Targeting Natural Resource Corruption

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Traceability systems: Potential tools to deter illegality and corruption in the timber and fish sectors?

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Key takeaways

- Illegal logging, fishing, and the associated trade in their products are major threats to sustainability and are often abetted by corruption. One reason that the illegal timber and fish trade and the corruption that facilitates it have flourished is that it is possible and often easy to "launder" illegal products in ways that make them difficult to distinguish from legal ones.
- Tracing timber and fish via digital tools and online systems could be key to preventing such laundering. Digital traceability systems that monitor the flow of materials through supply chains are designed to deter the laundering of illegal products by flagging anomalies and thereby alerting businesses or governments to possible incidences of lawbreaking and corruption.
- Our research finds vulnerabilities in the traceability systems we examined, however, that reduce their effectiveness in preventing laundering and combating illegality and corruption. While they can be strengthened in a variety of ways, the efficacy of traceability systems as anti-crime/corruption tools will always be conditional upon the will and capacity of authorities to act on the information the systems provide.

Introduction: Digital traceability systems

In spite of decades of efforts to curb illegal and unsustainable logging and fishing, both remain major problems. Aside from obvious drivers like global demand and high profitability, a major reason the trade in illegal forest products and fish persists is that it resists detection. Criminals find ways to launder illegal materials so they appear legitimate, disguising them with false documentation and commingling them with legal products in ways that make them all but indistinguishable (EIA 2012, Greenpeace 2015).

Tracing timber and fish via digital tools and online systems could be key to curbing such laundering. A traceability system that worked perfectly would underwrite claims of legality and/or sustainability by reliably tracking all component materials of any product back through all supply chain steps and pathways to their origins, thereby preventing the introduction of any unauthorized material. Systems that address components of this goal exist in both the timber and fish sectors. Our research examined two distinct types of digital traceability systems, outlined in Table 1.

Voluntary systems: how they work

The authors examined several voluntary traceability systems through website reviews, interviews, and demonstrations.[1] While each had unique attributes, their commonalities are the focus of this analysis. A company starts by generating a complete map and information base for its supply chains through a process of "discovery." In this process, the company requires its immediate supplies to register with the system, who do the same with their suppliers, and so on up the chain until harvest/catch locations are identified. Then, transactions between suppliers can be recorded and tracked via digital "handshakes" between the parties - the seller enters information on the product's identity and volume which the buyer accepts (or rejects if inaccurate). The system allows users to monitor the flow of materials as they pass from the source through the various manufacturing and distribution steps, providing a check that can alert them to possible anomalies. The transaction data typically relates to the flow of goods (not the financial flow), relying on unique identifiers for units of the product in question.

In the timber sector, transactions between suppliers where no combination of materials occurs (for example, in the distribution of finished goods like furniture) are easily tracked, but most manufacturing processes do involve the commingling of inputs, e.g., logs from several forest concessions are mixed at a sawmill, or lumber from several sawmills is mixed at a flooring mill. Where this happens, voluntary traceability systems typically use "mass balance" or "volumetric mapping" systems to reconcile inputs to outputs, applying conversion factors to account for waste and to bridge units of measure (e.g., board feet of lumber to lineal feet of moldings). This mixing also happens in the fisheries sector. Very short supply chains, such as fishermen selling directly to a local retailer or restaurant from a dock, are exceptions,

Definitions

Corruption: Actions that constitute abuse of entrusted power for private gain.

Fish: For the purposes of this paper, whole fish and all products made from them.

Timber: For the purposes of this paper, logs and wood-based value-added products such as lumber, veneer, plywood, wood furniture, pulp, paper, and packaging (i.e., does not include non-timber forest products).

Traceability: We define traceability as the ability to track all inputs to a product back to their origins through identified links in supply chains. Traceability, in this paper, therefore includes both the harvest locations of timber or fish and the identity of all companies involved in subsequent manufacturing or distribution.[2]

Traceability system: Among the many systems and technologies that can aid traceability, this paper focuses on relatively modern digital traceability systems that cover multiple links in supply chains, as opposed to, for example, systems that are primarily paper-based or digital systems used by companies to track internal material flows.

Mandatory traceability systems are legally required by governments, mostly in producer countries. **Voluntary traceability systems** are operated by private businesses whose users are often located toward the end of supply chains in consumer countries.[3]

[1] Global Traceability; Sourcemap; Xylene; Fish Trax Systems: Trace Register; This Fish. For a more detailed review of different voluntary systems in the fish sector, see: Future of Fish's "Getting There from Here: A Guide for Companies Implementing Seafood Supply-Chain Traceability Technology."

[2] While the concept of traceability is straightforward, the way it is used in relation to timber and fish is ambiguous (Hunt et al. 2014).

[3] Note that in our analysis of voluntary traceability systems, we did not include certification systems like Forest Stewardship Council (FSC), Programme for the Endorsement of Forest Certification (PEFC), or Marine Stewardship Council (MSC) for reasons explained in the annex.

Table 1: Two types of digital traceability systems

	TIMBER SECTOR	FISH SECTOR
MANDATORY TRACEABILITY SYSTEMS	Systems that governments in producer countries require companies to use, although not necessarily designed or operated by the government. These are part of a producer country's legal framework governing the forest sector and seek to ensure that relevant national laws are upheld. These systems are always designed to track logs from the forest to primary manufacturing sites or to the port if they are exported. Sometimes they cover steps in manufacturing and distribution as well. In addition to controlling illegal logging and trade, they are intended to improve revenue collection and promote transparency and good governance (FAO 2016). They are typically found in countries where the contribution to national GDP from the timber sector is relatively high and where illegal activity has been a significant problem historically. In some cases, they have been developed in response to trade agreements with consumer countries and/or laws that prohibit the importation of illegal timber, such as the US Lacey Act or the European Union Timber Regulation (EUTR).*	Several traceability requirements exist for seafood that is caught in certain jurisdictions, managed under international regimes, and/or traded into import markets, such as the EU and US. A few regional fisheries management organizations (RFMOs) require catch documentation and traceability for a limited number of the species that they are responsible for managing (i.e. toothfish managed under the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), bluefin tuna managed under the International Commission for the Conservation of Atlantic Tunas (ICCAT), bluefin tuna managed under the Commission for the Conservation of Southern Bluefin Tuna (CCSBT). The Convention on the International Trade in Endangered Species (CITES) also requires catch documentation and traceability for trade in some shark species that are listed in its Appendix II.
VOLUNTARY TRACEABILITY SYSTEMS	The systems that we included in this analysis are created and provided by for-profit businesses, primarily to serve companies in consumer countries. Generally located near or at the end of international supply chains, these companies seek to engage in responsible sourcing practices as part of broader sustainability commitments; to manage reputational risk; to meet provisions made under contract law with their own customers; and/or to comply with laws like Lacey and EUTR.	Many fishermen, wholesalers, retailers, and commercial actors throughout the supply chain rely on voluntary platforms similar to those in the timber sector that mainly serve companies in consumer countries wanting to manage brand risk, comply with government regulations for legality and health and safety, and/or demonstrate that the fish and seafood has been sourced sustainably.

** E.g., a number of countries have incorporated traceability systems into Timber Legality Assurance Systems mandated under Voluntary Partnership Agreements (VPAs) -- legally binding trade agreements between the European Union and a timber-producing country outside the EU that are components of the EU Forest Law Enforcement, Governance and Trade (FLEGT) Action Plan to address illegal logging and the European Union Timber Regulation (EUTR) that grew from it.*

but in most cases, lots are mixed, especially where numerous different fishing vessels supply a processor or when a vessel operates in different locations and jurisdictions during a single fishing trip.

Mandatory systems: how they work

Mandatory systems are similar to voluntary systems in that they map supply chains and track material flows through them, but with the additional element of being used by governments to enforce laws and/or collect due revenue. Again, although these systems vary considerably in design and implementation, they have similarity of intent and effect. Generally speaking, they are designed to:

1. collect, transfer, and store data describing the physical harvest (catch) event – including location, date and time, species and volume, and the identity of the harvesting entity;
2. collect and store data on the when, where, how and to whom the harvested primary material is transferred; and
3. collect, store, and analyze data to detect non-conformities through reconciliation at each subsequent supply chain step covered by the system (ITTO undated).

In addition, a digital system can be used to check that the appropriate permissions have been granted, storing records of relevant documents like harvesting permits.

In the timber sector, mandatory traceability systems are in place or under development in numerous producer countries, including, Brazil, Cameroon, Central African Republic, Ghana, Indonesia, Liberia, Romania, and Viet Nam. A standard feature of these systems is the incorporation of a variety of datasets along the supply chain, including forest inventories (calculations of volumes of standing timber by species) in permitted concessions, lists of all trees that will be felled in an approved harvest plan, actual timber harvest, transportation, processing, and payment of taxes and duties. According to Seidel et al. (2012), such systems often begin with "the application of unique numbers or codes to stumps and logs in a forest concession, through physical marking using paint, waterproof paper/plastic tags, barcodes or RFID tags. Data may be recorded using a handheld device or on paper, which may be transferred to a database either automatically or manually at a later stage. At each control point in the supply chain… timber may be re-tagged/marked and product information (e.g., length, species and value) recorded… [so as to] verify the logical flow of timber products and/or volume, and ensure that the volume does not increase at any stage." Discrepancies are automatically flagged so they can be subsequently investigated (Chatham House 2020). Beyond the primary manufacturing stage, it is common to switch from methods based on physical marking/tagging to volumetric mapping relying on conversion factors (see above) because the tags are usually lost in manufacturing.

In the fish sector, several mandatory systems have established traceability requirements that are designed to prevent the infiltration of illegal fish into the supply chain. Multilateral schemes, required under regional fisheries management organizations, must be complied with by any and all parties participating in the fishing, processing, and trading of regulated fish. They require a catch document that identifies the origin of the fish caught and certifies compliance with the management regulations that govern their catch. This catch document is then required to be associated with the catch from the point of capture through the rest of the supply chain. In addition to multilateral schemes, there are unilateral schemes enforced by single market states. A key difference is that unilateral schemes only regulate what enters into their market, so compliance with the rules is established by looking backwards into the supply chain at the time when the products arrive at the border. "This back-tracing process implies that verifiable traceability in these systems must be very solid in order for the back-tracing to be meaningful and achievable" (FAO 2015). Some markets, like the

EU and New Zealand, have traceability requirements that apply to both the entire supply chain of imports, going beyond the border, and to domestic production as well. These systems are clearly more comprehensive and can help to also eliminate seafood fraud and mislabeling of products that may occur within a domestic supply chain.

How traceability systems could help deter crime and corruption

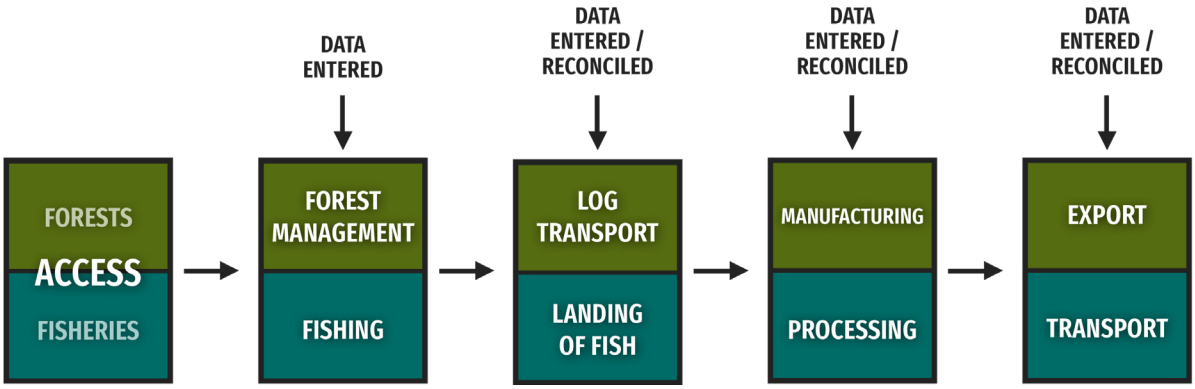
As has been noted, a major purpose of voluntary and mandatory traceability systems is to detect and prevent the introduction of unknown, unauthorized and possibly illegal materials into supply chains. To the extent that they are able to do so, they have the potential to deter corruption as well as crime. The two are closely interrelated; illegal trade in timber and fish is often, though not always, abetted by corruption, and a great deal of illegal logging, fishing, and laundering occurs in contexts where governance is weak and corruption systemic. Corruption takes a variety of forms, including bribery, fraud, abuse of office, extortion, and nepotism, and can occur at all levels of governance, from low-level functionaries to top government officials (Grant and Hin Keong 2021, INTERPOL 2016, UNODC 2019, World Bank Group 2019).

Corruption risk exists across timber and fish supply chains. Traceability systems can potentially address many, though not all, of the different types of risk identified (e.g., they cannot address the registering of vessels in countries with weak regulation and oversight). A simplified version of these supply chains and associated risks helps demonstrate why and how:

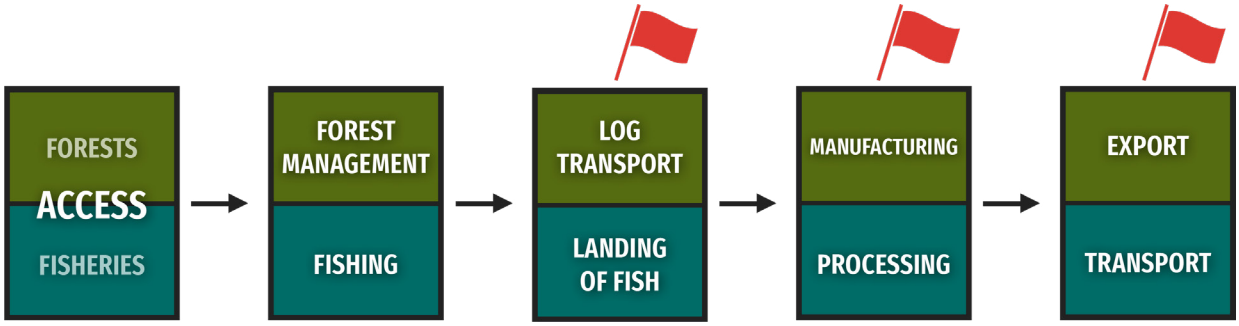
Table 2: Simplified supply chains and example risks

Access	**Example risk:** Granting of logging concessions or issuance of false fishing permits in return for bribes
Forest / Fishery Management	**Example risk:** Authorization of forest management plans based on false information in return for bribes, bribery to avoid penalties for exceeding fishing quotas
Log Transport / Landing of Fish	**Example risk:** Bribery to avoid inspections at road checkpoints or at port
Manufacturing / Processing	**Example risk:** Bribes to avoid detection or penalties for laundering illegal wood or fish into primary or secondary manufacturing/processing facilities
Export of Value-Added / Processed Products	**Example risk:** Bribery to avoid inspections, falsify documents

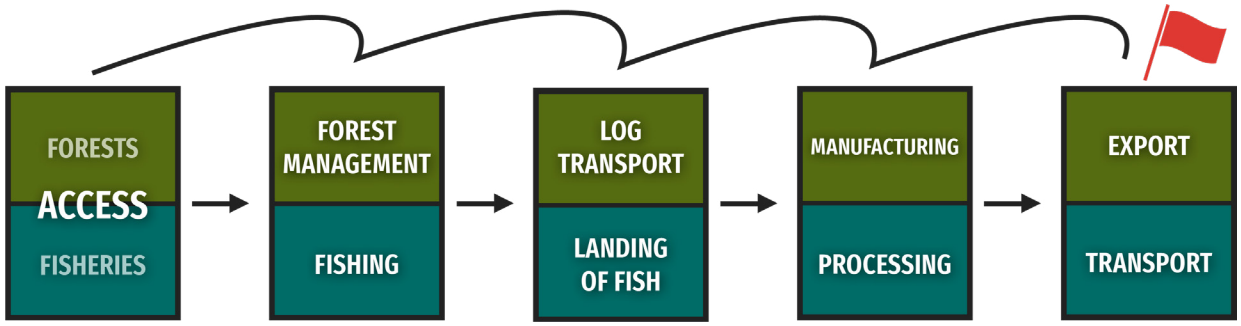
Digital traceability systems seek to prevent the laundering of illegal material by detecting anomalies in data that is inputted at multiple points in the supply chain, starting at the point where information about the identity and volume of the primary material is first entered (in the case of the timber and fish sectors, the point of timber harvest or fishing catch).



If the reconciliation of data from one point in the supply chain to the next reveals an irregularity, it raises a red flag.



This in turn can form the basis for an investigation that starts at the point in the supply chain where the flag was originally raised but will often follow it upward and outward if needed in order to get to the root of the problem.



The Role of Third Country Processors

A growing trend in both the timber and fish product trades is reliance on a third country or other jurisdiction (that is, not the harvesting country or the end destination country) for processing raw materials before the products are re-exported to other markets. A great deal of this processing occurs in Asia, primarily in China, Viet Nam, and Thailand. China, for example, is the world's largest importer and exporter of timber and seafood by volume (FAO 2020). Much of the raw material imported and processed in these countries is then exported to markets in the EU and the US.

Historically, these jurisdictions have been characterized by an absence of traceability requirements for timber and fish products. China, South Korea, and Japan, for example, all have large distant water fishing fleets that operate all over the world, often gaining access to fish in another country's waters through opaque cash payments. This lack of transparency can allow for laundering illegal products in the processing stages, creating difficulties in verifying the legality of any product that is later exported. Attempts to curb corruption and illegal harvest that threaten the sustainability of forest and marine ecosystems around the world will depend on significant changes in the ways these third-country processors operate.[4]

This root isn't necessarily criminal and/or corrupt behavior, of course – it may simply be human or other error – but it could be, and traceability systems are designed to identify irregularities that otherwise could very well go unnoticed.

In other words, an investigation triggered by a red flag raised toward the end of a supply chain could identify incidences of crime and/or corruption at the beginning. To illustrate this, suppose that a traceability system detects that the amount of canned tuna fish being produced at a given facility is more than should be possible given the volume of whole fish coming into it. An investigation of the anomaly could lead back to a fishing boat that is found to have illegally exceeded its quota, leading in turn to an official who was bribed to look the other way.

Traceability systems' limitations as anti-crime/corruption tools

Neither voluntary nor mandatory traceability systems were developed to address corruption per se, so perhaps limitations in this regard should be expected. This said, both types of systems have vulnerabilities that reduce their effectiveness not only as anti-corruption tools but also in fulfilling their main purpose: the prevention of illegal laundering.

The critical vulnerability of voluntary traceability systems for both timber and fish is a reliance on supplier honesty, combined with the fact that they generally cover only a subset of total inputs used and outputs produced. Unless all of a given supplier's customers use the same traceability system, only a portion of the total volume of material flowing through that company will be monitored, and it is up to suppliers and sub-suppliers to disclose from whom they buy inputs and to enter the data into the system. These factors would appear to make it possible and indeed relatively simple for a company to (even unwittingly) receive illegal material from undeclared suppliers and mix it into legal inventory.

The greatest limitation of mandatory traceability systems as anti-crime/corruption tools may be that they are themselves vulnerable to corruption, both

[4] Encouragingly, laws requiring Legality Assurance Systems that include traceability components for imported timber have recently been passed in China and Viet Nam but have not yet been fully implemented.

in the broader context outside of the direct supply chain the system covers, and on the part of officials who control the entry or monitoring of data.

For example, in the timber sector, several corruption risks exist at the "access" stage, which is not governed by traceability:

- The original land concession may be channeled to cronies or political allies, "bought" through bribes, or obtained from original or customary owners via coercion.
- Officials responsible for harvest permits may be bribed to issue them for "ghost trees" in areas that have already been harvested or deforested, or are too remote to extract timber.
- Officials who conduct forest inventories may be bribed to falsify and inflate the volumes of commercial species, or mis-categorize protected species as unprotected ones (BV Rio 2017, EIA 2015, Greenpeace 2015, TNRC undated).

All of these examples would create a "garbage in, garbage out" scenario where false data at the top of the system enables the laundering of illegal material into subsequent steps in the supply chain. These risks can be mitigated in various ways, such as through 3rd party verification, internal checks and balances, and effective monitoring by independent government agencies, civil society organizations, and the public, but they will remain as long as corruption is endemic.

There are analogous cases in the fish sector. Vessels can be registered in Flag of Convenience jurisdictions, or gain access to a country's waters through opaque high-level agreements. If a vessel registration, license, permit, or other authorization to operate is established or procured through a bribe or other corrupt means, a traceability system (based on catch documentation) and import controls will not reveal it (Freitas 2021, TNRC undated). Paper-based systems, which are still numerous, are particularly vulnerable to this type of corruption.

Thus, other mechanisms (for instance inspection, certification, or use of analytical instruments or methods) are needed to verify or validate the data (NOAA 2021). But verification and validation of the recorded data are not usually part of fish traceability systems (EU IUU Coalition 2016). The biggest mandatory systems all simply require "one-up, one-down" traceability. That is, the custodian of the product only needs to know from whom they received and to whom they passed the product, rather than "full-chain" traceability. Furthermore, the traceability requirement is only a record-keeping requirement, rather than a reporting requirement of the supply chain to government authorities. As a result, any attempts by authorities or enforcement officials to conduct audits or investigations must rely on a slower trace-back to identify all of the custodians in the supply chain, which may be difficult or infeasible (NOAA 2021). Some of these weaknesses can be addressed by employing electronic or digital traceability systems, and an adequately designed interoperable electronic traceability system could overcome the challenges of "one-up, one-down" paper-based systems but would still not necessarily reveal any corruption that had occurred to originally acquire a license or registration.

Additional vulnerabilities in both types of system and both sectors exist even in the parts of the supply chain covered by traceability. Officials responsible for inspecting harvesting equipment, entering or confirming shipment data, or controlling transfers across jurisdictional borders can be offered (or indeed demand) bribes (TNRC undated). Also, the conversion factors used in mass balance systems (see above) can be manipulated to allow for the introduction of unauthorized material (BV Rio 2017).

The consequence of all the above is that product identities or volumes monitored through a traceability system are not guaranteed to be true or accurate. Insofar as traceability systems provide convenient access to records and data

Tools and Technology that Support Tracking and Transparency

Tagging technologies

» Printed or electronic tagging such as barcodes and Radio Frequency Identifier tags that can be applied at the point of harvest and 'read' by authorized parties at subsequent points in the supply chain, enabling efficient cross-checking of the tagged product against information contained in official records.

Database technologies

» Distributed databases, like blockchain, help prevent data manipulation by recording, and displaying, the "official" record that cannot subsequently be changed. There is some evidence from the timber sector that inspectors were less willing to engage in corruption because of the shared visibility of (immutable) shipment data in a digital tracking database (Mgaza and Hin Keong 2021).

Monitoring tools

» Global Forest Watch and Global Fishing Watch use satellites to share regular, high-resolution earth observation data, allowing law enforcement and civil society to monitor things like forest change and identification of vessels involved in deep sea fishing.

» EARTH is a software platform that combines smartphone and satellite-based technologies to support communities and individuals on the frontline of conservation and stewardship efforts, including in forests and at sea.

» WWF is supporting the Romanian government's traceability system (SUMAL) in incorporating the use of hidden cameras on roads to surveil passing logging trucks' license plates and loads and compare the information with data recorded in the system. This has allowed the detection of transports lacking proper delivery documents, multiple transports using the same delivery documents and fraudulent declarations of timber volumes (flagrant overloading).

Testing technologies

» A number of methods including DNA and stable isotopic ratio analysis can be used to scientifically confirm declarations of species and/or geographic origin where there is adequate reference data. (Targeting Natural Resource Corruption 2021)

that otherwise would be less readily available, one can argue that they always help. However, a case can also be made that perversely, when they fail, traceability systems may provide a cover for and even encourage laundering rather than deterring it. Companies that receive products through a voluntary traceability system may be less likely to do further checks, emboldening suppliers who withhold or enter false data to mix in more illegal material. Mandatory systems face similar risks when subverted: Brazil's digitized timber traceability system has been in place longer than most, but over a period of years gaming and corruption of the system became so widespread that it was rendered largely ineffective -- and yet it continues to be relied on by importers of tropical wood as adequate proof of legality (BV Rio 2017).

Thus, the ability of traceability systems to curb crime and corruption is entirely dependent on an institutional, political and social context that supports their intended use. Traceability systems, like any other technology, can only be an anti-corruption tool in the hands of the non-corrupt (TNRC 2021). Even if they work as intended, raising a red flag for every data discrepancy and possible malfeasance, they would still be rendered useless if the authorities responsible for investigating and sanctioning misbehavior lack the will or capacity to act on the information provided.

Traceability systems' effectiveness as anti-crime/corruption tools

Our research identified no specific evidence that *voluntary* traceability systems are effective in combating crime or corruption, and, while this could change in the future, their current capacity to do so appears to be limited. When interviewed, however, representatives of these systems argued that one of their major strengths is that they are often used by major multinational companies whose continued business is a top priority for suppliers and sub-suppliers. This could reduce the likelihood that the latter will engage in activities that could be exposed by the traceability system and damage the business relationship, but this does not address crime or corruption directly. Theoretically, a company that detects an anomaly through a voluntary traceability system could alert the proper authorities and prompt an investigation, but the link is indirect at best.

Mandatory traceability systems have clearer potential as anti-crime/corruption tools because they are administered by governments in support of their legal systems, but as previously noted, this requires that enabling conditions for effective investigations and law enforcement be in place. If they are, then the penalties criminals and corrupt officials face if caught and convicted are an obvious deterrent – provided, of course, that such penalties are sufficiently severe to outweigh the value of illicit profits and bribes. Additionally, if a company is prosecuted (or publicly investigated) for a crime, the loss of customers may result, multiplying the risks potential wrong-doers face.

There is some limited evidence that mandatory traceability systems have been effective in curbing corruption in the timber sector. In Ghana, researchers interviewed representatives from government, industry, and civil society organizations who affirmed that Ghana's Wood Tracking System (WTS) implemented in 2019 "has reduced opportunities for corruption; all directors of the Forestry Commission and certain managers have supervisory access to the WTS database, which means they can identify the individuals responsible for red-flagged data, and all actions in the database are associated with a named individual, leaving an audit trail. This is backed up by the existence of penalties for staff who engage in misdemeanors. The establishment of the [Timber Validation Department] has also helped to ensure the robustness of the system, although the fact that it sits within the Forestry Commission does limit its independence (Chatham House 2020)." It is logically obvious, however, that a system that can detect possible incidences of crime will do the same for corruption in cases where they coexist: what deters the one will tend to deter the other.

Furthermore, the effectiveness of voluntary and mandatory traceability systems should be, and often is, fortified through audits and other means [see sidebar on preceding page]. In the case of voluntary systems, suppliers may be assessed for risk based on a variety of factors, such as the geographies in which they operate or from which they procure materials, and occasional audits can be conducted on companies that are classified as high risk. These can include independent review of documents and volume balances, random sampling and testing of materials to verify declarations of species and/or origin, etc.

Audits also play an important role in mandatory systems where data is often entered by the companies harvesting and trading the material. Digital traceability systems, however robust, can never completely replace field inspections by competent authorities who can check volume and other information entered into the system (FAO 2016); however, they can supplement these inspections by ensuring that auditors have access to full and up-to-date information to perform effective audits. Such audits are especially important at the point of original data entry, where the timber

is harvested or the fish is caught. Indonesia's Information System of the Timber Forest Products Administration, for example, is "an important instrument to verify and control timber legality" because it "provides data and information on pre-logging stock inventories with 100% sampling intensity conducted as the basis for the preparation of a logging plan. Using ISTFPA, for example, all trees to be harvested are given an IDBarcode label, containing information on forest function, number of logging blocks, number of trees, tree species, tree diameter, tree height on clear bole and tree position" (Astana et al. 2020). Conversely, in the same country's fishing sector, "for some traders it is less effort to gather the SKPI [certificate of fish landing] that reports the highest catch volumes and load the containers accordingly rather than spend the time compiling the actual forms that correspond to the tuna in the container. While traders may be approached by government officials to provide evidence to support the SKPI, oversight remains weak" (Doddema et al. 2020).

Recommendations for strengthening traceability systems

- Voluntary systems seek to establish traceability along the entire supply chain from the company using the system back to the source, whereas mandatory systems are designed to establish traceability in the other direction, from the source forward to, at the limit, the boundary of national jurisdiction beyond which traceability will be lost unless picked up by another system. Although the two systems' information domains logically intersect, in practice they do not exchange data. This reduces their overall efficacy in controlling illegality and corruption.

  The two types of systems will be more effective if and when ways are found to link them, thereby encompassing global trade and equipping authorities in production, processing and consuming countries with the means to police the international trade in timber, fish, and potentially many other natural commodities.

- Traceability systems are vulnerable to corruption in two main ways:

  - First, the data in the systems can be falsified. Particularly at the initial data entry stage, efforts to avoid "garbage in, garbage out" scenarios are vital. Stronger monitoring and verification systems (Hosch and Blaha 2017; Astana et al. 2020), supported and/or required by large consumer countries and companies, can help. In addition, transparent database technologies that associate any incorrect data with specific individuals can encourage those individuals' compliance with proper procedure (Chatham House 2020; Mgaza and Hin Keong 2021).

  - Second, investigating any identified red flag requires increased capacity and will of law enforcement. Linking traceability and transparency to broaden monitoring and support law enforcement is likely a critical part of the solution (Davidescu and Buzogány 2021).[5] For example, the Ghana Wood Tracking System (GWTS) is a complete database of information on the country's timber production. It is linked to the Ghana Timber Transparency Portal that makes much of this information public, including valid logging permits, authorized companies and their areas of operation, and the vehicle registration numbers of the trucks that

[5] Efforts to improve transparency can also help prevent political influence or illegal payments for unfair or unsustainable access agreements (Martini 2013). For example, for both timber and fish, more transparent and complete licensing of operators would unmask the real beneficiaries in the countries whose resources are being used, facilitating identification of the provenance of the product entering the market. Publishing the details of licensing agreements and harvest information can also help enhance accountability among government officials at all levels.

transport logs from the harvest site. These combined systems make it possible for any citizen or enforcement officer to identify illegality in ways that would not otherwise be possible. For example, anyone can look up the registration number of a logging truck and check the harvest record in the system, providing a level of control greater than that provided by a traceability system alone. Of course, any identified illegality or corruption would have to be investigated and prosecuted by officials who are not influenced by corruption, as previously noted.

» All traceability systems would benefit if information about them and the variety of tools that support them were less fragmented and if ways to increase the sharing of best practices were advanced. One way to accomplish this could be by developing a centralized resource that provides a comprehensive overview of how and where traceability systems and supporting tools are being applied and to what degree of success, not only to aid in understanding them and their actual or potential synergies, but also to encourage dissemination and uptake.

» While traceability systems of all kinds should continue to be developed, used and enhanced, mandatory traceability systems will likely always have more potential to combat crime and corruption than voluntary ones because they are operated by governments that make and enforce laws. Ultimately, illegal logging and fishing can only be stemmed at the source. Thus strengthening mandatory systems, and the institutions that ensure compliance with those systems, through all available means should be a priority for governments both domestic and

References

Astana, S., Riva, W.F., Hardiyanto, G., Komarudin, H., and Sukanda, A. (2020).Towards improved forestry performance: evaluating the added value of the timber legality assurance system in Indonesia. *International Forestry Review* Vol. 22. https://bit.ly/3wPPU8k

Borit, M. and Olsen, P. (2011). Evaluation framework for regulatory requirements related to data recording and traceability designed to prevent illegal, unreported and unregulated fishing. *Marine Policy* 36 (2012) 96 – 102. https://bit.ly/3wVla5U

BV Rio (2017). Using Big Data to Detect Illegality in the *Tropical Timber Sector.* https://www.bvrio.org/publicacao/160/using-big-data-to-detect-illegality-int-the-tropical-timber-sector.pdf

Doddema, M., Spaargaren, G., Wiryawan, B., and Bush, S.R. (2020). Towards improved forestry performance: evaluating the added value of the timber legality assurance system in Indonesia. *International Forestry Review.* https://bit.ly/3hUvpTA

Environmental Investigation Agency (2015). *Implementation and enforcement failures in the US-Peru Free Trade Agreement.* Briefing paper.

EU IUU Coalition (2017). Risk Assessment and Verification of Catch Certificates under the EU IUU Regulation. Position paper. http://www.iuuwatch.eu/wp-content/uploads/2016/07/Risk-Assessment-FINAL.DEC16.pdf

FAO (2015). Report of the Expert Consultation on Catch Documentation Schemes (CDS). Rome, Italy. FAO Fisheries and Aquaculture Report R1120. http://www.fao.org/documents/card/en/c/c497fcf1-c89a-4721-85e6-59c9f288ac6e/

FAO (2016). Traceability: a management tool for enterprises and governments. FAO FLEGT Programme, Technical Paper No. 1. http://www.fao.org/documents/card/en/c/83dcd903-46ce-4612-859c-460e883e5e59/

Freitas, B. (2021). Beneficial Ownership in the Fishing Sector and Links to Corruption. *TNRC.* Forthcoming.

Future of Fish. August 2014. Getting There from Here: A Guide for Companies Implementing Seafood Supply-Chain Traceability Technology. https://bit.ly/3xV4A7C

Grant, J. and C. Hin Keong (2021). Using Wood Forensic Science to Deter Corruption and Illegality in the Timber Trade. https://www.worldwildlife.org/pages/tnrc-topic-brief-using-wood-forensic-science-to-deter-corruption-and-illegality-in-the-timber-trade

Greenpeace (2015). The Amazon's silent crisis: logging regulation and 5 ways to launder. https://bit.ly/3roSnpb

Hoare, A., Young, D., Uehara, T., Seidu, M., Birikorang, G., Soh, L., Kamga Kamga, J. (2020). Forest Sector Accountability in Cameroon and Ghana. Chatham House. https://bit.ly/2TqS1lj

ITTO (undated). Timber tracking technologies: review of electronic and semi-electronic timber tracking technologies and case studies. Draft report. https://bit.ly/3BkdzRI

Martini, M. (2013). Illegal, unreported and unregulated fishing and corruption. Transparency International and U4 (392). https://bit.ly/3kINOVw

Mgaza, A. and Hin Keong, C. (2021). Tracking the trade: increasing efficiency and transparency in Tanzania's timber sector. TNRC. Forthcoming.

Mundy, V. and Sant, G. (2015). Traceability systems in the CITES context: A review of experiences, best practices and lessons learned for the traceability of commodities of CITES listed shark species. TRAFFIC report for the CITES Secretariat. https://bit.ly/3wWz1Jg

NOAA (2021). Report on the Implementation of the U.S. Seafood Import Monitoring Program. https://bit.ly/2UwFXPW

TNRC (undated). TNRC Guide: Identifying Corruption Risks along a Fishery Supply Chain. https://www.worldwildlife.org/pages/tnrc-fisheries-supply-chain-corruption

TNRC (undated). TNRC Guide: Identifying Corruption Risks along a Forest Supply Chain. https://www.worldwildlife.org/pages/tnrc-forest-supply-chain-corruption

UNODC (2019). *Rotten fish: A guide on addressing corruption in the fisheries sector.* Vienna, Austria: United Nations Office on Drugs and Crime. https://www.unodc.org/documents/Rotten_Fish.pdf

World Bank Group & Global Wildlife Program (2019). *Illegal Logging, Fishing, and Wildlife Trade: The Costs and How to Combat It.* https://bit.ly/3iCIujN

Annex: Certification systems, chain of custody, and traceability

Forest and fish certification and eco-labeling schemes are another voluntary approach that companies can use to address traceability, through chain of custody certification. In general, "chain of custody" refers to the "chronological documentation or paper trail showing the seizure, custody, control, transfer, analysis and disposition of evidence, physical or electronic" (Borit and Olsen 2011). However, in both the forest and fish industries, the term has taken on more specific meanings.

In forests, Chain of Custody (CoC) certification is a key component of all certification schemes, including Forest Stewardship Council (FSC), the Programme for the Endorsement of Forest Certification (PEFC) and the Sustainable Forestry Initiative (SFI). Each system has a specific CoC standard that covers the purchase, sale, storing and processing of certified material (as well as other issues like health and safety requirements). Representations that CoC provides traceability for certified products from forest to retail are commonplace,[6] but in fact, CoC generally does not do this – at least not yet.

One reason it doesn't is that all forest certification schemes allow the mixing of certified and non-certified materials in manufacturing, most commonly using "volume credit" systems where the link between certified products and certified forests is broken. In FSC, for example, the use of such a credit system is predominant for the manufacture of "FSC MIX" products. Under this system, manufacturers bank credits in an account each time they purchase certified material and can draw down these credits to produce a corresponding quantity of "FSC MIX" products anytime in the subsequent 24 months. Because of the ongoing mixing of inputs and the time delay between when credits are built and when they are used, it's generally impossible to know if the contents of any given batch of products sold as "FSC MIX" are from certified or non-certified forests, much less what their precise origins are. The same applies to PEFC and SFI.

Another reason that CoC certification does not guarantee traceability is that there are multiple independent certification bodies that are accredited by and perform CoC audits for each of the schemes, and while auditors review information on trade volumes, suppliers and customers of certified material for each individual client company, CoC standards do not require verification of transactions between companies and such information is therefore not cross-checked with other certification bodies. Nor is data on trade flows of certified material tracked and related by FSC, PEFC or SFI themselves in a way that might result in traceability and fraud prevention. Tracing and checking transactions of certified material up a supply chain is possible, but expensive, so it currently happens only under exceptional circumstances.

In fisheries, documentation of chain of custody forms part of the requirements for eco-label certification, such as the Marine Stewardship Council (MSC). The exact chain of custody requirements vary but in two important areas there is in practice a difference between documenting traceability and documenting eco-label-type chain of custody:

1. ''Traceability'' is a purely descriptive term, and one can split and join (fish) products as much as one likes and still have traceability as long as one documents the fact that the units (for instance the boxes of fish) have been split up or joined together. There are very specific mixing rules for the chain of custody as defined by the eco-

[6] E.g., "FSC Chain-of-Custody certification traces the path of products from forests through the supply chain, verifying that FSC-certified material is identified or kept separated from non-certified material throughout the chain." "PEFC chain of custody establishes the link from the forest to the market, tracking forest and tree based products from sustainable sources to the final product."

label certification agencies, such as prohibiting the mixing of fish from two different suppliers. In this respect, eco-label type chain of custody requirements ("do not mix") are stricter than the mandatory traceability requirements ("mix as much as you like as long as you document it") (Borit and Olsen 2011).

2. Beyond the rules about not mixing, the MSC and many other schemes do not contain provisions for keeping separate units and associated recordings. From an eco-label-type chain of custody view, there is no difference between two boxes of fish that come from that same certified supplier, even if the fish is caught by different vessels or on different days. However, in a traceability system, this is essential information and the boxes should have separate unique identifiers and separate sets of properties. In this respect, traceability requirements ("if units are physically separated, they should be documented separately") are stricter than the eco-label type chain of custody requirements ("as long as you do not mix in violation of the eco-label rules, you do not need to differentiate between units that are of the same category") (Borit and Olsen 2011).

For all their limitations, it must be noted that certification systems in both the fish and timber sectors evolve continuously. CoC certification sets the stage for traceability, and there is keen interest in improving these systems. So far, however, no one has figured out how to do this in a way that is not so expensive as to impede the uptake of certification.

About Targeting Natural Resource Corruption

The Targeting Natural Resource Corruption (TNRC) project is working to improve biodiversity outcomes by helping practitioners to address the threats posed by corruption to wildlife, fisheries and forests. TNRC harnesses existing knowledge, generates new evidence, and supports innovative policy and practice for more effective anti-corruption programming. Learn more at tnrcproject.org.

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