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FROM BUILDING A PRODUCTION AREA DATABASE FOR TRACEABILITY AND MANAGEMENT TO A MULTI-LAYER DATABASE FOR THE FUTURE

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1. INTRODUCTION: PRODUCTION AREA DATA COLLECTION

The production area database for agricultural and forestry commodities such as coffee, rubber and timber is critical infrastructure for effective sector management. It also enables companies to trace products, meet market requirements for supply-chain transparency, and demonstrate compliance. An accurate ("clean") and regularly updated ("live") production area database is now vital to these commodity sectors.

In the recently published Forest Trends report *The urgent need to build a production area dataset for agricultural and forestry commodities for management and traceability: A bottom-up approach*, the authors highlight the urgency of building a production area database as export markets impose increasingly stringent requirements for traceability and for commodities and products to be legal and deforestation-free. The report argues that Vietnam urgently needs to build a live and clean production area database because:

- Existing production area databases are fragmented and not connected across stages. Companies working with farming households to develop sustainable sourcing areas invest resources in building databases for their own production areas. They regard these as proprietary assets and do not share the data with third parties. This creates a risk of overlapping sourcing areas among companies operating in the same locality and wastes resources when multiple parties collect data for the same production area.
- Companies developing sustainable production areas usually select accessible locations with established organizational systems, such as existing purchasing networks, to link with farming households. This leaves data gaps for production areas outside those arrangements. Without baseline data for traceability and compliance, products from unlinked areas entering export supply chains create risks for the sector.
- Management agencies currently collect production area data for some commodity crops. However, these data are not updated regularly, are not harmonized, and do not contain enough input fields to support traceability.
- A live and clean production area database enables companies to conduct traceability and due diligence and demonstrate supply-chain compliance with market requirements. It also helps management agencies identify risks of overlap between cultivated land and forest land, attract and guide private investment into sourcing areas, and develop practical policies that steer commodity sectors in line with management priorities.



The report argues that even with limited public financial resources, government can still build a live and clean production area database through a "bottom-up" approach. Under this approach, local authorities mobilize their staff, especially commune-level staff, to work with farming households to collect data for each parcel where commodity crops are grown. The process requires regular technical advice and support from some provincial department staff. Commune and village staff need training in the use of data-collection tools (software). For the bottom-up approach to succeed, several conditions are needed:

- Government authorities engage from the outset, clearly assign responsibilities to provincial and commune focal points, and treat data collection as an official responsibility.
- Data-collection tools/software meet technical quality, cybersecurity and data-safety requirements.
- Online support is available to commune and village staff for tool- and software-related questions.

These observations, including the recommendations in the report above, were developed from production area data-collection activities in several locations in Điện Biên and Sơn La. With technical support from Forest Trends and the provincial Departments of Agriculture and Environment, commune and village staff in Pu Nhi and Chiềng Sinh communes (Điện Biên) and Mường Chanh and Nậm Lầu communes (Sơn La), together with coffee-growing households, collected production area data. The data cover each coffee plot of each household. Collection is still underway and is now entirely managed by commune and village staff. Provincial leaders plan to review the pilot after data collection in these locations is completed and, based on lessons learned, direct its replication province-wide.



Photo 1: Residents of Nậm Lầu Commune, Sơn La Province, practice using the production area data-collection tool. Source: Forest Trends



2. THE "BOTTOM-UP" APPROACH: ISSUES EMERGING FROM PRACTICE

Following publication, the arguments and recommendations in the report prompted debate over the approach, including the tools used for data collection, data collection itself, storage, synchronization and data security. Application of the bottom-up approach in Điện Biên and Sơn La has also revealed several practical issues, including:

- Resource duplication in data collection. Companies developing sustainable sourcing areas have already collected data for those areas. Under the bottom-up approach, local authorities collect data for the same areas again, wasting resources. Avoiding this requires a coordination mechanism between companies and government for data collection and sharing (see Box 1).
- Risk of inconsistent production area data across localities if central authorities do not provide specific guidance on data fields and collection templates. A bottom-up approach in which localities act independently can result in different input data being collected in different places, making it impossible to synchronize data across localities and between local and central levels.

Box 1. Resource duplication in production area data collection

Under the bottom-up approach, Forest Trends supported villages in Mường Chanh Commune, Sơn La Province, to collect production area data. During data collection, staff in several villages said they had done the same work a few months earlier, when coffee companies hired them to collect data on household coffee plots in their villages. The companies paid village staff by the working day. Commune staff were completely unaware of these village-level data-collection activities. In other words, the companies had not contacted the commune authorities when carrying out household-level data collection. Commune and village staff also did not know why the companies were collecting the data.

Source: Field activities in Mường Chanh, July 2026.



- No clear mechanism exists to keep collected data live and clean after the first round of data collection is completed. Land-related changes (e.g., ownership, crops or area) may occur every year, depending on factors such as commodity prices and the land market. Without a specific mechanism for updating such changes, the collected dataset may become "dead" and unusable.
- Data-collection tools are unstable and inconsistent. There is currently no specific guidance for localities on what tools to use, how collected data should be stored, or the required level of data security and confidentiality. This creates a need for specific, harmonized requirements for data collection and management across localities and between local and central levels.

The bottom-up approach has several limitations, particularly the duplication of time and resources for both management agencies and companies. However, it remains necessary for areas outside company-linked sourcing areas and for locations without baseline data. A coordination mechanism is therefore needed so that data from companies, commune authorities and provincial technical agencies can be standardized, verified, integrated and regularly updated.



Photo 3: Commune staff guide residents in using the production area data-collection tool. Source: Quana Van Thanh



3. GOVERNMENT'S ROLE IN DATA COLLECTION AND MANAGEMENT

Some argue that data collection is the responsibility of companies because they need the data to demonstrate compliance and trace their commodities. From a sector-wide perspective, however, production area data collection is not solely a corporate responsibility. Companies focus only on their own production areas and not on areas outside them. Risks arise when products from outside a company's sustainable sourcing area enter export supply chains serving markets that require traceability. In addition, companies hold data but do not share it with one another, creating the risk that their production areas overlap.

The role and manner of local government involvement in companies' production-area development (and production area database collection) vary considerably. The examples below, compiled from field surveys in several localities, illustrate this variation.

Case 1. A representative of a large coffee company with sourcing areas in the former Di Linh and Bảo Lộc districts of Lâm Đồng Province said that, before starting activities to develop its sourcing area, the company had to send official letters to the relevant district People's Committees requesting permission to conduct surveys and sourcing-area development. The letters described the survey area and fieldwork plan, including community meetings and collection of land data. The company could proceed only after receiving formal written approval. Once the district People's Committee approved the proposal, it sent letters to the communes where the company planned to develop sourcing areas, introduced the company to the commune People's Committees, and requested local support. Without district approval and commune support, the company could not - and was not permitted to - operate locally. During implementation, it also had to regularly report activity results to district and commune authorities.

Case 2.1. Forestry company V.N wanted to partner with forest-growing households in Tuấn Sơn Commune (former Hữu Lũng District), Lạng Sơn Province, to establish a plantation timber sourcing area certified under the FSC sustainable forest management standard. In 2025, the company sent an official request to the district People's Committee for permission to develop production areas in several communes, including Tuấn Sơn. The district subsequently issued written approval for the company to operate there.

† Company names in these examples have been anonymized to protect confidential information.



Forestry company T.H also wanted to develop an FSC-certified plantation timber sourcing area in Hữu Lũng. In early 2026, T.H sent an official letter to the provincial People's Committee seeking in-principle approval to invest in an FSC-certified plantation timber sourcing area in Hữu Lũng District, including Tuấn Sơn Commune. The provincial People's Committee authorized the Department of Agriculture and Environment to engage with the company. The Department then assigned the Provincial Forest Protection Sub-Department as the focal point. Its leaders invited T.H's management to a meeting. At the meeting, T.H presented detailed plans for a sourcing area in Tuấn Sơn Commune - overlapping the area of V.N. The Sub-Department knew that V.N had already received district approval to develop a sourcing area in Tuấn Sơn, but according to its leadership, V.N had not implemented any activities after that approval. To avoid leaving forest-growing households waiting, the Sub-Department supported T.H's sourcing-area development in Tuấn Sơn. It then sent a letter to the commune People's Committee requesting support for T.H. Based on that letter, the commune authorities met with T.H to understand the detailed plan and later issued written approval for agreed activities. The commune also introduced T.H to villages containing the plantations where T.H would develop its sourcing area.

While T.H was implementing activities in Tuấn Sơn, staff from V.N obstructed the work, arguing that Tuấn Sơn was V.N's area because the commune People's Committee had already approved V.N's production-area development there and that T.H had been allowed to carry out similar activities in the same area. When this occurred, the commune People's Committee asked V.N and T.H to negotiate and agree on how to divide the sourcing area. When they could not agree, the commune convened a meeting with the leaders of both companies. Commune leaders required the two companies to report in detail on activities already carried out in the commune and their specific plans for the next period. At the meeting, the commune acted as coordinator and "arbiter," made a ruling and decided how the two companies would implement activities locally. Based on the commune's decision, both companies are continuing their activities accordingly. The commune People's Committee also requires both companies to report their results to the commune every month.

Learning from the V.N-T.H case, the commune People's Committee subsequently sent a letter to leaders of all villages requiring each village to cooperate with only one company. It also required village leaders to provide monthly updates to the commune on company activities in their areas.

Case 3. Mường Chanh is one of the communes with a large coffee area in Sơn La Province. Because production is concentrated and well established, several coffee companies chose the commune to develop sustainable sourcing areas by partnering with farming households to produce sustainable coffee. As noted in Box 1, the companies did not inform the commune of their plans. Instead, they worked directly with villages and hired village staff to collect household production area data. Staff in some villages knew the purpose of the data collection; many did not. The commune People's Committee was entirely unaware of the companies' activities in the villages.



These three cases show very different roles for local authorities in company production-area development. As noted in the Forest Trends report cited in Section 1, to avoid wasting resources and reduce risks, local authorities should play an important role in coordinating company activities to build production-area datasets within their jurisdictions, as in Case 1 or Case 2. Local authorities should also require companies developing production areas in their jurisdictions to share production area data with government, based on the principles of purpose limitation and confidentiality (see Section 4).

The three cases also show that local-government roles in company production-area development currently vary greatly, from relatively clear approval and coordination to difficulties managing company activities locally - challenges that are expected to become more complex and multidimensional in the future. This variation creates risks of overlapping sourcing areas, non-transparent competition among companies, inadequate mechanisms to protect farmer interests, and loss of information needed for state management. Local authorities should therefore coordinate companies' production-area data development and require them to share production area data under principles of purpose limitation, confidentiality, and protection of legitimate competitive advantages (see Section 4).



Photo 4: Forest protection staff in Năm Lầu Commune, Sơn La Province, guide residents in using the production area data-collection tool.
Source: Forest Trends



4. BUILDING A PRODUCTION AREA DATABASE: TOP-DOWN AND BOTTOM-UP APPROACHES

To avoid wasting resources, production area databases should combine top-down and bottom-up approaches. Data collected through both approaches should be integrated and consolidated at the commune People's Committee (for all production areas in villages within the commune), the provincial Department of Agriculture and Environment (for all communes in the province), and the Ministry of Agriculture and Environment (for data from localities nationwide). Collection and storage must follow confidentiality and purpose-limitation principles. Provincial Departments should provide technical guidance, quality assurance and province-level data aggregation; the Ministry should establish data standards, technical standards, security requirements and a national integration mechanism.

Inputs to the system's production area database include: (a) cadastral data (where available), with cadastral information for each production plot; (b) production area data from companies that have developed sustainable sourcing areas; and (c) newly collected production area data gathered through village and commune staff. The sections below describe these information sources.

4.1. Cadastral data

Cadastral data comprise digitized information on parcel boundaries, land users and assets attached to the land. Key components include cadastral maps, cadastral registers and land-use-right certificate records. Cadastral maps show the location, shape, area and land-use category of parcels. Cadastral registers contain information on land users, parcel numbers and parcel areas. Cadastral data also include legal documents, registration applications and survey results. They make it possible to identify each parcel, its legal status, boundaries and size.

Some localities already have cadastral data. This source is very important because it allows individual cultivated plots to be identified and provides a foundation for production area data. Using it, management agencies and/or companies need only add information such as the land user and crop grown on the parcel to create a complete production area dataset.

However, many localities still lack cadastral data, especially for agricultural and forestry land, which is often not prioritized in cadastral database development. This is common in disadvantaged, resource-constrained localities. Without cadastral data, companies and local authorities must build production area databases from scratch.



4.2. Data from companies

Companies that have developed sustainable sourcing areas already have production area databases that meet export-market requirements, including traceability requirements.

To avoid duplicated information and wasted resources in data collection, these companies should share their data with management agencies. Companies should share production area data with the People's Committee of each commune in which their sourcing area is located. Consolidated data from all communes should then be sent to the provincial Department of Agriculture and Environment.

A representative of a large coffee company described production area data as "a company asset." According to several coffee companies, the average cost of collecting data for one hectare of coffee is about USD 5-7, and in some cases as high as USD 30. This includes costs for community meetings, sourcing-area surveys, field measurement, data collection and cleaning, among other activities. These estimates assume that cadastral land data already exist and companies can access them free of charge. Where cadastral data are unavailable, data-collection costs rise substantially. Because the data are assets created through investment, one company said it is "not easy to share this data source."

Companies consulted said they would share data if management agencies guaranteed that the data would not be shared with any third party, preventing companies that have not developed their own sourcing areas from accessing competitors' data. Management agencies therefore need to explain the purpose of collecting the data and establish robust mechanisms to prevent leakage of company-provided data. If these conditions are met, management agencies can save substantial human and financial resources in data collection (see Box 2).

Box 2. Benefits of data sharing by companies

Nậm Lầu is one of two communes in Sơn La Province selected to pilot coffee production area data collection for EUDR compliance. The commune currently has more than 5,000 ha of coffee across 40 villages. To collect the data, the commune People's Committee mobilized commune staff and all village staff in the 40 villages to work with households on field data collection. Because settlements are dispersed, travel is difficult, most residents are ethnic minorities, weather conditions are unfavorable, and landholdings are fragmented (averaging 0.3 ha per plot), field data collection is highly challenging. After three weeks of intensive work by commune and village staff and households, data had been collected for less than 2,000 ha.

In contrast, while Nậm Lầu had to build its production area data from scratch, a commune in Quảng Trị Province had previously collected data from a company. There, commune staff needed only about one week to create production area data covering 2,000 ha of coffee.

Source: Field activities and information shared by companies.



4.3. Newly collected data

Local authorities need to collect production area data for all areas outside those already covered by company data. This is necessary to ensure comprehensive and complete coverage of the production area database and to avoid information gaps in hard-to-reach areas and/or small production areas where companies have little interest in developing sourcing areas. Doing so requires detailed guidance (data-collection templates and required data fields) and effective data-collection tools (software and smartphones) suited to the actual conditions, capacity and skills of commune and village staff. As noted in the earlier Forest Trends report *The urgent need to build a production area dataset for agricultural and forestry commodities for management and traceability: A bottom-up approach*, strong engagement by Party committees and local authorities is needed from the outset, together with training to equip commune and village staff with the knowledge and capacity to use these tools.

4.4. Data synchronization and updating

Data synchronization is critical. Data must be synchronized among villages within the same commune, among communes within the same province, and among provinces nationwide. Synchronization also requires consistent input information at the point of collection - among companies and between companies and local authorities - including common data fields and collection templates. Unsynchronized data cannot be integrated, resulting in fragmented, incomplete and unusable datasets.

Ensuring data consistency requires specific guidance from the Ministry of Agriculture and Environment, the agency responsible for the production stage of agricultural and forestry commodity sectors. Guidance should specify the information fields to be collected and mechanisms for independent verification or cross-checking among company-provided data, commune-provided and confirmed data, cadastral data and remote-sensing data. These mechanisms can identify duplicate parcels, coordinate errors, land-use changes, missing declarations or false declarations.

Companies may receive different requirements from customers regarding the level of detail needed for production area information. Depending on the specific market/customer requirements, companies can expand the data fields they collect.

After the initial dataset is completed, collected data should be updated annually so that it accurately reflects changes in household-level land use (for example, changes in crops or land users). This keeps the data live. Government should establish a system (for example, a website) that allows residents, or village staff assisting residents, to update changes in the system. Updated data should be confirmed by the commune before being accepted into the system.



This helps ensure accuracy and prevent risks across the system. Management agencies need to allocate human and financial resources for data updating. Financial resources could be mobilized from companies operating locally - for example, the Government could allow commune People's Committees to collect USD 1-2 per tonne of coffee purchased by companies within the commune.

A complete, regularly updated production area database also gives management agencies a basis for resolving disputes and handling complaints when two or more companies declare the same sourcing area. It can also help resolve discrepancies when company data differ from commune-confirmed data, when farmers say parcel or land-user information has been recorded incorrectly, or when data are used for purposes beyond those originally committed.



Photo 6: A specialized cultivation area bordering natural forest in Son La. Source: Forest Trends



5. FUTURE DATA REQUIREMENTS FOR COMMODITIES AND PRODUCTS

Export markets are imposing increasingly stringent requirements on products. These often go well beyond product quality to include requirements that products be socially and environmentally safe. The Government of Vietnam is also strengthening quality control and product traceability requirements. Product data - including direct data (such as product composition and chemical and physical properties) and related data (such as environmental and social information associated with production, processing and circulation) - are important for meeting these requirements.

Current requirements for product input data and future trends point to four different data layers related to products that supply-chain actors need to collect.



01

**Data on the geographic location of production plots
and
product legality**



02

Cultivation and carbon footprint data



03

Product journey and trade data



04

Environmental, social and governance data



- **First data layer: Data on the geographic location of production plots and product legality**

This is the foundational data layer for demonstrating compliance with deforestation-free production requirements and land-use requirements. At a minimum, the dataset should include a production-plot identifier, coordinates and spatial boundaries, producer information, crop type, area, current land-use status, information on links with a company or cooperative, estimated output, date of the latest update, and source of data verification. The EUDR is a typical example of requirements for this data layer. Similar EUDR-type requirements from other markets are likely to continue in the future.²

- **Second data layer: Cultivation and carbon footprint data**

This data layer is important for assessing the impact of cultivation on greenhouse gas emissions. Greenhouse gas emissions resulting directly from activities used to produce a product - including cultivation, processing, circulation and trade - are commonly referred to as its carbon footprint. The carbon footprint is calculated from the average greenhouse gas emissions per unit of product generated during production. Calculating a product's carbon footprint requires data on fertilizer and pesticide use (e.g., timing of application/spraying, quantities and types), irrigation water use, management of ground cover and residues, and shade-tree systems (for coffee plantations), among other factors. All activities should be recorded and retained in farm diaries. One example is the Government of Japan's requirement that companies importing wood pellets into Japan account for greenhouse gas emissions across the entire product supply chain.

- **Third data layer: Product journey and trade data**

This layer supports product traceability throughout the supply chain. Data to be collected include product outputs, material inputs at each stage, and descriptive evidence demonstrating activities at each stage. These data also serve as inputs for supply-chain due diligence. Under the EUDR, companies importing agricultural and forestry commodities within its scope must collect and retain evidence for traceability.

- **Fourth data layer: Environmental, social and governance data**

This layer covers issues such as gender, labor, inclusion and diversity, and occupational safety. It helps provide evidence that supply-chain actors comply with relevant requirements related to

² The UK Government has officially announced the development of regulations similar to the EUDR. Details: <https://www.gov.uk/government/publications/the-uks-approach-to-deforestation-regulations/the-uks-approach-to-deforestation-regulations>. The Government of Japan is also gathering information to consider whether a mechanism similar to the EUDR could be applied to wood pellets imported into Japan.



social issues. Social requirements are often incorporated into the laws of producing countries when those countries participate in international conventions or trade agreements that include social provisions. For example, Vietnam endorsed the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) in 2007; Vietnam also signed the EU-Vietnam Free Trade Agreement (EVFTA) in 2019, which includes many requirements on labor, employment and social-responsibility commitments. This layer also provides scope to make effective use of indicators from activity reports by government agencies and development organizations across different fields, giving companies a basis for claims and compliance reporting, such as minimum-wage figures and country-risk indicators.

Different markets have different requirements for the data layers to be collected. In addition to mandatory requirements set by governments, customers may impose requirements that often originate from voluntary standards. In the timber and rubber sectors, voluntary requirements are embedded in sustainability certification systems such as FSC and PEFC. In coffee, voluntary requirements include sustainability certification systems such as 4C, RA and Fair Trade.



Photo 7: Local residents inspect and dry coffee beans after harvest in San La. Source: Ara-Tay



6. DATA: ROLES OF GOVERNMENT AND COMPANIES

Because their objectives differ, government and companies have different data requirements. Government needs data for sector management; companies need data to meet government and market requirements. Company information needs are more diverse and vary by export market and buyer, while government needs a harmonized information system, defined by government, to support management.

In general, over the short term companies do not yet need to collect all information across the four data layers described in Section 5. In the medium and long term, however, pressure from climate change, increasingly diverse and stringent market requirements, and international environmental organizations will make collection of these data layers essential for companies. Moreover, in international markets, meeting social and environmental requirements - including low emissions in supply chains - is becoming a competitive advantage. Companies should therefore prioritize data collection covering all activities in their supply chains.

Although management agencies do not need the same level of detailed supply-chain information as companies, they still need basic data from the layers above. Access to these sources helps agencies understand the condition of a commodity sector from production through export, enabling more effective policies and mechanisms. Better understanding of commodity sectors also provides important inputs for negotiations to develop and expand markets with exporting countries.

Government needs infrastructure for collecting, managing, synchronizing and using data. Core components include a shared technology platform, information and storage systems, data connection and sharing standards, access-control mechanisms, backup and recovery procedures, access logs, information-security measures, and data-analytics capacity for commodity-sector management.



Photo 8: View of production areas on upland fields in Son La. Source: Forest Trends



7. CONCLUSION: MULTI-LAYER, LIVE AND CLEAN DATA START NOW

This report provides basic information on the current state of production area data for agricultural and forestry commodities and identifies data limitations that hinder traceability and the demonstration of compliance with legal and market requirements. It discusses data collection methods, data synchronization and data use, and recommends combining top-down and bottom-up approaches: central authorities issue data standards, technical standards, security mechanisms and integration procedures; local authorities organize data collection, validation and updating; and companies share sourcing-area data under legal mechanisms that protect their legitimate interests. For the model to operate, government must provide technology infrastructure, resources for updating, data-verification mechanisms, access controls and dispute-resolution procedures. The report also identifies a future trend, especially in export markets, toward broader and more stringent data requirements covering commodities and products and every stage of their supply chains. This requires companies and management agencies to prioritize building multi-layer databases starting now.



Photo 9: Residents of Nậm Lầu Commune, Sơn La Province, practice using the production area data-collection tool. Source: Forest Trends



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