



DNA & AI Helping to Combat Illegal Logging



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From genetic testing to visual fingerprinting, technological advances are helping to combat timber theft.

Lumber prices have been rising at an incredible rate and hitting new records over the last year. With U.S. wood production at a 13-year high and [record lumber prices](#), the increase in demand and shortage in supply of timber are contributing to an increase in illegal logging.

It's a global problem

Illegal logging is a global problem and is defined as *the harvest, transport, purchase and or sale of timber in violation of national laws*. It is estimated that up to [30% of all internationally traded timber](#) products are illegally sourced and illegal timber makes up for [over 70% of timber exports](#) in many underdeveloped countries.

Table 1. Illegal Logging in Selected Countries

Country of Origin	Estimated % of Illegal Logging
Brazil	50%
Cameroon	50%-65%
DRC	90%
Ghana	34%-70%
Indonesia	60%-80%
Laos	35%-80%
Malaysia	35%

According to [INTERPOL](#), the global market for illegally harvested timber is estimated to be between \$51 and \$152 billion USD, annually.

As the illegal timber trade continues to grow, fueled by increasing demand and higher prices, so will the likely increase in theft and fraud in the industry.

Fortunately, advances in technology are bringing new tools to the market to help combat the illegal harvesting of timber.

New Technologies to combat illegal logging

In recent years many new approaches and technologies have come to the market to help in the fight against the illegal trade of timber. From the point of harvesting to the final product, these new technologies can track raw wood and processed wood back to their point of origin.



Timber Fingerprinting

There are many aspects of timber that make it unique. For example, the rings found on a cross-section of a log are unique to each tree. This unique ring pattern can offer insight into the historical climate as well as be used to uniquely identify an individual tree.

Through the use of AI imaging technology, a [timber fingerprint](#) is generated from the unique characteristics of the ring pattern.

These timber fingerprints can then be matched to a database of existing timber fingerprints, helping to save law enforcement much time and effort in matching logs back to the stumps they originated from.

Just like regular 'fingerprinting', timber fingerprinting is one method to uniquely identify logs. It's an inexpensive and easy-to-use tool. However, this method has its limitations as it is not a viable method of identification once the logs have been processed.



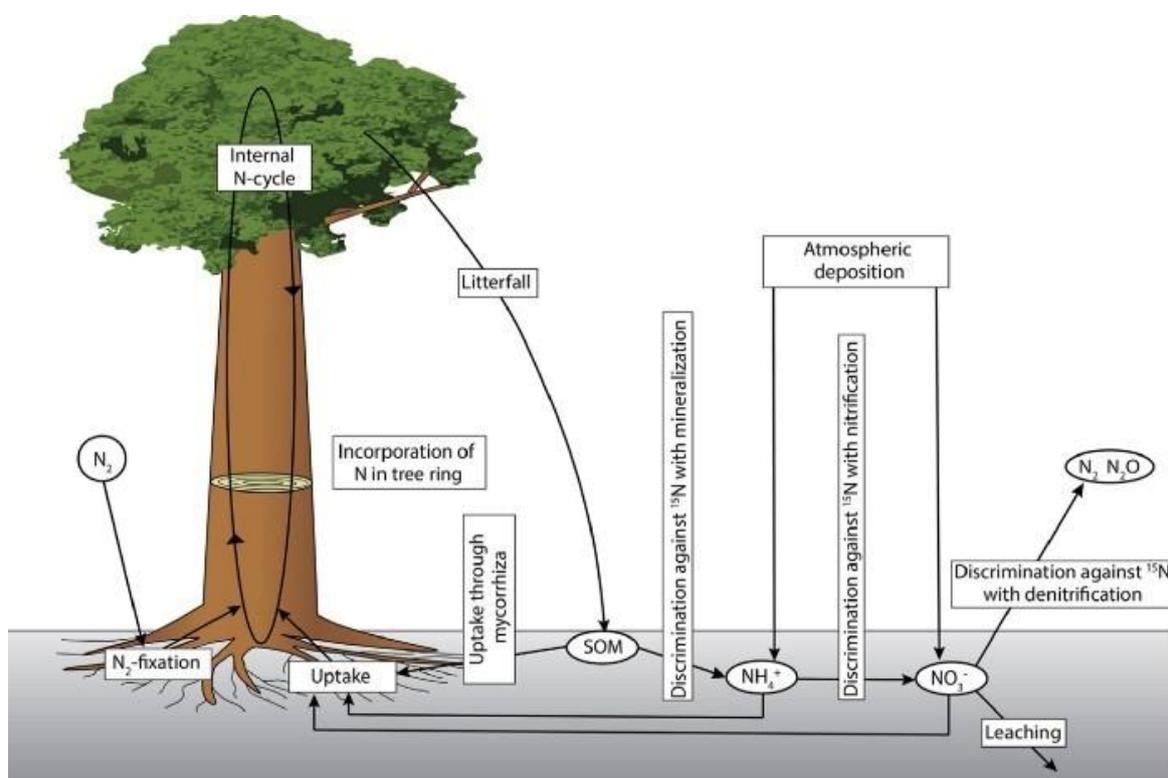
Genetic Analysis

Once logs are processed, the challenge of sourcing the processed wood product back to its origins becomes more difficult. Fortunately, scientists have been able to find ways of using genetic analysis to trace back to the species and even geographic origin of the timber.

The success of this method depends largely on the quality of the sample provided (the amount of processing the wood has undergone) and whether an existing reference sample to match it to exists.

The genetic sequence is captured from the sample and this sequence is compared to a database of known populations. This type of genetic analysis can be used to identify populations of plants down to the individual plant.

Although this method can provide a very high level of accuracy, it does come at a high cost.



Stable Isotope Analysis

Another approach for identifying processed wood is through the analysis of stable isotopes that are resident in the wood. Stable isotopes are non-radioactive forms of atoms that have unique properties that enable them to be used in many ways, from water and soil management to environmental studies and even forensics (such as in this case).

As the tree grows, it absorbs these unique stable isotopes, forming a type of unique atomic signature. This atomic signature is compared to known stable isotopes that occur in various distributions and patterns around the world and this is used to determine its origin.

These unique signatures can often be identified down to a unique [geographic area](#), such as a valley or mountain range. This analysis is often performed near the end of the supply chain where the wood has already been processed into a final product.



Fiber Analysis

In situations where the wood products are heavily processed and not suitable for either DNA or stable isotope analysis, fiber analysis can be used.

This is where wood fiber is extracted and the sample examined to determine its unique anatomical features. The technique uses high-power microscopes to identify the unique microscopic features of the fiber.

Fiber has unique anatomical features which allow it to be traced back to the wood source, to the genus, and potentially even to the species of the plant.

Technology aids in the fight against illegal logging

Increasing prices for timber and low supply will continue to put pressure on the market and fuel illegal logging. Fortunately, new technology is available to help.

However, for these tools to be effective, they need to be embraced by law enforcement, which includes the proper training and funding to make it happen.

The adoption and leveraging of new technologies by law enforcement and by industry leaders will help in the fight against illegal logging and the trade of illegal timber.