WHAT IS A FOREST

a view of Europe's forest coverage

FOREST INFORMATION SYSTEM FOR EUROPE

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This fact sheet is produced as a part of a project for developing the Forest Information System for Europe (FISE). It contains information obtained or derived from various publicly available sources described within the fact sheet in more detail. It does not intend to be a comprehensive analysis of forest area, but a collection of the main elements for a better insight on the different ways of defining forest area in Europe and the consequences of the various definitions. Our goal is to keep this information timely and accurate. If errors are brought to our attention, please get in touch with charlotte.colliander@eea.europa.eu. We will try to correct them.

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What is considered a forest?

When looking into forest area and cover it is important to consider that the term 'forest' may have very different meanings depending on the context. As a result, different data sources may use different forest definitions or even concepts, typically linked to the assessment methods and criteria agreed in various international frameworks. Great care should thus be taken when using, comparing, or combining, forest area and forest cover estimates.

So, attention should be paid when using different data sources because they may use different forest definitions depending on the assessment method and criteria as agreed in various international frameworks.

A fundamental distinction needs to be made between forest as land cover and forest as land use. Land cover describes the state of the land, often closely linked to the instant or short period an observation is made, e.g. using a sensor aboard a satellite or other forms of Earth Observation. Land use focuses on the function of a piece of land, recorded in cadastral information or land use or management plans, which may disregard the momentary state of the land. This has important implications for managed forest land that undergoes cycles of planting, growth, and harvest. When such land is recently harvested the area seizes to be forest in terms of land cover, until the trees regrow. In terms of land use, however, this land is considered forest throughout the management cycle, including when no trees are present.

Many forest land cover maps follow the Food and Agricultural Organization (FAO) modular-hierarchical Land Cover Classification System. At the regional scale, Forest Europe makes use of the FAO results under the Forest Resources Assessment (FRA), following a land use definition for reporting on the European forest area. Countries validate collected information before publishing and aligning forest definitions on forest cover and land use. At the European scale, data on forest is gathered by the CORINE Land Cover monitoring (CLC) combining land cover information from satellite with land use information from other sources.

Forest definitions

The FAO-FRA definition of forest is "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. It does not include land that is predominantly under agricultural or urban land use." EUROSTAT and Forest Europe make use of the same definition[1]. The FAO-FRA definition provides further explanations such as that forests are designated landholdings used as forests, regardless of their current vegetation. Regeneration sites after harvesting, understocked sites due to clear-cut and (natural) disasters, nurseries, forest roads and firebreaks, rubber-wood, cork oak and Christmas tree plantations, areas with bamboo and palms (if height and canopy cover criteria are met) etc. are included in the forest area. It excludes tree stands in agricultural production systems such as in fruit plantations and agro-forestry systems, and trees in urban parks and gardens[2].

[1] Eurostat collects information on the area of wooded land, including forest and other wooded land as defined in FAO FRA, through the European Forest Accounts (EFA). The methodology states that data on land reported through that questionnaire "must be coherent with other data provided at European and international level (national accounts, Forest Europe, FAO, and OECD)". 14 Member States report data on forest area to Eurostat under the EFA, and in addition Eurostat gapfills EFA tables with FAO-FRA data on forest area. Data reported for the same variable are in general well aligned among EFA, FRA and Forest Europe.

[2] National definition of forests however, could differ from the FAO definition.

The FAO's Forest definition is the internationally recognised reference definition and is being used by Forest Europe, FISE, and the Joint Forest Sector Questionnaire (JFSQ)/Forest Accounts of Eurostat.

The CORINE Land Cover (CLC) definition is: “Areas occupied by forests and woodlands with a vegetation pattern composed of native or exotic coniferous and/or broad-leaved trees and which can be used for the production of timber or other forest products. The forest trees are under normal climatic conditions higher than 5 m with a canopy closure of 30% at least. In case of young plantation, the minimum cut-off-point is 500 subjects by ha.” This definition uses Forest cover to refer to areas where trees dominate a veg-

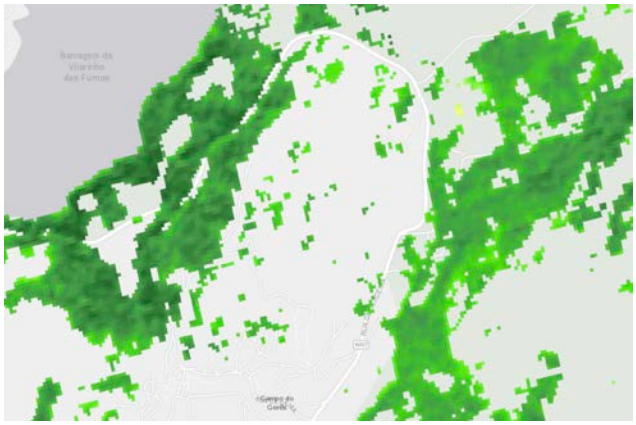

Figure 1. Image of forest cover example Copernicus HRL forest cover 2018, screenshot Peneda-Gerês National Park, Portugal (copernicus.eu).

etation type. 'Forest cover' is used primarily when assessments are based on remote sensing, and legal designation of the land or forest or other is unknown. This definition also uses criteria for minimum tree cover, minimum tree height and a minimum area below which the area it is not considered a forest.

Besides the FAO and CLC assessments, which both have their own definition of forest, the EUROSTAT LUCAS and the UN-FCC-LULUCF assessments are noteworthy. They both use the FAO forest definition in their own process to collect and process data of the forest area but have their own specific criteria and thresholds set in their specific policy context..

The EUROSTAT LUCAS survey is a European-scale field survey. It generates harmonised forest land cover and land use data for European statistics through direct field observations every three years since 2006 (EUROSTAT-LUCAS). The LUCAS 'Woodland' land cover class equals the FAO Forest class and the 'Shrubland' cover' class is equal to the FAO class 'Other Wooded Land'. The share of forest area based on the LUCAS data is used as indicator for the Sustainable Development Goal Life on land (SDG 15).

Under the UN Framework Convention on Climate Change (UNFCCC), parties annually report on land use, land use change and forestry (LULUCF) to provide information on carbon greenhouse gas emissions and removals from land use including forests. The forest definition follows the 2006 IPCC Guidelines on national greenhouse gas inventories (vol. 4) which allows to set minimum thresholds for area, tree height and tree crown cover density according to national circumstances. Specific Member States implementations are reported in National Inventory Reports and listed in Annex II of the LULUCF Regulation. In few cases there are differences between definitions in National inventory reports and the LULUCF Regulation which will require reconciliation for compliance.

As the UNFCCC focus on anthropogenic emissions and removals and this is distinguished by whether land is managed (anthropogenic) or unmanaged (non-anthropogenic) Parties also report on whether areas are managed or unmanaged. Using the land-based approach means including all the national territory in one of the six land use categories and all emissions and removals from managed land will then be included in the national greenhouse gas inventory. Countries provide information on the base of guidelines on the forest area following their own criteria for crown cover, tree height, minimum area (for land spanning elements) and minimum width (for linear elements) (Annex 2).

Terms related to forest

Besides forest itself, there are other terms that are used in land classifications that may influence the forest area. The FAO forest assessment defines two classes similar to forests: 'Other Wooded Land' (OWL) and 'Other land with tree cover' (OLT). EUROSTAT and Forest Europe make use of the same categories. The FAO defines OWL as land with a canopy cover of 5-10 percent of trees able to reach a height of 5 m in situ, or a canopy cover of more than 10 percent when smaller trees, shrubs and bushes are included. Other Land with Tree cover (OLT) is defined as 'Other land' that is predominantly agricultural or urban land use and has patches of tree cover that span more than 0.5 hectares with a canopy cover of more than 10 percent of trees able to reach a height of 5 meters at maturity" and including both forest

The CORINE Land Cover Forest classes

Broadleaved forest (class 3.1.1): Vegetation formation composed principally of trees, including shrub and bush understorey, where broad-leaved species predominate, crown cover density is > 30 % or a minimum 500 subjects/ha density, and with broad-leaved trees representing > 75 % of the formation. The minimum tree height is 5 m.

Coniferous forests (class 3.1.2): Vegetation formation composed principally of trees, including shrub and bush understorey, where coniferous species predominate, crown cover density of > 30 % or a minimum 500 subjects/ha density, and with coniferous trees representing > 75 % of the formation. The minimum tree height is 5 m (with the exception of Christmas tree plantations).

Mixed forest (class 3.1.3): Vegetation formation composed principally of trees, including shrub and bush understorey, where neither broad-leaved nor coniferous species predominate, crown cover of > 30 % or a 500 subjects/ha density for plantation structure. The share of both coniferous and broad-leaved species exceeds 25 % within the canopy closure. The minimum tree height is 5 m.

'**Transitional woodland and shrub areas**' (class 3.2.4) represent natural development of forest formations, consisting of young plants of broad–leaved and coniferous species, with herbaceous vegetation and dispersed solitary adult trees. Transitional process can be for instance natural succession on abandoned agricultural land, regeneration of forest after damages of various origin (e.g. storm, avalanche), stages of forest degeneration caused by natural or anthropogenic stress factors (e.g. drought, pollution), reforestation after clearcutting, afforestation on formerly non-forested natural or semi-natural areas etc.

'**Transitional woodland and shrub**' corresponds to the land cover and use as defined by the FAO as 'Forest' or ' Forest and other wooded land'. This is why all the four forest classes can best be applied when estimating forest land in Europe. A crosswalk table with a comparison of 'Transitional woodland and shrub' versus Forest and 'Other wooded land' is given in the Annex 4.

and non-forest tree species. Similarly to the FAO category 'Other wooded land', LUCAS also considers class 'Other wooded land', while the CORINE land cover classification includes a category called 'Transitional woodland and shrub'. More detail is given in Annex 1 and on CORINE land cover nomenclature. The IPCC guidelines do not foresee such a top level land use category but could allow for specific implementations at sub-category level. You can find more detail on the FAO definitions of 'Forest', 'OWL' and 'OLT' in Annex 1 and on (FAO terms and definitions GFRA 2020 fao.org).

'Trees outside forest' (TOF) are all trees as excluded by the definition of 'Forest' and 'Other wooded land' (fao.org). TOF have an essential role for biodiversity, climate change mitigation and health aspects. Likewise, there is a growing interest in monitoring TOF (Euronews) due to the ambition to plant 3 billion trees by 2030 in the EU. TOFs are not assigned an area in the overall land use classification but occur inside 'Other land'. Although the definition of TOF is based on trees, it also includes other vegetation and characteristics at the site.

The comparison of the forest area (including Other wooded land) from the different assessments shows that they result in a different forest area for Europe (Figure 3). This comparison is further complicated by the fact they have different assessment years (Depending on the data sources the EU outermost territories may or may not be included). The difference between to FAO's 2020 estimate for the EU27 forest area (159 million ha), and the LULUCF estimate from 2019 (163 million ha) is greater than 4 million hectares, or roughly the forest area of Latvia. The CORINE Land Cover reports the lowest forest area, even when the area for 'Transitional woodland and shrub' is included.

As an example, the forest area for the EU27 reported in the forest assessments of FAO-FRA, LULUCF, CLC, and LUCAS show large differences over the period 1990-2020 (Figure 4). The forest area according FAO-FRA (the sum of Forest and OWL) amounts to approximately 180 million ha in 2020, which is similar to the forest area reported by LUCAS (2018), but much higher than the area reported by CLC and LULUCF. FAO-FRA reported for 2020 a 10% higher forest area (ca. 17 million ha) than was reported by LULUCF, which could mainly be explained by the inclusion of the OWL class in the FAO-FRA forest area. Although the class Transitional woodlands and shrubs is included in the CLC forest area in the graph, which together with the CLC Forest class theoretically covers about the same land cover types as the FAO Forest and OWL classes, the area reported by CLC is 23 million ha lower than that reported by FAO-FRA.

The Member states use different forest definitions

All EU member states base their national forest definition on area, a percentage of tree crown cover and tree height. However, differences exist between member states for minimum values used for these criteria which lead to a difference in forest area.

A minimum tree height of 5 meter is used in most (63%) of the EEA member states its forest definitions, and almost half of the member states use a minimum tree cover of 10%. The criterium used for minimum area size is much more diverse, over a third uses the criterium of 0.5 ha as minimum area size for forest areas, and 18% uses a minimum area size of 0.1 ha.

Also the estimation method used in the national inventories is quite diverse: 32% of the surveys use field plots and 10% use photo interpretation. Other surveys use maps (11%), combined methods (25%) or is unkown (24%).

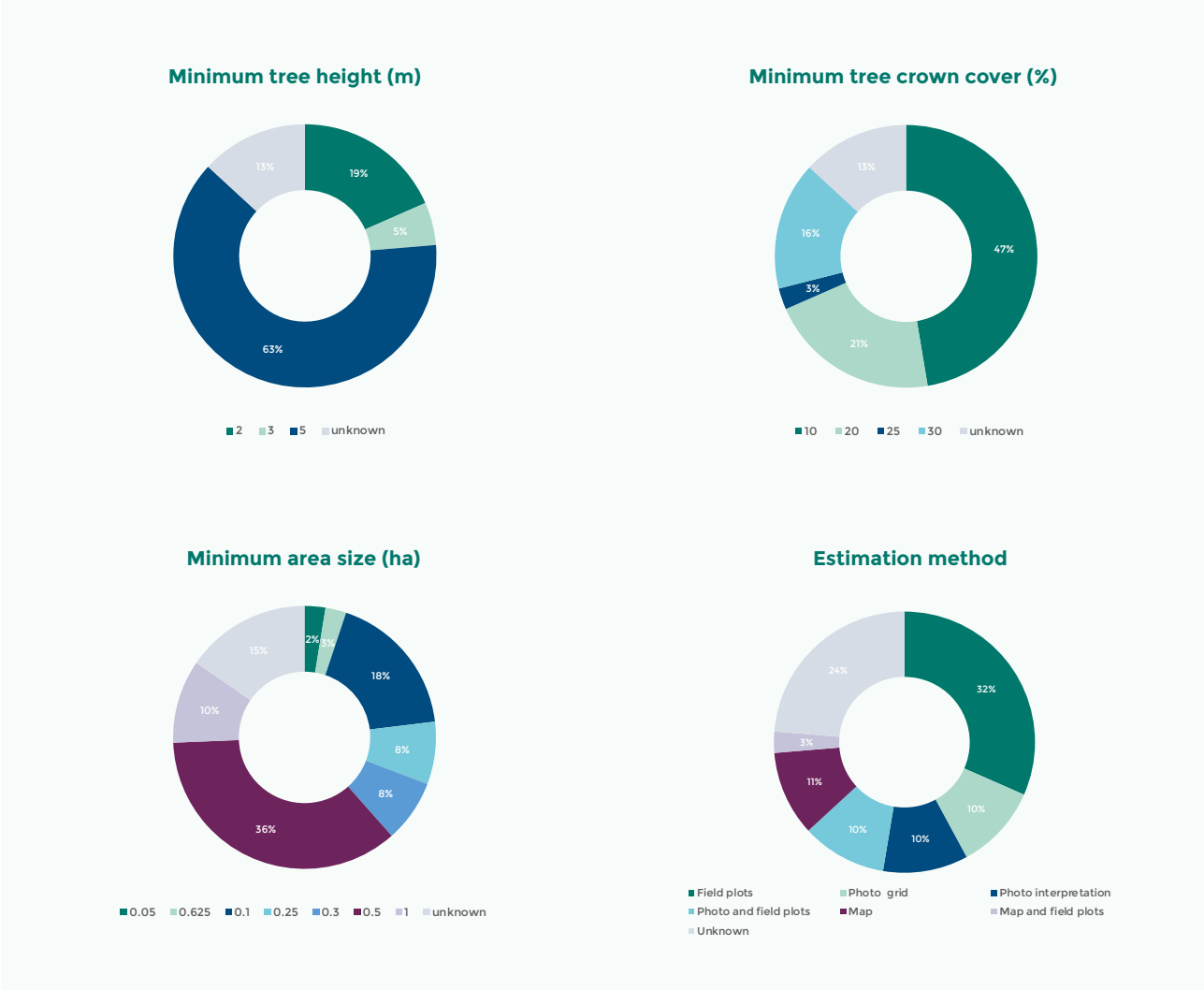

Figure 2. Quantitative forest criteria and estimation method used by EEA member states to define forest. Data is given in Annex 2.

Consequences of different definitions

All four assessments for the EU27 show an increase of the forest area for all periods considered, yet at a slower pace in the last 15 to 20 years. The hybrid land cover-land use CLC assessment (including forest and transitional woodland and shrub) even shows a slight decrease in forest area of 108.000 ha over the period 2012 to 2018. These assessments combined lead to some important conclusions:

1. The concept of forest and land cover, land use or a hybrid of both as well as their specific definitions and thresholds is a key consideration when assessing forest cover in the EU and Member States
2. Several assessments point to an increase in forest area in the last 30 years;
3. Growth in forest and tree-covered area has slowed in the last two decades.

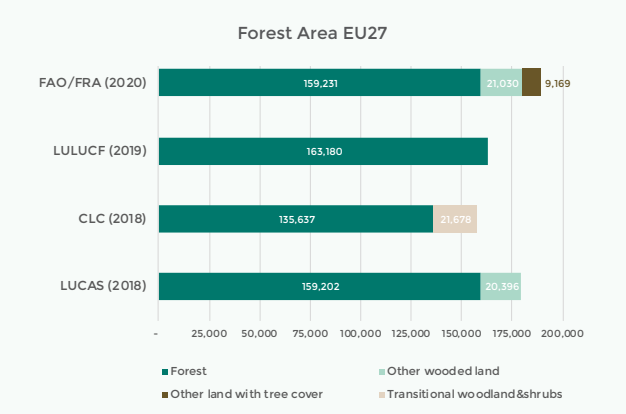

Figure 3. Forest area (1000 ha) for the EU27 according to different forest assessments of FAO-FRA, LUCAS, CORINE Land cover, and LULUCF (year of reporting for sources: FAO-FRA: 2020, LUCAS: 2018, CORINE-CLC: 2018, UNFCCC: 2019). LULUCF includes managed and unmanaged forests as defined by IPCC.

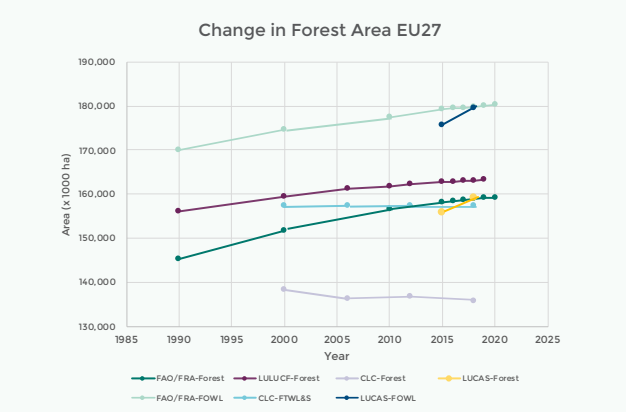

Figure 4. Forest area for the current EU27 Member States[3]. FAO-FRA data is presented for both "forest area" and "forests and other wooded land" (FOWL), and LUCAS data is presented in a similar manner ("forest" area and "forest and other wooded land" – FOWL). ; CLC data is presented as "forest" area (including broadleaved forest, coniferous forest, mixed forest) and "forest and transitional woodland and shrub' (FTWL&S). LULUCF includes managed and unmanaged forest as defined by IPCC.

[3] Data sources fig. 3 and fig. 4: FAO/FRA; CLC: Land cover and land cover changes in European countries in 2000-2018 — Copernicus Land Monitoring Service; LULUCF; LUCAS 2

Why are there different definitions of forests?

The different forest definitions are formulated to meet specific management, legal or policy purposes e.g., biodiversity (protected forest area), timber (forest available for wood supply), or land use designated as forest. Depending on the purpose, different definitions use different criteria which will yield different forest areas. Criteria may be used to assess:

- The value for timber;
- The value for biodiversity;
- The value for cultural services (e.g. recreation, tourism, spiritual);
- The value for drinking water quality;
- The value for carbon sequestration and storage;
- The value for other ecosystem services (SEEA);
- The improvement of livelihoods of forest-dependent people;
- Whether forests are natural or planted, unmanaged or managed;
- Whether forests are pre-existing or newly established;
- Whether forests are continuous or fragmented;
- Whether forests are composed of native or non-native species
- Whether forests are undisturbed.

How can we measure forest areas - Field surveys

Forest characteristics can be measured through roughly two different methods: field surveys and remote sensing surveys. These two approaches are usually combined.

Field surveys

Field surveys are carried out on the ground in the forest. Field surveys have a wide range of methodological approaches and aspects that are monitored. Some collect information on forest resources such as forest area, tree species, and wood volume. Others collect information on aspect such as forest presence, forest health, forest vegetation, biodiversity indicators etc. Common feature of all field surveys is that measurements are taken in the field. Here field surveys at the national and European level are explained.

National Forest Inventories

Most countries periodically assess their forests through a National Forest Inventory (NFI) to collect information on forest resources such as forest area, tree height, tree diameter, tree species, and tree age. Forest area is estimated from the point of view of land use and the definition of forest extent includes unstocked areas such as clearing areas, forest roads, nurseries etc. Other forest characteristics such as basal area, growing stock, or carbon sequestration are estimated based on this information. Some countries collect additional information such as whether the forest stand is planted or naturally regenerated, conservation status, amount of dead wood present, property status, and fragmentation. On some occasions, information is collected on flora and fauna. The information is collected through field surveys which are based on different designs for the sample points such as random stand selection or grid selection. Information is primarily presented through statistics and used by national governments for national policy goals and by forest owners for management purposes.

The results of the NFIs are reported to global and European reporting processes. Forest Europe reports on the state of Europe's forests. (State of Europe's Forests 2020), the FAO-FRA reports on forests worldwide Global Forest Resources Assessment 2020. Further, the European Forest Inventory Network (ENFIN) is working on harmonisation of collecting and reporting forest data.

European Forest Survey

The EUROSTAT-LUCAS survey is a European scale field survey. It works on harmonised land cover and land use data for European statistics carried out through direct field observations every three years since 2006. Collected data are comparable among the participating countries. The LUCAS survey forestry classes are aligned to that of the FAO. The LUCAS 'Woodland' land cover class is equal to the FAO Forest class and 'Shrubland' cover class is equal to the FAO class Other Wooded Land. One of the limitations of LUCAS with respect to forests is the missing of additional (non-agricultural) information on forest. More information on LUCAS can be found on the website Overview - Land cover/use statistics.

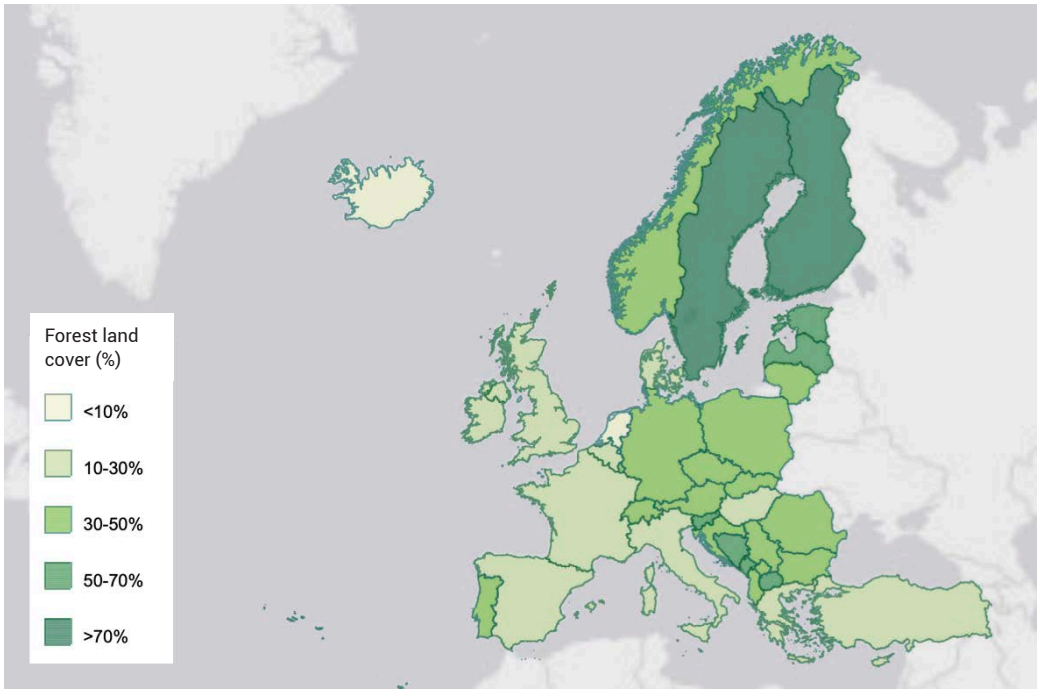

Figure 5. Forest land cover in 2018 for the EEA countries

Source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community | European Environment Agency (EEA), Copenrnicus Land Monitoring Service 2018

How can we measure forest areas - Remote sensed surveys

Remote sensing techniques occur through (semi) automatic methods. At European level, treed land is estimated based on satellite survey and measured as percentage of canopy cover. The canopy cover is often thresholded for classifying grid cells into forest/non-forest. No minimum size of forest area is considered for classifying grid cells into forest/non-forest. The Copernicus Land Monitoring Service (CLMS) is one of the most important European land cover surveys. Its pan-European component the CORINE Land Cover (CLC) datasets, and High-Resolution Layers (HRL) among which the HRL Forest layers.

The **CORINE Land Cover** is provided for 1990, 2000, 2006, 2012, and 2018. This vector-based dataset includes 44 land cover and land use classes, of which the four before mentioned forest classes. The time-series also includes a land change layer, highlighting changes in land cover and land-use.

The countries validate collected information before publishing and aligning forest definitions on forest cover and land use.

CLC uses a Minimum Mapping Unit (MMU) of 25 hectares (ha) for areal phenomena and a minimum width of 100 m for linear phenomena. The time series are complemented by change layers, which highlight changes in land cover with an MMU of 5 ha. The proposed MMU for the CLC-Backbone product is 0.5 ha and this could match with the national definition of about half of the MS. However, in the CLC-Core the MMU will be 1 ha.

The method used for the CLC map is a special remote sensing case because it is implemented by human delineation of the polygons using land use and land cover definitions. The definitions differ from the definitions of NFIs and other remote sense methods.
The definitions of the types are further explained on copernicus.eu. More information on the Corine Land Cover inventory is given in the Corine Land Cover Brochure.

The **High Resolution layers (HRL)** are raster-based datasets which provide information about different land cover characteristics and are complementary to land-cover mapping (e.g. CORINE) datasets. Three products are relevant for forest area that are available for the reference years 2012, 2015 and 2018:

1. Tree cover density (TCD) (level of tree cover density in a range from 0-100%);
2. Dominant leaf type (DLT) (broadleaved or coniferous majority);
3. Forest type (FTY) which estimates the forest type product to get as close as possible to the FAO forest definition.

The HRL-Forest 2018 has a resolution of 10m and the previous series a resolution of 20m. Forest cover is estimated based on tree cover density (TCD) detected with satellite images. TCD differs from the stand density (number of trees per ha) as esti-mated by field surveys. No information is extracted on specific stand characteristics such as tree species, tree height, and stem

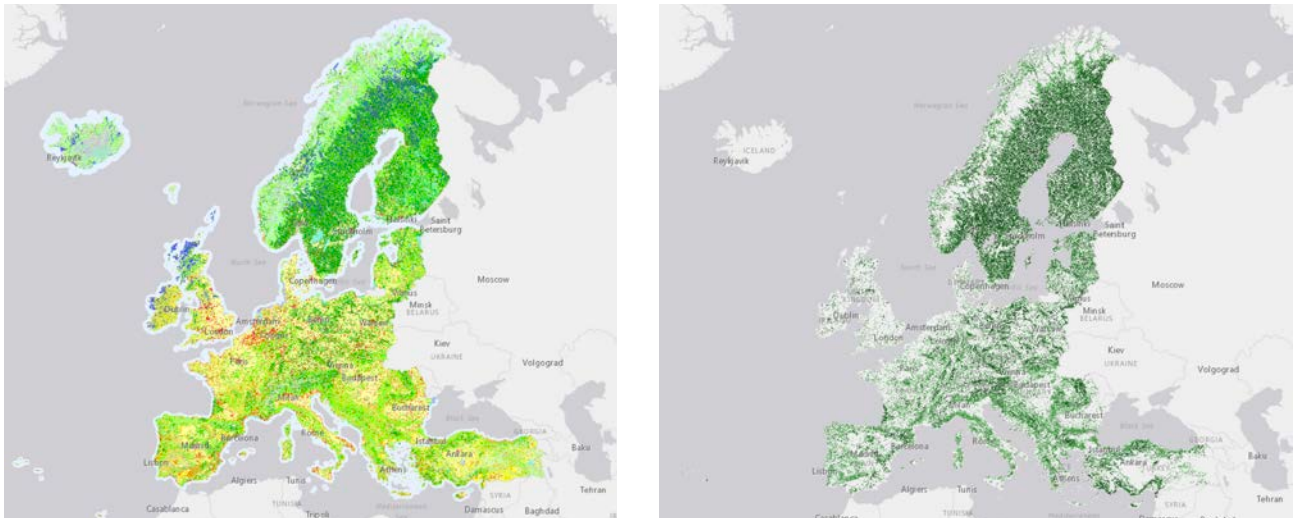

Figure 6. CORINE-Land Cover map (left) and Copernicus HRL-Forest map (right)
Source: CORINE/COPERNICUS

diameter. Therefore when using satellite data, it is very important to interpret and verify them against of national source e.g. from NFIs. More information on the HRL Forest map can be found on the website Forests — Copernicus Land Monitoring Service.

Airborne Laser Scanning (ALS) provides forest data through radar surveys such as crown projection and information on tree height and stem diameter, which is essential information to calculate growing stock and timber assortments. In several countries, e.g., Sweden, a wall-to-wall national forest map is created using ALS techniques[4]. The technique needs further development before it can be widely used in all forest types to collect forest information comparable with field surveys.

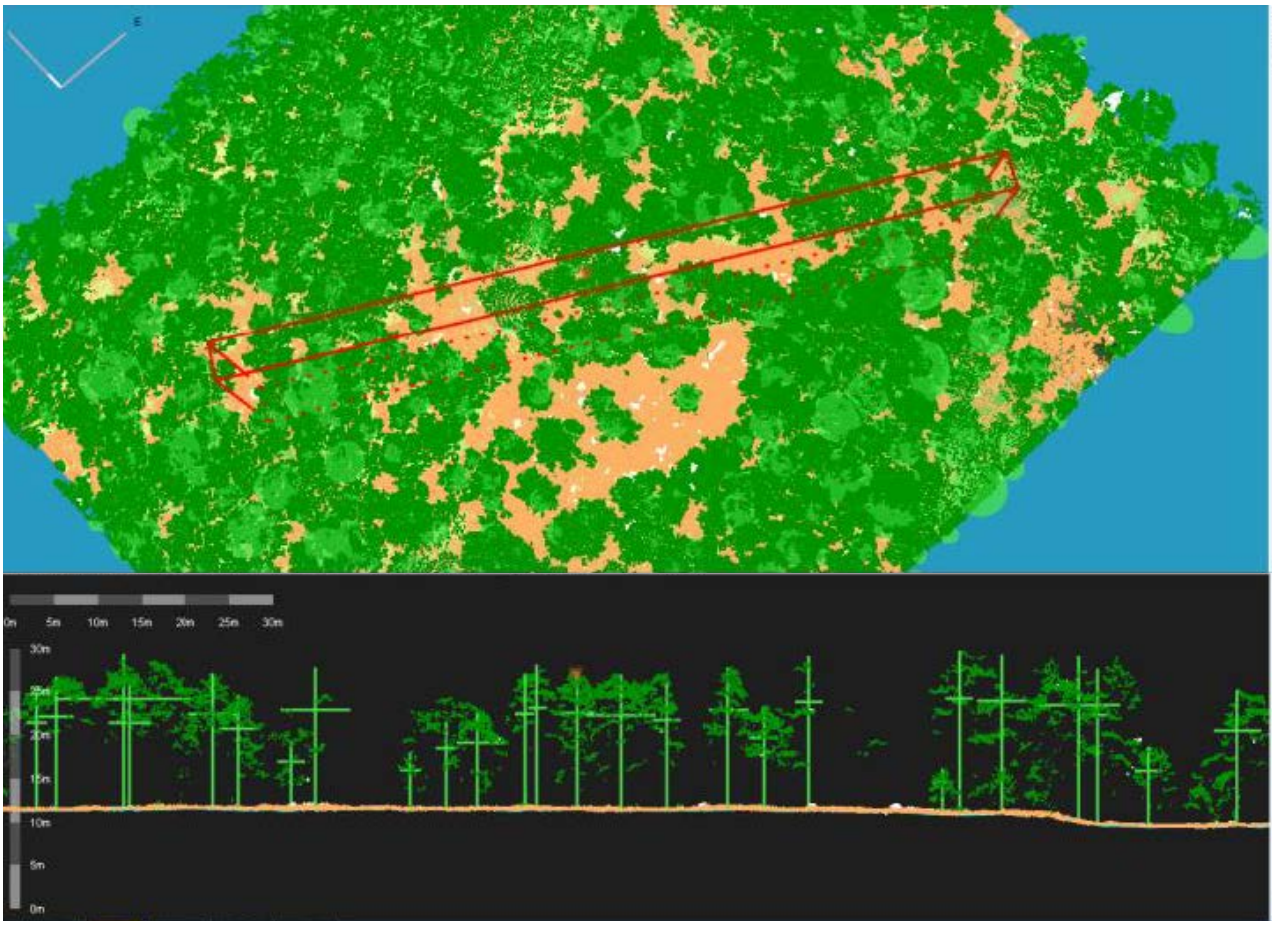

Figure 7. Example of a ALS/Lidar image of forest (Forest reserve Dieverzand, the Netherlands, image Wageningen Environmental Research)

[4] M. Nilsson, K. Nordkvist, J. Jonzén, et al. (2017) A nationwide forest attribute map of Sweden predicted using airborne laser scanning data and field data from the National Forest Inventory. Remote Sensing of Environment, Volume 194, 2017, pp 447-454. DOI 10.1016/j.rse.2016.10.022.

ANNEXES

Annex 1

International forest land definitions

FAO definitions

Forest

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. It does not include land that is predominantly under agricultural or urban land use.

Explanatory notes

1. Forest is determined both by the presence of trees and the absence of other predominant land uses. The trees should be able to reach a minimum height of 5 meters in situ.
2. Includes areas with young trees that have not yet reached but which are expected to reach a canopy cover of 10 percent and tree height of 5 meters. It also includes areas that are temporarily unstocked due to clear-cutting as part of a forest management practice or natural disasters, and which are expected to be regenerated within 5 years. Local conditions may, in exceptional cases, justify that a longer time frame is used.
3. Includes forest roads, firebreaks and other small open areas; forest in national parks, nature reserves and other protected areas such as those of specific environmental, scientific, historical, cultural or spiritual interest.
4. Includes windbreaks, shelterbelts and corridors of trees with an area of more than 0.5 hectares and width of more than 20 meters.
5. Includes abandoned shifting cultivation land with a regeneration of trees that have, or are expected to reach, a canopy cover of 10 percent and tree height of 5 meters.
6. Includes areas with mangroves in tidal zones, regardless whether this area is classified as land area or not.
7. Includes rubber-wood, cork oak and Christmas tree plantations.
8. Includes areas with bamboo and palms provided that land use, height and canopy cover criteria are met.
9. Includes areas outside the legally designated forest land which meet the definition of "forest".
10. Excludes tree stands in agricultural production systems, such as fruit tree plantations, oil palm plantations, olive orchards and agroforestry systems when crops are grown under tree cover. Note: Some agroforestry systems such as the "Taungya "system where crops are grown only during the first years of the forest rotation should be classified as forest.

FRA2020 Terms and definitions

Other wooded land

Land not classified as 'Forest', spanning more than 0.5 hectares; with trees higher than 5 meters and a canopy cover of 5-10 percent, or trees able to reach these thresholds in situ; or with a combined cover of shrubs, bushes and trees above 10 percent. It does not include land that is predominantly under agricultural or urban land use.

Explanatory notes: The definition above has two options:

1. The canopy cover of trees is between 5 and 10 percent; trees should be higher than 5 meters or able to reach 5 meters in situ. or
2. The canopy cover of trees is less than 5 percent but the combined cover of shrubs, bushes and trees is more than 10 percent. Includes areas of shrubs and bushes where no trees are present. - Includes areas with trees that will not reach a height of 5 meters in situ and with a canopy cover of 10 percent or more, e.g. some alpine tree vegetation types, arid zone mangroves, etc.

FAO terms and definitions GFRA 2020

Other land with tree cover

Land considered as 'Other land', that is predominantly agricultural or urban lands use and has patches of tree cover that span more than 0.5 hectares with a canopy cover of more than 10 percent of trees able to reach a height of 5 meters at maturity. It includes both forest and non-forest tree species.
The difference between Forest and Other land with tree cover is the land use criteria. Includes groups of trees and scattered trees (eg trees outside forest) in agricultural landscapes, parks, gardens and around buildings, provided that area, height and canopy cover criteria are met. Includes tree stands in agricultural production systems, for example in fruit tree plantations and agroforestry systems when crops are grown under tree cover. Also includes tree plantations established mainly for other purposes than wood, such as oil palm plantations. Excludes scattered trees with a canopy cover less than 10 percent, small groups of trees covering less than 0.5 hectares and tree lines less than 20 meters wide.

FAO terms and definitions

Forest Europe definitions

Forest

See FAO

Terms and Definitions

CORINE LAND COVER definitions

Forest

Areas occupied by forests and woodlands with a vegetation pattern composed of native or exotic coniferous and/or broad-leaved trees and which can be used for the production of timber or other forest products. The forest trees are under normal climatic conditions higher than 5 m with a canopy closure of 30 % at least. In case of young plantation, the minimum cut-off-point is 500 subjects by ha.

Corine Land Cover classes

LULUCF definitions

Forest

Following the FAO Forest definition, but countries can adapt the threshold settings for the criteria on crown cover, area size, and tree height. See Annex 2

UNFCCC Biome-specific forest definitions

Annex 2

Quantitative thresholds used to define forests as selected by individual EU MS, UK and Iceland as used in LULUCF National Forest Inventories (NFI) surveys and reporting

Country	Crown cover [1] (%)	Height [1] (m)	Area [1] (ha)	Minimal width [1] (m)	Estimation method [2]
Albania					
Austria	30	2	0.05	10	Field plots
Belgium	20	5	0.5		Photo grid
Bosnia and Herzegovina					
Bulgaria	10	5	0.1	10	
Croatia	10	2	0.1		
Cyprus	10	5	0,3		Photo interpretation
Czech Republic (FAO definition) [3]	20	5 – in situ	0.5	20	Field plots
Denmark	10	5	0.5	20	Photo interpretation and field plots
Estonia	30	2	0.5		Field plots
Finland	10	5	0.25/0.5*	20 **	Field plots
France	10	5	0.5	20	Photo interpretation and field plots
Germany	10	5	0.1		Field plots
Greece	25	2	0.3		Photo grid
Hungary	30	5	0.5		Photo interpretation
Kosovo under UNSCR 1244/99					
Latvia	20	5	0.1	20	Photo interpretation
Iceland	10	2	0.5	20	Field plots
Lichtenstein					

Country	Crown cover (%)	Height (m)	Area (ha)	Minimal width (m)	Estimation method
Lithuania	30	5	0.1	10	Field plots
Ireland	20	5	0.1	20	Photo interpretation and field plots [3]
Italy	10	5	0.5		Photo interpretation
Luxembourg	10	5	0.5		Photo grid
Malta	30	5	1		
Montenegro [3]	10	5	0.5	20	Photo interpretation and field plots
Netherlands	20	5	0.5	30	Map
North Macedonia					
Norway	10	5			Field plots
Poland	10	2	0.1		Maps and field plots
Portugal	10	5	1	20	
Romania	10	5	0.25	20	Photo grid
Serbia	10	5	0,5		Field plots
Slovakia	20	5	0.3	20	Field plots
Slovenia	30	2	0.25		Map
Spain	20	3	1	25	Map
Sweden	10	5	0.5		Field plots
Switzerland	20	3	0,0625		Field plots
Turkey	10	5	1		Wall to wall land use map

Sources

1. Regulation (EU) 2018/ of the European Parliament and of the Council of 30 May 2018 on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework, and amending Regulation (EU) No 525/2013 and Decision No 529/2013/EU (europa.eu) Annex II

2. Lawrence, M. R.E. McRoberts, E. Tomppo, T. Gschwantner, and K. Gabler (2010) Comparisons of National Forest Inventories). Tomppo, E., T. Gschwantner, M. Lawrence, R.E. McRoberts (Eds.) National Forest Inventories. Pathways for common reporting. (Table 2.1. p21) DOI 10.1007/978-90-481-3233-1

3. Values provided by the countries.

Annex 3

National Definitions: each country has its own Forest definition (source LULUCF)

Country	National forest land definition
Austria	Permanently unstocked basal areas that are directly connected with forest in terms of space and forestry enterprise and contribute directly to its management (such as forestal hauling systems, wood storage places, forest glades, forest roads) also represent forests. Areas which are used in short rotation with a rotation period of up to thirty years as well as forest arboretums, forest seed orchards. Christmas tree plantations and plantations of woody plants for the purpose of obtaining fruits such as walnut or sweet chestnut do not account as forests. Rows of trees (except shelter belts for wind protection) and areas with woody plants in a park structure are not forest land.
Belgium	This category includes all land with woody vegetation consistent with thresholds used to define forest land as described in paragraph 6.1 of the NIR. It also includes systems with vegetation that currently fall below, but are expected to exceed, the threshold of the forest land category.
Bulgaria	Areas of natural forest regeneration outside urban areas with a size of more than 0.1 ha also represent "forest". Forests are also: areas which are in a process of recovering and are still under the parameters, but it is expected to reach forest crown cover over 10% and tree height 5 meters; areas, which as the result of anthropogenic factors or natural reasons are temporarily deforested , but will be reforested; protective forest belts, as well as tree lines with an area over 0.1 ha and width over 10 meters; cork oak stands. City parks with trees, forest shelter belts, and single row trees do not fall under the category "forests.
Croatia	Forest includes land under forest management (forest land without tree cover): Productive forest land without tree cover, non-productive forest land without tree cover, barren wooded land (e.g. forest roads wider than 3 meters, quarries)
Cyprus	Forests include forest roads, cleared tracts, firebreaks and other small open areas within the forest as well as reforested areas or burnt areas or other areas that temporarily have low plant cover due to human intervention or natural causes, but does not include municipal parks and gardens.
Czechia	Forests excludes the areas of permanently unstocked cadastral forest land, such as forest roads, forest nurseries and land under power transmission lines.
Denmark	Temporarily non-wooded areas, fire breaks and other small open areas, that are an integrated part of the forest, are also included. Christmas trees are also included.
Estonia	All temporarily unstocked forest areas and regeneration areas which have yet to reach a crown density of 30 per cent and a tree height of 2 meters are also included as forest, as are areas which are temporarily unstocked as a result of human intervention such as harvesting, or natural causes (fires, etc.) but which are expected to revert to forest.
Finland	Productive forest land, part of the poorly productive forest land and forest roads. Parks and yards are excluded regardless of whether they meet the forest definition.
France	Forest roads, forest openings less than 20 m wide (e.g. for fire control) , windbreaks and forest belts, as well as the poplar plantations and short rotations woody crops, if the criteria for Forest land are met. 5% of France's European forests are unmanaged on lands such as strong slopes or used for leisure, esthetic, cultural or military. Also, 40% of France's dependencies Forest land is considered as unmanaged.
Germany	Any area of ground covered by forest vegetation, irrespective of the information in the relevant cadastral survey or similar records. "Forest" also refers to cutover or thinned areas, forest tracks, firebreaks , openings and clearings, forest glades, feeding grounds for game, landings, rides located in the forest, further areas linked to and serving the forest including areas with recreation facilities, overgrown heaths and moorland, overgrown former pastures, alpine pastures and rough pastures, as well as areas of dwarf pines and green alders. Heaths, moorland, pastures, alpine pastures and rough pastures are considered to be overgrown if the natural forest cover has reached an average age of five years and if at least 50% of the area is covered by forest. Forested areas of less than 1,000 m^2 located in farmland or in developed regions, narrow thickets less than 10 m wide, watercourses up to 5 m wide do not break the continuity of a forest area.
Greece	No additional criteria available.
Hungary	Forest land (includes **FL-FL, L-FL** sub-categories) includes areas covered by trees, as well as roads and other areas that are under forest management but that are not covered by trees.
Ireland	Land with a minimum area of 0.1ha, a minimum width of 20 m, trees higher than 5 m and a canopy cover of more than 20% within the forest boundary, or trees able to reach these thresholds in situ.

Country	National forest land definition
Italy	Forest roads, cleared tracts, firebreaks and other open areas within the forest as well as protected forest areas are included in forest. Plantations, mainly poplars, characterised by short rotation coppice system and used for energy crops are included and also other plantation as chestnut and cork oak, have been included in forest land.
Latvia	Young natural stands and all plantations established for the forestry purposes, which have to reach a crown density of 20 % or tree height of 5 m are considered under forest land; as well as the areas normally forming part of the forest area, which are temporarily unstocked as a result of human intervention or natural causes, but which are expected to revert to forest.
Lithuania	Tree lines up to 10 meters of width in fields , at roadsides, water bodies, in living areas and cemeteries or planted at the railways protection zones as well as single trees and bushes, parks planted and grown by man in urban and rural areas are not defined as forests.
Malta	No additional criteria available.
Luxemburg	Permanently unstocked basal areas that are directly connected with forest in terms of space and forestry enterprise and contribute directly to its management (such as forestal hauling systems, wood storage places, forest glades, forest roads) also represent forests. Areas which are used in short rotation with a rotation period of up to thirty years as well as forest arboretums, forest seed orchards, Christmas tree plantations and plantations of woody plants for the purpose of obtaining fruits such as walnut or sweet chestnut do not account as forests but represent cropland. Rows of trees (except shelter belts for wind protection) and areas with woody plants in a park structure are not forest land.
Netherlands	The Netherlands has chosen to define the land-use category “Forest Land" as all land with woody vegetation, now or expected in the near future (e.g. clear-cut areas to be replanted, young afforestation areas)
Poland	Young stands and all plantations that have yet to reach a crown density of 10 percent or a tree height of 2 m are included under forest. Areas normally forming part of the forest area that are temporarily unstocked as a result of human intervention, such as harvesting or natural causes such as wind-throw, but which are expected to revert to forest are also included.
Portugal	Forests (areas occupied by forests and woodlands which can be used for the production of timber or other forest products) and agroforestry areas (annual crops or grazing land under the wooded cover of forestry species). The forest trees are under normal climatic conditions higher than 5 m with at least 30% canopy closure.
Romania	It comprises deciduous forest, coniferous forest, mixt forests, clear-cut areas and nurseries, as defined by presence of deciduous trees, coniferous trees, deciduous and resinous trees, dead trees, clear-cuts and forest nursery.
Slovakia	This category includes the land covered by all tree species serving for the fulfillment of forest functions and the lands on which the forest stands were temporarily removed with aim of their regeneration or establishment of forest nurseries or forest seed plantation.
Slovenia	It includes abandoned agricultural land with natural expansion of forest. Abandoned agricultural land on area more than 0.5 ha, which have been abandoned for more than 20 years, with minimal tree height 5.00 m and have a tree crown cover between up to 75 % are defined as forests.
Slovenia	It includes abandoned agricultural land with natural expansion of forest. Abandoned agricultural land on area more than 0.5 ha, which have been abandoned for more than 20 years, with minimal tree height 5.00 m and have a tree crown cover between up to 75 % are defined as forests.
Spain	Any land having woody vegetation with no agricultural use/activities fulfilling the threshold of forest and any other land which is expected achieve these parameters (including for “dehesa“ where tree cover meet the thresholds).
Sweden	Land with a tree crown cover (or equivalent stocking level) of more than 10 % at maturity, with a minimum area of 0.50 hectare. The trees should be able to reach a minimum height of 5 m at maturity in situ. No minimum width is considered. Permanent forest roads (width>5m) are not considered forest land. All forests are considered managed.
United Kingdom	Forestry statistics definition used for GHG inventory includes integral open space and felled areas that are waiting restocking.
Iceland	All forested lands, not belonging to Settlement, that is presently covered with trees or woody vegetation that reach the defined thresholds. Natural birch woodland is included in the IFR national forest inventory (NFI). In the NFI the natural birch woodland is defined as one of the two predefined strata to be sampled. The other stratum is the cultivated forest consisting of tree plantation, direct seeding or natural regeneration originating from cultivated forest.

Annex 4

Crosswalk table comparing Corine Transitional woodland and shrub versus FAO Other wooded land

Transitional woodland and shrub	Forests according to FAO (Forest / Other wooded land)
clear cuts in forest areas;	Forest
open clear-felled or regeneration areas in the transitional stage of regrowth, which lasts for usually 5-8 years or until trees reach the 5 m height;	Forest and other wooded land
young forest plantations;	Forest
forest nurseries inside forests area;	Forest
electric line corridors, fire breaks (if wider than 100 m);	Fires breaks = forests
natural grassland areas with small patches of forest < 25 ha and/or with trees inter-mixed which cover < 30 % of the surface;	Forest and other wooded land
burnt forest or burnt natural shrubland areas that do not show black tones any more in the satellite imagery, but damage is still visible;	Forest
forests heavily damaged by wind, snow-brake, avalanche, insects, acid rain or other pollution with > 50 % of trees severely affected;	Forest
areas of recultivation of mineral extraction sites and dump sites by means of affor-estation or natural / semi-natural succession with shrubs;	Forest
agricultural lands (classes 2xx) under recolonization process with occurrence of young forest trees, which cover > 30 % of the surface (scattered trees or small plots of young trees);	Forest and other wooded land
abandoned fruit tree plantations and orchards;	No (class 323)
afforestation on former natural grasslands or natural shrubs (322, 323), even when original vegetation still dominates;	Forest and other wooded land
arborescent matorrals that are pre- or post-formation of broad-leaved evergreen forest with a usually thick evergreen shrub stratum composed of evergreen oaks (Quercus suber/ilex/ rotundifolia), olive trees, carob trees or pines, with crown cover density < 30 %;	Forest and other wooded land
marginal zones of bogs with vegetation composed of shrubs and pines, which cover > 50 % of the surface.	Forest and other wooded land
young broad-leaved and/or coniferous trees;	Forest
damaged or dead trees and shrubs;	Forest and other wooded land
fully grown trees, covering < 30% of area;	Forest and other wooded land
shrubs;	Other wooded land
herbaceous vegetation (grasses and herbs);	No (yes if former forest cover)
bare soil or natural bare surfaces.	No (yes if former forest cover)

Annex 5

Forest area according the assessments of FAO, CLC, LULUCF, Other wooded land (OWL), Other land with tree cover, transitional woodlands and shrub for the EU27 and EEA38

	Year of assessment	Area (1000ha)	Land area
Land area EU27	2020	399,636	
Land area EEA38	2020	541,478	
Forest EU27 FAO	2020	159,231	39.8%
Forest EU27 LUCAS	2018	159,202	39.8%
Forest EEA37 FAO	2020	202,487	37.4%
Other wooded land (OWL) EU27 FAO	2020	21,030	5.3%
Other wooded land (OWL) EU27 LUCAS	2018	20,396	5.1%
Other wooded land (OWL) EEA37 FAO	2020	25,789	4.8%
Other land with tree cover (OTC) EU27 FAO	2020	9,169	2.3%
Other land with tree cover (OTC) EEA38 FAO	2020	9,653	1.8%
Forest EU27 CLC	2018	135,637	33.9%
Forest EEA38 CLC	2018	166,154	30.7%
Transitional woodland and shrub -EU27 CLC	2018	21,679	5.4%
Transitional woodland and shrub -EEA38 CLC	2018	32,592	6.0%
Forest LULUCF EU27	2019	163,180	40.8%
Forest LULUCF EEA32	2018	199,370	36.8%

SOEF2020 Terms and Definitions

FRA2020 Terms and definitions

Source: FAO, Forest Europe, CORINE-CLC and UNFCCC


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