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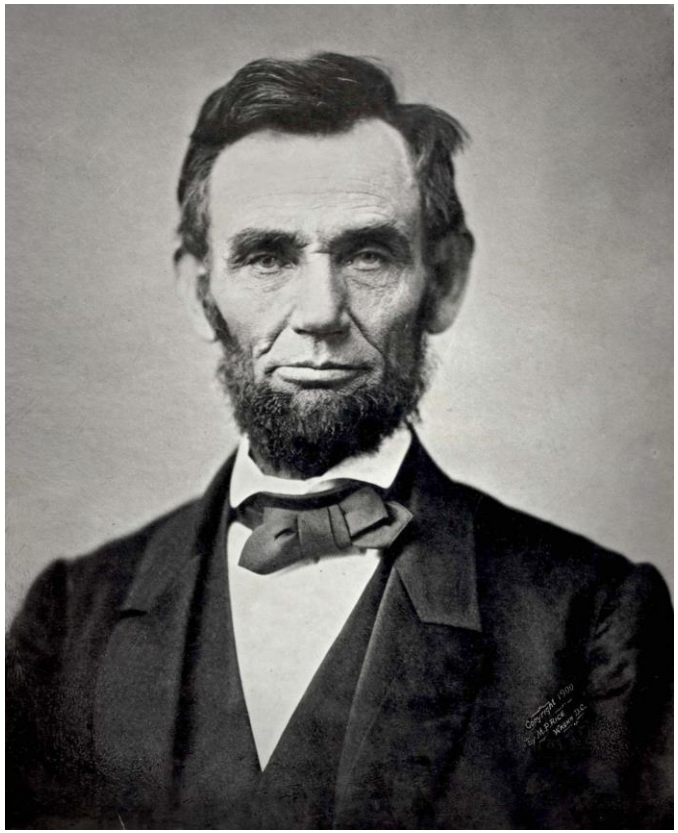
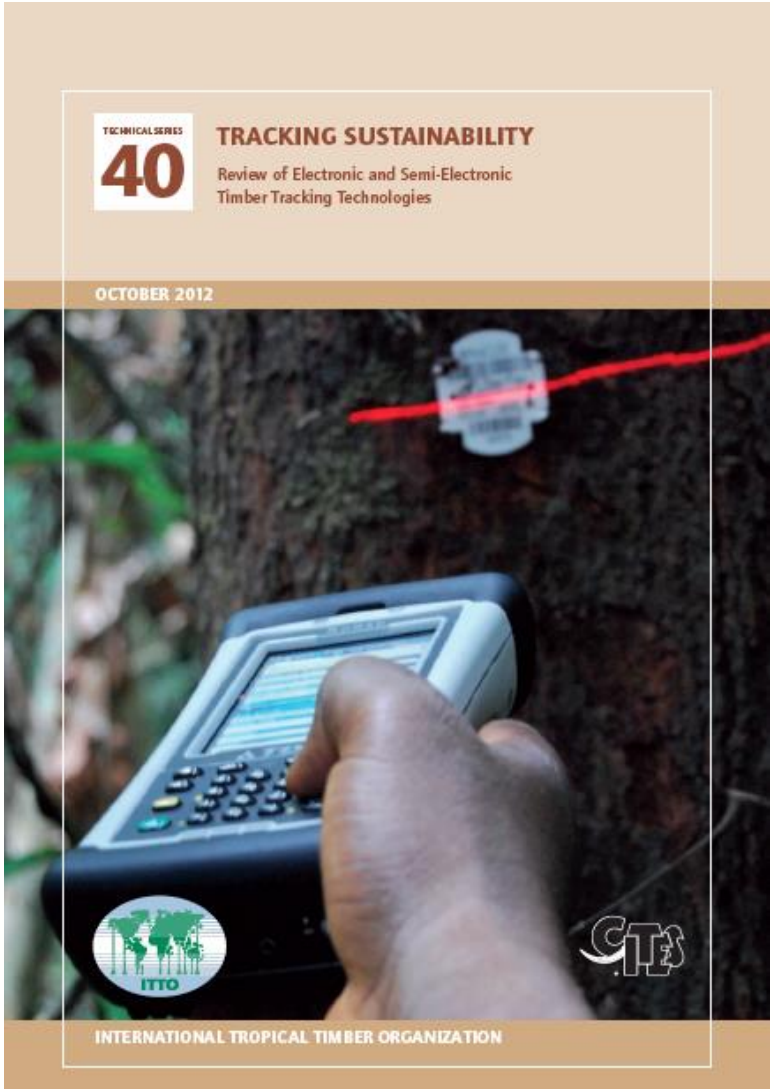
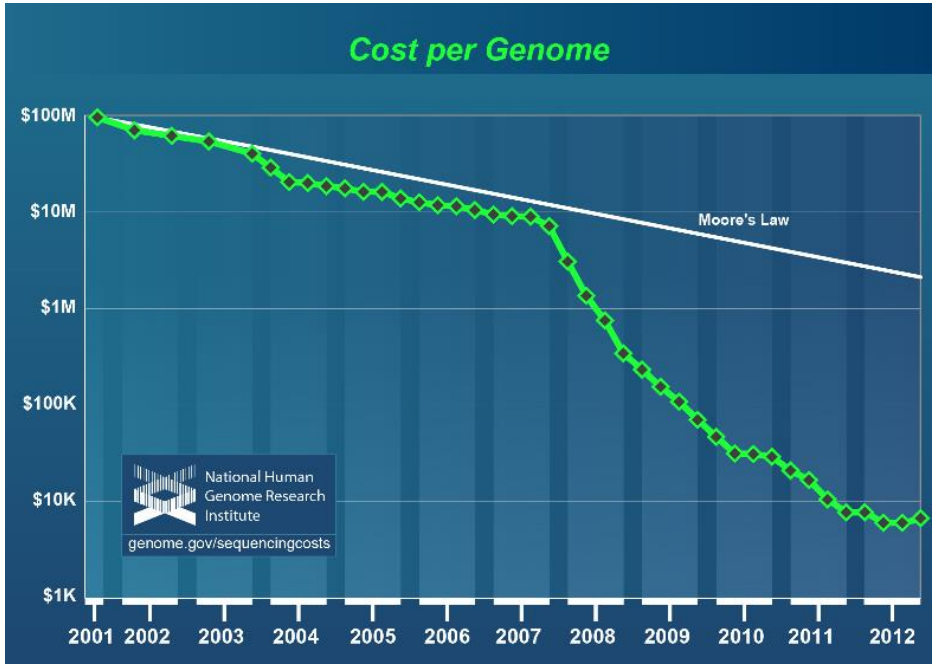
Scientific verification in timber supply chains

Andrew Lowe



Abraham Lincoln
“Law without enforcement is just good advice”

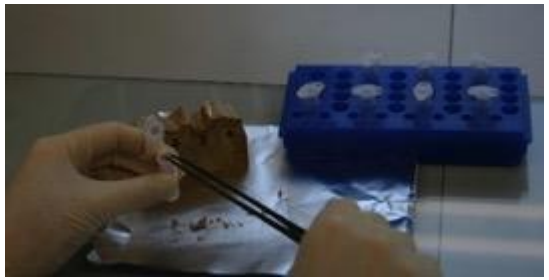



Cost per Genome
$100M
$10M
$1M
$100K
$10K
$1K
Moore's Law
National Human Genome Research Institute
genome.gov/sequencingcosts
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012

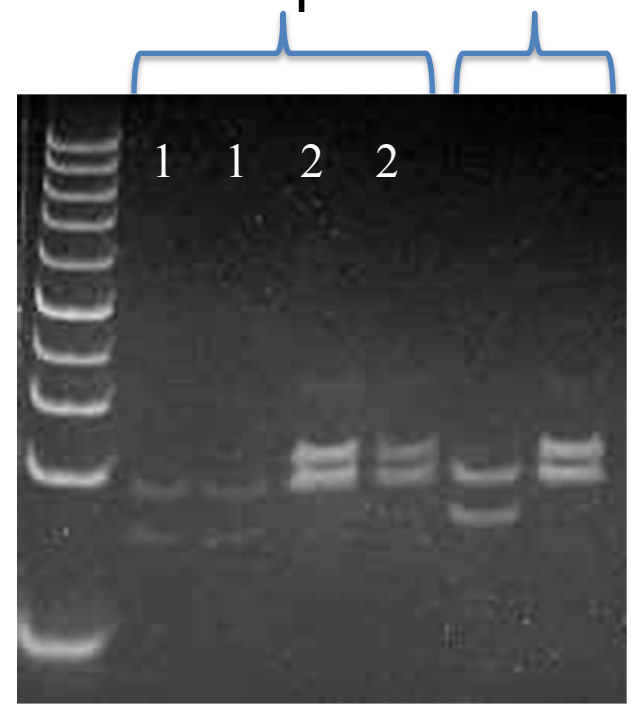
Species discrimination using DNA

Checking species identity
DNA barcoding

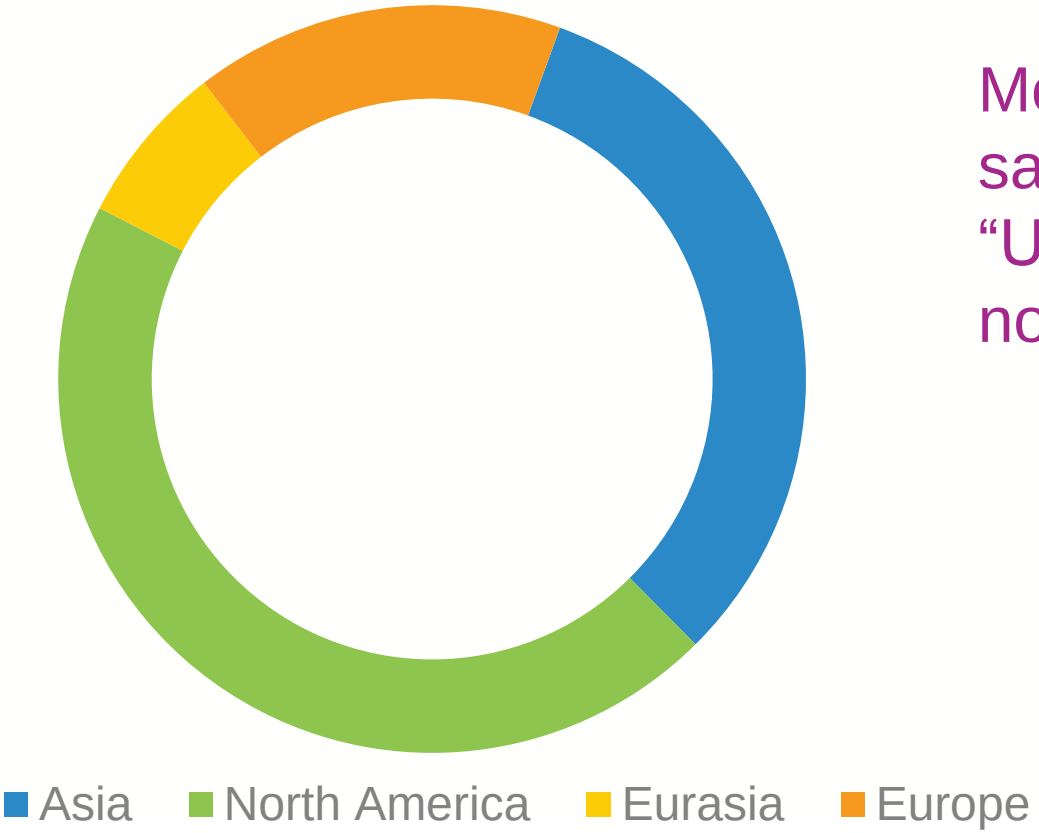
Glued oak timber is declared as “Siberian oak “



The piece of timber is composed of a mixture of European and Mongolian oak



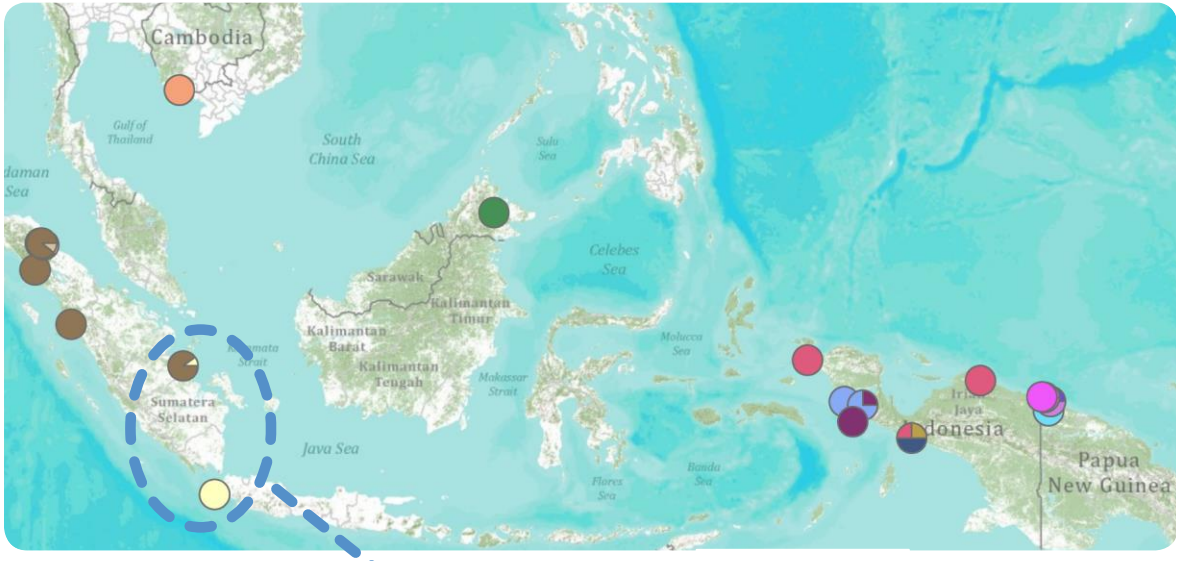
Scientific verification of timber claimed as ‘US White Oak’ in European markets



More than half of samples declared as “U.S. white oak” were not from North America

Region of origin using DNA


LONGBEACH
FENCING.COM.AU



THÜNEN

DoubleHelix

SOURCE: THUNEN – GERMANY, DOUBLEHELIX - SINGAPORE

Individal identity using DNA

DNA Fingerprinting of maple

- 430 individuals from 40 populations
- 135 variable SNPs screened
- Significant genetic structure

- Individualisation probability 1 x 10^{23}

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Primary

Matched back

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Simmonds Lumber
Timber importers & wholesalers

CertiSource
DNA Verification System

Australian Government
Australian Centre for
ernational Agricultural Research

ITTO

Common Name	Scientific Name	Barcoding	Genographic	Fingerprinting
Northern temperate forest				
Oak	*Quercus* spp.	✓	✓	✓
Larch	*Larix* spp.	✓	✓	
Poplar	*Populus* spp.	✓		
Maple	*Acer macrophyllum*		✓	✓
Neotropical forest				
Mahogany	*Swietenia* spp.	✓	✓	✓
Andiroba	*Carapa guianensis*		✓	✓
Cedro	*Cedrela fissilis*	✓	✓	✓
Cerdo-cheiroso	*Cedrela odorata*	✓	✓	
Angelim Vermelho	*Dinizia excelsa*		✓	✓
Jatobá	*Hymenaea courbaril*		✓	✓
Pará-pará	*Jacaranda copaia*		✓	✓
Maçaranduba	*Manilkara huberi*		✓	✓
Marupá	*Simarouba amara*		✓	✓
Ipê-amarelo	*Tabebuia serratifolia*		✓	✓
Cumala	*Virola surinamensis*		✓	✓
Cumaru/ Shihuahuaco	*Dipteryx odorata*		✓	✓
African tropical forest				
Doussie	*Afzelia* spp.	✓		
Okan	*Cylicodiscus gabunensis*	✓		
Sepele/Sipo	*Entandrophragma* spp.	✓	✓	✓
Tali	*Erythrophleum ivorense*	✓		
African mahogany	*Khaya* spp.	✓	✓	
Azobé	*Lophira alata*	✓		
Iroko	*Milicia excels, M. regia*	✓	✓	✓
Wenge	*Millettia laurentii*	✓		
Ayous	*Triplochiton scleroxylon*	✓	✓	✓
African Teak	*Pericopsis elata*	✓		✓
Padauk	*Pterocarpus soyauxii*	✓		
Prunus	*Prunus africana*		✓	✓
Sipo	*Entandrophragma utile*		✓	✓
Okoumé	*Aucoumea klainea*		✓	✓
Okan	*Cylicodiscus gabonensis*		✓	✓
Padouk	*Pterocarpus soyauxii*		✓	✓
Azobé	*Lophira alata*		✓	✓
Bilinga	*Nauclea diderrichii*		✓	✓
Khaya/Acajou	*Khaya invorensis*	✓	✓	✓
SE Asian tropical/Australasian forest				
Ramin	*Gonystylus bancanus*	✓		
Merbau	*Intsia bijuga,*	✓	✓	✓
Sandalwood	*Santalum* spp.	✓	✓	✓
Teak	*Tectona grandis*		✓	✓
Meranti/Balau Bangkirai	*Shorea* spp. *Dipterocarpus* spp.	✓	✓	✓

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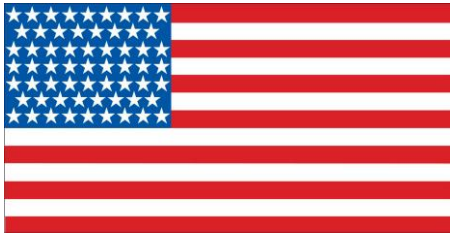
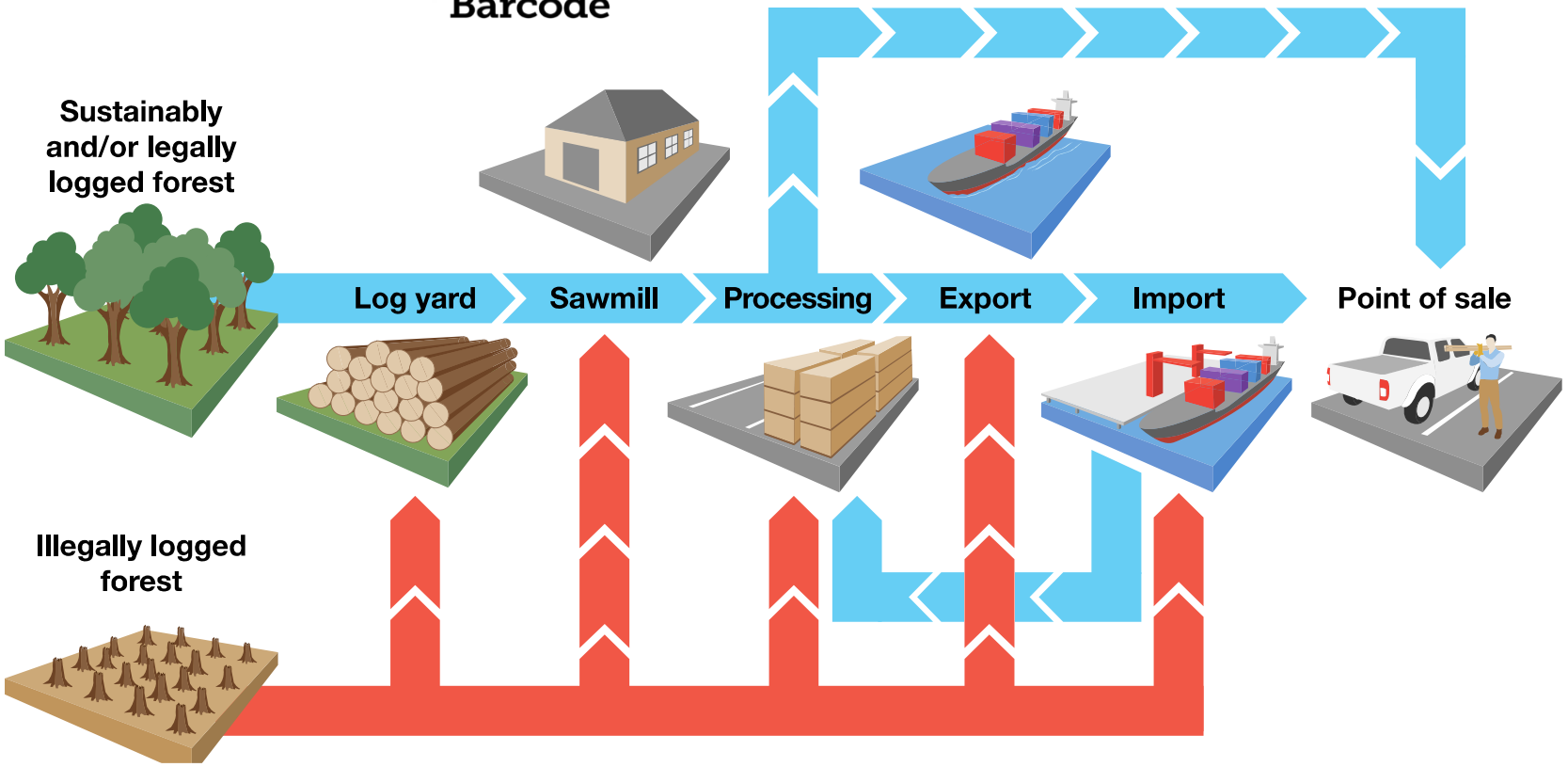


DoubleHelix

Nature's Barcode™



International Consortium on Combating Wildlife Crime

Dormonett et al (2015) Biological Conservation. Lowe et al (2016) BioScience

Global Timber Tracking Network

UNODC
United Nations Office on Drugs and Crime

INTERPOL

CITES

GTTN
GLOBAL TIMBER TRACKING NETWORK

Thanks to

- University of Adelaide
  - Elly Dormontt, Kor Jent van Dijk, Duncan Jardine, Bianca Dunker, Rainbo Belton,
- Double Helix Tracking Technologies
  - Darren Thomas, Avalyn Lim, Soo Lin Goh, Max Horowitz-Burdick
- von Thunen Institute, ECCDI (Myanmar), FORDA (Indonesia)
- ITTO, ACIAR, Department for Agriculture (Australia)

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SOURCE: CIAT INTERNATIONAL CENTER FOR TROPICAL AGRICULTURE