Wood identification training and technology for industrial compliance and governmental enforcement of the Lacey Act and CITES

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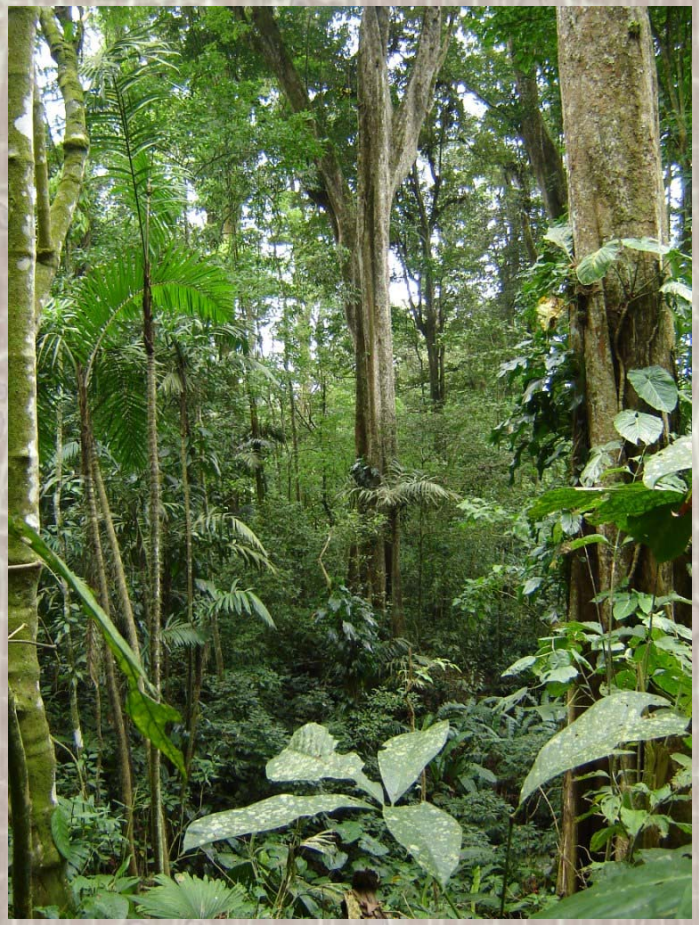
Why do we care?

Competing demands



Conservation

Utilization

What is wood identification (ID)?

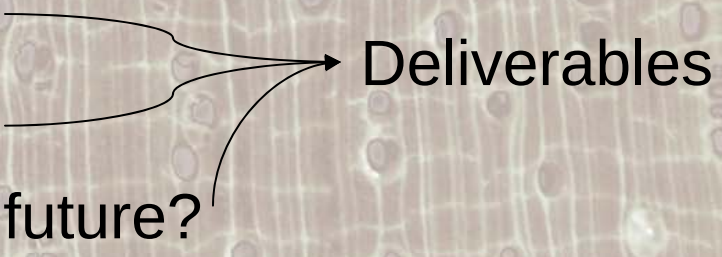
- Traditional ID is a combination of science and art
  - Science: technical anatomical features observed and interpreted
  - Art: accumulated expertise in assembling features as a part of a pattern
- Wood ID is a process of pattern recognition

What should we be asking?

- What is needed?
  - By industry?
  - By government?
- What is deliverable, and when?
- What are the costs to develop future methods?

Lacey Act Implementation

- Depends on real information: origin, scientific name, wood species
- Similar to CITES in some ways
- Both require wood ID expertise
  - What is possible now?
  - What is practical now?
  - What can we do in the future?



Timing for deliverables

- Short term: *Existing* training or technology - deliverable in less than a year
- Medium-term: Clearly possible but in need of development and testing - deliverable in 1-3 years, depending on scope
- Long-term: Scientifically sound, but in need of research, development, and testing - deliverable in 4-7 years

Deliverables - Short term

- Government and Industry
  - Hardwood vs. Softwood discrimination
    - Using hand lens and naked eye
  - Scientific name orientation
    - Accessing custom database (FPL can provide)

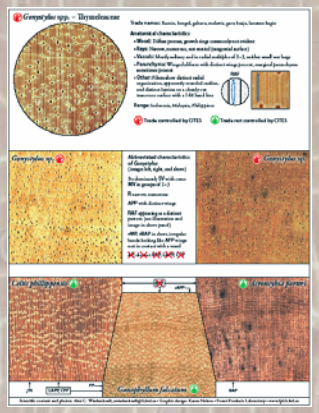
- Real-time processing needs for government, perhaps less for industry
- Some US Universities have this expertise

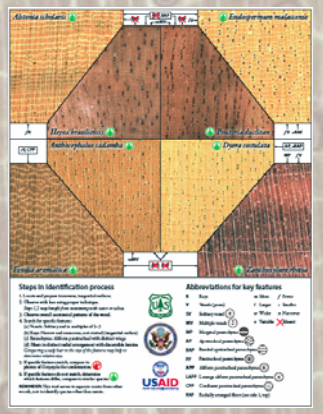
Deliverables - Short term

- Government
  - Train the trainers for dissemination
    - APHIS PPQ
    - CBP
    - FWS
- Industry
  - QA/QC staff, technical sales, other personnel
    - Allow in-house (proprietary?) development of training plan relating to wood products
- Fewer US Universities have this expertise

Deliverables - Short term

- Training videos, webinars
- Pamphlets, fliers, posters
- Training sessions in person

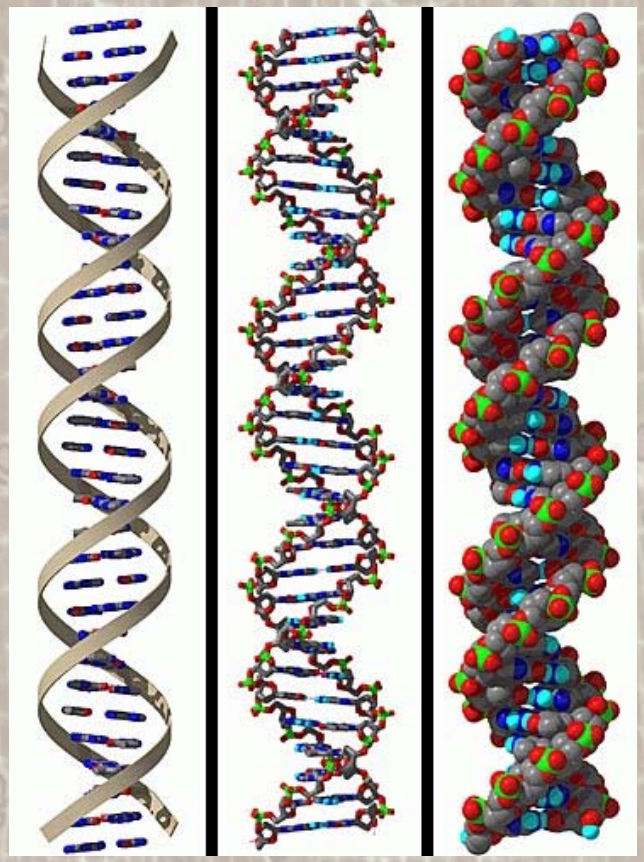




All require traditional expertise in wood ID

Deliverables - Medium term

- DNA technology
  - ‘Fingerprinting’
  - ‘Barcoding’
- In my judgment, for Lacey and CITES purposes, both lack scientific rigor for timber ID at this time
- That said, both could work eventually



Deliverables - Medium term

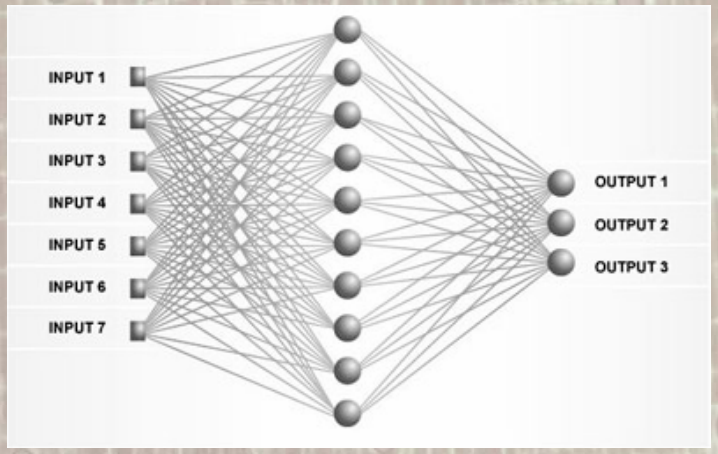
- DNA technology
  - ‘Fingerprinting’
    - Advantage: individual specificity
    - Disadvantage: sampling
  - ‘Barcoding’
    - Advantage: sampling
    - Disadvantage: only to species
  - There are reasons to think barcoding will be a more appropriate tool

Deliverables - Long term

- Training personnel is expensive and depends on human resources
  - Some people are essentially not trainable
  - Personnel turnover destroys accumulated expertise
  - Infrequent practice dulls skills
- Machine vision and machine learning overcome these limitations

Deliverables - Long term

- Machine vision and machine learning
  - Uses neural networks and machine vision to evaluate unknown specimens (*Malaysia)
  - Neural network is trained, tested, and re-trained by a human expert
  - Machines do not:
    - Forget
    - Take another job
    - Require a highly skilled technician to operate



Delivering the deliverables

- Combating illegal logging depends on legally sound technologies - scientific rigor
- For short, medium, and long term deliverables to exist, we need:
  - Requests: organizations have to ask for help
  - Partnerships: the right combination of talents and influence can solve these problems
  - Resources: scientific rigor comes with a cost

Those to whom I am indebted:

- Forest Trends - for inviting me to speak
- 3rd Potomac Forum attendees - for your time and attention
- Organizations that have supported my research, outreach, and teaching:
  - USFS: FPL and International Programs
  - APHIS PPQ
  - US State Department

Questions?