

Removals/Fellings and Forest Balances

Version 1.1.2 of December 2017

Introduction

1. Removals / Fellings Ratio and Forest Balance are strongly connected with the concept of Forest Available for Wood Supply (FAWS). This concept, which was applied under varying names since the beginning of international reporting on forests is currently used in the pan-European reporting. Montréal Process indicators also cover the concept under a different name (Indicator 2.a: Area and percent of forest land and net area of forest land available for wood production).
2. According to the definition developed for the 2020 pan-European reporting, **Forest available for wood supply** is defined as:

Forests where there are no environmental, social or economic restrictions that could have a significant impact on the current or potential supply of wood. These restrictions could be based on legal acts, managerial owners' decisions or other reasons.

Explanatory notes

- i. *Environmental restrictions should consider: protected areas, protected habitats or species, and also those protective forests meeting the above requirements. Age or diameter class restriction should not be taken into account (except in the case of protected ancient forest).*
- ii. *Social restrictions include restrictions to protect aesthetic, historical, cultural, spiritual, or recreational values as well as areas where the owner has made the decision to cease wood harvesting in order to focus on other goods and services (e.g. leisure, landscape, aesthetic value).*
- iii. *The economic restrictions are considered as those affecting the economic value of wood utilisation (profitability). These includes: accessibility, slope and soil condition. Short-term market fluctuations should not be considered.*
- iv. *A significant impact occurs when harvesting is totally prohibited or when restrictions severely limit the feasibility of cuttings for commercial purposes.*
- v. *When restrictions do not severely limit commercial utilisation of wood in an area, it should be considered available for wood supply even if current harvesting is for auto-consumption or no harvest at all is taking place. Conversely, when restrictions limit the feasibility of commercial wood utilisation, even if there is occasional cuttings for auto-consumption or other small-scale interventions of a non-commercial nature, the forest should be considered as FNAWS.*
- vi. *Regarding the assessment of availability for wood supply, the following recommendations were proposed for reporting: (i) the three different categories should be accounted for separately if possible (environmental, social, and economic); (ii) restrictions considered for each category should be detailed if possible (e.g. protected areas, protected species).*

(Source: I. Alberdi et al. / Forest Policy and Economics 70 (2016) 20–29, based on TBFRA 2000, modified MCPFE 2003)

3. Source:

The main source of current information for Forest Available for Wood Supply is the Joint FOREST EUROPE/UNECE/FAO Questionnaire on Pan-European Indicators for Sustainable Forest Management 2015.

4. Using Forest Available for Wood Supply as a base for construction of felling/removals and forest balances, is particularly important for countries with significant area of “unmanaged” forests, as it allows to emphasize human induced changes in wood resources and to reduce

the impact of the impact of natural processes in Forest not Available for Wood Supply on the reported values. However, these comparisons could also be constructed for the total area of forests, given the relevant data is available for all forests.

5. Reporting practice has shown that countries interpret and report on FAWS in varying ways. In order to improve understanding and application of this definition, countries were asked to also report forest categories/types that are considered to be available for wood supply. For ease of reference, the related table with information for 2015 pan-European reporting is attached to the set of national data (please see the format below).

Approach to reporting on the categories related to Forest area			
Category	Check if included	Area estimate (1000 ha)	Comments
Forest			
Christmas tree plantations on forest land	<input type="checkbox"/>		
Poplar plantations on forest land	<input type="checkbox"/>		
Short-rotation forestry	<input type="checkbox"/>		
Short-rotation coppices on forest land	<input type="checkbox"/>		
... of which not available for wood supply			
Protected forests	<input type="checkbox"/>		
Forests of very low productivity / economic revenue of harvesting	<input type="checkbox"/>		
Forests physically not accessible	<input type="checkbox"/>		
Protective forests	<input type="checkbox"/>		
Military forests	<input type="checkbox"/>		
Other forests excluded from harvesting legally or by the owner's decision	<input type="checkbox"/>		
Other, please specify	<input type="checkbox"/>		
Other wooded land			
Alpine shrubland (e.g. Pinus mugo)	<input type="checkbox"/>		
Other shrubland (e.g. maquis, garrigue, matorral)	<input type="checkbox"/>		
Other, please specify	<input type="checkbox"/>		
Other land with tree cover			
Agro-forestry (silvo-pastoral) areas (e.g. for rearing Iberian black pig)	<input type="checkbox"/>		
Plantations of nut-producing trees or shrubs (e.g. Sweet chestnuts, almonds, walnuts, hazelnuts)	<input type="checkbox"/>		
Olive groves and fruit tree orchards	<input type="checkbox"/>		

Poplar plantations on agricultural land	<input type="checkbox"/>		
Short-rotation coppices on agricultural land	<input type="checkbox"/>		
Christmas tree plantations on agricultural land	<input type="checkbox"/>		

6. For the improvement of future reporting and in the context of the workshop discussion, please analyse how Forest Available for Wood Supply is reported by your country from the Ratio and Balance perspective, in particular, consider:
- if the national reporting covers all forest categories with wood removals;
 - what are other domestic sources of wood, that are not or cannot be covered by FAWS;
 - information about growing stock, increment and drain of wood is available for all categories classified under FAWS.

Removals/Fellings Ratio

1. Purpose:

This simple ratio is designed to provide an overview comparison between the amounts of wood extracted from growing stock and the volume of timber reported under removals.

2. Balance Formula:

$$\text{Removals/Fellings Ratio} = \frac{\text{Removals}}{\text{Fellings}} \times 100\%$$

3. Definitions:

Total wood removals

The total of **Industrial round wood removals** and **woodfuel removals**.

(Source: FRA 2015, Working paper 180, page 12; JFSQ item 1)

Industrial round wood removals (Sub-category)

The wood removed for production of goods and services other than energy production (woodfuel).

Explanatory notes:

The term "removal" differs from "felling" as it excludes harvesting losses (stemwood) and trees that were felled but not removed.

It includes removals from fellings in earlier period and from trees dead due to or damaged by natural causes.

(Source: FRA 2015, Working paper 180, page 12, modified; JFSQ item 1.2)

Woodfuel removals (Sub-category)

The wood removed for energy production purposes, regardless whether for industrial, commercial or domestic use.

Explanatory notes:

Includes all wood collected or removed for energy purposes, such as: fuelwood, wood for charcoal or pellet production, harvesting residues, stumps, etc.

Includes removals from fellings in an earlier period and from trees killed or damaged by natural causes.

Excludes woodfuel, which is produced as a by-product or residual matter from industrial manufacture of wood products, such as sawmill residues, planer shavings, etc. .

(Source: FRA 2015, Working paper 180, page 13; JFSQ item 1.1)

Roundwood

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. It is an aggregate comprising wood fuel (including wood for charcoal) and industrial roundwood (wood in the rough). It is reported in cubic metres solid volume underbark (i.e. excluding bark).

Explanatory notes:

1. Includes roundwood directly chipped in the forest, but not industry by-products. (Source: Joint UNECE/FAO/Eurostat/ITTO Forest Sector Questionnaire, 2001, modified).

2. For the purpose of this table, value (of both marketed and non-marketed wood) is defined as the market value at the site of harvest, road side or forest border. If values are obtained from a point further down the production chain, transport costs and possible handling and/or processing costs should be subtracted whenever possible.

(Source: FRA 2010 - Non-wood forest products, Working paper 180, page 12, modified)

Fellings (annual)

Average standing volume of all trees, living or dead, measured overbark to minimum diameters as defined for "Growing stock" that are felled during the given reference period, including the volume of trees or parts of trees that are not removed from the forest, other wooded land or other felling site. Includes: silvicultural and pre-commercial thinnings and cleanings left in the forest; and natural losses that are recovered (harvested).

(Source: MCPFE 2003, from TBFRA 2000, modified)

4. Sources

- a. The source of information for "Removals" is the ECE/FAO TIMBER database, which reflects the data supplied on the Joint Forest Sector Questionnaire. Reported values cover all possible domestic sources of roundwood (Forest and Tree outside Forest).
 - b. The source of information for "Fellings" is the Joint FOREST EUROPE/UNECE/FAO Questionnaire on Pan-European Indicators for Sustainable Forest Management 2015. Reported values cover fellings measured in the Forest Available for Wood Supply only.
5. Because of differences resulting from the way both are defined and measured, it is not expected that both values will fully match, this is because:
- a. Removals are meant to include wood produced outside FAWS
 - b. Fellings include bark, stumps and not removed parts of felled trees, they may also include felled trees (un)intentionally left in forests.

However, understanding reasons for differences between "Fellings" and "Removals", and to extent possible, identification and assessment of components of this difference would help to learn whether these differences are explained by national circumstances or if they result from errors, gaps or inconsistencies in the monitoring system.

6. For the improvement of future reporting and in the context of the workshop discussion, please review the structure of this ratio, as well as values used for its prefilling for your country and:
 - i. Comment on the construction and relevance of this ratio;
 - ii. Analyse correctness and completeness of this data, feel free to complete or correct the source data, if relevant data is available;
 - iii. For the balance, analyse reasons for differences between values of “Fellings” and “Removals” for your country, try to attribute concrete value to identified differences;
 - iv. In the light of the above analysis, consider if and what in your national monitoring systems should be changed to make it complete and consistent.

Forest Balance

1. Purpose:

This balance, developed by Prof. Kulervo Kuusela¹, is a comparison between the growing stock volume at the beginning and end of a balance period and the gross increment and drain during that period. The balance monitors consistency between its elements, often measured through different inventory systems.

2. Balance Formula:

$$\text{Forest Balance} = \frac{\text{Growing stock change} - \text{Increment_Drain change}}{\text{Growing stock change}} \times 100\%$$

Where

$$\text{Growing stock change} = \text{Growing stock at the end of the period} - \text{Growing stock at the beginning of the period}$$

$$\text{Increment_Drain change} = \text{Gross annual increment} - \text{Natural losses} - (\text{Fellings} - \text{Fellings of natural losses})$$

3. Definitions

Gross (annual) increment

Average annual volume of increment over the reference period of all trees measured to minimum diameters as defined for “Growing stock”.

Explanatory note:

1. Includes the increment on trees which have been felled or die during the reference period.

(Source: TBFRA 2000, modified)

Natural (annual) losses

¹ Kuusela K. (1979). Forest balance on the national level. *Silva Fennica* vol. 13 no. 3 article id 5044.
<https://doi.org/10.14214/sf.a14901>

Average annual losses to the growing stock during the given reference period, measured to minimum diameters as defined for "Growing stock", due to mortality from causes other than cutting by man, e.g. natural mortality, diseases, insects attacks, fire, windthrow or other physical damage.

(Source: TBFRA 2000, modified)

Net (annual) increment

Average annual volume of gross increment over the given reference period less that of natural losses on all trees, measured to minimum diameters as defined for "Growing stock".

(Source: TBFRA 2000, modified, FRA 2015)

4. Sources

The source of information for "Forest Balance" is the Joint FOREST EUROPE/UNECE/FAO Questionnaire on Pan-European Indicators for Sustainable Forest Management 2015. Reported values cover fellings measured in the Forest Available for Wood Supply only.

5. Forest balance, if fully consistent and measured with inclusion of all elements should equal zero. This would mean that all components of growing stock change are complementary. In a monitoring practice, reaching full balance could be difficult, taking into account availability of data, complexity of growing stock measurement and variety of inventories, methods, models and tools used for this purpose. However, a big discrepancy between "Growing stock change" and "Increment_Drain change" can indicate problems with quality and credibility of reported data and suggest the necessity for review of the national monitoring system.
6. *For the improvement of future reporting and in the context of the workshop discussion, please review the structure of this balance, as well as values used for its prefilling for your country and:*
- i. Comment on the construction and relevance of this balance;*
 - ii. Analyse correctness and completeness of this data, feel free to complete or correct the balance, if relevant data is available;*
 - iii. For the balance, analyse reasons for differences between values of "Growing stock change" and "Increment_Fellings change" for your country, try to provide values for factors affecting these differences;*
 - iv. In the light of the above analysis, consider if and what in your national monitoring systems should be changed to make it complete and consistent.*