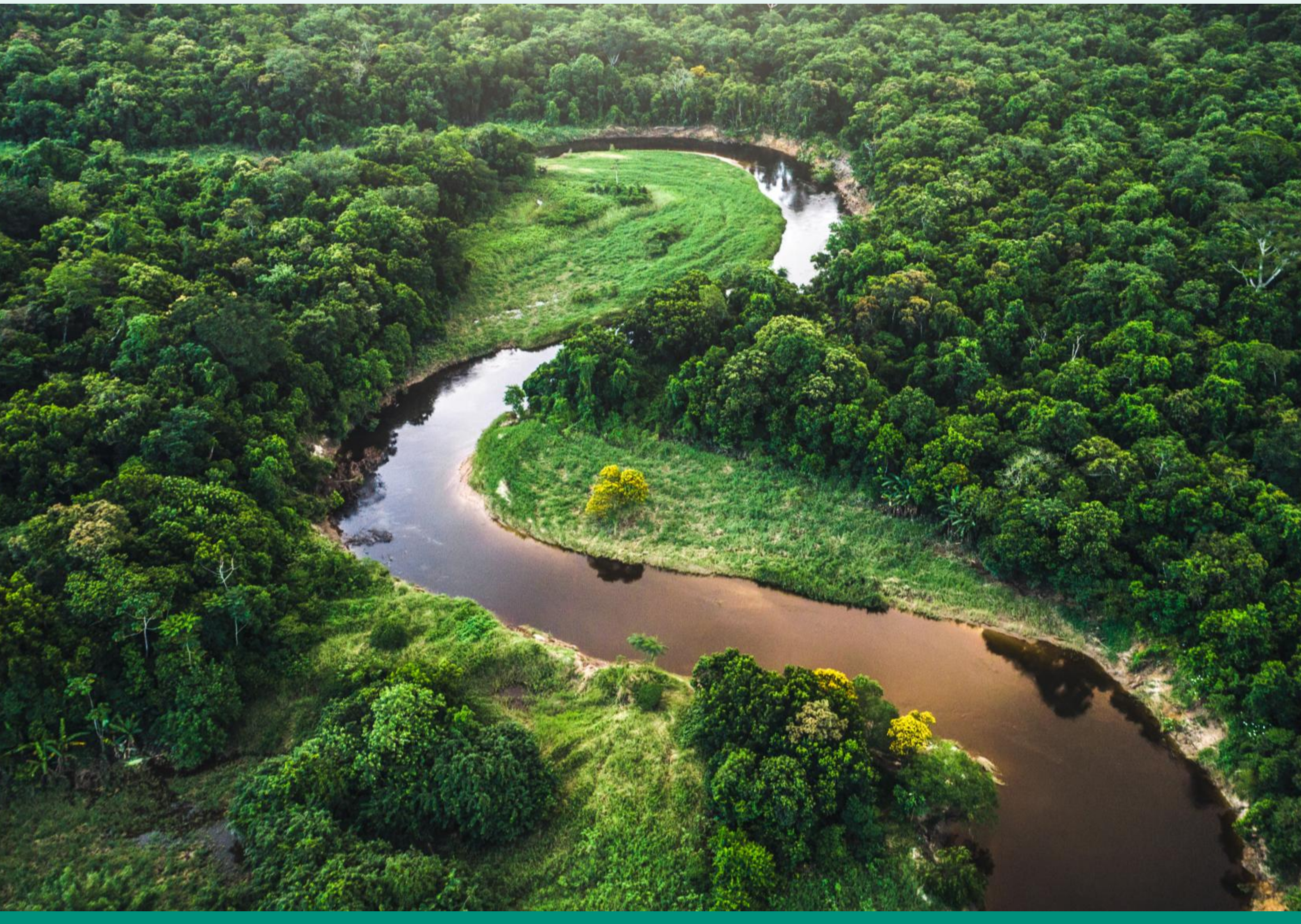
Deforestation Risk Assessment Guide

DD-14 Guide, Version 1.0



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Contents

About this Tool

About this tool	This tool provides guidance to help organisations align with environmental standards, regulatory compliance, and specific operational contexts to effectively assess and mitigate deforestation impacts.
Other relevant tools	Review also the **Supply Chain Mapping Guide (DD-07)** for guidance on mapping your supply chains and the **Digital Tools for Responsible Sourcing Guide (DD-16)** for guidance on evaluating digital tools, as they provide related and relevant information.

This document aims to support organisations in identifying deforestation risks within their supply chains and comprises part of the Preferred by Nature's Due Diligence Toolkit. The toolkit guides organisations in aligning their operations with sustainability standards and regulatory compliance. It includes several complementary policies, procedures, and practices designed to identify, assess, and manage supply chain risks.

The guidance in this document is adaptable to different interpretations and different approaches to assess deforestation, enabling organisations to customise their due diligence processes based on their specific needs, operational contexts, and regulatory requirements.

General motivations for assessing deforestation risk may include compliance with a regulation such as the EUDR or reflecting the broader sustainability goals and objectives of organisations' responsible business activities. Specific objectives for assessing deforestation may include:

- Pinpointing areas with low deforestation risk where minimal monitoring and traceability might be adequate.
- Identifying high-risk deforestation zones and analysing underlying causes and trends.
- Assessing the organisation's direct or indirect impact on deforestation through its products.
- Taking proactive steps to prevent deforestation, enabling timely and appropriate action or adjusting sourcing methods.
- Addressing instances of deforestation, such as initiating forest restoration efforts.

Organisations may choose to develop and implement their own deforestation analyses using primary data sources, for which this guidance outlines the necessary steps and tools. Alternatively, an organisation might opt to outsource the identification of deforestation risks and occurrences to an independent third party, utilising a proprietary methodology and tools. In such cases, this guidance aids the organisation in comprehensively understanding the third party's approach, ensuring it aligns with their needs and obligations.

Review Digital Tools for Responsible Sourcing Guide (DD-16) for additional support for interactions with third-party service providers.

The results of the deforestation or forest degradation analysis should be entered into the Supply Chain Risk Analysis Template (DD-10a) and recorded.

Where relevant, use the Supply Chain Information Management Template (DD-09) for the management of supplier information and risk assessment conclusions.

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Organisations aiming to meet the EUDR need to consider the specific requirements of this regulation while reading and applying this guidance. Features of the regulation include requirements for the gathering of geolocations of plots where commodities have been produced; a defined list of commodities and products in scope; specific definitions for the concepts of 'forest', 'deforestation', and 'deforestation-free', as well as detailed due diligence responsibilities for different types of actors (i.e., Operators and Traders).

Otherwise, organisations incorporating deforestation into their due diligence systems can employ a combination of internal procedures and external analyses, methods, and information sources. In any case, this guidance facilitates the creation of a structured approach with established steps and tools to effectively manage deforestation risks.

In summary, organisations should identify the correct scope of their deforestation risk assessment before employing any of the processes or methodologies outlined here. This includes:

- Reflecting on the general objective of the risk assessment, such as to make sourcing decisions, improve current supply chains, meet the expectations of business partners, or to comply with a given regulation.
- Defining the specific requirements and standards for deforestation-free sourcing that the organisation seeks to comply with, such as the ones detailed by the EUDR or by a voluntary industry or certification standard.
- Specifying the commodities and products in the scope of the organisation and identifying and mapping the relevant supply chains. This may include a complete supply chain from the factories to the farms and forests, as described in the **Supply Chain Mapping Guide (DD-07)**.

Review the Supply Chain Mapping Guide (DD-07) to gain an understanding of your supply chains and identify the minimum information required.

Example User case of this Guidance

EcoBlend Inc. is an organisation sourcing soy and coffee products and using paper for packaging. The organisation operates in both regulated markets, with strict deforestation monitoring requirements, and unregulated markets. To manage its deforestation risk, EcoBlend decided to implement a due diligence system tailored to the specifics of each commodity, including their origin and certification status:

- For its soy supply, EcoBlend adopted the Earthworm Zero Deforestation or Conversion (ZDC) methodology, utilising Trase data for municipality-level risks and Agrosatélite for plot-level assessments. This guidance will help EcoBlend to understand the methods of these service providers and ensure ing they align with its policies and market obligations.
- In monitoring its coffee supply chains, EcoBlend opted for an in-house approach using GIS software and satellite imagery for plot-level assessments. This guidance provides an overview of the tools and steps required for this process.

- Finally, for packaging, EcoBlend relies on FSC certification, recognised for its verifications against deforestation. Additionally, EcoBlend considers extra assessments for products from suppliers on the Forest 500 list. This guidance helps EcoBlend evaluate these methods and tools, ensuring they meet its policy goals and regulatory requirements. This scenario illustrates how EcoBlend can leverage this guidance to create a nuanced due diligence system, addressing deforestation risks across its supply chains concisely and effectively.

1. Introduction to Deforestation

Deforestation stands as one of the most significant environmental challenges faced by the world today. Forests play a crucial role in maintaining ecosystems and provide essential services that benefit the climate, support biodiversity, and sustain human livelihoods. Despite increased awareness and efforts to combat this issue, current deforestation rates remain alarmingly high. This ongoing destruction threatens to push certain forest biomes beyond a tipping point, underscoring the urgent need for global action to halt deforestation.

Agricultural expansion, driven by the global demand for agricultural commodities and products derived from these commodities, stands as the primary cause of deforestation. Agricultural expansion links directly to the international trade in commodities and subsequently, to the retail and consumption ends of supply chains. In this context, supply chains emerge as a critical leverage point for addressing global deforestation, with a particular role for lead firms, such as commodity traders, multinational corporations, and large retailers.

The implementation of more responsible sourcing practices has the potential to significantly reduce deforestation along global supply chains. The pressure to adopt such practices originates from various sources:

Consumer's Preferences: More informed and environmentally conscious consumers are demanding products that do not contribute to the degradation of the planet. Consumer awareness and demand for sustainability are driving companies to adopt more sustainable sourcing practices.

Civil Society: Civil society organisations, including NGOs and activist networks, play a critical role in exerting pressure on companies and governments alike. Through advocacy, campaigning, and direct action, these entities highlight the consequences of deforestation, mobilise public opinion, and demand accountability and transparency in supply chain practices. Their efforts often spearhead the push for sustainable practices, making them indispensable allies in the fight against deforestation.

Regulation: Governments and international bodies are increasingly implementing laws and regulations that require companies to ensure their supply chains do not contribute to deforestation or to report on their activities in relation to deforestation. Legal frameworks are becoming stricter and more widespread, making compliance a significant factor in global trade. See Annex 1 for examples of selected international regulations and policies addressing Deforestation and key International Initiatives by governments and the Private Sector.

Private Sector Leadership: Many companies recognise the value of positioning themselves as leaders in sustainability and corporate responsibility. By adopting sustainable sourcing practices, these companies not only mitigate their environmental impact but also enhance their brand reputation, customer loyalty, and competitive advantage in the marketplace.

To meet today's demand for deforestation-free products, companies need to improve their sourcing practices and adopt due diligence systems. This includes understanding the origins of raw materials and assessing the risk of deforestation within their supply chains.

2. Definitions, Scale, and Scope

This chapter lays out the foundational elements for conducting a deforestation risk assessment. It provides key terms and concepts for establishing the temporal and spatial scales for the analysis, with a view to focusing on the scope of the risk assessment.

These preliminary steps are crucial as they tailor the analysis to specific objectives, ensuring that subsequent efforts are well-directed and relevant to the context being examined.

2.1 Definitions

Selecting appropriate definitions is essential for tailoring deforestation risk assessments to their specific objectives and selecting suitable methodologies. The absence of a universally agreed-upon definition of "*forest*" means that each assessment must begin with the determination of a definition by your organisation, that aligns with your goals. The choice of definition significantly influences the outcome of the analysis.

Forest definitions often incorporate various criteria related to the physical structure of forests, such as tree density, canopy cover, and tree height. For instance, the Food and Agriculture Organisation (FAO) and the EUDR define a forest as *"land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10%, or trees able to reach these thresholds in situ, excluding land that is predominantly under agricultural or urban land use"*.

The UNFCCC, on the other hand, defines forest more flexibly as a minimum area of land of 0.05-1 hectares with tree canopy cover of more than 10-30% and trees with the potential to reach a minimum height of 2-5 meters at maturity in situ. When using ready-made geospatial datasets (see below), it is crucial to understand their definitions, as they may or may not align with specific analytical needs.

Deforestation is generally defined as a permanent change in land cover, transitioning from forest to non-forest land cover over time. However, the loss of forest cover does not always equate to deforestation. For example, clear-cutting, a common timber harvesting technique in some regions, does not necessarily result in the permanent removal of forested areas. Similarly, infrastructure development like roads and buildings might cause forest cover loss but typically cover a contained and limited surface area. Additionally, short-rotation tree plantations on agricultural lands can contribute to deforestation figures if the land reverts to agricultural use - a practice that is permitted within many national legislations.

In addition to the overarching definition of forest and deforestation, several related terms can be relevant to assessing deforestation, including:

Land-cover Change refers to alterations in the physical material at the surface of the earth, which includes the transition from forests to non-forested areas. This change can be observed through satellite imagery and is crucial for identifying deforestation events.

Land-use Change encompasses modifications in how areas of land are utilised by humans, which can involve shifting from forested areas to agricultural or urban uses. It can refer to other types of land-use change, such as the conversion of natural landscapes other than forests (grasslands, peatlands, etc…) to agriculture. This term highlights the socio-economic factors driving changes in forest landscapes.

Forest Degradation refers to a reduction in the capacity of a forest to provide goods and services. This process, which may not result in an outright loss of forest area, can stem from unsustainable logging or poor management practices, pollution, as well as disturbances that diminish biodiversity, carbon storage or other forest functions. See also Box 04 below for the EUDR definition of forest degradation, which is quite narrow by comparison.

Forest Fragmentation occurs when large, contiguous forest areas are divided into smaller, isolated patches due to deforestation or infrastructure development.

This fragmentation impacts biodiversity, forest health, and ecological processes by disrupting animal habitats and altering microclimates within the forest.

Clear Cutting is a forestry practice whereby all trees in a particular area are uniformly cut down. While it is a normal and widely accepted silvicultural tool of forest management for timber production, irresponsible clear-cutting can have significant ecological impacts, including increased soil erosion and loss of habitat.

Forest Plantations are areas planted with trees for commercial purposes, often involving a single species. While plantations can contribute to global wood supplies, they are usually less diverse and offer fewer ecological benefits than natural forests. They are also sometimes criticised for replacing natural forests, thus affecting biodiversity and ecosystem services.

Box 04: Relevant EUDR Definitions

Article 2 – Definitions

(3) '**deforestation**' means the conversion of forest to agricultural use, whether human-induced or not [occurring after 31 December 2020];

(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;

(5) '**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;

(6) '**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';

(7) '**forest degradation**' means structural changes to forest cover, taking the form of the conversion of:

(a) primary forests or naturally regenerating forests into plantation forests or into other wooded land; or

(b) primary forests into planted forests;

(8) '**primary forest**' means naturally regenerated forest of native tree species, where there are no clearly visible indications of human activities, and the ecological processes are not significantly disturbed;

(9) '**naturally regenerating forest**' means a forest predominantly composed of trees established through natural regeneration; it includes any of the following:

(a) forests for which it is not possible to distinguish whether planted or naturally regenerated;

(b) forests with a mix of naturally regenerated native tree species and planted or seeded trees, and where the naturally regenerated trees are expected to constitute the major part of the growing stock at stand maturity;

(c) coppice from trees originally established through natural regeneration;

(d) naturally regenerated trees of introduced species;

(10) ‘**planted forest**’ means forest predominantly composed of trees established through planting and/or deliberate seeding, provided that the planted or seeded trees are expected to constitute more than 50 % of the growing stock at maturity; it includes coppice from trees that were originally planted or seeded;

(11) ‘**plantation forest**’ means a planted forest that is intensively managed and meets, at planting and stand maturity, all the following criteria: one or two species, even age class, and regular spacing; it includes short rotation plantations for wood, fibre and energy, and excludes forests planted for protection or ecosystem restoration, as well as forests established through planting or seeding, which at stand maturity resemble or will resemble naturally regenerating forests; […]

Forest Degradation vs Deforestation

Forests around the world are facing two major threats: deforestation and forest degradation. While deforestation is the clear and permanent removal of forests to make way for alternative land uses such as agriculture or pasture, forest degradation is more complex and encompasses a broader spectrum of issues. Essentially, forest degradation refers to a decline in the forest's health and functionality (including ecological, economic, etc.) due to various disturbances. These disturbances can be either natural, such as wildfires, or human-induced, including selective logging, excessive harvesting of forest products, mining activities, hunting, overgrazing by livestock, pollution, or the spread of pests and diseases.

When it comes to detecting forest degradation from space, the task is notably more challenging than identifying deforestation. This complexity arises firstly from the lack of a universally accepted definition of what constitutes forest degradation. This ambiguity makes it difficult to assess forest degradation in its entirety because it can manifest itself through numerous different types of disturbances, each with its own impact.

Furthermore, defining forest degradation involves more than just noting the presence of a disturbance. Unlike deforestation, which can be quantified based on the area of land cleared and viewed in terms of a binary outcome (either a forest has been cleared or it has not), forest degradation assessment requires understanding the degree or intensity to which a disturbance has impaired the forest. This involves evaluating how significantly a disturbance has compromised the forest’s capacity to provide its essential functions and services.

Lastly, the more subtle nature of forest degradation and the limitations of current remote sensing technology add another layer of difficulty to its detection. While deforestation results in large, easily detectable changes in land cover that can be observed from space, the signs of forest degradation are often much less visible. The effect of degradation typically occurs at a finer spatial resolution, making it a challenge to monitor accurately through satellite imagery.

Box 05: Forest Degradation in the EUDR

One approach to monitoring forest degradation is to capture the health and functions of a forest ecosystem by discrete forest categories and measure degradation as a conversion from one forest type to another with *lesser* ecological value.

This approach is taken by the EUDR, which defines forest degradation as *"structural changes to forest cover, taking the form of the conversion of (a) primary forests or naturally regenerating forests into plantation forests or into another wooded land; or (b) primary forests into planted forests"*. The EUDR provides further definitions of the different forest classes, which are mainly defined by the degree of human management.

At least in principle, the EUDR definition of forest degradation allows organisations to operationalise and measure forest degradation as a form of land-cover change, i.e., just like deforestation, as a discrete outcome without the complexity of further investigating the degree of disturbances.

Consequently, monitoring forest degradation for EUDR compliance can follow a similar approach as outlined in this document. However, this hinges on the ability to accurately detect different forest categories as well as the transition from one forest category to another.

Moreover, the EUDR's approach has its complexities. Notably, in the timely identification of degradation, which might not be immediately evident at the moment of conducting a deforestation risk assessment and submitting a due diligence statement.

2.2 Spatial Scale

The geographic scale of deforestation risk assessment can range from the precise scrutiny of an individual plot of land, such as a section within a farm or forest, to broader evaluations encompassing entire landscapes, regions, nations, or even vast biomes that span across multiple countries, like the Amazon Basin.

The purpose of the assessment often dictates the geographic scale employed. At the plot level, the analysis might focus on verifying the deforestation status of products originating from that land, a key requirement for EUDR compliance. This granular approach allows for pinpointing the exact locations where deforestation is occurring.

Regional or national assessments, on the other hand, take on a more landscape perspective. They are often not solely concerned with identifying the occurrence of deforestation but aim to understand its extent, drivers of deforestation, as well as its historical dynamics. Such assessments are instrumental in identifying high-risk zones and devising strategies for targeted mitigation efforts.

The geographic scale also influences the data requirements. For example, as the focus narrows to smaller plots of land, the need for high-resolution satellite imagery becomes imperative to capture the finer details of land-cover change. Conversely, lower-resolution data might suffice for assessments over larger areas.

In some assessments, the focus shifts from broad geographic regions to specific entities within the supply chain, such as suppliers and processors. These assessments might integrate geographic information, such as the location of mills or processing plants and their proximity to known areas of high deforestation risk, to evaluate the direct impact these entities could have on deforestation.

A comprehensive assessment might combine various spatial scales. A first assessment on the country or regional level might identify priority areas for plot- or municipal-level analysis, which can be further refined by assessing specific local supply chain entities.

2.3 Temporal Scale

As elaborated above, deforestation is defined as a change in land-cover over time. This means that any deforestation risk assessment requires at least two points in time to compare the land-cover and assess whether deforestation (or forest degradation) has occurred. The initial point in time is referred to as the cut-off date. The Accountability Framework Initiative (AFi) defines a cutoff date as "*the date after which deforestation or conversion renders a given area or production unit non-compliant with no-deforestation or no-conversion goals, commitments, targets, or other obligations*."

Furthermore, it is advisable to establish cut-off dates that precede current norms to discourage pre-emptive deforestation or conversion activities that might take place in anticipation of upcoming restrictions. Moreover, if the analysed time frame is too short, it may not reveal significant land-cover changes that occur over more extended periods.

In such cases, incorporating historical data on land-cover changes can enrich the analysis, offering deeper context and understanding of long-term trends.

Conversely, an overly extensive time frame might mask the critical dynamics of forest cover. For example, an analysis might overlook scenarios where forest cover is initially cleared but regrows, potentially resulting in a failure to identify the deforestation event. Conversely, new forest growth subsequently cleared might also go undetected. If there is an indication that the chosen time frame could obscure significant land-cover transitions, it's advisable to segment the analysis into multiple periods.

This approach allows for a more nuanced understanding of deforestation events and land-cover dynamics, ensuring a comprehensive analysis that aligns with the goals of the assessment. Please refer to the AFi Operational Guidance on Cutoff Dates for further guidance on cut-off dates.

2.4 Scope of the Assessment

Besides the temporal and spatial dimensions, the scope of a deforestation risk assessment is also defined by the range of products to be investigated, the number of supply chains and supply chain entities to be included, and the number of different geographies involved. Moreover, it is also relevant to decide whether the assessment should concern the legality of deforestation, in which case the analysis would need to consider local legislation.

Defining the full scope of the assessment ensures that the analysis remains focused on relevant factors. It also helps decide whether an organisation can conduct the analyses in-house - requiring some GIS expertise and computing power - or if the assessment should be externalised to third-party service providers with greater capacities and more experience.

> For further information on this, consider the Digital Tools for Responsible Sourcing Guide (DD-16), which offers detailed guidance on selecting service providers for due diligence tasks.

3. Ready-made Assessments and Platforms

This chapter explores the utility of pre-existing assessment tools and databases for initial evaluations of deforestation risk. Such platforms offer a cost-effective alternative to extensive investments in specialised GIS expertise or external consulting services. They provide a preliminary understanding, helping to set priorities for more detailed assessments where needed.

While in certain scenarios, these tools may be sufficient for an organisation's requirements, for more nuanced and tailored analyses, the subsequent chapter will guide the conducting of in-depth geospatial analysis.

3.1 Reports and Risk Profiles for Countries or Regions

Certain organisations and networks publish reports or provide ready-made deforestation risk profiles at the country or regional level.

For areas affected by deforestation, there is often a substantial amount of academic and grey literature shedding light on the drivers, actors, and dynamics of deforestation on the ground.

Moreover, some initiatives provide databases with risk profiles, such as the FAO Global Forest Resources Assessment or the (forthcoming) EUDR Country Benchmarking.

Accessing these resources provides a foundational step for understanding the deforestation risks associated with commodities and their production areas.

Food and Agriculture Organization of the United Nations FAO periodic Global Forest Resources Assessment (FRA)	FAO's FRA examines the status of around 200 countries and territories with more than 60 forest-related variables, with data collected using commonly agreed terms and definitions through a transparent reporting process and a well-established network of officially nominated national correspondents.
EU Regulation on Deforestation-free Products (EUDR) Country Benchmark (in development)	The EUDR has established a three-tier system in which countries (or sub-national regions) will be classified as low-risk, standard risk, and high-risk. These 'country benchmarks' will be based on an objective and transparent assessment by the Commission, considering the latest scientific evidence and internationally recognised sources. The idea is to apply enhanced scrutiny for high-risk countries. According to the text of the EUDR, the elements for country benchmarking classification will primarily be based on risk assessment against three criteria: (a) rate of deforestation and forest degradation, (b) rate of expansion of agricultural land for relevant commodities; and (c) production trends of relevant commodities and products. This benchmarking exercise is in the process of development. Pending the availability of results, all countries will be considered under the "standard" risk of deforestation category. In August 2023, Trase and Proforest published a detailed policy briefing highlighting the key principles and recommendations on risk benchmarking. It includes a methodological framework, elements on setting thresholds, and case studies for cattle and soy.
World Resources Institute WRI Cocoa Deforestation Risk Assessment	WRI has developed a map layer – called the Cocoa Deforestation Risk Assessment (DRA) – providing a standardised view of future deforestation risks. The inputs include a map of forest extent, a map of forest loss, and other contextual data. The methodology is detailed and publicly available. WRI recommends users to "*layer their geospatial data on top of the Cocoa DRA to determine how the locations of their areas of interest compare to the distribution of risk classes on the landscape. This can be done through a visual assessment or automatically, using the tools available in GIS software*".

3.2 Company Risk Profiles

Risk assessments at the company level can help companies identify and understand deforestation risks associated with their suppliers. This enables a focused approach to managing and mitigating deforestation risks within supply chains. By focusing on these supplier-specific evaluations, companies can prioritise engagement and intervention strategies, ensuring that their supply chains align with sustainability commitments and regulatory standards. Opting for assessments based on methodologies that are transparent and publicly accessible enhances the credibility of the analysis.

trase Trase deforestation exposure for global traders	Founded in 2015 by the Stockholm Environment Institute and Global Canopy, *Trase* assesses deforestation and conversion associated with the production of key commodities in sub-national jurisdictions (municipalities, departments). It highlights areas of recently deforested land used to produce a specific commodity. Used in combination with global supply chain data, it also measures to which extent supply chain actors (companies, countries, and investors) are exposed to commodity deforestation in their sourcing practices. The methodology used by Trase is publicly available. Deforestation data is particularly developed for Latin America and the production of soy. However, data is also available for cocoa production in West Africa and palm oil production in Southeast Asia.
SPOTT a ZSL conservation initiative SPOTT *ZSL*	Developed by the Zoological Society of London (ZSL), the *SPOTT* tool offers independent and publicly available assessments of commodity producers, processors, and traders. The criteria assessed by SPOTT include, among others, categories on deforestation and biodiversity, HCV / HCS protection and impact assessments, as well as peat, fire, and GHG emissions. Scores are available for each indicator and aggregated by category and overall score. In terms of deforestation, the tool highlights whether a company has taken commitments to zero-deforestation, how the company defines deforestation, which cut-off date is used, which system the company is using to monitor deforestation, as well as the amount of deforestation recorded in its operations, etc. Assessments are reviewed annually and rely on self-reported and verified information (the latter having a greater weight). The methodology and scoring criteria are publicly available.
FOREST 500 FOREST 500	Developed by Global Canopy, Forest 500 identifies the 350 companies with the greatest influence on tropical deforestation and the 150 financial institutions that are providing the most finance to them. It covers beef, leather, palm oil, paper, soy, and timber. The results are updated every 2 years. Companies are awarded a total score of 100, aggregating scores from an overall approach category and commodity-specific categories on commitment/policy strength, associated human rights, and reporting and implementation. The methodology is publicly available.
CDP DISCLOSURE INSIGHT ACTION CDP Forest	CDP has developed surveys for companies to disclose their sustainability performance. There is one survey and scoring specific to forests, and two others on climate and water security. CDP Forest is a disclosure mechanism to track progress on avoidance of deforestation and conversion, via the Deforestation Commodity Footprint (DCF) metric.

It relies on an open scoring methodology, with scores ranging from D (poor) to A (best). Companies ranking A are publicly disclosed on the CDP website. Registration is necessary to access other data.

The Forest survey includes categories on procedures, governance, business strategy, implementation, verification, and supply chain. Examples of deforestation-related questions that companies must respond to include:

- Disclosure of the share of commodity volumes verified as DCF and the breakdown on how verification is achieved and traceability level (areas with negligible risk, verified through monitoring systems, physically certified, etc.) (section F1.5);
- Whether the company has experienced forest-related detrimental impacts (section F1.6);
- If and how the company is assessing its deforestation/conversion footprint (section F.17);
- Whether companies undertake a forest-related risk assessment and its description (section F2.1).

canopy

Canopy Hot Button

The Canopy *Hot Button* serves as a comprehensive assessment tool that rates man-made cellulosic fibre (MMCF) producers based on their environmental impact, particularly their sourcing practices from ancient and endangered forests. The annual report offers insights into the industry's progression towards adopting sustainable and low-impact fibre alternatives, known as Next Generation solutions, by providing a "green shirt" rating for those with lower deforestation risks.

SOY ON TRACK BEEF ON TRACK

Soy on Track and Beef on Track

Soy on Track and *Beef on Track* are platforms focused on enhancing transparency within soy and beef value chains. Managed by Imaflora, they support the development of tools and actions for deforestation-free chains. Various organisations contribute to and can use the platforms to stay updated on the progress of implementing commitments towards deforestation-free soy and beef production.

3.3 GIS Data Platforms and Alert Systems

Previously, conducting geospatial analysis required familiarity with GIS data and software, limiting its accessibility. Now, open-access web-based platforms offer a user-friendly way to perform analysis without needing specialised software or extensive skills. While these platforms might not support every type of analysis due to limited data and functions, they still provide an accessible starting point and are continuously improving. Users can overlay various data layers, such as land use, deforestation history, and protected areas, and even upload or draw specific areas for analysis.

Advanced systems, such as those listed below, provide a major advantage by incorporating automated alert systems, such as Global Land Analysis & Discovery (GLAD) alerts and RADD Forest Disturbance Alert (see Annex 2 for an extended list). These systems provide near-real-time monitoring of the Earth's surface, automatically detecting changes in land cover and generating alerts for potential deforestation events. They are typically public sources and available for free, making them accessible to a wide range of users. Regular updates ensure that the data remains current. Some systems even allow for regular automated email updates regarding land-cover changes in specified areas.

However, the global coverage of these systems can be inaccurate for local contexts leading to incorrect identification of deforestation events. Moreover, systems use a predefined definition of forest, which may not be adjustable to meet specific analytical needs or align with local forest definitions. Finally, the technical nature of these systems and their underlying algorithms may not be transparent to most people, making it difficult for non-experts to understand and trust the results.

What IS in the Plot (WHISP)	Whisp is an open-source tool designed to support deforestation risk assessment compliance with the European Deforestation Regulation (EUDR). The tool analyses and converges multiple EUDR-relevant data sets to evaluate a plot's forest cover, assess the presence of deforestation alerts, and check compliance with zero deforestation requirements with the cut-off date of December 31, 2020. Results are presented in a simple table format, making it accessible for those without expertise in geographic information systems (GIS).
Global Forest Watch	Global Forest Watch (GFW) provides an online platform that offers tools and data for forest monitoring worldwide. It utilises cutting-edge technology to provide near real-time information on forest changes, aiming to improve forest management, combat illegal deforestation, and support sustainability efforts.
MapBiomas	MapBiomas is a collaborative initiative that maps land cover and land use changes in Brazil, providing annual updates with a 30m spatial resolution. Managed by a network of NGOs, universities, and tech startups, MapBiomas aims to make knowledge about land use accessible for conservation and climate change combat efforts. It utilises advanced remote sensing and mapping technologies to reveal transformations in Brazilian territories.

4. Conducting Geospatial Analysis

This section offers a roadmap for conducting geospatial analysis tailored to specific needs, focusing on foundational knowledge rather than the operational aspects of GIS software or computational analysis. Our objective is to equip you with a basic understanding necessary to further develop such skills, define precise needs, and effectively collaborate with professional service providers. The initial subsection introduces geospatial data, followed by guidance on practical considerations for performing an analysis.

Complementary guidance can be sought from the Consumer Goods Forum Forest Positive Coalition's Monitoring and Response Framework, which aims to standardise deforestation alerts in relation to palm oil supply chains. It requires current, precise base maps with less than 30 meters resolution, annual updates, and above 80% accuracy as per GOFC GOLD guidelines. Preferring the HCSA forest definition, it's designed for monitoring service providers and clarifies reporting thresholds for stakeholders.

4.1 Understanding Geospatial Data

Geospatial data refers to information that has a geographic component, which means it is tied to specific locations on Earth through geographic coordinates.

Essentially, anything that can be located on the planet's surface qualifies as geospatial data, covering a broad-spectrum including landscapes, landcover types, infrastructures, administrative boundaries, or climate-related metrics.

There are two primary types of geospatial data: vector files and raster files. Vector files consist of geometries represented by points, lines, and polygons. Points represent specific coordinates, lines connect points, and polygons have multiple lines that create a shape.

A raster file, on the other hand, is a type of image made up of pixels, where each pixel represents an area on the Earth's surface, with different files varying in resolution (the size of each pixel representing Earth's surface area). Each pixel has assigned a discrete numeric value - or a code, which represents information, such as land-cover class, average tree height, crop type, etc...

Raster files are particularly suited to expressing continuous data that changes smoothly across a landscape. Raster and vector files together cover the full width of data required for geospatial assessment of deforestation at all geographic scales.

Optical Satellite Imagery

These are photographs of Earth taken from space by satellites operated by entities like NASA (Landsat), the European Space Agency (Copernicus), and private companies such as Planet Labs. Being composed of pixels, these images are essentially raster files that provide visual data of the Earth's surface, crucial for both visual assessments and computational geospatial analyses.

Used in deforestation risk assessments, the images offer the benefits of easy interpretation, comprehensive global coverage, and accessibility. Many platforms provide images for free, especially for non-commercial uses.

Some providers update their imagery frequently, which can be as often as every few hours, facilitating close monitoring of environmental changes and human activities, like road construction or farmland expansion.

Figure 1: A high-resolution (10m) satellite image from Planet Labs showing an agricultural landscape in Brazil with forest patches.

Relying only on satellite imagery can bring strong limitations in terms of accurate interpretation of what is happening on the ground. Depending on the satellite, image resolutions might be too low to generate relevant information. Agricultural practices, such as the cultivation of shade-tolerant crops like coffee and cocoa beneath forest canopies, are often nearly impossible to detect and map accurately using satellite imagery alone.

Moreover, image quality may be compromised by cloud cover, a common issue in tropical regions. Some providers offer automatic cloud masking using machine learning, but this is not universally available. If available, radar imagery can be a valuable alternative, as it can penetrate cloud cover, providing consistent monitoring capabilities.

Additionally, temporary changes in vegetation caused by events such as forest fires, landslides, or defoliation due to seasonal changes or pests and diseases, can be misinterpreted as the absence of forest or as permanent deforestation. Differentiating between forest cover and other types of green vegetation can also be challenging, especially when forest cover is pre-defined by fixed attributes that cannot be visually evaluated (e.g., tree height).

To enhance accuracy in deforestation monitoring, it is typically best to integrate satellite imagery with other relevant geospatial data, including various types of maps. This combined approach helps overcome the limitations of relying solely on satellite images (see below).

Main Features of Satellite Imagery

Source of Data: Satellite imagery can come from public sources such as NASA's *Landsat* or ESA's *Copernicus* programmes, or from private companies that provide proprietary data.

Spatial Resolution: The detail in satellite images is determined by their resolution, which varies:

High-resolution: Imagery with 10 metres per pixel clarity captures intricate ground details.

Moderate-resolution: At 30 metres per pixel, this imagery is suitable for a wide array of applications.

Low-resolution: With 100 metres per pixel, these images are best for observing large-scale environmental changes.

Revisit Time / Update Frequency: This refers to the frequency with which a satellite returns to capture new images of the same location, ranging from daily to several times a month.

Custom Data Acquisition: Certain satellite services allow users to request images of specific areas tailored to the user's needs.

Archive Availability: The extent of historical data varies by provider. Public entities often have archives that go back several decades, whereas private companies may focus on more recent imagery.

Land Cover and Land-Use Maps

These maps are commonly created from satellite imagery using sophisticated algorithms, including machine learning techniques, to categorise the Earth's surface into different types of land cover and usage for each pixel. Pixel values can express all sorts of information, from tree height, tree type, canopy cover, or crop type.

Accordingly, these maps can express forest extent, agricultural land-use type and much more. Due to the quantitative nature of raster files (e.g., land-use category expressed as a numerical pixel value), such land-cover maps allow for computational geospatial analysis in GIS software, which is crucial for large-scale assessments and not easily possible from raw satellite imagery.

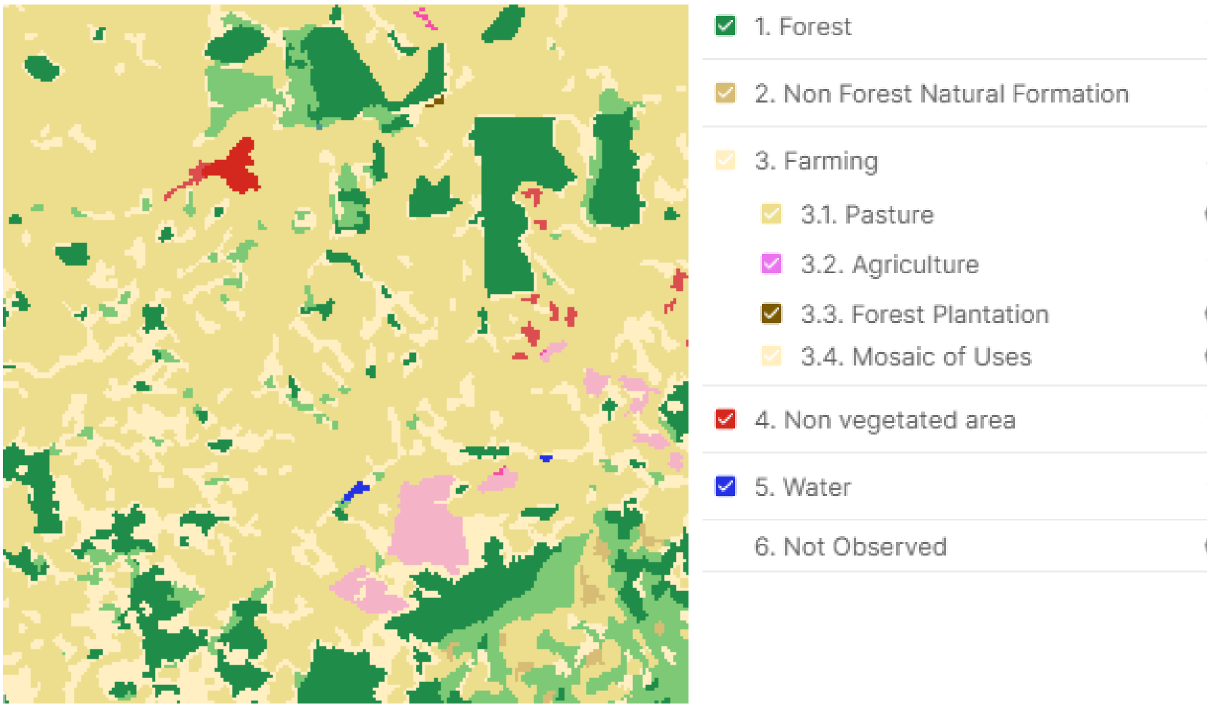


Figure 2: A raster file depicting the land-use of rural Brazil, with several land-cover and land-use classes. Taken from [GFW](#).

Each land-cover map has its strengths and weaknesses. One frequent issue is the misalignment of classifications within the maps compared to the definitions required for analysis. For instance, a forest's definition might differ from the one used in the map.

A related challenge is accurately categorising land cover to ensure that agricultural areas - even those with tree cover that may resemble forests - are correctly excluded from forest classifications. This is particularly problematic when land that meets a forest's criteria is designated for agricultural purposes. Moreover, global land-cover maps result from algorithms and machine learning, which always come with a margin of error. In cases where a single map's accuracy is questioned, corroborating the data with high-resolution satellite imagery can enhance reliability.

Main Features of Land-cover Maps

Global vs. Regional Maps: Global mapping products are great for covering large areas with a consistent approach but often lack the accuracy of more localised datasets. These regional datasets are tailored to reflect specific area characteristics, reducing common misclassifications seen in global maps, such as mistaking farms for forests.

Open Source vs. Proprietary Datasets: Public datasets produced by academic and government institutions follow transparent academic standards, allowing for peer review and extensive research. They offer a cost-effective way for land cover assessment. However, while potentially more precise and tailored, proprietary datasets lack transparency in their methodologies, making it challenging for users to gauge their limitations.

Administrative Boundaries, Land-use Units, and Other Locations

Administrative boundaries, land-use units, including concessions, protected areas, or plots of land, as well as specific locations of objects, are commonly expressed as vector files (i.e., shapes, lines, or points):

Administrative Boundaries: Accurately outlined using vector polygons, these delineations represent varying administrative levels from local to national boundaries. They provide the framework through which land management policies and resource allocations are applied and enforced.

Land-Use Concessions, Plots, and Protected Areas: These are defined using vector files, which map out the exact perimeters of areas such as land allocated for specific uses, individual landholdings, and zones designated for conservation.

Buildings, Processing Plants, Small Plots: Small-scale features are precisely marked using vector points, each point defined by unique geographic coordinates. This precision is vital for cataloguing infrastructure, real estate, and detailed asset management.

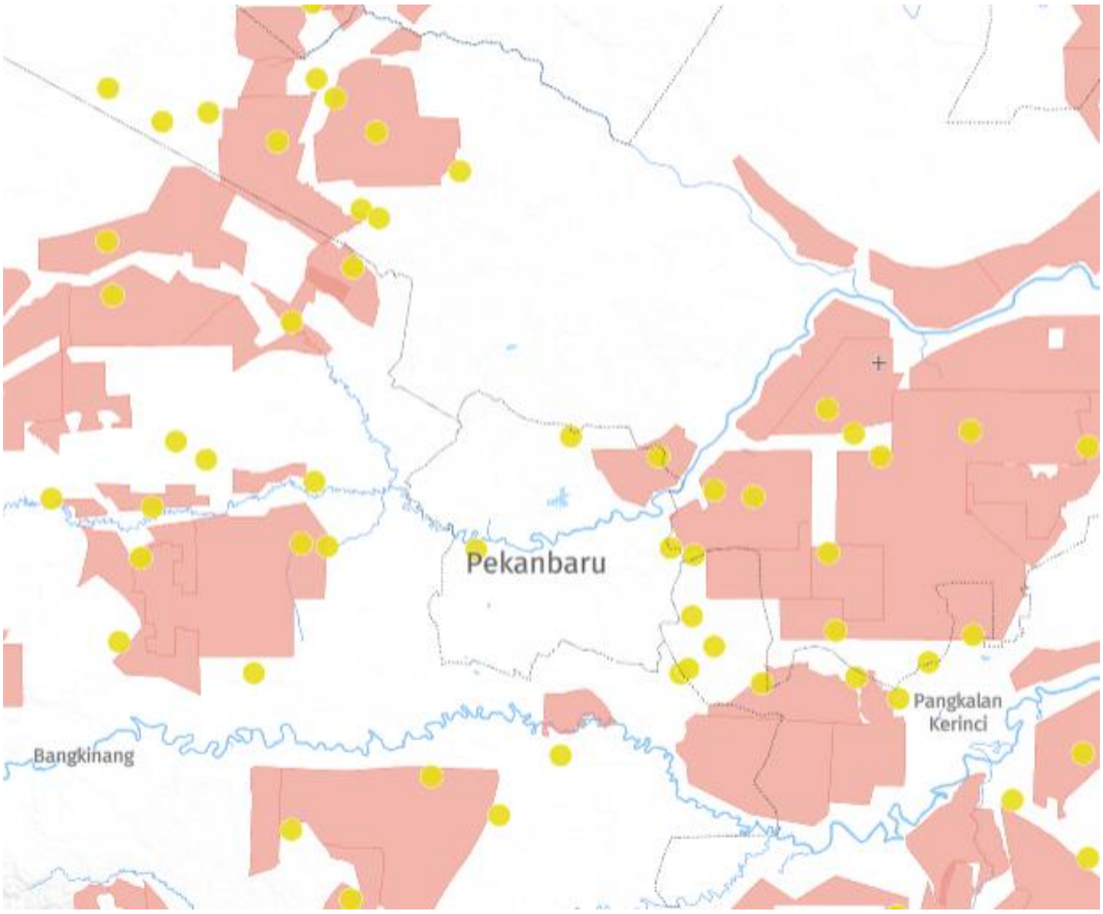


Figure 3: A map showing a part of Indonesia, with vector polygons representing palm oil concessions and administrative boundaries, vector lines representing rivers, and vector points representing palm oil mills. Taken from GFW.

4.2 Geospatial Analysis at the Plot Level

Assessing deforestation at the plot level involves a focused analysis of smaller, well-defined areas like individual farms. This approach can serve as a distinct or complementary method to broader national or sub-national assessments of deforestation.

Conducting these assessments can vary; they may be systematic, based on sampling, or targeted towards areas previously identified as high-risk within sub-national or landscape contexts.

NOTE: this guidance does not explore the specifics of collecting plot-level information, such as determining farm boundaries. For detailed guidance on this aspect, please refer to the document **Supply Chain Mapping Guide (DD-07)** and the guidance on the collection of polygon location data by ISEAL.

Review the Supply Chain Mapping Guide (DD-07) to gain an understanding of your supply chains and identify the minimum information required.

Analysing deforestation at the plot level hinges on accurately identifying changes in land cover, specifically the transition from forest to non-forest areas. To do this effectively, a robust set of evidence is required. A key step is to identify the relevant geospatial data sources to rely on for a given analysis and to assess the robustness of expected results.

Analysing whether a plot is deforestation-free requires comparing a plot's previous state of land-cover with at least one later state of land-cover, to determine if forest cover has been converted within the analysed time frame. The analysed time frame depends on the purpose of the analysis. If the purpose is compliance with legislation, such as the EUDR, then the cut-off date of that legislation needs to be reflected in the analysis, i.e., 31st December 2020.

The comparison of land-cover over time can result in different scenarios[1]. A simplistic comparison of only two points in time, say Year X and Year Y, and considering only two land-cover classes, 'forest cover' and 'no forest cover', could result in the following scenarios[2]:

- The plot had no forest cover in Year X. Logically, the plot could not have been subject to deforestation afterwards.
- The plot has the same forest cover in Year X as in Year Y. Consequently, there is no evidence of deforestation.
- The plot has forest cover in Year X that is no longer present in Year Y. Accordingly, there is evidence of deforestation.

Unit of Analysis

When assessing a plot's land-cover, one must select a suitable *unit of analysis*. This can, but does not have to be, the plot of land under assessment. For illustration, imagine you wish to detect whether a plot contains forest cover, defined by a minimum area of 0.5 ha with an overall canopy cover of at least 80%. A raster dataset indicates land-cover for each 30mx30m cell (with a surface area of 900 m^2, equivalent to 0.09 ha) as a binary value: (1) *Tree cover with 100% canopy cover*, or (2) *Agricultural land use with no or insignificant tree cover*.

To classify a forest in line with the given definition, it would need at least six cells (= 0.54 ha), of which at least five cells (83%) indicate closed canopy cover. Further analysis must decide the spatial unit of analysis (i.e., what is being analysed?).

[1] With geo-spatial data at hand, such a comparison can be made either through a visual interpretation or through computational geospatial analysis. A visual interpretation might be sufficient for single plots. However, where the analysis encompasses many plots, it might be more economical to employ computational geospatial analysis, which requires moderate GIS and quantitative skills.

[2] For simplicity, these scenarios ignore forest regrowth. See below for a brief discussion on the risk of non-detection of deforestation after regrowth within the time frame of analysis.

The following options are available, each being illustrated in Figure 4:

Landscape Level: The analysis assesses the broader landscape, covering and surrounding the plot to identify whether any part of the whole scene classifies as forest cover.

Plot Level: The analysis assesses the entirety plot against the forest cover criteria.

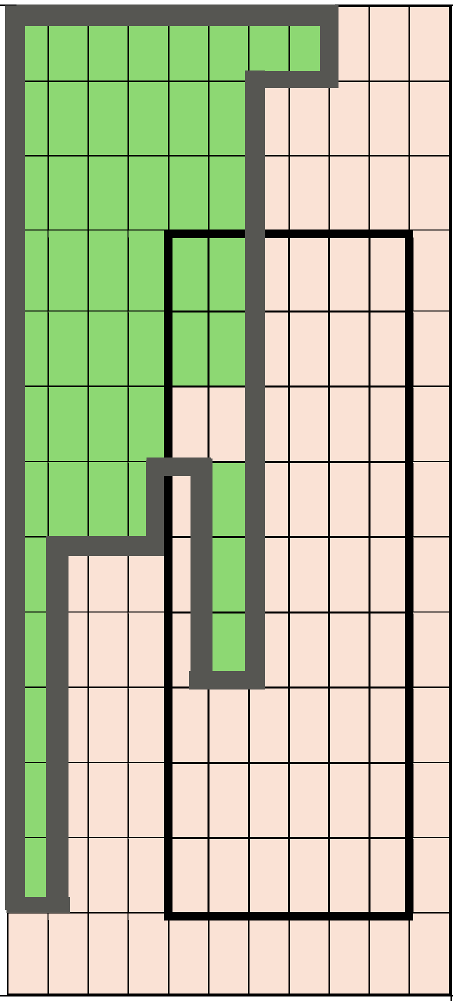
Quarter Plot Level: The analysis assesses each quarter of the plot individually to allow for a more granular analysis.

Flexible Subplot Level: The analysis uses a flexible unit of analysis to identify whether any part of the plot can be classified as forest cover.

Unfortunately, there is no single correct approach to selecting the unit of analysis. Each approach has its own limitations and advantages. What is more important is to stay consistent with one approach and be transparent about it.

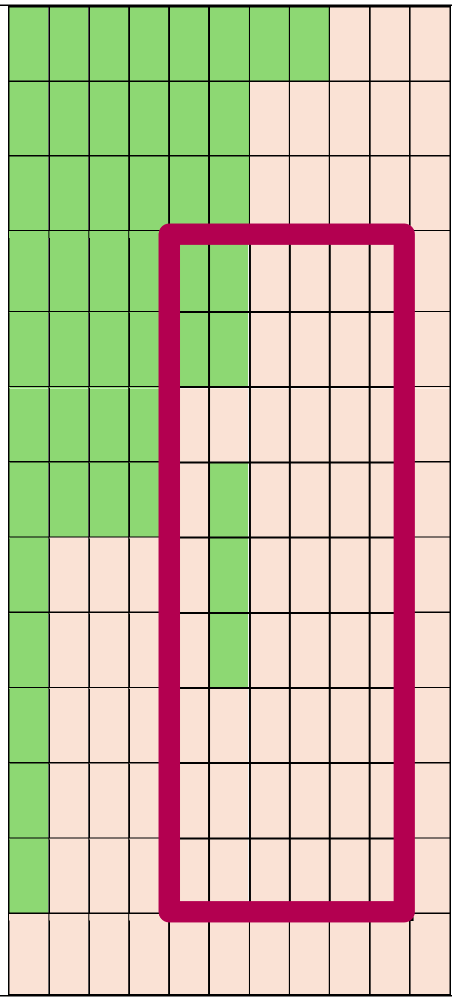
Figure 4: Different approaches to drawing the unit of analysis derive different results. Gray areas mark approaches that classify as forest cover (>0.5 ha, >80% canopy cover), while red areas mark approaches that do not classify as forest cover.

A.

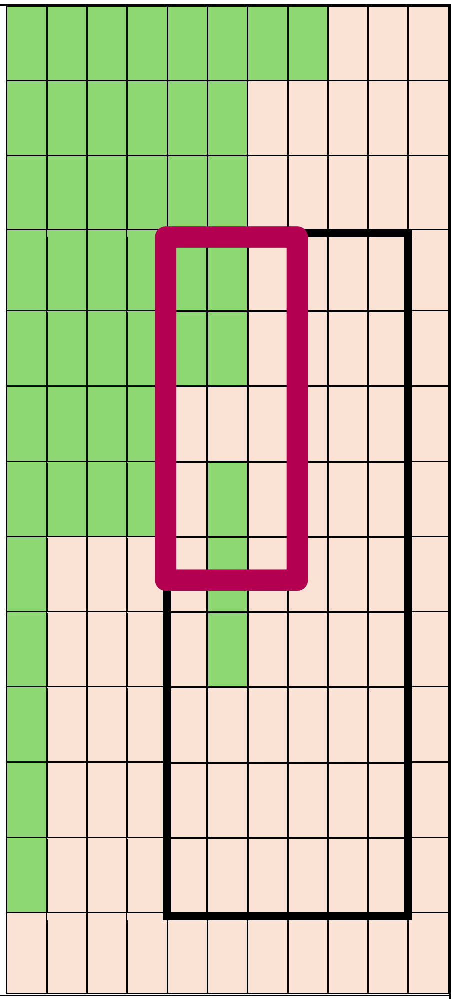
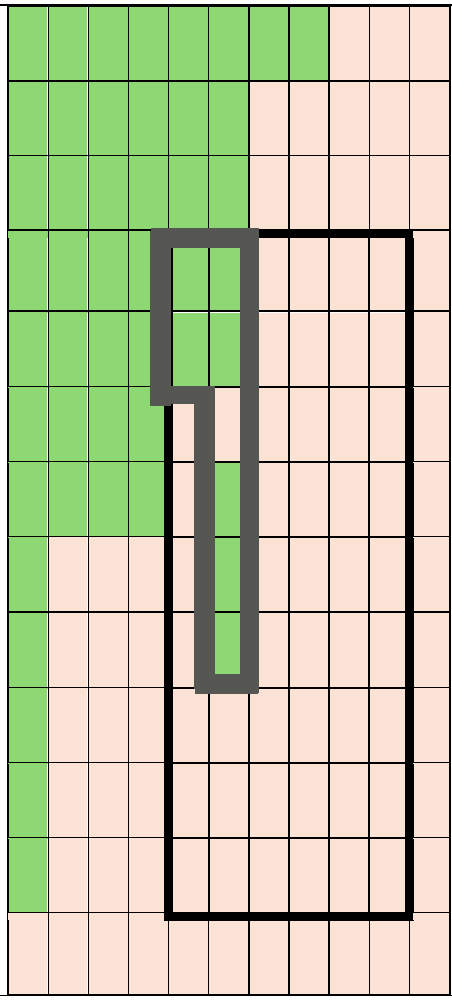


A larger part of the landscape can be classified as forest cover, of which some parts overlap with the plot.

B.



The analysis cannot classify forest cover at the plot level, since the plot's land cover does not match the definition of forest cover.

C. 	D. 
Even though the level of analysis is at a finer granular level compared to B, the plot quarter cannot be classified as forest.	There is forest cover on the plot when a particular area of eight pixels is analysed.

Cross-Validation of Data

Identifying deforestation at the plot level must always overcome the challenges associated with different sources of geospatial data discussed previously. Therefore, compiling as much data as possible and conducting a cross-validation of this evidence is advisable. If multiple datasets agree or complement one another in a certain conclusion, the evidence can be considered robust. For example, where several landcover maps and satellite images agree about the lack of tree cover and the presence of agricultural fields for a given plot at the cut-off date, we can conclude that produce from that field has a negligible deforestation risk.

Consider the following subsequent images, in which a 2021 land-cover map from MapBiomas, the JRC Global Forest Cover 2020, map, and a 2021 high-resolution image from Planet Labs agree with each other regarding the agricultural landcover for an area in Brazil.

If 2021 was our cut-off year, we could conclude a low deforestation risk for the plots depicted on these images, mirroring Scenario A outlined above. Additional certainty comes from a MapBiomas landcover map over the same area, but from 2017, five years prior to the cut-off year. As we can see, the area has been an agricultural area for years, despite the presence of some forest patches in 2017 and in 2021.

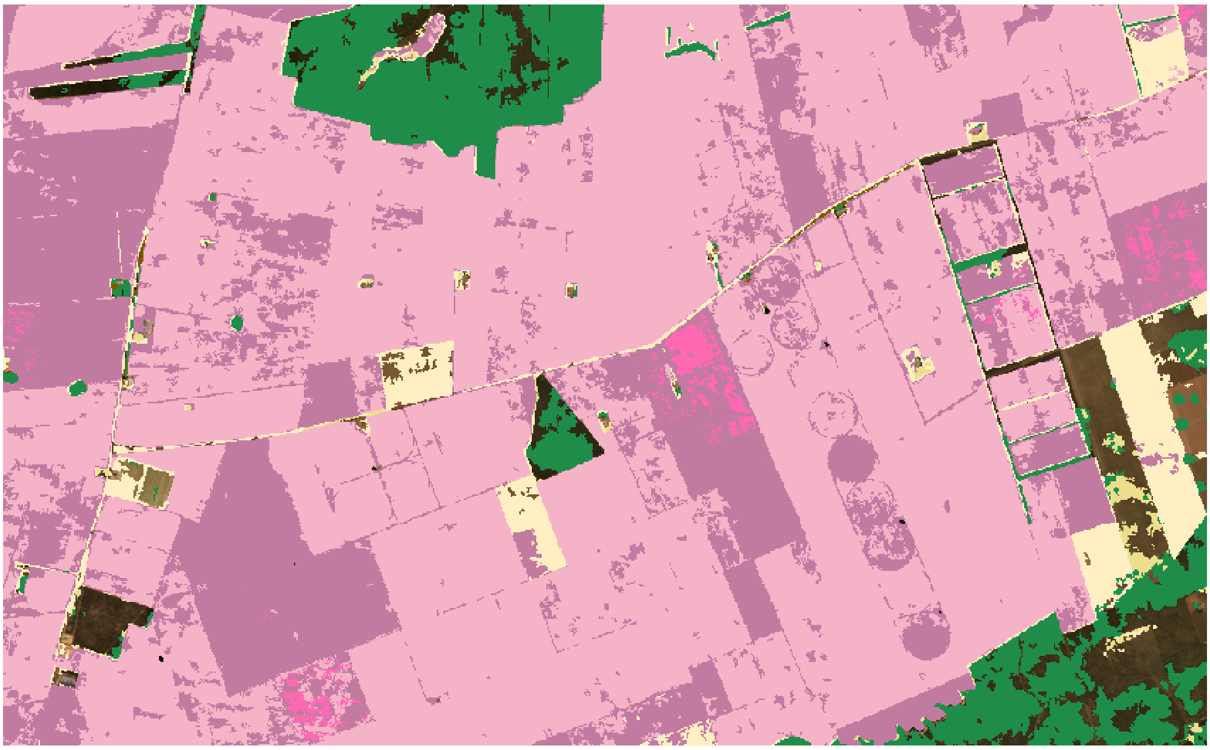


Figure 5: MapBiomas Landcover 2021: Raster land-cover map. Different shades of pink represent different agricultural land-uses, green represents forest cover, and yellow represents pastures.

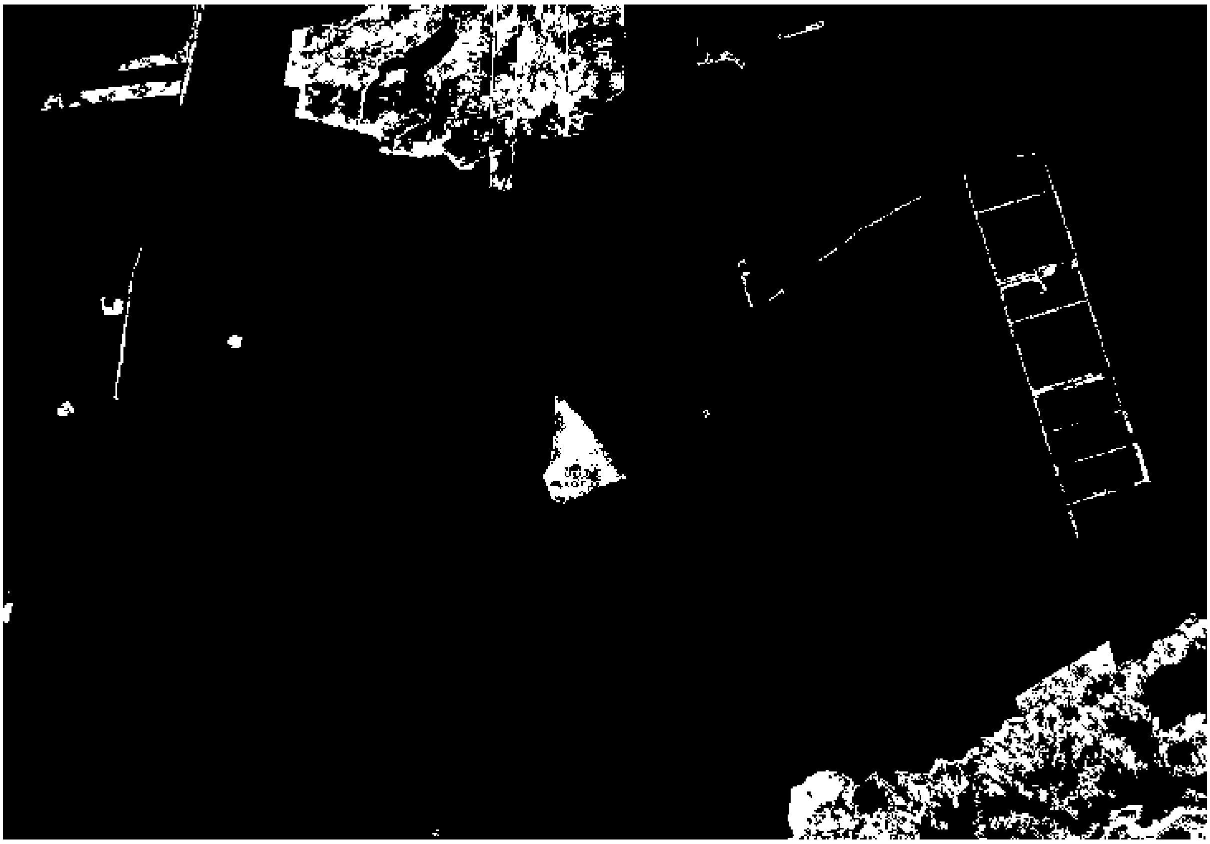


Figure 6: JRC Global forest cover 2020: Raster land-cover maps. White represents forest cover, black represents no forest cover.

Figure 7: [Planet Labs](#) Mosaic, July 2021: High-Resolution Land-cover depicts agricultural land-use.

Figure 8: [MapBiomas](#) Landcover 2017: different shades of pink representing different agricultural land-uses, green representing forest cover, and yellow representing pastures.

To illustrate the cross-validation of data for a more ambiguous case, consider the hypothetical analysis of a deforestation scenario in Table 1. Four different datasets were used in conjunction to conclude a deforestation risk for the time from Year 3 to Year 4. The datasets provide conflicting evidence, yet none of the datasets by themselves can provide conclusive evidence:

Forest Cover A: A forest-cover dataset with a resolution of 100m, available for Year 3, indicating no forest at the beginning of the timeframe of analysis - and accordingly not providing any evidence for a deforestation risk (see scenario A, above).

Forest Cover B: A forest-cover dataset with a resolution of 30m, available for Q3-4 of Year 3, Year 4, and Year 6. Similarly to *Forest Cover A*, this dataset does not indicate any land-cover change over the time frame of analysis - and accordingly does not provide any evidence for a deforestation risk (see scenario A, above).

Agricultural Land-use*:* An agricultural land-cover map with time coverage outside the relevant time frame of analysis, showing no agricultural cultivation in Year 1 but indicating a land-cover change by showing agricultural cultivation in Year 5.

High-Resolution Satellite Images*:* 5m resolution photographs, available every six months, disturbed by cloud cover at the beginning and at the end of the time frame of analysis, however, indicating a deforestation event in the time from Year 2 – Year 1 (Q1-2).

Table 1 Hypothetical Analysis of Deforestation Assessment: The inner cells of the table represent what each dataset depicts at a given time.

Time Frame of Analysis									
Dataset	Year 1	Year 2	Year 3		Year 4		Year 5	Year 6	Risk
			Q1-2	Q3-4	Q1-2	Q3-4			
Forest Cover A			No Forest						No Risk.
Forest Cover B				No Forest		No Forest		No Forest	No Risk.
Agricultural Land-use	No Fields						Fields		Risk
High-Res Images	Forest	Forest and cloud cover	Fields and cloud cover	Fields	Fields	Fields and cloud cover	Fields	Fields	Risk
Cumulative Evidence	**Forest cover**	**Deforestation**		**Fields**					Risk

5. Using the Results

Once results of the deforestation risk assessment have been finalised, the conclusions should be integrated into the overall risk assessment and supply chain analysis process.

The result can be used as an addition to National Risk Assessment results but could also be used directly as input to the supply chain risk analysis.

Results can be inserted in the Supply Chain Risk Analysis Template (DD-10a).

Annex 1 – Deforestation Policies and Initiatives

This annex provides examples of selected international regulations and policies addressing Deforestation, and key International Initiatives by governments and the Private Sector.

Box 01: Selected Regulations and Policies Addressing Deforestation

EU Deforestation Regulation (EU 2023/1115)[3]: This regulation, known as the EUDR for short, is a legislative initiative that aims to minimise the EU's contribution to global deforestation by ensuring that commodities entering the EU market, or exported from it, have not been produced on deforested or degraded land.

The regulation covers a range of agricultural commodities, including palm oil, rubber, soy, beef, wood, cocoa, and coffee. It requires some companies to conduct due diligence to ensure their supply chains are deforestation-free.

United Kingdom –Environment Act 2021[4]: This act includes provisions to tackle illegal deforestation by requiring larger businesses to ensure that the commodities they use, such as cattle, cocoa, palm oil, and soy, comply with local laws protecting forests in their country of origin.

Companies must report on due diligence measures taken to prevent these products from contributing to illegal deforestation.

United States – Lacey Act Amendments[5]: The Lacey Act initially only focused on wildlife protection. However, it was amended in 2008 to include plants and plant products, making it illegal to import, export, transport, sell, receive, acquire, or purchase any plant that is taken, possessed, transported, or sold in violation of the laws of the United States, a state, or relevant foreign law. This includes timber and timber products.

In this way, while the amended Act does not explicitly address deforestation, it indirectly prevents illegal logging and the trade of illegal plant products, thereby supporting efforts to combat deforestation and promote sustainable forest management.

Norway – Deforestation-Free Public Procurement: Norway committed in 2016 to deforestation-free supply chains related to its public procurement policies[6]. This means that the Norwegian government, in its purchases, seeks to avoid products that contribute to deforestation. This policy applies to goods such as timber, palm oil, soy, and beef. Concerns about deforestation also led Norway to ban palm oil-based biofuels in its public procurement in 2017[7].

EU Corporate Sustainability Due Diligence Directive (EU 2024/1760)[8]: While not exclusively focused on deforestation, the new EU Corporate Sustainability Due Diligence Directive (EU CSDDD), which passed into law in 2024, requires large companies to identify and prevent human rights violations and environmental damage, throughout their operations and value chains.

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[3] EU Deforestation Regulation (EU 2023/1115)

[4] United Kingdom –Environment Act 2021

[5] United States – Lacey Act Amendments

[6] Norway committed in 2016 to deforestation-free supply chains related to its public procurement policies.

[7] Norway to ban palm oil-based biofuels in its public procurement, in 2017.

[8] EU Corporate Sustainability Due Diligence Directive (EU 2024/1760)

Deforestation and degradation are included in the Annex under prohibitions in relation to human rights instruments. This law mandates the implementation of due diligence plans that must be publicly reported.

Box 02: Key International Initiatives:

Paris Climate Agreement: A landmark international treaty adopted in December 2015 to combat climate change. It seeks to limit global warming to below 2 degrees Celsius, ideally aiming for 1.5 degrees. Each country commits to national plans to reduce greenhouse gas emissions and is required to review and strengthen these plans every five years. The agreement also focuses on supporting developing countries through climate finance, technology transfer, and capacity building to help them meet their climate goals and adapt to the impacts of climate change.

Amsterdam Declaration Partnership: A commitment by ten European countries to eliminate deforestation from the production and importing of agricultural commodities by 2025, promoting sustainable supply chains in line with global environmental efforts.

New York Declaration on Forests: A voluntary and non-binding international declaration to halve the rate of deforestation by 2020 and end it by 2030. The declaration was endorsed by numerous governments, companies, and civil society organisations during the 2014 United Nations Climate Summit.

Sustainable Development Goals: The SDGs were adopted by all United Nations Member States in 2015. They include several goals directly and indirectly related to addressing deforestation. The key SDGs that deal with deforestation come under SDG 15: Life on Land. This goal aims to "*protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss*." One key target is 15.2, which seeks to promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests, and substantially increase afforestation and reforestation globally, albeit by 2020.

Box 03: Key Commitments, Roadmaps, Initiatives by the Private Sector

Tropical Forest Alliance Agriculture Sector Roadmap to 1.5°C: A collaborative effort by major agro-commodity traders to implement strategies for deforestation and emission reductions, with a focus on key commodities like cattle, palm oil, and soy, demonstrating industry leadership in sustainability.

Cerrado Manifesto: Over 60 Brazilian NGOs' call to stop deforestation and vegetation loss in the Cerrado, supported by 23 global brands committed to sustainable commodity chains, highlighting the critical role of corporate responsibility in conservation efforts.

Mato Grosso PCI Programme/Strategy: A holistic approach to sustainable development in Mato Grosso, Brazil, balancing agricultural expansion, conservation, and socio-economic inclusion, showcasing a model for integrating environmental stewardship with economic growth.

Consumer Goods Forum Forest Positive Coalition: Develops and implements roadmaps for reducing deforestation in the production of palm oil, soy, beef, and packaging, emphasising supply chain management, stakeholder engagement, and transparency for forest-positive outcomes.

Zero Deforestation Agreements Colombia: Targets achieving zero net deforestation by 2030 in sectors such as beef and dairy, emphasising sustainable production and the protection of forests through collective action and commitment.

Amazon Soy Moratorium: A significant initiative by the soy industry to prevent the purchase of soy from lands deforested after 2006 in the Amazon, leading to widespread compliance and demonstrating that agricultural expansion can coexist with environmental conservation.

French and UK Soy Manifesto: These initiatives by France and the UK aim to eradicate deforestation and ecosystem conversion from their soy supply chains, with commitments to sustainable sourcing and updated action plans, reflecting a proactive approach to environmental stewardship.

Palm Oil Collaboration Group: Facilitates collaboration across the palm oil industry to advance the implementation of NDPE (No Deforestation, No Peat, No Exploitation) commitments, involving over 30 companies in efforts to promote sustainability and responsible supply chain management.

WBCSD Soft Commodities Forum: This forum targets sustainable soy production to prevent deforestation in the Brazilian Cerrado, bringing together agribusinesses and stakeholders for collective action, contributing to the conservation of this biodiversity hotspot.

Global Roundtable on Sustainable Beef: Aims to improve the sustainability of global beef production by engaging various stakeholders to develop and implement strategies to reduce the environmental impact of beef, including significant efforts to lower greenhouse gas emissions.

Annex 2 – Other Resources

This annex provides examples of tools and resources used to assess deforestation. Included are key Single Map Products, Deforestation Alert Systems, and Geospatial Information System (GIS) software.

It is important to note that this list is not exhaustive; instead, it serves as a sampling of the various technologies and methodologies currently used to better understand and combat deforestation.

Examples of important Single Map Products

Name	Short description	Focus area
	Global Dataset	
JRC 2020 Global forest cover See EU Observatory	• The European Commission Joint Research Centre has developed a global map of forests for 2020 by integrating global datasets on tree cover, tree height, land cover, and land use into a single harmonised, globally consistent representation. • This map hosted by the EU Observatory on deforestation and forest degradation, provides a detailed visualisation of the presence or absence of forests in 2020. • It adheres to the FAO definition of forest and aligns with the EUDR cut-off date. • The map is available at a high resolution of 10 meters. • Users can interact with this map online through the Google Earth Engine platform, and it is also downloadable in tiles. • A list of known issues with the map is readily accessible online.	Global
SBTN Natural Lands Map	• The Natural Lands Map, developed under the Science Based Targets Network (SBTN), is a collaborative effort by the World Resources Institute (WRI), World Wildlife Fund (WWF), and Systemiq. • It integrates both global and local data to label natural and non-natural land cover types, such as forests, short vegetation, wetlands, water, snow/ice, and bare land. • The map includes a feature for spatial prioritisation of natural land, designated as "core natural land," to guide protection efforts. • Companies involved in land-based production or sourcing can use this map to verify if their activities have led to land conversion since 2020. • It offers a resolution of 30 meters and aligns with the FAO definition of forest. • The map is accessible through a visual online interface and can also be explored via Google Earth Engine.	Global
GLAD/Hansen Tree Cover Loss	• Known as Hansen Global Forest Change 2000-2022, this dataset was developed through a collaborative creation between the GLAD laboratory at the University of Maryland and the World Resources Institute (WRI). • It annually updates global-scale forest loss data, utilising Landsat time-series imagery.	Global

	• The dataset is available at an approximate resolution of 30 meters. • Users can access the data through the Global Forest Watch (GFW) interface and various other visualisation tools. • The dataset includes acknowledgments of inconsistencies, such as challenges in distinguishing between tree plantations and natural forest cover, as well as representing complex mosaic landscapes.	
Tropical Tree Cover	• This dataset maps tree extent at a ten-meter scale and tree-cover at a half-hectare scale, enabling precise monitoring of trees in urban areas, agricultural lands, and both open canopy and dry forest ecosystems. • It covers an extensive area of 4.3 billion hectares across the global tropics. • The dataset employs unique definitions of a tree and tree cover, distinct from those used in the Hansen Tree Cover Loss dataset. • It does not differentiate between plantation trees and non-plantation trees. • The data is accessible via the Global Forest Watch interface.	Global
JRC Tropical Moist Forest	• This dataset maps tree extent at a ten-meter scale and tree-cover at a half-hectare scale, enabling precise monitoring of trees in urban areas, agricultural lands, and both open canopy and dry forest ecosystems. • It covers an extensive area of 4.3 billion hectares across the global tropics. • The dataset employs unique definitions of a tree and tree cover, distinct from those used in the Hansen Tree Cover Loss dataset. • It does not differentiate between plantation trees and non-plantation trees. • The data is accessible via the Global Forest Watch interface.	Global
Spatial Database of Planted trees	• Global Forest Watch has compiled a dataset using data sourced from national governments, non-governmental organisations, and independent researchers. • This dataset categorizes "planted trees," which include forest plantations of both native and introduced species established through deliberate human efforts such as planting or seeding. • It allows for the distinction between planted forests and tree crops from natural forests, facilitating independent monitoring of changes in these cultivated areas in contrast to global natural forest cover. • The dataset encompasses 173 million hectares of planted forest and 50 million hectares of agricultural trees, together accounting for approximately 82% of the world's total planted forest area. • This data is available as the "tree plantation" layer on the Global Forest Watch (GFW) interface. • The dataset is updated periodically.	Global

World Database on Protected Areas (WDPA)	• This database is recognised as the world's most comprehensive data collection on protected areas. • It is a collaborative effort between the UN Environment Programme and the International Union for Conservation of Nature (IUCN), managed by the UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC). The project involves partnerships with governments, non-governmental organizations, academia, and industry. • The database adheres to the IUCN's definition of a protected area, which is the primary criterion for including entries. • The data is accessible through an online visualisation tool and is available for free download.	Global

Examples of Deforestation Alert Systems

Name	Short description	Focus area
	Global Coverage	
GFW Integrated deforestation alerts	• This deforestation alert system operates at a 10m resolution, capable of detecting changes in primary forests, plantations, and younger forests. • It integrates alerts from the GLAD-L, GLAD-S2, and RADD systems into a single comprehensive layer.	Global
GLAD-L (Global Land Analysis and Discovery – Landsat)	• This deforestation alert system features a 30m resolution and updates every eight days. • It is designed to cover a broad range of landscapes, effectively detecting loss in any type of tree cover, including plantations.	Global
RADD (Radar for Detecting Deforestation)	• This deforestation alert system uses radar-based technology with a 10m resolution and is updated every six to twelve days. • It effectively penetrates cloud cover to detect changes in humid tropical primary forests.	Global
JICA-JAXA Forest Early Warning System in the Tropics	• This system monitors tropical forests across 78 countries, updating and releasing deforestation data every 1.5 months using JAXA's ALOS-2 imagery. • Data can be accessed through the web-based system JJ-FAST. • Access to the data is provided free of charge.	Global

Examples of Visualisation and Analytical Tools

Name	Short description	Focus area
	Global Coverage	
Global Forest Watch	• Global Forest Watch is an online platform that provides extensive data and global forest monitoring tools. • It is operated by the World Resources Institute (WRI) and collaborates with over 100 organisations, researchers, and companies worldwide. • The platform features a robust database and offers detailed analysis related to deforestation and the status of forests globally. • A freely accessible GIS visualisation tool is available, which includes various relevant data layers such as tree cover, tree cover loss, land use, and integrated deforestation alerts. • Building on the freely available data, Global Forest Watch Pro offers enhanced functionalities, including more detailed analyses and customizable dashboards.	Global
GeoRSPO	• This platform was developed through a collaboration between the World Resources Institute (WRI) and the Round Table on Responsible Soy (RSPO). • It showcases concession maps necessary for RSPO certification, detailing group and company names, plantation specifics, certification status, and geographical boundaries. • The concession data is compiled from various sources, including ACOP submissions, GIS updates, membership applications, and certification processes. • Users can download geospatial data in shapefile format, enabling further analysis and application. • The platform provides advanced statistical and geospatial analysis tools, featuring data layers on deforestation, tree cover, climate data, and satellite imagery, enhancing the depth of environmental monitoring. • Committed to transparency, the platform is continuously updated with new map layers and features to improve data accuracy and user experience. • Part of the initiative is the Greenhouse Gas Emissions Estimation System (SEEG) from the Climate Observatory, supported by a network of NGOs, universities, and technology startups. • Initially launched in Brazil through the Brazilian Annual Land Use and Land Cover Mapping Project, it has since expanded to cover most Latin American countries and Indonesia. • The objective is to democratise access to land use data to foster conservation and sustainable management of natural resources. • Publicly available documentation on the methodology is provided via the Algorithm Theoretical Basis Document (ATBD), ensuring openness and educational potential.	Global

MapBiomas Land Cover and Use	• This initiative is part of the Greenhouse Gas Emissions Estimation System (SEEG), which is managed by the Climate Observatory and supported by a network of NGOs, universities, and technology startups. • It began in Brazil with the Brazilian Annual Land Use and Land Cover Mapping Project and has since expanded to most Latin American countries as well as Indonesia. • The primary objective is to make land use knowledge readily accessible, supporting the conservation and sustainable management of natural resources. • Information on the methodology is publicly available and can be accessed through the Algorithm Theoretical Basis Document (ATBD).	Latin America, Central America, Asia
Nusantara Atlas	• This platform offers comprehensive monitoring of deforestation, fires, peatland degradation, and forest regeneration across Equatorial Asia. • It specifically focuses on the impacts of industries like palm oil, pulp-and-paper, mining, and timber as primary contributors to deforestation. • Utilising a variety of satellite data sources such as Planet-NICFI, Sentinel-2, Landsat, NOAA-20, S-NP, and MODIS, alongside deforestation alerts from RADD and GLAD, the platform ensures robust data coverage. • It delivers near-real-time alerts on deforestation events and fire hotspots, enhancing response capabilities. • The platform enables users to create dynamic time-lapse animations from satellite data and provides access to detailed cadastral information. • Access to this valuable resource is free and open to the public.	Asia

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List of Generic GIS Software

ArcGIS: A comprehensive GIS platform by Esri used to create, manage, analyse, and map all types of geospatial data.

QGIS: An open-source GIS software that offers an extensive range of tools for mapping and spatial analysis.

ArcView: This is an older GIS software product also produced by Esri, part of the ArcGIS suite.

Avenza: Known for its PDF Maps app, Avenza provides tools for working with geospatial PDFs on mobile devices.

Collector by ArcGIS: An Esri application designed for collecting and updating data directly into a GIS from the field.

MapInfo: A professional GIS software provided by Pitney Bowes, used for mapping and location analysis.

NEXT GIS: A full GIS software suite that includes a desktop application, web services, and mobile applications.

Orux Maps: A mobile app offering offline maps and some capabilities to work with vector data in a GIS-like environment.

R with spatial extensions: R is primarily a statistical tool, but with spatial extensions, it can perform complex geospatial data analysis akin to a GIS platform.

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Preferred by Nature is an international non-profit organisation working to support better land management and business practices that benefit people, nature and climate. We do this through a unique combination of sustainability certification services, projects supporting awareness raising, and capacity building.

With 30 years of experience, we have worked to develop practical solutions to drive positive impacts in production landscapes and supply chains in 100+ countries. We focus on land use, primarily through forest, agriculture and climate impact commodities, and related sectors such as tourism.

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