

Rosewood is strong, durable, beautiful, and rot resistant—and in such great demand that illegally harvesting it is a global issue.

n 2012 in Panama, an Indigenous leader and a mestizo worker were killed after a months-long effort to ward off illegal poachers.1 In 2015 in New York, Christie's auction house sold four works for \$9,685,000.2 In 2016 in Thailand, national park guards were using chains to prevent their theft.3

One might expect such astounding figures and extreme measures to be associated with endangered animal species, religious artifacts, or Indigenous artwork. Rather, these astounding values and the illegal enterprises they intertwined with involve rosewoods. These tropical hardwoods were the world's most trafficked wildlife product in 2016, and its illegal logging and trade were second only to drugs as a global criminal sector.4

My knowledge of this activity predates these incidents. Around 2008, at academic conferences and from conservationists, I began to hear snippets about illegal rosewood logging in multiple areas of the globe. Conservationists in Madagascar were early in raising the alarm, with a 2009 article estimating that a remarkable 43,000 trees had recently been logged from northeastern protected areas.5 While conducting research in Panama in 2011, I read mounting news reports about felled cocobolo rosewood (Dalbergia retusa) trees in the drier cattle ranching provinces west of the Panama Canal: the discovery of

A Martin D28 Brazilian guitar, with **Brazilian rosewood harvested before** 1992, was listed on the company's website for \$19,999. This guitar is made with cocobolo rosewood, which has a similar tonal quality.

an illicit collection center for logs, stolen trees denounced by ranchers, and illegal logs confiscated by the environmental agency, ANAM.6 I took notice because I admire how Indigenous Wounaan, with whom I had started working fifteen years before, find the figured wood within a fallen tree, sculpting and sanding it into carvings of animals of their tropical environs.7 By 2012, newspapers were chronicling what came to be known as fiebre de cocobolo, or cocobolo fever. Loggers had moved from western private farms into eastern Indigenous lands.8 Panama's Indigenous peoples, like others throughout Latin America and the world, had long cared for their old-growth forests; the same satellite image-based maps that revealed those correlations also showed loggers just where they needed to go.9 The 2012 dry season was extreme: a months-long standoff between Wounaan villagers resulted in the killing of authority Aquilino Opúa and logger Ezequiel Batista, and left three other Wounaan wounded.10 By the time the sawdust and rumors had settled, journalists had documented how loggers were hunting down the scarce trees in spite of policies restricting it, and that containers filled with logs were destined for China.11 I soon learned that around the globe similar patterns of violent confrontation and exploitation were to meet what one official characterized as Chinese "insatiable demand" for rosewood.12 Such accounts were supported by high-resolution satellite imagery that revealed persistent and increasing deforestation throughout the world's tropics.13 And yet this recent focus on rosewood shipments to China has ignored centuries of worldwide rosewood exploitation.

VERSATILE WOODS, A GLOBAL HISTORY

"Rosewood" is not a single species or even a single genus. The dense, lustrous, typically dark red wood comes from many members of the bean family, Leguminosae (or Fabaceae), including Millettia laurentii (African rosewood); Senna siamea (Bombay blackwood); Machaerium scleroxylon, M. villosum, and M. acutifolium (Bolivian rosewood); Pterocarpus santalinus (red sandalwood), P. macrocarpus (Burmese padauk), and P. erinaceus (African rosewood); and especially the Dalbergia genus. The Dalbergia genus alone has 278 species¹⁴ and accounts for many commercial rosewoods: D. nigra (Brazilian or black rosewood), D. odorifera (scented rosewood), D. louvelii (violet rosewood), D. cearensis (kingwood), D. latifolium (Indian rosewood), and D. retusa (cocobolo). Common names for the trees in their native countries are equally numerous: pau de rosa, hongmu, huanghuali, palisander, cocobolo, bois de rose, palosanto, mukula.

In Chinese, hongmu literally translates to "red wood." Among hongmu, huanghuali (Dalbergia odorifera) is the most esteemed for traditional Chinese furniture. Unusual for a rosewood, huanghuali is yellowish. If oiled, aged pieces maintain their lustrous yellow, whereas many other rosewoods oxidize to a purplish black. As its species name suggests, this is the fragrant rosewood, a Chinese native favored for its perfume.15

For centuries, rosewood has been worked for luxury furniture and musical instruments, yet people have valued these woods for construction as well. Rosewood is strong, durable, and rot resistant—ideal qualities for load-bearing posts. (Where I conduct research in Panama, some rural Indigenous residents have built their own homes using posts from the valued cocobolo rosewood (D. retusa) because of these attributes.) For furniture, rosewood offers desirable characteristics beyond its good looks, particularly dimensional stability and structural strength, ¹⁶ but it may not be easy to work: the dense wood quickly dulls sawblades, and the oiliness of some species makes them difficult to glue.

In China, the most prized classical rosewood furniture is from the late Ming (1368–1644) and Qing dynasties (1644-1911).17 Art historian Wang Shixiang identifies the socioeconomic circumstances that facilitated the flowering of China's furniture tradition: the early Ming emperors' requirement that capital-area artisans work in the palace workshop for ten days each month; a five-fold increase in land under cultivation from 1368 to 1393, which supported a growing population and stimulated demand for luxury items; and an end to the ban on maritime trade during the Longqing emperor's reign (1567-1572), which allowed the importation of rosewood from Southeast Asia.18

Ming and early Qing furniture tables, chairs, daybeds, beds, and stools—is elegant and sparing, often with open spaces highlighting the character of the wood and showcasing the artisan's skill. Pieces from this period are renowned for simplicity (*jianlian*) and purity (*shunpo*).¹⁹ Furniture was "supposed to have a soul, epitomizing the cultural or even moral height of its designer and the taste of its user."²⁰ Rosewood furniture from the later Qing dynasty is heavier, highly decorated, with "overly ornate carvings":

Ming furniture was refined and elegant; decoration was used with discretion to supplement the superb line. Ch'ing [Qing] productions gradually lost that grace, depending on sheer volume and intricacy of carving to impress. Inlay with mother-of-pearl or bone was another favourite technique of ornamentation, while red lacquer was applied and carved freely. The overall effect was one of elaborate splendour, which eminently suited European tastes of the time.21

As the above quote from Grace Wu Bruce's 1995 book *Chinese Classical Furniture* made clear, European

preferences accounted for changes in Chinese taste. It was during the later Ming and throughout the Qing dynasties that European countries were expanding their colonial empires. The Portuguese arrived in Macau in 1535, and the English trade arose a hundred years later.22 German cabinetmakers in the later sixteenth century sought highly lustrous woods that could be worked with precision.²³ European clients also sent pieces to China to be lacquered, which informed Chinese craftspeople about foreign styles.24 In Paris in the mid-1600s, a desire for furniture with strong colors and contrasting woods created markets for tropical hardwoods from the colonies.²⁵ In the Americas, selective logging was part of European powers' colonial exploitation. By the 1600s, the Portuguese, Dutch, and French were harvesting rosewood; Brazil's rosewood was highly sought after.26

But logging these heavy, dense hardwoods was exceptionally onerous, and colonial dispossession and enslavement made logging possible. Indigenous peoples were violently taken from their land, enslaved, and set to work



This set of four *huanghuali* rosewood (*Dalbergia odorifera*) horseshoe-back armchairs from the Ming Dynasty sold for \$9,685,000 at Christie's in New York City in 2015. Furniture made from rosewood offers characteristics beyond its good looks, including strength and durability, that contribute to its desirability.



alongside enslaved Africans and their descendants.27 The same triangular trade that brought enslaved people to the Americas also brought some ebony and "redwoods" from West Africa; the luxury woods were then shipped to Europe.28

Preferred woods for furniture making corresponded to colonial geographies. The French favored purplewood, kingwood, tulipwood, rosewood, and satiné from French Guiana; the Portuguese imported rosewood from its colonies in Brazil and Asia; the Germans sought ebony, mahogany, and rosewood from their African colonies; the Scandinavians pursued teak from colonies or colonially linked sites in Southeast Asia; the English used walnut and mahogany from North America, northern Africa, and the West Indies. 29 As the British empire expanded, Indian rosewood, Ceylon satinwood, and Australian cedar became available.30 By the mid-1800s, tropical logging in Latin America changed as the region's colonies

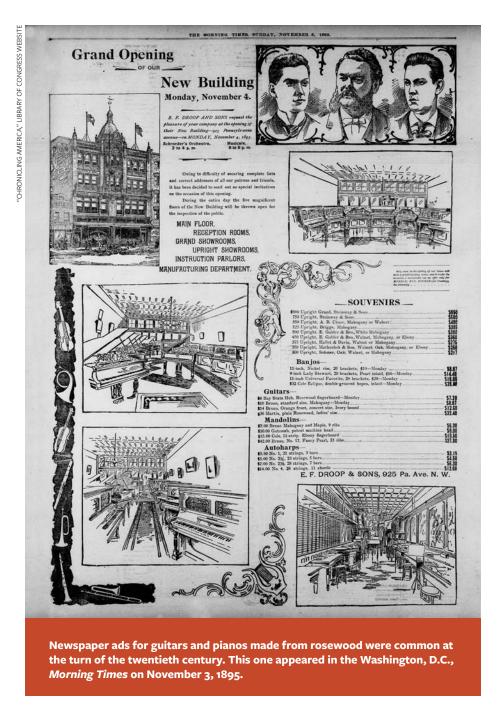
Cocobolo (Dalbergia retusa) sourced from Panama has been in demand for more than century. This photo of a load being readied for export from there was taken in 1923. The author saw a similar sight ninety years later, but it was illegally harvested wood.

became independent, the slave trade (and later, slavery itself) was banned, and veneering became widespread. Rosewood remained favored for opulent furniture, but it was also soon the preferred "tonewood" for musical instruments.

Rosewood offers aesthetic value in instruments—a rosewood back, for example, provides a dark contrast to the pale spruce in a guitar's top—but it is the many species' density and elasticity that make it truly desirable: it imparts a rich tonal quality, with resonance and overtones. Rosewood is used in all the main classes of musical instruments: chordophones (stringed instruments, such as guitars and violins), aerophones (instruments with air columns, such as flutes and bagpipes), idiophones (instruments whose bodies vibrate,

such as rattles and castanets), and even membranophones (stretched membrane instruments, such as drums).31 It is also used where durability is critical, such as for guitar fretboards.32

Beyond furniture and musical instruments, rosewood has been used for a huge array of commercial items—just about anything that does not require buoyancy: knife handles, brush backs, gunstocks, bowls, marimbas, bowling balls, chess pieces, construction beams, scientific instruments, jewelry boxes, gunstocks, canes, billiard cues, inlay, and pulley blocks.33 Some species, such as cocobolo, can be used for dying, and many species have medicinal properties.34



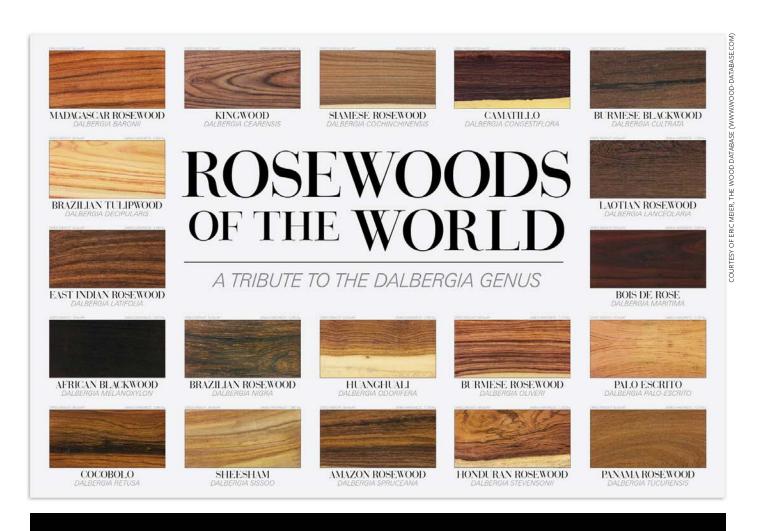
PASSION FOR—AND AGAINST—ROSEWOOD

In the mid-1900s, two cultural movements catalyzed changes in demand for rosewood: the design style now known as midcentury modern, and China's Communist Revolution. Mid-century design began before the Second World War and flourished in response to wartime austerity and new technologies, such as molded plywood.³⁵ Designers of mid-century furniture passionately celebrated

wood and were drawn to rosewood, teak, and walnut for their beauty.³⁶ The era's organic forms are perhaps best known in the work of George Nakashima, whose company displays its founder's philosophy on their website: "Instead of a long running and bloody battle with nature, to dominate her, we can walk in step with a tree to release the joy in her grains, to join with her to realize her potentials, to enhance the environments of man."³⁷

Rosewoods, together with teak (Teca grandifolia) and walnut (Juglans spp.), were the woods most commonly used in mid-century furniture. Whereas teak and teak-like woods had their ties to German, British, Scandinavian, and other European countries' colonial histories in Asia and Africa, and walnut was closely associated with the United States and Europe, rosewood was diverse and pantropical.38 Lumber supply chains shifted during the war to Latin American sources and expanded there even when it was over.39 Rosewood was "exotic" and linked to colonial power, and the beauty of the woods lent them to modernism (and Scandinavian aesthetics). As recent authors have noted, marketing promoted modernism as progressive, while tacitly emphasizing it as white and masculine, something that extended even to how designers were perceived by or presented to the public: designer Ray Eames held equal partnership with her design partner and husband Charles in the Eames Office firm, the firm behind the iconic Eames lounge chair, but whose contributions were often overlooked or downplayed.40

Rosewood symbolized luxury—as in the paneled walls of Manhattan's Four Seasons restaurant, built in 1960—and modernism.41 But it also was used in more commercial midcentury furniture, such as designer George Nelson's rosewood- and steelframed case goods for the Herman Miller Company.⁴² A New York Times article from 1964 noted rosewood's use in unadorned modern furniture. crediting Scandinavians for realizing "that a simple slab of rosewood could provide all the ornamentation that a lot of people would wish for."43 Like luthiers, furniture makers preferred Brazilian rosewood, Dalbergia nigra, which some considered the true rosewood for its dark lines set against the reddish wood, even though some customers were "afraid of so much



This poster by Eric Meier, creator of the Wood Database website, shows the Dalbergia genus rosewoods.

assertiveness" and "flamboyance."44 Another reason for its popularity, as Charles Eames stated in the announcement of the Eames lounge chair, designed with Brazilian rosewood, was that "rosewood never shows its wear," with no color shift or oxidation as it ages.45 By the 1970s, the Danish high-end audio and television manufacturer Bang & Olufsen reported feeling obliged to use rosewood panels as symbols of the Scandinavian design tradition.46

As furniture makers in the Global North embraced rosewood, China was undergoing a cultural revolution that ultimately led to the destruction of many classical rosewood furniture pieces. The War of Liberation in 1949 ushered in the People's Republic of China under Chairman Mao

Zedung. The new regime promised to eliminate class distinctions and create a utopian society. One consequence saw rosewood furniture denounced as "wanton emblems of bourgeoise oppression."47 Some antiques were lost during the Great Leap Forward of 1958 to 1963, when wood was needed to fuel the furnaces that would change China from an agrarian to an industrial country.48

Still more rosewood furniture was destroyed during the Great Proletarian Cultural Revolution, 1966 to 1976.49 Social prestige, material position (i.e., wealth), the educational system: all advantages were attacked.50 Elites were stripped of their salaries, criticized, humiliated, and sometimes executed. The campaign against the "four olds"-

old ideas, customs, culture, and habits of mind—inspired searches of houses and the destruction and confiscation of their contents.⁵¹ Fifty years later, one resident recalled that "even if you were to give someone rosewood furniture they would not want it."52 The Red Guards, studentled paramilitaries mobilized by Mao, ransacked houses and destroyed valuable classics, paintings, and antiques.53 Recent scholars have shown how individuals and authorities steered the iconoclasm toward a moderate course—tempering policies, concealing antiques and relicts, protecting local materials.⁵⁴ Classical furniture also was saved by those who fled China and by collectors in Hong Kong, Taiwan, and Singapore.55 But many pieces were gone, and since

FINE HARDWOOD VENEERS

for Architectural Interiors



Rosewood symbolized luxury. It was used in the paneled walls of Manhattan's Four Seasons restaurant, which was featured on the cover of the Fine Hardwood Association's 1960 brochure on Fine Hardwood Veneers for Architectural Interiors.

value rises with scarcity, the value of classical Chinese furniture was guaranteed to increase. The stage was set for a boom in demand for rosewood.

CONTINUED EXPLOITATION AND RESPONSE

Mao's death in 1976 and the 1980s economic reforms brought both increased wealth and subsequent demand for material goods in China; rosewood furniture in the classical Chinese tradition began attracting interest. Like Americans and Europeans, Chinese citizens rediscovered rosewood. The 1985 publication of *Classic Chinese Furniture*, by Wang Shixiang, is attributed with popularizing the more minimalist forms of furniture from the Ming and early Qing dynasties, rather than the ornate rosewood furniture cherished by Chinese collectors in

Asia.56 The Chinese government now promoted Eastern cultural traditions and rejected Euro-America and its consumer society.57 China's growing middle class sought rosewood furniture as respect for their heritage, prestige, and investment. This also was a younger clientele: "the growing consumption power of younger generations" was fueling the newly emerging market.58 Because relatively few antiques survived, a market was born for mass-produced reproductions as well as new pieces.59 Rosewood logs, thought to be safer than stock or real estate, were also stockpiled as an investment vehicle, feeding rampant speculation.60 The consequence was new demand for lower-value rosewood species and continued demand for the highestvalue ones.61

After centuries of global rosewood exploitation, the numbers of commercial species were declining. In 1990 the Herman Miller Company began preparing to discontinue use of Brazilian rosewood in the seven-ply veneers of the Eames lounge chair, eventually switching first to walnut and cherry and later to Bolivian rosewood. By 1992, Brazilian rosewood was listed by the Convention on International Trade in Endangered Species (CITES) at the most restrictive status, CITES Appendix I.

Soon, importing countries were establishing new timber governance policies. The European Union (EU) passed its Forest Law Enforcement, Governance, and Trade (FLEGT) legislation in 2003 to reduce illegal logging. In 2008, the U.S. Congress amended the 100-year-old Lacey Act to prohibit trade in illegally sourced plants and plant products, including timber, with illegality defined as anything in violation of laws in the source country. The expanded law required a declaration of country of origin and species name, and violators were subject to



confiscation, fines, and jail time.63 (In 2011, the U.S. Justice Department indicted the Gibson Guitar Company for having illegally sourced Indian rosewood and Madagascar ebony, eventually fining the company under the Lacey Act.⁶⁴) FLEGT's EU Timber Regulation, which came into force in 2013, defined legality similarly to the Lacey Act and prohibited illegally harvested timber and products in the EU market.65 Australia's 2012 Illegal Logging Prohibition Act likewise made it a criminal offense to import or process, knowingly or not, illegally logged wood.66

Yet global demand for rosewood continued. The Chinese government's economic stimulus package after the 2008 global financial crisis included measures to boost real estate, which ultimately led to a rising wood furniture market.⁶⁷ Between 2010 and 2011 demand for classical Chinese rosewood furniture climbed by 50 to 60 percent.⁶⁸ Reports of

illegal logging came from many countries. In Madagascar in 2010, all rosewood exports were banned but logging persisted in national parks, and the country's forty-eight rosewood species were targets.69 In Belize in 2013, the Ministry of Forestry, Fisheries and Sustainable Development burned rosewood flitches to demonstrate that illegal logging would not be tolerated.70 In Sri Lanka in 2014, customs officials busted the world's largest rosewoodsmuggling operation, seizing 420 metric tons of rosewood from East Africa.⁷¹ In Cambodia in 2015, illegally harvested timber from protected areas was trafficked to Vietnam.72 In Nigeria in 2017, the environment minister was found to have signed thousands of retroactive permits that "legalized" the export of 1.4 million rosewood logs.73 In Ghana in 2019, the equivalent of six million rosewood trees was estimated to have been exported to China over seven years

The Eames chair from Herman Miller, which used Brazilian rosewood in its seven-ply veneer, became so iconic and associated with modernism that it appeared in ads for other products. Today's version is made with walnut, santos palisander (Bolivian rosewood), and lacquered plywood veneers.

despite harvest and export bans.74 Rosewood logging was shifting from Asia to Central America to Africa; what was happening in the vast forests of South America was largely unknown.

One persistent problem has been the difficulty of distinguishing rosewood species, causing protected species to be traded as unprotected ones.75 Dalbergia and Pterocarpus woods are particularly hard to distinguish as either logs or finished products.⁷⁶ In 2000 the Chinese

government defined rosewood, creating the only such standard worldwide. The National Hongmu Standard of the People's Republic of China was based on analysis of both modern furniture and Ming and Qing pieces made from rosewood, or hongmu.77 The standard, revised in 2017, defined 29 species as hongmu, allowing them to be marketed under that coveted label.78

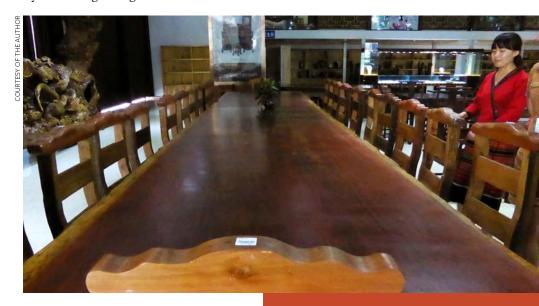
If intended to discourage illegal trade, the standard backfired: it not only intensified the pursuit of the listed species but also created an incentive for logging of all rosewood species.79 From 2005 to 2015, China's rosewood imports grew six times in value.80 In 2014, rosewood instrument blanks were priced at \$99,766 per cubic meter.81

Panama exemplifies the challenge of curtailing logging in the face of stratospheric values. Its forests produce cocobolo rosewood, a highvalue species and favored tonewood.82 In 2011, as cocobolo timber was being stolen from private lands and protected areas, the government sought to restrict illegal timber trade.83 It succeeded in getting rosewood listed in CITES Appendix III, which requires that all crossborder shipments be accompanied by documents certifying the wood's origin,84 and began enacting laws intended to curtail rosewood logging.85 An executive decree of 2008, for example, banned roundwood exports.86 But the laws had so many loopholes that it was easy to launder illegal wood as legal: rosewood logs were found in shipping containers at Panama City's port of Balboa, and openly stacked in logging yards. That the timber could be harvested and processed, then transported past inspection checkpoints and confiscated only at the port was indicative of the logging industry's power. In 2016, the environment agency convened negotiations (mesas de diálogo) with the forest sector.

The outcome: a decision to repeal the 2008 executive decree banning rosewood exports, on the grounds that it had failed to protect trees in forests.87 Other laws opened up logging while appearing to restrict it, granting logging exemptions—in Indigenous lands, on private farms, in plantations—and allowing the auction of seized wood.88 In effect, the measures legalized some rosewood logging and created ways to launder illegal wood.

It was apparent that countries were unable to control the illicit trade in rosewood. In 2017 CITES listed all Dalbergia species, African kosso (Pterocarpus erinaceus), and bubinga (Guibourtia demeusei, G. pellegriniana, and G. tessmannii) under Appendix II: all international trade of the listed species requires an export permit or re-export permit, but not an import permit. It also covers lookalike species of those listed.89 By the time global governance had

(emphasizing and distorting Asian cultures as exotic, backward, and even dangerous) overlooks centuries of previous use, trade, and the legacies of European and American colonial timbering.91 For example, with the 2017 CITES restrictions on rosewoods, the music industry lost tens of millions of dollars in sales, and traveling musicians faced possible seizure of their instruments when they crossed international borders.92 In August 2019, CITES exempted the music industry from the 2017 trade restrictions (while also listing another African rosewood, Pterocarpus tinctorius, in Appendix II), which was advocated by organizations mostly located in the Global North.93 Most rosewood continues to be wild harvested from old-growth forests and the boom has redoubled efforts to plant rosewoods, from countries as diverse as Indonesia, Costa Rica, Tanzania, Panama, India, Madagascar, and China.



caught up, however, rosewood trade was purported to be declining as China's President Xi Jinping cracked down on corruption.90 Yet, rosewood exploitation persists.

Although numerous illegal logging reports worldwide hold China culpable for the current rosewood boom, this orientalist narrative

When the market for rosewood furniture in China exploded as the growing middle class sought rosewood furniture as respect for their heritage, prestige, and investment, rosewood imports grew sixfold from 2005 to 2015. These tables and chairs were for sale near Jinghong, China, 2014.

Julie Velásquez Runk is director, professor, and Weigl Fellow of Environment and Sustainability Studies at Wake Forest University and a research associate at the Smithsonian Tropical Research Institute. Her forthcoming book is tentatively titled Entangled Rosewood: Beauty, Being, and Belonging.

ACKNOWLEDGMENTS

I would like to thank the librarians and staff of the National Humanities Center, the Forest History Society, and the Mertz Library of the New York Botanical Garden for tracking down materials. I am grateful for a Faculty Research Fellowship from the University of Georgia's Willson Center for Humanities and Arts and a National Endowment for the Humanities Fellowship at the National Humanities Center that supported this research.

NOTES

- 1. Rúben Polanco, "Dos Muertos Y Tres Heridos," La Prensa, April 3, 2012, accessed April 4, 2012, https://www. prensa.com/impresa/panorama/muertosheridos_0_3356664470.html.
- 2. "Classical Chinese Furniture—20 Years of Great Collections," Christie's, accessed June 30, 2020, https://www.christies.com/ features/The-best-collections-of-Classical-Chinese-furniture-8858-1.aspx.
- 3. United Nations, "We've Got to Stop These Guys': UN Wildlife Chief Slams Rosewood Trade," October 3, 2016, accessed June 24, 2020, https://news. un.org/en/audio/2016/10/617672.
- 4. UNODC, World Wildlife Crime Report (Vienna: UN Office on Drugs and Crime, 2016), 2; Thomson Reuters, "How to Cut Down the Risk of Illegal Logging in Your Supply Chain," August 17, 2016, accessed August 18, 2019, https://blogs. thomsonreuters.com/answerson/cut-riskillegal-logging-supply-chain/.
- 5. E. R. Patel, "Logging of Rare Rosewood and Palisandre (Dalbergia spp.) within Marojejy National Park, Madagascar," Madagascar Conservation & Development, 2 (2007): 11-16; Derek Schuurman and Porter P. Lowry II, "The Madagascar Rosewood Massacre," Madagascar Conservation & Development, 4 (2009): 98-101.



Panama exemplifies the challenge of curtailing logging in the face of stratospheric values. The author found cocobolo rosewood logs being readied for export containers in July 2014, three weeks after all of Panama's rosewood commerce was to have been halted.

- 6. Alcíbiades Cortez, "Aumenta La Venta Ilegal De Madera De Cocobolo," La Prensa (Panama City, Panama), September 25, 2011; Alcibíades Cortez, "Anam Decomisa Cargamento De Madera En Los Santos," La Prensa (Panama City, Panama), August 12, 2011; Alcibíades Cortez, "Ganaderos Denuncian La Tala Ilegal De Cocobolos En Los Santos," La Prensa (Panama City, Panama), December 26, 2011.
- 7. I had worked for the country's environmental agency and with Wounaan

- and Emberá communities, researching the socioecology of art and planting artisanal trees, including cocobolo, with Indigenous residents. See: Julie Velásquez Runk, Crafting Wounaan Landscapes: Art, Identity, and Environmental Governance in Panama's Darien (Tucson: University of Arizona Press, 2017).
- 8. Ella Vardeman and Julie Velásquez Runk, "Panama's Illegal Logging Boom from Dalbergia Retusa," Global Ecology and Conservation e01098 (2020), 6-9, https://doi.org/https://doi.org/10.1016/j. gecco.2020.e01098.
- 9. John E. Fa, James E. M. Watson, Ian Leiper, Peter Potapov, Tom D. Evans, Neil D. Burgess, Zsolt Molnár, et al., "Importance of Indigenous Peoples' Lands for the Conservation of Intact Forest Landscapes," Frontiers in Ecology and the Environment 18, no. 3 (2020): 135-40; D. Nepstad, S. Schwartzman, B. Bamberger, M. Sntilli, D. Ray, P. Schlesinger, P. Lefebvre, et al., "Inhibition of Amazon Deforestation and Fire by Parks and Indigenous Lands," Conservation Biology 20, no. 1 (2006): 65-73; Gerardo Vergara-Asenjo and Catherine Potvin, "Forest Protection and Tenure Status: The Key Role of Indigenous Peoples and Protected Areas in Panama," Global Environmental Change, 28 (2014): 205-15; Taylor H. Ricketts, Britaldo Soares-Filho, Gustavo A. B. da Fonseca, Daniel Nepstad, Alexander Pfaff, Annie Petsonk, Anthony Anderson, et al., "Indigenous Lands, Protected Areas, and Slowing Climate Change," PLoS Biology 8, no. 3 (2010).
- 10. Rúben Polanco, "Dos Muertos Y Tres Heridos," La Prensa (Panama City, Panama), April 3, 2012, https://www. prensa.com/impresa/panorama/muertosheridos_0_3356664470.html.
- 11. "Negociado Arrasa El Cocobolo," La Prensa (Panama City, Panama), November 18, 2013, Panorama, https://impresa. prensa.com/panorama/Negociado-arrasacocobolo_0_3802119840.html; Vardeman and Runk, "Panama's Illegal Logging Boom," 11-12.
- 12. Haibing Ma of the Environmental Investigation Agency told Voice of America News in May 2022 "that some 90 percent of the world's exports" go to China. Kate Bartlett, "China's Illegal Rosewood Trade with Mali Under Scrutiny," https://www.voanews.com/a/ china-s-illegal-rosewood-trade-with-maliunder-scrutiny-/6580241.html.
- 13. Naomi Basik Treanor, China's Hongmu Consumption Boom: Analysis of the Chinese Rosewood Trade and Links to Illegal Activity in Tropical Forested Countries (London: Forest Trends, 2015), 3, accessed November 8, 2018, https://www.foresttrends.org/publications/chinas-hongmuconsumption-boom/; Huang Wenbin and Sun Xiufang, "Tropical Hardwood Flows in China: Case Studies of Rosewood

- and Okoumé" (Washington, DC: Forest Trends, World Agroforestry Center, and CIFOR, 2013), 4, accessed November 8, 2018, https://www.forest-trends.org/publications/tropical-hardwood-flows-in-china/; M. C. Hansen, P. V. Potapov, R. Moore, M. Hancher, S. A. Turubanova, A. Tyukavina, D. Thau, et al., "High-Resolution Global Maps of 21st-Century Forest Cover Change," *Science* 342, no. 6160 (2013): 850.
- 14. "Dalbergia," *Plant List*, http://www. theplantlist.org/browse/A/Leguminosae/ Dalbergia/ (accessed April 20, 2020).
- 15. J. W. L. Jiufang, X. Yongji, and F. Ioras, "A Reevaluation of the Woods Used in Chinese Historic Furniture," *Bulletin of the Transilvania University of Brasov* 6, no. 55 (2013): 9; John Kwang-Ming Ang, "The Classic Tradition in Blackwood Furniture," *Arts of Asia* 30, no. 5 (2000): 104.
- Adam Bowett, Woods in British Furniture-Making, 1400–1900 (Wetherby: Onlong Creative Ltd. and Royal Botanic Gardens, Kew, 2012), xxiii.
- 17. Grace Wu Bruce, *Chinese Classical Furniture* (New York: Oxford University Press, 1995), 1.
- 18. Wang Shixiang, *Classic Chinese Furniture* (Hong Kong: Joint Publishing Company, 1986), 14, 15; Wu Bruce, *Chinese Classical Furniture*, 7, 8.
- 19. Shixiang, Classic Chinese Furniture, 41.
- Li Yuan, "Everything Old Is New Again: Classical Chinese Furniture," *China Today* (2011): 39.
- 21. Wu Bruce, Chinese Classical Furniture, 8.
- 22. Collector, "Furniture of the Ch'ing Dynasty," *Arts of Asia* 3, no. 5 (1973): 31.
- 23. Bowett, Woods in British Furniture-Making, xv.
- 24. Collector, "Furniture of the Ch'ing Dynasty," 31.
- 25. Bowett, Woods in British Furniture-Making, xv.
- 26. Bowett, Woods in British Furniture-Making, xv.
- Jennifer L. Anderson, Mahogany: The Costs of Luxury in Early America (Cambridge: Harvard University Press, 2012), 157.
- 28. Bowett, Woods in British Furniture-Making, xvi.
- 29. B. E. Fernow, "Forests and Forestry in the German Colonies," *Journal of Forestry* 10, no. 4 (1912): 634; Raymond L. Bryant, "Branding Natural Resources: Science, Violence and Marketing in the Making of Teak," *Transactions of the Institute of British Geographers* 38 (2013): 527, https://doi. org/10.1111/tran.12006 (accessed June 28, 2020); Bowett, *Woods in British Furniture-Making*, xviii.
- 30. Bowett, Woods in British Furniture-Making, xxi.
- 31. Bradley C. Bennett, "The Sounds of Trees: Wood Selection in Guitars and Other Chordophones," *Economic Botany* 70, no. 1 (2016): 60; Anna Jenkins et al., *Precious Woods: Exploitation of the*

- Finest Timber (London: TRAFFIC, 2012), https://www.traffic.org/site/assets/ files/7279/precious-woods.pdf (accessed November 8, 2018), 8; Gonzalo Brenes Candanedo, Los Instrumentos de la Etnomúsica de Panamá (Panamá: Autoridad del Canal de Panamá, 1999), 314; Omar Carmenates, "Honduras Rosewood: Its Endangerment and Subsequent Impact on the Percussion Industry" (PhD diss., Florida State University, 2010), ix; Keisuke Yamada, "Shamisen Skin on the Verge of Extinction: Musical Sustainability and Non-Scalability of Cultural Loss," Ethnomusicology Forum 26, no. 3 (2017): 379, https://doi.org/10.1080/17411912.2018.1 423575 (accessed June 20, 2020).
- 32. Bennett, "Sounds of Trees," 52.
- 33. James H. Flynn, ed., A Guide to the Useful Woods of the World (Portland, ME: King Philip Publishing Company, 1994), 123, 129, 132; Samuel J. Record and Robert W. Hess, Timbers of the New World (New Haven: Yale University Press, 1943), 254, 255, 258.
- 34. J. Velásquez Runk, "Wounaan and Emberá Use and Management of the Fiber Palm Astrocaryum standleyanum (Arecaceae) for Basketry in Eastern Panamá," Economic Botany 55, no. 1 (2001): 77.
- 35. Arlene Francis, "Eames Lounge Chair Today Show Debut," *The Home Show* video, 1956, http://www.openculture.com/2014/08/debut-of-charles-and-rayeames-iconic-lounge-chair.html (accessed August 18, 2019); Museum of Modern Art, "New Furniture Designs and Techniques Have Initial Showing at Musem of Modern Art," 1946, https://assets.moma.org/momaorg/shared/pdfs/docs/press_archives/1044/releases/MOMA_1946-1947_0027_1946-03-11_46311-15.pdf (accessed August 18, 2019).
- 36. David L. Barquist, "Druids and Dropouts: Working Wood, 1945–1969," in *Crafting Modernism: Midcentury American Art and Design*, ed. Jeannine Falino (Abrams, NY: Museum of Arts and Design, 2011), 226.
- 37. George Nakashima, "Philosophy," George Nakashima Woodworkers, https:// nakashimawoodworkers.com/philosophy/ (accessed June 23, 2020).
- 38. Indra Munshi Saldanha, "Colonialism and Professionalism: A German Forester in India," *Environment and History* 2, no. 2 (1996): 195; Fernow, "Forests and Forestry in the German Colonies," *Journal of Forestry* 10, no. 4 (1912): 633; Peter Vandergeest and Nancy Lee Peluso, "Empires of Forestry: Professional Forestry and State Power in Southeast Asia, Part I," *Environment and History* 12 (1996): 38.
- 39. "Latin American Lumber," *The Timberman* 44, no. 8 (1943): 18.
- 40. Ray Eames's full name was Ray-Bernice Alexandra Kaiser Eames. She and her husband Charles Eames had a huge impact on modern architecture and furniture design through their firm Eames Office. Per H. Hansen, "Networks, Narratives,

- and New Markets: The Rise and Decline of Danish Modern Furniture Design, 1930–1970," *Business History Review* 80 (2006): 451; Kristina Wilson, "Like a 'Girl in a Bikini Suit' and Other Stories: The Herman Miller Furniture Company, Gender and Race at Mid-Century" *Journal of Design History* 28, no. 2 (2015): 161; Cara Greenberg, *Mid-Century Modern* (New York: Harmony Books, 1984) 82.
- 41. Fine Hardwood Association, *Fine Hardwood Veneers for Architectural Interiors* (Chicago, 1960), 1.
- 42. Greenberg, Mid-Century Modern, 32.
- 43. Virginia Lee Warren, "Rosewood, Unadorned, Enjoys Modern Revival," *New York Times*, September 3, 1964, 32, accessed August 18, 2019, https://www.nytimes. com/1964/09/03/archives/rosewoodunadorned-enjoys-modern-revival.html.
- 44. Warren, "Rosewood, Unadorned," 32.
- 45. Betty Pepis, "Eames Has a New Chair in 3 Sections," *New York Times*, March 14, 1956, https://www.nytimes.com/1956/03/14/archives/eames-has-a-new-chair-in-3-sections-a-chair-in-three-parts.html (accessed August 18, 2019).
- 46. Per H. Hansen, "Networks, Narratives, and New Markets: The Rise and Decline of Danish Modern Furniture Design, 1930–1970," Business History Review 80 (2006): 480.
- 47. Anna Lake Zhu, "China's Rosewood Boom: A Cultural Fix to Capital Overaccumulation," *Annals of the American Association of Geographers* (2019): 10, https://doi.org/https://doi.org/10.1080/24694452.201 9.1613955 (accessed July 20, 2019).
- 48. Alfred L. Chan, Mao's Crusade: Politics and Policy Implementation in China's Great Leap Forward (Oxford: Oxford University Press, 2001), 275; "The Great Leap Forward: A Disaster for Chinese Antique Furniture," Antique Chinese Furniture, November 23, 2012, http://www.antique-chinesefurniture.com/blog/2012/11/23/the-great-leap-forward-a-disaster-for-chineseantique-furniture/.
- 49. Bruce, *Chinese Classical Furniture*, 61; Zhu, "China's Rosewood," 10.
- 50. Joel Andreas, *Rise of the Red Engineers:*The Cultural Revolution and the Origins of China's New Class (Stanford, CA: Stanford University Press, 2009), 88.
- 51. Andreas, Rise of the Red Engineers, 98; Daphon David Ho, "To Protect and Preserve: Resisting the Destroy the Four Olds Campaign, 1966–1967," in The Chinese Cultural Revolution as History, eds. Joseph W. Esherick, Paul G. Pickowicz, and Andrew G. Walder (Stanford, CA: Stanford University Press, 2006), 68.
- 52. Zhu, "China's Rosewood," 10.
- 53. Ho, "To Protect," 64.
- 54. Ho, "To Protect," 68–95; Laurence Sickman, foreword to *Classic Chinese Furniture: Ming and Early Qing Dynasties*, by Wang Sixiang (Hong Kong: Joint Publishing Company, 1986), 13.

- 55. Bruce, Chinese Classical Furniture, 61.
- 56. Ang, "The Classic," 104.
- 57. Jie Li, "Introduction: Discerning Red Legacies in China," in Red Legacies in China: Cultural Aferlives of the Communist Revolution, eds. Jie Li and Enhua Zhang (Cambridge: Harvard University Press, 2016), 5; Xiaobing Tang, "Socialist Visual Experience as Cultural Identity: On Wang Guangyi and Contemporary Art" in Red Legacies in China: Cultural Aferlives of the Communist Revolution, eds. Jie Li and Enhua Zhang (Cambridge: Harvard University Press, 2016), 140.
- 58. Yuan, "Everything Old," 39.
- 59. Environmental Investigations Agency, The Hongmu Challenge (London: Environmental Investigations Agency, 2016), https://content.eia-global.org/ posts/documents/000/000/314/original/ The_Hongmu_Challenge.pdf?1468592419 (accessed November 8, 2018); Yuan, "Everything Old," 39.
- 60. Treanor, China's Hongmu Consumption Boom, 4; Shaojie Huang, "China's Demand Threatens Rare Hardwoods in Mekong," New York Times, May 13, 2014, https:// sinosphere.blogs.nytimes.com/2014/05/13/ chinas-demand-threatens-rare-hardwoodsin-mekong/ (accessed May 28, 2020).
- 61. Treanor, China's Hongmu Consumption Boom, 6.
- 62. Herman Miller Company, "Sustainability Snapshot: How Herman Miller is Helping Design a Greener World," WHY Magazine, 2018, https://www.hermanmiller.com/ stories/why-magazine/sustainabilitysnapshot/ (accessed June 26, 2020).
- 63. U.S. Fish and Wildlife Wildlife Service, "Lacey Act," https://www.fws.gov/ international/laws-treaties-agreements/usconservation-laws/lacey-act.html.
- 64. Andrew C. Revkin, "Gibson Guitar to Pay \$300,000 in Penalties and Lose Seized Tropical Hardwood," New York Times, August com/2012/08/06/gibson-guitar-to-pay-350000-in-penalties-and-lose-seized-tropicalhardwood/ (accessed June 28, 2020).
- 65. EUFLEGT Facility, "What is the EU Timber Regulation?" https:// flegtvpafacility.org/flegt/.
- 66. Department of Agriculture, Water and the Environment, Australian Government, "Illegal Logging," https://www.agriculture. gov.au/forestry/policies/illegal-logging (accessed July 3, 2020). Australia began studying and reviewing its regulation in 2021 in anticipation of it sunsetting on April 1, 2023. See: "Sunsetting Review of the Illegal Logging Prohibition Regulation 2012: consultation paper," 5, https://www. awe.gov.au/sites/default/files/documents/ illegal-logging-sunsetting-reviewconsultation-paper.pdf.
- 67. Treanor, China's Hongmu Consumption Boom, 4.
- 68. Yuan, "Everything Old," 28.

- 69. John L. Innes, "Madagascar Rosewood, Illegal Logging and the Tropical Timber Trade," Madagascar Conservation & Development 5, no. 1 (2010): 7.
- 70. Ya'axché Conservation Trust, "Rosewood in Belize: The Truth Behind the Smoke," Mongabay, February 11, 2013, https://news. mongabay.com/2013/02/rosewood-inbelize-the-truth-behind-the-smoke/.
- 71. Jude Denzil Pathiraja, "Custom's Bust World's Largest Rosewood Smuggling Operation," The Island, April 2, 2014, accessed November 10, 2018, http://www. island.lk/index.php?page_cat=articledetails&page=article-details&code_ title=100977.
- 72. Sarah Milne, "Cambodia's Unofficial Regime of Extraction: Illicit Logging in the Shadow of Transnational Governnance and Investment," Critical Asian Studies 47, no. 2 (2015): 212-13.
- 73. Environmental Investigations Agency, The Rosewood, 3.
- 74. Environmental Investigations Agency, Ban-Boozled: How Corruption and Collusion Fuel Illegal Rosewood Trade in Ghana (Washington, DC: Environmental Investigations Agency, 2019), https://content.eia-global.org/ posts/documents/000/000/906/original/ BAN_Boozled_Rosewood_Ghana. pdf?1564513559.
- 75. UNODC, World Wildlife, 39; Karen Winfield, Michelle Scott, and Cassandra Grayson, Global Status of Dalbergia and Pterocarpus Rosewood Producing Species in Trade (Washington, DC: Global Eye, 2016), https://www.blackwoodconservation.org/ wp-content/uploads/2019/07/Global-Statusof-Dalbergia-and-Pterocarpus-Rosewood-CITES-2017-.pdf, 4.; Wenbin and Xiufang, Tropical Hardwood, 2.
- 76. Winfield et al., Global Status, 7.
- 77. C. Xu et al., "Introduction, Growth Performance, and Ecological Adaptability of Hongmu Tree Species (Pterocarpus spp.) in China," Journal of Tropical Forest Science 28, 3 (2016): 260.
- 78. "Rosewood Species Classified as Hongmu Under China's Revised (2017) Standard," August 3, 2020, https://www.forest-trends. org/publications/rosewood-speciesclassified-as-hongmu-under-chinas-revised-2017-standard/; Treanor, China's Hongmu Consumption Boom, 3; Huang Wenbin and Sun Xiufang, Tropical Hardwood Flows in China: Case Studies of Rosewood and Okoumé (Washington, DC: Forest Trends, World Agroforestry Center, and CIFOR, 2013), 4, https://www.forest-trends.org/publications/ tropical-hardwood-flows-in-china.
- 79. Environmental Investigations Agency, The Rosewood Racket (Washington, DC: Environmental Investigations Agency, 2017), 2, https://eia-global.org/reports/ the-rosewood-racket; Winfield et al., Global Status, 5.

- 80. Environmental Investigations Agency, The Нопдти, 3.
- 81. Sarah Ferriss, An Analysis of Trade in Five CITES-Listed Taxa (London: TRAFFIC and Chathan House, 2014), https://www.traffic. org/site/assets/files/8617/trade-in-fivecites-listed-taxa.pdf.
- 82. Bennett, "The Sounds," 58.
- 83. Julio César Aizprúa, "Continúa la venta de madera de cocobolo," La Prensa, July 2, 2011, accessed October 16, 2014, https://www.prensa.com/impresa/ nacionales/Continua-venta-maderacocobolo_0_3149685059.html.
- 84. CITES, "CITES Extends Trade Controls to 111 Precious Hardwood Species from Madagascar and Panama," last modified September 28, 2011, accessed September 26, 2012, https://cites.org/eng/news/ pr/2011/20110928_timber_appendixIII.php.
- 85. Vardeman and Runk, "Panama's Illegal Logging Boom."
- 86. Ministerio de Economía y Finanzas, "Decreto Ejecutivo No. 83 de 10 de julio de 2008 Que regula la exportación de madera proveniente del bosque natural o extraída de embalses de agua y se dictan otras disposiciones," Gaceta Oficial No. 26099 (2008): 1-3.
- 87. Ministerio de Ambiente, "Decreto Ejecutivo No. 7 de 2016 Que deroga el Decreto Ejecutivo No. 83 de 10 de julio de 2008, que regula la exportación de madera proveniente del bosque natural o extraída de embalses de agua y dictan otras disposiciones," Gaceta Oficial No. 27957-A (2016): 1-2.
- 88. Vardeman and Velásquez Runk, "Panama's Illegal Logging Boom," 11.
- 89. CITES, "Music to Your Ears: CITES CoP18 Moves Toward Strengthened Regulations for Tropical Trees, As Well As Cautious Exemptions for Rosewood Musical Instruments," August 29, 2019, accessed September 1, 2019, https:// cites.org/eng/CITES_CoP18_moves_ towards_strengthened_regulations_for_ tropical_trees_as_well_as_cautions_ exemptions_for_rosewood_musical%20_ nstruments_29082019.
- 90. Treanor, China's Hongmu Consumption Boom, 12.
- 91. Edward Said, Orientalism (New York: Vintage Books, 1994); Anna Zhu, "Rosewood Occidentalism and Orientalism in Madagascar," Geoforum 86 (2017): 11.
- 92. Robert Benincasa, "Musical Instruments to Be Exempt from Restrictions on Heavily Trafficked Rosewood," National Public Radio, August 27, 2019, accessed August 28, 2019, https://www.npr. org/2019/08/27/754509680/musicalinstruments-to-be-exempt-fromrestrictions-on-heavily-trafficked-rosewood. 93. CITES, "Music to Your Ears."