

Wood Identification Technologies for CITES Implementation

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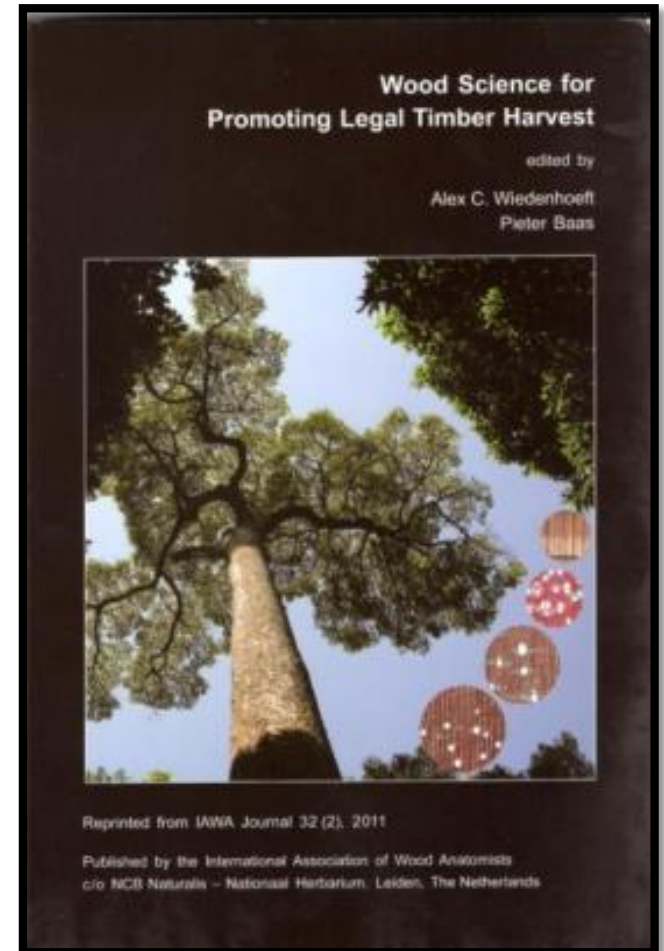
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State of the science for CITES wood forensics

Two sources of variability in wood

- Structural variability
 - Traditional wood identification
 - Fiber testing (pulp and paper)
 - Machine vision wood identification
- Molecular variability
 - Chemical fingerprinting
 - Near infrared spectroscopy (NIRS)
 - Stable isotopes
 - DNA methods



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The ways in which these things are relevant to CITES enforcement depend on the nature of CITES itself

What are some 'scientific' strengths of CITES?

- **It exists!** (We have something to work with)
- **It is an affirmative list** (We have specific hypotheses to test, and we control the question)
- **We have resources and a built-up global network** (Countries invest effort in implementation)

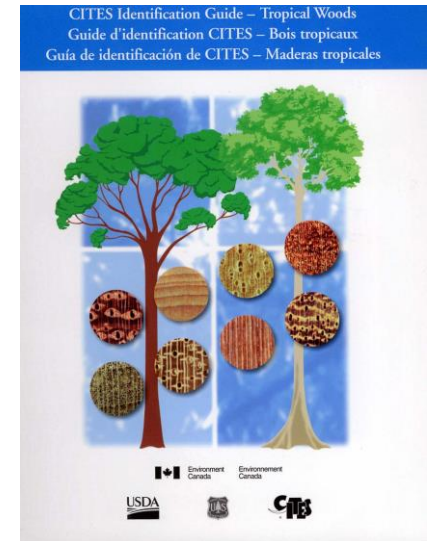
What are some 'scientific' concerns about CITES?

- **Species circumscription** (e.g. *Dalbergia retusa* and *D. granadillo*)
- **Political and not biological boundaries** (Appendix III)
- **Reference material for calibrating methods** (e.g. Madagascar)
- **Availability of screening technology and implementation** (what is available and deployable yesterday?)
- **Availability of forensic methods and implementation** (does forensic capacity scale with enforcement action?)

Seventeen years of CITES work

Historically, my work has been old-school

- Co-wrote the original CITES field manual for tropical timber identification (Miller, Wiedenhoeft, and Ribeyron 2002)
- Train-the-trainers capacity building
 - Nicaragua (2007, 2008)
 - Honduras (2007)
 - Singapore (2007)
 - USA (2002, 2005)
- Forensic support for CITES enforcement
 - APHIS-PPQ (ongoing)
 - CBP (ongoing)



Lessons learned: technological integration is key

- Scientific rigor
 - This is at a premium. Not all techniques rest on equally strong foundations, not all labs perform to the same levels
- Open access to information and active communication
 - Scientific data
 - Law enforcement data
 - Build a cooperative forensic workflow

How do we achieve technological integration and demonstrate real-world relevance?

or

The difference between the ivory tower and boots on the ground



Billie Ward, flickr

<https://www.flickr.com/photos/wward0/22752581253>



There are many answers to that question.

Wood anatomists have a suggestion:

WRAITH



Not so much this.

More like this.



WRAITH

Wood Research Against Illegal Timber Harvest

An officially sanctioned Task Force of the International Association of Wood Anatomists (IAWA)

Action items for WRAITH:

- 1) Foundational research*
- 2) Standards-setting and proficiency verification
- 3) Press-release-style inauguration
- 4) International networking among players in these fields
- 5) Official outreach and communication by IAWA to disseminate information and encourage cooperation



REVIEW OF MACROSCOPIC FEATURES FOR HARDWOOD AND SOFTWOOD IDENTIFICATION AND A PROPOSAL FOR A NEW CHARACTER LIST

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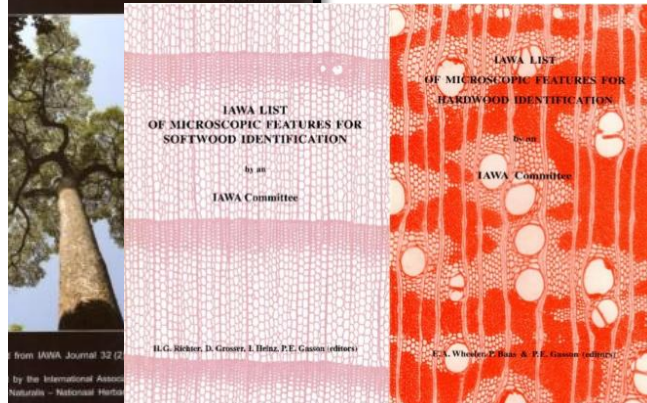
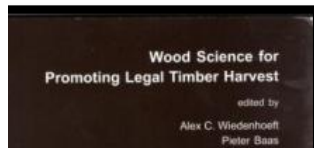
ABSTRACT

With the adoption of a number of anti-illegal logging laws, treaties, memoranda, and international agreements around the world, there is broad and renewed interest in wood identification, especially in the field at the macroscopic level. In response to this interest, and to begin to fill an obvious gap in the corpus of wood anatomical reference material, we review several prominent English-language publications on macroscopic wood identification in order to form a list of characters. We compile characters and organize them in the spirit of the IAWA lists for hardwood and softwood microscopic identification, present the state of the art as it exists, attempt to reconcile the different sets of definitions, characters, and character states, then present our proposed working-list. It is our intent with this publication to open an international discussion regarding the standardization of macroscopic wood identification features, and it is our hope that such a discussion can include critical works from the non-English literature. We also call for an illustrated glossary to accompany the proposed list. A standard lexicon to describe wood at the macroscopic level will simplify the preparation of identification documents and permit the ready translation of keys and other references for easy use and deployment around the world.

Keywords: List, glossary, hand lens, wood identification, forensic wood anatomy, nomenclature, illegal logging.

INTRODUCTION

Microscopic identification is fundamentally a laboratory-based endeavor, typically restricted to people with access to and skill with light microscopes, reference collections, and operating from a place of significant expertise with wood anatomy. Such expertise is critical to maintain and to grow, especially in light of the increasing demand for forensic wood science *sensu lato*, to address concerns about illegal logging and supply chain verification of wood products. According to Johnson & Laestadius (2011)



Okay, why wood anatomists?

Wood forensic research in my lab

- Traditional wood anatomy
 - *Acer, Pinus, Swietenia*
 - Product claim verification
- DNA isolation
 - Organellar microcapture
 - Optimization of bulk extraction
- NIRS cooperation (Brasilia, Brazil)
 - Identification of mahogany, cedar
- XyloTron
 - Biogeographic regional emphasis
 - Pan-Amazonian
 - Sub-Saharan tropical Africa
 - Botanical feature detection



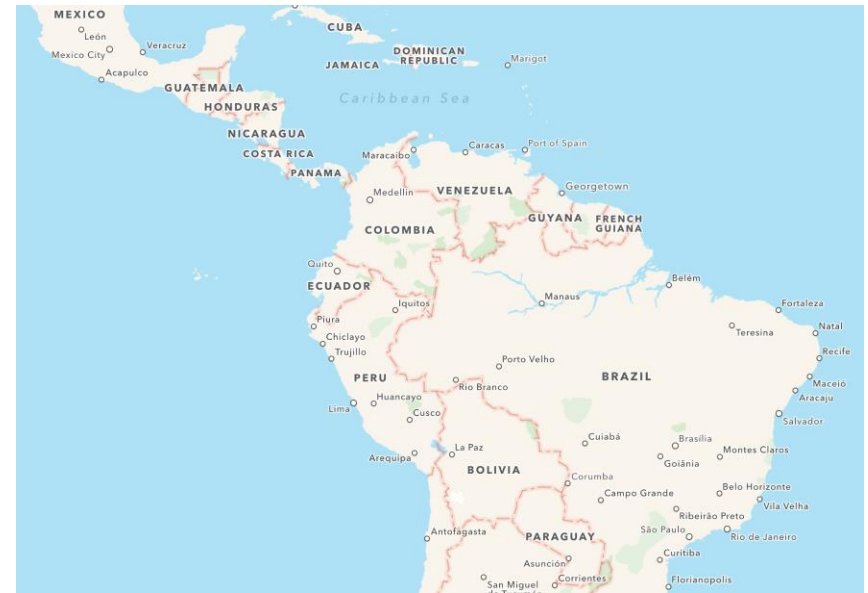
#XyloLab

- Twitter
 - **#XyloLab**, #CWARXyloTron, #XyloTron
 - @CWAR_ACW (me)
 - @adridcc (postdoc Adriana Costa)
 - @epiphyto (postdoc Rafael Arévalo)
- Instagram (just getting started!)
 - xylolab.mad
- FPL resources
 - Website: www.fpl.fs.fed.us
 - Blog: <http://www.fpl.fs.fed.us/labnotes/>
 - Search “wood anatomy”
- Email: acwieden@wisc.edu



Pan-Amazonian XyloTron and broad technological integration

- Current partner:
 - Brazil
- Future partners:
 - Peru (pending)
 - Colombia (nascent, and leveraged through Brazil)
 - Ecuador (nascent)
 - Bolivia (leveraged through Brazil)



Tropical sub-Saharan Africa XyloTron and broad technological integration

- Current partner:
 - Ghana
- Future partners:
 - Kenya, Tanzania, Uganda (nascent, support sought)
 - Cameroon?
 - Congo Basin cooperators?

