

EU FLEGT VPA PROGRAMME

STRENGTHENING THE CONTRIBUTIONS OF CIVIL SOCIETY ORGANIZATIONS AND COMMUNITIES TO INDEPENDENT FOREST MONITORING IN LIBERIA



Web-Based Forest Monitoring Tools: A Rapid Review

David Young, Technical Advisor

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Forest Monitors



Abbreviations

CEO	Collect Earth Online
CF	Community forest
CFMA	Community Forest Management Agreement
CIAT	International Centre for Tropical Agriculture
CS-IFM	Civil Society Independent Forest Monitors / monitoring
CSO	Civil society organisation
CSV	Comma-separated values, a spreadsheet format
DRC	Democratic Republic of the Congo
EOSDA	Earth Observing Systems Data Analytics
EPA	Environmental Protection Agency
ESA	European Space Agency
EU	European Union
EUDR	EU Deforestation Regulation
EUTR	EU Timber Regulation
FAO	Food and Agriculture Organisation of the United Nations
FAQ	Frequently asked questions
FCI	Foundation for Community Initiatives
FDA	Forestry Development Authority
FLEGT	Forest Law Enforcement Governance and Trade
FMC	Forest Management Contract (areas)
GFW	Global Forest Watch
GIS	Geographical information systems
GLAD-L	Global land analysis and discovery – Landsat data
GLAD-S2	Global land analysis and discovery – Sentinel 2 data
GPS	Geographical positioning system
IDEF	Initiatives for Community Development and Forest Conservation, Ivory Coast
IEDM	Integrated Enterprise Deforestation Monitoring
IFM	Independent Forest Monitors / monitoring
IFM CM	IFM Coordination Mechanism
JRC	Joint Research Centre
KLC	Key landscapes for conservation and development
KML	Keyhole markup language, a GIS file format
LISGIS	Liberia Institute of Statistics and GIS
LLA	Liberia Land Authority
LVD	Legality Verification Department of the FDA

MME	Ministry of Mines and Energy
NASA	National Aeronautics and Space Administration, US
NGO	Non-governmental organisation
NICFI	Norway International Climate and Forests Initiative
NUCFMB	National Union of Community Forest Management Bodies
OTP	Open Timber Portal
P/PAs	Proposed and gazetted Protected Areas
PAPFOR	Programme d'Appui à la Préservation des Ecosystèmes Forestiers en Afrique de l'Ouest (Support programme for the preservation of forest ecosystems in West Africa), an EU programme
PDF	Portable document format, a document format
PUP	Private Use Permits
RADD	Radar for detecting deforestation
RFUK	Rainforest Foundation UK
SDI	Sustainable Development Institute
SMART	Spatial Monitoring and Reporting Tool
TIFF	Tag image file format, a digital image format
TLAS	Timber Legality Assurance System
TSC	Timber Sales Contract
US	United States of America
USAID	US Agency for International Development
VPA	Voluntary Partnership Agreement
WRI	World Resources Institute
WWF	World Wide Fund for Nature (internationally) / World Wildlife Fund (North America)

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Summary: Key messages

- **Seventeen** tools for potentially generating alerts about deforestation based on automatic interpretation of satellite images were identified and examined. Of these, **four** were found to be appropriate for the CS-IFM context: Global Forest Watch (GFW)'s GLAD Alerts, VisioTerra's FLEGTWatch and Rainforest Foundation UK (RFUK)'s ForestEye.
- [GFW Alerts](#) are likely to be the easiest tool for a small NGO with limited funds and minimal technical skills although some mapping skills are useful to manage GIS downloads. It is easy to receive alerts and can be used fully independently, without cost or affiliation.
- [ForestEye](#) has the advantage of integration with [ForestLink](#), a tool previously piloted by CS-IFM and used for collecting alerts from the field level. It is explicitly built for NGO and community use and comes with a high level of support from RFUK. This also, however, makes it dependent on an external organisation and this may cost up to US\$10,000 per year.
- [FLEGTWatch](#) and ForestEye both depend on an affiliation with their respective providers, and this may incur a cost. In the past, CS-IFM did not see FLEGTWatch as user-friendly and is limited to a dozen areas of interest (mainly FMCs or CFs) selected by CS-IFM.
- [Forest Foresight](#) offers an AI-driven technology for predicting where deforestation is likely to occur, but it to requires formal affiliation with its provider and is not currently available in Liberia. So far it has generally been adopted by state wildlife authorities.
- The study also led to questions about the value of satellite-driven alerts compared to those originating from the field, including from community members. With limited human and financial resources and the short time-frame of many grants available to CS-IFM, **it is recommended** that the NGO continues to focus on improving systems of two-way communication with communities rather than emphasise IFM investigations based on satellite data. Mapping skills, however, could be developed in order to improve the in-house capability to include maps in IFM reports. This would also strengthen the foundation for any future move to embrace alerts derived from satellite imagery.
- The 13 other tools examined were [AidEnvironment](#), [Novasphere](#), the [EU Observatory](#), [Open Foris](#), [Collect Earth Online](#), [Planet Labs](#), [Terra-i](#), [Amazon Mining Watch](#), [Earth Genome](#), [Earthworm](#), [Farmforce](#), [Earth Observing Systems Data Analytics](#) (EOSDA), and [ICEYE](#). These were excluded from deeper study for three common reasons: they do not offer automatic satellite alerts, they depend on a level of technological skill, or they are orientated more towards commercial forest commodity traders.
- The results are summarised in the table below, based, where information was available, on the assessment criteria listed in Annex 1.



Early days of independent forest monitoring in Liberia: timber logged by the notorious Oriental Timber Company, 2004

Comparative summary of satellite-image forest monitoring tools

No.	Tool and provider	Ability to send deforestation alerts	Ease of use	Adaptability to specific needs	Cost, or independent use without affiliation	Downloadable spatial data
Examined in detail						
1.	Integrated alerts <i>GFW</i>	Yes – generates summary emails and coordinates accessible	Moderate – some mapping knowledge helps	High – can focus on any number of AOIs, can lead to large number of alerts	Yes – public access, no affiliation needed	Yes – deforestation patches can be individually downloaded
2.	ForestEye <i>RFUK</i>	No – automatic email alerts planned but not yet live	Positive – no install or coding needed; low-bandwidth optimised	Medium – no upload of own AOIs yet; Congo Basin & Amazon only	Yes – open access, no affiliation needed	No – cannot export to GIS; web visualisation only
3.	FLEGTWatch <i>VisioTerra</i>	Yes – generates emails with coordinates	Moderate – French-speaking support; some technical literacy needed	Medium – currently limited to a dozen AOIs	Partially – registration required; costs may be incurred in future	Limited – requires a few technical steps
4.	Forest Foresight <i>WWF</i>	Yes – generates automated alerts to institutional partners	Moderate – dashboard requires no coding but access is partnership-based	Medium – can serve specific needs but agreed through partnership	No – partnership with WWF-NL required, which depends on their funding	Limited – multiple GIS-outputs may be possible but requires coding
Examined in summary						
5.	Real-time Deforestation Monitoring <i>AidEnvironment</i>	No – does not automatically send alert emails	Difficult – likely to require close technical collaboration	Medium – can serve highly specific needs but agreed through partnership	No – partnership with AidEnvironment required, which depends on their funding	Likely – as part of partnership agreement
6.	MRV Monitoring <i>Novasphere</i>	No – does not automatically send alert emails	Difficult – likely to require close technical collaboration	Low – limited to joining existing arrangement with GoL	No – approval from GoL likely requirement	Likely – as part of partnership agreement
7.	EU Forest Observatory <i>EU JRC</i>	Yes – sends alerts, mainly EU-focused; global coverage limited	Moderate – web interface, user-friendly but geared toward EU datasets	Low to medium – adaptation for Liberia limited	Partially – some features EU-focused; public access possible	Yes – spatial data available in GIS-compatible formats
8.	Open Foris <i>FAO</i>	No – does not automatically send alert emails unless coded to do so	Difficult – likely to require technical coding knowledge	High – very adaptable to create custom datasets and analysis	Yes – open access; no affiliation needed	Limited – multiple GIS-outputs possible but requires coding

Web-Based Forest Monitoring Tools

No.	Tool and provider	Ability to send deforestation alerts	Ease of use	Adaptability to specific needs	Cost, or independent use without affiliation	Downloadable spatial data
9.	Collect Earth Online <i>NASA & USAID</i>	No – does not automatically send alert emails unless coded to do so	Difficult – likely to require technical coding knowledge	High – very adaptable to create custom datasets and analysis	Yes – open access; no affiliation needed	Limited – multiple GIS-outputs possible but requires coding
10.	PlanetScope <i>PlanetLabs</i>	Yes – can send alerts if commissioned to do so	Difficult – relies on a service-provider	High – highly specific needs agreed through contract	No – commercial service likely to be expensive	High – highly specific needs agreed through contract
11.	Terra-i <i>CIAT et al</i>	No – mainly operates for Latin America	Difficult – possibly no longer operating	Low – operates only for specific projects	Partially – needs agreement through partnership	Unclear from available information
12.	Track mining in the rainforest <i>Amazon mining watch</i>	No – does not automatically send alert emails	Moderate – easy access to online map but limited functionality	Low – produces predetermined low-resolution online maps	Yes – open access; no affiliation needed; West Africa data in future	Limited – requires technical coding knowledge
13.	Earth Index <i>Earth Genome</i>	No – does not automatically send alert emails	Difficult – machine learning tool requires training	High – will generate highly specific maps once trained	Partially – needs agreement through partnership	Limited – requires technical coding knowledge
10.a	Starling <i>Earthworm</i>	Yes – can send alerts if commissioned to do so	Difficult – relies on a service-provider	High – highly specific needs agreed through contract	No – commercial service likely to be expensive	High – highly specific needs agreed through contract
10.b	Compliance deforestation monitoring <i>Farmforce</i>	Yes – can send alerts if commissioned to do so	Difficult – relies on a service-provider	High – highly specific needs agreed through contract	No – commercial service likely to be expensive	High – highly specific needs agreed through contract
10.c	Sustainable forestry solutions <i>EOSDA</i>	Yes – can send alerts if commissioned to do so	Difficult – relies on a service-provider	High – highly specific needs agreed through contract	No – commercial service likely to be expensive	High – highly specific needs agreed through contract
10.d	Synthetic Aperture Radar <i>ICEYE</i>	Yes – can send alerts if commissioned to do so	Difficult – relies on a service-provider	High – highly specific needs agreed through contract	No – commercial service likely to be expensive	High – highly specific needs agreed through contract

Purpose and methodology

The objective of this study is to *identify web- and/or smartphone-based technologies that are best suited to CS-IFM in Liberia in terms of (a) alerting forest monitors to suspected areas of illegal logging or abuse of community rights and (b) providing a platform for international dissemination of IFM reports*. The full terms of reference are in Annex 2.

The research assessed 17 web-based tools that potentially provide alerts about deforestation that might point an IFM team to investigation a particular locality. Of these, 13 were deemed inappropriate (see ‘Others considered’, page 16) and four were examined in depth. All four of these have a smartphone app to enable use in the field.

The study aimed to complement a parallel assessment, *Lines of Communication*, the objective of which was “to analyse existing communication channels between forest communities and national CSOs and recommend practical ways to improve timely, reliable, and inclusive information sharing for IFM and advocacy purposes”. The research into web-based tools was postponed from December 2025 to May 2026 due to delays in recruiting a researcher for *Lines of Communication*. One joint interview by both reviewers was conducted as the tool under consideration – RFUK’s ForestLink and ForestEye serves both purposes. In May 2026 the research was notified about a further tool, WWF’s Forest Foresight, so the report was updated to include this.

The research also assessed two platforms or channels for dissemination IFM reports: LoggingOff.info and the Open Timber Portal.

The research was largely based on the study of websites and supporting documentation. In addition, interviews were conducted with six Liberian NGO representatives involved in IFM, including three senior staff in CS-IFM; one Liberian and one external expert and representatives from two providers of satellite-based deforestation detection tools. It also included email exchanges with the providers of some of the tools.

Findings: Web-based tools

Overall observations

In addition to the assessment of specific web-based forest monitoring tools that form the major part of this report, some overall observations were made during the research, as follows.

Satellite image interpretation has the potential to provide a powerful tool for ‘top-down’ forest monitoring, that is the generation of alerts based on the remote detection of patches of deforestation. This is the opposite of, and complements, field-based alerts mechanisms such as those reviewed in the forthcoming *Lines of Communication* study. Satellite alerts are blind to the reason for any deforestation detected, and are therefore helpful in providing objective data.

To date field-based alerts have been the main source of information to CS-IFM and other members of Liberia’s IFM Coordination Mechanism (IFM CM).¹ These have the value of having significant context to offer clues on *why* the deforestation happened and are self-selecting in that the source of the alert is unlikely to incriminate themselves. Legitimate, trivial, or natural deforestation is unlikely to be reported, although these terms may be contested: what one person feels they have right to do (or can get away with) may not be what the legal framework permits. One respondent suggested “*we need to be wary of relying only on alerts from community members as they may only denounce what they don’t agree with*”.

Satellite alerts also offer an important channel for CS-IFM to extend its work to cover forest-risk commodities in addition to its traditional focus on illegal logging as instigated by the Voluntary Partnership

Agreement (VPA), ratified in 2012, the same year that CS-IFM was first formed.² Whereas the core mission of some IFM CM members is community rights, and that of some other Liberian NGOs is more conservationist, CS-IFM avoids any such stance and can “*can cut across the spectrum... And new threats, from cocoa, mining etc impact on the environment as well as on people*”. It’s therefore important that CS-IFM seeks a range of sources of alerts, not necessarily limited to those from its partners in the IFM CM.

The biggest challenge with satellite systems, however, is that they generate thousands of alerts, far too many for all to be investigated through fieldwork. One respondent commented “*satellite images are helpful as communities may not have knowledge of illegal operations in the forest*” whilst another said “*using satellite data to detect deforestation is also useful, but we can’t study the maps every day – we need an alert system*” that meets our needs and the time we have available.

As another respondent said, “*with satellite images, we need to keep it simple. If tools are too complicated they will not be used*”, and this study has not been able to identify a satellite system that is accessible enough to offer a clear route through this dilemma. Furthermore, current human resources in CS-IFM, in terms of both skills and time available, have not to date been able to prioritise the use of tools like this. Indeed, neither of two previous pilots to make greater use of technology in IFM were not sustained: the satellite tool [FLEGTWatch](#) lacked sufficient support from the service providers and the field alerts system [ForestLink](#) failed to generate any useable alerts. As a result no alert from either system ever led to an IFM field investigation.

In conclusion, therefore, in the context of limited resources, both funds and staff, CS-IFM may be better-placed to build on existing lines of communication, in both directions, between forest communities and the NGO(s) at the centre. A respondent summarised “*with the satellite images you still need the resources to do to ground verification, so it’s more of an optional extra*”. That said, basic GIS mapping skills could, however, be developed in order to improve the in-house capability to include maps in IFM reports. This would also strengthen the foundation for any future move to embrace alerts derived from satellite imagery.

Web-based forest monitoring tools with potential

Global Forest Watch (GFW) Alerts

[Global Forest Watch](#), “*Forest monitoring designed for action*”, is the world’s most widely-used mapping tool for forest cover and forest cover change. It is operated by the World Resources Institute ([WRI](#)): “*as an independent research organization, we leverage our data, expertise and global reach to influence policy and catalyse change across systems like food, land and water; energy; and cities.*” GFW has been operating for over a decade and has a strong reputation for quality, continuous improvement, and durability.

Step-by-step guide to receiving GFW Integrated Alerts

You can receive alerts about forest change by subscribing on the GFW platform:

- ✓ Create a [MyGFW account](#).
- ✓ Open the [Interactive Map](#).
- ✓ Select or upload **an AOI** — either by clicking on existing regions (e.g. County, FMC) or drawing/uploading your own polygon boundary. To see FMCs you may need to click on the ‘Land Use’ button and select ‘Logging Concessions’.
- ✓ Click **Subscribe** and choose GLAD/integrated alerts to receive **email notifications** whenever new alerts appear in that AOI.

You can also use the [Forest Watcher mobile app](#) to download alerts and forest change data for offline use — valuable in the field or without internet access.

Box 1: Steps to subscribing to regular alerts of deforestation from Global Forest Watch

One of GFW's services is [GFW Alerts](#), which can be customised for a particular area of interest (see Box 1). This can be a whole country or an individual user-defined area such as a single forest. GFW can then generate email alerts when forest cover changes, i.e. when deforestation is detected. This alert system is free to use and is controlled through a simple login process. Alerts can be emailed as soon as forest change is detected or as a monthly summary.

The newest iteration of GFW Alerts integrates three data sources, known as [GLAD-L](#), [GLAD-S2](#) and [RADD](#).³ It monitors the same location every few days and can detect changes down to 11 metre accuracy.⁴ This can mean, however, a very large number of alerts. If the whole of Liberia is selected as an AOI, almost 200,000 alerts *per week* can be generated.⁵ It is therefore recommended to customise the alerts requests by upload specific 'areas of interest' such as forest designations (FMCs, CFs, P/PAs) but this means that any deforestation outside these areas will not generate an email an alert.

Figure 1 shows there were over 2,064 alerts, totalling 25ha, in the one month in one section of one concession in Liberia, FMC F (Euro Logging). Of these, 5 were "*highest confidence detection by multiple alert systems*" and a further 47 were "*high confidence detection by a single alert system*".⁶

Basic information about GFW Alerts, such as the information from the three satellite sources to assess the confidence level, and the coordinates for each alert are included in the alert emails so can then be added to an offline GIS project or a smartphone map. Each alerts represents a square approximately 11x11 metres so it is necessary to look at clusters of them in order to assess the area of any deforestation. This, for example, enabled the alerts shown in the insert in Figure 1 to be cross-referenced to OpenStreetMap to ascertain this deforestation is on the outskirts of Belleh Yallah Town.

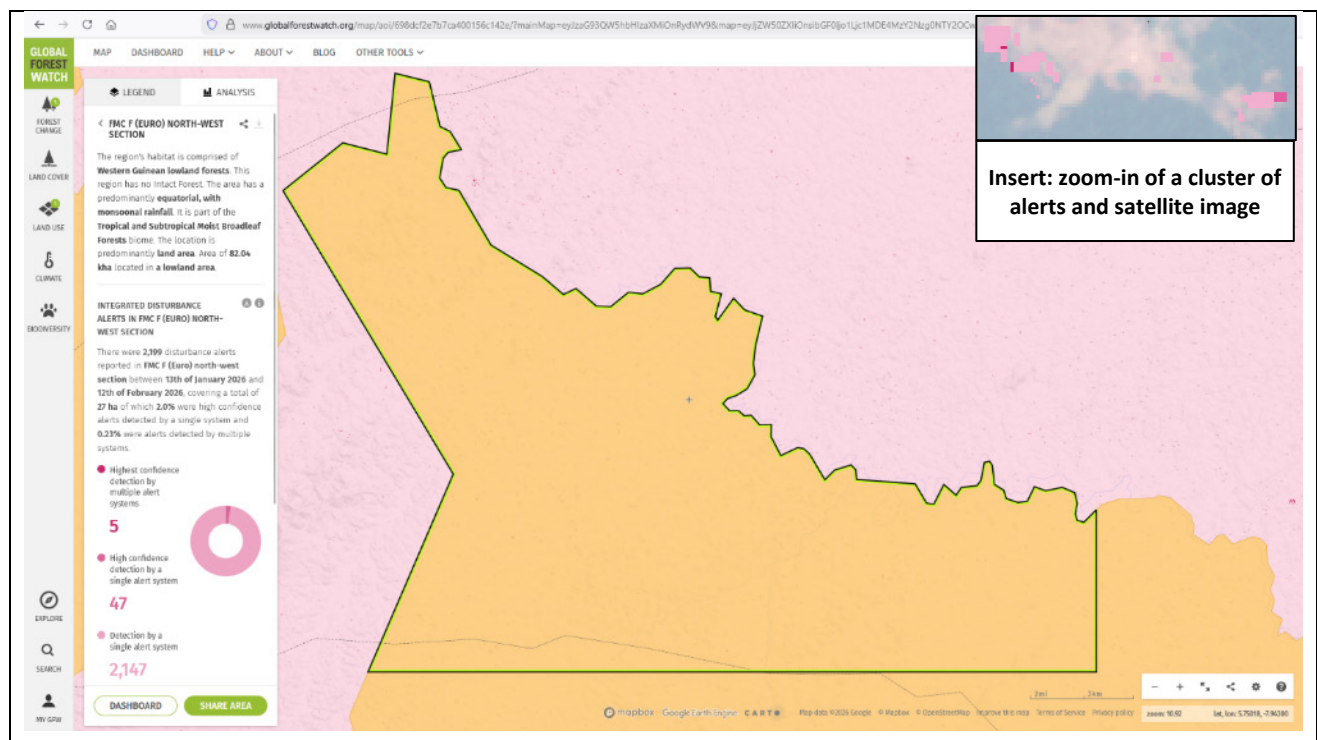
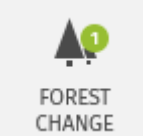
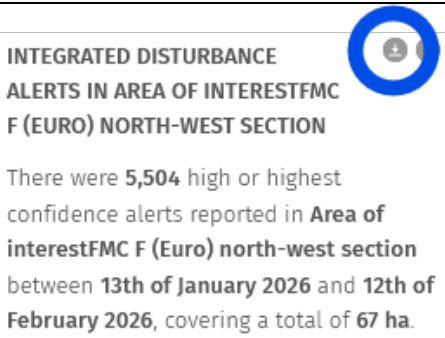


Figure 1: Screenshot of GFW alerts map for a section of FMC F (Euro), 13 January to 12 February 2026.

This can be done by zooming into the online map and selecting 'Google Satellite Imagery' from the options at the bottom of the Legend box, or by recreating them in an offline GIS system (see Box 2).

Step-by-step guide to downloading GFW Integrated Alerts You can download an Excel spreadsheet (.csv) that lists the coordinates of every alert:	
☒ Select an AOI. This can be one that you pre-set (like the north west part of FMC C, as in Figure 1) or by zooming in to a County or a District. Right click in the area and click 'Analyse'.	
☒ In the Legend box make sure 'Global integrated disturbance alerts' is listed. If not, click on the 'Forest Change' button and add it.	
☒ In the Legend box select the dates you want to examine.	Displaying alerts in all vegetation  From 13 JAN 2026 to 12 FEB 2026
☒ In the Analysis box (beside the Legend box) you can read a summary of the alerts for your selected AOI and timeframe. There is a small download button (circled). In this example there will be 5,504 lines in the spreadsheet. The coordinates of all these can be imported into GIS software, using 'Add Vector Layer' and then select a CSV file. It may require some trial and error with formatting the csv spreadsheet.	

Box 2: Step to subscribing to regular alerts of deforestation from Global Forest Watch

The GFW online map also provides a visual representation of *annual* tree loss. The most recent available data is for 2024, when this section of FMC F lost 88ha. The 25ha of alerts in one month (noted above) and the 88ha of tree cover lost in a year should not be compared as GFW checks the validity of alerts over many months before calculating tree loss.

There are a number of more sophisticated ways to download or view GFW Alerts data in local GIS software,⁷ but these all require some experience with [Google Earth Engine](#) and/or GIS systems:

- [GLAD-L](#) alert pixels and date layers can be downloaded directly from University of Maryland [dataset pages](#) and [GLAD-S2](#) from associated Google Earth Engine page, but the later does not seem to be available for Liberia. To download a [GLAD-L](#) layer click on the *Download* button on the top-right of the global map screen and then click on the tiles that cover Liberia (020W_00N_10W_10N and 010W_00N_00E_10N).
- GFW Integrated deforestation alerts (GLAD-L, GLAD-S2 and RADD combined) can be downloaded as coded static image files known as geo-tiffs. This involves visiting the [index map](#) and clicking on the relevant parts of the map (tiles 10N_020W and 10N_010W cover Liberia). The box that opens for each includes a url for the download, which can be copy-pasted into a new webpage. The resulting tif file is, however, coded in a specific way, explained in a [GFW help page](#), and may not be easy to use in a GIS software unless this coding is fully understood.

ForestEye

The [ForestEye](#) web interface is a “tool designed to provide precise, local analysis of deforestation... to transform the way deforestation is monitored, understood and addressed at the grassroots level”. It has been developed by Rainforest Foundation UK (RFUK), alongside a major re-build of its field-level alerts tool [Forestlink](#). Central to RFUK’s approach “is designed for micro-level analysis on handheld devices. Users can zoom in on specific areas to monitor deforestation in near-real-time, making it an invaluable tool for local forest monitors and communities who need to protect their immediate surroundings.”

The [ForestEye map](#) uses data from European Space Agency (ESA) satellites, mainly Sentinel 1 radar, which can ‘see’ through clouds (the same as GFW RADD alerts) but requires more analytical tools, supported by Sentinel 2 for optical imagery (the same as GFW GLAD-S2 alerts), which produces visible imagery but suffers from cloud cover obscuring it. The European Commission Joint Research Centre (JRC)’s generates the Tropical Moist Forest dataset from Sentinel 2 data, from which ForestEye generates yearly forest change data. Alongside this it uses RADD data from Sentinel 1 to publish 10-metre resolution forest canopy disturbance data every 8 days (see Figure 2, and note the zoomed-in 2km scale).

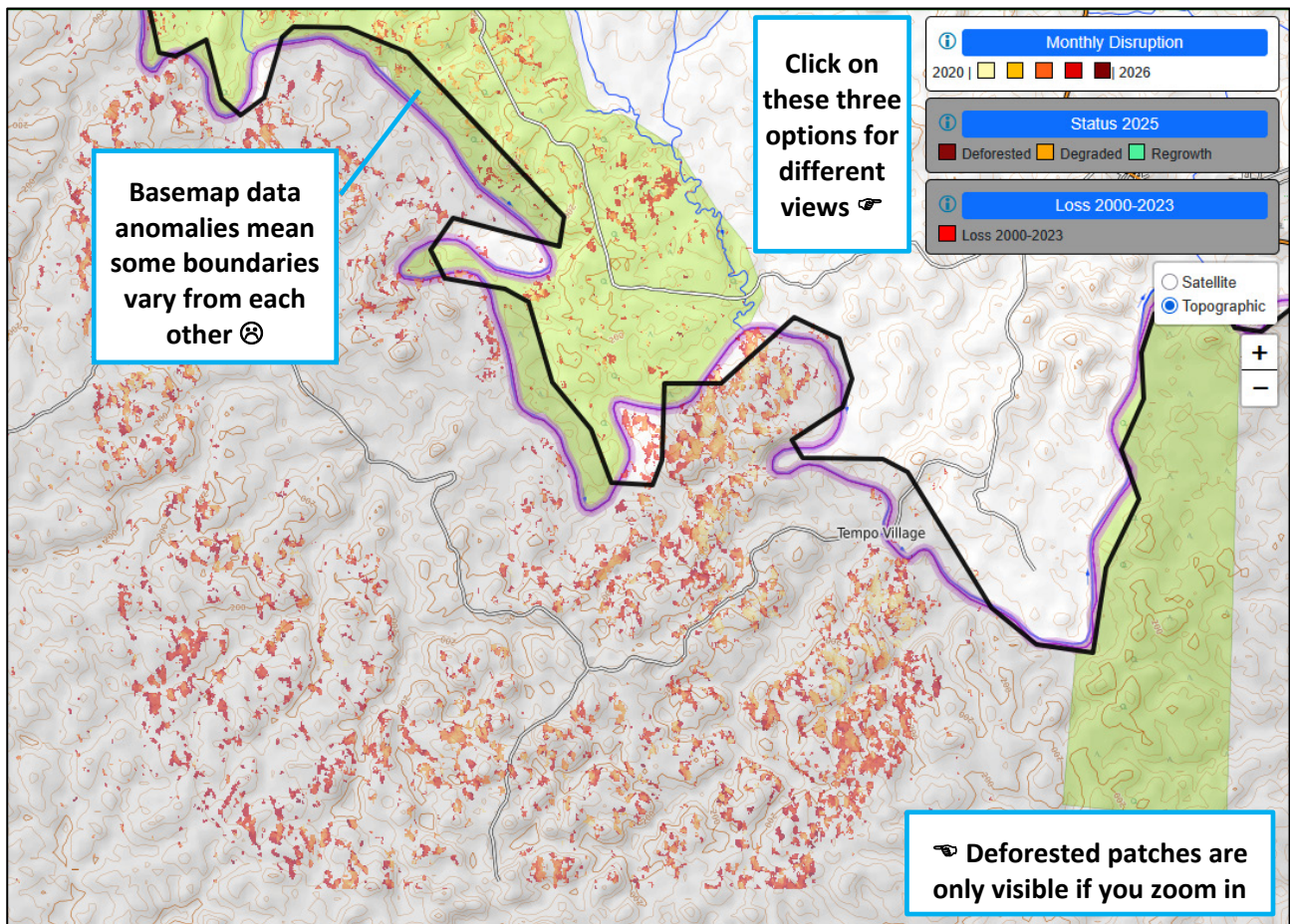


Figure 2: Screenshot of ForestEye map of deforestation on the Liberia-Côte d'Ivoire border 2020-2026

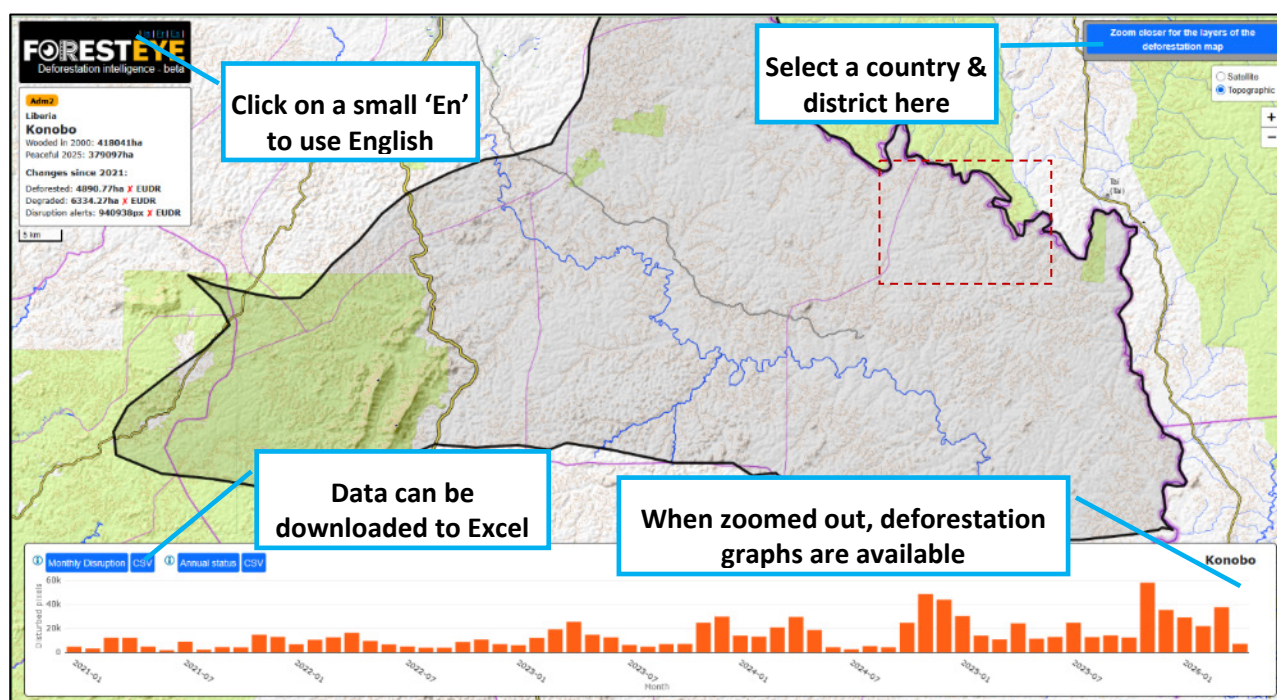


Figure 3: Screenshot of ForestEye's district level map, including monthly deforestation chart

RFUK offers ForestEye free of charge, in contrast to ForestLink which requires an annual license and support fee. RFUK do not focus on Liberia so any requests for customisation of ForestEye may be subject to its discretion. It does not offer any provision of individual AOIs that a user might provide, and has not, to date included any forest designations such as community forests, protected areas or logging concession maps. Like GFW it has uploaded a 66-district dataset. This allows a chart of monthly deforestation over the last five years, and one of deforestation, degradation and regrowth since 1990, to be generated for each district. The monthly chart for (old) Konobo District is shown in Figure 3 (for reference, the box in the centre-left part of this map is the same location as Figure 2). District level maps also provide a quick summary of the total area of forest in 2000 and 2025, and the areas deforested and degraded since 2021. This information includes a tag “✗ EUDR” to warn of likely non-compliance with the EU Deforestation Regulation.

ForestEye is primarily a tool for presenting and visualising data on a website, and RFUK [state](#) “ForestEye is designed for micro-level analysis on handheld devices”. District-level data from the graphs at the bottom of the screen can be downloaded in Excel format but it does not, however, enable downloads of shapefiles for further analysis offline.

FLEGTWatch Events

[FLEGTWatch](#), “monitoring deforestation in Central and West Africa” is, in its own words, a “service for automatic detection of forest cover changes... notification to observers and support to in-situ monitoring”. It was created in 2018 by VisioTerra, a French private company providing a range of earth observation services. It offers private service-provision contracts and has also been funded by the EU for projects such as the [PAPFOR project](#).

Like RFUK, VisioTerra uses ESA Sentinel 1 and Sentinel 2 satellite data. It analyses changes between images to create alerts known as ‘deforestation events’.

CS-IFM were introduced to FLEGTWatch in 2020, when Tropenbos funded VisioTerra to extend its coverage to Liberia. At the time FLEGTWatch had eleven NGO partners in West and Central Africa. When interviewed for this study, VisioTerra’s Director, Serge Riazanoff, confirmed, however, that there are no current contracts with any NGOs but the data is still being captured and those with a login can [view](#) the deforestation events.

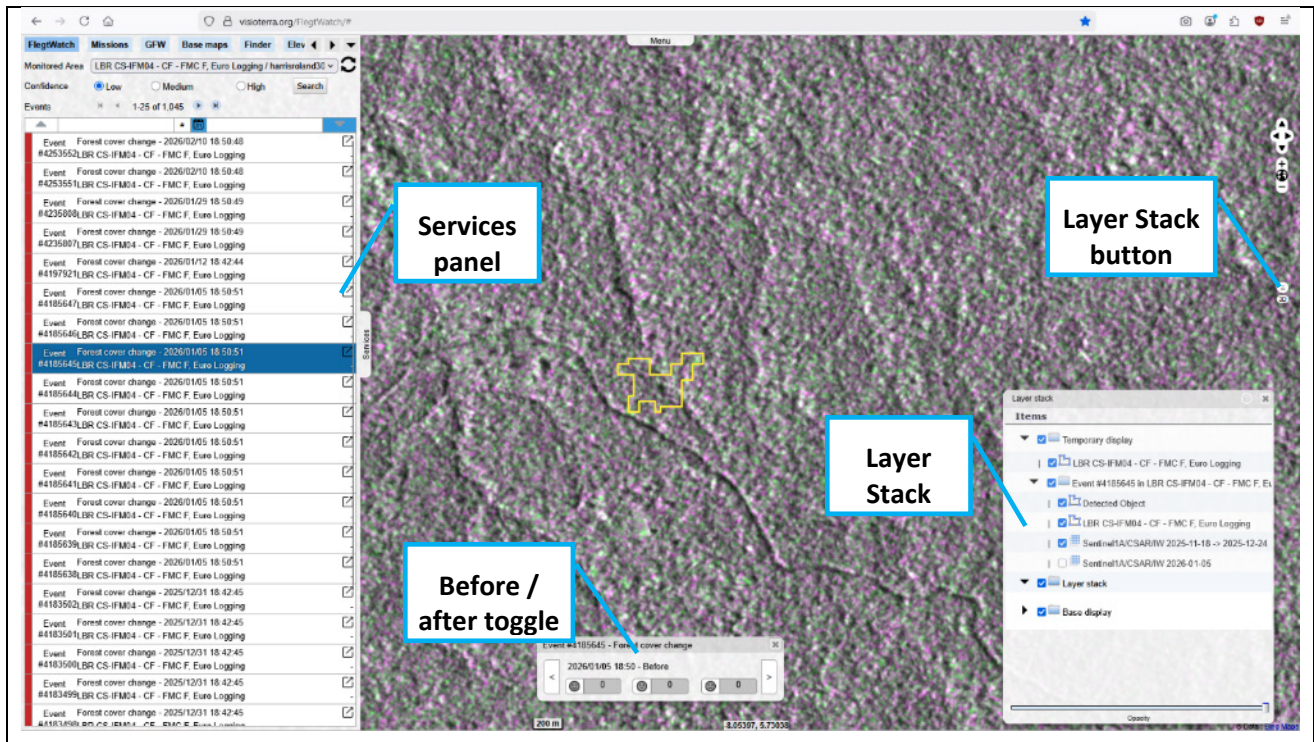


Figure 4: Screenshot of a FLEGTWatch deforestation event in FMC F (Euro) detected on 5 January 2026.

CS-IFM were required to give shapefiles for AOIs to VisioTerra and selected the following logging areas: FMC A (Alpha); FMC K (ICC); FMC I (Geblo); FMC F (Euro Logging); CFMA Beyan Poye; CFMA Matro; CFMA Bluyeama; CFMA Sewacajua; and CFMA Ziadue Teekpah. Subsequently VisioTerra have added three 'Key Landscapes for Conservation and Development' (KLCs) in Liberia for the EU [PAPFOR project](#): Mount Nimba, Gola, and Foyah. Hence it is no longer strictly a 'FLEGT' initiative but seeks to expand its remit to other forests at risk.

Deforestation events within a user's AOI can be emailed on a weekly basis. The email provides links to the locations within the online FLEGTWatch map (see Figure 4). From there it is possible to download the shapefile (see Box 3) and incorporate it into an offline GIS system (or online Google Earth) and measure its area. This also allows a user to locate the deforestation in terms of its proximity to towns, roads etc that do not appear on the FLEGTWatch map.

Step-by-step guide to obtaining FLEGTWatch alerts

- ✓ You **need an authorized account** to access FLEGTWatch, so contact VisioTerra, the Liberia national officer (Roland) or project manager (David) to create a [FLEGTWatch](#) login.
- ✓ **Agree on your AOIs** (unless a fee is paid, VisioTerra will limit restrict the total number of AOIs as it can't provide large data-processing services free of charge).
- ✓ Wait for the deforestation events emails, and click on the one of interest. Events can also be viewed from the **Services panel** to the left of the [FLEGTWatch](#) map.
- ✓ The map will zoom to the selected event (the background is typically a visualisation of radar data and is difficult to interpret, but this can be replaced with an [OpenStreetMap](#) background). Open the **Layer Stack** window from the button on the right of the [FLEGTWatch](#) map.
- ✓ Right-click on the line in the Layer Stack that represents the event, and select '**Export**' then 'as kml'. The saved kml file can then be opened in GIS or Google Earth software.

Box 3: Steps to obtaining deforestation events data from FLEGTWatch

In the example in Figure 4 the detected deforestation covers 13 hectares but the panel on the left indicates there is only ‘low confidence’ that it is in fact deforestation. VisioTerra also produced an Android App for field use, and an accompanying [training video](#). According to the video, this enables integration of video, audio, photographs, notes and GPS traces from an IFM field mission into the FLEGTWatch map. It also enables the user to draw AOIs on a map rather than upload GIS shapefiles.

Despite encouraging interaction with the staff of VisioTerra for this study there is no evidence of NGOs in any country using FLEGTWatch since 2020 and the interaction did not touch on the costs of renewing active support or significantly expanding the AOIs. There is therefore the risk that VisioTerra close the platform at any time. Short of this, there is also the risk it does not update it, for example with new website or image capture and analysis technology.

The past experience of CS-IFM also raises questions about its ease of use or added value to an already busy team. There were no occasions when a FLEGTWatch event led to an IFM field investigation. Respondent’s remarks included:

- I attended the training on FLEGTWatch but the trainers were hard to understand and I have not used it since.
- We struggled to understand FLEGTWatch; more training was needed.
- FLEGTWatch was limited to certain FMCs and CFs but we need alerts for the whole country.
- FLEGTWatch was difficult because VisioTerra was unresponsive and CS-IFM skillset and financial situation was too weak at the time.

These comments suggest a dedicated technical officer who has time to invest in FLEGTWatch, and perhaps its phone app in order that it becomes useful to IFM work on Liberia.

Forest Foresight

[Forest Foresight](#) has been developed by the Netherlands team of the World Wide Fund for Nature (WWF) since 2020. According to its [prospectus](#), it is “an innovative AI-driven technology for preventing illegal deforestation”. By using AI, this system presents a unique approach in that it will *predict* where deforestation is likely to occur (See Figure 5).

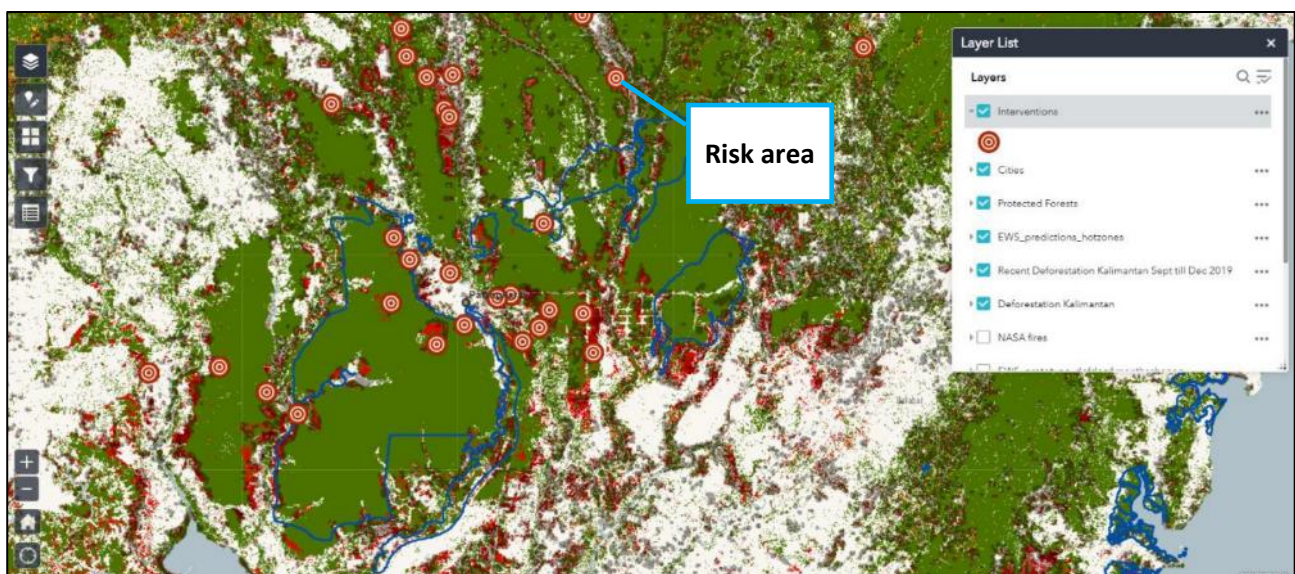


Figure 5: WWF [impression](#) of Forest Foresight dashboard, highlighting at-risk areas in Kalimantan, Indonesia

Forest risk maps are generated from RADD and Sentinel 1 satellite imagery, combined with additional data such as topology, population density, proximity to new roads or increased human activity, and uses machine learning techniques to “predict forest loss up to six months in advance, with 80% accuracy”. Automated

alerts are then generated and WWF expect users to be able to define their own geographic scope through [customised](#) AOIs. Other than web-based visualisation it's not clear whether this information can then be downloaded for incorporation into an offline GIS system.

The tool has been [piloted](#) by local or national governments in Peru, Bolivia, Colombia, Gabon, Indonesia and Laos, within their existing monitoring systems. In addition, WWF [says](#) it plans to “bring [Forest Foresight] to indigenous and local communities whose livelihood directly depends on healthy forests”. The [machine learning model](#) covers the entire pantropical belt, potentially making it widely adaptable and applicable. WWF is seeking funds to expand it, which means its availability in Liberia will depend on funders wanting to target this part of the world. It would appear that WWF does not consider West Africa as one of its [priority deforestation fronts](#).

Others considered

The initial search for online tools identified 13 others, listed below.

1. [AidEnvironment](#) is a European NGO that collaborates with others such as WWF, Greenpeace and Mighty Earth, mostly in Brazil and Southeast Asia West Africa, but also in Côte d'Ivoire and Cameroun. It makes use of platforms like GFW and other publicly available data. Its specialism is in supply chain analysis alongside satellite image interpretation, to link it to corporate activity in order to hold companies to account. It mainly **develops its own sector reports** rather than providing data to other NGOs.
2. [Novasphere](#) provides greenhouse gas emissions monitoring, reporting and verification (MRV) [support](#) to five government agencies: FDA, EPA, LLA, MME and LISGIS. The focus is on proposed and designated protected areas through a three-pronged approach: (i) satellite imagery to detect land use change; (ii) drones for local remote monitoring; and (iii) ground-truthing, leading to enforcement action if necessary. **NGOs do not have access to this technology.**
3. The [EU Forest Observatory](#), operated by EU JRC is intended to be an authoritative source of forest cover data to inform the EUDR. It therefore offers a [global forest map](#) for 2020 (the cut-off date for EUDR) tiles of which can be [downloaded](#), and a [forest cover change](#) map for 2016 to 2023. **It does not offer personalised or automatic satellite alerts for specific areas.** A helpful FAQs document has been [published](#) by the Austrian Chambers of Commerce, a reflection of its value to EUDR compliance by EU importers.
4. [Open Foris](#), operated by FAO, is “a set of free and open-source software platforms”, but only offers **automatic alerts for specific areas if the user builds the system** for doing this. It comprises [ten tools](#) covering field data collection, visual interpretation, data management, geospatial analysis and integrated solutions & risk assessment. It is highly adaptable but requires skills to manage spatial, survey, and other data design, collection, analysis and publication tools. It is best suited to sophisticated integration of map and data systems.
5. [Collect Earth Online](#) (CEO), operated by NASA & USAID, is an “open-source system for viewing and interpreting high-resolution satellite imagery” so **does not of itself offer automatic satellite alerts**. It is one of the ten tools available through Open Foris but, like this tool, relies on the skills to apply computer code and manage datasets. A Liberian GIS expert with a knowledge of CEO has offered an introductory presentation to NGOs to provide a basic understanding of CEO and the scripts to help forest monitoring in Liberia.
6. [Planet Labs](#) is a private company with its own [PlanetScope](#) set of some 200 satellites and aims to provide high resolution (3.7m) daily global coverage. Until April 2025 it had a partnership with the Norway International Climate and Forests Initiative (NICFI) enabling it to offer [coverage of 64 tropical forest countries](#) free of charge. The NICFI scheme also enable data to be provided to FAO's Open Foris (see below). Since then, it **operates only on a commercial basis**, and, for a price, offers a highly customised and responsive service.

7. [Terra-i](#) was an initiative of International Centre for Tropical Agriculture, an international conservation NGO and academia offering “*land-cover changes resulting from human activities*” every 16 days. **It appears to have ceased operations in 2023.** Although focussed on Latin America focused it was potentially adaptable to other regions, for example vegetation loss detection in [Ethiopia](#) and [Vietnam](#).
8. [Amazon Mining Watch](#) is an NGO that focusses on detection of **mining damage** to forests, has plans to expand this service to West Africa from mid-2026. It has worked with [Earth Genome](#) to develop machine-learning tools that can be trained to detect the specific imagery associated with mining. They then use data from Sentinel 2 satellites to scan large areas and produce an [online map](#) of affected areas, at 20ha resolution. It **does not of itself offer automatic satellite alerts**, and **requires coding experience to download data**.
9. [Earth Genome](#) is a US NGOs that develops open-source code for the same machine-learning approach for any purpose. Users first [train](#) the tool to recognise certain types of land cover, and apply this to larger areas. It has been [used](#) by NGOs and journalists in detecting cattle farms, mines, and narco-trafficking airstrips in the Amazon.
10. [EUDR.Co](#) is one of a number of private European companies providing services to help importers comply with the EUDR. It has published a [summary](#) of ten possible deforestation monitoring tools, five of which are described below (and others elsewhere in this report).
 - a. [Earthworm’s](#) Starling initiative is one example, focussed on the EUDR and offering high-resolution (1.7m) satellite image interpretation to international traders in forest risk commodities, including a group of four cocoa traders buying from the [Cavally](#) area in Ivory Coast and selling to EU countries. The approach includes working with [communities](#), but is driven by commercial sponsorship so **does not freely provide a service outside of the areas** it has partnerships for.
 - b. [Farmforce](#), also covered by the EUDR.co summary, describes itself as a ‘first mile’ monitoring service, an “Integrated Enterprise Deforestation Monitoring (IEDM) solution... comprised of three essential features that will allow EUDR compliance”; farm mapping, compliance checks, and due diligence reporting, utilising GFW data. It is oriented towards agri-businesses sourcing cocoa, coffee, or palm oil from smallholders, and **operates on a commercial basis**.
 - c. [Earth Observing Systems Data Analytics \(EOSDA\)](#) provides a web-based satellite imagery library that facilitates visualisation of [deforestation detection](#). Users can provide specific AOIs and request alerts when new images are available. It offers a free starter subscription providing lower-resolution images and no analysis. Above that, it **operates on a commercial basis**, and, for a price, offers a highly customised and responsive service, for example generating and send “decision-ready PDF reports”, to inform EUDR compliance.
 - d. [ICEYE](#) also has its own network of satellites, and specialises in radar imagery, which is not affected by cloud cover. These provide near-daily coverage at [forensic level](#) resolution, down to 25cm. It **operates only on a commercial basis** and access to anything but the briefest information requires a login from a private company email address (i.e. not a gmail address). It does publish information on prices.

Findings: Platforms

Only two existing web-platforms for publication of IFM reports were identified: [LoggingOff.info](#) and the [Open Timber Portal](#). In addition, social media channels and Liberian media organisations are at times used to disseminate reports and, hypothetically, CS-IFM could have its own website. So some observations on these are offered in addition to an assessment of these two dedicated websites.

LoggingOff.info

The [LoggingOff.info](#) site is “*is a space for civil society to share and exchange views and experiences of the FLEGT process and the importance of recognising communities’ land rights*”. The platform is provided by Fern for the benefit of NGOs working in VPA countries and who may not have the capacity to manage a website themselves or who want to reach a wider international audience. There are nominated and trained site managers in each country, and in Liberia these include Jonathan Yiah from SDI, Alex Cole from FCI and Isaac Saylay from NUCFMB.

The site acts as a historic depository of FLEGT-VPA and other material relating to forest governance, and has some 940 documents 212 of which are tagged IFM (see Figure 6). There are documents from 16 countries, including 230 from or about Liberia, and the site also hosts [NGO copies](#) of the Community Forestry Management Agreements, Commercial Use Contracts and other key legal documents that support IFM and other reports.

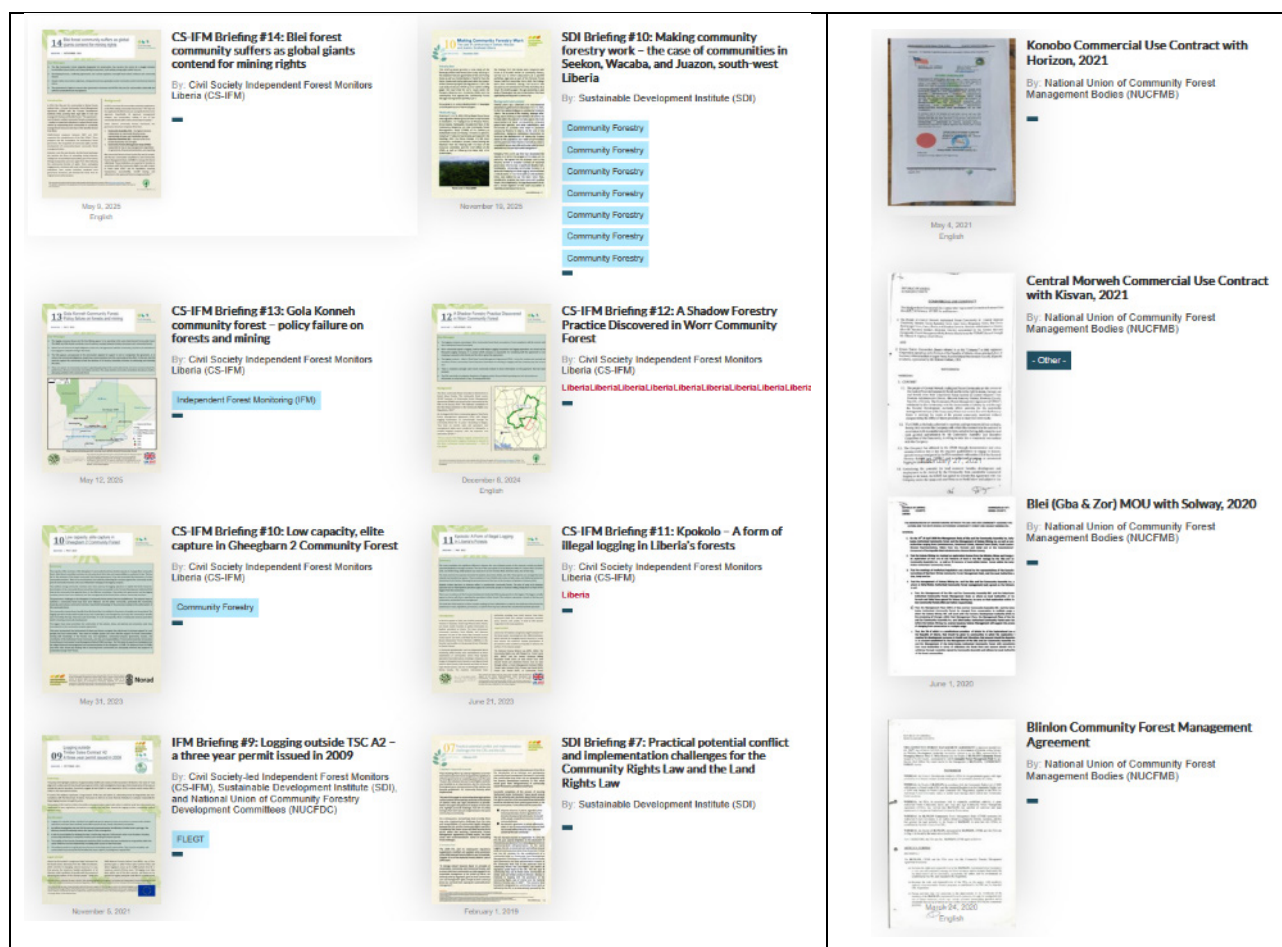


Figure 6: View of some CS-IFM Liberia reports and other forest sector documents on [LoggingOff.info](#)

The site is not structured to host IFM reports specifically, but judicious use of the search function can isolate these from the other documents. All 14 [CS-IFM reports](#) have been published on the site, along with other products such as a [Social Audit](#) (2013) [Community guide to the VPA](#) (2013) and a [Training guide for](#)

[community-based IFM](#) (2019). The site includes a limited amount of IFM material from Cameroon and Côte d'Ivoire but none from the other countries covered by the Open Timber Portal (see [next section](#)).

On average, CS-IFM has published a little over one IFM report per year since its inception in 2012. Inevitably this has fluctuated with the availability of funds, so three reports were published in 2014 but none in 2020 and 2022. But the number of reports is not indicative of the impact of IFM in Liberia, as described in the Discussion on 20.

Open Timber Portal (OTP)

The [OTP website](#) is operated by the World Resources Institute (WRI) and is [described](#) as “*established based on the legality grid developed by national actors as part of the VPA*” in each country. The representative from WRI confirmed they are open to a discussion with CS-IFM about registration and the ability to upload reports, noting “*all data published on the OTP goes through a quality control process, where the information is reviewed by the OTP team before it can be published*”.⁸

Country	Total number of IFM reports	Oldest report date	Newest report date	Forest Monitors*
Cameroon	48	2007	2025	CADDE, CED, FLAG, FODER, CED, CEDLA, CEPEDIC, ECODEV, FLAG, FODER, PAPEL, REM [†] , SUHE
Côte d'Ivoire	6	2014	2020	WCF [†] , IDEF
Honduras	1	2008	2008	MFI
DRC	20	2011	2023	OGF [†] , REM [†] , OCEAN, RENOI
Gabon	12	2020	2026	BF, ME
RoC	27	2012	2026	CAGDF [†] , CJJ, REM [†]
Total	114	2007	2026	

Table 1: IFM reports on Open Timber Portal

* For simplicity the forest monitor organisations are abbreviated in their original language. The purpose of is to show the range of organisations using OTP rather than to fully describe each one.

† ‘Mandated’, i.e. operating under a written agreement with the forest authority. The other forest monitors are civil-society-instigated, or sometimes referred to as ‘Self-mandated’.

The website has IFM reports dating from 2007 and is predominantly used by forest monitoring organisations in Congo Basin but also has some reports from close to the Liberia border in Côte d'Ivoire and from Honduras. There are no reports from Liberia or Ghana, despite active IFM initiatives in these countries, and recent reports from the Ivorian forest monitor, [IDEF](#), with whom IFM CM members have collaborated, are not included. Nor are historic IFM reports from [Global Witness](#) (1999 to 2012) in Cambodia, Cameroon, DRC, Nicaragua and Honduras. Ghana has recently upgraded its real-time monitoring system [GhNRM](#), which generates about six alerts per month, each of which is verified before a decision to undertake an IFM field mission to investigate further. A summary of the reports published by OTP is in [Tables 1 & 2](#), and shows, from a peak of 128 reports in 2022 there were only five in 2025.

The OTP website includes maps of the forest concessions in most of the countries, enabling users to locate the alleged infractions (See Figure 7). The platform also allows users to filter the list of IFM reports by country, concession, severity, year, and in particular by type of infraction and by the company responsible. It is therefore offers a tool for importers of timber to check the reports of companies it is buying from, for example as part of EUTR/EUDR due diligence.

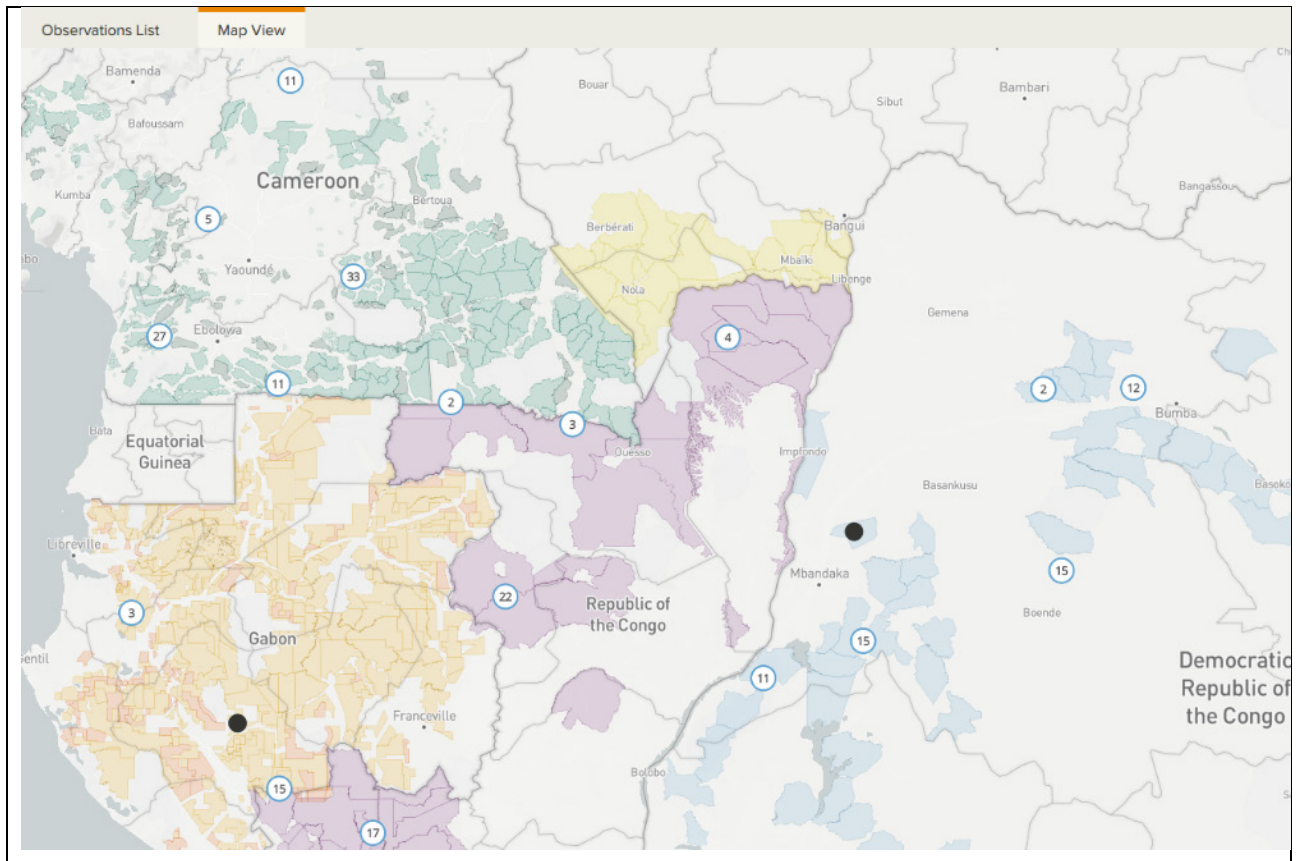


Figure 7: Map of logging concessions and IFM reports in Congo Basin, from the Open Timber Portal

Discussion: LoggingOff.info and OTP

A detailed look at the OTP platform highlights a significantly different approach to IFM in Congo Basin countries compared to Liberia. The types of infraction documented in the Francophone countries predominantly concern operational issues. Across all reports, the greatest number, 501, are tagged as related to timber harvesting and the second most frequent category, a distant 149 incidents relate to law enforcement. These typically recommend a fine or similar sanction against an individual logging company.

In contrast, as described in the [previous section](#), IFM in Liberia has sought to document systemic issues and, from the outset, focussed on community rights. The investigations into [PUPs](#) and [TSC A2](#) are prime examples, as each of these precipitated an in-depth official investigation instigated by GoL and independent of the FDA. The different approaches are in part due to a different tradition of IFM, which was established in Cambodia and Cameroon with a tightly ‘mandated’ approach, based from the outset on a written agreement between a forest monitor and a government authority.⁹ (The Francophone legal structure and the relative absence of community forests are other causes).

In summary, therefore, the OTP platform may not lend itself to the type of IFM reports produced in Liberia, but it offers some pointers for improving the platform(s) CS-IFM do use or might develop. A map of the location of each investigation might for example be useful. There could also be a published tally of recommendations and the responses to these but this would (a) require recommendations to be much more specific, which could objectively be assessed as implemented or not, and (b) risk antagonising the FDA as a decade-long list with relatively few responses may be counter-productive. Furthermore it has not been possible within this study to assess the use of social media (in particular WhatsApp channels) by forest monitors in any country, but this likely to be the most effective, if not the most public, means for IFM reports to reach their target audience.

Annex 1: Assessment criteria

This assessment sought to apply the same set of questions to each web-based forest monitoring tool it identified. The questions were as follows:

1. Does the tool generate and send alerts about forests of interest to me?
2. Do I need to install software or know how to write code?
3. Are any costs involved?
4. Can I tell the tool where my forest boundaries are?
5. Can I control the frequency of alerts or size of affected area?
6. Can I download raster or vector files for me to use with my GIS software?
7. Does the tool require me to be affiliated to any organisation, or can I use it for my own needs independently?
8. How recent is the information, is there evidence the tool is in current use?
9. What other similar tools are there?

In most cases desk-based examination of each service-provider's websites and other media reporting on the tool was used to determine the responses to these questions. In a minority of cases – but including all three tools selected as most promising – further information was obtained from video-calls and/or email exchanges.

The responses were then consolidated into the comparative summary table (page 6 above) and the subsequent text.

Annex 2: Research Terms of Reference

Web-based forest monitoring tools

Background

The contract between AFD, SDI and CS-IFM requires the following task “Review past work done by [ForestLink](#), including lessons learned. This will help identify if the IFM in Liberia will keep using this tool or reorient to other observation tools that work well in other FLEGT countries (Open Timber Portal, p, SMART, etc.). The aim is that a communication mechanism is proposed so that the findings of the social audits contribute to the implementation of the VPA in a quick, effective and constructive way”. (Context Analysis, Activity C.1.1 item 2).

In the Technical Offer, Action Plan for Context Analysis this task has been divided between two consultants. The International Technical Advisor employed under the contract will “focus externally on forest monitoring tools used outside Liberia”. At the same time a local consultant will be recruited to conduct “‘lines of communication’ [a] study to deepen our understanding of how forest communities communicate their concerns to national CSOs”. This terms of reference refers to the first of these tasks, which will be carried out as a desk study.

Justification

CS-IFM has in past been introduced to [Timby](#), [ForestLink](#), and [FLEGT Watch](#) amongst others, yet none have been adopted as a central part of its work. As noted in the Technical Offer, for example, “Our experience with Real-Time Monitoring and [ForestLink](#) suggests it may have not been appropriate for the forest governance and community context in Liberia. Tools such as these tend to be focussed on operational infractions such as cutting outside of boundaries, incorrect species labelling or under diameter. Such infractions are primarily the concern of the FDA and LVD, who have the skills and TLAS to help detect them. Alongside this, community concerns center on non-payment of a company's social obligations and governance and elite capture within the community. Any alert system that

communities are motivated to adopt must meet these perceived needs.” There is therefore a strong need to find technological platforms that are **fit for purpose** in the particular context of CS-IFM in Liberia.

Objective

The objective of this research is **to identify web- and/or smartphone-based technologies that are best suited to CS-IFM in Liberia in terms of (a) alerting forest monitors to suspected areas of illegal logging or abuse of community rights and (b) providing a platform for international dissemination of IFM reports.**

Activities

1. Identify as many web- or smartphone-based forest monitoring tools used in different contexts as possible, including but not limited to [SMART](#), [GLAD](#), [Timby](#), [ForestLink](#), [FLEGT Watch](#), [Community Monitoring](#), [Open Foris](#), and [Talkay](#).
2. Similarly identify as many different platforms for IFM reports as possible, including but not limited to including [LoggingOff.info](#) and the [Open Timber Portal](#).
3. Develop a set of assessment criteria based and obtain approval for these from CS-IFM.
4. Assess each tool against the criteria. Where necessary, for example if description of a tool is too superficial, seek online interviews with developers and users of the tool.
5. Present the findings to CS-IFM and the wider IFM CM member CSOs, using a slide pack (e.g. PowerPoint) as well as a written report.
6. Support CS-IFM in adopting any tools that are agreed on that can provide added value to IFM.

Timeline

A draft report must be submitted by the end of December 2025, for review by both AFD collaborators and CS-IFM. The dissemination and adoptions activities will happen in the first months of 2026.

The International Technical Advisor has three days allocated to this task, in addition to his regular two days per month.

Outputs

7. Assessment criteria
8. Slide pack
9. Final report

References

- ¹ The IFM CM is a group of experienced Liberia CSOs who devote time to IFM, often conducting joint field investigations and co-publishing IFM reports (see <https://loggingoff.info/?s=cs-ifm>). Convened by CS-IFM, it currently comprises two national unions of forest community committees, three rights-based capacity-building and advocacy NGOs (one of which is focussed on gender issues), and one media organisation.
- ² Annex VIII, Section 9 of the VPA text makes explicit reference to the role of civil society to implementation the VPA and to contribute to effective implementation of legality assurance system. European Commission and Government of the Republic of Liberia, 2012, Voluntary partnership agreement between the European Union and the Republic of Liberia on forest law enforcement, governance and trade in timber and derived products to the European Union; [http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:22012A0719\(01\)&qid=1469775707338&from=EN](http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:22012A0719(01)&qid=1469775707338&from=EN).
- ³ Global Land Analysis & Discovery (GLAD) combines the NASA/US Geological Survey's Landsat images (GLAD-L), which has 30 metre accuracy and updates approximately every eight days with data from the European Space Agency's Sentinel-2 satellites (GLAD-S2). This is more accurate (10m) and more frequent (approximately every five days). The third source is Radar for Detecting Deforestation (RADD), also from the European Space Agency (Sentinel-1 satellites).
- ⁴ GFW often states the accuracy is 10m, but this depends on the distance the point is from the equator. For Liberia it's approximately 11m.
- ⁵ This study monitored the alerts for 15 weeks between January and May 2026. The highest number was 186,504 alerts in the week starting 4 May. The lowest was 4,891, in the week of 2 March. These alerts represent areas of 2,300 and 60ha respectively.
- ⁶ Designating and analysing FMC F as an AOI takes some time, however, as the GFW map divides it into three sections corresponding to County and old District boundaries. Furthermore, GFW has used an old, 66-district dataset for Liberia, not the current 136-district one.
- ⁷ In 2020 GFW wrote a [manual specifically for Liberia](#). Although the manual is now a little out of date and only partially translated from French it is nonetheless and useful guide.
- ⁸ Sophie Labaste Sophie.Labaste@wri.org, 23 March 2026, pers. comm.
- ⁹ The terms 'mandated' and 'self-mandated' are difficult to apply in all situations, as they imply a dichotomy whereas there can be a range of relationships between a forest monitor and a forest authority. For example in Liberia there has never been a written agreement, but the NFRL provides for the right to information and the VPA provides for civil society monitoring (see Footnote 2).