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THE ONLINE AGARWOOD TRADE AND SEIZURE ANALYSIS IN THE PHILIPPINES

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ABSTRACT – Agarwood is the resinous heartwood that forms in some *Aquilaria* and *Gyrinops* species and is valued for its fragrance. The trade of agarwood for cultural and medicinal purposes has been documented for over 1,500 years. The persistent demand for agarwood threatened the survival of many agarwood-producing species, resulting in the inclusion of all *Aquilaria* and *Gyrinops* in CITES Appendix II, which went into effect in 2005. Despite the historical and longstanding use, it appears to have started only recently in the Philippines. This study provides baseline information on the trade of agarwood and related products, importation of *Aquilaria* species, and trafficking based on the online survey and seizure records in the Philippines. Results of a nine-month online survey from June 2021–February 2022 of agarwood trade groups showed that seedlings (n=690), agarwood (n=351), and fruits/seeds (n=265) were the most frequently advertised products. Prices ranged from PHP 25–350 (USD 0.49-6.84) for each seedling, PHP 1,000–4,000 (USD 19.50-78.20) for fruits/seeds per kilogram, and PHP 40,000–300,000 (USD 782-5,865) for agarwood per kilogram. Seizure records from authorities from 2012 to 2021 documented 37 agarwood seizure incidents from 2018 to 2021. No seizures were recorded from 2012–2017. Most seizures occurred on Leyte, Mindanao, and Luzon islands. Based on CITES Trade Database records, agarwood chips were imported from six countries but did not have corresponding DENR import permits, rendering the transactions illegal under Republic Act No. 9147. The ongoing destructive and illicit collection of agarwood in the Philippines is likely endangering the survival of *Aquilaria* species in the wild. However, available information on the scale of the problem is limited. The Philippines has adequate laws to protect natural resources but enforcing them remains challenging. Prevention of illegal cutting of wild *Aquilaria* trees is essential to ensure the species' survival in the wild. The potential of silviculture for agarwood production to support livelihood programs rather than being an extractive, get-rich-quick scheme in the Philippines that appears to be mushrooming in the country also warrants more in-depth studies.

Keywords: Aquilaria, CITES, illegal wildlife trade, Lapnisan, R.A. No. 9147

INTRODUCTION

Agarwood (Fig. 1) is the resinous, aromatic, and highly prized heartwood that forms in several *Aquilaria* and *Gyrinops* species of the Thymelaeaceae family (Barden *et al*., 2000). It is locally known as *lapnisan* but is often confused as *lanete*, which is the local name for a different tree, *Wrightia pubescens*

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R.Br. ssp. *laniti* (Blanco) Ngan of the Apocynaceae family. *Aquilaria* species are indigenous to East, South, and Southeast Asia's primary dipterocarp and mixed dipterocarp forests and can attain heights between 6 and 30 meters (Chua, 2008; Yin *et al*., 2016; Wang *et al*., 2021). The Philippines is host to five endemic (*A. apiculata*, *A. brachyantha*, *A. citrinicarpa*, *A. parvifolia*, and *A. urdanetensis*) and three indigenous (i.e., occur in other countries as well) (*A. cumingiana*, *A. filaria*, and *A. malaccensis*) species (Pelser *et al*., 2022) making it an epicenter of *Aquilaria* diversity in the Malesian region.

Figure 1. Pieces of agarwood seized by the National Bureau of Investigation in 2019. Photo © Emerson Y. Sy.

The natural formation of agarwood in trees is hypothesized to be the result of a physiological response to wounding (e.g., lighting strike, broken branches), pest infestation, or diseases (e.g., fungal infection) (Azren *et al*., 2018). After several decades, a very dense and resin-embedded heartwood may eventually form (Wang *et al*., 2020). Only a tiny percentage of *Aquilaria* trees form agarwood in the wild, and detection of the presence of agarwood can be difficult since external indications are not always visible (Barden *et al*., 2000). Agarwood has been traded for over 1,500 years for cultural and therapeutic purposes, with wide demand in the Middle East and East Asia as raw material for the production of perfume, oil, traditional medicine, sculpture, beads, and wine (Ali *et al*., 2016; Antonopoulou et al., 2010; Jung, 2013; Lopez-Samson and Page, 2018; Soehartono and Newton, 2001; Tran *et al*., 2003). The persistent market demand led to the unsustainable and indiscriminate felling of trees in pursuit of agarwood, resulting in the severe depletion of *Aquilaria* populations and illegal harvests in range states (Barden *et al*., 2000; Lim and Anak, 2010; Soehartono and Newton, 2001; Yin *et al*., 2016).

The agarwood trade is one of the most valuable forest products, generating billions of dollars annually (Jim, 2015). Indonesia and Malaysia exported 1,260 tons of agarwood from 1995 to 1997 (Barden *et al*., 2000). Although there is no unified standard in place for determining the quality and pricing of agarwood, the scent intensity, color, weight, size, shape, rarity, and country of origin are the main factors in determining its monetary value (TRAFFIC, 2005; Barden *et al*., 2000; Lim and Anak, 2010). The price per kilogram of agarwood pieces ranges significantly from a few United States Dollar (USD) to several thousand USD (Akter *et al.*, 2013; Chua, 2008; Desa *et al.*, 2021; Kanazawa, 2017). Top-quality agarwood pieces can fetch up to USD 10,000/kg (Tran *et al.*, 2003), while premium oil sells as much as USD 30,000 per liter (Barden *et al*., 2000).

Enticed by the high prices of agarwood, investors started silviculture for agarwood production in Guandong Province, China, to supply the market in 1978 (Yin *et al*., 2016). Subsequently, investors from various nations, which include Bhutan, India, Indonesia, Malaysia, Thailand, and Vietnam, established *Aquilaria* plantations (Persoon and van Deek, 2008). The estimated quantity of cultivated *Aquilaria* is >20 million trees in China, 10m in India, 3.4m in Indonesia, 1.2m in Malaysia, and 1m in Vietnam (Azren *et al*., 2018). Agarwood silviculture faces challenges, including intensive capital requirements, a lengthy production period before the return on investment, and the limited success of currently available inoculation technology (Desa *et al*., 2021). There have been questions about the ability of cultivated agarwood to supplant the market for wild agarwood since the majority of plantations can only produce low- to medium-quality agarwood, which is only suited for the manufacture of less valuable commodities (TRAFFIC, 2005; Persoon and van Deek, 2008).

During the 9th Conference of Parties (CoP 9) in 1994, India proposed the listing of *Aquilaria malaccensis* in CITES Appendix II due to habitat destruction and indiscriminate felling of *Aquilaria* trees, even young and uninfested trees, which threatened the survival of the species in the wild (CoP 9 prop. 114). The proposal was accepted and came into force on 16 February 1995. The inclusion of all species of *Aquilaria* and *Gyrinops* in CITES Appendix II, except for certain parts and derivatives (i.e., fruits, seeds), was accepted in 2004 and came into force on 12 January 2005 (CoP 13 prop. 49).

Provisions of the Revised Forestry Code of the Philippines/Presidential Decree (P.D) No. 705 as amended by Executive Order No. 277 series of 1987 and the Wildlife Resources Conservation and Protection Act of 2001/Republic Act (R.A) No. 9147 stipulates protection of all indigenous plant species in the Philippines, including *Aquilaria*. Section 68 of P.D. No. 705 states that cutting, gathering, and/or collecting timber or other forest products from forests, public land, or private land is prohibited without a license or permit. Under section 27 of R.A. No. 9147, it is prohibited to kill/destroy, trade, collect, gather, possess, or transport wildlife without relevant permits. Due to concerns about climate change and its devastating effects on the environment, Executive Order No. 23 series of 2011 was issued to declare a moratorium on the cutting and harvesting of timber in the natural and residual forests, which also followed the creation of the anti-illegal logging task force. The Department of Environment and Natural Resources (DENR) Administrative Order No. 2017-11 (DAO 2017-11) categorized *A. malaccensis* as Endangered, while the remaining seven indigenous *Aquilaria* species were categorized as Vulnerable. The amount of monetary fines and length of imprisonment vary based on the nature of the commission of the illegal act and the conservation status of a species. Illegal logging in a critical habitat is punishable by a fine of up to PHP 5,000,000 (USD 97,746) and/or eight years of imprisonment. For illegal trade, possession, or transport of Vulnerable and Endangered species, the penalties vary from 1–3 months of imprisonment and a fine of PHP20,000 (USD 391) and 1–2 years of imprisonment and a fine of PHP200,000 (USD 3,910), respectively. In addition, the law stipulates that the fine "shall be increased by at least ten percent (10%)

every three years to compensate for inflation and maintain the deterrent function of such fines". Since the law's adoption on 30 July 2001, the penalty should have been increased seven times by 2022, though it is unsure how this is practiced and enforced.

In the past five years, agarwood seizures and a burgeoning interest in cultivating *Aquilaria* species for agarwood production have been reported in the local news. In response to these recent developments, the DENR started issuing Wildlife Culture Permits for agarwood production in 2021. This research was undertaken to provide baseline information on agarwood trade in the Philippines based on surveys of online posts from agarwood traders, analysis of seizure records, and commodity inflows and outflows from the Philippines involving transnational buyers.

METHODS

A nine-month online market survey of Philippine Facebook groups specializing in agarwood trade and related products such as *Aquilaria* seeds, seedlings, and inoculants was conducted from June 2021 to February 2022. We surveyed ten publicly-accessible groups during the first two months and included five additional groups for the succeeding seven months. Each Facebook online post advertising agarwood-related material was manually reviewed, and pertinent information, such as the species, quantity, price, source, and location of the trader, was noted based on Facebook profiles and other metadata provided on the posts. Traders with multiple Facebook accounts were merged into a single account. An advertisement posted multiple times by a trader in different groups was recorded once to avoid inflating the total available quantity in the trade. We also recorded offers made by traders based in other countries, which were excluded in the domestic trade analysis since the products were overseas.

Data from the CITES Trade Database on international *Aquilaria* spp. trade to the Philippines covering the period of 1995-2021 was extracted on 1 December 2022 and analyzed to determine possible legal sources of agarwood. For the seizure analysis, we reviewed unpublished seizure records of the DENR-Biodiversity Management Bureau (DENR-BMB), Palawan Council for Sustainable Development Staff (PCSDS), and Bureau of Customs-Environmental Protection and Compliance Division (BOC-EPCD) from 2012 to 2021. We also collated open-source news reports and social media posts on agarwood seizures from 2016 to 2021. Source, transit, and destination locations were recorded when available. We used the exchange rate of USD 1 = PHP 51.1528 throughout the report for consistency (oanda.com/converter as of 28 February 2022).

RESULTS

Domestic Online Trade

From June 2021 to February 2022, a total of 1,323 advertisements offering to sell agarwood and *Aquilaria* products were documented. The most advertised products were seedlings (n=690; 52%), agarwood (n=351; 26%), and fruits/seeds (n=265; 20%) (Fig. 2. 2). Seedlings of three native species – *A. cumingiana*, *A. filaria*, and *A. malaccensis* and two non-native species – *A. crassna* and *A. sinensis* were offered for sale.

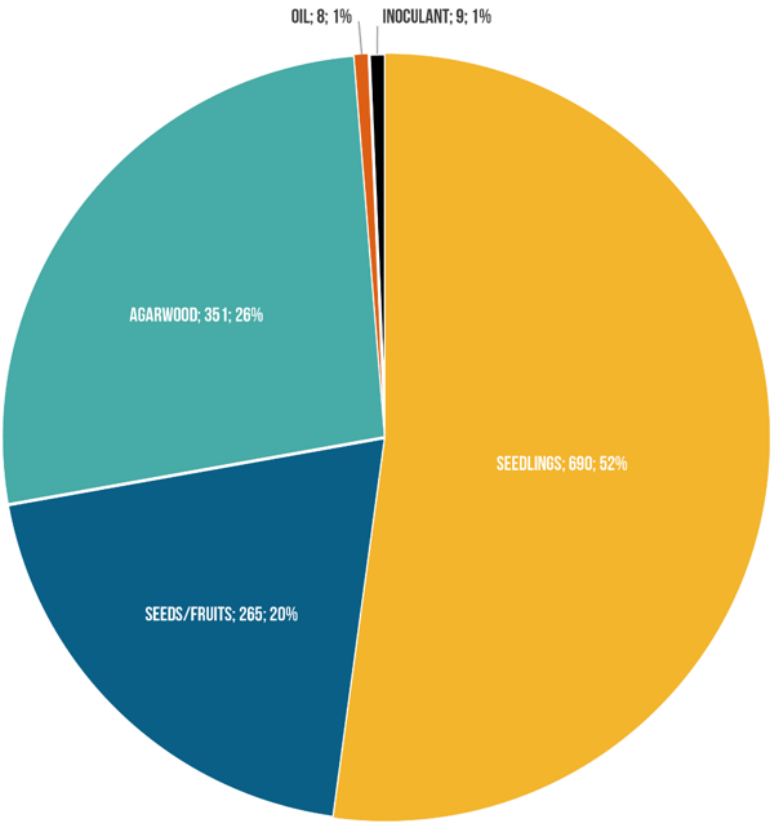

Figure 2. Online domestic advertisements of agarwood and related products in the Philippines from June 2021 to February 2022.

The asking prices for seedlings varied by species and size. The usual prices for *Aquilaria cumingiana* and *A. filaria* seedlings ranged from PHP 25/USD 0.49 (18–23 cm height) to PHP 250/USD 4.89 (25–38 cm height), whereas *A. malaccensis* seedlings were priced from PHP 220–350/USD 4.30–6.84 (18–25 cm height). Additionally, larger seedlings were offered for sale up to PHP 4,000 (USD 78.20) per plant. The fruits of *A. malaccensis, A. cumingiana,* and *A. filaria* were available for PHP 1,000–4,000/kg (USD 19.50–78.20/kg), while seeds were occasionally available for PHP 5–20/seed (USD 0.10–0.40). Agarwood pieces ranged in price from PHP 40,000 to PHP 300,000 per kilogram (USD 782–5,865). *Aquilaria* seed and seedling traders marketed their products as the "world's most expensive tree" or "wood of the gods" to entice investors to buy their seeds and seedlings and start *Aquilaria* farming in the Philippines. A hectare of land planted with 833 *Aquilaria* trees was projected to generate PHP 21,000,000–416,000,000 (USD 410,535–8,132,497) per hectare, assuming that each tree produced one kilogram of agarwood and sold for PHP 25,000 – 500,000 (USD489 – 9,774)/kg (Cercado, 2021).

Online Traders

Researchers recorded 334 unique Facebook accounts offering agarwood and related products located on at least 12 islands in the Philippines (Fig. 3). Based on the 179 accounts with location information, the majority of the traders were based on the islands of Mindanao (n=74, 41.3%) and Luzon (n=72, 40.2%), particularly in the provinces of Davao del Sur (n=18), Agusan del Sur (n=9), Davao Oriental (n=9), Sorsogon (n=23), and Camarines Sur (n=13).

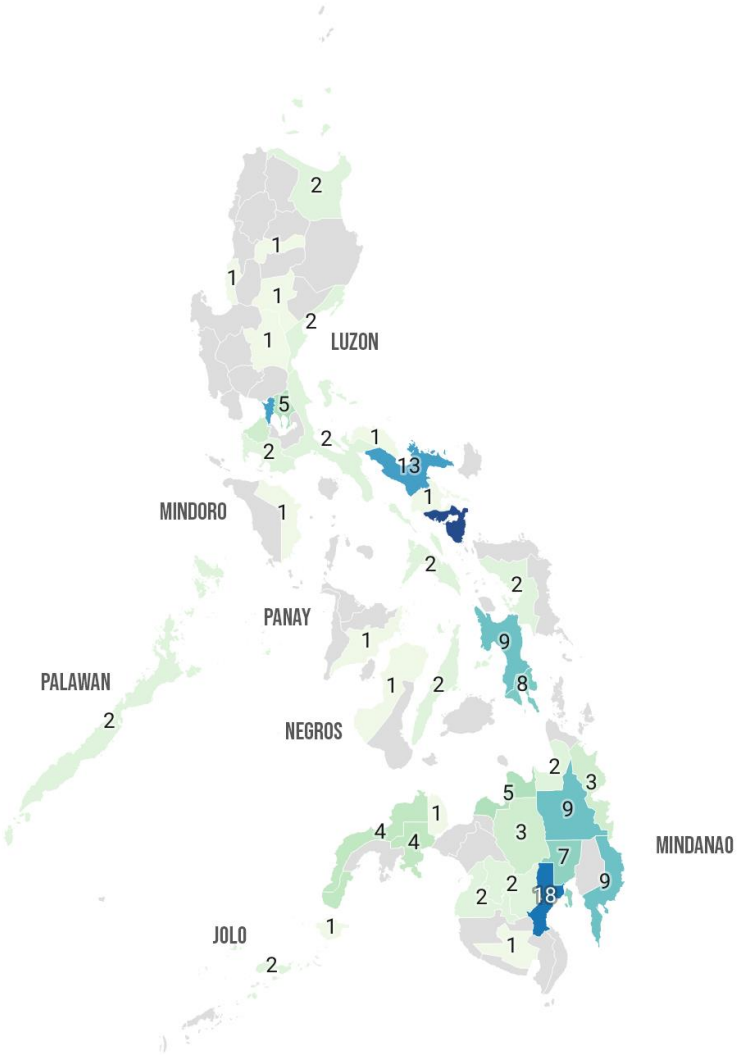

Figure 3. Online traders with location information in the Philippines.

CITES Trade Database

Between 2002 and 2021, 24 importation records of 10 commodity kinds of *Aquilaria* species into the Philippines were found in the CITES Trade Database. (Table 1). No *Aquilaria* import records were found for the period 1995–2001.

Table 1. International *Aquilaria* spp. trade to the Philippines between 2002 and 2021. No records were found for the period 1995–2001.

Commodity	Quantity	
	Exporter-reported	Importer-reported (Philippines)
Carvings	144 g	-
Cosmetics	36.7 g	-
Derivatives	24.7 kg	2 (unit ?)
Extract	-	2 bottles
Live	1,000	-
Oil	104 g	-
Powder	60 g	100 (unit ?)
Seeds	16 kg	-
Timber pieces	-	2 pcs
Wood chips	1,774 kg	-

Based on the CITES Trade Database, a total of 1,774 kg of agarwood chips were exported by six countries from 2018–2020 (Fig. 4), but without corresponding CITES import permits from the Philippines.

Seizure Incidents

From 2018 to 2021, 37 seizures involving at least 329.32 kg of agarwood were recorded (Fig. 5). Three seizures in Leyte Province did not indicate the amount seized, and no agarwood seizures were reported from 2012 to 2017. Twelve incidents (33%) involved 23 foreign nationals (Vietnam [n=8], China [6], Malaysia [3], India [3], Cambodia [2], and Indonesia [1]) who were apprehended while in possession of illegally-acquired local wild agarwood on the islands of Samar, Leyte or Mindanao. In addition, 88 Philippine nationals were identified to be involved in the poaching or trafficking of agarwood. The record included a seizure incident involving 17 poachers who cut down dozens of *Aquilaria* trees in the Municipality of Abuyog, Leyte Province in July 2019. However, neither the actual number of trees nor the presence of agarwood in the chopped trees were specified in the report.

Seizure incidents occurred across 12 provinces and the National Capital Region (NCR) on five islands from 2018 to 2021. The most agarwood seizure incidents occurred in 2020 and accounted for 55% of the total seized quantity during the study period. The islands of Samar and Leyte in Eastern Visayas had the most incidents, with 16 cases (43%), followed by Luzon and Mindanao with 11 (30%) and 9 (24%) cases, respectively (Fig. 6A). The highest total seized quantity was on Mindanao with 158.69 kg. This was mainly due to two separate outbound agarwood smuggling attempts via commercial courier to Vietnam involving a total of 93.24 kg in eight boxes at the Francisco Bangoy International Airport, Davao City, in December 2020 (Fig. 6B). The Bureau of Customs also seized two packages containing a total of 28.7 kg of agarwood from Laos and Vietnam and seven packages containing a total of 11 kg of *Aquilaria* fruits from Laos at the Ninoy Aquino International Airport (NCR) and Mactan-Cebu International Airport (Cebu) in 2020–2021.

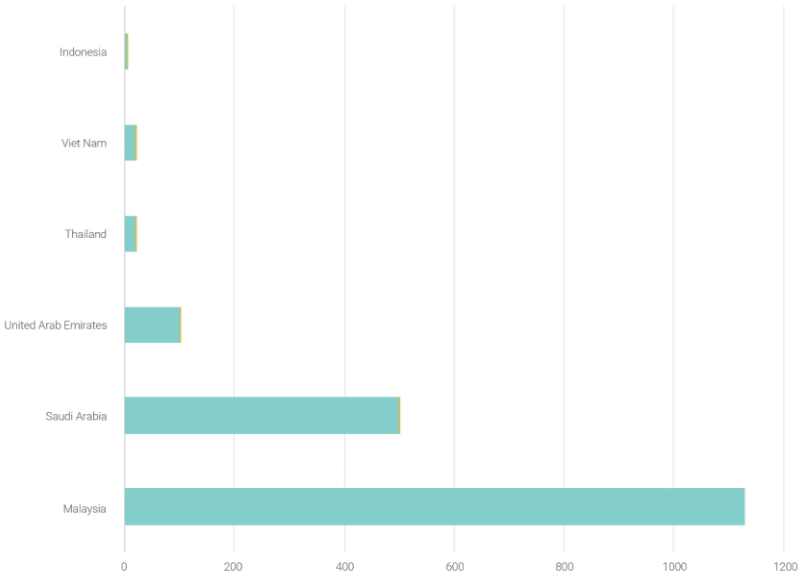

Figure 4. Source countries and total weight in kg of imported agarwood chips to the Philippines from 2018–2021.

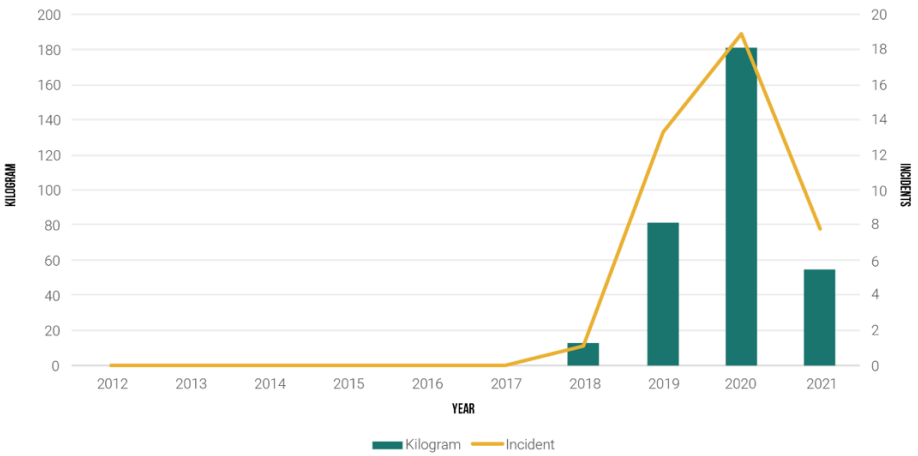

Figure 5. Agarwood seizure incidents and seized quantity in the Philippines from 2012 to 2021.

A


7
NCR
1
RIZAL
1
QUEZON
1
CAMARINES SUR
1
CATANDUANES
SORSOGON 1
1
NORTHERN SAMAR
SAMAR 1
1
EASTERN SAMAR
13
LEYTE
5
AGUSAN DEL NORTE
1
AGUSAN DEL SUR
3
DAVAO DEL SUR

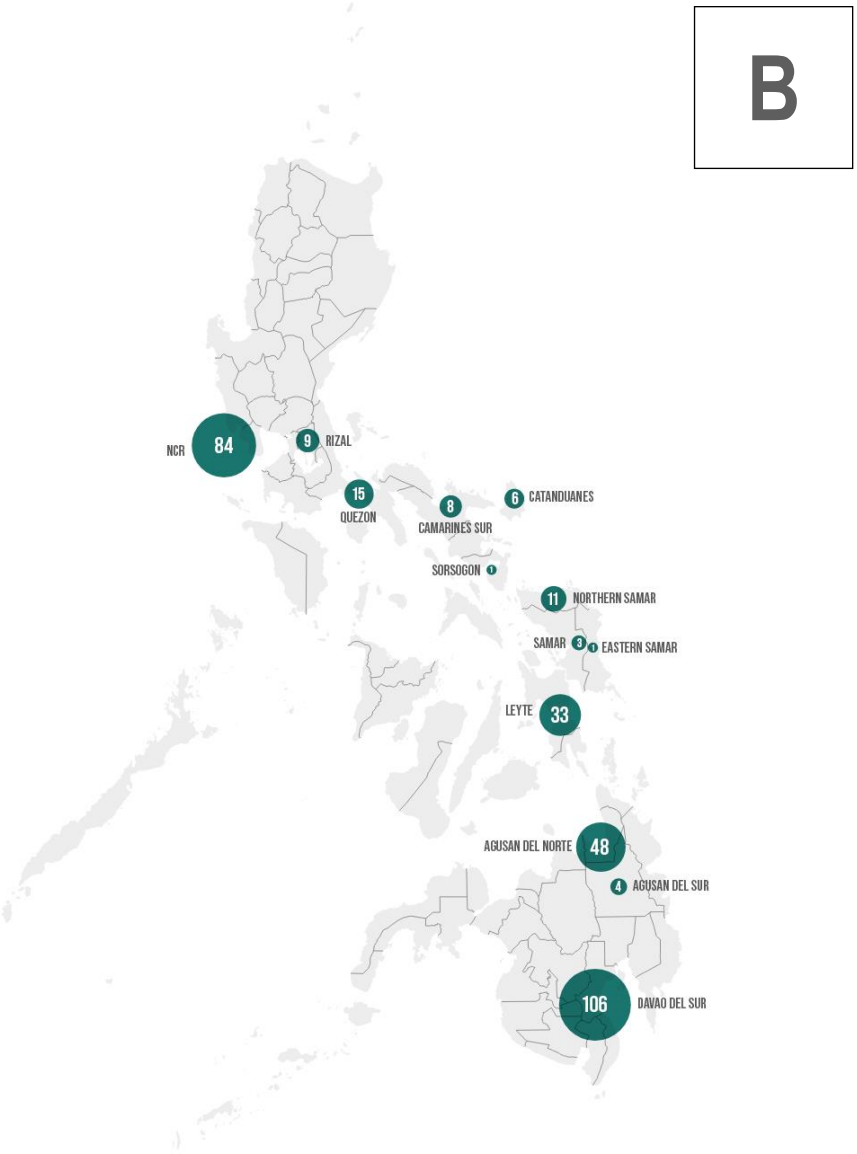

Figure 6. Agarwood seizure incidents and locations (A) and seized quantity in kg (B).

Trade Methods and Routes

Details from law enforcement efforts and online trade reveal that local wild agarwood is illegally sourced from natural forests in the islands of Mindanao and Leyte. Despite the species being legally prohibited from any harvest or trade in the country, domestic agarwood traders post offers publicly on Facebook agarwood groups and engage in private negotiations with prospective buyers over pricing, meeting location, and delivery method. Based on information from online agarwood trade groups, some traders falsely claim to possess the required tree-cutting permit and authorization to sell from the DENR to entice buyers. Typically, potential buyers inspect the quality, size, and aroma of agarwood during face-to-face meetings. A domestic buyer usually travels to the seller's location. However, it is also known that traders will transport agarwood illegally by automobile from the source to a buyer in the NCR or nearby provinces (Fig. 7A). International buyers may perform online transactions based on agarwood photos and videos sellers provided and have the items shipped by courier. After contacting local sellers online, a few foreign buyers travel to the Philippines to purchase agarwood. In the absence of relevant permits (i.e., cutting permit, local transport permit), foreign buyers have attempted to conceal agarwood in luggage and illegally transport it from the source (i.e., Leyte, Mindanao) through the international airport in the NCR to their home countries or ship agarwood and related products by air freight to and from the Philippines (Figure 7B).

DISCUSSION

The illegal collection and trafficking of agarwood in the Philippines appears to have commenced in 2017. The first Philippine agarwood trade group on Facebook we documented was created on 20 April 2017 and is currently the most prominent group with 33,245 members. As of 25 July 2022, at least 56 Philippine-based agarwood trade groups are on Facebook, with a total membership of 213,417 have been recorded. Although unlawful agarwood trading activities may have begun earlier, we found no records dating earlier than 2017. The first reported agarwood seizure in Davao City, Davao del Sur Province, Mindanao Island, involving three foreign nationals in 2018, clearly shows buyers seek agarwood outside their nations or traditional suppliers. Seizure records suggest that the islands of Leyte and Samar in Eastern Visayas and Mindanao are source locations of wild agarwood in the Philippines. Moreover, the NCR is the most significant international transit hub.

Agarwood traders in the Philippines also sourced agarwood chips from overseas. Analysis of records from the CITES Trade Database showed the importation of agarwood chips commenced in 2018. Six countries exported 1,774 kg of agarwood chips to the Philippines between 2018 and 2020 without import permits from the Philippine CITES Management Authority. While the agarwood chips were legally exported from source countries, shipments without the corresponding Philippine import permit make these transactions illegal under R.A. No. 9147. There is no known local use for agarwood chips in the Philippines, so imported agarwood chips are likely to be resold to international customers.

With the encouragement of *Aquilaria* seed and seedling traders, more individuals are interested in planting *Aquilaria* for agarwood production. Only 10 out of at least 135 online seed/seedling sellers mentioned having a business registration and DENR wildlife culture permit. This suggests that many *Aquilaria* seed and plant sellers likely do not have the necessary permits to operate or trade legally. Silviculture for agarwood production is still nascent in the Philippines, with no farms successfully producing cultivated agarwood to date. While a few proponents of agarwood silviculture have provided potential revenue based on a set of assumptions such as harvest volume and the buying price of top-quality

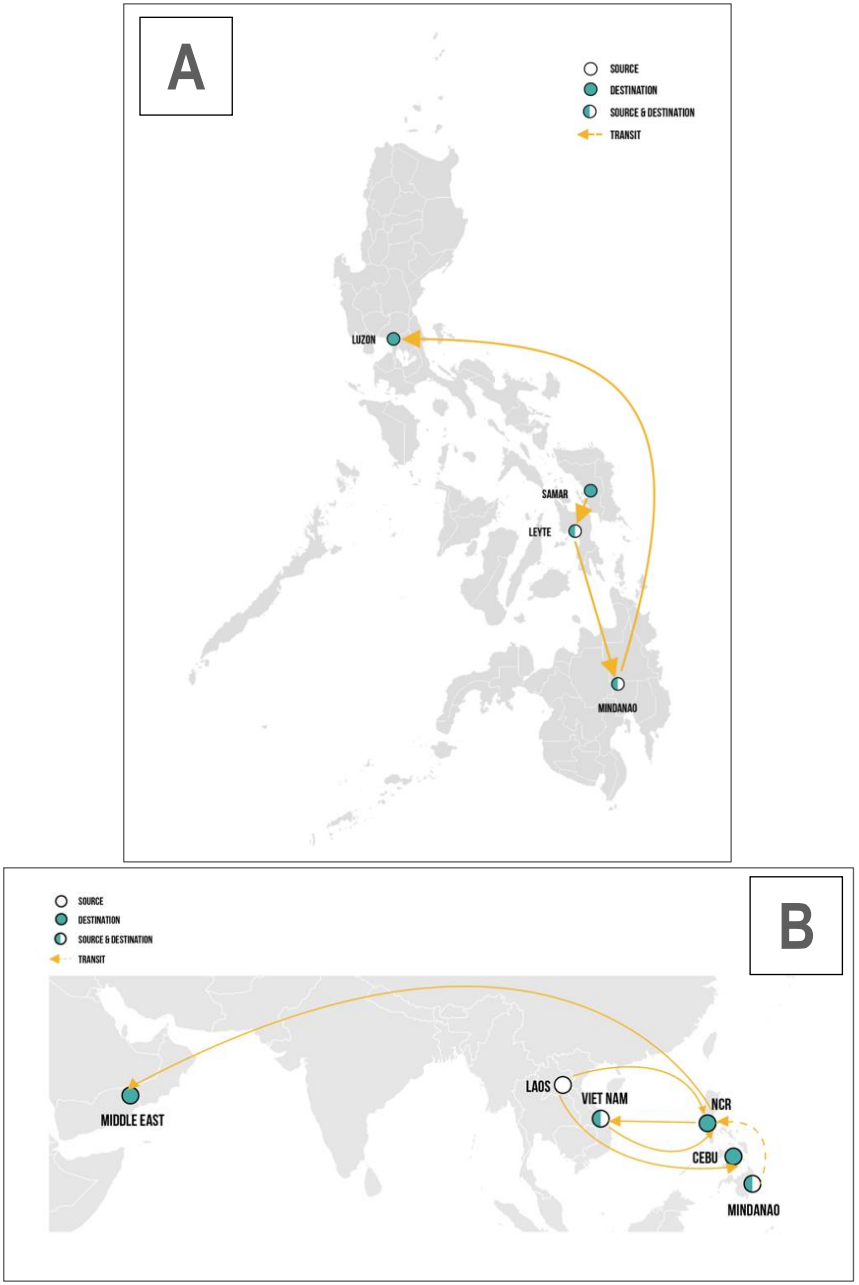

Figure 7. Domestic agarwood trade route (A) and international agarwood trade route (B) based on seizure records.

agarwood, the likelihood of a projected lucrative income from cultivated agarwood to materialize is very low because the quality of cultivated agarwood is still far inferior to that of wild agarwood (Kanazawa, 2017) and buyers are unlikely to pay a premium for it. While the quantity of cultivated agarwood may increase over time, it is unlikely to decrease or remove the demand for wild agarwood.

CONCLUSION

It has been established that the illegal collection and trafficking of agarwood elsewhere pose significant threats to *Aquilaria* species. Many *Aquilaria* populations have been severely depleted or extirpated in several range states, leading to their threatened status in the IUCN and listed in CITES Appendix II. The ongoing illegal collection in the Philippines likely threatens the *Aquilaria* populations in the Bicol Peninsula, Eastern Visayas (i.e., Leyte, Samar), and Mindanao, but distribution and density data are scarce. The Philippines has enacted strong legislation to protect natural resources on legal terms. However, enforcement remains a challenge, exemplified by the undetected illegal importation of agarwood chips from 2018–2021. Real-time information gathering by wildlife authorities should be high on the priority list to prevent the illegal cutting of *Aquilaria* trees in natural forests and ensure healthy populations' survival. The prospect of sustainable silviculture of *Aquilaria* for agarwood production that could have additional benefits for the local communities should be given more fiscal and research attention by the government and its various research agencies. It could be a more sustainable alternative than the proliferation of unregulated, get-rich-quick schemes that offer a direct monetary incentive to poach seeds and seedlings, which may eventually contribute to the depletion of native *Aquilaria* stands in the country.

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STATEMENT OF AUTHORSHIP

EYS conceptualized the study. EYS and AGBM collated the data and contributed equally to the writing of the paper.

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of illegally cut, gathered, removed and possessed forest products, and granting rewards to informers of violations of forestry laws, rules and regulations. Executive Order No. 277, series of 1987. https://www.officialgazette.gov.ph/1987/07/25/executive-order-no-277-s-1987/

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