

## EUDR IN ROMANIA: TRANSFER OF GOOD PRACTICES TO AGRICULTURE FROM THE FOREST SECTOR

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**ABSTRACT.** The EU Deforestation Regulation (EUDR; Regulation (EU) 2023/1115) extends due-diligence and traceability obligations from timber to cattle, cocoa, coffee, oil palm, rubber, soy and wood-derived products. This is a substantial regulatory shift for agriculture in EU Member States, while the forestry sector has more than a decade of operational experience with its predecessor timber regulation (EUTR; Regulation (EU) 995/2010) and with national instruments such as Romania’s Integrated Timber Tracking System (SUMAL). **Aim.** This article examines which best practices developed in the Romanian forestry sector are transferable to the implementation of EUDR in agriculture, under what conditions and with what limitations. **Methods.** A PRISMA-light systematic review of peer-reviewed literature (2015–2026) is combined with comparative

policy analysis of Romania, Brazil and Argentina and document analysis of EU, Romanian, Brazilian and Argentine regulatory texts. Six explicit transferability criteria are applied: institutional capacity, technical feasibility, cost, digital infrastructure, smallholder inclusion and legal compatibility. **Findings.** Parcel-level geolocation, group-of-operators arrangements, public traceability interfaces, and the combination of mandatory and voluntary controls are largely transferable from forestry to agriculture, but only after substantial institutional adaptation. SUMAL itself displays documented enforcement gaps and traceability fraud, so the transfer concerns governance logic rather than the literal system. Brazil (CAR, SISBOV, Soy Moratorium) and Argentina (RENSPA, SIGSA) offer complementary models for parcel registries and individual



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identification. **Policy implications.** Romania offers transferable lessons to other EU Member States, contingent on national forest governance, agricultural structure, administrative capacity and digital infrastructure. Operational priorities for Romania include designating a competent authority under Article 13 EUDR, integrating LPIS/IACS with a national EUDR-DDS gateway and supporting group due diligence through producer organisations.

**Keywords:** due diligence; EUDR; forest certification; geolocation; institutional transfer; Romania; traceability.

## INTRODUCTION

Deforestation remains one of the most acute environmental issues globally, with significant implications for climate stability, biodiversity conservation and ecosystem functioning (Costanza *et al.*, 1997; Li *et al.*, 2018; Wang *et al.*, 2024; Zhang *et al.*, 2021), and a systematic classification of environmental approaches used to maintain and improve forest management is provided in Buliga (2023). The increasing loss of forests, driven by the need to expand arable land and the escalation of trade in raw materials, has intensified pressures on global supply chains and shown how much consumption and production influence deforestation dynamics. Increasing agricultural land use in fragile hilly regions also contributes to processes of soil erosion and degradation, with considerable losses of water, humus and nutrients (Bucur *et al.*, 2007; Niacsu *et al.*, 2022).

In this context, the relationship between global markets, land use and environmental degradation has become a core element of public policy priorities.

In response to these transformations, the European Union has gradually strengthened its environmental and trade policy instruments, and this culminated in the adoption of the EU Deforestation Regulation (EUDR; Regulation (EU) 2023/1115). This regulation marks a paradigm shift from previous initiatives by increasing due diligence and traceability obligations (Global Traceability, 2025) on a wide range of forest and agricultural products, as well as in restricting access to the EU market to proof of their “deforestation-free” nature, regardless of the country of origin (EIA, 2024). The map-based compliance logic of the EUDR can, however, both allow non-compliant products (including illegal timber) and exclude legitimate producers; additional governance tools are therefore imperative (Brunel, 2024; Freitas *et al.*, 2025; van Noordwijk *et al.*, 2025). The implementation of the EUDR poses substantial challenges, especially for the agricultural sector, given that this sector has its own dispersed supply chains, a large number of operators, and institutional and technical capacities that differ between Member States. Requirements for traceability, validation of origin and demonstration of compliance can lead to significant increases in administrative costs as well as potential risks of non-compliance, with possible unfair effects on small farmers and operators with limited resources. Applying the EUDR obligations uniformly across all operators, commodities and Member States without proportionality safeguards thus raises issues of proportionality, efficiency and equity (FSC, 2021).

In contrast, the forestry sector in some Member States, including

Romania, has already established solid structures for the control of traceability, certification and the application of environmental guidelines. The development of forest governance, marked by the correlation between mandatory regulations and voluntary certification mechanisms (Hălălisan *et al.*, 2012, 2013; Nichiforel *et al.*, 2018; Scriban *et al.*, 2019; Weiss *et al.*, 2019), as well as the use of more efficient monitoring and control systems, constitute a consistent set of experiences that could facilitate the introduction of EUDR norms in other sectors of activity (Măciucă *et al.*, 2020). The transformations produced suggest the existence of considerable opportunities for the dissemination of best practices from forestry to agriculture. This experience, however, should not be idealised. Independent investigations and civil society reports have documented persistent traceability fraud and enforcement gaps in the operation of SUMAL (i.e. the Integrated Timber Tracking System, which is the national platform for tracking the traceability of timber in Romania), including the upload of falsified or recycled images by transporters, and recent assessments have called for a more robust SUMAL 3.0 architecture (Agent Green, 2026; EIA, 2021, 2024; OCCRP, 2024; WWF România, 2024). The transfer of practices from forestry to agriculture therefore concerns the governance logic and the institutional architecture, rather than the literal replication of any current Romanian system. It must therefore be read together with these documented limitations.

This article examines the possibility that lessons learned from forest sector

governance can provide a model for the implementation of EUDR in agriculture, with a focus on reducing administrative burden and strengthening compliance capacity. The analysis highlights transferable elements related to traceability, certification and law enforcement. Another aspect of the analysis is to assess the applicability of these elements for agricultural supply chains and to investigate the case of Romania as an example of alignment between imposed regulations and voluntary mechanisms. On these grounds, the article aims to support the formulation of directions for public policy that support the implementation of EUDR in a proportionate, efficient and equitable manner, in a way that is relevant at both national and European levels.

The research gap addressed by this article is the absence, in both the Romanian and broader Central- and Eastern-European literature, of a systematic operationalisation of the transfer of best practices from forestry to agriculture under EUDR, despite a growing comparative literature on EUDR readiness in producer countries (e.g. on the Global South, Fischer *et al.*, 2025; on Ethiopia, Tesfaye *et al.*, 2026) and on smallholder cost-burden (e.g. Bispo *et al.*, 2026; Judijanto, 2026).

The analysis is structured around four research questions:

- (RQ1) Which Romanian forestry-sector practices for EU Timber Regulation (EUTR)-driven traceability and due diligence are transferable to EUDR implementation in agriculture?
- (RQ2) Under what institutional, technical and economic conditions is such transfer feasible?

- (RQ3) What residual limitations and risks persist after transfer?

- (RQ4) How does Romania's position compare with major non-EU exporting jurisdictions (Brazil and Argentina) in terms of geolocation, traceability and smallholder inclusion?

The original contribution of the article is therefore not the description of SUMAL or of certification per se, but the operationalisation of the transfer of best practices through six explicit transferability criteria (institutional capacity, technical feasibility, cost, digital infrastructure, smallholder inclusion, legal compatibility), as well as the application of these criteria to ten forestry practices and three jurisdictions.

## MATERIALS AND METHODS

### Research design and questions

This study combines four complementary methods: (i) a systematic literature review carried out following a simplified PRISMA-inspired protocol; (ii) a comparative policy analysis of Romania, Brazil and Argentina; (iii) document analysis of EU, Romanian, Brazilian and Argentine regulatory texts; and (iv) two semi-structured expert interviews used to triangulate findings from the literature and document review. The analysis is guided by the four research questions stated at the end of the Introduction (RQ1–RQ4) and operationalises the concept of the transfer of best practices through six transferability criteria applied to each candidate forestry practice: institutional capacity (does an equivalent authority exist in agriculture?); technical feasibility (data infrastructure, geolocation precision, interoperability); cost (capital

and operating expenditure per operator, with particular attention to small- and medium-sized enterprises [SMEs]); digital infrastructure (existing systems that can be reused); smallholder inclusion (mechanisms for sub-4-ha operators); and legal compatibility (existence of a national or EU legal basis for the practice in the agricultural domain). Each candidate practice is then classified as fully transferable, partially transferable or not directly transferable to agricultural supply chains, with the conditions and limitations specified in the Results section (*Table 5*). The comparative dimension (RQ4) is operationalised through eight dimensions applied uniformly to Romania, Brazil and Argentina, as shown in *Table 6*.

### Systematic literature review (PRISMA-light)

The literature review followed the four PRISMA stages of identification (*Table 1*), screening, eligibility and inclusion, adapted to the policy-analytical nature of the study. Databases searched were Scopus, Web of Science and ScienceDirect, supplemented by ResearchGate for grey-literature triangulation and by the official portals EUR-Lex, FAO, the European Forest Institute (EFI) and the European Commission Joint Research Centre (JRC, 2023). The time window covered 2015–2026 for the EUDR period, with selected EUTR references retained from 2010 onwards to capture the legal precedent. The Boolean search string combined three concept blocks: ("EUDR" OR "EU Deforestation Regulation" OR "deforestation-free supply chain" OR "EUTR" OR "timber regulation") AND ("traceability" OR "due diligence" OR

"geolocation" OR "chain of custody" OR "certification") AND ("Romania" OR "forest" OR "agriculture" OR "Brazil" OR "Argentina" OR "smallholder"). Inclusion criteria were peer-reviewed empirical or legal studies; official EU and national legal acts; and technical reports from FAO, EFI, JRC, the World Bank, OECD and reputable monitoring NGOs. Exclusion criteria were opinion pieces without empirical basis, marketing material from compliance vendors and news media when a peer-reviewed or official equivalent existed.

Identification was performed via the OpenAlex and Crossref REST APIs (Semantic Scholar was used to verify individual DOIs but excluded from the count after rate-limit issues). Searches were run on 21 May 2026 across ten thematic query strings combining the EUDR/EUTR concepts with traceability, due diligence, smallholder, country (Romania, Brazil, Argentina) and commodity (timber, soy, cattle, palm, coffee, cocoa) terms. Across the twenty queries (ten in OpenAlex restricted to peer-reviewed journal articles 2010–2026, ten in Crossref restricted to journal articles 2010–2026), 1,624 unique records were retained after deduplication by DOI or normalised title. Title-level screening removed clearly off-topic records (medical, biomedical, soil erosion only and unrelated remote-sensing studies) and required at least one topical keyword from a curated list of EUDR/EUTR/traceability/forest-policy terms. A total of 582 records passed screening. Eligibility further required at least one strict EUDR/EUTR, traceability, due-diligence, forest-certification, SUMAL, CAR/SISBOV/RENSPA or related core term in the title,

which left 563 eligible records. All 563 eligible records were retained for synthesis as the indicative literature base. From this literature base, a curated subset of 65 sources is actually cited in the manuscript on the basis of (i) direct empirical or legal relevance to the four research questions; (ii) availability of full text in English, Romanian, Spanish or Portuguese; and (iii) avoidance of duplicate coverage of the same factual claim. The full list of identified records (DOI, title, year, source database, query) has been retained by the corresponding author and is available on request.

### **Comparative policy analysis**

The comparative policy analysis covers Romania, Brazil and Argentina. Romania was selected because it is the EU Member State with the longest operational electronic timber traceability system (SUMAL, in operation since 2008 and fully digital since 2014) and because it has been classified as a low-risk country under the EUDR benchmarking exercise published on 22 May 2025 (EU, 2025). Brazil and Argentina were selected because they are among the largest non-EU exporters to the EU of commodities in the EUDR scope (soy, beef and bovine leather) and because they have developed substantially different national traceability architectures, thus providing meaningful contrasts on every transferability criterion. The same eight comparative dimensions are applied uniformly to the three countries: lead competent institution(s); national traceability system for the relevant commodity; geolocation reference (national parcel registry); public access and transparency tier; certification ecosystem (mandatory vs voluntary);

smallholder treatment; enforcement authority; and recent empirical evaluations. The aim is not to rank the three countries against each other but rather to identify which national architectures provide better evidence for which transferability criteria.

### **Document analysis**

Regulatory and policy documents were analysed thematically. The corpus included: Regulation (EU) 2023/1115, the European Commission Guidance C (2024) 7027 final and Commission Implementing Regulation (EU) 2025/1093 on country-risk classification; for Romania, the Forest Code (Law 46/2008 with amendments), Government Decision 497/2020 on SUMAL 2.0, Order 1004/2016 and Law 171/2010 on forestry contraventions; for Brazil, the Forest Code (Law 12.651/2012) and the CAR/SICAR documentation; for Argentina, SENASA Resolutions 530/2025 and earlier acts establishing RENSPA and SIGSA. Documents were coded against the six transferability criteria, and the findings were cross-checked against peer-reviewed studies retained in the literature review.

### **Expert interviews**

To triangulate findings from the literature and document review, the authors conducted two semi-structured expert interviews. The two interviewees were senior practitioners selected purposively for their direct expertise in the two policy domains most relevant to the article's research questions: one specialises in environmental policy in Latin America, with practical experience in the implementation of forestry- and

agriculture-related due-diligence requirements in export supply chains; and the other specialises in EU environmental policy and in the Romanian forestry sector. Both interviewees gave informed verbal consent to be cited anonymously; no personal data are reported. The interviews were conducted by video call between February and April 2026 in English and Romanian, respectively; each interview lasted approximately 45–60 minutes. The interview guide was structured around the four research questions stated at the end of the Introduction (RQ1–RQ4), with prompts covering: (a) which forestry-sector practices are perceived as most readily transferable to agriculture; (b) institutional, technical and financial conditions for such transfer; (c) residual risks and limitations; and (d) the comparison between Romania and the two Latin-American jurisdictions covered in the comparative policy analysis.

The interviews were not recorded; the authors took written notes during and immediately after each session. A short thematic memo was then produced for each interviewee organised around the four research questions. Thematic analysis was used to identify points of convergence and divergence between the expert testimony and the published literature. Where divergence was found, the literature was given precedence, and the divergence is flagged in the relevant subsection of the Results. The expert interviews therefore played a complementary, confirmatory role and are not the primary evidence base of the article.

**Table 1** – PRISMA-style flow of records: identification → screening → eligibility → cited

| Stage                      | Records (n) | Criterion applied                                                                                                                                                                                                                                                                                  |
|----------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Identification             | 1,624       | OpenAlex + Crossref, ten Boolean query strings, deduplicated by DOI / normalised title; 2010–2026; English, Romanian, Spanish, Portuguese                                                                                                                                                          |
| Screening<br>(title-level) | 582         | Off-topic exclusions (medical, soil-erosion-only, biomedical, unrelated remote sensing); at least one topical keyword (EUDR, EUTR, traceability, due diligence, forest certification, SUMAL, CAR, SISBOV, RENSPA, Mercosur, smallholder, commodity supply chain, LPIS, IACS or related)            |
| Eligibility<br>(strict)    | 563         | At least one strict core term from {EUDR, EUTR, deforestation regulation, timber regulation, due diligence, traceability, forest certification, chain of custody, SUMAL, CAR, SISBOV, RENSPA, soy moratorium, cattle traceability, value chain policy, FLEGT, group of operators} present in title |
| Cited in<br>synthesis      | 65          | Curated subset cited in v3 manuscript, selected for direct empirical/legal relevance to RQ1–RQ4, availability of full text and avoidance of duplicate coverage of the same factual claim                                                                                                           |

Source databases queried on 21 May 2026

The analytical claims of the article remain grounded in the systematic literature review, comparative policy analysis and document analysis.

## RESULTS

The findings reported in this section draw on the four-fold methodology described in the Materials and Methods section. The systematic literature review (*Table 1*) returned 65 records that informed the thematic synthesis presented in this study. The document analysis outcomes are summarised in *Table 2* below, coding the corpus of twelve regulatory documents against the six transferability criteria that also structure *Table 2*. The expert interview findings are synthesised in *Table 3*, organised around the four research questions. Expert testimony was used in a confirmatory role and is woven

throughout the Results section where it converges with or diverges from the published evidence. The comparative policy analysis is presented in *Table 6* and discussed in the section Romania in comparative perspective (RQ4).

### Transfer of good forestry practices to agriculture

The expertise of the Romanian forestry sector provides a solid conceptual context for assessing the application of the EUDR in the agricultural sector (Pro-Lemn Association, 2024), notably through the way it combines mandatory regulations with voluntary certification mechanisms and through the use of modern traceability means (Pandey *et al.*, 2024; Xu *et al.*, 2025; Zhou *et al.*, 2025). Romanian forestry operates in a hybrid governance system, in which the national and European legislative frameworks are

complemented by voluntary norms, thus contributing to a reduction in enforcement gaps and strengthened compliance through standardised methods and inclusive mechanisms between stakeholders (Shen *et al.*, 2025). The initiative supports shared responsibility among stakeholders and facilitates the transfer of practical solutions and lessons learned within supply chains (SASI, 2025).

SUMAL, the national platform for tracking the traceability of timber in Romania, is a key element of this framework. SUMAL allows for the monitoring of timber movements along the supply chain, from logging and transport to processing (WWF Romania, 2024). It has significantly improved the visibility and monitoring capacity of forest chains. However, independent investigations have documented persistent non-compliance and fraud in the operation of the system.

For example, investigative journalism using artificial-intelligence analysis of SUMAL transports identified hundreds of fraudulent photographs uploaded by transporters, including blank or recycled images, vehicle interiors, items unrelated to timber and even selfies, while subsequent assessments have called for a redesign of the system architecture (Agent Green, 2026; Environmental Investigation Agency, 2021, 2024; OCCRP, 2024; WWF România, 2024). These aspects show the limits of traceability mechanisms (Mongabay, 2024) when they are not supported by concrete and effective control, enforcement and sanctioning actions (CRR, 2022; Freitas *et al.*, 2025; van Noordwijk *et al.*, 2025). Traceability is thus a necessary but not sufficient

condition for compliance, so it remains a relevant lesson for the design of EUDR implementation systems in the agricultural sector.

The high degree of expansion of forest certification in Romania, including through schemes such as the FSC and the Programme for the Endorsement of Forest Certification (PEFC), also illustrates the complementary role of voluntary standards in relation to the legislative framework.

A Romanian case-study comparison of voluntary forest certification against stringent national legal requirements shows that voluntary schemes deliver additional governance benefits chiefly where they complement, rather than provide a substitute for, the mandatory framework (Buliga and Nichiforel, 2019). These schemes make it possible to increase transparency, empower actors in supply chains and strengthen institutional capacity. At the same time, voluntary certification on its own does not guarantee EUDR compliance, because EUDR demands geolocation evidence and a due-diligence statement per consignment that certification schemes were not originally designed to deliver. Voluntary schemes can nonetheless be linked to the national EUDR workflow as risk-mitigation evidence and as a delivery channel for smallholder data (PEFC România, 2024; Preferred by Nature, 2024).

Extending the application of EUDR requirements to agricultural products (e.g. soy and beef and bovine leather) poses specific challenges given the diversity of supply chains as well as the need to trace provenance down to the farm or even parcel level. Despite Romania being considered a low-risk

country (TraceX Technologies, 2024, 2025), agricultural operators are still required to demonstrate compliance with the rules through due diligence procedures, including documenting the origin of the products and the history of land use (Regulation (EU) 2023/1115). In the case of imports from third countries, especially from regions with a higher risk level, the provisions become more rigorous and involve detailed mapping, risk analysis and an extended set of documents (EC, 2024 – Guidance Document for Regulation (EU) 2023/1115).

In this context, the EU–Mercosur trade agreement amplifies the export flows of agri-food products (e.g. soy and beef) from South America to the EU market, as it expands the significance of the traceability and due diligence requirements established by the EUDR (Popescu, 2024, 2022; Fern, 2024; SSC, 2025).

The expansion of trade under this institutional framework highlights the need for robust mechanisms to verify origin and prevent imported deforestation (Swift Geospatial, 2024), as this would ensure coherence between trade policies and the environmental priorities of the European Union (Solidaridad, 2024). Viewed from this perspective, the EUDR functions both as a regulatory tool for environmental protection and as a governance mechanism for supply chains based on international trade agreements.

International practices show that well-established traceability infrastructures and regulatory frameworks can contribute significantly to compliance with EUDR requirements. Countries such as Argentina and Brazil attest to the feasibility of monitoring

agricultural supply chains on a large scale, including through environmental registries, individual identification systems and the integration of cartographic and geospatial data. Investments in digital infrastructure, harmonisation of environmental policies with economic instruments and involvement of public authorities in facilitating compliance are thus not only necessary but also timely.

Satellite-based forest-change monitoring (e.g. Copernicus, Global Forest Watch, the EU Observatory on Deforestation and Forest Degradation (EC, 2023)) and laboratory-based provenance verification (e.g. stable-isotope and DNA methods) have been used operationally for timber under the EUTR (FSC, 2021; Mortier *et al.*, 2024; Truskowski *et al.*, 2026). Related approaches can be adapted to the agricultural sector, subject to EUDR requirements. The integration of these tools would allow for digital verification of changes in land use, reduce excessive reliance on costly manual checks and increase the credibility of due diligence reporting, thus contributing to the efficiency and robustness of the compliance process (Volciu-Ionescu, 2024).

A critical factor in the implementation of EUDR is the inclusion of smallholder farmers in the new regulatory structures (Rainforest Alliance 2024, 2025; RRG NBS, 2025). Lessons learned from forest certification – notably from group certification models and capacity-building programmes – suggest viable solutions to reduce individual compliance costs and prevent market exclusion. Overall, the analysis shows that the selective transfer of good

practices from the forest sector to agriculture, complemented by relevant international practices and the trade context generated by agreements such as the EU–Mercosur, can facilitate more coherent and efficient implementation of EUDR (Proforest, 2023, 2025).

Romania’s positioning as a Member State of the European Union with low deforestation risk and with consolidated institutional practice in forest governance creates the premises for the development of operational compliance models with national and European relevance. In the Romanian context, existing producer organisations – such as LAPAR (League of Agricultural Producers Associations of Romania) and Pro Agro (National Federation of Producers in Agriculture, Food Industry and Related Services in Romania), together with recognised producer cooperatives under Law 566/2004 and the group-of-operators mechanism foreseen by Regulation (EU) 2018/848 – can serve as natural aggregators for group due diligence and pooled compliance, in line with the governance logic illustrated in *Figure 1*. Practically speaking, fixed compliance costs (geolocation processing, due-diligence statement preparation, risk-assessment documentation) are distributed very unevenly between large operators and individual smallholders, with per-operator costs falling sharply when these are pooled across a producer organisation.

Published estimates of these per-operator costs vary widely with operator size, country of origin and commodity (EC, 2025; Judijanto, 2025; Radosavljevic *et al.*, 2021). For this reason, the present analysis refrains from a point estimate and instead emphasises

the institutional vehicle (group of operators under Regulation (EU) 2018/848, producer cooperatives under Law 566/2004, LAPAR and Pro Agro) through which Romanian smallholders could realistically pool compliance costs.

*Table 5* reports the outcomes of the document analysis. The twelve regulatory documents in the corpus were coded against six transferability criteria distilled from the literature review and used in parallel to structure the Romanian transferability matrix (*Table 5*). Table cells summarise the position of each jurisdictional bloc on each criterion; they are read together with the comparative architecture reported in *Table 6*.

### Implementing EUDR in Romania

The status of a country with low deforestation risk gives economic operators in Romania significant advantages in terms of the complexity of due diligence obligations, administrative costs and access to the single market of the community bloc (SASI, 2025). In practice, this classification is reflected in the application of simplified due diligence mechanisms and a lower frequency of compliance checks (Crouch, 2026).

The interaction between this status, simplified due diligence procedures and the mandatory/voluntary governance layers is represented in *Figure 1*. In practice, a low-risk classification under Article 13(1) and 13(3) of the Regulation reduces the formal requirement for a full risk assessment and mitigation cycle to information gathering plus a non-substantiated-concern check, although the underlying obligations to collect geolocation data and to submit a due-diligence statement remain in full force.

**Table 2** – Document analysis coded matrix: six transferability criteria applied to the four jurisdictional document blocs (EU, Romania, Brazil, Argentina)

| <b>Transferability criterion</b>                           | <b>EU acquis (Reg. 2023/1115; C(2024) 7027; Reg. 2025/1093)</b>                          | <b>Romania (Law 46/2008; GD 497/2020; Order 1004/2016; Law 171/2010)</b>                                                      | <b>Brazil (Forest Code 12.651/2012; CAR/SICAR)</b>                                               | <b>Argentina (SENASA Res. 530/2025; RENSPA; SIGSA)</b>                                                           |
|------------------------------------------------------------|------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| C1. Geolocation backbone (Art. 9 EUDR alignment)           | Mandatory parcel-level geolocation per consignment; small-parcel rule under Art. 9(1)(d) | LPIS/IACS for agriculture; SUMAL amenajament polygons for timber — aligned at parcel level                                    | CAR self-declared rural property registry; coverage extensive but accuracy uneven                | RENSPA producer registration; geolocation not yet at parcel granularity for all commodities                      |
| C2. Operator due-diligence obligations (Arts. 8, 10 EUDR)  | Operator DDS with collection–assessment–mitigation chain; record retention 5 years       | No domestic agricultural DDS yet; SUMAL provides timber chain-of-custody; agricultural operators rely on commercial documents | SISBOV for bovine; SISFLORA for timber at state level; consignment-level DD not codified for soy | DT-e electronic transit; mandatory individual cattle e-ID from 2026; soy DD via private schemes (RTRS, ProTerra) |
| C3. Public access and transparency                         | Information System (Art. 33) plus benchmarking decisions (Reg. 2025/1093) public         | Inspectorul Pădurii public app for timber; no agricultural counterpart                                                        | CAR partially public via SICAR; civil-society overlays (MapBiomass, Selo Verde)                  | Limited public access; civil-society monitoring (MapBiomass Chaco) complements                                   |
| C4. Enforcement architecture                               | Member-State competent authority designation (Art. 13); penalties (Art. 25)              | Garda Forestieră for timber; agriculture fragmented across APIA, ANSVSA, ANAF, MADR; competent authority not yet designated   | IBAMA, Federal Police, state environmental agencies; uneven across states                        | SENASA with provincial counterparts; enforcement uneven across provinces                                         |
| C5. Smallholder and group treatment                        | Group-of-operators recognition (Reg. 2018/848 cross-reference); SME tier (Art. 12)       | LAPAR, Pro Agro, Law 566/2004 cooperatives; uneven density across regions                                                     | Assentados often outside SISBOV; CAR mandatory but compliance support limited                    | RENSPA mandatory and free; INTA support; cattle e-ID cost concern from 2026                                      |
| C6. Voluntary certification integration as risk mitigation | C(2024) 7027 guidance recognises private schemes as risk-assessment inputs               | FSC/PEFC mature for timber; agricultural voluntary schemes (GLOBALG.A.P., RTRS, ProTerra) with uneven uptake                  | Soy Moratorium (Amazon biome); RTRS, ProTerra in soy                                             | ProYungas Visión Argentina (soy, yerba); RTRS                                                                    |

Source: Authors' coding of the twelve documents listed in the section Document analysis

Estimates of net administrative savings vary widely across operator type and commodity; in the most recent simplification impact assessment, the European Commission projects an aggregate compliance-cost reduction of approximately 75% across all in-scope companies, but this figure includes the broader December 2025 simplification package and not only the low-risk benchmark (EC, 2025; Crouch, 2026). Romanian farmers and exporters can therefore capitalise on this status as a competitive market advantage to position themselves on the EU market as suppliers of agri-food products compliant with the sustainability and traceability requirements imposed by the EUDR (Pauwelyn, 2024). The experience gained in the forestry sector constitutes a strategic resource for the implementation of EUDR in agriculture. Provenance verification technologies based on stable isotope and/or trace element analysis are reliable tools for validating provenance claims (Cropin, 2025). The institutional expertise acquired over time as a result of forest certification and the operation of the national timber traceability system has also allowed the development of relevant skills in data management, stakeholder guidance and ensuring alignment with regulatory norms. The application of the EUDR also offers both economic and market opportunities for Romanian agriculture. The rising trend in demand for sustainable products and the expansion of market segments sensitive to environmental criteria bring benefits to those who invest in advanced traceability and compliance systems (US Environmental Investigation Agency, 2024). The fact that Romania has access to European technical assistance,

financing and capacity-building instruments also makes it easier for its agricultural sector to adapt to the new requirements. At the same time, service and technology providers can benefit from national know-how and can identify viable solutions on foreign markets. Despite these advantages, however, the implementation of EUDR is not without risks and difficulties. Administrative and compliance costs affect the decision of operators to enter, expand in or exit affected supply chains, even under the simplified due-diligence regime. The most affected seem to be actors involved in complex supply chains as well as those whose businesses depend on imports. The requirements regarding the collection, management and storage of geolocation data differ greatly compared to current practices. As such, investments in digital infrastructure, employee training and reconfiguration of production processes become necessary. The increasing reliance on protein feed and food products intensifies compliance challenges. Economic operators need access to accurate geolocation data and evidence that international supply chains are deforestation-free, often characterised by multiple intermediaries and opaque trading relationships. This situation favours market consolidation around operators who can afford the costs of complex, advanced due diligence systems. Another risk may be heightened by subtle changes in land use as well as by possible erroneous classifications resulting from analyses based on satellite data. The misinterpretation of practices specific to traditional agricultural systems as well as agroforestry systems in relation to EUDR requirements may lead to possible situations of non-

compliance (Azevedo, 2024; EC, 2024b). The obligation to demonstrate the use of land at a reference date also imposes historical documentation obligations that can be costly and create difficulties for economic agents. The impact of the EUDR differs depending on the type and size of the holding. Commercial agricultural companies have superior financial and organisational resources to introduce integrated compliance systems, as they can benefit from economies of scale. In contrast, SMEs, although benefiting from certain simplification regulations, experience a relatively higher financial impact. The success of implementation for this sector thus depends largely on access to technical assistance, training modules and financial support mechanisms. Geolocation and data management are technically critical for EUDR compliance. Acquiring GPS coordinates, long-term archiving of data and transmitting due diligence statements via digital systems create high demands in terms of digitalisation and technical skills. Although these responsibilities generate costs, they can also produce indirect benefits. This includes increased transparency in supply chains, better risk management and strengthening business relationships in a sustainable way.

This analysis suggests that Romania is in a relatively favourable position for implementing the EUDR, but these structural advantages do not eliminate the need for significant investments in administrative capacity, digital infrastructure and professional training. The effective implementation of the EUDR depends on the capacity of authorities and operators to adapt lessons from the forestry sector, to support the

inclusion of SMEs and to manage the risks associated with trade with other countries (Judijanto, 2025; McDermott *et al.*, 2025). The EUDR can thus be interpreted both as a regulatory constraint, but also as a strategic opportunity to reposition the Romanian agricultural sector in a European and global context oriented towards sustainability. In the medium and long term, the success of EUDR implementation will depend on the balance between simplifying procedures, maintaining strict standards and capitalising on existing competitive advantages. Treating compliance as a development strategy, rather than a mere legal obligation, would allow the Romanian agricultural sector to actively contribute to international deforestation reduction goals. Read together with the four research questions stated above, the implications for Romania can be summarised as follows: low-risk benchmarking removes a part of the procedural burden but not the underlying obligations under Articles 9–10 EUDR, while the existing forestry-sector data infrastructure provides a credible institutional starting point for agriculture, provided that the documented limitations of SUMAL are taken into account in the design of any agricultural counterpart. *Table 6* summarises the findings from the expert interviews. Both experts gave informed verbal consent to being cited anonymously and are labelled by area of expertise rather than by name. The summary follows the four research questions (RQ1–RQ4) and is consistent with the supporting literature reviewed in the thematic subsections of the Results section.

**Table 3** – Expert interview synthesis: two senior practitioners (anonymous) summarised across the four research questions

| Expert<br>(area of<br>expertise)                                                                              | RQ1<br>(transferable<br>practices)                                                                                                                                                                                   | RQ2<br>(conditions for<br>transfer)                                                                                                                                                                               | RQ3<br>(residual<br>limitations)                                                                                                                                                        | RQ4<br>(Romania vs<br>Latin America)                                                                                                                                                                                 |
|---------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Expert 1</b><br>Latin-American<br>environmental<br>policy; due-<br>diligence in<br>export supply<br>chains | Parcel-level<br>geolocation and per-<br>consignment<br>documents are the<br>most directly<br>transferable<br>mechanisms; chain-<br>of-custody literacy<br>among smallholders<br>is the binding<br>constraint         | Competent-authority<br>designation and a<br>standardised<br>consignment<br>document are pre-<br>conditions; voluntary<br>schemes (RTRS,<br>ProTerra) usable as<br>evidence only with<br>audited data hand-<br>off | Self-declared<br>registries (CAR-<br>type) leave a<br>verification gap;<br>sanction regimes<br>need to be<br>calibrated to<br>producer scale<br>to avoid driving<br>informality         | Argentina's<br>RENSPA+SIGSA<br>combination is the<br>closer reference<br>for Romania than<br>Brazil's CAR;<br>Romania benefits<br>from the EU<br>Information<br>System which<br>Latin-American<br>jurisdictions lack |
| <b>Expert 2</b><br>EU<br>environmental<br>policy and<br>Romanian<br>forest<br>governance                      | SUMAL chain-of-<br>custody logic and<br>Inspectorul Pădurii<br>public layer are the<br>strongest forestry<br>transfers; APV-style<br>ex-ante harvest<br>declarations a<br>candidate for<br>agricultural<br>extension | Joint enforcement<br>protocol across<br>APIA, ANSVSA,<br>ANAF, MADR and a<br>lead competent<br>authority; IT<br>capacity uplift to<br>interoperate LPIS<br>with the EU<br>Information System                      | Documented<br>SUMAL fraud<br>cases (recycled<br>photos, blank<br>uploads) show<br>that traceability<br>without<br>independent<br>satellite/docume<br>nt verification is<br>insufficient | Romania is<br>comparatively well<br>placed on<br>geolocation (LPIS)<br>but trails on<br>consignment-level<br>data and public<br>transparency<br>outside timber                                                       |

Source: Authors' thematic memos from interviews  
conducted February–April 2026 (Expert interviews section)

### Analytical implications for the agricultural sector and supply chain management

A growing strand of recent literature argues that the implementation of the EUDR in agriculture cannot be interpreted strictly as a regulatory-compliance exercise (McDermott *et al.*, 2025; Muradian *et al.*, 2025; Zabel *et al.*, 2025). For example, a recent two-decade review of stakeholder engagement in Romanian FSC certification clarifies how iterative stakeholder dialogue, rather than the rule text alone, has driven uptake and credibility of the scheme (Nichiforel *et al.*, 2024). In their view, this compliance effort is rather a multidimensional process of institutional, organisational

and technological adaptation of supply chains.

Findings from the forestry sector show that the effectiveness of deforestation-free chain governance depends mainly on the interaction between mandatory regulations, voluntary certification mechanisms and traceability infrastructures, as illustrated in *Figure 1*. However, the capacity of stakeholders to actively participate in the implementation stages should not be neglected. The Due Diligence Fund supports the practical implementation of corporate due diligence in agricultural supply chains through funded partnerships and applied projects (GIZ, 2025).

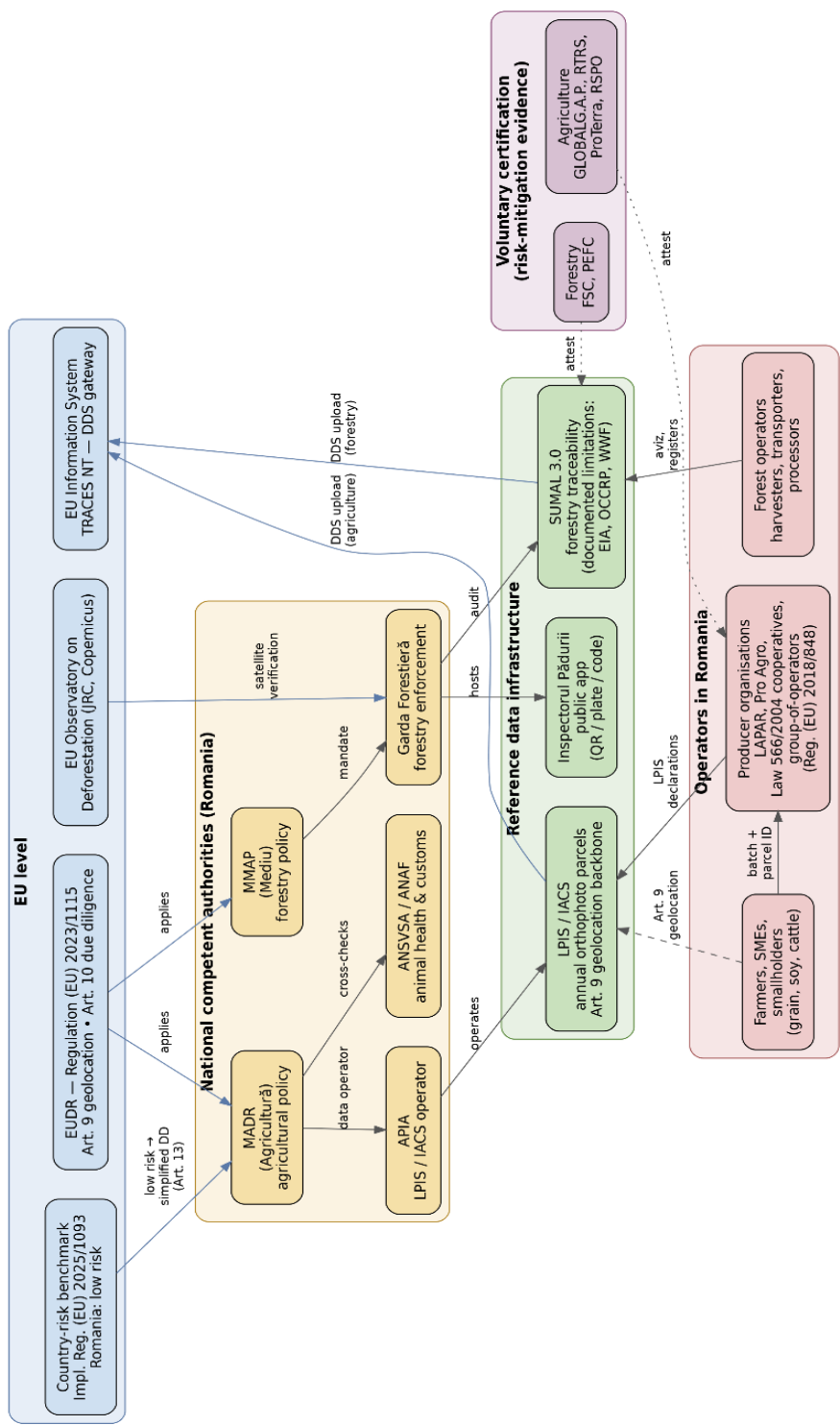


Figure 1 – Multi-level governance architecture for EUDR implementation in Romania

The Romanian experience suggests that the exclusive use of regulations has inherent limitations, for which the integration of voluntary certification schemes can compensate to some extent. Such schemes provide standardised operational protocols, audit mechanisms and structured frameworks for stakeholder consultation. The combination of regulatory and voluntary approaches improved both transparency and discipline in forest supply chains (Popescu *et al.*, 2019), and the EUDR requires high levels of traceability and strict documentation of the place of origin of products in this sector (Murray, 2024; Preferred by Nature, 2024).

Comparison with the experiences of countries such as Argentina or Brazil confirms that large-scale traceability is possible even in complex agricultural systems with large production volumes and a significant number of actors. These examples highlight the importance of adapting the general principles of the EUDR to specific national contexts. This avoids the identical application of institutional models without taking into account the ownership structure, administrative capacity or level of digitalisation. In practice, the efficiency of traceability systems depends on the quality of institutional infrastructures and the coherence of public policies. Its status as an EU Member State, with low deforestation rates, offers Romania a favourable foundation, with a significant impact on the financial and administrative effort required to comply with the EUDR requirements. The analysis indicates that this advantage can reduce the administrative pressure on agricultural operators, but it does not eliminate the need to develop robust data

collection, management and verification systems, especially in the context of supply chains dependent on imported products. The risks associated with products originating from jurisdictions with different risk profiles thus remain a determining factor in the complex compliance process. Published estimates of EUDR compliance costs vary widely depending on commodity, operator size and country of origin. Peer-reviewed studies on oil-palm smallholders (Judijanto, 2025), comparative analyses of EUTR adaptation (Radosavljevic *et al.*, 2021) and the European Commission's (EC, 2025a, b) simplification impact assessment together suggest that costs are non-trivial for SMEs and smallholders, but can be partially offset in the medium term by improved supply-chain transparency, reduced reputational risk and longer-term contracts (EC, 2025a, b; McDermott *et al.*, 2025). The empirical picture is not yet settled and broad statements that costs are "manageable" should be read with caution. From this perspective, EUDR compliance can be understood as an investment in supply chain transparency and credibility, rather than an obligation to comply with a set of rules. However, it is also worth noting the limits of traceability tools in the absence of effective control and law enforcement mechanisms. (Borrelli *et al.*, 2020; Ganasri and Ramesh, 2016; Jiao *et al.*, 2025; Thomas *et al.*, 2018; Zhao and Hou, 2019). Romania's experience makes it possible to appreciate that, although digital monitoring systems have greatly improved the capacity for monitoring and transparency of flows, the fact that some illegal practices persist shows that traceability is a necessary, but

not sufficient, condition for achieving the EUDR objectives. This finding shows how important it is not to mechanically take tools from one sector to another, but to adapt them to the institutional and operational context. Overall, the results of this analysis support the assessment that the success of EUDR implementation in Romanian agriculture is conditioned by the ability of actors to capitalise on the structural advantages currently existing. Another asset is the possibility of adapting the “lessons” from the forestry sector and appropriately managing regulatory requirements, administrative costs and sustainability objectives as a whole. These implications provide the analytical structure necessary to formulate conclusions and policy recommendations, which are developed in the following section.

### **Technical and structural barriers in agricultural supply chains and transferable solutions**

A candid assessment of the transfer of forestry practices to agriculture must acknowledge several technical and structural differences between the two sectors. First, agricultural properties in Romania exhibit a high degree of fragmentation, with the average farm size being smaller than the size of forest management units. Many of the parcels are also below the four-hectare threshold, at which EUDR geolocation switches from the polygon representation to the single-point one. Commodity chains for soy, maize, sunflower and cattle tend to involve collection and processing of product from a large number of farms through collectors, traders and processors, which makes it more difficult to preserve the parcel identity the entire

way along the supply chain. Finally, the relevant reference data (e.g. parcel boundaries, land use history and annual declarations from farmers) are stored in systems separate from those that support forest traceability. This implies that currently there is no analogue to SUMAL for agricultural commodities.

The majority of these limitations may, however, be addressed using the existing Romanian experience. For example, an orthophoto-based map of agricultural parcels produced within the scope of LPIS and IACS already provides the necessary degree of geolocation, equal or superior to the one provided by forest management plan compartment maps. An additional layer of traceability based on the concept of batches similar to that applied by SUMAL in its transport permit and register may be added on top of the LPIS system that would make it possible to link consignments of grains, oil seeds or livestock to the declared parcels of origin. Recent work proposes a step-change in parcel- and forest stand-level identification; chemistry-based tracing models that integrate data across tree genera and lower reference-data requirements (Truszkowski *et al.*, 2026), combined with operational origin-verification frameworks proven on sanctioned Eastern European timber (Mortier *et al.*, 2024), point to a route beyond the current LPIS-only geolocation backbone and towards independent biophysical confirmation of declared origin. The group due diligence approach, including both the producer organisations (LAPAR, Pro Agro, recognised cooperatives) and the group of operators approach specified in Regulation (EU) 2018/848, may distribute the costs of compliance among

many small farms. The main difference between the two sectors and related solutions are summarised in *Table 4*.

## DISCUSSION

### Interpretation of findings against the research questions

The Results section provides three blocks of evidence: a description of the Romanian institutional and governance context for forestry, an account of EUDR implementation conditions in Romania with an analytical synthesis of supply-chain implications, and a structural-barriers assessment with a comparative matrix (*Table 5*). Together, these address RQ1 (transferable practices) and RQ2 (conditions of transfer). A recent pan-

European synthesis of forest-restoration evidence underscores that the translation of ambitious targets into practice is consistently constrained by uneven national documentation and governance capacity (Erdozain *et al.*, 2024), a finding that frames the transferability discussion below. The comparative dimension RQ4 is addressed in *Table 6*. Regarding RQ1, the strongest case for transfer concerns the geolocation backbone. The role played in forestry by amenajament polygons and SUMAL is closely paralleled, in the agricultural sector, by the LPIS/IACS polygon layer maintained by APIA. The legal basis for this transfer is already in place under the CAP horizontal regulations and Article 9 EUDR.

**Table 4** – Comparative overview of forestry and agricultural governance dimensions in Romania and transferable solutions for EUDR compliance

| Dimension                 | Forestry sector (Romania)                                                    | Agricultural sector (Romania)                                                                | Transferable solution                                                            |
|---------------------------|------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| Unit of management        | Forest management units and parcels (amenajament)                            | Strongly fragmented farm holdings; many parcels below 4 ha                                   | Use LPIS parcels as the unit of geolocation; polygon or point per Article 9      |
| Geolocation reference     | SUMAL / amenajament polygons                                                 | LPIS (APIA) orthophoto polygons, annual refresh                                              | Adopt LPIS as the reference layer for EUDR geolocation                           |
| Chain of custody          | Primary/secondary transport permits, SUMAL registers                         | Largely commercial documents; no batch-level national register                               | Add SUMAL-style aviz and register logic on top of LPIS for in-scope commodities  |
| Certification / standards | FSC, PEFC (mandatory plus voluntary)                                         | GlobalG.A.P., organic, PDO/PGI – uneven uptake                                               | Recognise and link voluntary schemes in the national EUDR workflow               |
| Smallholder inclusion     | Group certification under FSC/PEFC                                           | Producer organisations, cooperatives (Law 566/2004), group-of-operators (Reg. (EU) 2018/848) | Group DDS via LAPAR, Pro Agro, cooperatives and similar intermediaries           |
| Public transparency       | Inspectorul Păduri (Forest Inspector) citizen app (QR / plate / code lookup) | No citizen-facing agricultural equivalent                                                    | Develop an "Inspectorul Agriculturului" analogue (MADR, APIA, ANSVSA, ANAF, STS) |
| Enforcement authority     | Garda Forestieră (Romanian Forest Guard)                                     | Fragmented across APIA, ANSVSA, ANAF, MADR                                                   | Clarify lead competent authority and inter-agency data-sharing protocols         |

**Table 5** – Transferability matrix of Romanian forestry-sector practices to agricultural EUDR implementation

| Forestry practice                        | Transferability | Expected benefit                                              | Limitations in agricultural context                                                                                       | Implementation requirements                                                                                             |
|------------------------------------------|-----------------|---------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| SUMAL Timber tracking                    | Partial         | Batch-level traceability for grain and livestock consignments | Agricultural batches aggregate from many parcels; SUMAL itself has documented fraud and enforcement gaps                  | New agricultural traceability layer on top of LPIS; remote-sensing verification of operator-submitted data              |
| Forest management plan compartment maps  | Full            | Parcel-level geolocation backbone for Article 9 EUDR          | LPIS already exists and is updated annually; minor adjustments needed for small parcels (< 4 ha) per Article 9(1)(d) EUDR | Adopt LPIS as the reference geolocation layer; ensure interoperability with the EU Information System                   |
| APV (advance harvest plan)               | Partial         | Ex-ante declarations of harvest with geolocation linkage      | No formal agricultural equivalent of APV; closest analogue is the annual single payment declaration in IACS               | Extend IACS annual declarations with EUDR-relevant fields (commodity, expected production)                              |
| Aviz de însoțire (consignment note)      | Partial         | Document-linked traceability per consignment                  | Existing commercial documents for grain and livestock are not standardised at national level                              | National e-aviz scheme for in-scope agricultural commodities, with QR linkage to LPIS parcels of origin                 |
| Inspectorul Pădurii public app           | Full            | Public traceability viewer increases social oversight         | Privacy and commercial-confidentiality constraints stronger in agriculture                                                | Develop a public LPIS-EUDR viewer or a public DDS extract with appropriate data-protection safeguards                   |
| Garda Forestieră (Romanian Forest Guard) | Not directly    | Specialised enforcement agency reduces inter-agency friction  | No single equivalent agency for agricultural commodities; enforcement fragmented across APIA, ANSVSA, ANAF, MADR          | Joint enforcement protocol; designation of a lead competent authority under Article 13 EUDR                             |
| FSC/PEFC voluntary certification         | Partial         | Voluntary schemes can be linked as risk-mitigation evidence   | Voluntary certification does not deliver geolocation per consignment by itself                                            | Recognise GLOBALG.A.P., ProTerra, RTRS, RSPO as risk-mitigation evidence; standardise data hand-off to the national DDS |
| Group certification of                   | Full            | Cost-sharing of fixed compliance burdens across               | Producer organisation density uneven                                                                                      | Channel group due diligence through LAPAR, Pro Agro and                                                                 |

## EUDR in Romania: transfer of good practices to agriculture from the forest sector

|                                                                                     |         |                                                   |                                                                                              |                                                                                                                        |
|-------------------------------------------------------------------------------------|---------|---------------------------------------------------|----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| small forest owners                                                                 |         | SMEs and smallholders                             | across Romanian regions                                                                      | Law 566/2004 cooperatives; group-of-operators under Regulation (EU) 2018/848                                           |
| Satellite-based deforestation monitoring (used by Inspectorul Pădurii/Forest Guard) | Partial | Independent verification of operator declarations | Agricultural land-use change has different signatures than forest loss; calibration required | Tap Copernicus and the EU Observatory on Deforestation and Forest Degradation; combine with national land-cover layers |
| Felling permits and chain of custody                                                | Partial | Permit-and-batch logic for grain consignments     | No felling-permit equivalent in agriculture; closest analogue is the harvest declaration     | Pilot a harvest-and-batch permit scheme for in-scope commodities in 2026–2028 to inform the national rollout           |

Two decades of forest-related legislative change across European countries demonstrate, however, that property-rights configurations rather than the geolocation backbone alone determine compliance outcomes (Nichiforel *et al.*, 2020). Group certification practices in forestry (FSC and PEFC group certification of small forest owners) are directly mirrored by the group-of-operators logic of Regulation (EU) 2018/848 and by Romanian producer organisations such as LAPAR, Pro Agro and Law 566/2004 cooperatives.

Regarding RQ2, the conditions of transfer cluster around three axes: institutional (designation of a competent authority under Article 13 EUDR and clarification of inter-agency responsibilities); technical (interoperability between LPIS/IACS, an EUDR-DDS gateway and the EU Information System); and financial (a public funding line to subsidise group due diligence for SMEs and smallholders). Regarding RQ3, residual limitations are non-trivial. The documented SUMAL

traceability frauds (recycled photographs, blank uploads, vehicle interiors in place of timber) demonstrate that traceability without an effective verification layer is insufficient. The EUDR's reliance on operator-submitted geolocation creates an analogous vulnerability in agriculture; remote-sensing verification, customs cross-checks and risk-based audits are required to close this gap.

### Romania in comparative perspective (RQ4)

*Table 6* compares practices in Romania, Brazil and Argentina on eight dimensions. The comparison shows that Romania is closer to Argentina than to Brazil in terms of smallholder treatment (both rely on national producer registries: RENSPA in Argentina and APIA producer registers in Romania), but it is closer to Brazil on the use of a parcel-based geolocation backbone (the Brazilian CAR plays a role comparable to LPIS, although with a different legal status and substantially weaker enforcement against post-2008 illegal clearings).

**Table 6** – Comparative overview of EUDR-relevant traceability and governance architectures in Romania, Brazil and Argentina

| Dimension                                               | Romania<br>(EU Member State)                                                                                             | Brazil                                                                                                                                                              | Argentina                                                                                                                                                                     |
|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lead competent institution(s)                           | MMAP; MADR; APIA (LPIS/IACS); EUDR competent authority not yet formally designated                                       | MAPA (2024); Ministry of the Environment; state-level environmental agencies                                                                                        | SENASA; INTA; MAGP                                                                                                                                                            |
| National traceability system for the relevant commodity | SUMAL 2.0 (timber, operational since 2014); SUMAL 3.0 currently in public consultation                                   | SISFLORA (state-level timber); SISBOV (bovine identification, MAPA, since 2002); National Plan for Individual Cattle Identification (PNIB) phased to 2032           | SIGSA (animal health management); DT-e electronic transit document; mandatory individual electronic identification of cattle from 1 January 2026 (SENASA Resolution 530/2025) |
| Geolocation reference (national parcel registry)        | LPIS/IACS (APIA, EU-funded; annual orthophoto refresh)                                                                   | CAR (Cadastral Ambiental Rural) — self-declared geo-referenced rural property registry under the 2012 Forest Code                                                   | RENSPA (Registro Nacional Sanitario de Productores Agropecuarios; SENASA, since 1997)                                                                                         |
| Public access and transparency tier                     | Inspectorul Pădurii public app for timber; no agricultural equivalent                                                    | Partial: CAR data are public via SICAR with restrictions; civil-society platforms (e.g. MapBiomass, Selo Verde Mato Grosso) cross-check CAR with deforestation data | Limited public access; some open RENSPA queries; civil-society monitoring (e.g. MapBiomass Chaco) complements official data                                                   |
| Certification ecosystem (mandatory vs voluntary)        | Mandatory: SUMAL; Voluntary: FSC, PEFC; agricultural voluntary schemes (GLOBALG.A.P., RTRS, ProTerra) with uneven uptake | Mandatory: CAR, SISBOV (partial); Voluntary: Soy Moratorium (2006, private-sector pact, Amazon biome only), RTRS, ProTerra                                          | Mandatory: RENSPA, SIGSA; Voluntary: ProYungas Visión Argentina (soy, yerba), RTRS                                                                                            |
| Smallholder treatment                                   | Group-of-operators under Regulation (EU) 2018/848; producer organisations (LAPAR, Pro Agro, Law 566/2004 cooperatives)   | Small producers (assentados) often outside SISBOV; CAR registration mandatory but enforcement uneven; subsidised compliance support limited                         | RENSPA registration mandatory and free; smallholders supported by INTA programmes; mandatory cattle e-ID from 2026 raises cost concerns                                       |

## EUDR in Romania: transfer of good practices to agriculture from the forest sector

|                              |                                                                                                                              |                                                                                                                                                                                       |                                                                            |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| Enforcement authority        | Garda Forestieră for timber; for agriculture: fragmented across APIA, ANSVSA, ANAF and MADR                                  | IBAMA, Federal Police, state environmental agencies; varies by state                                                                                                                  | SENASA (with provincial counterparts); enforcement uneven across provinces |
| Recent empirical evaluations | Hălălısan <i>et al.</i> , 2012, 2013; Popescu <i>et al.</i> , 2019; Măciucă <i>et al.</i> , 2020; EIA 2021, 2024; OCCRP 2024 | Brazil's Amazon Soy Moratorium (Heilmayr <i>et al.</i> , 2020, Nature Food); Climate Policy Initiative, 2023; Mongabay, 2024; international-law analyses of SISBOV (e.g. Sousa, 2024) | Brazilian Farmers, 2024; Tridge, 2025; SENASA Resolution 530/2025          |

Notes: MMAP = Ministry of Environment, Waters and Forests (Romania); MADR = Ministry of Agriculture and Rural Development (Romania); APIA = Agency for Payments and Intervention for Agriculture (Romania); LPIS = Land Parcel Identification System; IACS = Integrated Administration and Control System; MAPA = Ministry of Agriculture and Livestock (Brazil); CAR = Rural Environmental Registry (Cadastro Ambiental Rural); SICAR = Rural Environmental Registry Information System (Sistema Nacional de Cadastro Ambiental Rural); SENASA = National Service for Agrifood Health and Quality (Argentina); INTA = National Institute of Agricultural Technology (Argentina); MAGP = Ministry of Agriculture, Livestock and Fisheries (Argentina)

The use of uniform comparative dimensions builds on precedents in European forest research, including the FunDivEUROPE comparative research platform that applied an explicit common protocol across European forest types (Baeten *et al.*, 2013). Argentina's January 2026 mandatory electronic cattle traceability (SENASA Resolution 530/2025) and Brazil's 2024 National Plan for Individual Cattle Identification (PNIB, 2025–2032) provide useful templates for moving Romanian cattle from herd- to animal-level traceability in line with EUDR (Article 9) requirements.

### Limitations and novelty

The principal limitation of the analysis is the absence of primary fieldwork. No interviews, surveys or audits were conducted, and the empirical base is therefore secondary.

The novelty of the contribution lies in three elements:

(i) the explicit operationalisation of transfer of best practices through six transferability criteria;

(ii) the application of these criteria to ten forestry practices in Romania, producing a fully/partially/non-transferable classification (Table 5);

(iii) the systematic comparative perspective with Brazil and Argentina on eight uniform dimensions (Table 6).

These three elements are, to the authors' knowledge, new in the Romanian EUDR literature.

## CONCLUSIONS

The analysis allows three groups of forestry-sector practices to be distinguished by their degree of transferability to EUDR implementation in Romanian agriculture (Table 5).

First, fully transferable practices are those for which an institutional equivalent in agriculture already exists or can be created at low marginal cost and for which the legal basis is available. These include parcel-level geolocation (the role played by amenajament polygons in forestry can be played by

LPIS/IACS in agriculture); group-of-operators arrangements (mirroring FSC/PEFC group certification through producer organisations under Law 566/2004 and Regulation (EU) 2018/848); and a public traceability interface (the Inspectorul Pădurii application has a clear analogue in a public LPIS viewer or in a public EUDR-DDS extract).

Second, partially transferable practices require substantial institutional or technical adaptation, the most important condition being the existence of a designated competent authority for agricultural EUDR matters and the legal authority to compel batch-level reporting. These include consignment notes inspired by the *aviz de însoțire* logic for grain and cattle; risk-based satellite monitoring (Copernicus, the EU Observatory on Deforestation and Forest Degradation) calibrated for agricultural land-use change rather than forest cover loss; and the integration of voluntary certification (GLOBAL G.A.P., ProTerra, RTRS, RSPO) as risk-mitigation evidence within the national EUDR workflow.

Third, practices that are not directly transferable or that require a new institutional design include the operational role of Forest Guard (no single equivalent agency currently covers agricultural commodities; enforcement is fragmented across APIA, ANSVSA, ANAF and MADR), and the specific architecture of SUMAL 2.0/3.0, whose enforcement gaps and traceability fraud caution against literal replication.

Operationally, the implementation of EUDR in Romanian agriculture would benefit from four converging steps:

(i) a Government Ordinance designating the competent authority under Article 13 EUDR (most plausibly MMAP for coordination, MADR for the agricultural commodities and APIA as the LPIS host);

(ii) IT integration between LPIS/IACS and a national EUDR-DDS gateway, anchored on the EU Information System;

(iii) a budget line for group due-diligence subsidies for SMEs and smallholders, channelled through LAPAR, Pro Agro and recognised cooperatives;

(iv) a joint enforcement protocol between Garda Forestieră (Romanian Forest Guard), MADR, APIA, ANSVSA and ANAF for cross-commodity verification.

Limitations of the analysis include the absence of primary fieldwork, the rapidly evolving regulatory environment (the December 2025 EUDR amendment, the May 2025 country-risk classification and the SUMAL 3.0 consultation are all very recent) and the limited number of peer-reviewed empirical evaluations of EUDR implementation available at the time of writing.

These limitations point to a research agenda focused on empirical evaluation of EUDR effects on deforestation, smallholder livelihoods and supply-chain structure in the medium term. Read with the appropriate caution, Romania's experience offers transferable lessons for other EU Member States with a comparable agricultural structure and digital infrastructure, but transferability is contingent on national forest governance, the architecture of LPIS/IACS and the political will to

designate a competent authority and to fund SME-oriented compliance support.

## RECOMMENDATIONS

### Public policy recommendations

Cross-sectoral coordination between forestry and agricultural governance should be strengthened by establishing formal instruments for cooperation and knowledge transfer between competent authorities. Building on existing experience in the field of forest traceability could help to reduce administrative fragmentation, increase institutional harmonisation and allow for a more efficient and balanced implementation of EUDR in the agricultural sector.

Supporting the inclusion of small farmers and SMEs is a key condition for preventing market exclusion effects due to compliance costs and complexity. Comparative evidence from European private-forest extension and advisory systems shows that diversified, multi-channel advice infrastructures markedly improve compliance among smaller landholders (Lawrence *et al.*, 2020). Group certification tools, dedicated capacity-building programmes and access to tailored financing instruments can also reduce individual compliance costs and facilitate the adoption of EUDR requirements in a fair and sustainable manner.

### Recommendations on infrastructure and technological capacity

Investment in digital infrastructures for the collection, management and verification of geolocation data is essential for effective EUDR compliance. Expanding the use of geospatial

technologies, satellite monitoring and scientific methods for verifying the place of origin can strengthen the credibility of compliance assessments and reduce dependence on resource-intensive administrative procedures.

Integrating these tools in an interoperable framework accessible to both public and private actors could provide the basis for ensuring the efficient operation of deforestation-free supply chains. Investment should explicitly cover next-generation biophysical origin-verification capacity – chemistry-based tracing across multiple tree genera (Truszkowski *et al.*, 2026) and operational origin-verification frameworks built for sanctioned-timber contexts (Mortier *et al.*, 2024) – so that operator-declared geolocation can be independently corroborated rather than treated as the sole evidentiary basis.

### Directions for future research

Future research should focus on empirical analyses of the effects of the EUDR on reducing deforestation, on farmers' livelihoods, and on the structure and dynamics of supply chains. Long-term analyses and the use of integrated methods are needed to identify both the intended effects and unintended consequences of the regulation's implementation in distinct national and sectoral contexts. Particular attention should be paid to how institutional, technological and economic adaptations influence the balance between environmental and competitive economic performance priorities.

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