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Open Data for Supply Chain Due Diligence

Contents

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Executive Summary

Global deforestation, driven predominantly by agricultural expansion, is increasingly being targeted by regulatory frameworks in consumer countries. These frameworks, such as the EU Deforestation Regulation (EUDR), the US Lacey Act, and the UK Forest Risk Commodities (UKFRC) proposal, aim to ensure that commodities linked to deforestation - like palm oil, cocoa, soy, and timber - are sourced responsibly. These regulations impose stringent due diligence (DD) and traceability requirements across supply chains, placing significant data demands on upstream actors, particularly smallholders and producers in developing countries.

This report explores current data availability, identifies barriers to compliance, and proposes interventions to bridge data gaps and promote inclusive, sustainable supply chains.

Key Findings include:

1. Regulatory Data Demands are increasing

The report compares five major regulatory frameworks and finds increasing complexity in supply chain data demands over time. The EUDR, in particular, mandates traceability to the plot level and requires comprehensive documentation for all supply chain actors, regardless of risk level. While some frameworks allow flexibility through risk-based approaches or recognition of third-party certifications, inconsistencies remain in how such approaches are integrated in regulations.

While new data demands from regulations create challenges for downstream companies on who the legal obligations rest, the more pressing and critical challenges lie in data origination upstream, in particular when commodity production comes from smallholders and small and medium enterprises (SMEs). These upstream actors face disproportionate challenges due to limited digital literacy, lack of access to technology, and insufficient support systems.

2. Analysis of upstream supply chains in Ghana and Indonesia reveals structural challenges with scaling data collection and sharing

The research unpacked the above challenges of data collection, generation and sharing for two specific commodity production systems: cocoa in Ghana and oil palm in Indonesia. Using a qualitative approach based on extensive field observations and engagement with corporate and public actors, the report unpacks the awareness, capacity, incentives, and structural barriers that upstream actors face and have to navigate in light of the data demands from downstream buyers.

Cocoa production in **Ghana** is exclusively from smallholders and the sector is regulated by the Ghana Cocoa Board (COCOBOD). Efforts by COCOBOD, private actors and multi-stakeholder initiatives to improve traceability data are progressing in the “direct” cocoa supply chain consisting usually of organised cooperatives. However, challenges persist especially amongst smallholders not in cooperatives due to data fragmentation, lack of coordination, and limited incentives for cooperatives and licensed buying companies (LBCs). Key barriers include

misalignment between national and international laws, low digital capacity, and economic constraints to the roll out of the national Ghana Cocoa Traceability System.

Indonesia's palm oil sector includes a mix of independent smallholders, independent and mill-owned concessions, and various trader and intermediaries between concessions and refineries/mills. Independent smallholders often lack cultivation permits and are sometimes reluctant to register and map their property due to tax implications. Traceability is further complicated by the involvement of middlemen, and high competition for supply that disincentivises data sharing. A small proportion of mills and exporters, usually in certified supply chains or destined for European markets, will have higher awareness and technological capacity to engage in data collection and cater to demands from new regulations, usually due to the investment of refiners (sometimes with support from buyers) into 3rd party traceability systems. However, the majority of upstream actors in the palm sector remain unprepared for compliance with new consumer market regulations as the National Dashboard remains at an early stage of roll out.

Although significant investments are being made by downstream companies to close data gaps in both sectors, these usually always focus on the development of siloed B2B solutions that create dedicated supply chains from a small segment of the production. There are various problems with this current 'status quo':

- Data collection is often top-down, lacking producer consent (and sometimes producer incentives).
- Private tools typically only cover a small percentage of farms that are already supplying to "more demanding" markets – usually farms deemed sustainable as they have been established longer, and simply cleared forest before regulatory cut-off dates. This means that the scope of private tools only covers the boundaries of existing farms, where little to no forest remains, with no mandate or responsibility over forest outside the farms that may still be at risk of clearance. In some cases, this enables buyers to incentivise and reward these farmers, however, data tools are often used in isolation without providing a pathway to integrate other less mature farmers into supply chains.
- These dynamics also lead to duplication of data efforts, driving up costs and diverting funds from sustainability goals. This creates a trade-off between regulatory compliance and investments in sustainable, deforestation-free production.

3. Combining global Digital Public Infrastructure (DPI) tools with country data systems should be prioritized as the long-term solution

Numerous global and national initiatives are working to address data challenges, including internationally DIASCA, AIM4Forests, and the Forest Data Partnership; and nationally in Ghana and Indonesia the Ghana Cocoa Traceability System and National Dashboard respectively. These can be understood as building digital public infrastructure (DPI), which refers to foundational digital systems, often open-source and interoperable, that support inclusive access to data and

services. DPI can play a transformative role in enabling traceability, data sharing, and data verification across supply chains. Interviews with DPI experts highlighted several priorities:

- Harmonising efforts between governments and private sector to avoid duplication by facilitating awareness raising and piloting data sharing models in production landscapes.
    - A particular need here is collective alignment between what constitutes relevant and useable risk-data on legality.
- Ensuring national governments are central to DPI development and ownership by building on current efforts in production countries and leveraging any existing data systems available.
    - This can be related to developing and disclosing national land use- and forest maps, but also relates to better disclosing legality evidence and related data that often exists in non-digital formats. Yet it is important to recognise sensitivities around making such data open.
- Identifying and supporting smallholders with access to technology and training, to ensure all producers have an understanding on the level of evidence required to prove compliance, as well as have the necessary technology for it.
- Building sustainable financial models for DPI maintenance, for example by creating incentives such as premium payments and access to services (i.e. medical, schools, financial credits, etc.).

List of Acronyms

CMC	Cocoa Marketing Company
COCOBOD	Ghana Cocoa Board
DD	Due Diligence
DPI	Digital Public Infrastructure
EUDR	Regulation on Deforestation-Free Products
EUTR	European Union Timber Regulation
FCDO	UK Foreign, Commonwealth and Development Office
FLEGT	European Union Forest Law Enforcement, Governance and Trade
FFB	Fresh Fruit Bunches
FRC	Forest Risk Commodities
FT	Frontier Technology
ISH	Independent Smallholders
GCTS	Ghana Cocoa Traceability System
LBC	Licensed Buying Company
MSI	Multi-Stakeholder Initiative
NFC	Near Field Communication
PO	Palm oil
SMEs	Small and Medium Enterprises
STDB	Surat Tanda Daftar Budidaya (i.e., cultivation registration certificates)
UKFRC	UK Forest Risk Commodity Regulation

1. Introduction

Close to 90% of global deforestation is linked to agricultural expansion[1]. While this deforestation takes place in producing countries, consumer markets demands are one of the main drivers[2]. Because of their role on deforestation caused by agriculture, several consumer countries are developing regulations requiring mandatory due diligence of 'forest risk commodities' (FRC) by supply chain companies. These regulations aim to do this by increasing the level of transparency and traceability of the supply chain, in order to support decisions that would have a positive impact on the ground[3].

Emerging supply chain due diligence regulations have several ramifications beyond their own jurisdictions. As these supply chain regulations become more data-oriented, data requirements are cascaded up the supply chain affecting primary producers and other upstream actors. This affects millions of producers and smallholders involved in supply chains for FRCs such as palm or cocoa, who may not necessarily be connected to deforestation but not have the resources or support needed to provide the required data to prove they are compliant with downstream actor requirements. Similarly, smaller actors downstream in these supply chains may also face challenges to generate or access the required data.

To address exclusion risks stemming from data capacity and coverage gaps, coordinated efforts to create open data tools and sources, a so-called new Digital Public Infrastructure (DPI), will be needed.

By acknowledging how regulations concerning Forest Risk Commodities (FRC) put additional data requirements on actors from producing countries, the UK Foreign, Commonwealth and Development Office (FCDO) seeks to support and ease some of the load in generating, collecting, storing and transferring data, aiding these actors to be part of compliant supply chains. This report is the outcome of a project under the Frontier Technologies (FT) programme, which supports FCDO to invest on early-stage ideas and technology solutions. The project investigates the potential for open data and tools for supply chain due diligence and traceability.

2. Research approach

The research project, undertaken by Proforest on behalf of FCDO, feeds into this report which provides a quick assessment of current data and technology available to respond to emerging legislation; explores the ability of supply chain actors to use data and technology for compliance;

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[1] Sylvester, J.M.; Gutierrez Zapata, D.M.; Perez Marulanda, L.; Vanegas Cubillos, M.; Bruun, T.B.; Mertz, O.; and Castro-Nunez, A. 2024. Analysis of food system drivers of deforestation highlights foreign direct investments and urbanization as threats to tropical forests. Scientific Reports 14: 15179. ISSN: 2045-2322. https://www.nature.com/articles/s41598-024-65397-3

[2] WWF (2021). *Stepping Up? The continuing impact of EU consumption on nature worldwide.* WWF.*stepping up the continuing impact of eu consumption on nature worldwide fullreport low res.pdf*

[3] Fripp, E., J. Gorman, T. Schneider, S. Smith, J. Paul, T. Neeff, F. Marietti, L. Vary, A. Zosel-Harper. 2023. *Traceability and transparency in supply chains for agricultural and forest commodities: A review of success factors and enabling conditions to improve resource use and reduce forest loss*. World Resources Institute. Traceability and Transparency in Supply Chains for Agricultural and Forest Commodities | World Resources Institute

identifies what interventions, including open data and tools, are needed to address the gaps to compliance; and includes a series of recommendations for FCDO to support the inclusion of supply chain actors into compliant supply chains.

This project aims to answer three research questions:

1. What data and information are likely to be needed by different supply chain actors to comply with emerging FRC regulations in consumer markets?
2. How prepared and able are supply chain actors to meet regulation requirements and data demands? Based on the nature of the technical landscape and the incentives of different market actors, what needs, barriers and pain points are different actors likely to have in demonstrating compliance with emerging requirements?
3. What interventions are required to address the needs/barriers we believe actors will face in generating and accessing the data needed to demonstrate compliance with legislation?

The project was structured in three phases (Figure 1). First, an analysis of various official regulatory texts set the context of identifying existing and emerging regulatory supply chain data demands. Second, workshops with Proforest regional teams in production countries provided insights into supply chain specificities, allowing to identify concrete gaps and barriers to compliance to consumer countries' regulations. Third, the mapping of existing tools and initiatives, and interviews with the organisations behind such tools, allowed an understanding of the current state of play of the technology environment.

This is a high-level scoping study relying on existing insights of the current situation across Proforest's client teams, country-level experts and commodity leads. As such, the study is not an exhaustive assessment, and findings are generalised.

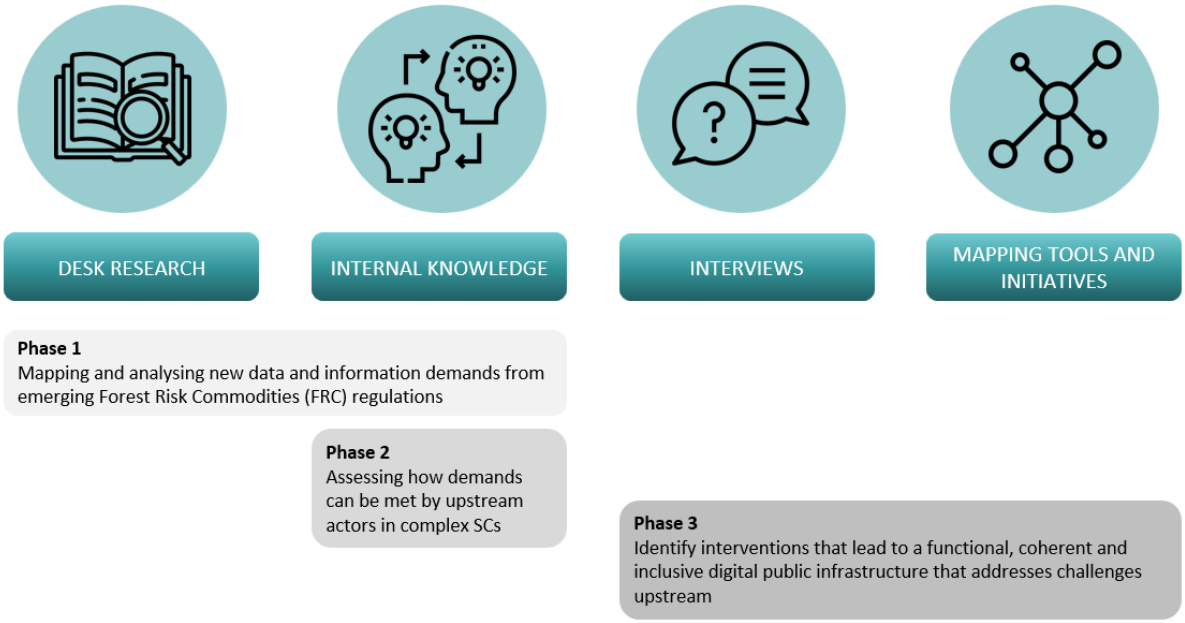

Figure 1. Methodology and data collection approach

3. Regulatory data demands and gaps

3.1. Identifying and comparing data requirements from FRC regulations

The aim of this first section is to assess the (expected) data demands by looking at general design features, allowing comparability across regulations. To broadly understand how data needs could be embedded in due diligence regulations, this research focuses on 5 regulations:

- EU Regulation on Deforestation-free Products (EUDR),
- EU Timber Regulation (EUTR),
- UK Forest Risk Commodity Regulation (UKFRC) (proposal),
- US Forest Act (proposal)
- US Lacey Act.

Three main parameters were examined in terms of data requirements:

- location and traceability evidence and data,
- deforestation evidence or forest cover data,
- legality evidence (as defined by production country) and data.

These regulations have been designed at different periods of time which also allows a glimpse of the evolution of data demands in FRC regulations. Details regarding data requirements can be found in the Annex (Table A1). The findings of this regulation comparison are as follows:

- **No consistency on data points across regulations:** analysis on data requirements related to Traceability data, Forest cover data, and Legality data for different segments of the supply chains show that there is no consistency in terms of the requirements and evidence for demonstrating deforestation and legality across the mapped regulations.

- **Translating obligations into data points is not straightforward**: regulatory texts often do not indicate which specific data points are sufficient to provide proof of compliance. Even for the EUDR, which is designed to use satellite and remote sensing data, the Commission notes that while such tools can help to document the absence of deforestation, the regulation does not impose the use of satellite imagery[4]. Hence, 'digital' tools and platforms that condense compliance to a set of data points are, to a degree, deductive.

- **Traceability requirements evolving**: The processing and sharing of traceability data is a central aspect of DD regulations. The regulations mapped show some variety of approaches (Table A1). Establishing traceability implies a dual data challenge: i) ensuring the boundaries of the required location are accurate and credible/legitimate, and ii) ensuring the transfer of the origin data along the supply chain is possible. These data challenges are particularly relevant for the EUDR's traceability to plot-level. The sheer number of actual and potential plots involved in the production of mass-market

[4] See European *Commission Frequently Asked Questions Implementation of the EU Deforestation Regulation*, Version 4 – April 2025, p.54.

products, combined with requiring multiple data points for each plot, means that upstream and downstream actors under the EUDR will require extensive internal capacities to manage this level of traceability.

- **Risk-based due diligence:** Allowing companies flexibility in data and evidence collection dependent on the risk level of a product or supply chain is one way to manage the amount and complexity of data collection. All the regulations mapped have slightly different risk-based approaches. Notably, the EUDR again stands out as giving limited flexibility, stipulating that even for commodities/products from low or medium risk origin jurisdictions (as defined by the EC benchmark) all data requirements (under article 9) need to be met.
- **Use of certification:** Voluntary, 3rd party certification and other market recognition mechanisms (such as FLEGT legality licenses under EUTR), are ways to manage data needs and provide information and potential proof points for different regulatory requirements. They are important for downstream actors but also for upstream actors as it provides them with certainty they have met the necessary data demands. Regulators can leverage voluntary certification in different ways, through for example, guidance or direct recognition. The direct recognition of certification schemes in EUDR is limited, whereas the EUTR stands out regarding the recognition of both voluntary certification (allowing the use of certification as evidence of compliance) and the recognition of FLEGT legality licenses, which are a public form of legality certification developed by production countries. Under EUDR, the role of such systems is less direct, which in turn increases the complexity of data management for both upstream and downstream actors already using these systems.

Smallholder farmers: data requirements and exemptions

FRC regulations from consumer countries do not pose direct obligations on upstream actors, although they are exposed to cascaded buyer demands for compliance data. Because of this, regulatory texts do not tend to specify any differentiated requirements or exceptions for upstream actors nor smallholders. However, due to sustained concerns, the EUDR has sought to address upstream challenges, and it specifies one simplification in the geolocation data collection (allowing GPS point coordinates rather than more detailed polygons for plots under 4 ha). However, does not address the main barriers to smallholders to comply with the regulations, such as digital literacy, lack of legality evidence or title, and limited information flow to farmers from buyers resulting in poor understanding of downstream regulatory requirements.

Downstream SMEs: data requirements and exemptions

The EUDR has more specific 'differentiated obligations' for processing and collecting data. Specifically, it foresees 'simplified due diligence' for SMEs (when these are not the first operator) which mainly focusses on collecting, archiving, and being able to share transaction data for in-scope products.

Despite this simplification, it is expected that developing sufficient awareness and data capabilities for this simplified due diligence process will still pose significant challenges to smaller enterprises.

Finally, we can see a tendency of consumer countries to develop more data demanding laws. However, producing countries being indirectly influenced by these regulations may not be ready nor able to face these rising demands. Section 3.2 explores the awareness, ability and readiness of upstream actors to face the regulatory requirements of consumer countries, by focusing on two complex supply chains (i.e., cocoa and palm).

3.2. Analysis of gaps and barriers in data access

Building on the findings of section 3.1 and the developed analytical framework (Figure 2), this section looks at how the data requirements translate in the context of upstream actors[5]. This section unpacks how FRC data requirements can be addressed, managed and navigated by the producers of raw commodities and other upstream actors that sit outside the jurisdiction of demand-side markets. Through Proforest's work on production countries, and with the support of Proforest local teams in Ghana and Indonesia, we explored the current state of play regarding

[5] In this report the smaller supply chain actors are classified as:

- **Small and Medium Enterprises (SMEs)**: downstream actors in the demand-side jurisdictions.
- **Small-scale or smallholder actors**: upstream actors in production countries outside of demand-side jurisdictions.

While exact definitions and categorisations will differ per country, the definitions followed in this report can be found in the annex.

the readiness and ability of actors in the palm oil supply chain in Indonesia and the cocoa supply chain in Ghana to comply with upcoming regulations.

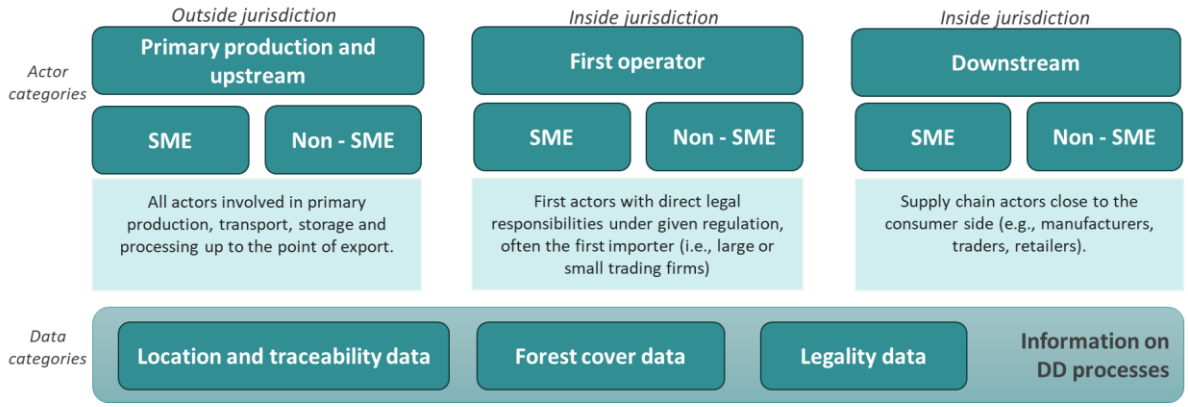

Figure 2. Key supply segments influenced by FRC regulations, and main data categories required by most FRC regulations.

3.2.1. Cocoa production in Ghana

Ghana contributes about 20% of global cocoa production with nearly 100% of this production coming from smallholders. Despite being highly regulated by the Ghana Cocoa Board (COCOBOD), the cocoa supply chain is complex, and faces many challenges for traceability (e.g., bulking at intermediaries, cocoa laundering), leading to little to no physical segregation. Major cocoa trading companies have their own sustainability programmes, which allow for traceability to first purchase point. The first purchase point is where cocoa is aggregated after leaving the farm. In Ghana it would be a cooperative or Purchasing Clerk

While data collection efforts by private actors, multi-stakeholder initiatives' (MSI), and public actors exist, they remain uncoordinated and tend to overlap. Three major categories can be identified in the Ghanian cocoa supply chain: producers, licensed buying companies (LBCs) and the cocoa marketing company (CMC) (Figure 3). Producers are broadly split into two main categories: conventional farmers (approximately 60-80% of production) and those in sustainability programmes (approximately 20-40%)[6].

[6] Proforest Internal knowledge

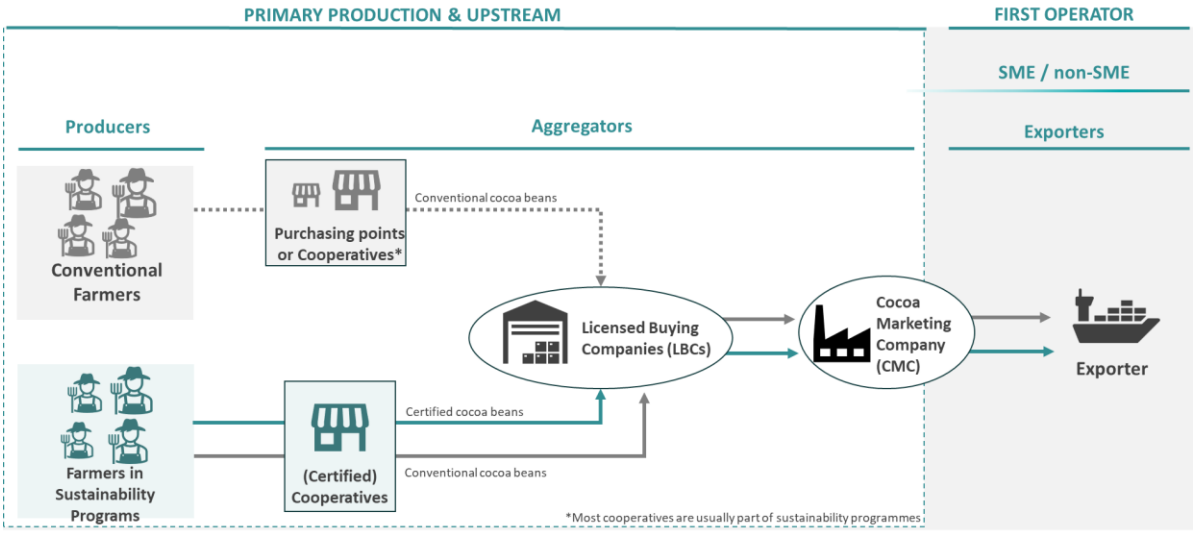

Figure 3. Simplified cocoa supply chain typology subject to the influence of FRC regulations.

The findings about the readiness to face FRC requirements by different cocoa supply chain actors in the context of Ghana are summarised in Table 1.

Table 1: Summary of the Current Situation of Different Cocoa Supply Chain Actors in Ghana Regarding Data Generation and Collection

Current State of Play in the Cocoa Context in Ghana				
SC Actor	**Awareness**	**Technology Access**	**Incentives**	**Overall barriers to data collection and sharing**
Smallholders				Significant, informal land-holding, and occasional permitted or illegal cultivation in Protected Areas. Misalignment between national & overseas laws
Cooperatives				Significant, due to bulking and cocoa laundering
Licensed Buying Companies				Medium/ significant, currently only 30-50% of cocoa traced back to cooperative level
Exporter				Medium, data collection often incomplete. Dependence on COCOBOD for transactions and logistics is a challenge

Note. Red indicates significant barriers that need to be addressed for FRC related data collection and sharing; Yellow indicates moderate level of barriers hindering FRC related data collection and sharing; Green indicates no significant barriers identified, with conditions already in place for FRC data collection and sharing.

The main takeaways from this gap assessment of Cocoa in the context of Ghana are as follows:

1. Majority of cocoa farmers in Ghana are not organised in cooperatives. Yet cooperatives play a crucial role in engaging and incentivising producers on data needs and managing data.
    - The level of organisation and investment at cooperative level is key for addressing data gaps and challenges. Support for cooperatives is strong for certified cooperatives or those in company sustainability programmes.
    - Despite national efforts to map smallholders through COCOBOD's Ghana Cocoa Traceability System (GCTS), most progress has been made by the private sector through sustainability programmes in a highly competitive setting, leading to duplication of data collection. Due to COCOBOD's legal mandate, the GCTS is beginning to make progress in collating data from companies but there is a reluctance from companies to share data due to concerns about data confidentiality and degree of alignment with compliance requirements (e.g. EUDR). However, EUDR has provided an impetus as the majority of cocoa is exported to the EU.
2. Collecting information about legality at producer level is complex due to a number of local factors:
    - Use rights to produce cocoa legally are not required under national law. Also, land tenure tends to be temporary.
    - National law may allow cocoa cultivation and deforestation within forest reserves (even in theory after the 2020 EUDR cut-off date). At the same time, conflicting boundaries of Protected Areas may lead to farmers being deemed illegal.
3. Local traders/aggregators don't have the incentives or capacity to manage/transfer large data volumes.
    - In addition to capacity gaps, lack of incentives means that the reliability of data from cooperatives and LBCs has been questioned.

3.2.2. Palm oil production in Indonesia

Indonesia is the largest palm oil producer in 2025 (59%), followed by Malaysia (24%) [7]. Almost half of this production is domestically consumed, and the rest is exported. In 2023, Indonesia accounted for 54% of global exports[8]. About 85% of these exports are traded by companies with formal No Deforestation, No Peat, and No Exploitation (NDPE) commitments.

While industrial plantations are common in Indonesia, there are ~2.6 million smallholders managing 6.2 million ha (~41% of the total palm oil production area) and producing 35-40% of country's palm oil [9,10] . Most smallholders are independent and for most, market access is obtained by selling Fresh Fruit Bunches (FFB) to dealers. Legality is the first challenge as most smallholders do not have legal permits. Traceability remains challenging due to low data sharing by dealers and where farm mapping has taken place it is often by/for private service providers. A simplified typology of the palm oil supply chain in Indonesia can be seen in Figure 4. The findings

[7] Trase (n.d.). *Indonesia palm oil supply chain* Indonesia palm oil - Supply chain - Explore the data - Trase
[8] USDA (2025). *Production – Palm Oil.* Palm Oil | USDA Foreign Agricultural Service
[9] Musim Mas (2025).*Smallholders Approach and Programmes Smallholders Approach and Programmes - Musim Mas*
[10] European Forest Institute (2024). Inclusion of Indonesian smallholders in European Union supply chains under the EU Deforestation Regulation: Challenges and potential mitigation measures.Smallholder_challenges.pdf

about the readiness to face FRC requirements by different palm oil supply chain actors in the context of Indonesia are summarised in Table 2.

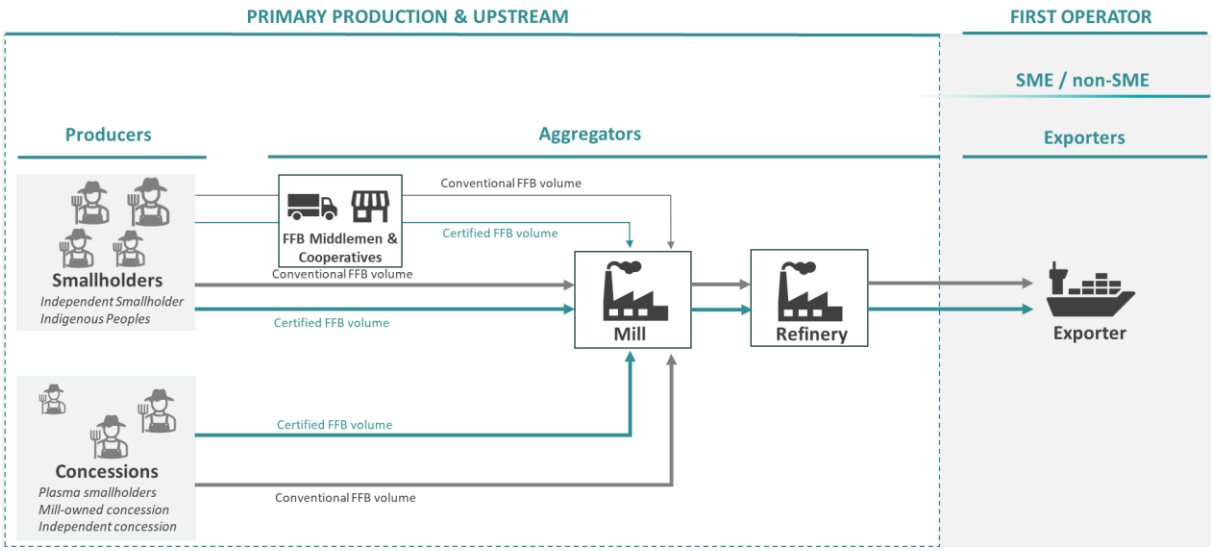

Figure 4. Simplified palm oil supply chain typology subject to the influence of FRC regulations

Table 2: Summary of the Current Situation of Different Palm Supply Chain Actors in Indonesia Regarding Data Generation and Collection

Current State of Play in the Palm Oil Context in Indonesia				
SC Actor	**Awareness**	**Technology Access**	**Incentives**	**Overall barriers to data collection and sharing**
Independent smallholder				Significant – competing incentives (tax avoidance), misalignment between national & international forest definition/monitoring.
Mill-owned concessions				Minimal (if oriented at regulated export markets).
Independent concessions				Medium, requires engagement but are generally under-resourced with little investment.
FFB middlemen				Medium, due to the complexity of the supply chain and significant costs of segregation.
Mills & refineries*				Significant, usually various FFB middlemen involved, complicating traceability. No capacity to segregate.
Exporter				Minimal/Medium (if oriented at regulated export markets).

** Expected higher awareness and technology access if oriented at regulated export markets*

Note. Red indicates significant barriers that need to be addressed for FRC related data collection and sharing; Yellow indicates moderate level of barriers hindering FRC related data collection and sharing; Green indicates no significant barriers identified, with conditions already in place for FRC data collection and sharing.

The main takeaways from this gap assessment of palm oil in the context of Indonesia are as follows:

1. Unlike for cocoa, only a small percentage of palm oil (<10%) is exported to the EU, and other major offtake markets (i.e. China, India and the domestic Indonesian market) don't have such strict sustainability requirements.
2. There is a huge range in the type and capacity of producers and mills. Large concessions owned by vertically integrated producers (e.g. Wilmar, GAR, Musim Mas) are well capacitated.
3. However, the majority of the sector is represented by independent mills and 40% of production comes from independent smallholders – all of whom have much lower capacity and limited incentives to address data gaps and challenges
    - Majority of smallholders are not organised in Indonesia (there are very few cooperatives or farmer groups).
    - Usually, the first point of contact are dealers, which have limited incentives or capacity to collect and manage data. It is a similar picture for independent mills.
4. Collecting information about legality at producer level is complex due to a number of local factors
    - There are an estimated 2.6 million PO smallholders in Indonesia yet only 186,321 producers have a cultivation permit ('STDB').
    - Some ISHs are in "forest zone" or within an allocated palm concession area, so farmers won't be able to obtain STDB, nor would they want to be identified.
5. Local traders and mills don't have the incentives or capacity to develop and manage/transfer large data volumes

4. Ways to address data challenges and gaps

4.1. Current state of private solutions & available technologies

During Phase 2 the research identified key challenges that SC segments are facing when it comes to meeting FRC DD requirements. Table 3 provides a summary of available technologies that are already being leveraged. Overall, there is sufficient technology, yet additional work needs to be done to be able to use it to its full capacity.

Table 3. Available Technologies Leveraged by Different Supply Chain Segments to Address Key Challenges for FRC Compliance

FRC DD requirement	SC segment	Key challenges	Available technologies
Geolocation	Producer	*Unawareness of FRC requirements & lack of proof on their right to cultivate land*	*Mobile app, GPS*
	Aggregator	*Lack of resources to map all smallholders and build the capacity of cooperatives*	*Mobile app, Drones, Open Registries*
	Exporter	*Limited visibility on farm location*	*AI/Machine Learning*
Traceability & segregation	Producer	*Lack of IDs or unreliable identification documents*	*NFC*
	Aggregator	*Lack of resources to segregate volumes*	*NFC, Internal management system on volume reconciliation*
	Exporter	*Lack of farmers' registries or digitised data to verify volume compliance*	*AI/ Machine Learning, Blockchain & DLT*
Deforestation-free	Producer	*Limited financial support & cap building*	*Mobile app*
	Aggregator	*Geolocation data not 100% complete*	*Drone technology, Satellite imagery, Mobile app*
	Exporter	*National forest maps are unavailable*	*Drone technology, Satellite imagery, Mobile app*
Legal compliance	Producer	*Conflicting Protected Areas boundaries or lack of formal land right to cultivate*	***Current available technology should be sufficient to prove compliance. Yet more clarity is needed on what regulation is applicable on a country basis and what level of evidence is sufficient***
	Aggregator	*Lack of digitalised evidence*	
	Exporter	*Lack of clarity on applicable national & sub-national regulations (+frequent policy changes)*	

Although significant investments are being made by downstream companies to close data gaps in both sectors, these usually always focus on the development of siloed B2B solutions. There are various problems with this current 'status quo':

i) **Top-down**: Data collection is carried out top down, with minimal involvement or consent from the producers from who the data is harvested,
ii) **Duplicative:** Data collection and analysis is duplicated across companies, resulting in escalating costs. This is problematic as costs are often drawn from sustainability or responsible sourcing budgets creating a trade-off between data collection for regulatory purposes and existing goals and investments in sustainable or deforestation free supply chains.
iii) **Selective:** Reaching the most remote and under capacitated producers is often not cost-effective, especially when the volumes from such smaller actors are limited. In a for-profit model they will be disadvantaged without necessarily being non-compliant but because they can't provide the paper trail to prove they are compliant. This means where buyers can meet demand from other larger, better capacitated actors they will exclude smaller actors.
iv) **Unrelated to local processes and realities**: Private solutions tend to focus on location data retrieval and forest monitoring using international definitions, they do not address local challenges or barriers which often shape the behaviour of producers in a more direct manner.

The last point is crucial, given that;

- At producer level it is crucial to build capacity on new technologies and ensure growers have access to technology (in most cases a smart phone is probably enough), while also ensuring ownership of data is better managed.
- At the aggregator level there is a need to work with producers to improve traceability in the first mile. The support from local government is crucial in shifting from paper-based to digitised evidence.
- At the exporter level there is a need to provide more clarity on applicable regulations in each national context and what level of evidence is sufficient to prove compliance.

This fragmented approach has raised concerns around data completeness, interoperability, the security of sensitive supply chain information, and the ability of new technology to actually change behaviour and the underlying incentives of deforestation. All of this highlights the urgent need for coordinated public-private alignment.

4.2. Conceptualisation of Digital Public Infrastructure (DPI)

Data and information demands from new regulations have created a need for inter-operability and consistency in data collection and sharing across entities. It has also raised questions on how to ensure data is generated and shared with the public interest in mind, rather than driven only by market dynamics.

To enhance data availability and interoperability, and avoid exclusion of producers from supply chains based on their lack of data, several organisations and initiatives are working towards building "Digital Public Infrastructure" for FRC due diligence. DPI is a broad container term covering various effort at global and, sometimes, national scales.

Digital Public Infrastructure (DPI) is a broad concept. Some definitions are:

- *Foundational digital services and technologies provided by the government or public-private partnerships to support efficient, secure, and accessible digital services and transactions in the public interest* (DIASCA)
- *Shared digital systems that are secure and interoperable and that can support the inclusive delivery of and access to public and private services across society* (Organisation for Economic Co-operation and Development (OECD))
- *Open-source software, open data, open AI models, open standards, and open content that facilitate re-use across organisations, sectors, levels of government, and countries* (Digital public goods (DPGs - UN))

Practically, the key players supporting and developing DPI for FRC are looking into various products and tools, from common data formats to the creation of global registries of production locations, to creating global pre-competitive platforms that would allow individual producers to share data directly downstream.

4.3. Ongoing DPI processes and emerging solutions to address data challenges/gaps

Various actors and tools are seeking to address the data gaps and challenges created by new FRC regulations. The scoping research reviewed existing interventions or initiatives already in place. A few key observations include:

- Most solutions targeting use of geolocation data and deforestation analysis, less work to address legality requirements.
- Most open-source tools have only been tested within cocoa & coffee.
- Mapping producers should be regarded as an ongoing process rather than a one-time activity in preparation for EUDR or other upcoming regulations, there is a need to identify a long-term solution to ensure data is maintained up to date
- Private sector is not supporting public (open source) or national government efforts and hence duplicating work.

Table 4 provides a non-exhaustive list of existing solutions and ongoing processes.

Table 4. Current solutions & ongoing processes to address data challenges and gaps

Global processes	Private solutions
• DIASCA • AIM4Forests (& AIM4COMMODITIES) • Forest Data Partnership • FACT	• Beyco Farmer App • EUDR Tracer • Sourcemap • Fairfood • Open Food Chain • TransparenC • ForestMind • SEPAL • Global Field ID (Varda) • Meridia • TRACT • Koltiva *And many more…*
Open-source solutions	
• INATrace • Deforestation Free Trade Gateway (ITC) • Asset Registry • Open Foris • WHISP	

Figure 5 gives a simplified summary of how the different actors involved in FRC due diligence (producers, downstream companies, and enforcing authorities) share data and how that relates to 'data facilitators and intermediaries' such as B2B providers, national processes, and (global) DPI initiatives.

While private data flows (in orange) are relatively developed, the green dotted lines show emerging, but underdeveloped, 'public' or 'open' data flows that in the long term could be developed. The key catalyst for making this work are national systems, which can roll out comprehensive and authoritative data collection efforts covering location, legality, and deforestation from all producers within a jurisdiction, offering a long-term solution to fully bridge existing data gaps.

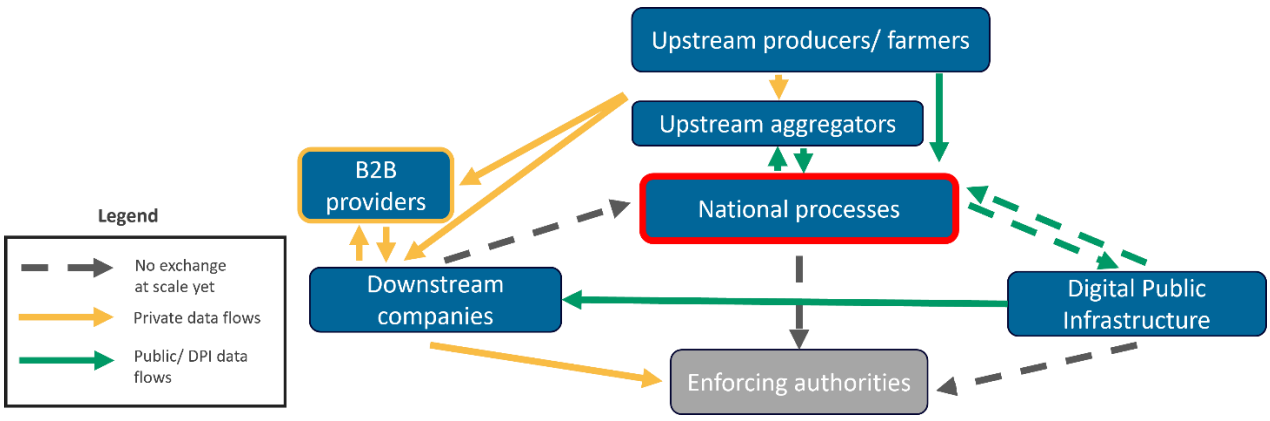

Figure 5. Summary of data sharing between actors involved in FRC due diligence.

4.4. Overview of global processes and gaps

The Global FRC DPI community pursues several objectives, including:

i) Developing common data formats & creating global registries of production locations and unique identifiers;
ii) Working on interoperability to allow data sharing between SC segments as well as between different private providers in a pre-competitive manner (primary producer location, deforestation analysis, etc);
iii) Enabling producers to generate and own their data;
iv) Digitising and unlocking public datasets in production countries.

Table 5 outlines the progress and gaps on DPI for FRC due diligence.

Table 5. Progress on Data Generation and Access for FRC Compliance, and Remaining Gaps.

FRC DD requirement	Progress	Remaining gaps
Geolocation	Global standards on technical specs and consistency of data and interoperability – unique ID's at plot level	No standard practice for ensuring quality, ethics/consent, and ownership of data
Traceability & segregation	Piloting of digital systems for tracking data attached to physical volumes (yet still underdeveloped and costly)	Lack of comprehensive, digitised evidence and interoperability remain a big challenge
Deforestation-free	Current efforts focused on facilitating interoperability to link up various sources of information that can support a deforestation risk assessment (e.g. WHISP)	National forest definition and international definitions are not always aligned. Many companies take a precautionary approach and use stricter definitions or higher resolution maps of private systems to avoid liability.
Legal compliance	Emerging efforts to map what compliance with local laws (yet significant work still required to support importers & exporters)	Actual evidence is often 'locked' into national systems and institutions or is not digitised

4.5. Priority areas highlighted by interviewed DPI experts

As part of this research, Proforest identified organisations that are working towards finding interventions that lead to a functional, coherent and inclusive DPI that is able to address and manage the challenges identified upstream. The complete list of interviewed experts can be found in Table C1 (Annex C).

In summary, the priority areas highlighted by experts are:

1. Harmonise efforts **between private sector & national government to avoid parallel/duplicated data** (FAO, ITC, TRACT, SEI).

2. **Facilitate involvement of National Governments in DPI discussions** (within spaces like FACT or potentially DIASCA) **to identify opportunities & gaps, as well as share lessons learned.** Joint efforts with national governments are key for ownership (FAO). Linked to data access, working with national governments to support data generation (incl. legality) plays a big role in the success of DPI's efforts (SEI, SASI, ITC, SAFE, DIASCA).

3. **Identify financial model to ensure long-term sustainability of National Government DPI.** While funding of DPI by national governments may be key in the initial stages, it should enable DPI to be self-sustainable in the long-term and not rely on external funding for its functioning (FAO, ITC).

4. **Support Technology & Data access to minority groups (i.e. smallholders).** Support for smallholder groups that are far from DPI discussions is crucial. Additionally supporting digitalisation efforts is key for the success of DPI (ITC, SEI, DIASCA). National repositories (on smallholders, on legality and legislation, …) are also key (SEI, TRACT).

5. **Build data ownership of producers within DPI & identify incentives for them to share data with private sector & national government**. Support DPI efforts in which farmers have ownership of their data, and that incentivises them to share the data with other stakeholders (ITC, FAO, TRACT, DIASCA). E.g.:
    - Explore a premium payment to farmers for their data while the farmer chooses with whom it is shared (e.g., ITC).
    - Allow the data collector (e.g., farmer) to choose how their data is used and shared (e.g., WHISP).

5. Conclusions and recommendations

This final section aims to summarise key observations of the scoping research and set out a number of broad considerations for closing data gaps, as well as specific recommendations for transformative investments.

5.1. Conclusions

The significant data gaps in commodity supply chains are the result of compounding dynamics in countries of production, which are not insurmountable but will require concerted, long-term investment and action. We highlight three major challenges:

1. **Level of organisation or aggregated support at primary production level is key for addressing data gaps and challenges with small producers, in particular the collection of location data.** National systems are seeking to collect location data at scale, but lack resources, so additional funding and effective data and resource sharing models with the private sector are needed.

2. **Collecting information about legality at producer level is complex due to a variety of local factors and the lack of precision and alignment on what acceptable due diligence and evidence looks like.** Urgent efforts are needed in key commodity producer countries to agree on realistic and practical applications of legality and appropriate evidence or proxies, to avoid inadvertently pushing out smaller and more informal actors.

3. **Local traders or aggregators don't have the sufficient incentives or capacity to develop and manage large data volumes.** Ensuring physical traceability will remain challenging in many complex supply chains. Companies are using different mechanisms for working with or around such data bottlenecks.

The many B2B processes or solution providers which most companies now rely on to provide relevant data, do little to address the structural issues above. To do this, the development of digital public infrastructure needs to be accelerated in close collaboration with the private sector and combined with a better valorisation of producer agency and ownership in the data collection process. The following considerations can help shape further action:

4. **Global DPI efforts are mostly aimed at addressing standardisation of geolocation data collection and deforestation risk assessment**
    - Legality requirements beyond right over land to grow a specific commodity are not clear on a country-by-country basis.
    - Current DPI efforts are not yet creating incentive structures for upstream actors to accelerate data collection and use public mechanisms to share that data.

5. **National processes to generate public datasets and systems are crucial to facilitate and expand data collection and verification by producers, aggregators and exporters.** Depending on their design and scope, these could cover some or most

relevant data for conducting due diligence and can be especially important in disclosing information or evidence of legality issues. However:

- Progress and completeness lag behind the timelines for EUDR compliance, and transparency and functionality of these public datasets/tools remains to be fully understood (and developed)
- Producer countries lack sufficient resources for comprehensive mapping efforts (not only for geolocation of producers but also public mapping of forests & official Protected Areas)
- Private sector is not brought into the scaling of these national processes. Precompetitive public-private collaboration is needed to build trust and understanding amongst private actors to share their mapping efforts and reduce the burden of national processes

6. **Ensuring open data tools are scaled up, actually functional for and used by companies, and maintained up to date, requires long term planning and investment.** Based on our discussions, key aspects assessed include:

    - Mapping of farm plots is not a one off (particularly for annual crops like soy where plots may change from year to year), there's a need to identify recurring incentives for producers to maintain these datasets up to date. ITC and other organisations within DIASCA are exploring incentives for producers to want to engage on DPI:
        - Local government can put in place the most direct incentives – it's therefore crucial to align private sector, national government & DPI efforts (DIASCA is exploring ways of bringing the private sector more formally into their discussions).
        - Monetary flows: every time data from a producer is shared with private sector or government there needs to be a payment for producers (this would help ensure data meets quality criteria & it's up to date).
        - Other incentive packages for local communities could be explored like access to healthcare, school fees or data exchange (i.e. info on crop prices, weather, etc.).

    - The maintenance of global DPI platforms and tools will require resources. While 'public' there is a need to explore different business cases for private sector funding and understand what changes would be needed for public data infrastructure to attract more company funding. There are also opportunities for more coordinated use of public/donor funding.
    - When smallholders are not organised (like in the case of palm) there is a need to engage at the landscape level to build their understanding of DPI. For this private sector landscape initiatives and company sustainability programmes could be leveraged.

- Producer Countries lack sufficient resources to be able to reach 100% of primary producers. Injecting donor funding will not be sustainable in the long run; long term planning will be needed.

5.2. Recommendations

The data gaps and challenges created by new FRC regulations are being addressed on a number of fronts, and this study did not cover all ongoing efforts by companies, data providers, governments, and dedicated global programmes. In this last section, we identify and unpack a handful of specific investment areas where we see significant added value: the development of tools, guidance and resources for addressing legality risks (5.2.1), and the development of stronger national processes for data collection in Indonesia, Ghana, and Brazil (5.2.2.).

5.2.1. Improving availability and consistency of legality risk data and evidence

A recurring element of all FRC due diligence regulations is their emphasis on companies checking and confirming that producers are operating legally. As discussed in Section 2 this can mean a broad range of things, and the EUDR in particular sets a broad scope. The concrete evidence and data companies can collect to meet 'legality' will vary from country to country, creating further challenges. Importantly, the EUDR also includes human rights laws as ratified by the country of production, which expands the scope of legality further – yet is also an area where most companies have some experience in collecting data or doing risk assessments.

Scope of legality under EUDR

The EUDR lists areas of law without specifying particular laws, as these differ from country to country and may be subject to amendments. Only laws concerning the legal status of the 'area of production' constitute relevant legislation Article 2(40). The areas of relevance are:

(a) land use rights;
(b) environmental protection;
(c) forest-related rules, management & conservation,
(d) third parties' rights;
(e) labour rights;
(f) human rights protected under international law;
(g) FPIC,
(h) tax, anti-corruption, trade and customs regulations.

From a data perspective, a wide range of existing and potentially new sources can be considered for legality. The experience of EUTR in the timber sector provides some indications, yet it is unclear if some of the more established practices, such as relying on national level legality assessment assume negligible risk, would suffice to meet EUDR's legality criteria.

To offer some structure to this challenge, we can distinguish between data on 'legality' risks and data that reflects compliance evidence for individual producers.

Both areas have specific data challenges and possibilities for developing open data solutions, in this section we sketch out a range of options for fast-tracking this process.

A. Improving availability and consistency of relevant legality risk data/information (for use by downstream companies with DD obligations)

Problem: a broad range of data points on legality risks can be considered. Often companies use private providers to develop global or national datasets which have little bearing on the production landscapes they source from. While reductive, such approaches could be useful first steps. However, there is little shared understanding of how different types of risk data can be combined and when and how to look for more granular information. This is compounded by large discrepancies in data use both horizontally (i.e. between downstream peers and competitors) and vertically (i.e. downstream companies might be using different risk data than their upstream suppliers or other actors). There's a number of ways that open data or DPI initiatives could make progress in this space:

- Support development of collaborative efforts for typologies of risk data and hierarchies, that can help create consistent understanding of how to combine and triangulate different types of relevant information.
- Support development of open-source data pools for national and sub-national risk data and assessments. These could be platforms where companies and initiatives combine different datasets on specific risks and reduce duplication.
- Support consistency in 'red flags' identification for escalation of evidence requests within and across due diligence processes. This could include exploring collective open-data approaches for grievance management.
- Support multi-stakeholder consensus building on sufficient mitigation and remediation actions and processes.

B. Improving digitalisation and disclosure of legality evidence

Problem: aside from risk data, there is official documentary evidence of legality status that can be acquired as part of due diligence processes. Such documentation or evidence is often 'locked' into national systems and local institutions or administrative bodies, and often producers themselves don't have access. While this is authoritative evidence, it is not only difficult to obtain for actors downstream, but it can also be cost-prohibitive to try and collect this for all producers in a given supply chain (especially for smallholders) – and local privacy laws and consent processes might further complicate this. It is in line with risk-based due diligence that such documentation is not collected for each due diligence process – yet it is still crucial and can give more security to producers as well. Therefore, better disclosure and digitalisation of these sources of evidence through open data initiatives is critical.

Several options can be considered based on what different levels of government in production countries are already doing, or could do:

- Support governments to share and disclose existing land cadastres and registries

- Support governmental platforms and programmes that are accelerating data collection for relevant local compliance frameworks
- Support development and maintenance of specific public registries/embargo lists managed by governmental agencies or ministries, for example list of companies that have standing violations of labour or environmental laws.

5.2.2. Country specific recommendations

The outlined recommendations are focused on some of the main producer countries of the commodities covered by the UK Forest Risk Commodities regulation (cattle, cocoa, palm oil and soy) (Table 6). These countries also represent the highest deforestation risk exposure for the UK according to Trase[11]. By concentrating efforts in these regions, the UK can use its resources more effectively to support UK-based companies in meeting regulatory requirements and reducing their environmental impact through targeted, context-specific interventions.

[11] Trase (2024). *UK unprotected from high levels of deforestation exposure.* UK unprotected from high levels of deforestation exposure - Insights - Trase

Table 6. Summary of National Government Efforts and Ongoing Processes in Key Producing Countries of Forest Risk Commodities

Forest Risk Commodity	Supply chain (main producers)	Main producing countries	UK major import countries & exposure to deforestation[11]	Volumes imported in the UK *(focusing on countries giving UK highest exposure to deforestation)*[12,13]	National government systems *(focusing on countries giving UK highest exposure to deforestation)*	Existing donor funding for national processes
Cocoa	Smallholder farmers	Ivory Coast, Ghana, Ecuador, Indonesia, Brazil, Cameroon, Nigeria & Peru	Ivory Coast, Ghana & Peru	94,640t (2024)	National traceability systems are underway in Ivory Coast, Ghana & Peru	AIM4Forests (Ghana)
Cattle	Family farming and other small-size breeders.	USA, Brazil, China, EU, India, Argentina	Brazil	72,436t (2020)	Agro Brasil + Sustentável Platform	SAFE (Brazil), AIM4Forests (Brazil)
Soy	Large-scale and smallholder farmers	Brazil, USA, Paraguay, Canada, Argentina & Uruguay	Brazil	670,991t (2024)	Agro Brasil + Sustentável Platform	SAFE (Brazil)
Palm oil	Smallholders, Independent concessions and mill-owned concessions	Indonesia, Malaysia	Indonesia, Papua New Guinea	238,579t (2024)	National traceability system under development in Indonesia	SAFE (Indonesia), AIM4Forests (Indonesia, Papua New Guinea)

[12] Trase (n.d.). *United Kingdom (importing country).* United Kingdom (importing country) - Explore the data - Trase
[13] International Trade Centre (ITC) (n.d.). *Trade Map.* Trade Map - Trade statistics for international business development

Indonesia

The implementation of the EU Deforestation Regulation (EUDR) has catalysed enhanced collaboration between traders and the Indonesian government, notably through the Joint Taskforce aimed at aligning compliance efforts and improving data-sharing and smallholder inclusion. Government policies have prioritised support for producers, particularly through ISPO certification, though uptake remains low due to limited funding. Traders have shown limited engagement in policy forums, partly due to concerns over perceived collusion stemming from past initiatives. While major traders are piloting the National Dashboard to improve traceability, progress is hindered by data-sharing constraints and transparency issues. Additionally, smallholders face significant barriers to compliance, including lack of formal land tenure and registration, which restricts their market access. Rising compliance costs, particularly for geolocation and traceability, are prompting traders to increasingly rely on large, traceable suppliers, potentially marginalising smallholders further. A list of recommendations for Indonesia's context can be found in Table 7.

Table 7. Summary of Recommendations to Address Data Gaps in the Palm Oil Supply Chain of Indonesia

FRC DD requirement	Specific recommendations to address gaps in palm oil data
Geolocation, Traceability & Segregation	1. **Multi-stakeholder discussion between Indonesian government & private sector** to identify opportunities for collaboration in accelerating deployment of national dashboard. a) Opportunity to build on discussions held in the context of POCG (Palm Oil Collaboration Group) with Coordinating Ministry of Economic Affairs and CPOPC (Council of Palm Oil Producing Countries) b) Identifying solutions to address data challenges/ gaps in Indonesia: • Data security • Interoperability (private sector and aggregating) • Supporting smallholders get an STD-B license (cultivation permit) • Explore role of ISPO certification.
	2. **Piloting data aggregation and sharing models** for under-resourced producers in landscape or jurisdictional initiatives to: • Aggregate and scale existing data collection efforts of companies, service providers and other localised data solutions • Explore data sharing and interoperability models for pulling data into the national dashboard • Explore mechanisms to ensure the maintenance and viability of data generation and maintenance of national dashboard in the long run • Pilot tools developed within global DPI community (i.e. DIASCA, FAO, WRI, etc.) • Share findings of pilot with local and national government as part of the "long-term" financing model of national dashboard & explore opportunities for replication
	1. **Leverage government to government discussions** to:

FRC DD requirement	Specific recommendations to address gaps in palm oil data
	• Discuss opportunities to share official Indonesian forest maps (already publicly available through the Ministry of Environment and Forestry, referred to as KLHK) in a downloadable format to support importer companies to verify compliance with upcoming FRC regulation • Initiate discussion on risk-based traceability and risk mitigation approaches (particularly for smallholders), including potential options for remediation once deforestation has happened (i.e. idea of recognising remediation in scope of the regulation)
Deforestation-free	2. **High level guidance for UK-based companies on how to leverage DPI for regulatory compliance and to support better outcomes in producer countries.** This guidance should cover at a minimum: • Providing them with the set of data and DPI tools that could be leveraged to support their company DCF reporting • Data and evidence required to prove compliance with several FRC regulations (EUDR, UK FRC, etc.) • Incentives for private sector to maintain their commitment to entirely eliminate deforestation from supply chains (i.e. navigating corporate DCF goals and legal compliance requirements)
Legal compliance	1. **Leverage DPI efforts** (and potentially the World Database on Protected Areas led by UNEP and IUCN and managed by UNEP-WCMC) to identify opportunities for KLHK to make forest zoning maps (already available in Indonesia's' National Geospatial Portal) in a downloadable format to support importer companies to verify compliance with upcoming FRC regulations.

Ghana & Ivory Coast

Ghana's COCOBOD developed the Ghana Cocoa Traceability System (GCTS) – a national platform designed to facilitate traceability of cocoa which also addresses the EUDR requirements by tracking cocoa from farm to port. While Licensed Buying Companies (LBCs) - traders - support the idea of a unified system, many remain concerned about GCTS's robustness, credibility, transparency and accountability. The key interest of the traders revolves around the operationalisation of the GCTS after dry runs have been conducted in only two cocoa districts, out of the seventy cocoa districts in Ghana. Additionally, there are uncertainties on whether subscription (at a yet to be determined rate) to the GCTS will be mandatory, or interoperable with traders' existing traceability systems. Until the national operationalisation of the system is undertaken throughout all the seventy cocoa districts, clarity on subscriptions regulations (mandatory or parallel to existing traceability systems) and the subscription fees are provided, traders are hesitant to fully transition, highlighting the need for stronger assurances and technical improvements.

The situation in Ivory Coast is similar to Ghana, where national government is developing a public platform that traders support yet are obliged to maintain their own private systems until it proves reliable for demonstrating FRC DD compliance. Yet in Ivory Coast most cocoa is sourced through intermediaries (≈65%), therefore even though government is making efforts towards mapping and engaging smallholders to be included in the national system, the indirect supply

remains a major challenge[14]. A list of recommendations for Ghana and Ivory Coast's context can be found in Table 8.

Table 8. Summary of Recommendations to Address Data Gaps in the Cocoa Supply Chains of Ghana and Ivory Coast

FRC DD requirement	Specific recommendations to address gaps in cocoa data
Geolocation, Traceability & Segregation	**Ghana:** **1. Conduct awareness raising and dissemination about the GCTS across Ghana's cocoa growing regions (beyond 4 pilot districts) for exporter companies, cooperatives and LBCs** 2. **Conduct regular public-private dialogues between government & private sector to share results of GCTS readiness evaluation and discuss opportunities for further strengthening the system to support company compliance needs, and public-private collaboration on operationalising the system, e.g.:** • Support under-resourced private sector companies (LBCs) to be integrated onto national digital system/platforms • Ensure seamless integration of existing Private sector data into national system • Identify a financial model to sustain the platform's long-term functionality **Cote D'Ivoire:** 3. **Conduct public-private dialogues between government & private sector to share updates about the readiness of the CCC systems and identify opportunities for closer public-private collaboration on e.g.:** • Integration of existing private sector data into national system • Discuss resources needed to map and engage producers in under-resourced areas
	1. **Provide financial support to national governments to deploy their national systems** a) Provide financial resources to support national governments in establishing local government offices to host Cocoa Management System (CMS) officers, responsible for training of purchasing clerks to support mapping and engagement of smallholders into national systems (Ghana) b) Training of CMS officers and purchasing clerks of LBCs on use of the GCTS system. For purchasing clerks, a particular focus on those from smaller LBCs who are likely to have greater knowledge gaps (Ghana) c) Enhance capacity of national government on data management and integrate technology from DPI where relevant

[14] Nitidae & EFI. 2024. *Traceability and transparency of cocoa supply chains in Côte d'Ivoire and Ghana***.** Nitidae & EFI https://euredd.efi.int/wp-content/uploads/2023/08/Traceability-and-transparency-of-cocoa-supply-chains-in-Cote-dIvoire-and-Ghana.pdf

FRC DD requirement	Specific recommendations to address gaps in cocoa data
Deforestation-free	d) Build capacity of cooperatives & provide support in getting farmers IDed, and digitalising existing data (Ivory Coast) 2. **Leverage DPI efforts** to initiate discussion on needs and potential support that can be provided to SODEFOR to align forest zoning across regional and national government in Ivory Coast). This will in turn support legal compliance requirements and enable #2 below
	2. **Leverage government to government discussions** to: • Discuss opportunities to share official forest maps from Ivory Coast via SODEFOR in a public and downloadable format to support importer companies verify compliance with upcoming FRC regulation. • Leverage efforts from SODEFOR (the government agency responsible for managing classified forests and reforestation programs) to initiate the discussion on risk mitigation approaches once cocoa-driven deforestation has been identified (i.e. same idea of exploring the role of restoration to support FRC DD compliance).
	3. **High level guidance for UK-based companies on how to leverage DPI for regulatory compliance and to support better outcomes in producer countries**. This guidance should cover at a minimum: • Greater clarity is needed regarding the legal status of cocoa produced in specific scenarios and areas, along with improved data accessibility for sourcing companies. This means developing an applied guidance for data and evidence in the cocoa sector that can be used to indicate compliance with several FRC regulations (EUDR, UK FRC, etc.) • Providing them with the set of data and DPI tools that could be leveraged to support their company DCF reporting • Incentives for private sector to maintain their commitment to entirely eliminate deforestation from supply chains (i.e. navigating corporate DCF goals and legal compliance requirements)
Legal compliance	1. **Leverage government to government discussions** on evidence required for proving land use rights compliance in the context of Ghana and Ivory Coast where no formal tenure exists (or when temporary) to confirm what level of evidence should be required in the importing country.

Brazil

FRC DD regulations have accelerated initiatives like the AB+S (Sustainable Agro Brazil Platform) Platform and increased ABIOVE's (Brazilian Association of Vegetable Oil Industries) involvement in traceability and transparency, supporting national monitoring efforts. On the other hand, producer associations have voiced frustration, arguing that Brazil's strong environmental laws are undervalued and that expectations to exceed legal requirements lack fair compensation. This tension has contributed to the absence of formal dialogue between Brazilian government and the EU on EUDR. While private compliance solutions exist, they offer limited environmental

impact. Long-term progress depends on strengthening national systems, improving coordination, and supporting inclusive, multi-stakeholder dialogue—especially in key jurisdictions. A list of recommendations for Brazil's context can be found in Table 9.

FRC DD requirement	Specific recommendations to address gaps in soy and cattle data
Geolocation, Traceability & Segregation	1. **Enabling localised data solutions:** multi-stakeholder convening between national government & private sector to identify opportunities for collaboration in accelerating deployment of national dashboard. a) Build on work from ABIOVE & Coalizão Brazil Climate Forests and Agriculture to identify data gaps & challenges b) Provide more clarification for exporters/ importers in terms of existing information available to meet legality requirement
	2. **Data governance & validation:** a) Identify financial models to sustain the long-term sustainability and relevance of national platforms (e.g., Brazil Agro+Sustainable Platform) regardless of the administration in charge. Additionally, supporting new functionalities of the platform that would allow to identify the data that is accepted by consumer countries' governments to meet FRC regulations' requirements would provide further support. b) Current national platform relies on public data (i.e. Cadastro Ambiental Rural) & self-declared information. Setting up a validation mechanism & clear roles and responsibilities across state vs federal governments on who has the mandate to validate data
	3. **Incentivise farmers to share their information in the national platforms** a) Engagement with producers' associations to promote national solutions for monitoring and traceability. b) Explore the role of premium payment in return for data as well as better market access c) Explore how data inputted in Brazil Agro+Sustainable Platform can help producers access better rural credits
Deforestation-free	1. **Facilitate government to government discussions to**: • Recognise National Systems on deforestation data and monitoring. Currently Brazil has two complementary national systems on deforestation data and monitoring: i) Prodes System, the most reliable and accurate Brazilian data base on deforestation rates; ii) Deter Platform, generates daily alerts to improve monitoring against deforestation. • Initiate discussion on risk mitigation and regeneration approaches once deforestation has happened (i.e. idea of recognising restoration in scope of the regulation). Currently, Brazil has two national programs: i) National Program for Converting Degraded Pastures into Sustainable Agricultural and Forestry Systems (PNCPD); ii) National Plan for the Recovery of Native Vegetation (PlanaVeg).

FRC DD requirement	Specific recommendations to address gaps in soy and cattle data
	2. **High level guidance for UK-based companies to support them in navigating corporate DCF goals and legal compliance requirements**. This guidance should cover at a minimum: • Data and evidence required to prove compliance with several FRC regulations (EUDR, UK FRC, etc.) • **Incentivise private sector** to maintain their commitment to entirely eliminate deforestation from supply chains
Legal compliance	1. **Facilitate dialogue between Brazil government and importer countries to define legality expectations and feasible legal requirements.**
	2. Incentivise farmers to use the national platforms • Non-compliant farmers remain a challenge due to lack of penalties. Identifying and providing incentives to resolve their non-compliance may result in an increase of the use of national platforms and data sharing

Annex A: Regulatory data demands

Table A1: Simplified typology for comparison of FRC regulations based on their design and data requirements.

Regulation	Scope - products/ commodity	Scope – compliance trigger(s)	Scope – obligations type	Traceability requirements	Risk-based approach to data collection/DD	Recognition of certification
EUDR	*Cattle, cocoa, coffee, oil palm, rubber, soya and wood*	*On product transaction/shipment (import, trade, export)*	*Transaction-level DD*	*Traceable to plot/ harvested area*	*Yes - but not for all aspects of the regulation*	*Implicit - referenced as a potential tool in guidance documents/ FAQ/ preamble/ etc.*
EUTR	*Timber and wood products*	*On product import*	*Product-level DD*	*Traceable to 1st aggregator*	*Yes - but not for all aspect of the regulation*	*Explicit - included as a tool in the core text of the regulation*
UKFRC (*proposal*)	*Cattle products (excluding dairy), cocoa, palm oil and soy*	*Company size threshold*	*Company-DD policy and process*	*TBC but no mandatory approach- just guidance*	*Yes - fully risk based*	*Implicit - referenced as a potential tool in guidance documents/ FAQ/ preamble/ etc (TBC)*
US Forest Act (*proposal*)	*Cattle, cocoa, palm oil, rubber, soy, wood pulp*	*On product import*	*Product-level DD*	*Traceable to farm/ unit of management*	*Yes - fully risk based*	*Implicit - referenced as a potential tool in guidance documents/ FAQ/ preamble/ etc (TBC)*

Regulation	Scope - products/ commodity	Scope – compliance trigger(s)	Scope – obligations type	Traceability requirements	Risk-based approach to data collection/DD	Recognition of certification
US Lacey Act	*Timber and wood products, plant/seeds/plant-based products, products derived from fish and wildlife*	*On product import*	*Product-level DD** **Not a proper DD requirement*	*Traceable to country of origin*	*No – all requirements must be met, regardless of risk level*	*Not recognised*

Note. Dark grey indicates high data needs/no flexibility; Grey indicates medium data needs/some flexibility; Light grey indicates low data needs /more flexibility

Annex B: Supply chain actor definitions

- **Small scale producers and actors**: primary commodity producers that operate at small-scale:
    - **Small-commercial Farmers** using less than 20ha of land. Generally connected to domestic or international value chains, but often only selling via dealers/intermediaries. Farming is the dominant livelihood strategy. Range from "larger" farmers that are well capacitated and/or organised with income above the poverty line, through to very small, independent farmers with lower capacity and weak or insecure market access, and often marginal income.
    - **Semi-commercial Farmers** selling a significant surplus of production but loosely connected to markets. Mostly poor to very poor (close to poverty line) and may have diverse livelihood strategies.
    - **Semi-/subsistence Farmers** who sell none or only a small proportion of surplus (usually to local markets), tend to have low productivity. Poor to very poor, depend on production for own food.

  In addition to producers, various small-scale actors are relevant in this category, in particular: **small-scale aggregators such as collection centers or cooperatives**, and **small-scale local traders** who manage transportation and distribution.

- **Small and Medium Enterprises (SMEs):** as per Article 3 of the Directive 2013/34/EU, SMEs are categorised as undertaking that does not exceed the limits for two out the following three criteria:
    - balance sheet total under EUR 20 000 000;
    - net turnover under EUR 40 000 000;
    - average number of employees during the financial year under 250.

Annex C: Interviewed organisations

Table C1: List of organisations (and their DPI processes) interviewed for this project.

Ongoing process tackling DPI	Lead Organisation	Description & Aim
DIASCA/SAFE	SASI (GIZ)	DIASCA aims to develop common open standards to support interoperability between traceability systems. SAFE is dedicated to preserving forests by promoting sustainable agri-food systems. It supports the transition to deforestation-free, sustainable, and legal value chains.
AIM4Forests	FAO	Working with 20 countries to institutionalise their NFMS and provide high-integrity MRV through modern monitoring technologies. As part of this programme FAO have developed Open Foris which is a set of free and open-source solutions for forest and land monitoring.
DFTG	ITC	DTFG is an innovative platform that aims to empower producers and cooperatives by providing them with the tools needed to collect, manage, and showcase their deforestation-free data.
Trase	SEI & Global Canopy	Not-for-profit initiative aimed at bringing transparency to deforestation and agricultural commodity trade. Trase combines data on commodity production and trade to map supply chains linking consumer markets via traders with regions of production.
TRACT	Private sector	TRACT enables end-to-end supply chain traceability, visualising your product movements from the farm all the way to the final customer destination. Suppliers can send geolocation data directly to downstream companies for easy aggregation and management. TRACT is linked to GFW for deforestation assessment after the EUDR cut-off date.
FACT Dialogue	UK and Malaysia co-chairs & CIFOR-ICRAF Secretariat	30 Producer-Consumer partnership to protect forests and other ecosystems while promoting sustainable trade and development while addressing the climate and biodiversity crisis. 4 key thematic areas: (1) Support for Smallholders; (2) Traceability and Transparency; (3) RDI; (4) Trade & Markets.
Forest Data Partnership	WRI	Align stakeholders to reach consensus around key data sets in the ever-expanding landscape of forest monitoring data and identify critical data gaps.

About Proforest Initiative

Proforest is a mission-driven organisation. We believe that agricultural commodity production can be done in a way that meets global demand and works for the natural environment where commodities are grown, benefits the people who live and work there, and in a way that creates a resilient climate.

We manage grant-funded programmes through our charitable Proforest Initiatives in the UK, Africa and Brazil. The Proforest Group has more than twenty years of practical experience in supporting governments, companies, communities and partners, to establish responsible production and sourcing practices in Asia, Africa, Latin America and the Caribbean, Europe and North America.

We focus on the production base and supply chains of agricultural and forestry commodities including soy, sugar, rubber, palm oil, cocoa, coconut, beef and timber. We use our understanding of production and supply chain activities built through working with companies to inform our work with governments, landscapes and sectoral initiatives.

Conversely, our programmes enable a longer-term engagement that can build a supportive environment where companies can engage with other stakeholders or collaborate with each other to scale impact.

We support this foundation of governance through creating and facilitating multi-stakeholder platforms; developing tools and guidance; providing policy advice; and delivering training to build capacity and ensure local benefits and local ownership of issues in the places commodities are produced.

Visit our website to see an overview of projects we've worked on and to meet our global team.
You can also find training and resources on the Proforest Academy.

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