Frequently Asked Questions

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EU Observatory on Deforestation and Forest Degradation (Obervatory)

# Introduction

This document provides information in the form of replies to general and specific questions about the EU Observatory on Deforestation and Forest Degradation (Observatory). Further documentation, in particular regarding the description of methodologies used to produce the spatial datasets that are available via the Observatory, should be consulted under each dataset, either via a link in the introductory note or the “Info tab” when viewing the dataset. Please consult this FAQ document and all other documentation before sending a specific question to the functional mailbox (jrc-forest-observatory@ec.europa.eu).

# Acronyms

EUDR EU Regulation on the making available on the Union market and the export from the Union of certain commodities and products associated with deforestation and forest degradation

FAO Food and Agriculture Organization of the United Nations

FAOSTAT Food and Agriculture Organization Corporate Statistical Database

GCB Global Carbon Budget

GFW Global Forest Watch

GISCO Geographic Information System of the Commission

JRC Joint Research Centre

LULUCF Land Use, Land-Use Change and Forestry

NGHGI National Greenhouse Gas Inventory

Observatory EU Observatory on deforestation and forest degradation

UN COMTRADE United Nations Commodity Trade Statistics Database

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# Context of the Observatory

## What is the origin of the Observatory?

In 2019, the Commission announced an action to establish an EU Observatory on deforestation, forest degradation, changes in the world’s forest cover, and associated drivers with the objective to facilitate access to information on supply chains for public entities, consumers and businesses. Another action that was announced refers to the Copernicus programme with the exploration of the feasibility of developing a Copernicus REDD+ service component to strengthen the existing global or national forest-monitoring systems.

Further details can be found in the Commission Communication “Stepping up EU Action to Protect and Restore the World’s Forests” ([COM(2019) 352 final](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52019DC0352)) under Priority 5 “Support the availability of, quality of, and access to information on forests and commodity supply chains - Support research and innovation.” The European Green Deal, the EU Biodiversity Strategy for 2030 and the Farm to Fork Strategy further confirmed the commitments of this Communication.

## What is the position of co-legislators about the Observatory?

The Council welcomed the Commission’s announcement of a Forest Observatory in coherence and without duplication of existing monitoring tools and mechanisms. It also invited the Commission to consider the feasibility, including financial and administrative implications, of an early alert mechanism to inform stakeholders about sourcing commodities from areas at risk of deforestation. The Council Conclusions from 16 December 2019, especially paragraph 39, provide further details ([ST 15151 2019 INIT](https://data.consilium.europa.eu/doc/document/ST-15151-2019-INIT/en/pdf)).

The European Parliament stresses the need for independent monitoring of production and trading of commodities associated with deforestation, cooperation with customs authorities regarding transparency and extended data requirements, and a further development of research and monitoring programmes such as Copernicus for early warning systems of deforestation and environmental degradation, forest fires and forest damage prevention. The European Parliament specifically “welcomes the creation of a forest observatory to collect data and information on deforestation in Europe as well as globally, and calls for this observatory to establish a mechanism to protect forest defenders”. The European Parliament Resolution from 22 October 2020, especially the section on “Definitions, Forest Data and monitoring” (paragraphs 82 to 91), provides further details ([P9\_TA(2020)0285](https://www.europarl.europa.eu/doceo/document/TA-9-2020-0285_EN.pdf)).

## Which legal EU documents refer to the Observatory?

The Observatory has no legal or authoritative status. The EU Regulation on the making available on the Union market and the export from the Union of certain commodities and products associated with deforestation and forest degradation ([Regulation (EU) 2023/1115](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023R1115), abbreviated EUDR) mentions the role of the Observatory in Recital 31. The Observatory should support the implementation of the EUDR by providing scientific evidence with regard to global deforestation and forest degradation and related trade. Specifically this includes facilitating access to information on supply chains and providing easy-to-understand data and information by linking deforestation and forest degradation to Union demand and trade of relevant commodities and products. This recital notes the provision of land cover maps as time series since the cut-off date (31 December 2020) and the participation in the development of an early warning system, pending a feasibility assessment. It specifically mentions cooperation with competent authorities, relevant international organisations and bodies, research institutes, non-governmental organisations, operators, traders, third countries and other relevant stakeholders.

In addition, several non-legally binding documents refer to or mention the Observatory. Among those, the new EU Forest Strategy for 2030 ([COM(2021) 572 final](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021DC0572)) notes the development of EO-based monitoring tools, operationalized by Copernicus and interactions with the Forest Information System for Europe. The new proposal for a Regulation on “a monitoring framework for resilient European forests” underlines in recital 9 the Observatory’s role on global forest monitoring ([COM(2023) 728 final](https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=COM:2023:728:FIN)). Question 64 in the [Frequently Asked Questions about the EUDR](https://environment.ec.europa.eu/publications/frequently-asked-questions-deforestation-regulation_en) (version dated 29 June 2023) explains recital 31 of the EUDR in simpler terms.

## Who is responsible for the Observatory?

The Joint Research Centre (JRC) is responsible for the establishment (development and content) of the Observatory. The JRC is the European Commission’s science and knowledge service. A combination of JRC in-house funding and contributions by other services ensures the operation and development of the Observatory.

# Content of the Observatory

## What is the structure of the Observatory?

The current structure of the Observatory has four main components:

* Global Forest Monitoring
* Production and Trade of Commodities
* Global Land Use Carbon Fluxes
* EU Tools for Forest Monitoring

Under each component, there is a range of data sets, software tools, or specific visualizations. The following figure illustrates the components and sub-components of the Observatory (status from 9 July 2024).



## What are the sub-components under each component?

Maps of forest cover and attributes are the sub-components under the Global forest monitoring component. There are four sub-components of the Global forest monitoring that can be interactively visualized:

* Global forest cover 2020: Spatial dataset showing the global forest cover presence in year 2020 (cut-off year in EUDR) at 10m spatial resolution obtained through the integration of global spatial datasets on land cover status in year 2020
* Forest attributes: Global spatial dataset of key landscape features about forest derived from the Copernicus global land cover map of year 2019 at 100 m resolution. Forest attribute values are made available at country level and for larger regional domains
* Forest cover changes and drivers: Global spatial dataset of global forest disturbances such as deforestation, forest harvest, selective logging, forest fires, extreme events, insect defoliations, etc. during period 2015-2022. Forest disturbance areas are made available at country level
* Tropical moist forest: Spatial dataset showing the coverage of undisturbed tropical moist forest and disturbance patterns in tropical moist forests during the period 2000 to 2022

Under the Production and Trade of Commodities component, there are three sub-components with interactive visualization of global datasets regarding the national-level production of commodities and products subject to the EUDR, and the volume of trade of such commodities between third parties and the EU:

* Production: Values of production quantities and area harvested in each producing country based on FAOSTAT sources
* Trade flows: Annual bilateral trade of the EUDR product list (Annex II) between countries. The data shown are based on FAOSTAT and UN COMTRADE. The data are available also as aggregated values for the bilateral trade with EU-27. Additionally, maize products are provided.
* Toolbox for the download and analysis of production data (FAOSTAT), and bilateral trade (FAOSTAT and UN COMTRADE)

The sub-component under ‘Global Land Use Carbon Flux’ presents CO2 flux data from Land Use, Land-Use Change and Forestry (LULUCF), sourced from National Greenhouse Gas Inventories (NGHGI) communicated via a range of country reports to the United Nations Framework Convention on Climate Change. Data are allocated to different categories: Forest (excluding organic soils), Deforestation (conversion of forest to other land uses), Other non-forest land uses, Organic soils, and Harvested wood products. In addition, a comparison is made between the NGHGI estimates for the period 2000-2022 and two independent global land use emission datasets: (i) Global Carbon Budget (GCB, [Friedlingstein et al. 2024, in review](https://essd.copernicus.org/preprints/essd-2024-519/)) for Forest (shown in the ‘original’ version and also ‘translated’ to the NGHGI definition of human-induced sink, [Grassi et al. 2023](https://essd.copernicus.org/articles/15/1093/2023/)), Deforestation, Other and Organic soils; (ii) Global Forest Watch (GFW, data from [Gibbs et al. in review](https://essd.copernicus.org/preprints/essd-2024-397/), which updates [Harris et al. 2021](https://www.nature.com/articles/s41558-020-00976-6)) for Forest and Deforestation.

The sub-components under ‘Tools for Forest Monitoring’ presents a few JRC tools or technical approaches that can be useful for monitoring of forest cover or attributes. These tools link to websites that provide access to software or applications. Tools and approaches include:

* Near real time disturbance analysis
* Landscape pattern analysis
* EU forest tree species distribution
* Spatial reference data for forest disturbances in Europe
* Impact toolbox for image processing and environmental monitoring

## Will there be changes to the Observatory and its content?

The Observatory undergoes regular maintenance and updates. Current products may be improved or revised, as needed or appropriate. Any update will be duly documented. To the extent possible, historical data will remain available along with the new data sets.

## What is the cost of the Observatory?

Data and tools that are made available through the Observatory are publicly available and free-of-charge for any user. Currently the European Commission covers all costs for maintenance and development of the Observatory.

## What is the spatial reference system used to display the maps?

The Observatory uses the geographical projection (latitude and longitude) with the WGS84 geodetic datum for all spatial data. The geographical coordinates are expressed in decimal degrees of latitude and longitude.

## What is the country nomenclature?

National estimates that are derived from maps are based on boundaries of countries as provided by GISCO. National data on production and trade use country allocations according to FAO and COMTRADE sources.

# Specific sub-components of the Observatory

## What is the global map of forest cover of 2020?

The global map of forest cover provides a spatially explicit representation of forest presence and absence for the year 2020. This map builds on several global wall-to-wall datasets or datasets covering large areas that are global for their given scope. The map is therefore a harmonized, globally-consistent representation of where forests existed in 2020. [A JRC Science for Policy Report describes the global input layers and mapping approach](https://data.europa.eu/doi/10.2760/262532%E2%80%8B).

## Why is year 2020 important?

The EUDR sets 31 December 2020 as cut-off date for the Regulation. That means, deforestation and forest degradation after year 2020 are subject to the Regulation.

## What is the definition of forest in the global map of forest cover of 2020?

The definition of forest in the global forest cover map of 2020 follows the definition of forest in the EUDR as defined in article 2 (4):

“‘forest’ means land spanning more than 0.5 hectares with trees higher than 5 metres and a canopy cover of more than 10 %, or trees able to reach those thresholds in situ, excluding land that is predominantly under agricultural or urban land use;”

Agricultural use and agricultural plantation are defined in Article 2 (5) and 2 (6) as follows:

* “‘agricultural use’ means the use of land for the purpose of agriculture, including for agricultural plantations and set- aside agricultural areas, and for rearing livestock;
* ‘agricultural plantation’ means land with tree stands in agricultural production systems, such as fruit tree plantations, oil palm plantations, olive orchards and agroforestry systems where crops are grown under tree cover; it includes all plantations of relevant commodities other than wood; agricultural plantations are excluded from the definition of ‘forest’”

It should be noted that all plantations of relevant commodities other than wood, that is cattle, cocoa, coffee, oil palm, rubber, soya, are excluded from forest. It has to be noted that this global map displays predominantly forests with standing trees.

## What is the resolution of global map of forest cover of 2020?

The spatial resolution of the global forest cover map is 10m (i.e. pixels have a size of 10m x 10m or 0.01 ha at the equator). However a few input layers used to create the map are at 30m spatial resolution or coarser. The effects of these differences in the resolution can only be noticed occasionally in the map (i.e. over a very limited number of areas) and are only visible when viewing at very high zoom levels.

Post processing removed patches of forest and non-forest smaller than 0.5ha. A patch is defined as connected pixels of the same class (forest or non-forest) in cardinal and intercardinal directions (eight-neighbour rule).

Input data layers were not specifically projected to a common global 10m geographical grid system with WGS84 datum but were transformed ‘on the fly’ during the integration of the map. In rare cases, the effects of the on-the-fly-projection of the data layers can be noticed for locations far from 0 degrees latitude and longitude.

## What software was used to generate the global forest map?

The map was compiled in Google Earth Engine (GEE, [Google Earth Engine](https://earthengine.google.com/)).

## What are known issues of the global forest map?

For a list of known issues please refer to this website: <https://forobs.jrc.ec.europa.eu/GFC>

## Where can the global forest map be accessed or downloaded?

Access and download of the global forest cover map of 2020 is possible on different websites with varying functionalities:

* Observatory (interactive visualization) : <https://forest-observatory.ec.europa.eu/forest/rmap>
* Web Mapping Service: [https://ies-ows.jrc.ec.europa.eu/iforce/gfc2020/wms.py?](https://ies-ows.jrc.ec.europa.eu/iforce/gfc2020/wms.py)
* JRC data catalogue (Metadata access): <https://data.jrc.ec.europa.eu/dataset/e554d6fb-6340-45d5-9309-332337e5bc26>
* Data download: <https://forobs.jrc.ec.europa.eu/GFC>
* Google Earth Engine: <https://developers.google.com/earth-engine/datasets/catalog/JRC_GFC2020_V2>

## What is the spatial and temporal resolution of the ‘production data’?

The production and area harvested (i.e., the hectares required to produce the selected commodity) are based on the FAOSTAT dataset and are therefore reported as annual values by country. The Observatory also provides five-year averages.

## What is the spatial and temporal resolution of the ‘trade data’?

The trade data in the Observatory are based on annual values by country from the FAOSTAT and UN COMTRADE. The Observatory provides also five-year averages. By default, the Observatory shows UN COMTRADE values, but the user can opt to display FAOSTAT data. By default, the dashboard shows the bilateral trades that contribute to the 95% of the total trade volume related to the selected reporter. This threshold can be adjusted in the dashboard.

## Which commodities and products are reported in the Observatory?

The list of products included in the Observatory is based on the Harmonized System (HS) commodity code reported in the Annex II of the EUDR. Additionally, maize products are included in the Observatory.

## Which trade flows are reported in the Observatory?

In the Observatory we report the trade between countries as import declared by the reporter. For example, for the trade flow of cocoa beans between country A and B, we show the import declared by country B from country A.

## Why does the Observatory show different datasets under Global Land Use Carbon Fluxes?

Carbon fluxes from Land Use, Land-Use Change and Forestry (LULUCF) receive an increasing attention from climate policies. Despite recent advances in modelling and monitoring tools, striking differences in LULUCF estimates have been reported in the literature (e.g., [Grassi et al. 2023](https://essd.copernicus.org/articles/15/1093/2023/)). These differences have relevant implications for assessing collective climate progress and, more broadly, for the confidence in land use estimates under the Paris Agreement. The Global Land Use Carbon Flux dataset allows the scientific and practitioner communities to compare LULUCF fluxes from National Greenhouse Gas Inventories (NGHGIs) with two independent datasets, adjusted to the NGHGI definitions to ensure comparability: the Global Carbon Budget and the Global Forest Watch. This comparison may support the UNFCCC reviews of Biennial Transparency Reports and stimulate new studies from the scientific community to understand why results diverge for some countries.

## How are data sourced from National Greenhouse Gas Inventories?

Data from NGHGIs are sourced via a range of country reports communicated to the United Nations Framework Convention on Climate Change (UNFCCC). For developed countries, data are from annual GHG inventories. For developing countries, the dataset combines the most recent and complete information from different sources, including National Communications, Biennial Update Reports, submissions to the Reducing Emissions from Deforestation and forest Degradation (REDD+) framework, and Nationally Determined Contributions. For each country, we attempted to select the most recent and complete source of data, with expert judgement in a few cases.

## Are all GHG included or just CO2?

Only CO2 is included. Exceptions are some developing countries for which it was not possible to separate CO2 from non-CO2 emissions (mainly CH4 and N2O from forest fires). However, based on information available, non-CO 2 emissions are around 6 % of the total CO2-equivalent LULUCF flux. Therefore, the global contribution of non-CO 2 emissions in the Observatory (i.e. from developing countries that do not separate GHGs) is assumed to be negligible.

## How are CO2 fluxes from National Greenhouse Gas Inventories allocated to classes in the Observatory?

CO2 fluxes reported by countries in the NGHGIs following IPCC categories, are allocated to the classes forest land, deforestation, other non-forest land uses, organic soils, and harvested wood products to facilitate comparison with independent sources. Information on the correspondence between categories in the NGHGI and classes in the Observatory and the assumptions or approximations made in cases of lack of completeness are described in detail in [Grassi et al., 2022](https://essd.copernicus.org/articles/14/4643/2022/). Our assumptions are documented in the country-specific info sheet next to each graph in the Global Land Use Carbon flux page in the Observatory.

## How is Global Carbon Budget (GCB) data adjusted to the NGHGI definitions?

The GCB ([Friedlingstein et al. 2024, in review](https://essd.copernicus.org/preprints/essd-2024-519/)) uses three bookkeeping models to estimate CO2 fluxes from Forest, Deforestation and Other transitions, and external datasets to estimate CO2 emissions from Organic soils. These classes of the net land-use change flux are re-aggregated as follows in the Observatory, to enhance comparability with NGHGI: permanent deforestation (GCB) = Deforestation (Observatory); forest regrowth + wood-harvest-and-other-forest-management + shifting-agriculture (GCB) = Forest (Observatory); peat-drainage-and-peat-fires (GCB) = Organic soils (Observatory); other-transitions (GCB) = Other land uses (Observatory). Information on data quality of bookkeeping models’ results for individual countries (quality flags) can be found in the data supplement to the [Global Carbon Budget 2024](https://www.icos-cp.eu/science-and-impact/global-carbon-budget/2024). Forest fluxes from the GCB are adjusted to the NGHGI definition of human-induced CO2 sink using the methodology from [Grassi et al. (2023)](https://essd.copernicus.org/articles/15/1093/2023/), which adds the natural sink from dynamic global vegetation models occurring on managed lands to the Forest CO2 flux from bookkeeping models.

## What is included in the Global Forest Watch (GFW) data?

The GFW data ([Gibbs et al. in review](https://essd.copernicus.org/preprints/essd-2024-397/)) includes provisional CO2 fluxes from forests and deforestation from 2001 onwards, estimated by integrating ground data into a geospatial GHG monitoring framework ([Harris et al. 2021](https://www.nature.com/articles/s41558-020-00976-6)). It combines global forest change maps, benchmark carbon density maps, and other Earth observation data using the IPCC national greenhouse gas inventory guidelines that countries use for the land sector (gain-loss approach). In the Observatory, gross emissions from forest disturbances and gross removals by standing and new forest are recombined into Forest and Deforestation classes for comparability with NGHGIs. In the Observatory, GFW CO2 fluxes linked to shifting agriculture can be allocated to either the Forest or Deforestation classes.

## Is it possible to download the entire Global Land Use Carbon flux dataset?

Please send the request to jrc-forest-observatory@ec.europa.eu

# Data and information use

## What is the legal status of data and information?

Data on the Observatory aim to provide sound scientific and transparent spatial information at global scale for forest cover, deforestation and forest degradation and related trade of commodities and products. The data underpinning the maps and visualizations can be freely accessed. Any information and data sets shown on the Observatory have no legally binding meaning or value. They do not implement, imply, or suggest a legal position of the European Commission.

## What will be the use of the global forest cover map of 2020?

In the context of the EUDR, the global forest cover map of 2020 is non-mandatory, non-exclusive and not legally binding. The map could serve operators in the assessment of risk of deforestation when declaring land parcels by geolocation from which commodities or products within the scope of the EUDR are imported to or exported from the European Union market. The European Commission foresees the interoperability between the information system for making declarations of due diligence and the global forest cover map of 2020. However, a spatial match or non-match between a due diligence statement and ‘forest’ in the global forest cover map of 2020 does neither mean with full confidence that the parcel has been deforested or has not been deforested, respectively, since 2020.

The map can also be used for verification by competent authorities, e.g. when selecting sample areas to carry out detailed and robust checks.

## Are there different versions?

Data on the Observatory evolve and structural changes in the data are or will be duly documented. To the extent possible, historical data will remain available along with the new data sets.

## Can I download data and information?

The user can download most maps and statistics (i.e. estimates derived from the available spatial datasets). For statistics, click in the upper right of each figure and select the file format for the download as data or as image. For maps, navigate to the info tab, either by clicking on a country or selecting the “toogle sidebar” on the upper right of map viewer, and from there navigate to the download site.

## Can I use data and information for my own work, e.g. in presentations, studies, scientific papers, etc.?

You may use data and information from the Observatory for your own work when duly referenced with the original source of the data (e.g. JRC, FAO, UN COMTRADE, etc.) and follow the data policy of each individual data set provider. We encourage the users to refer to the specific products and their underpinning scientific references that are generally available under the Info tab of each data set or statistic.

Suggested generic reference for the Observatory: “European Commission, Joint Research Centre, EU Observatory on deforestation and forest degradation. Global land-use carbon fluxes. <https://forest-observatory.ec.europa.eu>, Last access: DATE”

Suggested references for specific datasets under the Observatory:

* For the global map of forest cover in 2020: “Bourgoin, Clement; Ameztoy, Iban; Verhegghen, Astrid; Carboni, Silvia; Colditz, Rene R.; Achard, Frederic (2023): Global map of forest cover 2020 – version 1. European Commission, Joint Research Centre (JRC) [Dataset] PID: <http://data.europa.eu/89h/10d1b337-b7d1-4938-a048-686c8185b290>.”
* For data on production derived from FAOSTAT: “Data manipulation performed by the EU. Underlying data obtained from FAO. FAOSTAT Production and Forestry databases, licensed under CC-BY-NC-SA 3.0 IGO (https://creativecommons.org/licenses/by-nc-sa/3.0/igo/). Extracted from: [https://www.fao.org/faostat/en/#home](https://www.fao.org/faostat/en/%23home). Date of Access: 09-10-2023.”
* For data on trade derived from FAOSTAT: “Data manipulation performed by the EU. Underlying data obtained from FAO. FAOSTAT Trade database, licensed under CC-BY-NC-SA 3.0 IGO (https://creativecommons.org/licenses/by-nc-sa/3.0/igo/). Extracted from: [https://www.fao.org/faostat/en/#home](https://www.fao.org/faostat/en/%23home). Date of Access: 09-10-2023.”
* For data on trade derived from UN COMTRADE: “Data manipulation performed by the EU. Underlying data obtained from UNITED NATIONS, UN COMTRADE DATABASE: licensed under UN COMTRADE conditions available at https://shop.un.org/databases#Comtrade, extracted from <https://comtradeplus.un.org/BulkFilesSearch>. Date of Access: 09-10-2023.”
* For the data on Global Land Use Carbon Flux: (i) data from National Greenhouse Gas Inventories: Melo et al. (in preparation, which updates [Grassi et al. 2023](https://essd.copernicus.org/articles/15/1093/2023/)); (ii) data from Global Carbon Budget: [Friedlingstein et al. 2024, in review](https://essd.copernicus.org/preprints/essd-2024-519/); (iii) data from Global Forest Watch: [Gibbs et al. (in review](https://essd.copernicus.org/preprints/essd-2024-397/), which updates [Harris et al. 2021](https://www.nature.com/articles/s41558-020-00976-6)).

If you have any question about a proper reference or you would like to collaborate, please send an email to jrc-forest-observatory@ec.europa.eu.

# Known issues

## Where can I find out about known issues?

Known issues are documented in the respective sub-components, either under the “Info tab” (see upper right) or in the related software and tool documentation.

## How can I report issues?

Please write to jrc-forest-observatory@ec.europa.eu to report any issue. This functional mailbox aims to collect feedback on the Observatory interface or its content e.g. design and functionality, general observations, reporting of errors in data, recommendations for improvements, etc. Please mention explicitly the issue in the subject line and a short summary at the beginning of the email. This will help to categorize quickly your feedback and, if applicable, to provide replies in reasonable time.