



EUROPEAN
COMMISSION

Brussels, 22.11.2023
COM(2023) 728 final

ANNEXES 1 to 4

ANNEXES

to the

**Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE
COUNCIL**

on a monitoring framework for resilient European forests

{SEC(2023) 384 final} - {SWD(2023) 372 final} - {SWD(2023) 373 final} -
{SWD(2023) 374 final}

ANNEX I

LIST OF FOREST DATA REFERRED TO ARTICLE 5(2) AND THEIR TECHNICAL SPECIFICATIONS

(a) Forest area

Description: area of forest, whereby the minimum mapping unit shall be 0,5 ha.

Spatial resolution: 10m or finer.

Frequency: at least annual.

(b) Tree Cover density

Description: level of tree cover density ranging from 0 to 100%. Tree cover density is defined as a vertical projection of tree crowns to horizontal Earth's surface and provides information on the proportional crown coverage per pixel.

Spatial resolution: 10m or finer.

Frequency: at least annual.

(c) Forest type

Description: forest land cover with a tree cover density above 10% by a dominant leaf type (broadleaf or coniferous), excluding areas under agricultural and urban land use, whereby the minimum mapping unit shall be 0,5ha.

Spatial resolution: 10m or finer.

Frequency: at least 3 years.

(d) Forest connectivity

Description: degree of compactness of forest areas. It is defined in the range of 0 to 100.

Method: Described in Vogt, P., Caudullo G. EUROSTAT – *Regional Yearbook 2022: Forest Connectivity*, EUR 31072 EN, Publications Office of the European Union, Luxembourg, 2022

Spatial resolution: 10m or finer.

Frequency: at least annual.

(e) Defoliation

Description: significant negative deviation of the Leaf Area Index (LAI) in forest, expressed as % decrease of LAI compared to its historical baseline, established based on Copernicus data. LAI characterizes the amount of leaves of plant canopies, defined as the one-sided green leaf area per unit ground surface area in broadleaf canopies and as half the total needle surface area per unit ground area in coniferous canopies.

Spatial resolution: 300m or finer.

Frequency: at least every two weeks.

(f) Forest fires

Data listed below are to be provided on the basis of the European Forest Fire Information System (EFFIS) products.

i. Fire events

Description: an individual fire event with a delimited fire perimeter. The fire perimeter can be established on the basis of the burned area produced by the fire or by the accumulation of thermal anomalies detected by satellite sensors, which will result in a burnt area with a specific fire perimeter. Fire events are characterized by date of fire occurrence, duration of the fire and fire size.

Spatial resolution: 375m or finer.

Frequency: at least once per week.

ii. Burnt forest areas

Description: an area that has been damaged by the occurrence of wildfires and detected by the decrease of the spectral response of the vegetation after the fire with respect to the pre-fire conditions.

Spatial resolution: 20 m or finer.

Frequency: at least once per week.

iii. Fire severity

Description: short-term degree of damage caused by a wildfire to the vegetation and expressed in categories : unburned, scorched, light, moderate and heavy. Severity is measure as the difference between pre-fire vegetation conditions to post-fire vegetation state and evaluated shortly after the occurrence of a fire event.

Spatial resolution: 20 m or finer.

Frequency: Every two weeks.

iv. Post-fire soil erosion

Description: potential losses of soil due to the removal of vegetation by wildfires. It is measured on the basis of the type of vegetation affected, the severity of the fire, which implies the partial or total removal of vegetation cover, and the use of the Revised Universal Soil Loss Equation as defined in Bosco, C. et al. (2015), Modelling soil erosion at European scale: towards harmonization and reproducibility, *Nat. Hazards Earth Syst. Sci.*, 15, 225–245, which considers potential weather impacts on the soil surface.

Spatial resolution: 1 km² or finer.

Frequency: Every two weeks.

v. Post-fire event recovery

Description: degree of recovery of the vegetation cover in an area affected by wildfires and expressed as a percentage of the pre-fire vegetation state. Monitoring and analysis of vegetation recovery is done on the basis of land cover type existing prior to the wildfire event.

Spatial resolution: 20 m or finer.

Frequency: at least annual.

(g) Wildfire risk assessment

i. Dead fuel moisture content

Description: fuel moisture is a measure of the amount of water in a fuel (vegetation) available to a fire and is expressed as a percent of the dry weight of that specific fuel. For the purposes of fire danger computation, fuel moisture is computed based on meteorological variables. Proxys of fuel moisture content for fine fuels, intermediate-fuel size and thick fuels are provided by the fuel moisture contents of the Fire Weather Index as defined in Van Wagner, C.E., Pickett, T.L., 1985. *Equations and FORTRAN program for the Canadian Forest Fire Weather Index System. Forestry Technical Report*. Canadian Forestry Service, Ottawa, Canada.

Spatial resolution: 8 km or finer.

Frequency: yearly data from accumulated daily values.

ii. Live fuel moisture content

Description: Fuel moisture is a measure of the amount of water in a fuel (vegetation) available to a fire and is expressed as a percent of the dry weight of that specific fuel. For live vegetation, the live fuel moisture content can be obtained from the inversion of radiative transfer models of vegetation types.

Spatial resolution: 500 m or finer.

Frequency: at least monthly.

iii. Fuel type map

Description: map of distribution of different fuel types. A fuel type is an identifiable association of fuel elements of distinctive species, form, size, arrangement, or other characteristics that will cause a predictable rate of spread or resistance to control under specified weather conditions, using standard fire behaviour fuel models.

Spatial resolution: 100 m or finer.

Frequency: at least every 2 years.

(h) Tree cover disturbances

Description: maps of areas where tree cover was significantly changed, either temporarily or as a gradual degradation, including the following parameters detailing the characteristic of identified disturbances:

(i) timing – day-of-year marking the starting point of the identified disturbance;

(ii) magnitude – description of the magnitude of the disturbance anomaly in comparison to the baseline expressed by the photosynthetic activity;

(iii) recovery – description of the duration and magnitude of the post-disturbance return to baseline.

Spatial resolution: 10m or finer.

Frequency: at least annual.

ANNEX II

LIST OF FOREST DATA REFERRED TO ARTICLE 5(3) AND THEIR TECHNICAL SPECIFICATIONS

(a) Forest available for wood supply and forest not available for wood supply

Description: division of forest area into:

(i) Forest available for wood supply - forests where environmental, social or economic restrictions do not have a significant impact on the current or potential supply of wood. These restrictions can be established by legal acts, managerial or owner's decisions or by other factors.

(ii) Forest not available for wood supply - all forest area that is not considered available for wood supply pursuant to point (a). These are forests where environmental, social, economic or legal restrictions prevent any significant wood supply. It includes:

(1) forests with legal restrictions or restrictions resulting from other policy decisions that totally exclude or severely limit wood supply for reasons such as environmental or biodiversity conservation (protection forest, national parks, nature reserves and other protected areas such as those of special environmental, scientific, historical, cultural or spiritual interest);

(2) forests where physical productivity or wood quality is too low or harvesting and transport costs are too high to justify wood harvesting, apart from occasional cuttings for auto-consumption.

Unit: share of forest area.

Spatial resolution: national and NUTS2 value.

Minimum frequency of data collection and sharing: annual.

(b) Growing stock volume (per hectare)

Description: The aggregated above-ground volume of all living and standing stems over a forest area, shared per European Forest Types. Included are over-bark stem volumes—from the stump height to and including the stem top—of living stems with a diameter at breast height of more than 0 cm (height of more than 1.30 m).

Unit: m³ ha⁻¹.

Spatial resolution: national, NUTS 2 and monitoring site level.

Minimum frequency of data collection and sharing: 5 years.

(c) Net Annual Increment (per hectare)

Description: gross annual increment minus the average annual natural losses, i.e. trees that die during the period between two ground monitoring site surveys and remain unharvested in the forest, shared per European Forest Types.

Gross annual increment is defined as the average annual increment of living trees over the forest area during the period between two ground monitoring site surveys. It is expressed in terms of volume increment and includes the growth components of trees with a diameter at breast height ≥ 7.5 cm. Volume increment includes the over-bark increment of the stem from stump height to the top diameter of 7 cm, and for broadleaves additionally includes large branches with a minimum diameter of 7 cm.

Net annual increment corresponds to gross annual increment by referring to the same specified forest area, to the same period between two ground monitoring site surveys, using the same thresholds and including the same tree parts.

Unit: m³ ha⁻¹ year⁻¹

Spatial resolution: national, NUTS 2 level and monitoring site level.

Accuracy: confidence interval of data to be provided.

Minimum frequency of data collection and sharing: 5 years.

(d) Stand structure

Description: variety in diameter distribution in a given forest area.

Unit: number of trees per hectare by 'diameter at breast height' classes and tree species.

Spatial resolution: monitoring site level

Minimum frequency of data collection and sharing: 5 years.

(e) Tree species composition and richness

Description: number of individuals per tree species (or lower taxonomic ranks, where relevant) in a given forest area.

Spatial resolution: monitoring site level

Minimum frequency of data collection and sharing: 5 years.

(f) European Forest Type

Description: as described in European Environment Agency's Technical report No9/2006.

European forest types are ecologically distinct forest communities dominated by specific assemblages of trees mainly determined by the latitudinal/altitudinal zonation of European vegetation and by inner climatic and edaphic variation therein. It entails categorisation of forest into 14 categories, following the methodology as in *Giannetti, F., Barbati, A., Mancini, L.D. et al. European Forest Types: toward an automated classification. Annals of Forest Science* 75, 6 (2018).

Spatial resolution: Aggregate national value for forest area per European Forest Type; monitoring site level.

Minimum frequency of data collection and sharing: 5 years - to encode changes in European Forest Type registered between monitoring site visits.

(g) Removals

Description: Volume of all trees that are harvested and removed from forests, including wood recovered from natural losses, during the period defined as calendar year or forest year. It includes harvested stem wood and non-stem wood such as branches, roots and stumps. It is an aggregate comprising wood fuel and industrial roundwood.

Unit: 1000 m³ under bark

Spatial resolution: national, distinguished by broadleaved and coniferous species.

Minimum frequency of data collection and sharing: annual.

(h) Deadwood

Description: volume of standing and lying dead trees and dead lying woody debris, larger than or equal to 10cm in diameter, in a forest area. The volume of dead standing and lying wood includes stumps and roots.

Unit: m³ ha⁻¹

Spatial resolution: national, NUTS2 and monitoring site level.

Minimum frequency of data collection and sharing: 5 years.

(i) Location of forest habitats in Natura 2000 sites

Description: location of forest habitats as listed in point 9 of Annex I to Directive 92/43/EEC within sites of Community importance and special areas of conservation designated in accordance with Article 4 of that Directive.

Spatial resolution: 1:25,000 mapping scale or finer.

Minimum frequency of data collection and sharing: 6 years.

(j) Abundance of common forest birds

Description: the forest bird indicator describes trends in the abundance of common forest birds across their European ranges over time. It is a composite index created from observational data of bird species characteristic for forest habitats in Europe. The index is based on a specific list of species in each Member State. The index is based on a methodology as in Brlík et al. *Long-term and large-scale multispecies dataset tracking population changes of common European breeding birds*, Sci Data 8, 21. 2021.

Minimum frequency of data collection and sharing: 3 years.

(k) Location of primary and old-growth forests

Description: location of primary and old-growth forests, as defined in SWD(2023)62: *Guidelines for Defining, Mapping, Monitoring and Strictly Protecting EU Primary and Old-Growth Forests*

Spatial resolution: 1:25,000 mapping scale or finer

Timeline: Location mapped and shared by 1 January 2028.

(l) Protected forest areas

Description: location of forests within protected areas, consistent with reporting on Nationally designated areas to the European Environment Agency, supplemented by information on their levels of protection, including strict protection, and the associated management regimes as specified in national legislation or other relevant documents.

Spatial resolution: 1:25,000 mapping scale or finer.

Timeline: Shared by [OP: *please insert the date = 30 months after the entry into force of this Regulation*] and updated annually.

(m) Production and trade of wood products

Description: data on production and trade of wood products as specified in the Joint Forest Sector Questionnaire and the relevant user manuals.

Minimum frequency of data collection and sharing: two years, data sharing aligned with the timeline of the Joint Forest Sector Questionnaire initiative.

(n) Forest biomass for bioenergy

Description:

(i) data on the use of forest biomass for energy production consistent with reporting in accordance with Part I, point (m) (1) of Annex IX to Regulation (EU) 2018/1999, divided into the following categories of users:

(1) *Energy producer as main activity:* plants that generate electricity and/or heat for sale to third parties, as their primary activity. They may be privately or publicly owned. The sale need not take place through the public grid.

(2) *Autoproducers:* plants that generate electricity and/or heat wholly or partly for their own use as an activity which supports their primary activity. They may be privately or publicly owned. Fuel used for heat production consumed within the autoproducer's establishment is included here.

(3) *Households:* includes consumption by households, excluding fuels used for transport. It includes households with employed persons.

(4) *Other sectors*: comprises any other economic sector that is not included in the above mentioned (e.g., agriculture, forestry and fishing, commercial and public services and transport).

(ii) data on the production of ‘wood pellets and wood briquettes’ consistent with values reported in accordance with Part I, point (m), (1) (a), (b) and (c) of Annex IX to Regulation (EU) 2018/1999, divided by the feedstock types included in the abovementioned points (a), (b) and (c).

Unit: all the items shall be reported in 1 000 m³ solid volume, except for black liquor and crude tall oil which should be reported in tonnes.

For the categories of Part 1, point (m), (1)(b)(iii), (1)(c), (1)(d)(i), and (1)(d)(ii) of Annex IX to Regulation (EU) 2018/1999, the conversion factors to 1 000 m³ solid wood equivalent shall be reported as defined by UNECE. 2010. *Forest product conversion factors for the UNECE region*. Geneva.

Frequency of data collection and sharing: 2 years, data sharing to be aligned with the timeline for reporting obligation of Part 1, point (m), of Annex IX to Regulation (EU) 2018/1999.

ANNEX III

DESCRIPTIONS FOR FOREST DATA REFERRED TO IN ARTICLE 8

(a) Forest disturbances caused by factors other than fires

Description: maps of areas where forest cover and the forest ecosystem were significantly, but most likely temporarily, changed. The data product contain the following components:

- (i) an annual map of disturbances with an indication of the likely disturbance agent and of the time in the year it initiated;
- (ii) near-real-time disturbance monitoring, providing geolocated alerts indicating where a forest disturbance appears to be taking place, or to have taken place recently.

(b) Aboveground biomass

Description: maps of biomass which is the sum of the following components of standing and living trees:

- (i) aboveground part of stump (including bark);
- (ii) stem from stump to stem top of the tree including bark (threshold for diameter at breast height and stem top diameter of 0 cm);
- (iii) dead branches;
- (iv) living branches;
- (v) foliage.

The below-ground parts of the stump, trees below 1.3 m in height and shrubs are not included in the estimates of aboveground biomass.

(c) Forest structure

Description: maps of structural properties of forest and its canopy on the basis of the vertical and horizontal distribution of the crowns and distribution of other tree-size related parameters.

(d) Value of non-wood forest products

Description: commercial market value at the forest gate of goods derived from forests that are tangible and physical objects of biological origin other than wood, aligned with the latest available *Terms and Definition* document accompanying the FAO Global Forest Resource Assessment reporting.

(e) Location of forest habitats outside Natura 2000 sites

Description: location of forest habitats as listed in Annex I to Directive 92/43/EEC outside sites of Community importance and special areas of conservation designated in accordance with Article 4 of that Directive.

(f) Forest naturalness classes

Description: forest area divided into ‘naturally regenerating forest’, ‘planted forest’ and ‘plantation forest’, as defined, respectively, in Article 2, points 9, 10 and 11 of Regulation (EU) 2023/1115.

(g) Presence of invasive species

Description: maps of invasive alien plant and tree species in a forest area, as defined in the list of invasive alien species of Union concern established in accordance with Article 4(1) of Regulation (EU) 1143/2014 of the European Parliament and of the Council¹.

(h) Diversity of non-tree vegetation

Description: Maps the richness, composition and abundance of non-tree plant species in a forest area.

(i) Threatened species

Description: maps of the presence of threatened species in forest ecosystems classified according to IUCN Red List categories.

(j) Other wooded land

Description: maps of other wooded land.

¹ Regulation (EU) No 1143/2014 of the European Parliament and of the Council of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species (OJ L 317, 4.11.2014, p. 35, ELI: <http://data.europa.eu/eli/reg/2014/1143/oj>).

ANNEX IV

RECOMMENDED ASPECTS FOR VOLUNTARY INTEGRATED LONG-TERM PLANS REFERRED TO IN ARTICLE 13

1. OVERVIEW AND PROCESS FOR DEVELOPING THE PLAN
 - 1.1. Executive summary
 - 1.2. Legal and policy context
 - 1.3. Public consultation
2. GENERAL EVOLUTION OF FOREST ECOSYSTEMS IN THE MEMBER STATE
 - 2.1. *Projected trends, threats, cumulative impacts, and opportunities regarding the forest ecosystems and their services in the medium to long-term, including but not limited to 2040 and 2050, considering relevant forest data of Annex I and Annex II. Integrated assessment that ensures synergies and addresses trade-offs between the sector-specific targets and projections under point 3.*
 - 2.2. *National plans and forest-related target(s) for 2030 and beyond, if available, and indicative milestones for 2040 and 2050*
3. SECTOR-SPECIFIC RELATED CONTENT
 - 3.1. Biodiversity
 - 3.1.1. *Intended or likely future trajectory or range of relevant forest data of Annex I and Annex II; projected trends in the medium to long-term, including but not limited to 2040 and 2050,*
 - 3.1.2. *General description of main drivers, policies, including objectives and measures; links to monitoring and planning under other policy instruments*
 - 3.2. Forest-based bioeconomy
 - 3.2.1. *Projected trends for the development of the national forest-based bioeconomy in the medium to long-term, including but not limited to 2040 and 2050. Forest-based bioeconomy includes timber-based industries, forest bioenergy, and non-timber products and services.*
 - 3.2.2. *General description of main drivers and policies, including objectives and measures; links to monitoring and planning under other policy instruments*
 - 3.3. Climate mitigation as regards carbon sequestration
 - 3.3.1. *Intended or likely future trajectory or range of relevant forest data of Annex I and Annex II; Projected trends in the medium to long-term, including but not limited to 2040 and 2050,*
 - 3.3.2. *General description of main drivers, policies, including objectives and measures; links to monitoring and planning under other policy instruments*
 - 3.3.3. *Links to agricultural and rural development policies*
 - 3.4. Climate adaptation
 - 3.4.1. *Projected climate hazards and risks in the near term (present - 2040), medium term (2041 - 2070) and long term (2070 - 2100)*

- 3.4.2. *General description of main drivers, policies, including objectives and measures; links to monitoring and planning under other policy instruments*
- 3.5. Disaster risk assessment and management
 - 3.5.1. *Description of the forest disaster risk assessment and management objectives with links with the Union Civil Protection Mechanism, Directive 2007/60/EC on the assessment and management of flood risks² and national risk assessments.*
- 4. ENABLERS
 - 4.1. Estimates of investment needs
 - 4.2. Policies and measures for related research, development and innovation
 - 4.3. Training and capacity building
- 5. ANNEXES (as necessary)
 - 5.1. Details on modelling (including assumptions) and/or analysis, indicators.

² Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks (Text with EEA relevance). OJ L 288, 6.11.2007, p. 27–34, ELI: <http://data.europa.eu/eli/dir/2007/60/oj>