using detailed NFI plot data, this distribution key could be updated and improved, allowing for a better estimation of the FNAWS and FAWS in the Netherlands. Also, it should be further explored whether the current estimation of FNAWS is accurate compared to the actual felling taking place.

Also, data on OLWTC could be improved. Currently, no data is available for the amount of agroforestry in the Netherlands. Agroforestry is included in the EFA definition of OLWTC and is an upcoming phenomena in the Netherlands, also suggested as a promising development by the National Forest Strategy. Data for this is therefore highly relevant. Furthermore, no data for the amount of timber on OLWTC is known. Currently, the data that is available in the NFI for this area is allocated to forest. Consequently, if timber estimates of OLWTC are specified, the timber estimates

of forest will decrease. This will result in a deviation of the amount of forest in the EFA from the amount of forest reported elsewhere by Probos, e.g., in the JFSQ. Further research on these topics could explore the possibilities and possible limitations of such approach.

Data for the timber accounts could also be improved further. For example, no figures were estimated for irretrievable losses in the Netherlands for OLWTC. Furthermore, the mortality in trees is currently not taken into account in the increment estimate. These limitations could be resolved in future research. Also, in the available NFI data the vitality of trees are not translated into m3 losses of wood. For further research it would be useful to have estimated results for irretrievable losses. It is suggested to explore if the figures from the NFI data about the vitality of trees can be translated into m3 losses of wood.

For future research it would also be interesting to research how to compare the data from A1a and A2a. There are some slight differences. For example, in the EFA table A2a (timber on wooded land) the variable "net increment" is requested, this however is not requested in table A1a which is about the area of wooded land. In A1a "afforestation and other increase" needs to be reported.

Further research could also contribute to improve the monetarization of wooded land and timber stocks. Currently, this is undertaken using a single conversion factor to a monetary value. However, methods used in ecosystem accounting could improve this approach. The SEEA EA handbook describes, for instance, how the ecosystem service wood provisioning by forest ecosystems could be captured in a monetary value. Further research should seek how to apply such methods to the EFA.

Another limitation mentioned in this report is that the BKN is made at a 4-year cycle and the NFI at a 5-year cycle, meaning that no annual data is available to fill in the asset accounts. Therefore, inter- or extrapolation of data has to be performed. For example, currently, the increments from NFI7 (table 14.2 in NFI7) are estimated by interpolating data collected for the NFI6 and NFI7. This means over a period between 2013 and 2017. It should be further investigated if a better method that can provide yearly numbers can be found, instead of interpolation between the five years. A method should also be explored to estimate figures for 2020. The estimation of missing data points can be improved by taking the annual change in land used for forest as a variable. This kind of data can be derived from, for instance, the Dutch ecosystem accounts in further research. It would also be interesting to look at how other countries have covered this. For example, Estonia recommends a recent report for guidance on interpolation/extrapolation. This limitation also occurs to fill in the supply and use tables.

There are also multiple possibilities for further research on the supply and use tables. According to ESA (European System of Accounts) it seems that conceptually, the total supply of wood is equal to the sum of (i) the volume of net increment of wood from all land with cultivated wood and (ii) the volume of removals of wood from all land with uncultivated wood. Currently, this approach is not taken by Eurostat. We would like to explore this issue further in order to come to a final approach.

Additionally, in the supply table C1a the amount of logs (over bark) are estimated by subtracting fuel wood from the total wood in the rough. To separate logs in coniferous and non-coniferous the following is done. The non-coniferous wood is taken from the JFSQ and converted to overbark, and then the coniferous wood is estimated by subtracting the non-coniferous wood from the total logs. To improve the supply table in the future, a possibility would be to make a percentage distribution between coniferous and non-coniferous wood. It would be useful to find out whether a percentage

distribution gives a better picture of the ratio of different types of wood than classifying a type of wood as a residual item.

Further research can also be done on the use table (C1b), because there is a slight difference between the data on coniferous and non-coniferous wood and fuel wood from the publication "Houtproductie en gebruik in Nederland" and the EFA. With regard to the category "final consumption and capital formation" in the use table C1b the amount of roundwood used by households can be allocated to final consumption. Currently, this is not how it is done, but in the future this would be a possibility. Besides this, something that remains unclear from the supply and use tables is that wood provision is measured as an increment of forest trees is considered as a first economic product in the supply chain. This product is considered CPA 02.10.3 "Forest trees". However this CPA code is not included in the supply and use tables. This needs to be sorted out in the future.

Similar to imports in the supply table, exports are derived from the JFSQ. However, the exports in the EFA do not always match the figures in the JFSQ. The amount of fuel wood seems to match, but the total of amount of exports not. The reason for this mismatch is due to adjustments that need to be made to balance supply and use. In a future project we will investigate if data in the different publications can be more aligned. Despite the balancing, the total supply and use do not exactly match in the current questionnaire. This also will be put straight in a future project.

Even though during this project, a lot of data was found and used to fill in the EFA questionnaire, providing valuable insights on the forests and forestry sector of the Netherlands, there is still room for improvement to fill out the EFA. Further research will focus on these improvements as much as possible, to ensure detailed and accurate forest statistics.

9. References

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10. Annex

A: How to fill in the economic tables (tables B1, B2, B3a and B3b)

This annex will describe how the economic tables B1, B2, B3a and B3b are filled in from the perspective of Statistics Netherlands. Every member state will use the national accounts data as the main data source for this part of the questionnaire, therefore it can be useful to have a more detailed methodology available. It is important to note that Statistics Netherlands uses a classification system, which is based on the CPA (Classification of Products by Activity) classification. Therefore, we will refer to the CPA codes in the annex to illustrate how to fill in the questionnaire with the help of the national accounts data. In this chapter, we will provide a detailed guide on how to construct the economic tables of the EFA questionnaire, with each table being discussed in its own sub-chapter.

1 Total output (at basic prices)

The total output is automatically calculated by adding 1.1, 1.2, 1.3 and 1.4 of the table together. It is at basic prices. Output in basic prices refers to the value of goods and services produced by an industry or sector of the economy at their basic prices. Basic prices are the prices that producers receive for their products, before any taxes or subsidies are added. Indirect taxes, such as sales taxes or value-added taxes (VAT), increase the final price of goods and services, while subsidies reduce their final price. By excluding these indirect taxes and subsidies from the basic prices, we can obtain a more accurate measure of the actual economic activity taking place in a given industry or sector.

Of which output for own final use

This refers to a set of goods or services that are kept by an institutional unit for either their own consumption or for capital formation. In the Dutch System of National Accounts, this falls under the category of "use". Specifically, the forestry sector makes use of forestry products, which can only be sourced from within the same sector (as classified under CPA code 02 in the use table). The majority of this self-use involves the purchase of services by the forestry sector from other parts of the forestry sector.

1.1 Goods characteristic of the forestry and logging activity

Most of the output is generated here under 1.1.2 wood in the rough. All forestry products (CPA code 02) that are produced in the Dutch SUTs are put under this category.

1.2 Services characteristic of the forestry and logging activity

It is currently unknown which part of the forestry products (CPA code 02) are services. For now this is put under "wood in the rough". The output is for their own use related to services. This figure will be put in this cell and subtracted from the forestry products.

1.3 Other products from connected secondary activities in the local KAU

The remaining categories of the production of the forestry sector are placed under the item 'other products from connected secondary activities in the local KAU'. This includes:

- Wood and of products of wood and cork, except furniture; articles of straw and plaiting materials (CPA code 16)
- Research & Development. (CPA code 72)
- Public administration and defense services; compulsory social security services (CPA code 84)
- sporting services and amusement and recreation services (CPA code 93)

1.4 Other products

Within the supply and use tables there are currently no commodities or services that should be part of other products.

2.1 Goods input

The goods input is the sum of:

- Trees, tree plants and forest tree seeds
- Energy, lubricants
- Fertilisers and soil improvers
- Plant protection products and pesticides

Trees, tree plants and forest tree seeds

- Trees and tree plants used as input include live forest tree plants, forest tree seeds and forest trees bought to produce timber. From the Dutch SUT's the commodity group sowing seeds (CPA code 01) is used from the use table.

Energy, lubricants

Energy and lubricants used as input include electricity, motor spirit (gasoline), natural gas, liquefied or in the gaseous state, lubricating petroleum oils and heavy preparations n.e.c. and other similar products. From the Dutch SUT's the following items are included from the use table:

- Diesel (CPA code 19)
- Electricity (CPA code 35)

Fertilisers and soil improvers

This particular category comprises straight and compound fertilizers, as well as organic fertilizers. However, it is important to note that due to insufficient data, this classification is not explicitly accounted for in the Dutch national accounts. At present, there are no provisions within the System of National Accounts that cater to this category.

Plant protection products and pesticides

Plant protection products and pesticides, such as insecticides, fungicides, herbicides, and similar inputs, are not specifically identified in national accounts due to a lack of reliable data. Consequently,

there are currently no provisions in the Dutch System of National Accounts that explicitly address this category.

2.2 Services input

The services input is the sum of:

- Services characteristic of the forestry and logging activity
- Regular maintenance and repair of equipment
- Maintenance of buildings
- Financial services (FISIM)

2.2.1 Services characteristic of the forestry and logging activity

Characteristic services output and input include forest trees nursery services, support services to forestry and any other services provided by a local Kind of Activity Unit belonging to the forestry industry. This definition is the same as for category 1.2. Here it refers to the use and not the production. From the Dutch SUT's the following items are included from the use table:

- Employment wood production (CPA code 16)
- Forestry products (CPA code 02)

2.2.2 Regular maintenance and repair of equipment

Regular maintenance and repair of equipment used as input includes repair and maintenance services of forestry machinery and repair and maintenance services of motor vehicles. From the Dutch SUT's the following items are included from the use table:

- Repair and installation of machines (CPA code 33)
- Repair and maintenance of cars and motors (CPA code 45)

2.2.3   Maintenance of buildings

Th subclass 'maintenance of buildings' includes the regular maintenance and repair services of fixed assets used in production (non-residential buildings and structures):

- Material used (e.g. cement, sand, bricks, tiles, glass);
- Labour charges (e.g. for painters, builders' labourers, carpenters, joiners, plumbers, electricians);
- Total costs borne by forestry and logging units in respect of overall payments to other units (e.g. material, labour charges, management earnings and profits).

Included here are the maintenance of forest roads and bridges, etc. This subclass excludes major improvements and extensions of buildings and structures used in production.

From the Dutch SUT's from the use table the following is included:

- Motorways, roads, streets and other vehicular or pedestrian ways and airfield runways (CPA code 42)

- Coastal and port constructions, dams, locks and related hydro-mechanical structures (CPA code 42)
- Site preparation works (CPA code 43)

2.2.4 Financial services (FISIM)

The measurement of financial intermediation services, also known as banking services, in national accounts is referred to as FISIM (Financial Intermediation Services Indirectly Measured). FISIM is estimated by national accounts and reported in EFA accounts. It is calculated as the difference between the interest rate paid to depositors and charged to borrowers and the "reference rate" of interest, which is the rate that both parties would be happy to agree upon. This reference rate is not an average of the rates on loans or deposits, but rather lies between bank interest rates on deposits and loans. The prevailing rate for inter-bank borrowing and lending is a suitable choice for the reference rate.

FISIM applies only to loans and deposits provided by financial institutions and is imputed for all such transactions. The allocation of FISIM to user industries is based on the stocks of loans and deposits of each industry. If this information is not reliable, the output of each industry is used instead. The use table directly provides the value for FISIM.

2.3 Other goods and services used as inputs

In the use table, there are several intermediate use categories that have not yet been discussed. These categories encompass a variety of goods and services that are used in the production. From the use table these include:

- Fabricated metal products, except machinery and equipment (CPA code 25)

- Soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations (CPA code 20)
    Air transport services CPA code 51)
    Food and beverage serving services (CPA code 56)
- Computer programming, consultancy and related services (CPA code 62)
- Real estate services (CPA code 68)
- Rental and leasing services (CPA code 77)
- Services to buildings and landscape (CPA code 81)
- Services provided by extraterritorial organisations and bodies (CPA code 99)

3 Gross value added (at basic prices)

Gross Value Added (GVA) is a measure of the economic value generated by an individual producer, industry, or sector in a particular period. It is calculated by subtracting the cost of inputs used in the production process from the total value of outputs produced.

3.1 Consumption of fixed capital

Consumption of Fixed Capital (CFC) is a measure of the depreciation or wear and tear that occurs on fixed assets, such as buildings, machinery, and equipment, during the process of producing goods and services. CFC represents the value of the capital that is used up during the production process, and therefore needs to be replaced over time. The value can be subtracted from the supply and use tables.

CFC is an important concept in national accounting, as it helps to calculate the net value added of an economy. When calculating Gross Domestic Product (GDP), for example, it is necessary to subtract the value of CFC from the total output of goods and services, in order to arrive at the net value added.

3.2 Net value added (at basic prices)

Net Value Added is a measure of the contribution of each industry or sector to the overall economy. It is calculated by subtracting the value of intermediate consumption, depreciation (CFC), and taxes on production and imports from the Gross Value Added (GVA) of an industry or sector.

3.2.1 Other taxes on production

Other taxes on production can be directly subtracted from the use table from the national accounts. An example of such taxes is the real estate tax.

3.2.2 Other subsidies on production

Other taxes on production can be directly subtracted from the use table from the national accounts.

4 Factor income

By subtracting the other taxes and subsidies on production from the net value added, we get the factor income.

4.1 Compensation of employees

Compensation of employees refers to the total amount paid by employers to their employees in exchange for their labor services. This includes wages and salaries, bonuses, commissions, and benefits such as health insurance and retirement contributions.

5 Net operating surplus and Mixed income

Subtracting the compensation of employees from the factor income, we get the net operating surplus.

5.1 Net property income

Net property income includes interest, distributed income of corporations, reinvested earnings on foreign direct investment, other investment income and rent received, minus interest, property income and rent paid. In the Dutch national accounts this value is registered as "mixed income" and is part of the value added.

5.2 Net entrepreneurial income

Adding the net property income and the net entrepreneurial income.

6 Gross fixed capital formation (excluding deductible VAT)

Gross fixed capital formation (GFCF) is a measure of investment in fixed assets by businesses, households, and government entities. In the national accounts, GFCF is an important component of the expenditure approach to Gross Domestic Product (GDP). GFCF includes all investment in fixed assets such as buildings, machinery, equipment, and infrastructure that are used in production processes over a period of time. It also includes the value of improvements made to existing fixed assets. The data comes from the investment data which is also part of the national accounts and is explained in the methodology chapter.

 In the EFA questionnaire it is the sum of:

- 6.1 Buildings, structures and land improvements
- 6.2 Machinery and equipment
- 6.3 Plant resources yielding repeat products
- 6.4 Other GFCF

7 Net fixed capital formation (excluding deductible VAT)

Fixed assets may decrease in value over the years due to wear and tear or because the technology becomes outdated (economic depreciation). This is called consumption of fixed capital (also known as depreciation). In gross investment, this is not subtracted from the value of the investment, whereas in net fixed capital formation it is.

8 Changes in inventories

Changes in inventories refer to the difference between the value of a company's inventory at the end of a period and its value at the beginning of that period. It includes any additions to or subtractions from the inventory during the period, such as purchases, production, sales, and losses due to theft, damage, or obsolescence. There are currently no changes in inventory recorded in the Dutch SUT's for the forestry sector.

8.1 Work-in-progress on cultivated biological assets

This value can be approximated by the value of the net increment of timber cultivated in forests available for wood supply minus the value of the timber removed from those forests by logging, which can be found in Table A2b.

9 Capital transfers (net)

Capital transfers refer to transactions in which one unit (either a household, a corporation, or a government) provides financial assets, non-financial assets, or funds to another unit without expecting anything in return. Capital transfers are recorded in the capital account of the national accounts. There are currently no capital transfers recorded in the Dutch capital accounts for the forestry sector.

Table B2 Output of the forest and logging industry by type

Output by economic type and institutional producing sector. in million euro national currency. Forestry and logging industry only. Output in basic prices with specifications to: own final use, market/non market output and of which households.

The own final use was already recorded in table B1 and refers to a set of goods or services that are kept by an institutional unit for either their own consumption or for capital formation. In the Dutch System of National Accounts, this falls under the category of "use". Specifically, the forestry sector makes use of forestry products, which can only be sourced from within the same sector (as classified under CPA code 02 in the use table). The majority of this self-use involves the purchase of services by the forestry sector from other parts of the forestry sector.

Market output refers to the goods and services produced by the forestry sector that are sold in the market, such as timber and wood products, non-wood forest products, and ecotourism services. Non-market output, on the other hand, refers to the goods and services produced by the forestry sector that are not sold in the market, but rather used or consumed directly by households, businesses, or the government. Examples of non-market output in the forestry sector include conservation practices by the government for example. In the supply table of the national accounts, the output created under CPA 84 is put under non-market output. The output from the forestry sector belongs to the market output.

There is currently no data in the national accounts that can identify a share of the output to households.

Table B3a Supply of wood in the rough

The supply of wood in the rough comes mostly from the forestry sector, corrected for its own final use (which consists of services and not wood in the rough). The other industries are in this case the government that provides some social work provision (CPA code 84). The imports are found in the Dutch use table, both the intra-EU and the extra-EU imports should be included here.

Trade and transport margins refer to the difference between the cost of producing or acquiring goods and the price at which they are sold, reflecting the value added by traders, distributors, and transporters in the supply chain. They can also be found in the supply table, just as taxes and subsidies on products.

Table B3b Use of wood in the rough

The use of wood in the rough comes from different economic sectors as can be found in the use table. Most of the use of wood in the rough in the NEtherlands is by the woodworking industry. The exports are also found in the Dutch supply table, both the intra-EU and the extra-EU exports should be included here. Final consumption and capital formation can be directly taken from the use table as well.