

Using Big Data to Detect Illegality in the Tropical Timber Sector

A Case Study
of BVRio Due
Diligence and
Risk Assessment
System

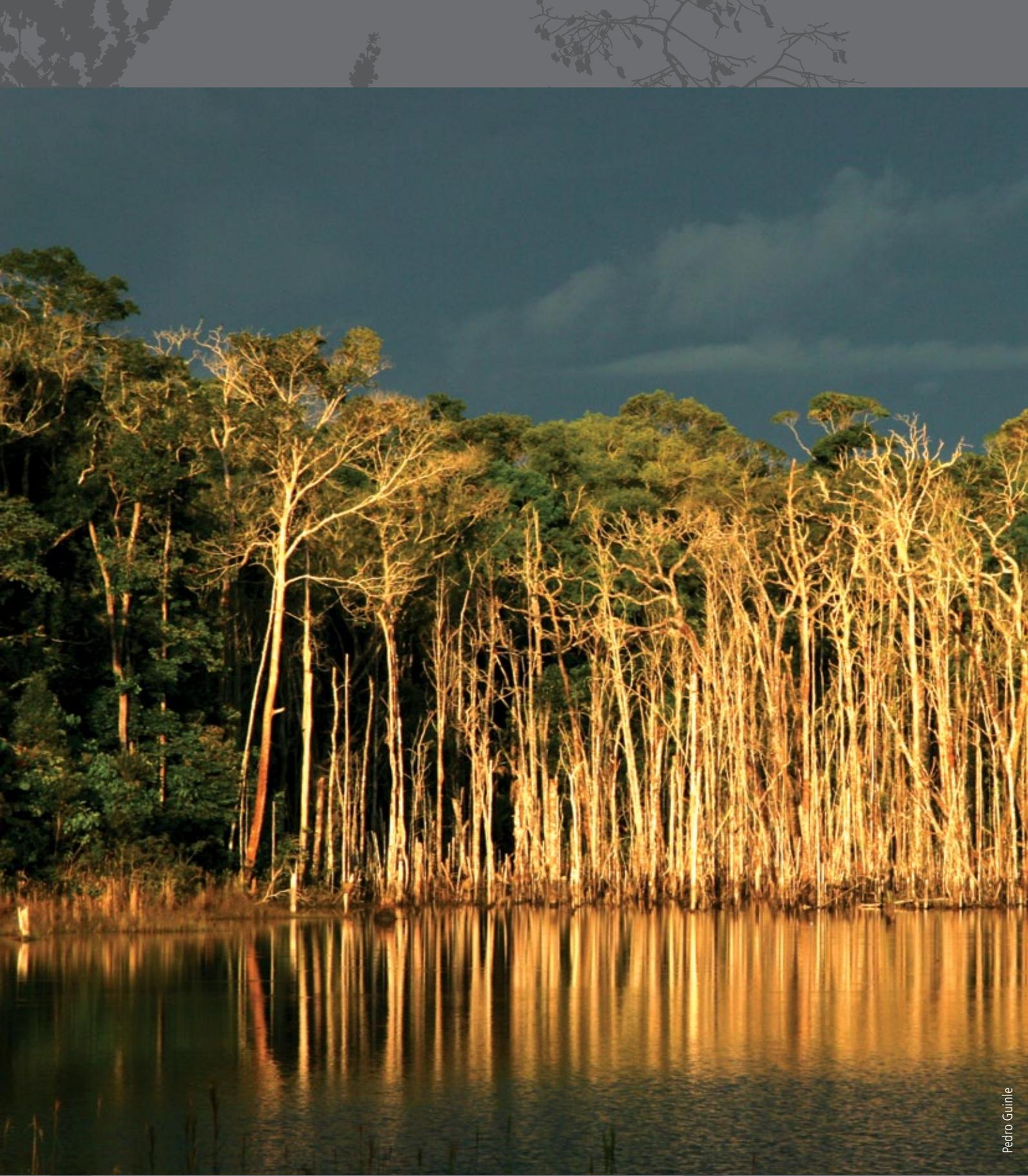






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BVRio Institute (www.bvrrio.org) is a non-profit association created in 2011 with the objective to develop market mechanisms to facilitate compliance with Brazilian environmental laws. iBVRio is a Climate Action Leader of the R20 Regions for Climate Action initiative, received the Katerva Awards 2013 for Economy, and is a member of the Forest Legality Alliance and of the Brazilian Coalition on Climate, Forests and Agriculture.

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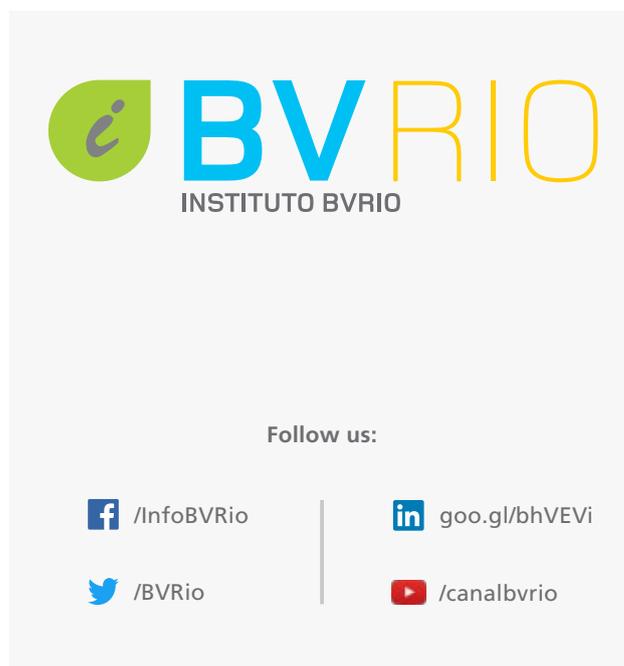
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Commonly Used Acronyms

AUTEX or AUTEF	Autorização de Extração Florestal, logging permit
CEPROF	Cadastro de Exploradores e Consumidores de Produtos Florestais, Register of Producers and Consumers of Forest Products
DOF	Documento de Origem Florestal, Document of Forest of Origin
FLEGT	Forest Law Enforcement, Governance and Trade initiative of the EU
FSC	Forest Stewardship Council
GF	Guia Florestal, Timber Transportation Authorisation
GFTN	Global Forests & Trade Network
GHG	Greenhouse gas
IBAMA	Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis
MMA	Brazilian Ministry for the Environment
OEMA	Organização Estadual de Meio Ambiente
POA	Plano Operacional Annual, Annual Operational Plan
SAD	Sistema de Alerta de Desmatamento, Deforestation Alert System
SEMA	Secretaria Estadual de Meio Ambiente
SIMEX	Sistema de Monitoramento da Exploração Florestal, Forest Monitoring System
Sisflora	Sistema de Comercialização de Transporte de Produtos Florestais

Executive Summary

The illegal production and trade of tropical timber is one of the main drivers of environmental degradation worldwide, leading to loss of habitats and biodiversity, increased greenhouse gas emissions, human rights abuses and corruption. Over the last 15 years, international efforts have intensified to combat illegality in the timber sector. The US Lacey Act 2008, the EU Timber Regulation, and amendments to Australia's Illegal Logging Prohibition Act have made trading illegal timber a punishable offense.

The Brazilian tropical timber sector today is responsible for the extraction of more than 13 million m³ of hardwood logs from Amazonian rainforests. The sector generates more than US\$ 3 billion in annual revenue and employs more than 200,000 people. International rankings, however, place Brazil as one of the highest risk countries for illegality in the timber sector. It is estimated that more than 70% of timber products from the Amazon may come from illegal operations, which may involve theft of wood from conservation areas and indigenous reserves, use of slave labour, and other types of illegal practices. In addition to illegality, the sector is also falling short in terms of the adoption of sustainability standards. The result is extremely negative for the sector and for tropical forests.

In Brazil, production of tropical timber is managed under three official control systems: one federal system, as well as separate state systems in Mato Grosso and Pará. Compared to many tropical countries, the timber control systems in Brazil are both comprehensive and sophisticated. Widespread corruption and

fraud, however, have rendered these systems unreliable and put Brazil at the top of the list of risky countries worldwide.

Timber fraud practised in Brazil can be divided into three main groups:

1

Illegal logging and timber

theft, including logging in unauthorised areas and extraction of volumes higher than those authorised in the logging permits.

2

Documentation frauds associated with the government's Timber Control System

in order to create a document trail that makes illegal timber appear 'official'.

3

Operational illegalities and / or irregularities at the forest, sawmills or sale outlets

, including contraventions of employment legislation, operations without valid licenses and tax evasion.

Lack of transparency and poor access to information in official databases enhances the potential for fraud.

A number of approaches have been used for tracing timber products' origins and screening them for legality. These have different advantages and disadvantages, and could be used in combination to complement each other. Approaches include:

- Field audits and spot checks by independent auditors to verify whether operations conform to expected rules, regulations or standards;
- Traceability systems and technologies, including bar codes, computer chips and radio frequency identifiers, GPS and DNA identification;
- Remote sensing, using satellite imagery or drones;
- Supply chain information platforms, created by NGOs and private companies to help buyers identify the sources of products;
- Big data analysis, whereby large volumes of data are cross-checked to extract patterns and information, which can then be used to trace supply chains and detect potential illegalities and or irregularities.



Adam Roman

BVRio's Due Diligence and Risk Assessment System (the 'system') was created to screen Brazilian timber and timber products for their legality status. The system is an integral part of the BVRio Responsible Timber Exchange, which also includes a Trading Platform for sourcing timber products from legal sources. The system brings together and analyses information on legality (including risks of non-compliance with environmental and social requirements during extraction, processing and transportation); supply chain inconsistencies; and social aspects (such as abuses of labour legislation). Information is extracted from the Brazilian government's documentation system for the control of forest management activities, transport and trading of timber products.

Based on a large and growing data set, the system uses a big data approach to identify direct and indirect evidence of the risks associated with operations at production sites. Based on the analysis, production sites are given a risk rating:

✓ **No Indication of Infringements, Irregularities or Non-Compliance**

Associated with the direct factors analysed, and negligible risk derived from indirect analyses.

⚠ **Low to Medium Risk**

Inconsistencies or uncertainties are associated with the production site analysed, or the system detects infractions and irregularities that are indirectly related to the timber consignment analysed.

⚠ **Medium to High Risk**

Proven infractions and/or non-conformances are found (of lower severity than those in the 'high risk' category), or there is a high risk of illegality based on the circumstantial evidence obtained through indirect analyses.

✗ **High Risk**

The production site is associated with proven severe infractions or illegality.



The risks along the supply chain are assessed using government-issued Timber Transport Authorisations for each timber consignment. Due Diligence and Risk Assessment Reports are generated by the system for each specific timber consignment and include a description of the timber consignment; supply chain information and any weaknesses; the production sites in the supply chain; and a risk assessment of each production site in the chain.

There is an urgent need to promote legality and sustainability in the Brazilian tropical forest sector, to maintain standing forests and the industry associated with them. A pre-requisite for this process is to bring the industry to legality, ensuring compliance with laws and providing a level playing field for all actors. This, in turn, requires action to promote the use of legal timber among associations, producers and distributors of timber products; develop monitoring mechanisms; encourage the use of legal and, eventually, certified timber products among purchas-

ing departments of public and private sector bodies; and promote the legal segment of the industry in international markets.

Based on BVRio's experience, the use of big data for risk assessment is promising, as it combines the outputs of a wide range of approaches rather than relying on any one in isolation. Any initiative designed to increase the sector's legality, however, depends on the availability and transparency of relevant information. It is essential that government agencies provide more transparency to enable better monitoring, greater control, and a reduction of illegality in the Brazilian tropical timber sector. •

Alexander Lees



1. Introduction

The illegal production and trade of tropical timber is one of the main drivers of environmental degradation worldwide, leading to loss of habitats and biodiversity¹, greenhouse gas (GHG) emissions, human rights abuses and corruption. While sustainable forest management can provide a value for standing forests, livelihoods for forest peoples and economic activity in rural areas, those benefits are erased when the timber sector is dominated by illegal production. Unfortunately, it is estimated that over 50% of tropical timber still comes from illegal sources².

Over the last 15 years, international efforts have intensified to combat illegality in the timber sector. In terms of legislative requirements, the US Lacey Act 2008³, the EU Timber Regulation⁴, and amendments to Australia's Illegal Logging Prohibition Act⁵ have made trading illegal timber a punishable offense. In parallel, initiatives such as the EU's Forest Law Enforcement, Governance and Trade (FLEGT)⁶ and TREE⁷ have helped to increase capacity to implement these laws.



Adam Roman

1 See, for recent study of Barlow et al. 2016 demonstrating the drastic effect of tropical forest degradation on loss of biodiversity. (Barlow, J. et al. (2016): Anthropogenic disturbance in tropical forests can double biodiversity loss from deforestation. *Nature* 535, 144–147, 07 July 2016 - <http://dx.doi.org/10.1038/nature18326>)

2 See, for instance, Hoare, A., 2015: Tackling Illegal Logging and the Related Trade. Chatham House, London (<http://indicators.chathamhouse.org>). Similar, or even higher figures are quoted by the Brazilian Ministry of the Environment, Interpol, Imazon, ITTO, Traffic and NepCon.

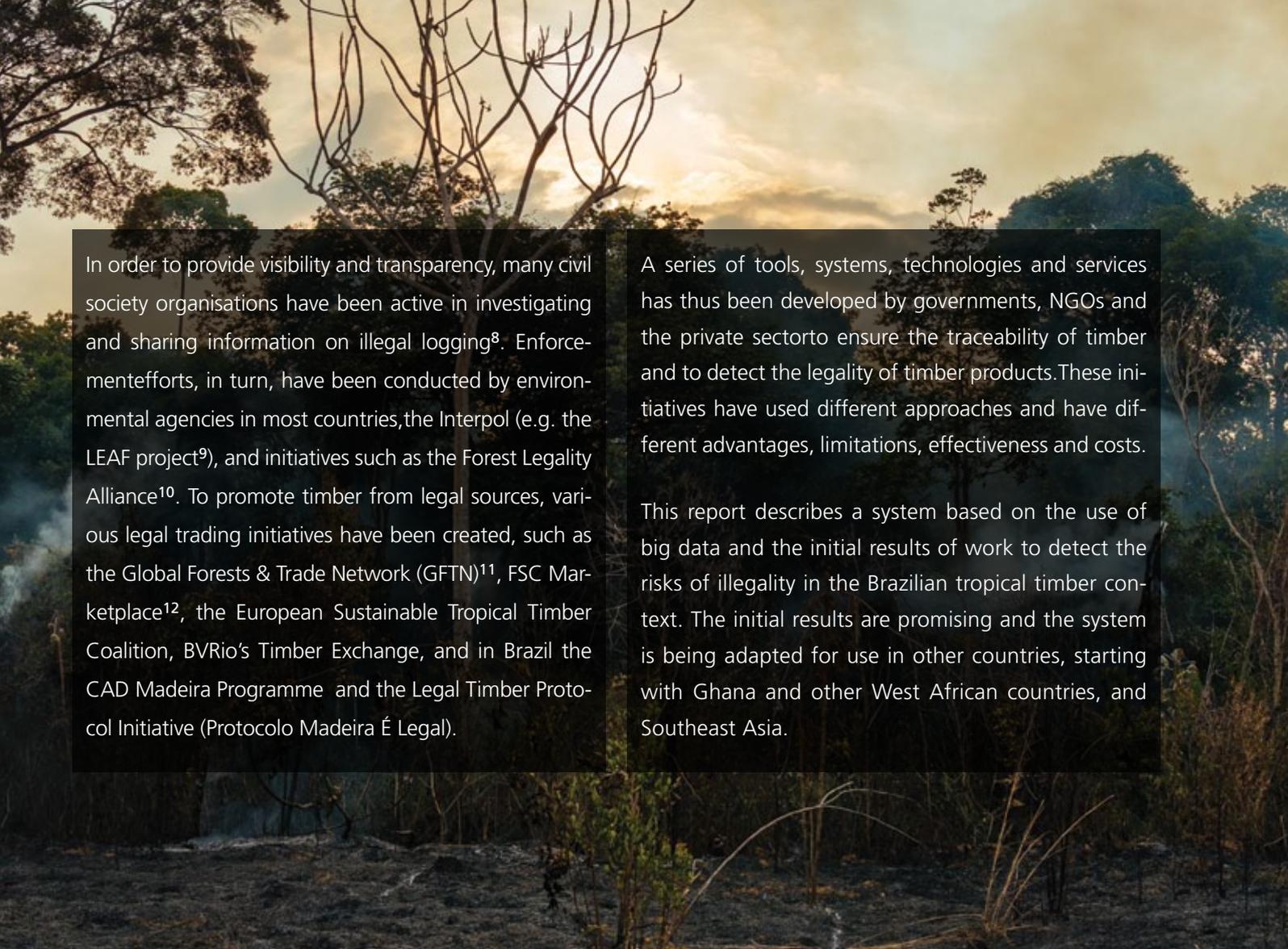
3 The Lacey Act of 1900 is a law in the USA that bans trafficking in illegal wildlife. In 2008, the Act was amended to include plants and plant products such as timber and paper (www.aphis.usda.gov/aphis/ourfocus/planthealth/import-information/SA_Lacey_Act).

4 http://ec.europa.eu/environment/forests/timber_regulation.htm

5 The Australia Illegal Logging Prohibition Act was designed to support the trade of legal timber into the Australian market (<http://www.agriculture.gov.au/forestry/policies/illegal-logging>).

6 The FLEGT Action Plan aims to reduce illegal logging by strengthening the sustainability and legality of forest management, improving forest governance and promoting trade in legally produced timber (www.flegt.org).

7 The Timber Regulation Enforcement Exchange (TREE) is an ongoing series of networking and information-sharing meetings that brings a growing group of officials together every six months (www.flegt.org/web/timber-regulation-enforcement-exchange/).



In order to provide visibility and transparency, many civil society organisations have been active in investigating and sharing information on illegal logging⁸. Enforcement efforts, in turn, have been conducted by environmental agencies in most countries, the Interpol (e.g. the LEAF project⁹), and initiatives such as the Forest Legality Alliance¹⁰. To promote timber from legal sources, various legal trading initiatives have been created, such as the Global Forests & Trade Network (GFTN)¹¹, FSC Marketplace¹², the European Sustainable Tropical Timber Coalition, BVRio's Timber Exchange, and in Brazil the CAD Madeira Programme and the Legal Timber Protocol Initiative (Protocolo Madeira É Legal).

A series of tools, systems, technologies and services has thus been developed by governments, NGOs and the private sector to ensure the traceability of timber and to detect the legality of timber products. These initiatives have used different approaches and have different advantages, limitations, effectiveness and costs.

This report describes a system based on the use of big data and the initial results of work to detect the risks of illegality in the Brazilian tropical timber context. The initial results are promising and the system is being adapted for use in other countries, starting with Ghana and other West African countries, and Southeast Asia.

8 For example, Greenpeace, FERN, Friends of the Earth, Environmental Investigation Agency, Chatham House (e.g. Illegal Logging Portal, www.illegal-logging.info).

9 Law Enforcement Assistance for Forests (www.interpol.int/Crime-areas/Environmental-crime/Projects/Project-Leaf).

10 The Forest Legality Alliance is a multi-stakeholder initiative with the goal of reducing illegal logging by supporting the supply of legal forest products (www.forestlegality.org).

11 WWF's Global Forest & Trade Network (GFTN) is a partnership linking companies, communities, NGOs and entrepreneurs, with the goal of creating a new market for environmentally responsible forest products.

12 <https://marketplace.fsc.org>

13 The European Sustainable Tropical Timber Coalition has the goal of increasing demand for timber from sustainably managed and legally harvested tropical forests (www.europeansttc.com).

14 <http://timber.bvrio.org>.

15 An initiative created by São Paulo state government to promote the public purchase of timber from legal sources.

16 A partnership promoted by 23 public and private sector stakeholders in São Paulo, including WWF and FSC Brasil.

1.1 Illegality and its impacts on the Brazilian tropical timber sector

The Brazilian tropical timber sector today is responsible for the extraction of more than 13 million m³ of hardwood logs from Amazonian rainforests¹⁷. These logs feed the wood processing industry and, in combination, the sector generates more than US\$ 3 billion in annual revenue and employs more than 200,000 people¹⁸. Given the richness of natural resources in the region, this sector is relatively small¹⁹ and the importance of the sector is actually decreasing.

The decline of the Amazonian timber industry is the

result of a number of factors, from its low level of sophistication to the challenges created by the informal economy, illegality and unsustainability.

International rankings place Brazil as one of the highest risk countries for illegality in the timber sector²⁰. Constant reports made by the press and NGOs have increased the perception of risk associated with the sector²¹. This perception is confirmed by repeated operations by the Federal Police in Amazonian states, resulting in the imprisonment of state government officials and timber traders²².

According to several studies, it is estimated that more

12 <https://marketplace.fsc.org>.

13 The European Sustainable Tropical Timber Coalition has the goal of increasing demand for timber from sustainably managed and legally harvested tropical forests (www.europeansttc.com).

14 <http://timber.bvrio.org>.

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17 Serviço Florestal Brasileiro, 2015: www.florestal.gov.br/snif/producao-florestal/cadeia-productiva

18 Serviço Florestal Brasileiro, 2015 (Ibid).

19 GVces, 2015: Contribuições para análise de viabilidade econômica das propostas referentes à decuplicação da área de manejo florestal sustentável. Centro de Estudos em Sustentabilidade da Escola de Administração de Empre-

sas de São Paulo da Fundação Getúlio Vargas. São Paulo, p. 57. 2015. See also McKinsey & Company 2016. Promovendo a legalidade e aderência às práticas sustentáveis na exploração e comércio de madeira nativa tropical no Brasil. Report for the Ministério do Meio Ambiente do Brasil (MMA), Feb 2016, which states that the sector could increase revenues by ca. R\$2.7 billion/yr.

20 Brazil is the top country in the risk ranking of the Spanish Ministry of Agriculture and the Environment (www.maderalegal.info/). See also NepCon's Forestry Risk Profile for Brazil (<http://www.nepcon.org/forestry-risk-profiles/brazil/>) and Wellesley, L. 2014: Illegal Logging and Related Trade The Response in Brazil. A Chatham House Assessment (<http://indicators.chathamhouse.org>).

21 For example:

- <http://m.greenpeace.org/brasil/pt/high/Noticias/Madeira-ilegal-da-Amazonia-chega-impunemente-a-Europa/>
- <http://planetasustentavel.abril.com.br/noticia/ambiente/extracao-ilegal-madeira-e-crime-organizado-tem-hackers-envolvidos-704266.shtml>
- <http://amazonia.org.br/imprensa/exploracao-ilegal-de-madeira-cresce-63-em-mato-grosso/>

22 For example:

- <http://g1.globo.com/fantastico/noticia/2015/08/operacao-desmantela->

than 70% of timber products from the Amazon may come from illegal operations²³, which may involve theft of wood from conservation areas and indigenous reserves, use of slave labour, and other types of illegal practices (see Section 2).

In addition to illegality, the sector is also falling short in terms of the adoption of sustainability standards. The aggregate production from FSC-certified forest management operations accounts for less than 3% of the total log production in the Brazilian Amazon²⁴, and is diminishing as a result of unfair competition from illegal sources. PEFC certified areas in the Brazilian Amazon are even smaller²⁵.

esquema-de-exploracao-ilegal-de-madeira-no-para.html

- <http://noticias.uol.com.br/meio-ambiente/ultimas-noticias/redacao/2015/08/11/governo-investiga-rondonia-por-oficializar-madeira-ilegal-de-outros-estados.htm>
- www.midiamax.com.br/policia/carreta-apreendida-cerca-50m3-madeira-ilegal-costa-rica-279107
- www.ebc.com.br/noticias/2015/08/policia-federal-desmonta-quadrilha-de-comercio-ilegal-de-madeira
- <http://g1.globo.com/mato-grosso/noticia/2015/09/empresario-e-presos-e-12-mil-m-de-madeira-ilegal-e-apreendida-em-mt.html>

23 For example, Greenpeace 2014: A crise silenciosa da Amazônia. Controle do setor madeireiro e 5 formas de fraudar o sistema (http://chegade-madeirailegal.org.br/doc/BR/controle_madeireiro_5_formas_fraudar.pdf), and Imazon 2013. Boletim Transparência Manejo Florestal Estado do Pará (2011-2012). Also, A.C. Hummel, former director of the Brazilian Forest Service stated that “the extraction of illegal timber was never less than 60% of total amount logged in the Amazon” (in: www.painelflorestal.com.br/noticias/artigos/madeira-da-amazonia-um-novo-foco-no-combate-a-ilegalidade)

24 Imaflo, 2012: Acertando o alvo. Desvendando o mercado brasileiro de

The combination of these factors has resulted in a reduction in demand for Amazonian timber. In the domestic market, the difficulty of sourcing legal wood is resulting in a trend towards wood substitution in the construction industry²⁶. In international markets, legislation focused on legality (i.e. US Lacey Act and the EU Timber Regulation) and sustainability standards (e.g. FSC certification) will gradually reduce demand for imports of timber products from the Amazon. Gradually, American and European companies are refraining from buying timber from the Brazilian Amazon, a trend that has accelerated since the Federal Police operations in 2015²⁷.

On the supply side, a reduction in timber production

madeira amazônica certificada FSC (www.imaflora.org).

25 According to a review by Alves et al (2011), 1.2 million ha of tropical forests were certified by FSC and only 73,000 ha were certified under CERFLOR-PEFC in the Brazilian Amazon. See: Alves, R.R., Jacovinell, L.A.G., Silva, M.L., 2011: Plantações florestais e a proteção de florestas nativas em unidades de manejo certificadas no Brasil. *Rev. Árvore* vol.35 no.4 Viçosa July/Aug. 2011 (www.scielo.br/scielo.php?script=sci_arttext&pid=S0100-67622011000500011).

26 There is a trend towards the substitution of tropical hardwoods by other materials, ranging from wood from plantations to concrete, aluminium and plastics. See WWF Brasil and Sinduscon (Association of Construction Companies of São Paulo), 2011: Aquisição responsável de madeira na construção civil. Um guia prático para as construtoras.

27 For example: http://noticias.pgr.mp.br/noticias/noticias-do-site/copy_of_criminal/madeira-limpa-21-sao-presos-em-3-estados-em-operacao-para-combater-desmatamento-ilegal

of around 40% has been observed over the past 10 years²⁸. A significant barrier for the production of legal, sustainable and/or certified timber, is the unfair competition posed by illegal operations. The lower cost structure of illegal operators (with lower production costs, tax avoidance, etc.), enable them to displace the legal sources in the market, resulting in financial difficulties for companies involved in legal and/or certified sustainable production²⁹.

The result is extremely negative for the sector and for tropical forests: in the absence of mechanisms that value standing forests, they become more vulnerable to deforestation for conversion to other land uses, increasing GHG emissions, and the loss of habitat and biodiversity.

Recognising the importance of this trend, the Brazilian Nationally Determined Contribution (NDC – See

Box 1) states that the country intends to adopt measures to “enhance sustainable native forest management systems, through georeferencing and tracking systems applicable to native forest management with a view of curbing illegal and unsustainable practices”³⁰. Combating illegal logging is also one of the objectives of the Brazilian Coalition on Climate, Forests and Agriculture³¹.

There is an urgent need to promote legality and sustainability in the Brazilian tropical forest sector and foster a step-change in the management of Brazil’s forests, to ensure the maintenance of standing forests and the reduction of GHG emissions from the land use sector. Indeed, there is the potential to multiply the area under sustainable selective logging in the Brazilian Amazon by, at least, a factor of ten³².

28 Serviço Florestal Brasileiro, 2015: www.florestal.gov.br/snif/producao-florestal/cadeia-productiva.

29 See, for instance:

- Sindimasp (Association of Timber Wholesalers of São Paulo) and WWF Brasil, 2012: Comércio de madeira. Caminhos para o uso responsável. Sindimasp (www.sindimasp.org.br).
- The GVCes (2015, *ibid*) report estimates that the costs of illegal timber are 50% lower than those associated with legal production.
- McKinsey & Company, 2016: Promovendo a legalidade e aderência às práticas sustentáveis na exploração e comércio de madeira nativa tropical no Brasil. Report for the Ministério do Meio Ambiente do Brasil (MMA), Feb 2016.

30 Brazilian NDC towards achieving the objective of the UN Framework Convention on Climate Change, submitted to the UNFCCC in 2015.

31 The Brazilian Coalition on Climate, Forests and Agriculture (www.coalizaobr.com.br) was formed in 2016 by business associations, companies, the civil society, organisations and individuals interested in contributing to the advancement and cooperation in the Brazil’s climate agenda. Representing over 130 organisations, including private sector companies, associations, and NGOs, the Coalition is gaining significant recognition as a stakeholder in the formulation of public policy related to land use and climate.

32 GVCes 2015, (*ibid*).

This, in turn, requires action to promote the use of legal timber among associations, producers and distributors of timber products; development of monitoring mechanisms; encouragement to use legal and, eventually, certified timber products among purchasing departments of public and private sector bodies; and the promotion of the legal segment of the indus-

try in international markets.

A pre-requisite of this objective is to ensure that the sector operates legally, in compliance with laws, rules and regulations, with all actors operating on a level playing field. •

Box 1: Brazilian Nationally Determined Contribution (NDC) and land use

The Brazilian NDC will result in a 37% reduction below 2005 levels of GHG emissions by 2025. Measures related to land use and forests include:

- Strengthening and enforcing the implementation of the Forest Code at federal, state and municipal levels;
- Strengthening policies and measures with a view to achieving zero illegal deforestation in the Brazilian Amazon by 2030 and compensating for GHG emissions from legal suppression of vegetation by 2030;
- Restoring and reforesting 12 million hectares of forests by 2030 for multiple purposes;
- Enhancing sustainable native forest management systems, through georeferencing and tracking systems applicable to native forest management with a view to curbing illegal and unsustainable practices.

Source: Brazilian NDC towards achieving the objective of the UN Framework Convention on Climate Change, submitted to the UNFCCC in 2015.

Brazilian Timber Control Systems and Types of Fraud

In Brazil, production of timber is controlled by three official timber control systems. The main system, developed by the Federal Government, is the Document of Forest of Origin (Documento de Origem Florestal – DOF), introduced by the Brazilian Ministry of the Environment in 2007 and adopted by most states in the country. Two states (Pará and Mato Grosso), however, developed and operate their own systems, Sisflora (Sistema de Comercialização de Transporte de Produtos Florestais – See Table 1). These states supply over

70% of the tropical timber produced in the country.

In general, the three systems are similar to each other and are comprehensive, covering all activities related to timber production: i.e. permitting, extraction (logging), transportation, processing, and commercialisation of timber products. The main focus of these systems is to ensure that every activity is documented, to enable wood products to be traced through the chain and forest management regulations to be enforced.

2.1 Timber Control Process

In broad terms, the regulatory process related to timber extraction follows the steps outlined below and summarised in Table 1:

1. Development of a forest management plan, to be approved by the environmental agency (SEMA – Secretaria Estadual de Meio Ambiente, or OEMA – Órgão Estadual de Meio Ambiente) of the state where the forest is located;

2. Preparation of an annual operational plan (Plano Operacional Anual – POA) including detailed forest inventories identifying the trees, species and volumes to be extracted. In the Amazon region, the maximum volume authorised to be logged is 30 m³/ha, every 35 years³³;

3. Once a POA is approved, the SEMA issues a logging permit detailing the species and volumes authorised to be extracted in the next logging season (Autorização de Extração Florestal – AUTEX for the whole country, or AUTEF in Pará);

4. The volume authorised for extraction and commercialisation is registered in a credit-debit system linked to the Register of Producers and Consumers of Forest Products (Cadastro de Exploradores e Consumidores de Produtos Florestais– CEPROF). This volume is credited into the forest management company's account, and every time it sells a volume of timber, this is debited from the account;

5. The system also controls the transportation of timber, using timber transportation permits (Guia Florestal – GF, or Documento de Origem Florestal–DOF). Every time a GF or DOF is issued, the volume of timber in it is debited from the account of the dispatching party and credited in the account of the receiving party;

6. Sawmills must record the amount of timber purchased, wood products sold and the conversion rates achieved at processing. Maximum conversion rates are defined for each type of product, stated in law (see Annex 1).

A short guide on how to read and interpret these documents is found in Annex 2.

33 Lower volumes are authorised if shorter rotations are used (e.g. 20–25m³ over a cycle of 25 – 30 years, assuming an increment of 0.83 m³/ha/yr).

Table 1: Main documentation related to the extraction, processing, transportation and sale of timber and timber products, required by the three official Timber Control Systems in Brazil.

System	DOF (Documento de Origem Florestal)	Sisflora Mato Grosso	Sisflora Pará
Region Covered	All states in Brazil, except for Mato Grosso and Pará Managed by Ibama	Mato Grosso state Managed by SEMA Mato Grosso	Pará state Managed by SEMA Pará
Forest	Forest Management Plan For the whole logging area to support multi-year operation. Must be prepared by a forest engineer and authorised by the state's Secretary of Environment (SEMA/OEMA)	Forest Management Plan For the whole logging area to support multi-year operation. Must be prepared by a forest engineer and authorised by the state's Secretary of Environment (SEMA)	Forest Management Plan For the whole logging area to support multi-year operation. Must be prepared by a forest engineer and authorised by the state's Secretary of Environment (SEMA)
	POA(Plano Operacional Anual) Annual operational plan, providing a more detailed inventory of the area to be logged, including individual trees, logging roads and log decks	POA (Plano Operacional Anual) Annual operational plan, providing a more detailed inventory of the area to be logged, including individual trees, logging roads and log decks	POA (Plano Operacional Anual) Annual operational plan, providing a more detailed inventory of the area to be logged, including individual trees, logging roads and log decks
	AUTEX (Autorização de Extração Florestal) Logging permit issued by the SEMA for a period of 1 year, stating the species and volumes authorised to be extracted during the period ³⁴ .	AUTEX (Autorização de Extração Florestal) Logging permit issued by the SEMA for a period of 1 year, stating the species and volumes authorised to be extracted during the period	AUTEF (Autorização de Extração Florestal) Logging permit issued by the SEMA for a period of 1 year, stating the species and volumes authorised to be extracted during the period
Transportation	DOF (Documento de Origem Florestal) A license for the transportation of timber products issued by the logging company via the online official system.	GF (Guia Florestal) A license for the transportation of timber, differentiated by type of product: <ul style="list-style-type: none"> • GF1 - for the transportation of logs • GF3 - for other timber products In addition, DOFs are also needed if timber products are transported across states.	GF (Guia Florestal) A license for the transportation of timber, differentiated by type of product: <ul style="list-style-type: none"> • GF1 - for the transportation of logs • GF3 - for other timber products In addition, DOFs are also needed if timber products are transported across states.
Sawmill	LO (Licença Operacional) Operational license. System of stock control and conversion rates associated with the DOF system. Sawmills must record input and output, and conversion rates associated with different products	LF (Licença Florestal) – Forestry license LA (Licença Ambiental) – Operational license. System of Stock Control and conversion rates associated with Sisflora. Sawmills must record input and output, and conversion rates associated with different products	LAU (Licença Ambiental Única) – Environmental license. System of Stock Control and conversion rates associated with the Sisflora. Sawmills must record input and output, and conversion rates associated with different products
Sales	Nota Fiscal Eletrônica – Federal digital invoice/receipt of the Brazilian revenue department, to record all sales in the country and the amount of taxes due.	Nota Fiscal Eletrônica – Federal digital invoice/receipt of the Brazilian revenue department, to record all sales in the country and the amount of taxes due.	Nota Fiscal Eletrônica – Federal digital invoice/receipt of the Brazilian revenue department, to record all sales in the country and the amount of taxes due.

34 Some exceptions and regional variations exist. For instance, the SEMA from Amazonas state does not issue AUTEX and the logging permit is part of the Operational License of the forest (Licença Operacional).

2.2 Types of fraud

Compared to other tropical countries, the timber control systems in Brazil are among the most complete and sophisticated in the world. They are of a similar standard to, and contain all the elements required by the Timber Legality Assurance Systems adopted by countries that enter into Voluntary Partnership Agreements with the EU³⁵.

Despite of the merits of this regulation, the vast majority of timber produced in the Amazon is still illegal. According to Greenpeace³⁶, between 2007 and 2012, illegal logging in Pará state alone affected over 700,000 ha, representing about 80% of a total logged area of 905,000 ha. Widespread corruption and fraud have rendered these systems useless and put Brazil at the top of the list of risky countries worldwide.

Many organisations in Brazil have developed systems and activities to detect and report illegal timber extraction. These include the SIMEX system developed by Imazon³⁷ and used in Pará and Mato Grosso States³⁸. Other NGOs operating in the Amazon region (e.g. ISA, IDESAM, Greenpeace), have conducted field investigations and focused their attention on identifying, naming and shaming illegal timber extraction and sales³⁹.

Based on their investigations, in 2015 Greenpeace published a report listing the five types of fraud most used by traders of illegal timber operating in the Brazilian Amazon⁴⁰. In 2016, a diagnostic study conducted by McKinsey & Company for the Brazilian Ministry of Environment, highlighted the main weaknesses of the control systems, the main types of fraud, and their recommendations for improvement⁴¹.

35 Part of the EU Timber Regulation and the Forest Law Enforcement and Governance (FLEGT) programme: www.euflegt.efi.int/home.

36 Greenpeace, 2014: A crise silenciosa da Amazônia. Controle do setor madeireiro e 5 formas de fraudar o sistema (http://chegademadeiraillegal.org.br/doc/BR/controlado_madeireiro_5_formas_fraudar.pdf).

37 SIMEX (Sistema de Monitoramento da Exploração Florestal – Forest Monitoring System) is a methodology developed by Imazon (www.imazon.org.br) based on the Deforestation Alert System (Sistema de Alerta de Desmatamento – SAD).

38 Transparência Manejo Florestal series available in Imazon's site; and Transparência Florestal Mato Grosso series, available in ICV (www.icv.org.br/2014/09/18/iniciativa-transparencia-florestal/).

39 See:

- Greenpeace, 2015: A crise silenciosa da Amazonia. Licença para lavar madeira: garantida (<http://www.greenpeace.org/brasil/pt/Documentos/licensa-para-lavar/>). And other reports from the same series.
- ISA, 2015: A rota do saque. Violações e ameaças a integridade da Terra do Meio (PA).
- IDESAM, 2014: Diagnóstico da cadeia produtiva da madeira no município de Lábrea.

40 Greenpeace 2014. A crise silenciosa da Amazônia. Controle do setor madeireiro e 5 formas de fraudar o sistema (http://chegademadeiraillegal.org.br/doc/BR/controlado_madeireiro_5_formas_fraudar.pdf).

41 McKinsey & Company, 2016: Promovendo a legalidade e aderência às práticas sustentáveis na exploração e comércio de madeira nativa tropical no Brasil. Report for the Ministério do Meio Ambiente do Brasil (MMA), Feb 2016.

Based on these reports⁴² and BVRio's own findings (see Section 5), the main types of fraud practised in Brazil can be divided into three groups (summarised in Table 2):



1. Illegal Logging and Timber Theft: This includes logging of unauthorised areas (including conservation areas, indigenous reservations and community land); extraction of volumes higher than those authorised in the logging permits; and extraction of a different species mix from that specified in the permits (i.e. favouring the most valuable species).



2. Documentation Frauds associated with the government's timber control system in order to create a document trail that makes illegal timber appear 'official'. This includes obtaining permits for areas that are never logged in order to create credits to launder stolen timber, adulterations of forest inventories to inflate the volume of valuable species authorised in the system, inflation of conversion rates at sawmills (to create credits for higher volumes of processed timber downstream), and tampering with the official system to create fictitious credits (only possible with the assistance of state government officials).



3. Operational illegalities and/or irregularities at the forest, sawmills or sale outlets: This includes contraventions of employment legislation (including use of slave labour), operations without valid licenses and tax evasion.

⁴² See also report prepared by Sindimasp (Association of Timber Wholesalers of São Paulo) and WWF Brasil, 2012: Comércio de madeira. Caminhos para o uso responsável. Sindimasp (www.sindimasp.org.br).

The two first types of fraud (1 and 2) complement each other: the first type – stolen timber – needs to be accompanied by the second type to obtain the documentation required for subsequent processing, transportation and commercialisation. Indeed, there is an illicit market for credits, enabling parties who cannot justify certain consignments of timber to acquire credits from third parties to balance their accounts. Once illegal timber enters the system, it acquires a false veneer of legality that is difficult to detect even by enforcement agencies, custom officers and government officials.

The third type of fraud – related to operational irregularities – is not necessarily associated with timber theft. But it is often the case that parties who trade in illegal timber also do not comply with other laws. Furthermore, the parties involved in illegal operations are often involved other activities that also show irregularities. This correlation offers opportunities to detect illegal logging in one location by investigating the track record of the parties involved and the past performance of their other logging operations.

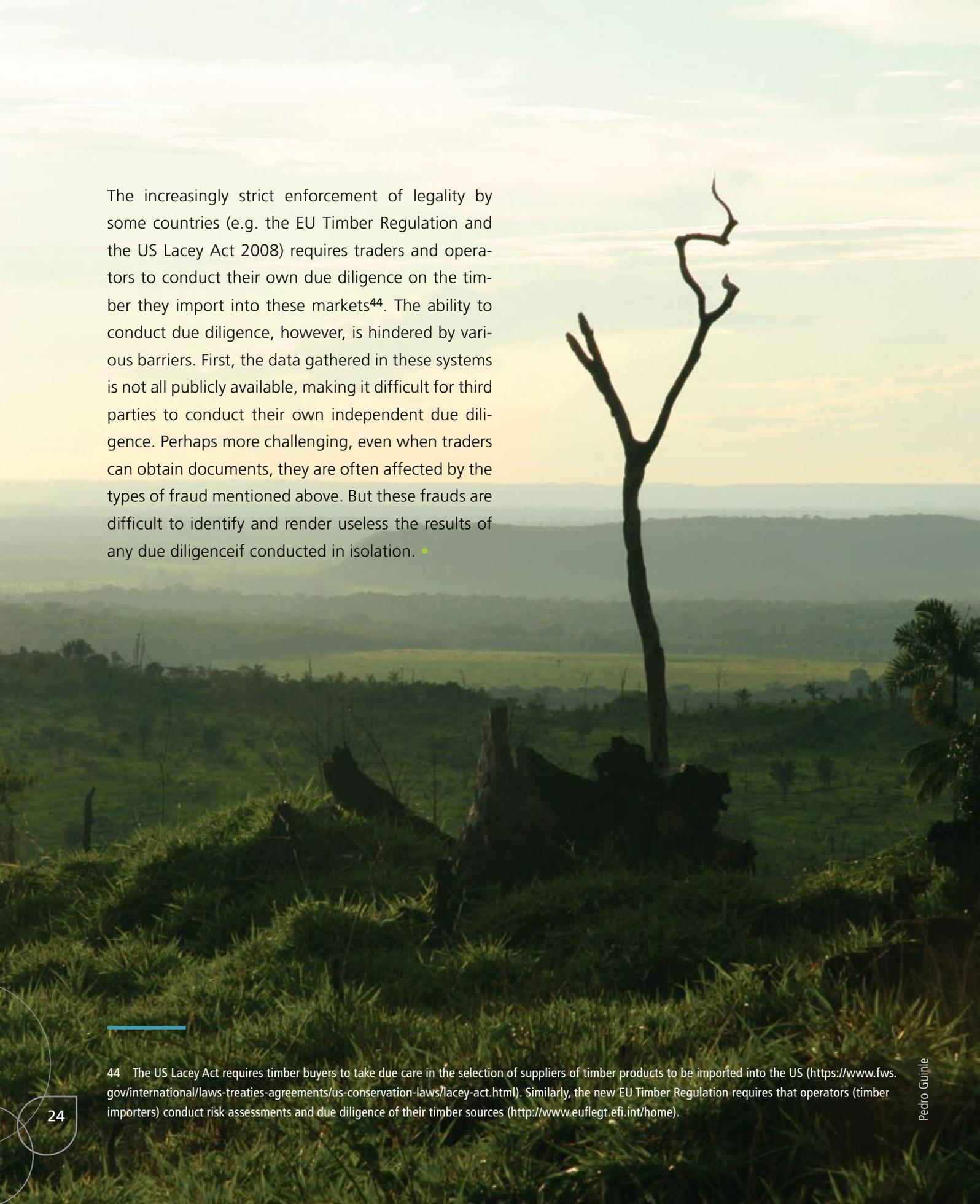
2.3 Detecting Fraud

Each of these types of fraud requires different means of detection, such as documentation analysis, field inspections and/or roadblocks, satellite imagery and remote sensing, and system and company audits. (See Section 3).

An initial check of the list of infractions and embargoes raised by the state and federal environmental agencies⁴³ can offer an initial tool for detecting fraud. But these lists only report infractions that have already been detected, while a vast number of illegalities pass unnoticed by the environmental agencies or are only detected at a later stage.

Lack of transparency and poor access to information in official databases enhances the potential for fraud. Some attempts are being made to provide more access: for example, the new version of the Pará control system – Sisflora 2 – provides more information on the supply chain. But these systems are still far from accessible. The DOF system in particular needs a lot more transparency, as very little information captured by the system is publicly available.

⁴³ A consultation system is available at the site of the Federal Government's environmental agency Ibama (<https://servicos.ibama.gov.br/ctf/publico/arease-embargadas/ConsultaPublicaAreasEmbargadas.php>) and at state environmental agencies (SEMAs).

A landscape photograph of a savanna. In the foreground, there is a large, dark silhouette of a dead tree with a jagged, broken top. The ground is covered in green grass. In the background, there are rolling hills and a hazy sky, suggesting a vast, open landscape. The lighting is soft, possibly from a low sun, creating a silhouette effect on the tree.

The increasingly strict enforcement of legality by some countries (e.g. the EU Timber Regulation and the US Lacey Act 2008) requires traders and operators to conduct their own due diligence on the timber they import into these markets⁴⁴. The ability to conduct due diligence, however, is hindered by various barriers. First, the data gathered in these systems is not all publicly available, making it difficult for third parties to conduct their own independent due diligence. Perhaps more challenging, even when traders can obtain documents, they are often affected by the types of fraud mentioned above. But these frauds are difficult to identify and render useless the results of any due diligence if conducted in isolation. •

44 The US Lacey Act requires timber buyers to take due care in the selection of suppliers of timber products to be imported into the US (<https://www.fws.gov/international/laws-treaties-agreements/us-conservation-laws/lacey-act.html>). Similarly, the new EU Timber Regulation requires that operators (timber importers) conduct risk assessments and due diligence of their timber sources (<http://www.euflegt.efi.int/home>).

“Lack of transparency and poor access to information in official databases enhances the potential for fraud.”

Table 2: Summary of the main types of fraud practiced by timber producers in the Brazilian Amazon, as well as levels of impact, and means of detection.

	Type of Fraud	Level of Impact on Forests	Ease and Means of Detection
<p>Illegal Logging and Timber Theft. Requires the acquisition of illegal credits to enter into the market</p>	<p>Illegal logging in unauthorised areas (timber theft) Logging in areas without a logging permit (AUTEX or AUTEF), logging inside Conservation Areas, Indigenous Reservations, Community Lands</p>	High	<p>Easy to detect illegal logging through, for instance, satellite image analysis. Difficult to detect illegal timber once it enters the official system. Detection requires:</p> <ul style="list-style-type: none"> • Field verification • Inspection during transportation (road blocks) • Monitoring of the creation and commercialisation of illegal credits for laundering illegal timber.
	<p>Illegal logging in authorised areas Irregular execution of the Forest Management Plan, resulting in:</p> <ul style="list-style-type: none"> • extraction of volumes higher than those approved, usually favouring valuable species • harvesting valuable species instead of less valuable species, within approved volumes 	Medium to High	<p>More difficult to detect remotely. Difficult to detect illegal timber once it enters into the official system. Detection requires:</p> <ul style="list-style-type: none"> • Field verification • Inspection during transportation (road blocks) • Monitoring of the creation and commercialisation of illegal credits for laundering illegal timber.
<p>Documentation Frauds Related to forest management. Creates illegal credits to 'launder' illegal timber</p>	<p>Forest Management Plan (FMP) approved only for the creation of credits FMP not intended to be implemented, but only to create credits for harvesting. It requires the involvement or negligence of staff from government agencies. Two types are common:</p> <ul style="list-style-type: none"> • FMPs for forests that are not appropriate for harvesting • FMPs for forests that were never harvested (usually in areas far from roads and/or distant from processing sites) 	High	<ul style="list-style-type: none"> • Satellite image analysis • Field verification of approved FMPs • Verification of transportation routes (i.e. incoherent routes)
	<p>Fraudulent tree inventories Inventories exaggerate volumes of valuable species, used to 'launder' timber purchased from other sources</p>	Medium to High	<ul style="list-style-type: none"> • Analysis of inventories to compare volumes recorded against average volumes for the region • Field verification

	Type of Fraud	Level of Impact on Forests	Ease and Means of Detection
Documentation fraud related to processing and re-selling. Creates illegal credits to 'launder' illegal timber	Inflation of conversion rates during processing at sawmill Exaggerates the conversion rate, allowing sawmills to use a smaller amount of credits to produce the same amount of processed timber. The credits 'saved' can then be used to accompany illegal timber. This is one of the most common type of fraud, as it is facilitated by the control system. While the absolute impact of this fraud is of medium impact (e.g. an inflation of 30% in a conversion rate), it occurs widely and the cumulative impact is high.	High	<ul style="list-style-type: none"> • On-site audits of sawmills • Mass balance verification of GFs associated with stocks purchased and sold • Improved transparency of official control systems would increase possibility of detection
	Fraud associated with commercialisation (undeclared sales) Sawmill does not issue a Timber Transport Authorisation (GF or DOF) associated with sales and keeps the credits to justify timber obtained from illegal sources or sells them to third parties. It also results in tax evasion.	Limited	<ul style="list-style-type: none"> • Audits of sawmills and buyers' accounts • Road blocks to inspect timber transport documents
Documentation frauds related to the IT system or transportation. Creates illegal credits to 'launder' illegal timber	Direct fraud/Tampering with the official Timber Control System (DOF or Sisflora) Information is illegally entered into the system to: <ul style="list-style-type: none"> • create fictitious credits in the accounts of logging companies or sawmills • create fictitious forests or sawmills Requires the involvement of staff from government agencies. While this type of fraud is infrequent, the impacts of individual cases are very high.	Limited to High	<ul style="list-style-type: none"> • Audits of government and company control systems to compare data entered into the system with associated documents • Improved transparency of official control systems to increase opportunities for detection
	Duplication of credits in interstate sales Credits are cancelled after delivery, as if the sale did not occur. Credits are saved for further use.	Limited	<ul style="list-style-type: none"> • Reconciliation between different official control systems
Operational irregularities and contraventions. These do not involve illegal logging or creation of illegal credits	Contraventions of the employment legislation Abuses of the employment legislation, including use of slave labour. Reduces operational costs, creating an unfair disadvantage for operators that comply with employment legislation. In the case of slave labour, it comprises an intolerable and severe abuse of human rights	No impact on forests	<ul style="list-style-type: none"> • On-site audits of sawmills and forest operations • Confirmed abuses are reported in slave labour list of the Ministry of Labour (Ministério do Trabalho), available at http://reporterbrasil.org.br/listasuja/resultado.php
	Contraventions of forestry and environmental legislation E.g., operations (forests or sawmills) with expired operational licences or permits, forests not registered on the Rural Environmental Registry (CadastroAmbiental Rural – CAR), and irregularities related to operational rules.	Possible impact on forests	<ul style="list-style-type: none"> • On-site audits of sawmills and forest operations • Confirmed irregularities are listed by federal (ibama.gov.br) or state environmental agencies (SEMAs)
	Tax Evasion – Sawmill does not issue a Timber Transport Authorisation (GF or DOF) associated with sales or declares lower prices to reduce tax burden	No impact on forests	<ul style="list-style-type: none"> • Audits of sawmills and buyers' accounts • Road blocks to inspect timber transport documents

3. Approaches for detecting and preventing illegality

The ideal approach to ensuring that commercial timber production complies with laws and regulations is through the adoption and enforcement of official timber legality assurance systems. These must be used by all parties in the sector. Most countries have legislation, rules and regulations to control the use of forest resources, and require a large number of documents to be produced before permits are granted. If these documents are all gathered in a single system, and their information is reflected in digital databases, these systems can become powerful tools for the management of commercial timber production. In addition,

governments must ensure that laws are enforced.

In many tropical countries, however, these systems are either non-existent or ineffective (see Section 2 for a discussion about Brazil). Operators who source timber from countries with ineffective controls or poor law enforcement need to adopt alternative means to ensure that their suppliers adhere to minimum standards, comply with local and international laws, and that production does not result in undesirable social and environmental impacts.

A number of approaches have been used for tracing timber products' origins and screening them for legality. These include:



Field audits and spot checks;



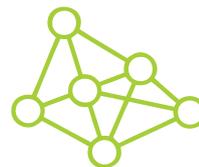
Traceability Systems and technologies;



Remote Sensing



Supply Chain Information Platforms;



Big Data Analysis.

Table 3: Summary of approaches used for wood traceability and/or for the detection of illegality.

Types	Description	Advantages	Limitations
Field Audits and Verification	Legality verification based on field audits of logging operations and sawmills	<ul style="list-style-type: none"> • Low technology • Medium cost • Wide coverage (i.e. audits can be conducted anywhere, on demand) • Enables assessment of quality of forest management, which is a legal requirement in some countries 	<ul style="list-style-type: none"> • Higher cost than some alternatives • Not scalable (no economies of scale) • Time specific (not continuous) • Restricted to specific producers • Time and people intensive
Traceability technologies	Use of identifiers to accompany or identify the source of timber products: e.g. bar or QR codes; computer chips and RFID; GPS tracking of log trucks; analysis of DNA, isotope or wood anatomy; use of Stardust markers	<ul style="list-style-type: none"> • Potentially very accurate • Potentially scalable (offering economies of scale) 	<ul style="list-style-type: none"> • Usually restricted to a subset of market players that adopt the technology • May be costly or require high setup costs (with potential for economies of scale)
Remote Sensing	Use of satellite imagery, drones, LIDAR sensors, etc., for monitoring forests and logging operations	<ul style="list-style-type: none"> • Useful for monitoring large areas • Can be done from a distance, without the need for field visits • Useful for detecting forest disturbances associated with logging, deforestation and/or fires • Can provide continuous coverage and real time alerts • Economies of scale 	<ul style="list-style-type: none"> • Use restricted to monitoring of forest operations • Do not provide information on the supply chain and traceability • Can have high setup costs and, depending on the technology used, can be costly • Restricted availability of images due to cloud cover (especially in tropical areas)
Supply chain Information Platforms	Online information platforms aimed at collecting information about market players (timber producers, sawmills, buyers, etc.) to enable the identification of supply chains	<ul style="list-style-type: none"> • Helpful for the identification and visualisation of large numbers of suppliers • For large supply pools, potentially lower costs when compared to individual audits 	<ul style="list-style-type: none"> • Usually restricted to a subset of market players that adopt the technology • Often dependent on self-declared data, entered by producers and therefore of low reliability • Better quality data could result in high costs
Big data analysis	Analysis of multiple and large databases of information related to logging, transportation, processing and sales of timber (e.g. documents, satellite imagery, geographical data), to identify trends and patterns based on large numbers of cross-checks	<p>Depending on data availability, may be comprehensive in terms of:</p> <ul style="list-style-type: none"> • the parties analysed • the activities covered (logging, transportation, processing) • the timing of verifications (i.e. may be continuous and provide real time alerts) 	<ul style="list-style-type: none"> • Data intensive and dependent on transparency of information • Initial setup is sophisticated and costly, but the technology is highly scalable

3.1 Field audits, spot checks and verification

Field audits have been used for the verification of logging and timber processing operations for many years. Independent auditors visit various stages of operations to verify whether operations conform to expected rules, regulations or standards. They inspect field and factory practices, as well as records and documentation.

The scope of an audit varies according to the needs of the contracting party, ranging from verification of chain of custody and legality, all the way to compliance with social and environmental sustainability standards⁴⁵ or procurement guidelines⁴⁶. A range of organisations offers these services, including private sector verification companies and NGOs⁴⁷.

Field verification has the advantage of being ‘readily available’, and applicable to any subject or sector, regardless of whether the audited party has previously adopted any standard, control system or technology. Interested parties can conduct or appoint third party auditors to verify any type of operations at anytime. Of course, auditors need to hold appropriate qualifications and accreditations depending on the purpose of the auditing report. This might include internal decision making (which may not require any qualifications), compliance with legislation (e.g. EU Timber Regulation, US Lacey Act), or market claims (e.g. FSC Certification).

While some believe that field audits provide the ultimate level of certainty about the legality of forestry operations, there has been some criticism of over-reliance on this approach. Field audits are time-specific (i.e. they are spot checks, not continuous) and thus potentially limited in their ability to detect non-conformances that occur at other times. For the same reason, there may be long time gaps between the occurrence of an infraction and its detection during an audit. Field audits also rely entirely on the discretionary power of auditors and can therefore be affected by corruption – a potential weakness that is reduced when human involvement is partially replaced by technology. Cost is also a concern – field visits require people, logistics and time to be performed adequately. In addition, there are few or no economies of scale (i.e. the costs of auditing a large pool of suppliers are not significantly lower than the costs of auditing an individual producer) and it is difficult to scale them up cost-effectively.

One way of scaling up field inspections at an affordable cost is to engage local agents to perform the audits, reducing the costs of logistics and transportation. This approach is used by FLEGT for its Independent Monitors – local NGOs that perform independent audits and alerts⁴⁸. While this approach enhances the coverage and granularity of monitoring at lower cost, there is a difficulty in ensuring consistency of findings between diversified groups of monitors.

45 E.g., FSC (www.fsc.org) or PEFC (www.pefc.org).

46 E.g., private sector responsible sourcing guidelines (e.g. Nestlé), the UK government’s former Central Point of Expertise on Timber – CPET (<https://www.gov.uk/government/groups/central-point-of-expertise-on-timber>), or the guidelines for procurement of legal timber of Brazilian government’s housing finance bank CAIXA (http://www.caixa.gov.br/Downloads/sustentabilidade/guia_caixa.pdf). See also Proforest report – FLEGT licensed

timber and the EU member states procurement policies (<http://www.proforest.net/en/publications/flegt-licensed-timber-and-eu-member-state-procurement-policies>).

47 E.g., Rainforest Alliance (www.rainforest-alliance.org), Proforest Initiative (www.proforest.net), NepCon (www.nepcon.net), or the Brazilian certification organisation, Imaflores (www.imaflora.org).



48 The FLEGT programme of the EU adopts the approach of using Independent Monitoring of Forest Law Enforcement and Governance (IM-FLEG), through networks of independent auditors, usually from local or regional NGOs (see, for instance, REM (2010): Independent monitoring: a practical manual. In: www.fao.org/sustainable-forest-management/toolbox/tools/tool-detail/en/c/218011/)

3.2 Traceability Systems Based on New Technologies

A variety of technologies have been used or tested for tracing or identifying timber sources, which can be part

of the assessment of compliance and legality. Their applications vary, as well as their effectiveness and costs:

- Bar Codes or QR Codes: based on tags attached to individual trees. These accompany the logs and sometimes the sawn timber through the supply chain. Information is contained in the codes and can be read by authorised parties, enabling quick assessment of the product against information contained in official records. A QR Code system has been adopted for the forest concessions granted by the Brazilian federal government⁴⁹;
- Computer chips and Radio Frequency Identifiers (RFID) – similar to bar codes, but able to store more information. RFIDs can be read from a distance.
- Tree TAG (www.earthobservation.com) - an emerging smartphone-based supply chain traceability system that tracks the location of logs transported from the forest to the sawmill;
- GPS (geographical positioning systems)– when attached to trucks, enable precise tracking of routes used for timber transportation;
- Stardust (www.stardustus.com) – a dust-like material that can be sprayed onto wood and detected with a hand-held device⁵⁰;
- DNA, stable isotope, wood anatomy, and fibre analysis – can be used to precisely identify species, as well as specific populations or individual plants, provided that genetic sampling is done in advance⁵¹.

49 The system, developed by the Brazilian Forest Service, tracks timber extracted from federal concessions in Brazil. QR codes can be read by Android app scanners (www.florestal.gov.br/snif/noticias-do-sfb/servico-florestal-brasileiro-lanca-aplicativo-para-consulta-da-rastreabilidade-da-madeira-das-concessoes).

50 WRI, 2016:www.wri.org/blog/2016/05/5-technologies-help-thwart-illegal-logging-tracing-woods-origin

51 WRI, 2014:<http://www.wri.org/blog/2014/03/4-actions-companies-can-take-source-legal-wood>

Most technologies require the a priori establishment of systems (for example, labelling of stumps and logs with bar coding) that often have high establishment costs (e.g. system development, initial setup, maintenance and training). At the same time, these may have scalable gains and offer lower costs per unit after an initially high setup cost.

The usefulness of some technologies may be limited because they can only identify timber from sources that adopted them in the first place (e.g. bar codes or chips). Unless the technology is imposed on all producers in a country or region, it will only be helpful to track timber from sources that voluntarily adopted the technology. Usually, these tend to be the more organised and compliant producers, while those operating illegally will not use the controls.

Some of these technologies only address specific aspects of the continuum related to the extraction, conversion and commercialisation of timber products (for instance, GPS focuses on transportation, DNA analysis on species identification). Their use, therefore, needs to be complemented by other measures to provide a full picture of the legality of the products.

3.3 Remote sensing

Remote sensing of forests, using satellite imagery analysis or the use of drones, reduces the need for field visits and can be used for monitoring activities that result in

forest disturbance. In particular, it is useful for monitoring compliance of logging activities with approved operational plans and the identification of illegal logging and deforestation.

While the type of information obtained through satellite imagery analysis has limitations, the use of drones is becoming more affordable and can provide more detail. Associated with new sensors, such as LIDAR (Light Detection and Range technology)⁵², it is possible to capture a lot more information and perform analysis of biomass volume, species composition and other data.

The initial setup costs of establishing a remote sensing capability can be high, but the technology is becoming increasingly cost competitive and is highly scalable, greatly reducing costs per individual operation. While the development of this technology requires very specialised skills, remote-sensing information is provided by a variety of organisations in a user-friendly format, often free of charge (e.g. Google Maps; INPE ⁵³ and Ibama⁵⁴ for images and maps related to Brazil). The Global Forest Watch platform⁵⁵, which compiles images from multiple sources and provides alerts such as tree cover loss, was developed specifically for monitoring changes to forests worldwide. For the Amazon region, Amazon developed and maintains a monthly Deforestation Alert System (Sistema de Alerta de Desmatamento - SAD) that monitors forest cover loss and forest degradation in the Brazilian Amazon⁵⁶, and the MapBiomass initiative⁵⁷.

52 See, for instance, <http://oceanservice.noaa.gov/facts/lidar.html>.

53 See Prodes system from the Brazilian Space Agency (INPE – Instituto Nacional de Pesquisas Espaciais, www.inpe.br).

54 See DETER system, of Ibama's Siscom (<http://siscom.ibama.gov.br/painelflex/>).

55 www.globalforestwatch.org/map .56 www.imazongeo.org.br/imazongeo.php

57 MapBiomass (<http://mapbiomas.org>) is an initiative aimed at producing high quality maps of land use in Brazil, updated annually, to facilitate decision making related to land use policies.

While the use of remote sensing is very helpful for identification and/or monitoring of observable information, it needs to be combined with other sources of information to enable the traceability and screening of legal timber.

3.4. Supply Chain Information Platforms

Supply chain information platforms have been created by NGOs and the private companies to assist commodities buyers to identify the supply chain and sources of products they procure⁵⁸. Some platforms also aim to provide transparency about company social and environmental performance⁵⁹, or to disseminate information and guidance on dealing with illegality⁶⁰. The focus here is on the platforms used by buyers and sellers in the supply chain.

Many of these platforms are collaboratively populated with data provided by market participants themselves, and aim to connect producers to buyers in a chain⁶¹. The

more data is input to the system, the more cross-checks it enables and the more robust the information it generates. If used in combination with other approaches, these platforms can become powerful management tools.

While the use of supply chain platforms can be very helpful, these also have limitations. First, most of them do not include all producers, but only a subset linked to parties who promote the platform (i.e. large buyers or consultants acting on their behalf). This restricts the ability to analyse the legality of products from other sources, or from sawmills that receive timber from a variety of sources. Second, if these platforms are reliant on self-declared data, it is open to manipulation and may not provide useful information on legality and sustainability standards. For these reason, they are often used in combination with audits of some of their higher risk participants.

Ensuring participation in these platforms can be challenging: unless there are incentives for participation, the information entered can be partial and out-of-date. On the other hand, if data needs to be entered

58 These include WRI's Forest Transparency Initiative (<http://alpha.forestransparency.org/en/about/fti>), Global Traceability Solutions (www.global-traceability.com), Food Reg (www.foodreg.com), TFT Sure (www.tft-earth.org), Track Record (www.trackrecordglobal.com), Ata Marie (www.ata-marie.com), and Blue Numbers (www.blunumber.org).

59 For instance, GCP's Forest 500 (<http://forest500.org>), Forest Trend's Supply Change (www.supply-change.org).

60 E.g., Forest Legality Alliance (www.forestlegality.org), WRI and WBCSD's Sustainable Forest Products (www.sustainableforestproducts.org), WWF's Global Forest & Trade Network (GFTN, <http://gftn.panda.org>),

FSC's Global Forest Registry (www.globalforestregistry.org), or Earthsight's Timber Investigator (www.timberinvestigator.info). For Brazil, see the practical guides "Comércio de madeira: Caminhos para o uso sustentável" prepared by WWF Brasil and Sindimasp (Association of Timber Wholesalers of São Paulo), and "Aquisição responsável de madeira na construção civil. Guia prático para as construtoras", prepared by Sinduscon (Association of Construction Companies of São Paulo).

61 E.g., the Farm Sustainability Assessment (FSA) tool (www.youtube.com/watch?v=dt_NssuOiko, www.fsatool.com) developed by the International Trade Centre ITC (www.intracen.org) and the Sustainable Agriculture Initiative (www.saiplatform.org).

by consultants or auditors, the initial setup costs can be very high and updating is impractical.

Finally, while information platforms focus on pools of suppliers, their utility tends to be more limited for tracking products along the supply chain. In the case of timber, there is a risk that illegal sources may 'contaminate' legal timber in sawmills. This requires a focus on the consignments of timber rather than solely on suppliers.

3.5. Big Data Analysis

Large volumes of data can be utilised and cross-checked to extract patterns and information⁶², which can then be used to trace supply chains and detect potential illegalities and or irregularities. This approach is sometimes referred to as 'big data analysis', irrespective of the size of the data sets (i.e. how "big" is big?).

Big data analysis is an evolving science in the field of information technology and can be used for detecting trends and hidden information in large datasets. For example, a

series of frauds can be detected by cross-checking data for consistency and hidden correlations. Large data sets can be combined with information extracted from the other approaches previously discussed (remote sensing, technologies and platforms) in order to create powerful tools for traceability and detection of illegality.

Some groups are developing systems to analyse large data sets in order to extract information and visualise trends. Imaflores is developing a system that uses large data sets of timber transportation permits (GFs) to visualise trends and statistics related to timber flows in Pará State. The Transformative Transparency Platform⁶³ uses production data and bills of lading with sophisticated algorithms⁶⁴ to map commodity supply chains from point of production to country of consumption (see Figure 1).

Initial setup costs can be expensive but the technology is highly scalable. Where information is available online, it may be possible to extract vast amounts of data at relatively low costs. Given the reduced need for expensive field visits or technologies such as remote sensing, DNA analysis or chips, the use of big data analysis may be more affordable.

62 https://en.wikipedia.org/wiki/Big_data.

63 The Transformative Transparency Platform (<http://ttp.sei-international.org>) was developed by the Stockholm Institute (<http://sei-international.org>), Global Canopy Programme (<http://globalcanopy.org>) and the European Forestry Institute (www.efi.int/portal) and is currently equipped for analysing supply chains of Brazilian soy and Colombian coffee. The platform is being adapted to cover Amazonian timber, in collaboration with BVRio.

64 See:

- Godar, J., Martin Persson, U., Jorge Tizado, E. and P. Meyfroidt, 2015: Towards more accurate and policy relevant footprint analyses: Tracing fine-scale socio-environmental impacts of production to consumption. *Ecological Economics* 112 (2015) 25–35.
- Godar, J., Suavet, C., Gardner, T.A., Dawkins, E. and P. Meyfroidt, 2016: Balancing detail and scale in assessing transparency to improve the governance of agricultural commodity supply chains. *Environmental Research Letters* (2016).

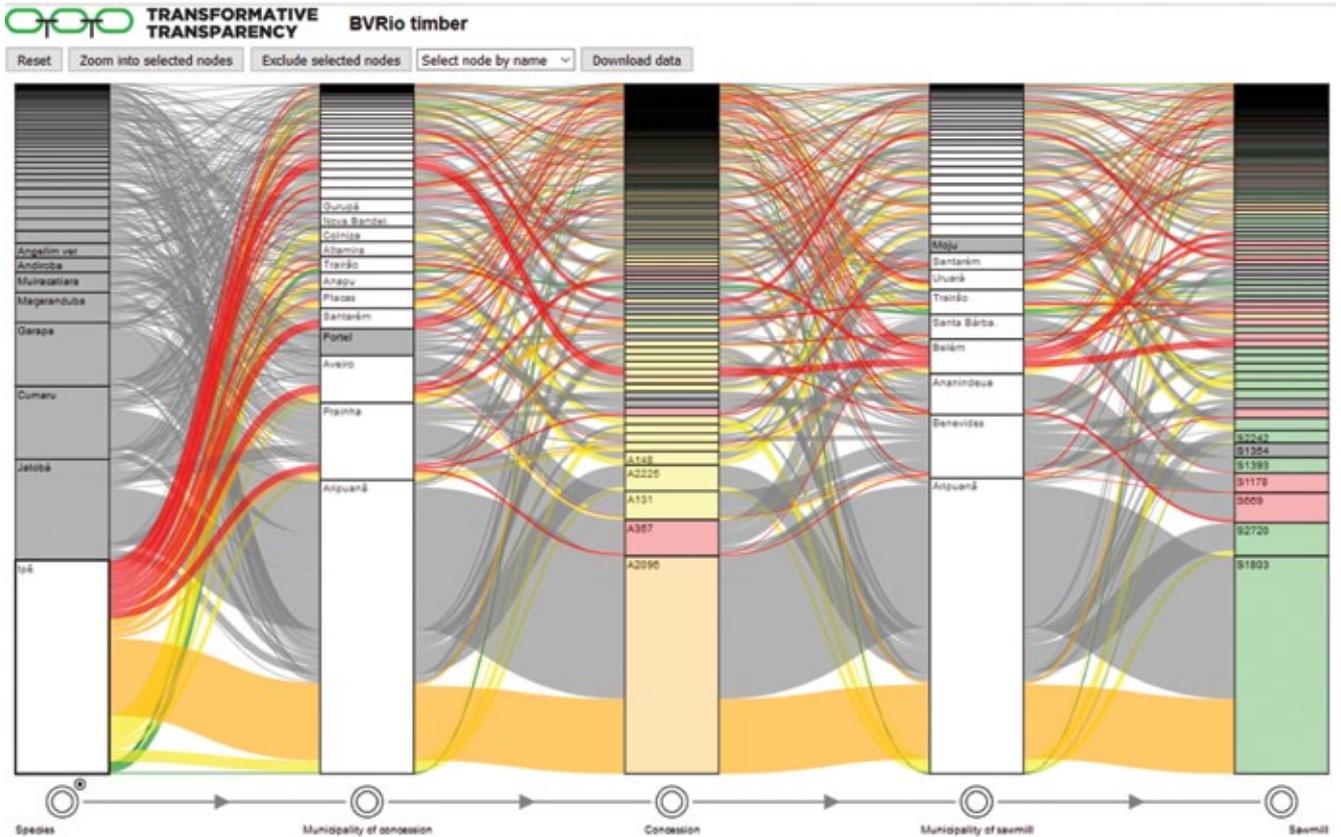


Figure 1: Transformative Transparency Platform showing the supply chain of timber from Pará State, provided by BVRio.

Furthermore, these systems can be designed to encompass 100% of market participants, providing full coverage and benefiting from the ability to cross-check information. And, depending on the frequency of data gathering, the information may be continuously updated to provide real time alerts.

One constraint on the use of this approach is access to data. In many countries, including – to a certain extent – Brazil, official systems lack transparency, restricting the public’s ability to analyse data and extract useful information. In other countries, information may not even be available, is not collected systematically, or is not

available in a digital format. These factors all increase the costs and reduce the effectiveness of the system.

It is also important to note that the information collected is often of questionable quality or veracity (i.e. it is mixed with fraudulent data). Screening tools are required for data curation prior to utilisation. Alternatively, the occurrence of fake data can be treated as an indication of potential irregularities, which can be confirmed with additional tests. Furthermore, if the output of the system is a risk rating, this shifts the burden of proof to the suppliers. This is the approach used by BVRio, described in more detail in the next section. •

Table 4. Advantages and disadvantages of different approaches used to detect or prevent timber illegality
(See Section 2 for discussion of types of fraud)

Approach	Detection capacity							
	Cost of System Setup	Unit Cost Per Use	Coverage of Supply Chain Actors	Illegal logging and timber theft	Fraud related to forest management	Fraud related to processing and re-selling	Fraud related to transportation	Operational irregularities and contraventions
Field audits and verification	✓ Low ¹	✗ Medium to High	✗ Low ²	✓	✓	✓	± ³	✓ ³
Tagging ⁴	✗ Medium to High ⁵	✓ Low ²	± Medium ⁷	✗ ⁸	± ⁹	± ⁹	± ⁹	✗ ¹⁰
Genetic Markers ¹¹	✗ High ¹²	✗ High ¹²	± Medium ¹³	✗ ⁹	± ⁹	± ⁹	± ⁹	✗ ¹⁰
GPS	± Medium	± Medium	± Medium ¹³	✗	✗	✗	✓	✗
Remote Sensing ¹⁴	✗ High ¹⁵	✓ Low ¹⁶	✓ Very high ¹⁷	✓	✓	✗	✗	✗
Supply chain information platforms	± Medium ¹⁸	✓ Low	± Medium ¹⁹	✗	± Medium ²⁰	± Medium ²⁰	✗ ²⁰	✗ ²⁰
Big Data Analysis	± Medium ²¹	✓ Low ²²	✓ Very high ²³	✓ ²⁴	✓ ²⁴	✓ ²⁴	✓ ²⁴	✓ ²⁴

Notes:

1. Readily available. No system setup needed.
2. Restricted to individuals audited.
3. Depending on the scope of audit, some aspects may not be detected.
4. Includes bar codes, QR codes, chips, Treetag, Stardust.
5. Introduction of these technologies requires significant effort and can be costly.
6. Once in place, unit cost tends to be low.
7. Coverage is restricted to technology adopters (e.g. those using bar codes).
8. Tagging does not enable detection of illegal logging outside controlled forests.
9. While these technologies enable tracking of legal wood, they do not assist in detecting frauds happening alongside the legal operations.
10. Does not prevent or identify operational contraventions.
11. Includes DNA markers, stable isotope, wood anatomy and fibre analysis.
12. Initial setup and unit costs are high.
13. Coverage is restricted to technology adopters.
14. Includes satellite imagery, aerial photography with drones or planes.
15. Depending on the specifications of the system, can be very costly.
16. Once setup, very low cost of usage.
17. Once setup, can cover large geographic areas at relatively low costs.
18. To reach a satisfactory level of coverage and completeness, these platforms require significant setup effort.
19. Difficult to obtain coverage and usually remain incomplete.
20. As these are often self-declaratory, they have low detection ability, and some types of fraud are not covered.
21. Initial setup requires large effort of data collection, design of algorithms, programming and automation.
22. Once setup, very low cost of usage.
23. Up to 100% of actors can be monitored.
24. Depending on data availability, these systems can cover all aspects analysed.

4. BVRio's Methodology

BVRio's Due Diligence and Risk Assessment System was created to screen Brazilian timber and timber products for their legality status. While the system is currently restricted to the Brazilian Amazon, BVRio is currently expanding it to other countries and continents⁶⁵.

BVRio's Due Diligence and Risk Assessment System is an integral module of the BVRio Responsible Timber Exchange, which also includes a Trading Platform for sourcing timber products from legal sources (see Section 4.7). The objective of the Exchange is to enable wood traders to screen out illegal timber from their supply base and, through demand-side pressure, help combat illegality in the sector.

Since its initial release, the due diligence system has proved to be of interest to a wider range of users than those using the trading platform. For this reason, standalone applications were developed to facilitate other uses (e.g. monitoring and enforcement of compliance by environmental agencies, customs authorities and NGOs; and due diligence of timber lots prior to purchase by timber traders). BVRio's Due Diligence and Risk Assessment Tools are available for desktop use and as apps in Android or iOS format⁶⁶.



65 Expansion into West Africa has started, with assistance from the UK Government's Forest Governance, Markets and Climate (FGMC) programme (http://flegt.org/map-of-projects/#search/filtered/donor_countries:GBR).

66 The desktop version can be accessed at: <http://timber.bvrio.org>.

Apps can be downloaded at the Google Play (<https://play.google.com/store/apps/details?id=br.com.bvrio.bvriomobile&hl=en>) and Mac App Store (<https://itunes.apple.com/br/app/responsible-timber/id1059374511?l=en&mt=8>).



4.1 Approach

BVRio's Due Diligence and Risk Assessment System (the 'system') aims to assist buyers and traders to conduct due diligence, and to assess the risk of illegality in timber products they may acquire. The system checks timber sources for irregularities, illegality or possible illegality related to legal, environmental or social requirements during extraction, processing and transportation processes.

The system uses a big data approach, based on a large and growing data set, and aims to identify inconsistencies that may be associated with irregularities and illegality. The larger the number of participants, the larger the database and stronger its analyses. The system is designed to provide blanket coverage of all production sites in the region analysed.

BVRio's Due Diligence and Risk Assessment System analyses:



- **Legality** – evidence of risks of non-compliance with legal, environmental and social laws, rules and requirements;



- **Supply Chain Inconsistencies** – whether the declared supply chain is consistent with documentation provided;



- **Social Aspects** – risks of non-adherence to, or abuses of, labour and employment legislation.

The due diligence and risk assessment process is conducted in two stages:

1. On a daily basis, the system analyses the compliance status of all production sites in the Amazon: i.e. timber extraction, processing and commercialisation operations (forest management units, sawmills and log yards used for timber storage and commercialisation). Based on the analysis, production sites are rated by level of compliance, ranging from those without any evidence of irregularities, through operations that show risks of possible infringements or illegalities, to those with proven illegality.

2. When a user enters the Timber Transport Authorisations related to a timber consignment, the due diligence system traces the timber product through the series of production sites and assesses the legality status or risk associated with that product.

Due diligence is conducted for each individual timber consignment, rather than producers or suppliers. Many supply chains are very complex, with traders and timber merchants buying from multiple sawmills, which

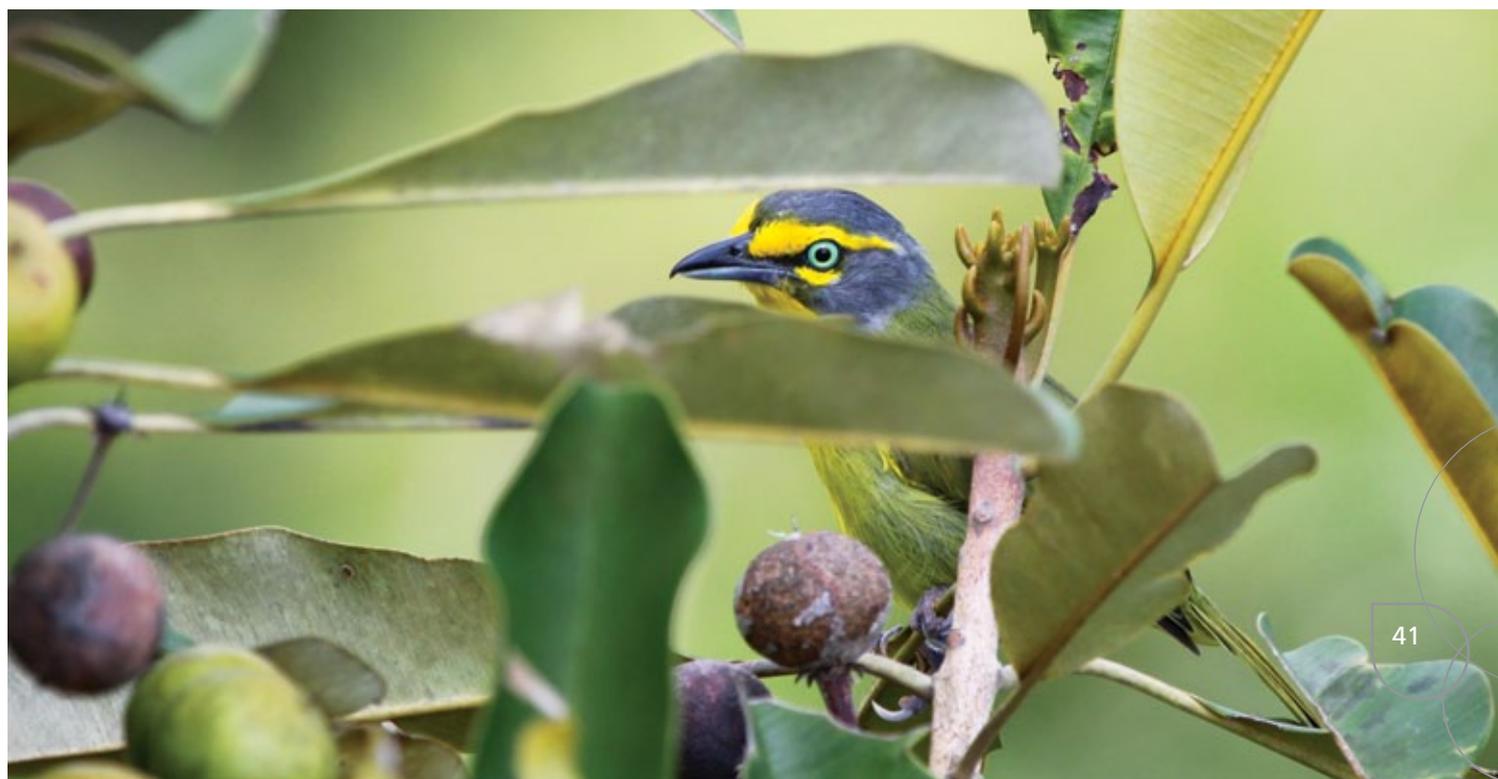
in turn acquire logs from multiple forest management units (with varying degrees of compliance). This means that a positive result for a timber consignment sold by a given sawmill does not guarantee that the next timber lot sold by the same sawmill will meet the same levels of legality and environmental compliance.

The risk assessment process also analyses the track record of companies and individuals involved in the supply chain. These include the forest owner, the person or company holding the forest management rights, the forest engineer responsible for the forest management plan and extraction activities, as well as those involved with the sawmills and timber yards. This allows the system to indirectly assess the risk of irregularities not yet detected by environmental agencies.

Each of these factors is categorised according to its legality status, ranging from compliance to proven illegal-

ity (see Section 4.3). A report is generated, indicating the score of these factors, so that users can make decisions based on the requirement of their jurisdictions.

The system does not currently conduct any direct assessment of the quality of forest management operations, as this would require either field audits or more sophisticated (and as yet inconclusive) remote sensing analyses. In Brazil, legal forest management operations are all based on selective logging with relatively low extraction volumes (a maximum of 30 m³/ha every 35 years) when compared to Southeast Asian forests. There is also an assumption that forest managers who comply with the legal requirements screened by BVRio's system will also tend to follow the forest management requirements of the law. In future, BVRio aims to conduct field audits of the quality of the forest management operations and confirm this assumption.



4.2. Data sources and analysis of production sites

BVRio's Due Diligence System is based on information extracted from the Brazilian government's documentation system for the control of forest management activities, transport and trading of timber products (See Section 2).

This includes:

- Timber Extraction Authorisations (Autorizações de Exploração Florestal – AUTEF and AUTEX);
- Timber Transport Authorisations (Guias Florestais – GF1 e GF3, used in Pará and Mato Grosso States; Documentos de Origem Florestal – DOF, for the rest of the country);
- Environmental License of the forest management units;
- Operational Licenses (Licenças de Operação - LO) of sawmills and timber yards;
- Rural Registration System (Cadastro Ambiental Rural – CAR) of forest management units.

To date, BVRio's system includes all 3,500 Timber Extraction Authorisations issued in Pará and Mato Grosso States since 2007, as well as information on all operational sawmills and timber yards in these states (around

3,000 sites). Given that 75–80% of all Brazilian tropical timber is produced in these states, this initial database covers a significant proportion of timber extraction and processing sites. Less information is available for other states, restricting the range of analyses that can be conducted. As more data becomes available for these states, it will be added to the system (see discussion on transparency in Section 2).

The following data can be extracted from these documents:

Timber Extraction Authorisations (AUTEF and AUTEX):

- Date of issue
- Validity of the authorisation
- Location and geographic coordinates of the forest management unit
- Forest landowner
- Person/company holding the forest management rights
- Forest manager responsible for the logging operation
- List of species and volumes authorised for logging, on a yearly basis
- Size of the annual logging block

Timber Transport Authorisations (DOF, GF):

- Name and address of seller of timber products
- Name and address of buyer of timber products
- List of products, species and volumes transported
- Electronic invoice issued for the commercialisation of the timber transported
- Planned transportation route
- Date and validity

Operating Licenses of Sawmills (LO):

- Date of issue
- Validity and expiry date
- Name of owner
- Address
- Activities authorised

Environmental Licenses of Forest Management Units:

- Date of issue
- Validity and expiry date
- Forest landowner
- Person/Company holding the forest management rights
- Forest manager responsible for the logging operation
- Size of management unit
- Location and geographic coordinates of the forest management unit

Rural Environmental Registry (CAR):

- Status
- Name of Landowner
- Other information, varying from state to state.

The authenticity and expiry date (validity) of these documents is verified, and this information is cross-checked to detect inconsistencies and irregularities. This information is also cross-checked with external databases, as follows:

- Lists of suspensions or cancellations of licenses issued by federal (Ibama) and state environmental agencies;
- Lists of official notifications and fines issued by federal and state environmental agencies;
- List of slave labour issued by the Ministry of Labour (Ministério do Trabalho);
- Rural Environmental Registry (Cadastro Técnico Federal);
- CITES list;
- Table of maximum sawmill conversion rates, issued by Ibama (IN21, see Annex 1).

BVRio also carries out statistical analysis of these data, which results in additional information to be cross-checked with other data.

For instance:

- Average volume of species, based on Timber Extraction Authorisations. These averages are used to detect outliers that need further investigation;
- Track record of landowners, forest managers, sawmill operators, timber merchants and traders, based on the historic series of compliance, including activities related to other sites.

Vol Hec - Tabebuia

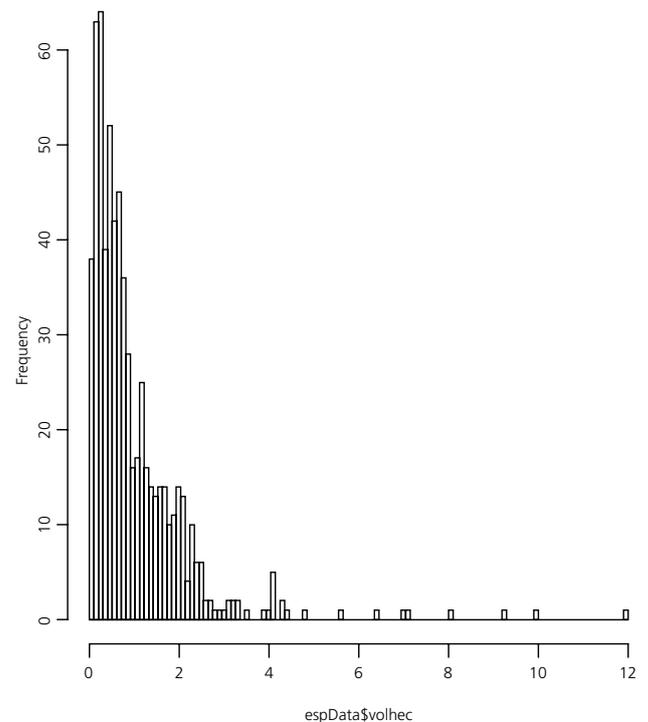


Figure 2: Distribution of authorised extraction volumes (m^3/ha) of ipê of individual AUTEFs, showing outliers.

By cross-checking these data with each other and with external databases, it is possible to detect irregularities, frauds or non-conformances such as:

- License suspensions or cancellations, official notifications and fines of forest management operations and sawmills;
- Track records of non-compliance of those responsible for forest management operations and sawmills;
- Overestimates of valuable species;
- Overestimates of conversion rates in sawmills;
- Involvement of management operations and sawmills with forced labour or abusive employment practices;
- Transportation route deviations and/or inconsistencies.

In addition, Timber Extraction and Timber Transport Authorisations are overlaid with satellite imagery, to conduct spatial analyses and detect irregularities such as:

- Overlaps with federal, state and municipal conservation units;
- Overlaps with indigenous lands and reservations;
- Overlaps with traditional community lands (comunidades quilombolas);
- Irregularities in the implementation of the forest management plan, related to irregular dates of logging, location, excessive extraction, or absence of logging where it is supposed to occur;
- Forest fires or deforestation;
- Incoherent transportation routes.

Spatial analyses are conducted using the following layers:

- Landsat 8 – historic series since 1999, provided by WRI Global Forest Watch;
- Maps of conservation units and indigenous reservations, provided by the Brazilian Ministry for the Environment (MMA);
- Maps of traditional community lands (terras quilombolas);
- Shape files of management plans extracted from the AUTEFs;
- Location of sawmills;
- Map of average volume of valuable species (i.e. ipê) across the Amazon region (Greenpeace)⁶⁷;
- Maps of illegal logging operations compiled by Brazilian NGOs Imazon and ICV, following the methodology developed by Imazon for the SIMEX programme⁶⁸;
- Maps of loss and gain of forest cover, compiled by Global Forest Watch⁶⁹.

Satellite images are processed using the NDFI methodology (Normalised Difference Fraction Index)⁷⁰ and compiled in a GIS system linked to BVRio's alphanumeric database and analytical model.

The system automatically updates itself with new data from all external databases at the end of each day. As the system is used, more information is gathered, making it more robust. In particular, the Timber Transport Authorisations (GFs) add an important layer of information.



Benjamin Child

67 Schulze, M., Grogan, J., Uhl, C., Lentini, M. and Vidal, E., 2008: Evaluating ipê (Tabebuia, Bignoniaceae) logging in Amazonia: sustainable management or catalyst for forest degradation? *Biological Conservation* 141, pp 2071–85. In Greenpeace, 2015: (www.greenpeace.org/brasil/Glob-al/brasil/documentos/2015/greenpeace_amazon_license_to_launder.pdf) itunes.apple.com/br/app/responsible-timber/id1059374511?l=en&mt=8).

68 Transparência Manejo Florestal series available at:

www.imazongeo.org.br/imazongeo.php; and *Transparência Florestal Mato Grosso series*, available in www.icv.org.br/2014/09/18/iniciativa-transparencia-florestal/.

69 www.globalforestwatch.org/map

70 Normalised Difference Fraction Index (NDFI), in Souza, C.M.; Roberts, D.A.; Cochrane, M.A., 2005: Combining spectral and spatial information to map canopy damage from selective logging and forest fires. *Remote Sens. Environ* 2005, 98, 329–343.

4.3. Risk analysis and interpretation of results

Using data gathered (Section 4.2), for each production site BVRio's system analyses two types of evidence:

- Direct – analysis of data available on the production site, i.e. analysis of documentation, satellite imagery and official databases of infractions (e.g. Ibama, slave labour), and analysis of timber inventories.
- Indirect – analysis of factors that indirectly impact the production sites, i.e. analysis of the track record of forest managers in the past or in other production sites, revealing indications of risks to the production site in question.

For timber consignments where data is available for the whole supply chain, the system performs up to 150 individual analyses. These analyses take into account whether there are proven irregularities, non-conformances or illegality (e.g. records of fines or embargos raised by government agencies, overlaps of logging areas with public lands); risks that irregularities, non-conformances or illegality exist; or the probability that they may occur in the future. The risk analysis also considers uncertainty levels (e.g. missing information about segments of the supply chain), circumstantial evidence (e.g. exaggerated volumes of valuable species, or unlikely transportation routes), and indirect risks (e.g. based on the track record of forest managers in the past, or at other production sites).

The results of these analyses are classified using a rating system designed to reflect the relevance of each risk factor, and/or the severity of its manifestation, as follows:

No indication of Infringements, Irregularities or Non-compliance

Associated with the direct factors analysed, and negligible risk derived from indirect analyses.

Low to Medium Risk

Inconsistencies or uncertainties are associated with the production site analysed, or the system detects infractions and irregularities that are indirectly related to the timber consignment analysed—for example, where a forest manager is involved with other logging operations with proven infractions.

Medium to High Risk

Proven infractions and/or non-conformances are found (of lower severity than those in the 'high risk' category), or there is a high risk of illegality based on the circumstantial evidence obtained through indirect analyses.

High Risk

The production site is associated with proven severe infractions or non-conformances; for example, overlaps of logging areas with indigenous reservations, severe overestimates of volumes of valuable species, cancellation of environmental licenses, or use of forced labour.

A description of the specific ratings given to each of the different factors analysed is shown in Annex 4.

Timber Exchange Dashboard

Sawmills - Environmental embargoes, direct and indirect

ID	Município	Estado	Embargos	Aut. Florestal	Aut. Estadual	Embargo Prop	AF Proprietário	AE Proprietário	Embargo Resp	AF Responsável	AE Responsável	Status
632	Juara	MT	N	N	N	0	0	0	0	0	0	Autorizado
643	Colniza	MT	N	N	N	0	0	0	0	0	0	Autorizado
1699	Alta Floresta	MT	N	N	N	0	0	0	0	0	0	Autorizado
1702	Apiacás	MT	N	N	S	0	0	1	1	0	0	Suspensão
1698	Sinop	MT	N	N	N	0	0	0	0	0	0	Autorizado
1703	Feliz Natal	MT	N	N	N	0	0	4	4	0	0	Investigar
1704	Colniza	MT	N	S	N	0	0	0	0	0	0	Suspensão
1705	Sorriso	MT	N	N	N	0	0	0	0	0	0	Autorizado
1706	São José dos Quatro Marcos	MT	S	N	N	0	0	0	0	0	0	Não Autorizado
1419	Aripuanã	MT	N	N	N	0	0	0	0	0	0	Autorizado
1653	Cotrigaçu	MT	N	N	N	0	0	0	0	0	0	Autorizado
1707	União do Sul	MT	N	S	N	0	1	0	0	1	0	Suspensão
1708	Cotrigaçu	MT	S	S	S	0	1	0	1	1	0	Não Autorizado
1709	Vila Bella de Sant. Trindade	MT	N	N	N	0	0	0	0	0	0	Autorizado
1630	Sinop	MT	N	S	N	0	1	0	0	1	0	Suspensão
1710	Brasnorte	MT	N	N	N	0	0	1	1	0	0	Investigar
1711	Rondolândia	MT	N	N	N	0	0	0	0	0	0	Autorizado
1714	Aripuanã	MT	N	N	N	0	0	0	0	0	0	Autorizado

Figure 3: BVRio's risk analysis dashboard.

It is important to note that BVRio's Due Diligence and Risk Assessment System aims to identify possible illegalities or irregularities related to a given timber consignment. The results presented in the Due Diligence and Risk Assessment System and the corresponding reports are based on verification and cross-checks of various publicly available databases, as well as internal analyses performed by BVRio. However, an assessment that indicates a high risk for a given timber consignment does not mean that

the consignment is actually illegal. Conversely, an assessment indicating a low risk for a timber consignment is not a guarantee that the consignment is legal. The BVRio Due Diligence and Risk Assessment System and the corresponding reports might also report mistaken or inaccurate assessments, resulting from errors or technical problems in the collection and interpretation of the official data. All information and documentation used and generated is stored and made available for independent auditing.

4.4. Risk assessment along the supply chain

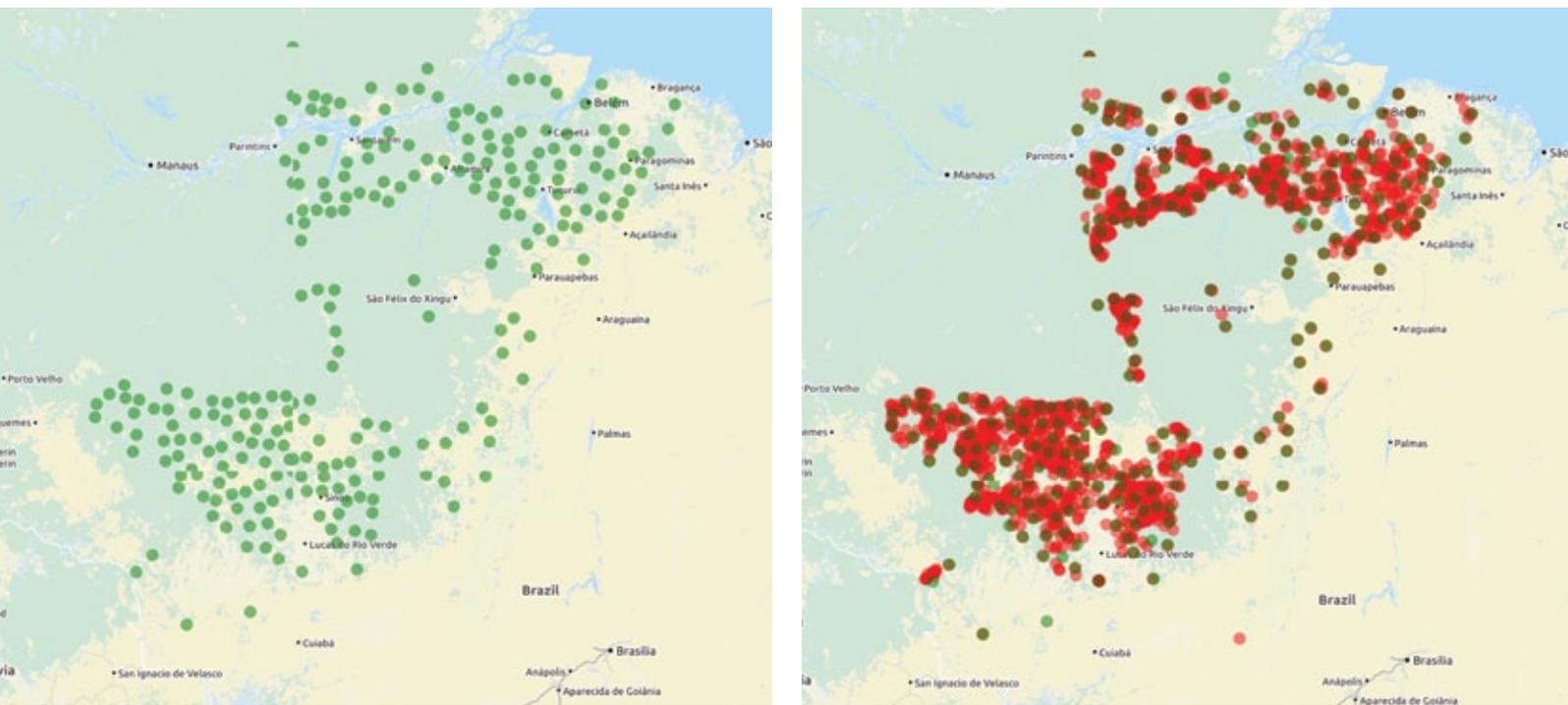


Figure 2: Result of preliminary analysis of logging operations from Pará and Mato Grosso. Before the analysis, all areas were marked in green (map on left). After the analysis, red dots represent severe irregularities, and orange dots represent indirect or less severe irregularities (map on right).

BVRio's approach to traceability is based on document tracking complemented by the analyses described in Section 4.2. The system aims to relate timber consignments to production and processing sites (forest management units, sawmills and timber yards) using the Timber Transport Authorisations (GFs or DOFs) issued for the consignment. Volumes are calculated using the mass balance of volumes entering and leaving a given sawmill.

Production sites are analysed to confirm their level of legality and compliance, as described in Section 4.3. This analysis results in a map of production sites, categorised according to their level of compliance, i.e. those without any indication of illegality or non-compliance, those with possible links with irregularities, and those with proven links to illegality (See Figure 4).

By overlaying the Timber Transport Authorisations (GFs), the route of specific timber consignments is defined through the various production sites associated with them. For a complete analysis, users need to upload all GFs related to the timber consignment for all stages from the forest of source to the final destination.

The process of attributing a stream of GFs to a timber consignment presents challenges, given that in some cases each GF does not reference the previous ones involved in the chain⁷¹. Furthermore, the responsibility for uploading the GFs remains with the user: it is a self-declaratory process that needs to be analysed by the system to detect possible inconsistencies.

Tests are conducted to analyse whether the GFs are likely to be related to the timber consignment in question, to the Timber Extraction Authorisation (AUTEF), and to each other.

Species Names

The Latin names of species stated in the different GFs need to have an exact match. Once a name is entered in an AUTEF, the government timber control system ensures that the same name follows the wood all the way to the final seller. If there are slight differences between the name in the AUTEF and the name in the GFs, it means that they are not related to the same timber consignment. Given that the

same species is often referred to by various names, the system can conduct an initial screening of the match. For example, the current database of AUTEFs in BVRio's system shows at least 8 name variations to refer to one of 17 species of Ipê:

- Tabebuia
- Tabebuia sp
- Tabebuia sp.
- Tabebuia spp
- Tabebuia spp.
- Tabebuia chrysantha
- Tabebuia chrysantha (Jacq.) Nichols.
- Tabebuia chrysantha (Jacq.) Nichols.
subsp. chrysantha

This variation is exacerbated if it is combined with the wide range of common names used for the same species. By comparing the names displayed in the different GFs, it is possible to discard those that do not refer to the same forest of origin as specified in the AUTEF.

71 Systems like Simlam and Sisflora, adopted in Pará and Mato Grosso states, already make available some data collected in their monitoring systems, and the Sisflora 2 system of the Pará state now provides more infor-

mation on the supply chain associated with each GF. On the other hand, the DOF system (Document of Forest of Origin) of the Federal Government still provides little transparency.

Sawmill Conversion Rates

Given the difficulty of obtaining data directly from sawmills, the system estimates the amount of sawn timber produced by calculating the mass balance, by multiplying the volume that enters a sawmill by the maximum conversion rates for a given product (according to the official regulation IN21 of Ibama, Annex 1). If the volume of final product is larger than the calculated volume, it raises a risk alert, commensurate with the difference.

As the system depends on the use of GFs to characterise the legality of a consignment of timber, there is a risk that a seller could use the same GFs (related to a timber consignment from legal sources) for multiple sales (e.g. providing buyers with GFs only from legal sources). In order to prevent this practice, BVRio has created a registry of supply chains (Section 4.5).

Sawmill Conversion Rates

Each timber consignment is classified according to the completeness of the information available about its supply chain, as follows:

- Category A: Supply chain documentation complete—timber consignment is traced by BVRio's Due Diligence and Risk Assessment System from the forest of origin to the timber yard used for this sale.
- Category B: Incomplete supply chain documentation and analysis—there is limited knowledge of the supply chain associated with the timber consignment, so it cannot be traced back to the forest of origin but only to a processing site.



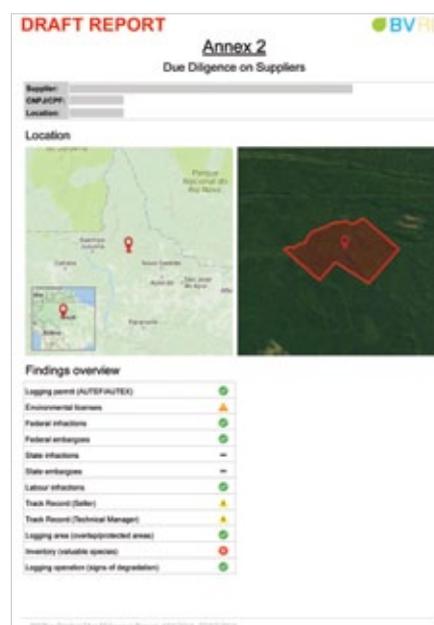
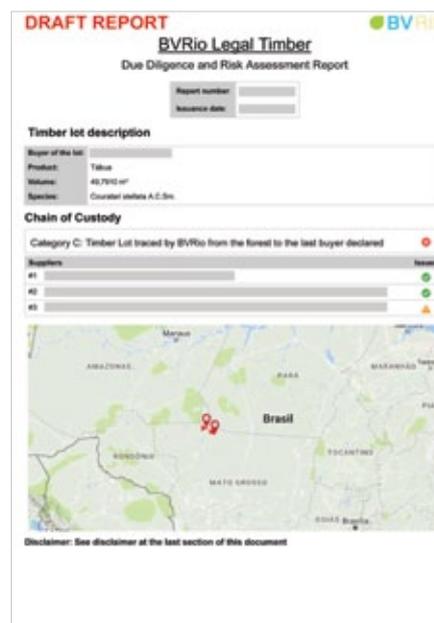
These categories do not relate to the risks of illegality, but to the availability of information about the supply chain. Ultimately, the level of risk of a given timber consignment is determined based on the assessment of individual production sites, as described in Sections 4.2 and 4.3. However, a consignment with incomplete supply chain information poses an additional and serious risk of illegality associated with the production points not analysed, because of the uncertainty associated with the missing supply chain data. At the same time, timber consignments for which there is complete supply chain information do not necessarily have lower risk, but do have higher visibility of the risks and/or level of compliance.

4.5. Reports and claims issued to the buyer

LDue Diligence and Risk Assessment Reports are issued to the buyer. They contain the following information (see template report, Annex 3).

- Description of the timber consignment;
- General description of the supply chain and any weaknesses;
- Detailed information about each production site in the supply chain, including satellite images;
- Risk assessment of each production site in the chain;
- Results of specific analyses
- Claim and disclaimer.

The reports are formatted to enable easy integration with requirements of regulators and programmes such as the EU Timber Regulations, US Lacey Act and the UK Government Timber Procurement Policy (CPET).



4.6. Supply Chain Registry and Cancellation System

As it is difficult to ascertain timber legality, many timber merchants sell products from both legal and illegal sources. If buyers demand to see documentation that supports the legality of a timber consignment, there is a risk that some merchants may use the same 'good' Timber Transport Authorisations (GFs) for multiple transactions.

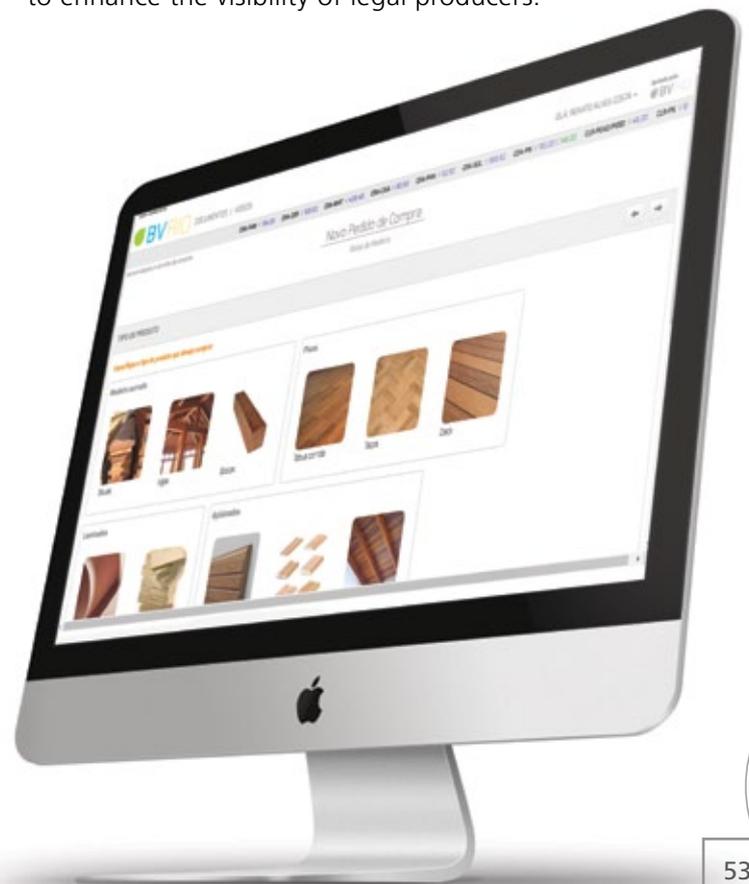
In order to close this loop hole, BVRio keeps a Supply Chain Registry and Cancellation System. Every time a GF is used for the transportation of a timber consignment sold through the Exchange, it is listed in the Registry and classified as 'Cancelled'.

BVRio plans to open the Registry System for public consultation. Parties will be able to check whether a GF is still valid, and whether there are indications of irregularities associated with timber consignment.

4.7. Trading Platform

BVRio's Responsible Timber Exchange is a negotiation platform for promoting the use of legal and/or certified wood in the domestic and international markets. The platform is integrated with the Due Diligence and Risk Assessment System described in the previous sections. The objective of the platform is to provide transparency, efficiency and liquidity to the market and facilitate compliance with the requirements of the EU Timber Regulations and the US Lacey Act.

For buyers, the platform works as a procurement tool for legal timber. For sellers, it provides a means to enhance the visibility of legal producers.



4.8 Record Keeping in Blockchain Technology

Block chain is a distributed database that maintains a continuously-growing list of data records protected against tampering and revision⁷². It is the technology used for the creation and trading of bitcoins, but its uses are much more diverse, including clearing services for financial transactions⁷³.

In 2015, The Economist described blockchain as “a programming language that allows users to write more sophisticated smart contracts, thus creating invoices that pay themselves when a shipment arrives or share certificates that automatically send their owners dividends if profits reach a certain level”⁷⁴.

The advantages of using blockchain-based registries are many. First, the records are immutable: once a record is published, it cannot be removed. Second, it is totally digital: papers and signature checks are not needed. Transferring ownership of records is as easy as sending an email. There is no central point of failure because the infrastructure is decentralised.

Third, security is high: blockchain technology uses cryptographic algorithms, providing a high degree of security to all operations.

BVRio’s Timber Due Diligence System and Trading Platform adopted blockchain technology for building a decentralised registry of its records and scores. The information is guaranteed not to change, given the immutability of blockchains, and it is available publicly⁷⁵. •



BLOCKCHAIN

72 www.economist.com/news/briefing/21677228-technology-behind-bitcoin-lets-people-who-do-not-know-or-trust-each-other-build-dependable

73 For example, a group of international financial institutions (including JPMorgan, Accenture, Deutsche Boerse, Citigroup, BNP Paribas and ABN AMRO Group) have invested in the development of blockchain-based clearing services, and so far Nasdaq and the Australian Stock Exchange are at the forefront of this new technology (www.bloomberg.com/news/articles/2016-01-21/

[blythe-masters-firm-raises-cash-wins-australian-exchange-deal](#))

74 www.economist.com/news/leaders/21677198-technology-behind-bitcoin-could-transform-how-economy-works-trust-machine?fsrc=email_to_a_friend

75 See www.bvrio.org/wp-content/uploads/2016/06/Regis-The-Decentralised-Registry---Medium.pdf

5. Assessment of legality and accuracy of analysis

Preliminary results were extracted from the analysis described in Section 4, applied to all production sites from Pará and Mato Grosso states, as well as from test conducted to assess the accuracy of the system.

Figure 5 shows the distribution of 100% of the logging operations of the Pará and Mato Grosso states since

2007, according to the results of the risksassessments conducted by BVRio's System based on direct analyses only (see Section 4.3). It can be seen that about 32% showed no indication of irregularities and more than 33% had proven or high risk of being involved in severe irregularities (orange and red bars).

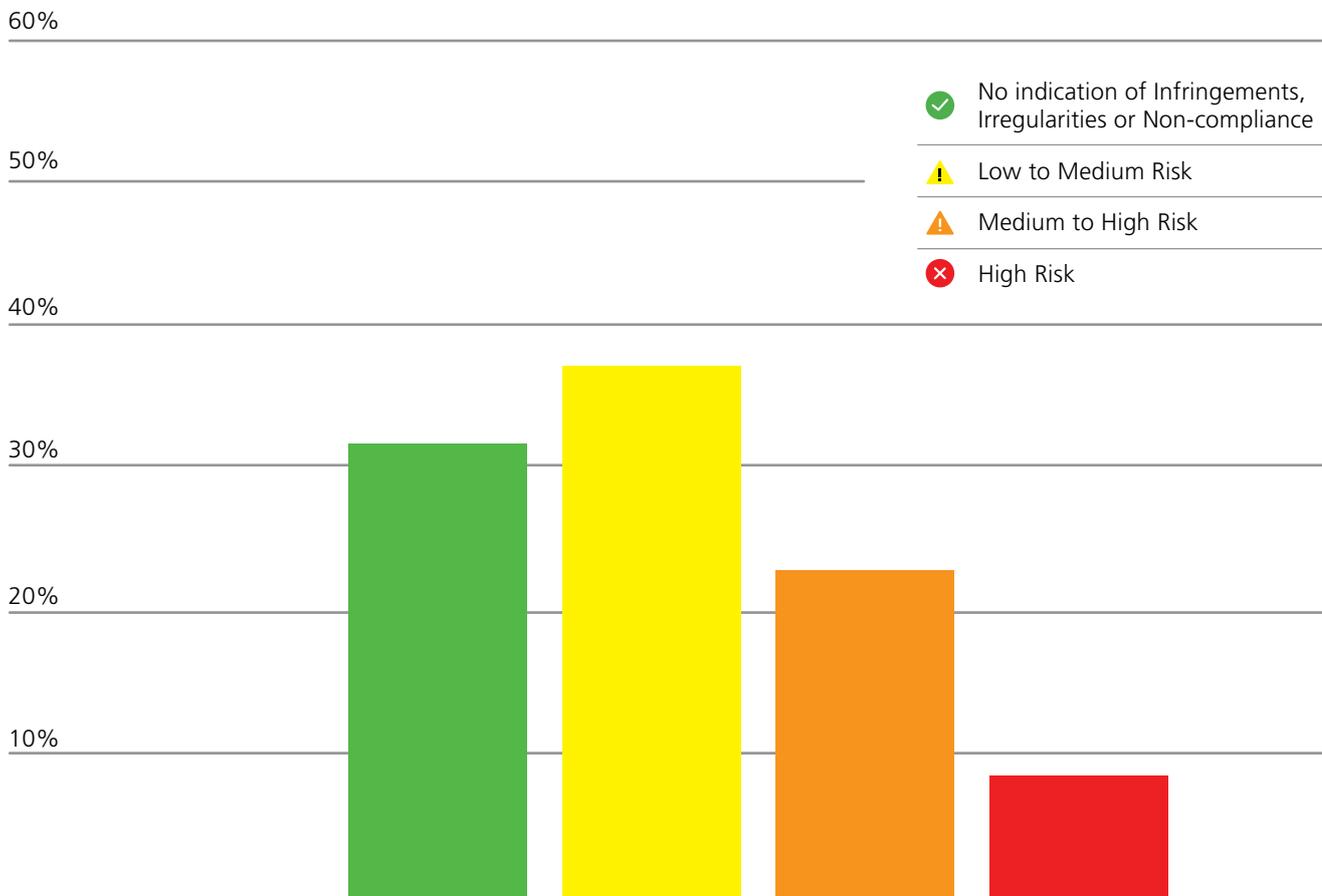


Figure 5. Risk of illegality of all logging operations from 2007–2015 in Pará and Mato Grosso States, according to BVRio's Due Diligence and Risk Assessment System. These results are based on analysis of factors directly associated with these logging operations, and exclude analysis of risks factors indirectly related to these operations (e.g. performance of management team in other logging operations).

The results shown in Figure 5, however, ignore the indirect risks assessed through the analysis of the track record of forest management teams (i.e. forest owner, forest engineer). If this factor is incorporated,

the risk profile of these operations becomes even worse, with less than 10% showing negligible risk and more than 40% considered of medium to high risk (Figure 6).

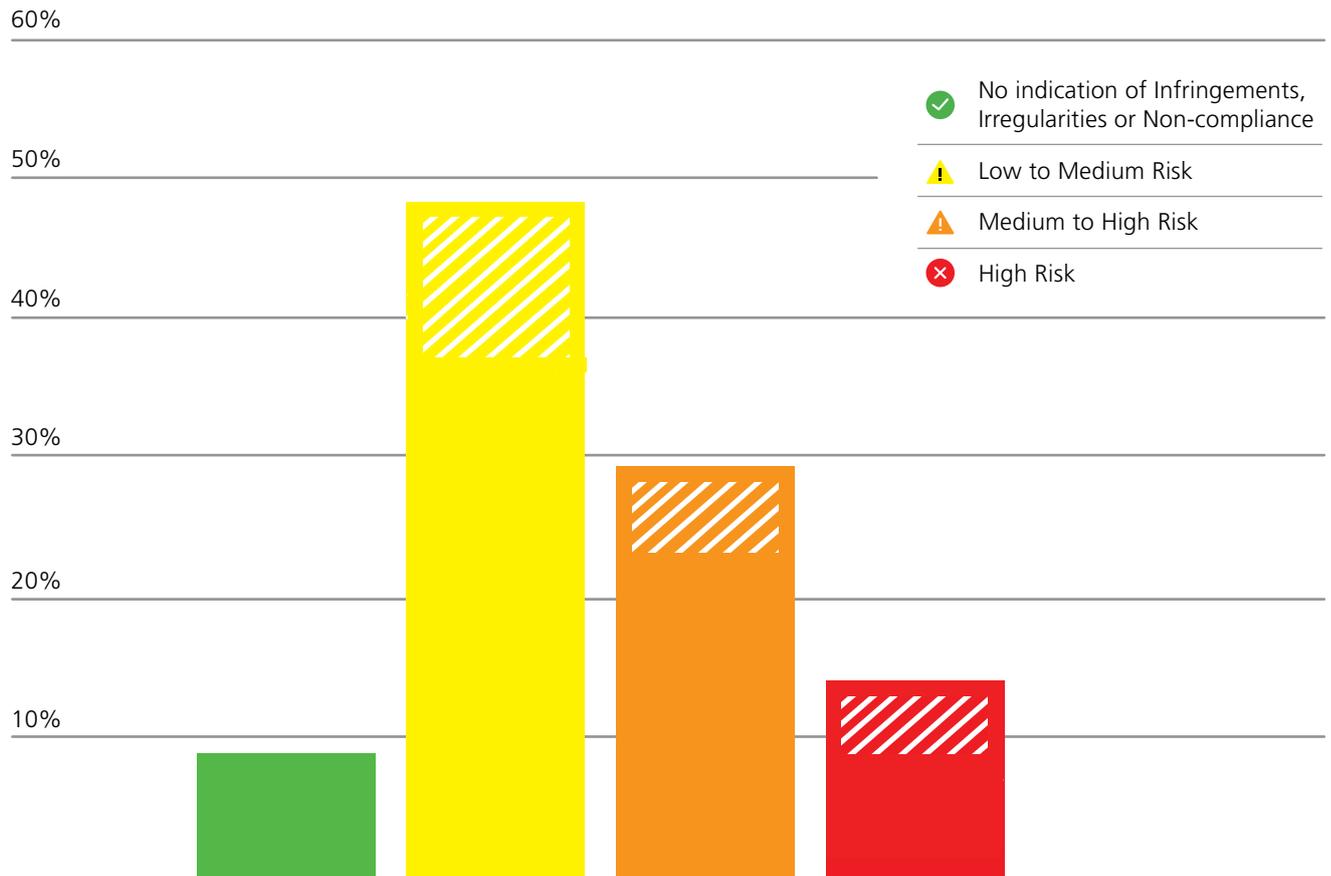


Figure 6. Risk of illegality of all logging operations from 2007–2015 in Pará and Mato Grosso States, according to BVRio’s Due Diligence and Risk Assessment System, including indirect analyses of risks associated with the forest management team. Hashed areas in the bars are derived from risks previously undetected without the indirect analysis of the track record of management teams

BVRio also conducted an assessment of the precision of the system for detecting irregularities. All logging operations in Pará and Mato Grosso States that have had proven infractions over the last 5 years were selected. The system was checked to determine whether it would have highlighted the risk of irregularities before these infrac-

tions were identified by the environmental authorities.

The analysis showed that BVRio’s System was able to identify the risk of irregularities in 99% of cases, demonstrating that the system is a powerful tool for identifying risks of illegality in the Brazilian timber sector. •

6. Conclusions and Recommendations

The use of big data as a risk assessment approach is promising, as it combines the outputs of a wide range of approaches rather than relying on any one in isolation. Furthermore, depending on their design, such systems can deliver useful results irrespective of whether the official data input in the first place is reliable, as it is cross-checked with other sources of information. This is the approach used for the BVRio Due Diligence and Risk Assessment Tools described above.

The results obtained through the use of the BVRio system have demonstrated the merit of this approach. Since its release to the public, traders and government agencies have used the due diligence tools extensively, both domestically and internationally (particularly for the US and European markets), providing a useful tool for risk assessment and mitigation. Any initiative designed to increase the sector's legality, however, depends on the transparency of relevant information. Systems like Simlam and Sisflora, adopted in Pará and Mato Grosso states, already make available some data collected in their monitoring systems. Improvements are still needed, and the Sisflora 2 system of Pará State is a step in the right direction. On the other hand, the states that use the Federal Government's DOF system provide little transparency, which in turn, creates favourable conditions for fraud.

The development and adoption of monitoring, control and traceability systems for the production, processing and transportation of Brazilian tropical wood products is an essential component of any strategy to promote legality. If these are combined with increased transparency of official data, it may be possible to reduce the level of illegality in the Brazilian tropical timber sector.





Annex

Annex 1: Maximum conversion rates in sawmills

Final Product	Maximum Conversion Rate from Logs to Final Product (%)
Logs	100%
Rough Sawn Timber:	
Blocks, Boules	45%
Planks	45%
Railway Slippers	45%
Posts	50%
Sawn Timber:	
Planks	45%
Beams	45%
Laths	45%
Slats	90%
Planed Timber:	
Decking	37%
Flooring	37%
Skirting	37%
Tongue & groove	37%
Ceiling (lambрил)	37%
Squares	37%
Solid doors	37%
Residues:	
Saw dust	100%
Pellets	100%
Chips	100%

Annex 2: How to read GFs, DOFs and AUTEFs

The main documents needed to demonstrate legality in the Brazilian forest sector are:

- Timber Extraction Permits (AUTEX and AUTEF);
- Timber Transport Authorisations (GFs or DOFs).

In the case of GFs, these are divided into:

- **GF1** – authorisation to transport logs, from the forest of origin to a sawmill;
- **GF2** – authorisation to transport non-timber forest products;
- **GF3** – authorisation to transport sawn or processed timber products.

GF3s are also issued when timber is exported, and in this case it contains the name of the importer, and the destination country.

These documents contain a lot of information, and it is important to understand what they mean. At the same time, the fact that these documents are issued by the official government timber control system (i.e. the documents themselves are rarely forged), does not mean that the information they contain always corresponds to reality. For this reason, timber traders should still try to conduct due diligence of this documentation, in order to avoid the possibility that it masks an illegality.

Some samples are shown below, with explanations about the information contained and the main types of checks needed to verify the authenticity of the data contained.



GOVERNO DO ESTADO DO PARÁ
SECRETARIA EXECUTIVA DE CIÊNCIA, TECNOLOGIA E MEIO AMBIENTE - SECTAM/PA
 Diretoria de Meio Ambiente - DMA

Autorização para Exploração Florestal

AUTEF Nº:	VALIDADE ATÉ		
Protocolo Nº: Data do protocolo:	Cadastro Ambiental Rural Nº: Licença Atividade Rural Nº:		
RESPONSÁVEL TÉCNICO:			
Engenheiro florestal:	CREA:		
DADOS DO PROPRIETÁRIO E DO IMÓVEL:			
PROPRIETÁRIO:			
CPF/CNPJ:			
DENTOR:			
CPF/CNPJ:			
IMÓVEL:			
MUNICÍPIO:			
COORDENADAS GEOGRÁFICAS:			
Área Total da propriedade:	Reserva Legal Existente:		
Área Total do MFS:	Área Antropizada:		
APP da UPA:	Área Autorizada:		
ATIVIDADE AUTORIZADA:			
0115 - Unidade de Produção anual do manejo florestal			
ÁREA LÍQUIDA AUTORIZADA:			
QUANTIFICAÇÃO AUTORIZADA (Lista detalhada por espécie no Anexo I)			
PRODUTO	Qtd. por ha	Qtd. total	UNIDADE
LOCAL E DATA:			

Valmir Gabriel Ortega
 Secretário de Estado de Ciência, Tecnologia e Meio Ambiente
SECTAM – PA

Manoel Imbiriba Junior
 Diretor de Meio Ambiente
SECTAM – PA

IMPORTANTE

- A presente Autorização gera o direito de execução da atividade constante do Projeto, não produzindo direitos reais imobiliários, possessórios ou domínios sobre o imóvel objeto da mesma, e nem com efeitos sobre terceiros;
- O uso irregular desta autorização implicará na sua cassação, bem como nas sanções previstas na Legislação vigente;
- Esta autorização não contém emendas ou rasuras;
- Cópia autenticada desta autorização deve ser mantida no local da exploração para efeito de fiscalização;
- Os dados técnicos de exploração no plano são de inteira responsabilidade do Engenheiro responsável pela elaboração do PMS;
- A utilização, consumo e transporte da madeira desta autorização estarão submetidos às regras da legislação florestal, nos moldes da Legislação vigente.

Quadro de Nomenclatura - Áreas da Legenda na Carta-Imagem:

DENOMINAÇÃO	NOMENCLATURA	DENOMINAÇÃO	NOMENCLATURA
Área da Propriedade Rural Total	APRT	Área da Propriedade Rural por Matrícula e Posse	APRMP
Área da Matrícula	AMR	Área de Reserva Legal	ARL
Área de Reserva Legal Compensada	ARL.C	Área de Reserva Legal Degradada	ARD.D
Área em Concessão	ACC	Área Desmatada – conversão de solo	ADS
Área a ser Explorada pelo Projeto de Exploração Florestal - PEF	AEP	Área com Exploração Florestal - Corte Seletivo	AEF
Área do Plano de Manejo Florestal "Sustentável" - PMS	AMP	Área com Floresta Plantada ou a Plantar	AFP
Área de Preservação Permanente	APP	Área de Limpeza e Reforma de Pastagem	ALRP
Área de Preservação Permanente em Área com Exploração Florestal	APP.F	Área de Preservação Permanente Degradada	APP.D
Área de Preservação Permanente em Reserva Legal	APP.RL	Área de Preservação Permanente em Área Aberta (de Exploração)	APP.A
Área de Preservação Permanente em Reserva Legal Compensada	APP.RL.C	Área de Preservação Permanente em Área Remanejada	APP.RA
Área de Preservação Permanente em Área a ser Explorada - do PEF	APP.AE	Área de Preservação Permanente em Área a ser Usujuda - do PMS	APP.US
Área de Preservação Permanente em Área Compensada de Área Rurais	APP.CAR	Área Comunitária em Assentamentos Rurais	ACBR



SECTAM
 Secretaria Executiva de Ciência, Tecnologia e Meio Ambiente

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 Fones: (01) 3184-3318/3319/3341/3360 - Fax: (01) 3276-8564 - www.sectam.pa.gov.br



Título Vencido em: 18/07/2008

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- 8

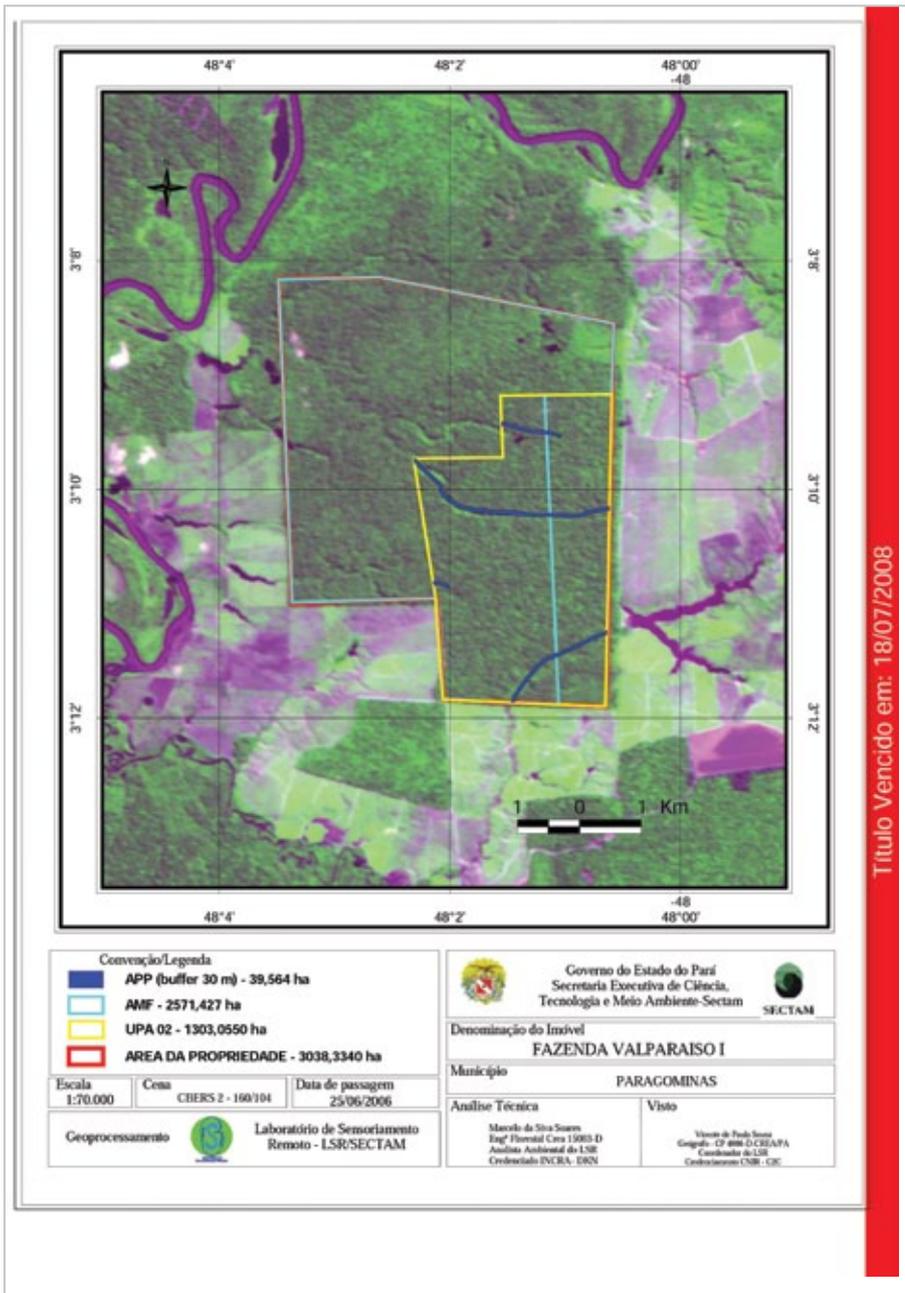
Figure A1: How to read an AUTEF. Above, a logging permit from Pará state (AUTEF), containing the following information:

1. AUTEF # and validity;
2. Name of Forest Engineer and registration #;
3. Name of landowner;
4. Name of owner of management plan;
- 5, 6 and 7. Location and details of the land where logging operation will take place;
8. Summary of volume of timber authorised to be removed.

What to be aware when when reading an AUTEF:

1. Check the track record of parties involved, as these are sometimes involved in illegal operations elsewhere, creating risks for this operation.

Figure A2: How to read an AUTEF. Page 2 of the AUTEF provides a map and satellite image of the logging area.



What to be aware of when reading an AUTEF:

1. Sometimes the AUTEF is only obtained in order to create an account to allow the purchase of illegal timber from other sources. Monitoring with satellite images allows the detection of logging activity in the area after its planned starting date.
2. AUTEFs may be authorised in areas that do not contain timber, or there may be overlaps with public lands, indigenous reservations or protection areas.
3. In the latter case, the image provided in the AUTEF may not be correct, or the date may be manipulated to an earlier point in time (e.g. prior to logging).

 GOVERNO DO ESTADO DO PARÁ SECRETARIA EXECUTIVA DE CIÊNCIA, TECNOLOGIA E MEIO AMBIENTE - SECTAM/PA Diretoria de Meio Ambiente - DMA			
Anexo I - Autorização para Exploração Florestal			
AUTEF Nº:		VALIDADE ATÉ:	
Protocolo Nº: Data do protocolo:		Cadastro Ambiental Rural Nº: Licença Atividade Rural Nº:	
QUANTIFICAÇÃO DE TORAS DE MADEIRA NATIVA - Autorizado no Plano Operacional Anual			
ESPÉCIES FLORESTAIS DO POA		QUANTIDADE (m3)	
NOME CIENTÍFICO	NOME POPULAR	por ha	TOTAL
<i>Astronium gracile</i> Engl.	Muiracatiara	1,7458	2.209,2420
<i>Bagassa guianensis</i> Aubl.	Tatajuba	0,2619	331,4788
<i>Brosimum guianense</i> (Aubl.) Huber	Amapá	0,4551	575,9485
<i>Carapa guianensis</i> Aubl.	Androba	0,1029	130,1668
<i>Caryocar glabrum</i> (Aubl.) Pers.	Pegularana	0,7853	993,7992
<i>Caryocar villosum</i> (Aubl.) Pers.	Peguis	0,2649	335,2274
<i>Chrysophyllum</i> sp.	Guajará-bolacha	0,3394	429,4892
<i>Clethropsis macrocarpa</i> Ducke	Timborana	0,8770	1.109,8390
<i>Copaifera duckei</i> Dayer	Copaiba	1,0724	1.357,0880
<i>Cordia sagotii</i> L.M. Johnst.	Freijo	0,2117	267,9502
<i>Couepia</i> sp.	Coco-pau	0,2651	335,4852
<i>Couratari oblongifolia</i> Ducke & R.Knuth	Taurari	1,1863	1.501,2230
<i>Dimorphandra</i> sp.	Louro-tamaquaré	0,6739	852,8674
<i>Goupia glabra</i> Aubl.	Cupiúba	1,3527	1.711,8430
<i>Huberodendron ingens</i> Ducke	Sumaúma	0,1434	181,4957
<i>Hymenaea</i> sp.	Jatobá	1,6281	2.060,3130
<i>Hymenolobium sericeum</i> Ducke	Angelim-pedra	0,0299	37,8420
<i>Hymenolobium</i> sp.	Angelim-amargoso	0,1452	183,7778
<i>Lecythis lurida</i> (Miers) S.A.Mori	Jarana	0,4752	601,3730
<i>Lecythis platanis</i> Cambess.	Castanha-sapucala	0,6660	842,8580
<i>Manihara huberi</i> (Ducke) Chevalier	Maçaranduba	11,3640	14.380,7600
<i>Micropholis</i> sp.	Curupixá	0,9173	1.160,8220
<i>Ocotea rubra</i> Mez	Louro-vermelho	0,0728	92,1194
<i>Parkia paraensis</i> Ducke	Faveira-branca	1,0422	1.318,9040
<i>Parkia paraensis</i> Ducke	Faveira-vermelha	0,5383	681,1731
<i>Peltogyne densiflora</i> Spruce ex Benth.	Pau-roxo	0,9428	1.193,1030
<i>Pouteria pachycarpa</i> Pires	Goiabão	0,4807	608,3059
<i>Pouteria ramiflora</i> (Mart.) Radlk.	Guajará	0,2826	357,5680
<i>Simarouba amara</i> Aubl.	Marupá	0,2461	311,3802
<i>Tabebuia capitata</i> (Bureau & K. Schum.) Sandwith	Ipi	0,5806	734,7874
<i>Tetragastris panamensis</i> (Engl.) Kuntze	Barrote	0,2903	367,3937
<i>Tratlenickia burseraeifolia</i> (Mart.) Wild.	Amesclão	0,2754	348,2364
<i>Vatairea sericea</i> Ducke	Sucupira-amarela	0,3167	400,7854
TOTAL DE VOLUME AUTORIZADO		29,9820	37.941,6417

9

Título Vencido em: 18/07/2008

Figure A3: How to read an AUTEF. Page 3 of the AUTEF provides a detailed list of species and volumes authorised for removal.

What to be aware when reading an AUTEF:

1. Volumes of valuable species are often exaggerated, sometimes much higher than observed in nature. This is used to 'launder' timber extracted from other sources.

Guia Florestal para Transporte de Madeira em Toras - GF 1 1

Guia de Transporte: **1** DVPF: **1** Origem: _____ N° Processo: _____ 2

Nota Fiscal: _____ 3

Remetente

Nome: _____ CNPJ/CPF nº: _____ Inscrição Estadual nº: CEPROF-PA: _____

Tipo Logr.: _____ Logradouro: _____ N°: _____ Complemento: _____ Bairro: _____ Distrito: _____ Município: _____ CEP: _____

UF: _____ Ponto de Referência: _____ Caixa Postal: _____

Destinatário

Nome: _____ CNPJ/CPF nº: _____ Inscrição Estadual nº: _____

CEPROF-PA: _____

Tipo Logr.: _____ Logradouro: _____ N°: _____ Complemento: _____ Bairro: _____

Distrito: _____ Município: _____ CEP: _____ UF: _____ Ponto de Referência: _____

Caixa Postal: _____ Trajeto ao Destino: _____

OUTEIRO

Especie e seus correspondentes volumes:

N°	Nome Científico	Nome Popular	Class.	Produto	Quantidade	Unid.	Preço Unitário	Preço Total

Memorial Descritivo de Transporte: _____

Memorial Descritivo de Transporte: _____

Tipo de Transporte: _____ Exportação: Sim () Não () 10

Rodoviário: Identificação(ões) do Veículo Transportador: _____

Hidroviário: Número de embarcações: _____ País de origem: _____ Nome das embarcações: _____

N° do DAE do Pagamento de ICMS: _____ Valor pago R\$: _____

N° do DAE do pagamento de taxa de emissão de GF1: _____ Valor pago R\$: _____

Data de Emissão _____ Data de Validade em Para _____ 11

CPF _____ Responsável pela emissão _____



0000011000001000592100107000011 12

Assinatura Responsável _____

Figure A.4: How to read a Guia Florestal – GF (timber transportation permit used in the states of Pará and Mato Grosso). The document contains the following information: 1. Type of GF. In this case, GF1, a permit to transport logs from the forest to a sawmill; 2, 3 and 4. Number of GF and the corresponding Nota Fiscal (electronic tax invoice); 5. Name and address of dispatching party (seller); 6. Name and address of receiving party (buyer); 7. Species, volume and price of products transported; 8, 9 and 10. Details of the route and date of transportation; 11 and 12. Validity of the document and bar code (this can be scanned with BVRio’s Timber Legality App to receive a report on its legality status).

What to be aware when reading a GF:

1. Names of buyers and sellers do not always mean that they are actually the parties involved.

2. A forest owner will commonly issue a fraudulent GF for a sawmill, at a cost, so that the sawmill can justify a volume of timber purchased without documenta-

tion. Sometimes this fraud can be identified from the GF itself, for example, if it uses unusual routes.

3. Other frauds relate to species, which may be identified by prices that are not compatible with a certain species.



MINISTÉRIO DO MEIO AMBIENTE
INSTITUTO BRASILEIRO DO MEIO AMBIENTE E DOS RECURSOS NATURAIS RENOVÁVEIS Nº _____
DOCUMENTO DE ORIGEM FLORESTAL - DOF

1 - Emissor		2 - Ibama/CTF	
3 - Endereço			
4 - Bairro		5 - Município	
6 - Origem		7 - Coordenadas	
8 - Endereço			
9 - Bairro		10 - Município	
11 - Roteiro de acesso			
12 - Autorização		13 - Tipo	
14 - Produto / Espécie		15 - Qtd.	16 - Un.
17 - Valor			
18 - Destinatário			
20 - Endereço		19 - Ibama/CTF	
21 - Bairro		22 - Município	
23 - Destino		24 - Coordenadas	
25 - Endereço			
26 - Bairro		27 - Município	
28 - Roteiro de acesso			
29 - Meio de Transporte	30 - Placa/Registro	31 - Município Origem	32 - Município Destino
33 - Nº Doc. Fiscal		38 - Para uso da fiscalização do Ibama, repartições fiscais e outras	
34 - Validade			
35 - Rota do transporte			
VERDE			
37 - Código de controle			
 			

Para verificar acesso: http://www.ibama.gov.br/ctf/consulta_dof.php

Figure A.5: How to read a DOF (timber transportation permit used in most Brazilian states except for MT and PA). The document contains the following information: 1 and 2. Name and Technical Registration # of seller; 3 to 11. Address of seller; 12. Authorisation number; 13. Type of operation for which permit was issued (e.g. forest management plan); 14 to 17. Type, quantity and price of product to be transported; 18 to 28. Name and address of buyer; 29 to 32. Details of the mode of transportation; 33. Electronic invoice number; 34. Validity of permit (dates); 35. Route planned.

What to look out for when reading a DOF: see GFs.

What to look out for when reading a DOF:

See GFs.

Annex 3 – Report Template

SAMPLE



BVRio Legal Timber

Due Diligence and Risk Assessment Report

Report number: # [input type="text"]

Issuance date: 16/06/2016

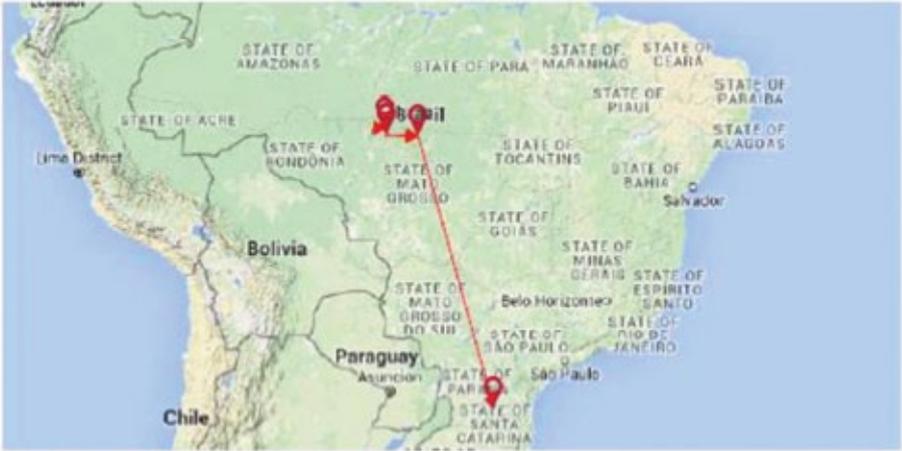
Timber lot description

Buyer of the lot:	<input type="text"/>
Product:	Decking
Volume:	12,20 m³
Species:	Tabebuia serratifolia

Chain of Custody

Category B: Timber Lot traced by BVRio from the forest to the last buyer declared ✔

Suppliers	Issues
#1 <input type="text"/>	✘
#2 <input type="text"/>	✔
#3 <input type="text"/>	✔
#4 <input type="text"/>	✔
#5 <input type="text"/>	⚠



Disclaimer: See disclaimer at the last section of this document

SAMPLE



Annex 1a

Description of Chain of Custody

Flow of products and supporting documents (Timber transportation authorizations - DOFs/GFs)

Flow (Starting from the last supplier back to the forest of origin)	
#1	From: [redacted] To: [redacted] Product: Decking - 12,20 m3
#2	From: [redacted] To: [redacted] Product: Decking - 30,91 m3
#3	From: [redacted] To: [redacted] Product: Decking - 30,91 m3
#4	From: [redacted] To: [redacted] Product: Toras de Madeira Nativa - 95,12 m3
#5	From: [redacted] To: [redacted] Product: Toras de Madeira Nativa - 259,08 m3
#6	From: [redacted] To: [redacted] Product: Toras de Madeira Nativa - 968,43 m3

Disclaimer

The Chain of Custody for this timber consignment was declared by the Buyer and supported by Timber Transport Authorizations. BVRio conducts a range of tests to verify the compatibility of the declared Chain of Custody. The compatibility tests are described in Annex 1b. All documentation and results related to this analysis are available for inspection in BVRio's Due Diligence System.

Annex 1b

Verification of Chain of Custody

Supplier of 1st degree

Name:	<input type="text"/>		
CNPJ/CPF:	<input type="text"/>		
Location:	<input type="text"/>		

Output (Sold to)	Transportations auth (DOFs/GFs)	Date
1 To: <input type="text"/>		15/06/2016
Product: Decking - 12,20 m3		

Input (Bought from)	Transportations auth (DOFs/GFs)	Date
1.1 From: <input type="text"/>		30/03/2016
Product: Decking - 30,91 m3		

Compatibility tests	
Timber Transport Authorizations submitted?	✔
Verification of authenticity of Timber Transport Authorizations in official system.	✔
Confirmation of no previous use of Timber Transport Authorizations in BVRio's system - i.e., whether the volumes were not yet committed to another timber consignment registered in BVRio's system	✔
Compatibility Test 1 (species): Matching of the species listed in Timber Transport Authorizations, verifying Latin and commercial names	✔
Compatibility Test 2 (volumes): Matching of the volumes listed in the input and output Timber Transport Authorizations, taking into account official sawmill conversion rates (IBAMA IN 21).	✔
Compatibility Test 3 (dates): Verification of dates of entry and departure of the timber lot in relation to related documentation (Timber Transport Authorizations).	✔
Compatibility Test 4 (route): Coherence of transportation route.	✔

Annex 1b

Verification of Chain of Custody

Supplier of 2nd degree

Name:	<input type="text"/>
CNPJ/CPF:	<input type="text"/>
Location:	<input type="text"/>

	Output (Sold to)	Transportations auth (DOFs/GFs)	Date
1.1	Ti <input type="text"/>	<input type="text"/>	30/03/2016

	Input (Bought from)	Transportations auth (DOFs/GFs)	Date
1.1.1	From: <input type="text"/> Product: Decking - 30,91 m3	<input type="text"/>	29/03/2016

Compatibility tests	
Timber Transport Authorizations submitted?	✓
Verification of authenticity of Timber Transport Authorizations in official system.	✓
Confirmation of no previous use of Timber Transport Authorizations in BVRio's system - i.e., whether the volumes were not yet committed to another timber consignment registered in BVRio's system	✓
Compatibility Test 1 (species): Matching of the species listed in Timber Transport Authorizations, verifying Latin and commercial names	✓
Compatibility Test 2 (volumes): Matching of the volumes listed in the input and output Timber Transport Authorizations, taking into account official sawmill conversion rates (IBAMA IN 21).	✓
Compatibility Test 3 (dates): Verification of dates of entry and departure of the timber lot in relation to related documentation (Timber Transport Authorizations).	✓
Compatibility Test 4 (route): Coherence of transportation route.	✓

Annex 1b

Verification of Chain of Custody

Supplier of 3rd degree

Name:	
CNPJ/CPF:	
Location:	

Output (Sold to)	Transportations auth (DOFs/GFs)	Date
1.1.1		29/03/2016

Input (Bought from)	Transportations auth (DOFs/GFs)	Date
1.1.1.1 From:		19/01/2016
Product: Toras de Madeira Nativa - 43,96 m3		
1.1.1.2 From:		19/01/2016
Product: Toras de Madeira Nativa - 51,15 m3		

Assessment of compatibility of volumes	
Type of conversion: Toras de Madeira Nativa - Decking	Indicators
Output: Decking - 30,91 m3	Maximum output with the declared input: 35,10 m3
Input: Toras de Madeira Nativa - 95,12 m3	Minimum input for the declared output: 83,77 m3
Conversion rate observed: 32,50%	Maximum rate admitted for the conversion: 36,80%

Compatibility tests	
Timber Transport Authorizations submitted?	✔
Verification of authenticity of Timber Transport Authorizations in official system.	✔
Confirmation of no previous use of Timber Transport Authorizations in BVRio's system - i.e., whether the volumes were not yet committed to another timber consignment registered in BVRio's system	✔
Compatibility Test 1 (species): Matching of the species listed in Timber Transport Authorizations, verifying Latin and commercial names	✔
Compatibility Test 2 (volumes): Matching of the volumes listed in the input and output Timber Transport Authorizations, taking into account official sawmill conversion rates (IBAMA IN 21).	✔
Compatibility Test 3 (dates): Verification of dates of entry and departure of the timber lot in relation to related documentation (Timber Transport Authorizations).	✔
Compatibility Test 4 (route): Coherence of transportation route.	✔

Annex 1b

Verification of Chain of Custody

Supplier of 5th degree

Name:	<input style="width: 80%;" type="text"/>
CNPJ/CPF:	<input style="width: 80%;" type="text"/>
Location:	<input style="width: 80%;" type="text"/>

	Output (Sold to)	Transportations auth (DOFs/GFs)	Date
1.1.1.1.1	To: <input style="width: 90%;" type="text"/> Product: Toras de Madeira Nativa - 26,40 m3	<input style="width: 90%;" type="text"/>	27/10/2014
1.1.1.1.2	To: <input style="width: 90%;" type="text"/> Product: Toras de Madeira Nativa - 21,39 m3	<input style="width: 90%;" type="text"/>	27/10/2014
1.1.1.1.3	To: <input style="width: 90%;" type="text"/> Product: Toras de Madeira Nativa - 35,05 m3	<input style="width: 90%;" type="text"/>	03/11/2014
1.1.1.1.4	To: <input style="width: 90%;" type="text"/> Product: Toras de Madeira Nativa - 23,66 m3	<input style="width: 90%;" type="text"/>	03/11/2014
1.1.1.1.5	To: <input style="width: 90%;" type="text"/> Product: Toras de Madeira Nativa - 52,34 m3	<input style="width: 90%;" type="text"/>	04/11/2014
1.1.1.1.6	To: <input style="width: 90%;" type="text"/> Product: Toras de Madeira Nativa - 49,38 m3	<input style="width: 90%;" type="text"/>	04/11/2014
1.1.1.1.7	To: <input style="width: 90%;" type="text"/> Product: Toras de Madeira Nativa - 50,86 m3	<input style="width: 90%;" type="text"/>	04/11/2014

	Input (Bought from)	Transportations auth (DOFs/GFs)	Date
1.1.1.1.1.1	From: Autorização florestal Product: Toras de Madeira Nativa - 968,43 m3	AUTEX # <input style="width: 90%;" type="text"/>	11/09/2013

Compatibility tests	
Timber Transport Authorizations submitted?	✔
Verification of authenticity of Timber Transport Authorizations in official system.	✔
Confirmation of no previous use of Timber Transport Authorizations in BVRio's system - i.e., whether the volumes were not yet committed to another timber consignment registered in BVRio's system	✔
Compatibility Test 1 (species): Matching of the species listed in Timber Transport Authorizations, verifying Latin and commercial names	✔
Compatibility Test 2 (volumes): Matching of the volumes listed in the input and output Timber Transport Authorizations, taking into account official sawmill conversion rates (IBAMA IN 21).	✔
Compatibility Test 3 (dates): Verification of dates of entry and departure of the timber lot in relation to related documentation (Timber Transport Authorizations).	✔
Compatibility Test 4 (route): Coherence of transportation route.	✔

Annex 2

Due Diligence on Suppliers

Supplier:	<input type="text"/>
CNPJ/CPF:	<input type="text"/>
Location:	<input type="text"/>

Findings overview

Federal infractions	
Federal embargoes	
State infractions	—
State embargoes	—
Labour infractions	

Federal infractions

Date: 13/07/2015
 Fine amount: R\$ 200.000,00 (análise admis/mérito de impugnação/defesa)
 Infraction notice number: (Flora)
 Legal basis: 70 1ª 72 II, IX Lei, 9605/98, 3 II, IX 82 Decreto, 6514/2008

Name:
 Location:

Date: 24/07/2015
 Fine amount: R\$ 188.812,00 (análise admis/mérito de impugnação/defesa)
 Infraction notice number: (Flora)
 Legal basis: 70 1ª 72 II Lei, 9605/98, 3 II 47 §-1º Decreto, 6514/2008, 31 Instrução Normativa, Instrução Normativa

Name:
 Location:

Date: 05/08/2015
 Fine amount: R\$ 33.471,30 (para homologação/prazo de defesa)
 Infraction notice number: (Flora)
 Legal basis: 70 1ª 72 II Lei, 9605/98, 3 II 47 §-1º Decreto, 6514/2008, 31 Instrução Normativa, Instrução Normativa

Name:
 Location:

Date: 05/08/2015
 Fine amount: R\$ 161.500,00 (para homologação/prazo de defesa)
 Infraction notice number: (Flora)
 Legal basis: 70 1ª 72 II Lei, 9605/98, 3 II 82 Decreto, 6514/2008, 31 Instrução Normativa, Instrução Normativa

Name:
 Location:

Federal embargoes

No issues found

State infractions

Information not available

State embargoes

Information not available

SAMPLE



Annex 2 Due Diligence on Suppliers

Documents

Type	Number	Expiration date	Status
AUTEX			Expired
LAU			Active

Property

Owner:	
Name:	
Authorized Net Area:	1.904,30 ha
Total Area:	10.472,83 ha

Federal infractions

No issues found

Federal embargoes

No issues found

State infractions

Date	Number	Status
		Em análise

State embargoes

Information not available

Labour infractions

No issues found

Track Record (Seller)

Category	Green	Yellow	Orange	Red
All AUTEX issued by the seller	0	1	1	0
Infractions - head-office and all branches of the company	0	0	0	0
Embargoes - head-office and all branches of the company	0	0	0	0
Slave Embargoes - head-office and all branches of the company	0	0	0	0

Track Record (Technical Manager)

All AUTEX signed by the technician	Green	Yellow	Orange	Red
	10	12	8	1

Logging area (overlap/protected areas)

No issues found

Inventory (valuable species)

Specie	Observed Volume (m3/ha)	Status
Breu. Amescla	2,02	⚠

SAMPLE



Annex 2

Due Diligence on Suppliers

Supplier:	<input type="text"/>
CNPJ/CPF:	<input type="text"/>
Location:	<input type="text"/>

Findings overview

Federal infractions	✓
Federal embargoes	✓
State infractions	—
State embargoes	—
Labour infractions	✓

Federal infractions

No issues found

Federal embargoes

No issues found

State infractions

Information not available

State embargoes

Information not available

Labour infractions

No issues found

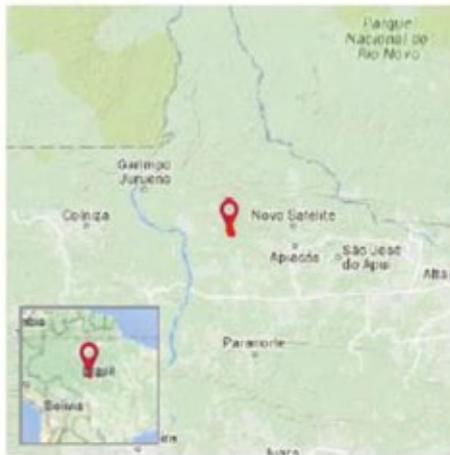
SAMPLE



Annex 2 Due Diligence on Suppliers

Supplier: _____
CNP/JCPF: _____
Location: _____

Location



Findings overview

Logging permit (AUTEF/AUTEX)	✓
Environmental licenses	✓
Federal infractions	✓
Federal embargoes	✓
State infractions	✗
State embargoes	—
Labour infractions	✓
Track Record (Seller)	⚠
Track Record (Technical Manager)	⚠
Logging area (overlap/protected areas)	✓
Inventory (valuable species)	⚠
Logging operation (signs of degradation)	✓

Annex 4. Scores used for the analysis

Analysis Conducted, by State of Origin			
1. Verification of Licences and Documents	PA	MT	Other States
1.1 Logging Authorisation (Autef/Autex)	✓	✓	✓ ⁽¹⁾
1.2 Environmental and Operational Licenses	✓	✓	✓ ⁽¹⁾
1.3 Rural Registry System (Cadastro Ambiental Rural, CAR), Simlam	✓	✓	✓ ⁽¹⁾
2. Infractions and Suspensions	PA	MT	Other States
2.1 Environmental Infractions (Federal level).	✓	✓	✓
2.2 Environmental Suspensions/embargoes (Federal level).	✓	✓	✓
2.3 List of process related to slave labour (Federal level).	✓	✓	✓
2.4 Environmental Infractions (State level).	—	✓	—
2.5 Environmental Suspensions/embargoes (State level).	✓	—	—
3. Complementary Analysis	PA	MT	Other States
3.1 Illegal overlap with Conservation Areas, Indigenous Lands or Traditional Communities Areas.	✓	✓	✓ ⁽¹⁾
3.2 Volumes of the valuable species in the logging permit.	✓	✓	✓ ⁽¹⁾
3.3 Satellite analysis of the logging operation.	✓	✓	✓ ⁽¹⁾
3.4 Track records of the involved Parties.	✓	✓	✓ ⁽¹⁾

Note: (1) Analysis available in the Premium version. Dependent on the provision of basic documents by the parties involved and the information available from the competent state agencies.

Methodology and Assessments

1. Verification of licenses and documents		
1.1 Logging Authorisation (Autef/Autex)		
Item	Assessment	Legend
1.1.1 Verification of the existence and authenticity of the document.	Confirmed	
	Not confirmed	
1.1.2 Verification of the validity (status) of the document (the 'Valid' and 'Expired' status refer to the date of the issuance of the Timber Transportation Authorization - Guia Florestal. A GF can be issued within 90 days after the expiry date of the Autef/Autex. The 'Suspended' status refers to the date of the consultation).	Valid	
	Expired / Suspended	
1.2 Environmental and Operational Licenses		
Item	Assessment	Legend
1.2.1 Verification of the existence and authenticity of the document.	Confirmed	
	Not confirmed	
1.2.2 Verification of the validity (status) of the document (the 'Valid' and 'Expired' status refer to the date of the issuance of the Timber Transportation Authorization - Guia Florestal. The 'Suspended' status refers to the date of the consultation).	Valid	
	Expired / Suspended	
1.3 Rural Registry System (Cadastro Ambiental Rural, CAR), Simlam		
Item	Assessment	Legend
1.3.1 Verification of the existence and authenticity of the document.	Confirmed	
	Not confirmed	
1.3.2 Verification of the validity (status) of the document (at the date of the consultation).	Active / Temporary	
	Cancelled	

2. Infractions and Embargoes		
Item	Assessment	Legend
2.1 Environmental Infractions (Federal level) (1).	No Negative Records	
	Low Severity	
	Medium Severity	
	High Severity	
2.2 Environmental Suspensions/embargoes (Federal level) (2).	No Negative Records	
	Irregularities Found	
2.3 List of process related to slave labour (Federal level).	No Negative Records	
	Irregularities Found	
2.4 Environmental Infractions (State level).	No Negative Records	
	Irregularities Found	
2.5 Environmental Suspensions/embargoes (State level).	No Negative Records	
	Irregularities Found	

3. Complementary Analysis		
Item	Assessment	Legend
3.1 Illegal overlap with Conservation Areas, Indigenous Lands or Traditional Communities Areas.	No	
	Yes	
3.2 Volumes of the valuable species in the logging permit (3).	Coherent	
	Inconclusive	
	Questionable	
	Incompatible	
3.3 Satellite analysis of the logging operation (4).	Coherent	
	Inconclusive	
	Questionable	
	Incompatible	
3.4 Track records of the involved Parties (5).	No events	
	Low severity	
	Medium severity	
	High severity	

Legends and Colour Code

	No indications of illegality or irregularity
	Indications of irregularities of mild/low severity
	Indications of irregularities of medium severity
	Indications of severe illegality and/or irregularities
n.a.	Information not available
—	Analysis not available in this version

Notes

(1) The infractions are categorised according with their severity and relevance, taking into account the type of infraction, the amount of the fines imposed and the time factor. Infractions not related to the timber sector are not reported in this item. In the case of logging activities (forest management areas), the following situations are not reported in this item: (i); (i) infractions assessed before the issuance of the Logging Permit (Autex/Autef); (ii) infractions assessed more than 3 years after the expiration of the Logging Permit; and (iii) infractions related to different branches of the same company. It is considered that in these cases the infractions do not affect the Logging Permit under analysis. However, these infractions will be considered for the assessment of the track record of the involved parties. For the purpose of the evaluation of the severity of the infractions, the amount of the fines is consolidated. A discount rate is applied according to the time elapsed so ancient infractions will have a lower weight in the consolidation. Consolidated values below R\$ [XXX] are considered negligible. Consolidated values between R\$ [XXX] and R\$ [XXX] are considered as low relevance. Consolidated values between R\$ [XXX] and R\$ [XXX] are considered as medium relevance. Consolidated values above R\$ [XXX] are considered as high relevance.

(2) Embargoes not related to the timber sector are not reported in this item. In the case of logging activities (forest management areas), the following situations are not reported in this item: (ii) embargoes imposed before the issuance of the Logging Permit (Autex/Autef); (ii) embargoes imposed more than 3 years after the expiration of the Logging Permit; and (iii) embargoes related to different branches of the same company. It is considered that in these cases the embargoes do not affect the Logging Permit under analysis. However, these embargoes will be considered for the assessment of the track record of the involved parties.

(3) The assessment of coherence of the volumes of valuable species authorized in the logging permit (Autef/Autex) is made based on the analysis of the aggregated average of all logging permits and statistical analysis developed by BVRio. An 'incompatible' assessment does not mean that the timber is illegal. And, reversely, a 'coherent' assessment is not a guaranty that the timber is legal.

This assessment simply reflects the results of statistical analyses made by BVRio based on the adopted methodology.

(4) The assessment of coherence of the logging operation results from the analysis made based on satellite images, the terms of the logging authorizations and the status of the forest before and after the period of the authorized logging. Several sources of information and methodologies of analysis are used. This assessment is dependent upon the availability of the satellite images and related analysis for the relevant period and area. An 'incompatible' assessment does not mean that the timber exploration was illegal. And, reversely, a 'coherent' assessment is not a guaranty that the timber exploration was legal. This assessment simply reflects the results of the analysis made by BVRio based on the best available information for the relevant area and period.

(5) The assessment of the track records of the involved Parties, when available, includes the owner of the forest, the holder of the logging authorization rights, the technical manager of the operation, the owner of the sawmill, suppliers of the sawmill and possibly the managers and related parties to these Parties. This assessment aims to identify any involvement of the Parties with illegalities or irregularities committed in other activities. The assessment is based on public information and internal analysis made by BVRio. Issues identified for a given actor are evaluated and weighted taking into account criteria as the severity, relevance, frequency and time. Actors are then ranked in four categories (green, yellow orange and red) which indicate actors which track records do not contain material negative events, or contains events of low, medium or high severity, respectively. It indicates the potential and theoretical risk assessed from a statistical analysis of the profile and track records of the involved parties and illegalities identified in other cases. A classification in the red category does not mean that the Party involved actually committed an illegality nor that there is a right risk that such Party will actually commit an illegality. And, reversely, a classification in the green category is not a guaranty that the involved Party did not commit, or will not commit, an illegality. These assessments simply reflect the results of statistical analyses made by BVRio based on the information analyzed and the adopted methodology.

Source of information

The results presented in the Due Diligence and Risk Assessment Report are derived from verification and cross-checking of various publicly available databases and internal analyses performed by BVRio.

Data	Source
Logging Authorisation (Autef/Autex)	State Environmental Agency (Simlam, PA/MT)
Environmental Licenses	State Environmental Agency (Simlam, PA/MT)
CAR (Simlam)	State Environmental Agency (Simlam, PA/MT)
Operational Licenses	State Environmental Agency (Simlam, PA/MT)
Federal Infractions	Federal Environmental Agency, Ibama
Federal Suspensions/embargoes	Federal Environmental Agency, Ibama
List of slave labour	Ministry of Labour, MTE
State-level Infractions	State Environmental Agency (Simlam, PA/MT)
State-level Suspensions/embargoes	State Environmental Agency, Sema (PA/MT)
Track records of involved parties	BVRio analysis, public information (several sources)
Overlap with Conservation Areas, Indigenous Lands or Traditional Communities Areas.	BVRio analysis, satellite images, data from Federal and State Environmental Agencies
Volumes of valuable species	BVRio analysis, State Environmental Agencies
Satellite analysis of the logging operation	BVRio analysis, data and satellite: Tree Cover Loss (GFW/WRI), SAD Deforestation (Imazon), SAD Degradation (Imazon), Simex (Imazon e ICV).

Annex 5: About BVRio Responsible Timber Exchange

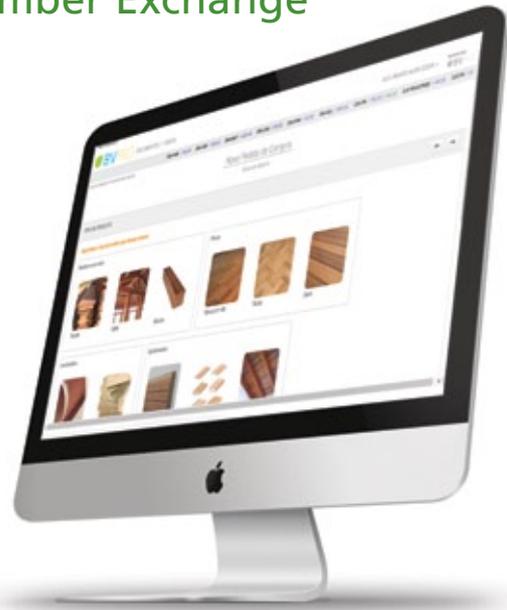
BVRio Responsible Timber Exchange is a negotiation platform for legal or certified (i.e. FSC) timber products integrated with a due diligence system and supply chain analyser, facilitating the analyses of supply chains of timber products from source of production to final buyer, providing transparency, efficiency and liquidity to this market. The system was designed to facilitate compliance with the requirements of the EU Timber Regulations and the US Lacey Act.

A trading platform with an in-built risk assessment and due diligence system

BVRio's Timber Exchange is a simple and efficient trading platform with internal due diligence functionalities. It includes a system to evaluate the risk of illegality of products negotiated, while ensuring its main purpose – to bring together producers and buyers of legal timber products in a transparent and safe environment.

A due diligence system, from the forest to the trading platform

BVRio due diligence system consists of a framework of procedures and measures designed to assess the compliance with the applicable legislation and to identify evidence of fraud and illegality. The due diligence system provides blanket coverage of all producers in the Brazilian Amazon, enabling analysis of any producer along the supply chain. All information and documentation are stored and made available for independent auditing.



Adding credibility to the DOF System of the Brazilian government

The due diligence starts with documentation provided for the Brazilian Government's DOF System (Document of Origin of Timber Products). Information gathered is cross-checked to detect any inconsistencies, including spatial satellite imagery analysis and verification of databases of infraction of labour legislation, illegal deforestation, environmental infractions, and tax compliance, possibly complemented by spot checks and field audits, analysing the risks of non-compliance or illegality of timber products.

Building on Brazilian experience

The Timber Exchange was developed by Rio de Janeiro's Environmental Exchange BVRio in consultation with a range of buyers, producers, auditing companies, supply chain experts, NGOs, and government agencies in Brazil. BVRio has vast experience in building and operating environmental markets in Brazil.

Annex 6: About BVRio



The Due Diligence and Risk Assessment System and the Legal Timber Exchange are initiatives of the BVRio Institute and BVRio Environmental Exchange.

BVRio Institute (www.bvrio.org) is a non-profit association created in 2011 with the objective to develop market mechanisms to facilitate compliance with Brazilian environmental laws. iBVRio is a Climate Action Leader of the R20 Regions for Climate Action initiative, received the Katerva Awards 2013 for Economy, and is a member of the **Forest Legality Alliance**.

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