



Original Research Article

Panama's illegal rosewood logging boom from *Dalbergia retusa*Ella Vardeman ^{a, b, d, *}, Julie Velásquez Runk ^{a, c}^a University of Georgia, Athens, GA, 30602, USA^b City University of New York, Graduate Center, 365 5th Ave, New York, NY, 10016, USA^c Smithsonian Tropical Research Institute, Balboa, Panama^d The New York Botanical Garden (NYBG), Institute of Economic Botany, 2900 Southern Boulevard, Bronx, NY 10458, USA

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ABSTRACT

Over the last decade, illegal rosewood logging has surged worldwide, with much attributable to an uptick in Chinese demand. For the last seventy-five years, Panama's main use of cocobolo rosewood (*Dalbergia retusa*) was in small pieces for artisanal carvings, its state of conservation favoring merchantable timber for recent exploitation with the surging market. Panama's cocobolo rosewood boom was from 2011 to 2015 and, given regulations, was largely illicit. However, no data on cocobolo logging have been made public. Here, we assess Panama's cocobolo logging. We used a media analysis of Panamanian and international reports on cocobolo logging from January 2000 to February 2018 coupled with long-term socio-environmental research to show how logging changed during the boom. We conducted a content analysis of articles to address four specific objectives: 1) to assess how cocobolo logging intensity changed over time; 2) to determine what topics related to logging were important for the press to relay to the public; 3) to show how logging changed geographically as the boom progressed; 4) to demonstrate how Panama and the international community responded to the global boom with new policies on rosewood governance. Media reports indicate how cocobolo logging changed over time and space, beginning with the initial logging intensification in 2011 and peaking with the height of global rosewood logging in 2014 and 2015. Media coverage of illegal logging ebbed during the dry season before the May 2014 elections, facilitating illicit logging and subsequent media coverage under a new administration. As logging increased, it moved from selective logging on western private farms to eastern Panama's forests held by indigenous peoples, including those with insecure tenure. Panama's series of cocobolo rosewood regulations allowed logging in indigenous lands as well as auctions of seized logs. The removal of so many trees during Panama's cocobolo boom, ban on cocobolo logging permits, coupled with global restrictions on commercial rosewoods and a Chinese crackdown on corruption curtailed most logging. We conclude by highlighting the role of media for assessing illegal logging in the absence of other data and underscore the difficulties of forest governance and logging controls for rosewoods, especially given the recent loosening of CITES controls for musical instruments.

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RESUMEN

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Durante la última década, la tala ilegal de los palos rosa ha aumentado en todo el mundo y se atribuye mucho al aumento de la demanda en China. Durante los últimos setenta y cinco años, el uso principal del palo rosa de cocobolo (*Dalbergia retusa*) en Panamá fue en piezas pequeñas para tallados artesanales. El poco uso favoreció la conservación a estado maduros de la madera aprovechable ahora con la creciente demanda. El auge de la extracción del rosa de cocobolo en Panamá fue de 2011–2015 y, según la normativa, fue en gran medida ilícito. Sin embargo, no se han hecho públicos los datos sobre la tala de cocobolo. Aquí, evaluamos la tala de cocobolo de Panamá. Utilizamos un análisis de la prensa panameña e internacional sobre la tala de cocobolo desde enero de 2000 hasta febrero de 2018, junto con investigaciones socioambientales a largo plazo para mostrar cómo la tala cambió durante el auge. Llevamos a cabo un análisis de contenido de artículos para abordar cuatro objetivos específicos: 1) evaluar cómo la intensidad de la tala de cocobolo cambió con el tiempo; 2) determinar qué temas relacionados con la tala fueron importantes para transmitir al público por la prensa; 3) mostrar cómo la tala cambió geográficamente a medida que avanzaba el auge; 4) demostrar cómo Panamá y la comunidad internacional respondieron al auge global con nuevas políticas sobre la gobernanza del palo rosa. Los informes de la prensa indican cómo la tala de cocobolo cambió con el tiempo y el espacio, comenzando con la intensificación de la tala inicial en 2011 y alcanzando su punto máximo con el incremento de la tala mundial de palo rosa en 2014 y 2015. La cobertura de la prensa sobre la tala ilegal disminuyó durante la estación seca antes de las elecciones de mayo de 2014, facilitando la tala ilícita y la posterior cobertura de la prensa bajo una nueva administración. A medida que aumentó la tala, pasó de la tala selectiva en granjas privadas del occidente del país en manos de pueblos indígenas, incluso aquellos con tenencia insegura. Las normas sobre el palo rosa de cocobolo en Panamá permitió la tala en tierras indígenas, así como las subastas de troncos incautados. La eliminación de tantos árboles durante el auge de la demanda de cocobolo de Panamá, la prohibición de los permisos de tala de cocobolo, junto con las restricciones globales sobre los palos rosa comerciales y una represión contra la corrupción en China restringieron la mayoría de la tala. Concluimos destacando el papel de los medios de comunicación para evaluar la tala ilegal en ausencia de otros datos y destacamos las dificultades de la gobernanza forestal y los controles de tala para los palos rosa, especialmente dada la reciente relajación de los controles de CITES para instrumentos musicales.

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1. Introduction

Rosewoods include numerous tree species that prized for their dark reddish, dense woods, many of which also are esteemed tonewoods for musical instruments. Most rosewoods are in the *Dalbergia* genus of Fabaceae, which Linnaeus described in 1781 after determining there was no broad difference in the fruit of *Amerimnon* P. Browne and *Ecastophyllum* P. Browne, (Pittier, 1922). Treasured commercial species are Brazilian rosewood *D. nigra* Vell., Indian rosewood *D. latifolia* Roxb., Madagascar rosewood *D. maritima* R. Vig., and Huanghuali rosewood *D. odorifera* T.C. Chen. Among them is cocobolo rosewood, *Dalbergia retusa* Hemsl., of Mexico and Central America. Over the last decade, there has been a tremendous worldwide surge in illegal rosewood logging, driven by Chinese demand (Basik Treanor, 2015; Environmental Investigations Agency, 2017; Innes, 2010; Siriwat and Nijman, 2018; Wenbin and Xiufang, 2013). In 2016, the United Nations Office of Drugs and Crime (UNODC) reported that seized rosewoods accounted, at 35%, for the greatest proportion of all wildlife seizures from 2005 to 2014 (UNODC, 2016b).

1.1. Cocobolo Rosewood

Cocobolo rosewood, *Dalbergia retusa* Hemsl., is a medium-sized tropical tree reaching heights of up to 25 m high (Hall and Ashton, 2016; Pittier, 1922). Its growth habit varies, spreading or sometimes tall and straight depending on the habitat. Leaves are alternate and compound with 9–14 ovate-oblong leaflets with rounded bases and acuminate to retuse apices. White, papilionaceous flowers grow on sparsely branched axillary racemes. Cocobolo produces a flat, ovate-elliptic, glabrous legume that can range from 7 cm to 12 cm in length depending on the number of seeds produced (Croat, 1978; Pittier, 1922; Record and Garratt, 1923). It is sparsely distributed through much of the Pacific slope from Mexico to Panama, with a recent report from Colombia (Tropicos.org). There are no censuses of Panama's cocobolo populations.

Cocobolo is cherished for its reddish, lustrous wood that often is highly figured with dark lines (Fig. 1). The wood is extremely dense at 1095 kg per cubic meter, much denser than, for example, big-leaf mahogany (*Swietenia macrophylla* King) at 590 kg per cubic meter (Meier, 2015). Where it grows, locals use cocobolo for anything that requires a hard, durable, and aesthetically pleasing wood. Commercially, it was a favored wood for knife handles, as cocobolo contains chemicals that help it resist damage from frequent soaking and drying as well as insects and disease (Record and Garratt, 1923). Cocobolo is most frequently used in fine furniture, cabinetry, and musical instruments, and also has been used in everything from cane handles to gunstocks (Chudnott, 1979; Pittier, 1922; Record and Garratt, 1923). It is considered one of the newer tonewoods used in guitar manufacture (Bennett, 2016).

Cocobolo has been commercially harvested for at least 100 years throughout Latin America (Saha et al., 2013). In Panama, commercial cocobolo logging was prominent in the early twentieth century, such as 1917 when the country exported 2.6 million kilograms (Record and Garratt, 1923). Locals report that its domestic exploitation dropped off because of its reputation for damaging saw blades.

In Panama, cocobolo is most well-known for its use by indigenous Wounaan for carvings. Wounaan and neighboring Emberá prefer strong, durable woods for many household tasks. They have long sold their carvings of shamanic staffs and household tools, some of which are of cocobolo, to tourists. In the 1980s Wounaan began to carve commercial animal

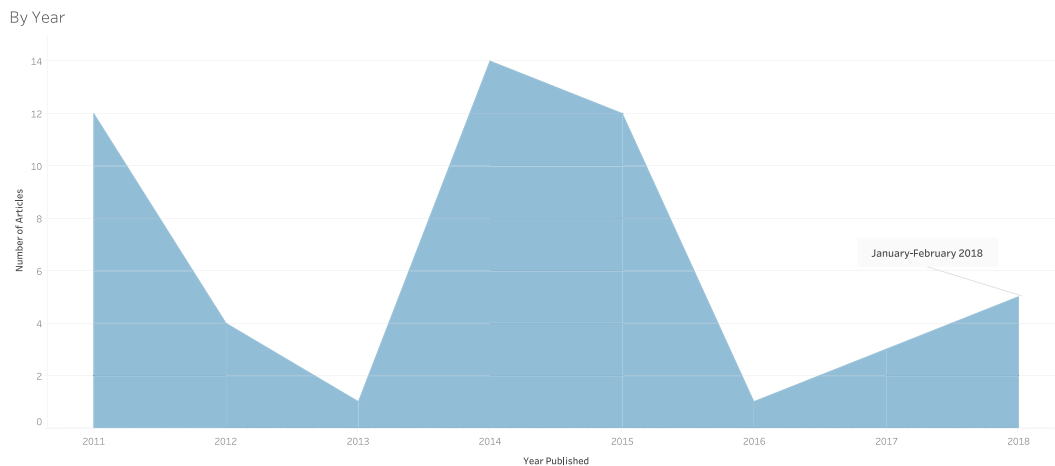


Fig. 1. Articles reporting *Dalbergia retusa* (cocobolo) logging by year. χ^2 test assessed against a null hypothesis of even distribution (shown by average) produced a P -value of 0.000078.

sculptures from cocobolo (Velásquez Runk, 2017; Velásquez Runk, Mepaquito, & Peña, 2004). For Wounaan men, rosewood became a critical source of household income while women developed commercial basketry. In some villages, over 90% of men included commercial carving among their income sources (Velásquez Runk, Ortiz Negría, Quintero García and Quiróz Ismare, 2007). Unlike commercial logging, cocobolo carving took advantage of the wood's resistance to rot, as artists used long-fallen limbs, roots, and, more recently, slash as source materials (Velásquez Runk, Peña, & Mepaquito, 2004).

1.2. Global Rosewood logging boom

With this history of commerce in Panama, the intensity of cocobolo logging that began around 2011 was striking. Throughout that period, the press chronicled logging conflicts, and the second author, conducting socio-environmental research in Panama, witnessed rural communities and environmental conservationists struggling to prevent logging (Alcibiades Cortez, 2013; La Prensa, 2012). Panama's environmental agency, Autoridad Nacional del Ambiente (ANAM), repeatedly issued regulatory policies to curtail cocobolo logging in 2011, 2012, 2013, and 2014 (República de Panamá, 2012, República de Panamá, 2011, República de Panamá, 2013, República de Panamá, 2014a, República de Panamá, 2014b). Cocobolo logging persisted.

Internationally, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) regulates the commerce of threatened species of rosewood. In 2008, Guatemala initially requested commercial protections for *D. retusa*, resulting in its placement under Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Appendix III protections (Species, 2019). Appendix III status allows a CITES member country to gain international cooperation in controlling trades in particular species, requiring documentation for the trade in those species and thus allows the gathering of data to assist in species management (CITES, 2019a). Then in 2011, both Panama and Madagascar also requested commercial protections for their *Dalbergia* species, resulting in the extension of CITES Appendix III protections for seven *Dalbergias* and 104 ebonies, including *Dalbergia retusa*. However, these regulations still allowed non-commercial *Dalbergia* exports with a maximum total weight of 10 kg per shipment (Hover, 2016). All international trade of Appendix II species must be authorized by an export permit or re-export certificate. However, import permits are not required for Appendix II species.

Early on the press reported that Panama's cocobolo was being exported for the Chinese market (e.g., La Prensa, 2013b). Worldwide, China was logging and also importing rosewoods, creating a global rosewood boom (UNODC, 2016b). Many of the original rosewood pieces that characterized Chinese classical furniture from the Ming and Qing dynasties had been destroyed in the Cultural Revolution (Mazurkewich, 2012; Shixiang, 1986). New pieces were made as China's growing middle class sought rosewood furniture in classical designs for both prestige and investment (Yuan, 2011). This resulted in a significant global uptick in illegal rosewood logging, especially higher value species such as *Dalbergia retusa* (Basik Treanor, 2015; Wenbin and Xiufang, 2013).

Panama's cocobolo logging was effectively slowed by local and global controls. Panama's National Environmental Authority suspended cocobolo commerce in April 2014 (República de Panamá, 2014) and then the new administration suspended cocobolo logging in September 2014 (Autoridad Nacional del Ambiente, 2014b), which was repeated in 2015 and 2016 under the new Ministry of Environment (Ministerio de Ambiente, 2015; 2016). Globally, China's new President Xi Jinping cracked down on corruption in 2015, slowing illegal logging (Basik Treanor, 2015), and the conference of parties to CITES uplisted all *Dalbergias* to Appendix II regulated trade status beginning in 2017 (CITES, 2017). However, in August 2019 CITES loosened Appendix II listing to accommodate the manufacture of musical instruments, renewing concerns about effective international rosewood governance (CITES, 2019b).

In Panama, other than data made public by journalists, there remains no publicly available data about cocobolo distribution, permitted logging, illegal logging, confiscated logs, or exported wood. In other locations with a similar lack of access to public data, scholars have begun to use news media as an effective data source on illicit trade, especially the illegal wildlife trade (Patel et al., 2015; Siriwat and Nijman, 2018).

The main objective of this study was to assess Panama's illicit cocobolo logging. We used a media analysis of Panamanian and international reports on cocobolo logging from January 2000 to February 2018 coupled with long-term socio-environmental research to show how logging changed during the 2011–2015 boom. We conducted a content analysis of articles to address four specific objectives: 1) to assess how cocobolo logging intensity changed over time; 2) to determine what topics related to logging were important for the press to relay to the public; 3) to illustrate how logging changed geographically as the boom progressed; 4) to demonstrate how Panama and the international community responded to the global boom with new policies on rosewood governance.

2. Methods

2.1. Data collection

During early 2018, we reviewed online news articles on the harvest and confiscation of cocobolo in Panama from 2000 to February 2018. Despite seeking articles as early as 2000, the oldest article found was from 2011. We ended our media search in the early logging season of 2018 (January and February) because only 5 articles on cocobolo logging were published during that period and they were all on tree and wood governance, rather than logging.

We conducted our search of news articles using Google News and Nexis Uni (formerly Nexis Lexis). We used English and Spanish search terms “cocobolo,” “cocobolo Panama,” “cocobolo illegal,” “wood illegal Panama” (Spanish: *madera ilegal Panama*), and “*Dalbergia* illegal Panama.” Additionally, we carried out searches using the specified terms within search engines on Spanish editions of prominent Panamanian online newspapers of *La Prensa*, *La Estrella de Panamá*, and *Panamá América*, as well as the other media outlets of Telemetro, PanamáON, and TVN Noticias. Google News and Nexis Uni (formerly Nexis Lexis) also led us to several non-Panamanian online new sources with relevant articles: Aporeia, BBC News, CITES, El Dictamen, Insight Crime, Jornada, Mongabay, Otramerica, Roavis, UN News, W radio, and Woodworking Network. Articles were considered relevant if the focus of the article was the extraction, confiscation, sale, exportation, and governance of cocobolo wood, as well as articles covering changes in CITES or Panamanian regulations on cocobolo. We defined extraction as logging of cocobolo trees, confiscation as the seizure of felled trees or merchantable round or sawn wood by Panamanian authorities, sale as domestic cocobolo commerce, export as the movement of commercial wood from Panama, and governance as domestic and international regulations, policies, or international conventions that govern resource use. Extraction, confiscation, sale, and export events were documented for each article within an Excel worksheet. Articles often reported on multiple events leading to a larger number of events than articles. Data collection was considered complete after all search terms on each platform produced only duplicate news articles. Duplicate articles included all articles previously collected as well as articles covering the same event that were clearly adapted from other news sources (same date, same events, and/or same text). In total, we collected 52 news articles covering Panama's cocobolo logging. Metadata for each article (date, news source, author, language, website address, locations, and keywords) were entered in a Microsoft Excel spreadsheet.

Additionally, the media analysis was complemented with long-term socio-environmental work in the region. The second author's work in Panama since 1996 and provided historical, environmental, and social contextualization for the media analysis as she typically was in Panama multiple times each year. That research included rosewood during 1996–2001 work with and consulting for Panama's environmental agency (initially the National Institute of Natural and Renewable Resources and subsequently the National Environmental Authority) on non-timber resources used for indigenous Emberá and Wounaan art, supported by agreements with indigenous authorities of the Emberá – Wounaan General Congress and Emberá – Wounaan Collective Lands General Congress. From 2001 to 2014, the second author researched cultural, environmental, and linguistics topics with the Wounaan National Congress and the Foundation for the Development of Wounaan People through formal agreements. From 2015 to the present, she continues to research on rosewood, ethno-ornithology, and forest restoration with those two organizations. The research was supported by institutional review boards and permits from Panama's National Environmental Authority (ANAM) and the National Institute of Culture (INAC). In 2018, the second author submitted a report on Panama's rosewood market, value chain, and governance to the Wounaan National Congress. Also, the second author used the publicly accessible database Legispan (<https://asamblea.gob.pa/legispan-2>) to review Panama's laws and policies related to cocobolo and interpret them with the media analysis.

2.2. Analysis

Each article was read, manually reviewed for content, and coded for salient themes and keywords using deductive and inductive coding. Google Translate was used to translate Spanish articles into English. Any ambiguities with translation were addressed by the second author, a fluent Spanish speaker. We selected themes and keywords by recording the names of people, organizations, other illegally harvested woods, other terms for *Dalbergia* species, and names of all laws and regulations pertaining to *Dalbergia* extraction. Keywords were words mentioned at least twice throughout all 52 articles and recorded for each article in a Microsoft Excel spreadsheet. Data was analyzed in Excel, using descriptive statistics and χ^2 tests

for significance. The distribution of articles by date was tested against an even distribution as the null hypothesis. Locations of wood confiscations and extractions cited in the articles were assigned a latitude and longitude using www.gps-coordinates.net, which uses Google Maps to provide GPS coordinates using a WGS84 datum. Locational data were recorded in a Microsoft Excel spreadsheet. We initially used ArcGIS and QGIS to display locational data in time series maps, mapping data by the political divisions of province and indigenous reserve lands known as comarcas, the latter only for the three comarcas (Comarca Gunayala, Comarca Emberá-Wounaan, and Comarca Ngäbe-Buglé) accorded provincial status. All data were displayed using Tableau Public.

3. Results

3.1. Media coverage of cocobolo logging

Our media search found 52 articles, illustrating the changing coverage of cocobolo logging over time (Fig. 1). Between 2000 and 2011, cocobolo logging was essentially unreported, with no articles found. In 2011, articles about cocobolo logging first began to appear in the media (12 articles). There is a distinct lull in media coverage in 2012 and 2013, with a total of only five articles. Peak media coverage of rosewood logging occurred during 2014 and 2015, with 14 and 12 articles, respectively (Fig. 1).

Within the scope of this study, the highest months for articles published were September 2011 (four articles), April 2014 (five articles), and June 2015 (five articles). There was a distinct lull in media coverage between 2012 and 2013, with only five articles total (Fig. 1). Media searches of non-Panamanian outlets produced fewer articles than searches of Panamanian news sources (Fig. 2).

Breaking down the media coverage by month reveals distinct patterns (Fig. 3). Panama has two seasons, the dry season (January–April) and the wet season (May–December). Logging primarily takes place in the dry season, because many

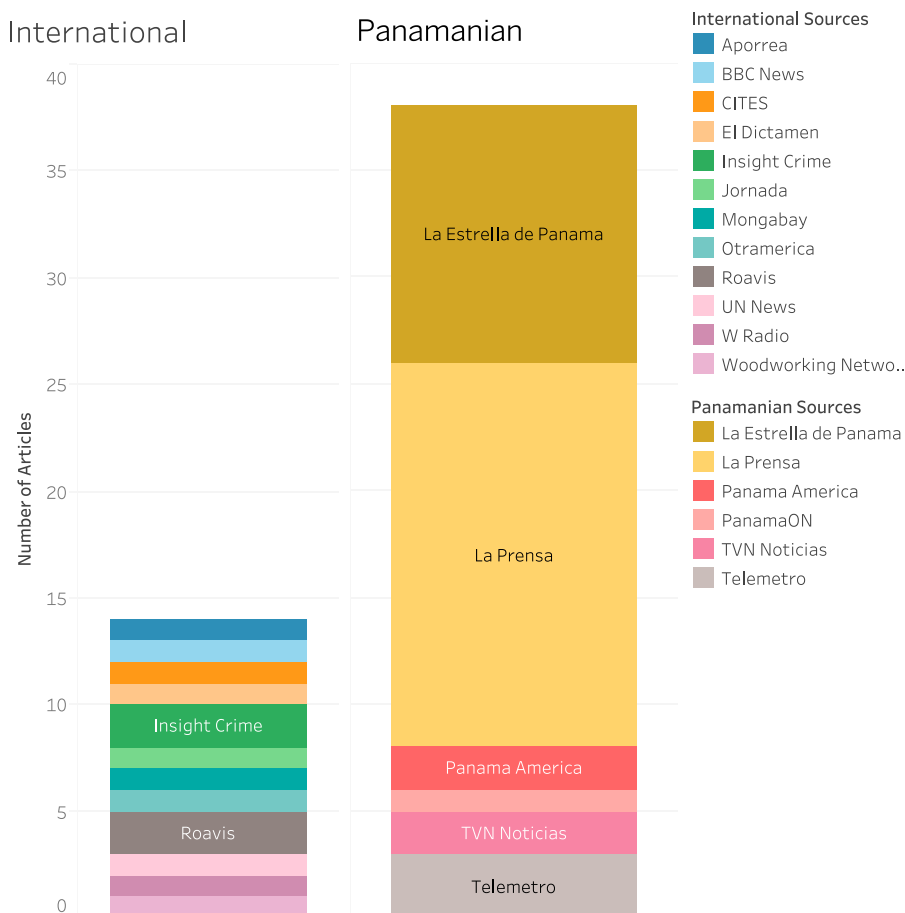


Fig. 2. Articles from international vs. Panamanian sources.

unpaved logging roads are not passable once the rains begin. In the first year of the cocobolo boom, the press reported just after the dry season logging, beginning coverage in the early rainy season (May). In the 2012 logging season, coverage of cocobolo logging picked up and was dominated by stories of Wounaan communities and their conflicts with loggers (Castro, 2012; Gómez Nadal, 2012; Redacción de Prensa.com, 2012). For the remainder of 2012 and through 2013 there was only a single article on cocobolo logging. Press coverage of illegal cocobolo logging increased again in 2014, with coverage markedly increasing in April at the end of the logging season. This period was just before the May 4, 2014 elections. In the dry season of 2015, there was more press coverage of logging than in previous years, with coverage again trailing off until the increase in the early 2018 dry season.

Overall, the media reported on cocobolo extraction, confiscation, local sale, and exportation (Fig. 4). Once ANAM put the 2011 restrictions on cocobolo logging, the press coverage assumed all logged cocobolo was illegal, which was possible given the absence of data on legally permitted cocobolo (a point we will return to below). Throughout the boom, journalists maintained an emphasis on illegal logging, with 98 events of illegal cocobolo extraction reported. In 2011, coverage focused heavily on confiscations and extractions of illegally logged wood, which was covered notably less in the following two years. With the heavy logging in 2014, the media coverage (number of articles) of cocobolo logging increased by 180% from the two previous years (Fig. 1).

3.2. Shifting logging locations

The locations mentioned in the press over the entire period showed a distribution throughout Panama (Fig. 5, bottom). The same data mapped by frequency and political unit reveals a much greater emphasis on Los Santos Province, in south-central Panama, and Darien Province, in eastern Panama (Fig. 5, top).

By further parsing data by year (Fig. 6), it is clear that logging shifted from western to eastern Panama as the cocobolo logging boom increased and then moved back to western Panama in later years. In 2011 (Fig. 6, top), logging was heavily reported from south-central Los Santos Province and by 2015 (Fig. 6, middle) had shifted east to Panama Province and Darién Province. It is common in Panama for the press to refer to Darien Province for events that take place in the Comarca Emberá-Wounaan and yet the media did also report on logging in the comarcas (Table 1). The press reported on logging from the Comarca Emberá-Wounaan (18 articles) and the Comarca Kuna Wargandí (5 articles).

3.3. National and international logging governance

Analysis of salient themes and keywords revealed that Panama's cocobolo media coverage reported primarily on domestic governance. Panamanian policies were mentioned more frequently than CITES regulations in every year of this study except in 2016 (Fig. 7). In that year, there was only one article that mentioned CITES governance compared to none about local governance. During the height of Panama's rosewood boom in 2014 and 2015, journalists gave increased attention to CITES trade regulations. In 2014, six out of 14 articles referred to Panamanian laws while three mentioned CITES and in 2015 11 of 12 articles referred to Panamanian legislation as opposed to two articles that mentioned CITES regulations. In the years 2012, 2013, 2017, and 2018 none of the articles reported changes to CITES regulations, even as the new CITES worldwide restrictions on *Dalbergias* were put into effect in 2017 (CITES, 2017).

Panamanian legislation reported in the articles primarily focused on suspension of cocobolo permits, 20 of the total 52 articles (Fig. 7). Eight articles reported on the first policy to curtail cocobolo logging in 2011, Resolution No AG-0260-2011 (República de Panamá, 2011), with the highest number in 2011 (Fig. 7). That same resolution was also covered by journalists in



Fig. 3. Media coverage of cocobolo logging in Panama by the number of articles per month. Annotations denote implementation of laws and regulations pertaining to *D. retusa* as well as the 2014 Panamanian elections. A χ^2 test to test the significance of articles by month (without regard to year) produced a *P* value 0.229 indicating that the distribution of articles by month was not significant.

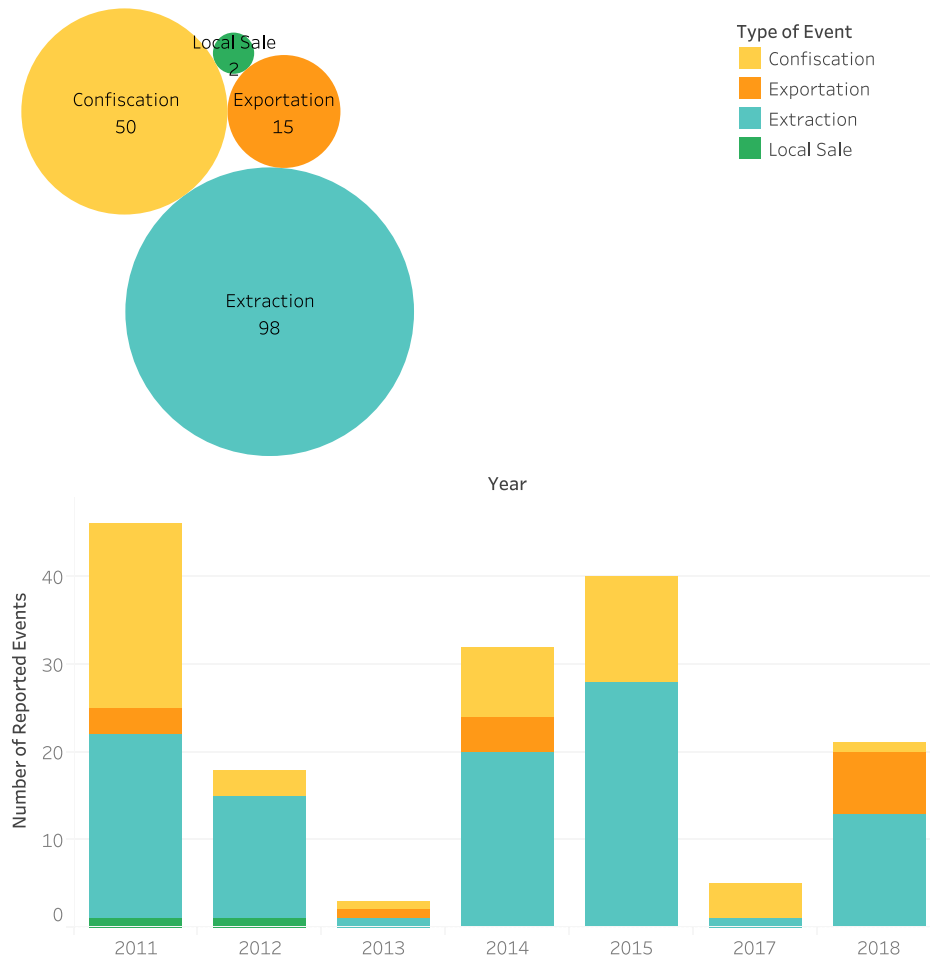


Fig. 4. Type of events (confiscation, exportation, extraction, and local sale) reported in logging articles, across all articles and by year.

2012, 2013, 2015, and 2017, even though additional regulations have been put into place (Fig. 7). Resolution No AG-0260-2011 prohibited the harvest of live cocobolo trees, yet allowed the harvest of fallen trees, stumps, and roots. Furthermore, that policy permitted the felling of live trees if they were on state lands, private farms, or indigenous collective lands and comarcas that are under a management plan (Autoridad Nacional del Ambiente, 2011). Law 72 of 2008 on indigenous collective lands was mentioned in a total of three articles, two in 2015 and one in 2012. The need to refer to that law indicates logging on untitled collective lands, as only two indigenous communities had collective land titles during the main logging boom years (2011–2015) (Velásquez Runk, 2012). A subsequent 2013 policy on rosewood logging, Resolution No. AG 0696-2013, (República de Panamá, 2013) was reported twice, once in 2014 and once in 2018. That policy again banned logging of live trees, yet allowed exceptions for fallen, plantation, and submerged trees and also permitted commerce of trees in public auctions (that is, confiscated trees) and those obtained by community logging permits in Comarcas and indigenous areas (República de Panamá, 2013). The Law that elevated the national environmental authority (ANAM) to the Ministry of the Environment, Law 8 of 2015, was covered once when it was passed in 2015.

4. Discussion

Online sourced media data shows that cocobolo logging in Panama was variable over time and space. Media coverage was high when the boom began in 2011, then dropped off for a couple of years, peaked during the 2014 and 2015 height of the boom, and subsequently decreased after governance policies were put in place. This pattern reflects rosewood trade patterns worldwide, including that of other Central American countries, with a global increase in illegal rosewood logging in 2014 and a decrease in 2015 with a concomitant dispersion from Southeast Asia into other harvesting regions (Basik Treanor, 2015; Environmental Investigations Agency, 2016). The Panamanian press's emphasis on illegal logging and wood confiscations, particularly in 2014 and 2015, illustrates how Panama's rosewood boom parallels the global trends (Fig. 5).

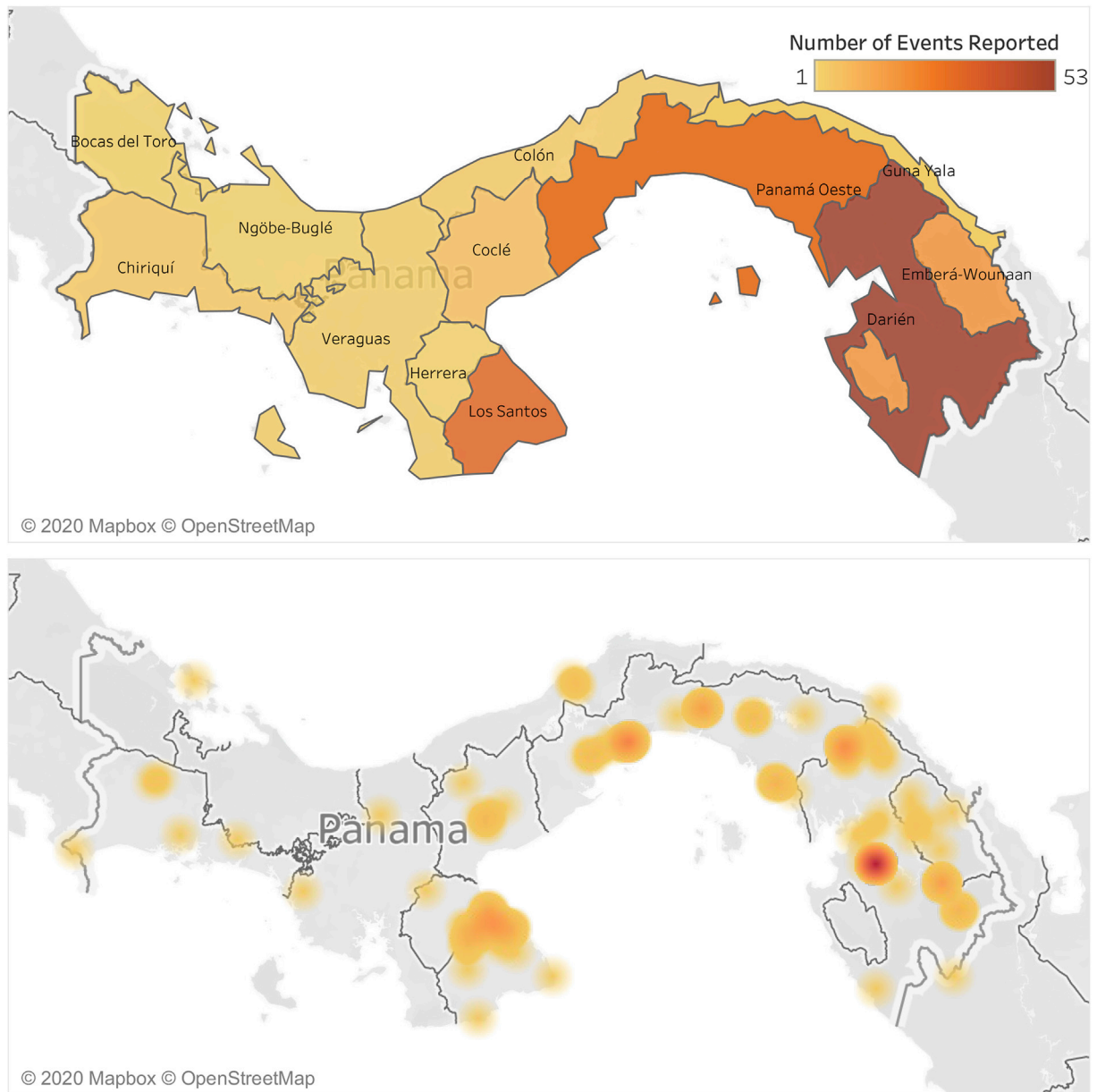


Fig. 5. Media coverage of cocobolo logging in Panama. Top, by Province and the Comarcas with the political-administrative status of provinces; Bottom, by location using specific town names or the centroid of the province. Events that occurred in Panamá Oeste Province, which was created in 2014, were included in data for Panamá Province, as the two provinces were inconsistently differentiated within the media articles.

By examining inner-annual variability of rosewood logging in Panama, we contribute to reports on global rosewood research that have relied on annual data (e.g., [Basik Treanor, 2015](#); [Cerutti et al., 2018](#); [UNODC, 2016b](#)) or data only during the 2014–2016 global boom years ([Siriwat and Nijman, 2018](#)). Panama's reports of cocobolo logging by month shows a tendency for the press to cover logging just *after* the January to April logging season, once the logging had already taken place. This might be a result of greater visibility once logs move from rural logging decks to more urban logging patios or seasonal deterioration of the roads. In Madagascar, seasonal road deterioration resulted in higher rosewood logs prices in the rainy season ([Ratsimbazafy et al., 2016](#)).

There was much annual variation in press coverage of rosewood logging. It is striking that after Panama's 2011 uptick in rosewood logging, in 2012 and 2013 there was relatively little coverage of cocobolo logging. The second author's work in the region during that period makes clear that logging continued, but the little press coverage is illustrative of the relative normalization of illegal rosewood logging, particularly as loggers learned to cut and move illicit logs. During that period ANAM issued two policies to curtail extraction, but the continuation of logging during a relative dearth of press coverage

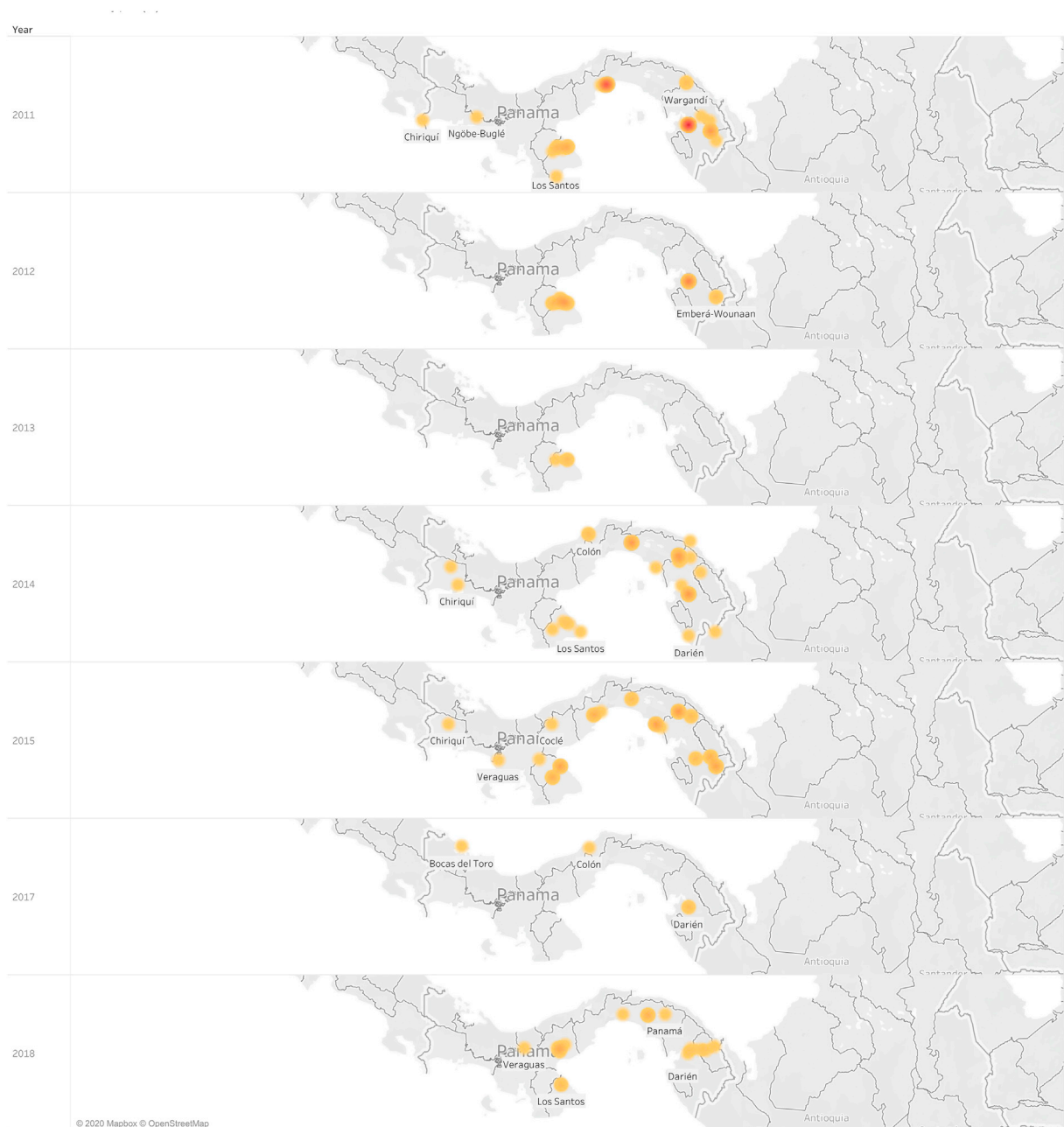


Fig. 6. Shift in logging over time. In 2011 (top), the press reported on logging in western Los Santos Province and eastern Panama in Darién. By 2014–2015 (middle), media coverage of logging was throughout much of the country with an emphasis on eastern Panama. By 2017 and early 2018, reports moved back towards Los Santos and Darién Provinces.

indicates a limitation to relying entirely on media reports even though they are valuable for studying illicit activities. In 2012, a Wounaan press push about a months-long stand-off with cocobolo loggers, in which a logger killed Wounaan leader Aquilio Opuá and then was killed by Wounaan (Gómez Nadal, 2012; Redacción de la Prensa, 2012). Media coverage of illegal logging also was low in 2016 and 2017.

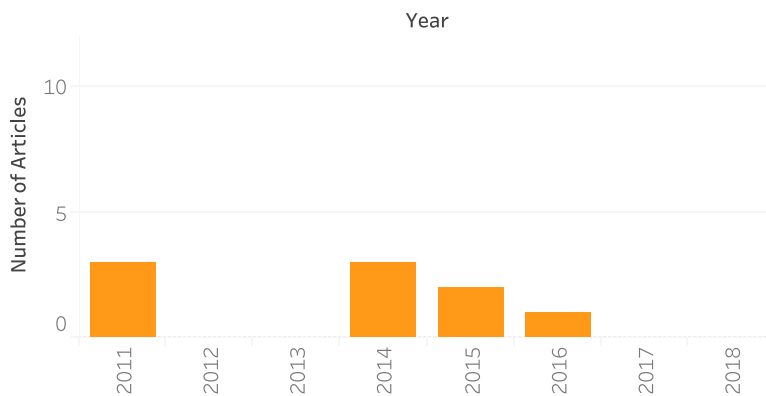
We suggest that this temporal variability in press coverage of logging relates to the election cycle. After the initial alarm of the 2011 logging increase, the absence of media coverage while logging continued means that loggers worked fairly unfettered by the press for almost two years. Media coverage of logging again picked up toward the tail end of the 2014 logging season. In addition to that being the heaviest year of rosewood logging worldwide (Basik Treanor, 2015; UNODC, 2016b), it was also an election year in Panama. Locals report that the dry season before administrations change, as in 2014, is when

Table 1

Logging events reported by province and comarca. Three logging events (two extraction and one seizure events) were not reported with locations and were not included.

Location of events reported	Province	
Comarcas	Emberá-Wounaan	18
	Guna Yala	1
	Ngöbe-Buglé	1
	Wargandí	5
Provinces	Bocas del Toro	1
	Chiriquí	4
	Coclé	6
	Colón	3
	Darién	53
	Herrera	1
	Los Santos	32
	Panamá	31
	Panamá Oeste	5
	Veraguas	2

CITES Media Coverage



Panamanian Regulation Media Coverage

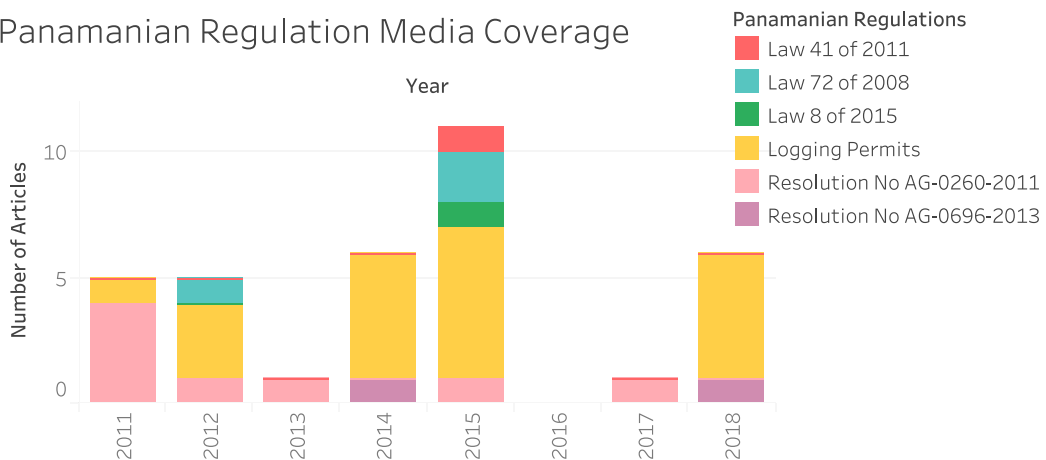


Fig. 7. Media coverage of international (top) and Panamanian (bottom) governance.

logging is heaviest, as the outgoing administration is less attentive to permitting and corruption is rampant. The 2014 uptick of press coverage—which it bears repeating was after logging had already occurred—coincided with the last month before the election. Once the May 4 election was held, the continual coverage on illegal logging supported the new administration's elevation of the environmental authority ANAM to the Ministry of the Environment in late March 2015, under Law 8 of 2015 (República de Panamá, 2015). Press coverage on logging continued through the end of that calendar year but then dropped off for another two years of logging seasons. That lull may relate, as it appears to have in 2012 and 2013, to the entrenchment of loggers in the region. The increase of media coverage in early 2018 reflected a growing urgency stated by local environmentalists to curtail logging before the next anticipated pre-election logging boom.

While articles about cocobolo logging reported on localities throughout the country, logging moved from east to west as the boom progressed. This changing spatiality of logging indicates how logging moved from private farms (e.g., Alcibiades Cortez, 2011a; Alcibiades Cortez, 2011b) to legalized (comarcas) and untitled indigenous lands in Panama and Darién Province (e.g., Bonilla, 2015). This is important because in Panama indigenous areas rival protected areas in terms of forest cover and are effective at avoiding deforestation (Vergara-Asenjo and Potvin, 2014), similar to global patterns of community-managed forests with lower deforestation rates than protected areas (Porter-Bolland et al., 2012). However, in eastern Panama, indigenous people are still struggling to legalize their lands outside of their comarcas (Velásquez Runk, 2012). Without legal rights, indigenous peoples could do little to prevent illegal logging on their lands as they were technically the property of the state.

In addition, some of the policies to curtail logging mentioned indigenous lands as locales where live trees could be harvested. In the first cocobolo logging ban, Resolution No. AG-0260-2011 (República de Panamá, 2011), indigenous lands, along with state lands and private farms, were specifically mentioned as places where logging could occur with a management plan. This requirement for a management plan was watered down in 2013's Resolution No. AG-0696-2013 (República de Panamá, 2013), in which logging in indigenous areas was permitted with community permits. That specificity was necessary because although Law 18 of 2003 (in what was otherwise a redistricting bill) quietly rescinded the indigenous consent articles in the 1998 General Law on the Environment (Velásquez Runk, 2012), many locals thought consent was still required. The ANAM resolutions served to flag that logging in indigenous lands was legal. The fact that articles mentioned the Collective Lands Law (Law 72 of 2008) (Fig. 7), meant that journalists were underscoring indigenous rights to their lands. The rampant illegal cocobolo rosewood logging in indigenous lands helped spur the drafting and passage of the indigenous consent law, Law 27 of 2016 (República de Panamá, 2016).

Throughout the logging boom and after, Panama struggled to govern cocobolo logging, as evidenced by seven bans put in place in 2011, 2012, 2013, 2014, 2015, and 2016, with that final one to be indefinite (República de Panamá, 2012, República de Panamá, 2011, República de Panamá, 2013, República de Panamá, 2014a, República de Panamá, 2014b, República de Panamá, 2015, República de Panamá, 2016). This was true even though Panama and Madagascar joined together to request CITES Appendix III commercial protections for rosewoods and ebonies, including *Dalbergia retusa* (CITES, 2011). In Panama, the 2011–2013 ANAM “bans” specified loopholes which effectively continued cocobolo logging. For example, the 2011 regulations allowed harvesting live trees under a management plan, which was subsequently downgraded in 2012 to a technical inspection, and then changed in 2013 to harvesting submerged woods and logging with a community permit in indigenous areas. Those loopholes allowed illegal wood to be laundered as legal wood, common techniques used worldwide in log laundering (Nellemann, 2012), and also described in Panama (Zea, 2018). In Guatemala, CITES Appendix III *Dalbergia* rosewoods were found to be labeled as other species, another means for laundering illegal wood as legal (Navarro Monge, Santamaria Gutiérrez, Vargas Bolívar, & Milla Quesada, 2014). In addition, the 2013 ban and even the 2014 suspension of cocobolo logging permits allowed the auction of wood seized by the environmental agency (Autoridad Nacional del Ambiente, 2013; 2014b). The media and locals recognized that this was a way for loggers to continue cocobolo logging and commerce: the loggers fell rosewood trees, ANAM seizes the logs, ANAM officials make a deal with the loggers, and the loggers buy back the logs at very low prices and are allowed to continue their rosewood commerce (La Prensa, 2013a). Myanmar and Cambodia are among the countries that have similar corruption around auctioned rosewoods (Basik Treanor, 2015). CITES permits were filed for the export of some cocobolo rosewood in Panama, indicating that some cocobolo was considered legal by the environmental agency or ministry (Velásquez Runk, in prep).

In Panama, the cocobolo boom was effectively quelled in 2015 as worldwide concern about illegal rosewood logging grew. Not only did ANAM suspend cocobolo logging permits in late 2014 (República de Panamá, 2014), China cracked down on corruption (Basik Treanor, 2015), and Panama's cocobolo began to represent illegal logging with which few wanted to be associated. In that same period, environmental crime and forest governance agencies began to circulate reports about illegal rosewood logging and corruption (e.g., Basik Treanor, 2015; Environmental Investigations Agency, 2017). In late 2016, the CITES convention of parties decided to list all *Dalbergias* on Appendix II regulated trade status effective in 2017 (CITES, 2017). Within the first two months of 2018, prime logging season months, the media spotlight focused on curbing illegal logging by 70% and implementing a new wood tracking system (Telemetro, 2018). The UN documented 2018 as a high logging year for Panama (Telemetro, 2018), coinciding with our analysis of diminished governance during election cycles (national elections were held May 5, 2019) and worldwide attention to rosewood trafficking (UNODC, 2016b). However, in August 2019 CITES loosened Appendix II listing to accommodate the manufacture of musical instruments, renewing concerns about effective international rosewood governance (CITES, 2019b). In September 2019, Panama's Ministry of Environment issued a national moratorium on logging, which was scaled back a week later (República de Panamá, 2019a, República de Panamá, 2019b; Ministerio de Ambiente, 2019).

5. Conclusion

This media analysis of cocobolo rosewood logging in Panama over the past decade demonstrates the value of using press accounts when no other data are publicly available. Press, especially the Panamanian press, reported on cocobolo logging as it was occurring, providing proxy data on the temporal and spatial variability of cocobolo logging during the global rosewood boom. In addition, those accounts coupled with an analysis of government policies showed how the government's sequential policies to curb cocobolo logging created loopholes that allowed some legal logging to continue, which facilitates laundering legal logs as illegal ones. Spatializing the media accounts, we illustrated how, as the boom progressed, loggers took advantage of policy loopholes and increasingly extracted trees and wood from forested indigenous lands. In the case of indigenous populations seeking collective title, loggers moved into their forested lands which were technically held by the government that had failed to answer their title petitions. During successive logging seasons, coverage of cocobolo extraction and confiscation decreased only to rise again to be used as a platform during the election season or the establishment of a new administration.

Both Panama and the parties of CITES have given attention to rosewood governance since the boom, with some success. However, the music instrument industry successfully lobbied for the reduction of *Dalbergia* Appendix II trade status for their business. This allows small amounts of *Dalbergia* rosewoods to be legally logged and facilitates the laundering of illegal wood into legal wood, as we have shown for cocobolo and has been documented for rosewood and other logging worldwide (Christian Nellemann, 2012). This is further supported by how Chinese imports of rosewood logs grew six times by value between 2005 and 2015 (Environmental Investigations Agency, 2016). As has been found for other locales (Basik Treanor, 2015; Environmental Investigations Agency, 2016), loggers continue to move on to non-*Dalbergia* rosewood and other precious hardwood species, such as *balsamo* (*Myroxylon balsamum*), *espavé* (*Anacardium excelsum*), and mahogany (*Swietenia macrophylla*) (Bech, 2014; Rodriguez, 2015). The cocobolo case exemplifies the difficulties of controlling illegal logging. This can serve to advance for protections of similarly exploited species in the future, especially since illegal logging has become the most profitable illicit environmental industry (Nellemann et al., 2018). This coupled with the beauty of the woods and the difficulty of quickly distinguishing among them (e.g., Espinoza et al., 2015), suggests that worldwide rosewood demand for the non-plantationharvested woods is likely to persist.

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The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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