Case Study

Orchid
Case study 1: Illegal trade in live orchids with emphasis on the European market

Previous editions of the World Wildlife Crime Report have not included detailed analyses of illegal trade in ornamental plants despite many species being threatened by overexploitation and subject to national and CITES trade regulation. Case study research on illegal orchid trade for the present report was carried out to shed light on distinct types of organized criminal activity in this sector and to address concerns about “plant blindness” in discourse about wildlife crime.¹

Orchids are particularly suited to becoming collectables. There are over 29,000 recognized species found across the globe,² with around 500 new species described annually in recent years.³ Their variety is seemingly infinite as natural stocks can be cross-bred with over 125,000 named hybrids already catalogued.⁴ Some wild species are endemic to a very small geographic area while the conservation status of most species is poorly documented.⁵

The legal ornamental orchid trade in live plants and cut flowers is dominated by mass-produced hybrids of a small number of genera such as Phalaenopsis, Vanda and Dendrobium. However, despite the widespread availability of artificially propagated orchids, thousands of wild orchids are still collected for trade, often driven by specialist international hobbyists looking for new species.⁶ The desire to be the first to possess a rare and beautiful wild orchid can push prices into the thousands of dollars for a single specimen. Dedicated collectors may even travel to remote areas for the sole purpose of prospecting for yet undiscovered species.⁷

Analysts have compared the illicit collection of wild orchids to the illicit collection of antiquities and found many similarities.⁸ Some perpetrators argue that by collecting these types of commodities they are preserving them, rescuing them from possible destruction. The analysts argue that this is more than just the neutralization or rationalization of a criminal act. Some orchid collectors appear to be motivated by a genuine desire to protect the objects of their fascination, particularly given that habitat loss and degradation is a leading cause of species extinction and a single orchid can yield hundreds of thousands of seeds of which only a tiny fraction survives in the wild.⁹

In addition to individual collectors, commercial propagators may seek out new wild species for the purpose of creating hybrids. Just as some in the exotic pet trade will draw in wild breeding stock to increase genetic diversity, commercial orchid producers can use novel species to enhance the value of their own proprietary varieties.¹⁰ There is also a localized risk of overharvesting wild orchids as a food source,¹¹ the most prominent examples being the use of orchid tubers to make a beverage/ice cream called salep in the eastern Mediterranean,¹² and a meat-like dish called chikanda in Southern-Central Africa.¹³

While the primary concern about trade impacts on wild orchid populations may relate to collectors of rare and novel species, CITES trade regulation measures apply to all orchid species. Although CITES usually targets trade restrictions at the individual species level, sometimes multiple related species share a common threat. In these cases an entire genus may be listed, such as the listing of the Dalbergia genus of rosewood species. These higher-taxon listings do not require evidence that
every single species in the genus is threatened by trade, and therefore they often include species that are not traded at all. These higher taxa protections are, at least in part, a concession to practicality, a recognition that it may be difficult for enforcement authorities to differentiate between threatened and unthreatened species in complex taxa such as the orchids. Orchids provide the single largest example of such mass listing because the entire Orchidaceae family has been listed in Appendix II of CITES since 1975.14 The large number of orchid species means they comprise some 70 per cent of the almost 41,000 CITES-listed species. Two popular slipper orchid genera—Paphiopedilum and Phragmipedium—and seven individual orchid species have subsequently been moved to Appendix I because of their special vulnerability to wild harvesting.15 16

In addition to their popularity with collectors, orchids are also widely traded internationally as ornamental plants.17 Most of this trade derives from commercial producers of artificially propagated hybrids, not wild harvesting of pure species, but owing to their family listing the majority of these exports require CITES paperwork.18 Mistakes are made, and many orchids seized are not threatened species rather hothouse-grown commercial shipments without the correct documentation.19 Additionally, orchid extracts are used in a range of traditional medicines, cosmetics and other products, often as a minor component, but all of which may require CITES permits.20, 21 Owing to the need for consistent quality supply in bulk, it is highly unlikely that these commercial applications draw on wild-harvested threatened species of orchids. Thus, when these products are seized, they are not necessarily indicative of a criminal threat to protected species. Nevertheless, despite such cases clouding the seizure record, trafficking of rare orchid species does take place. When a new species is discovered, it may be quickly decimated in its habitat.

The following case study looks at the process by which rare and new orchid species are brought from the forest to collectors. Research for the case study took place between November 2022 and January 2023 and included of a series of interviews with 17 key experts with insights into the illegal trade of ornamental orchids with a focus on European markets (for full methods see the methodological annex to this report).22 The interview findings were triangulated and combined with information from published literature as well as analysis of trade and seizure data from the WWCR3 analytical dataset.

**Sourcing**

Harvesters are primarily local men who have good knowledge of the habitat, often due to experience hunting animals or collecting other forest products.23, 24 Harvesters may be professional collectors who harvest orchids and other plants as their main income source, or people with other sources of income who harvest orchids opportunistically whenever they see them.25 One expert reported that even those involved in enforcement in protected areas, such as rangers, were said to collect plants for money.26 Despite financial motivations, harvesters are likely to be paid very little for the plants they collect.27 A South America-based expert reported that in Brazil collectors who harvested orchids in the genus Cattleya in bulk for intermediaries earn as little as the equivalent of $0.30 per plant. The expert also said that the original harvesters of Phragmipedium kovachii, which later sold for $10,000 per plant, sold the plants for the equivalent of $3.60 each (see Box CS1.1).28
Finding and harvesting some wild orchid species can be hazardous. Many orchid species are “epiphytic”, which means they grow on the surface of trees, gaining elevation and deriving moisture and nutrients from the air, rain, or debris. Harvesters must either climb or fell the host tree to access the orchid. One interview subject had witnessed orchid harvesters in Brazil “climbing trees without equipment...or cutting trees such as Cedro rosa [Cedrela fissilis], often 200- or 300-years old trees, to collect Laelia purpurata.” In South-East Asia, an interview subject reported that orchids in the genus Paphiopedilum are harvested from cliffs using ropes and bamboo ladders, while epiphytes growing on branches across rivers were collected using “a boat and a hooked pole.” In addition to local gatherers, international collectors stage their own collecting trips, organized by local nurseries.

Harvested orchids may be sold locally on markets or street stalls or online to domestic or international consumers and nurseries directly. As with other wildlife products, scouts may visit villages located in orchid habitats to inform villagers of the plants they wish to purchase. These scouts may give a description or show a photograph or a live plant of the orchids they are interested in. These intermediaries will either buy plants in bulk or pay only for valuable plants using cash or payment apps. As one informant reported: “People will bring bunches of plants and [the intermediary] will say ‘no, I don’t want these, I will not pay for this...I’ll pay for this.’” This can result in considerable “by-catch”; as one respondent reported: “I saw barrel-sized bins of discarded orchids.”

Buyers of illegally sourced orchids transport the plants to commercial nurseries and breeders, which may be entirely clandestine operations or may be apparently legitimate businesses that launder illegally harvested orchids through their operations. Plants destined for international markets where customs checks may occur may be kept in nursery conditions for some time to ensure that the damaged leaves and roots that enforcement officers are trained to check for are no longer present. As one trader interviewed said: “So they get wild plants. They establish them for six months or one year in Thailand or in Taiwan [Province of China], and then they export all around the world as a hybrid or even as a real species.”

**Box CS1.1. The discovery of Phragmipedium kovachii in Peru**

In May 2002, according to a journalist’s published account of the case, an orchid grower based in the United States was on an orchid collecting trip to Northern Peru and saw a highly unusual orchid in the Phragmipedium genus with a large pink flower for sale at a roadside stall. The seller had harvested the plant from the wild near his land and was selling three plants for the equivalent of $3.60 each. The species had been offered for sale as an undescribed species two weeks previously by a Peruvian nursery at a show in Florida for $10,000 per plant. After illegal import to the United States, the grower took the orchid to Selby Botanical Garden, where it was quickly described as a new species, *P. kovachii*. The Government of Peru complained that the species had been described from illegal material and the grower was charged with smuggling, receiving a $1,000 fine and two years of probation, while the botanical garden and one of its staff members were also fined. Large-scale harvesting for trade stripped most known plants from the wild immediately after the species was discovered. However, an academic expert interviewed for this case study reported that the Government of Peru later gave licences to local nurseries to collect five wild plants as motherstock for artificial propagation, making the case an...
interesting example of a country trying to address smuggling and promote access and benefit sharing, even after its genetic resources had been taken.*


d Cribb, ‘511. Phragmipedium Kovachii’.

Once seeds have been produced, the wild plants may then be discarded. According to the calculations of one trader interviewed: “[Of] 600 wild-collected *Paphiopedilum anitum*, 100 will bloom [and] 40 will be strong enough to make seeds. And the 600 plants go to the dustbin, because they can sell the flask for 150 to 250 dollars [$150–200].”41 A “flask” is a sterile sealed container in which a fertilized seed has been embedded in a medium containing agar and a nutrient source. Trade in this form is excepted from international licensing requirements under the terms of the CITES listing so no CITES permits are needed.

Since a large proportion of international orchid shipments require CITES permits, it is possible to track the legal orchid trade through the CITES Trade Database. Between 2012 and 2021, CITES data indicate that 6,796 unique orchid species in 481 genera were legally commercially traded as live specimens.42 Looking at the same official data in more detail for 2021, the top commercial exporters were in Asia (Figure CS1.1), although countries in Latin America and Europe were also prominent in the trade. About 76 per cent of these live plant exports were *Phalaenopsis* hybrids (“moth orchids”) or *Dendrobium* hybrids, both genera native to East Asia and the Pacific. The largest enumerated species exported was *Cymbidium sinense*, the so-called “New Year’s orchid”, native to China and northern Viet Nam. In 2021, this legal trade was reported as being from artificial propagation rather than wild harvest.
While the bulk of the legal trade is concentrated in a few genera, the hobbyist orchid market is characterized by the demand for rarity and diversity with thousands of species traded annually.\textsuperscript{44} Field observers in street markets in Asia and Latin America found hundreds of species commonly available in domestic trade.\textsuperscript{45} \textsuperscript{46} \textsuperscript{47} The demand for novel species seems to be insatiable with prices shooting into the thousands of dollars per specimen when a new species is discovered only to fall just as rapidly as commercial propagation becomes widespread.\textsuperscript{48} One respondent interviewed said that high levels of wild collection are seen “two to three years after the species is published and [they] will decline rapidly after that.”\textsuperscript{49}

While orchids are found on every inhabited continent, they are not evenly distributed. Asia and South America each have over 12,000 species, compared to more than 4,000 in North America, about 2,000 in Africa and much lower counts in the rest of the world.\textsuperscript{50} According to experts interviewed during research for this report, key source countries for wild live orchids are those with remaining populations of highly in-demand species, such as orchids in the \textit{Paphiopedilum} genus, including Indonesia, Malaysia, Thailand, the Philippines and Viet Nam.\textsuperscript{51} New orchids are also sourced from areas in the Americas with high species diversity, including Ecuador, Colombia, Costa Rica and Brazil.\textsuperscript{52} African sources are not as popular, with the possible exception of Madagascar.\textsuperscript{53}

\textbf{Illegal trading}

According to experts interviewed during research for this report, most orchids illegally entering Europe come by post.\textsuperscript{54} This includes hybrids and other orchids that could, in theory, receive CITES paperwork, but multiple experts reported that they are imported illegally to avoid the costs and
trouble of applying for trade permits or certificates. They are also smuggled in personal baggage by air or land, including, according to one interviewee, by airline staff. In addition to smuggling, plants that do not meet the CITES definition of artificially propagated are reported to be shipped through legal routes, with paperwork for a different species or hybrid.

Plants may be sent to consolidators (often nurseries or vendors) in consumer countries, who collect orders from different consumers or vendors to reduce shipping costs. This also occurs in the legal trade and it is possible that consolidators arranging the import of plants believe they are from legitimate businesses and are not intentionally buying plants illegally. As either active partners or passive facilitators of illegal trade, nurseries can provide an identifiable and potentially deterrable part of some trafficking chains.

Some plants are sold in person to consumers who travel to visit an international nursery, although these buying trips were reported by interviewees as less common following the rise of internet sales. Numerous academic and NGO studies have documented the legal and illegal trade on multiple international and national online platforms. The internet was reported to be an important platform for illegal orchid sales in both domestic and international markets, including Europe. According to one academic interviewed: “I think online trade is now more important for trading orchids, certainly in the EU [European Union], compared to face-to-face sales.” A case example in Box CS1.2 illustrates how social media communications can help drive collection pressure.

**Box CS1.2. Overharvesting of a newly described species driven by social media posts**

Paphiopedilum canhii was first discovered in 2009 by Hmong people in Viet Nam who brought plants from remote areas to sell at urban markets where they were acquired by a local grower who realized they were a new species. When the species was described in 2010, orchid growers in Viet Nam posted pictures of the flowers on social media. This attracted international dealers, who flocked to Viet Nam to buy wild plants for nurseries and breeders all over the world, with the largest shipments reportedly destined for Europe and Taiwan Province of China. Exports without permits were in contravention of CITES as all species of this genus, even if newly discovered, are listed in CITES Appendix I. With prices of $100 per plant being offered, local people reportedly “put aside their daily duties and, instead, went to the forest; on some days, more than 20 plant hunters collected plants.” Prices rapidly fell to $50 per kg and then to $10 per kg, and many harvested plants were discarded once demand from dealers stopped at the end of 2010. According to its evaluation in the IUCN Red List of Threatened Species, an estimated 10,000–15,000 plants were collected in the six months following the species’ description and it is now classified as Critically Endangered with 10 mature individuals thought to remain.

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1 Leonid V Averyanov et al., ‘Field Survey of Paphiopedilum Canhii: From Discovery to Extinction’, *Slipper Orchids* Fall (2014).

While artificially propagated plants are widely sold online, a 2016 study of orchid groups on one large social media website estimated that 22–46 per cent of orchids for sale were likely to be wild-harvested based on the text descriptions, comments from potential buyers, or photographs used in the advertisement. Interviewees reported that the main platforms being used to sell wild or illegal orchids were Facebook and eBay. Sales were also reported from international platforms such as Etsy and Instagram, and domestic trade on national platforms such as Shopee in Indonesia and Mercadoliom in Brazil.

Some orchid sellers based outside the European Union, including in Asian countries, were reported to be using social media profiles that appear to be European Union-based to make consumers believe that they did not need CITES paperwork. According to two interviewed experts, while many platforms are reported not to take action to stop wild orchid sales, a recent ban on sales of CITES-listed plants on Etsy is reported to have led to a decline in wild orchid trade there. One trader said that when Facebook groups were closed, new groups were formed “in 10 minutes”, or the users would shift to direct messaging. Online adverts for wild orchids on social media platforms will often include an instruction to connect via WhatsApp to arrange a purchase.

According to available seizure data in the WWCR3 analytical dataset, the most prominent points of departure for live orchid shipments seized in Europe during 2015–2021 were, in descending number of specimens seized: Taiwan Province of China, Viet Nam, Thailand, Sri Lanka and Brazil (Figure CS1.2). Some 91 per cent of these shipments were seized by the Kingdom of the Netherlands, Germany and the United Kingdom of Great Britain and Northern Ireland. Expert perception is that Europe is no longer a major destination for illicit bulk shipments of wild orchids, with trade in smaller quantities of plants in the postal system more likely. One trader stated that this was not always the case: “Twenty years ago, orchid smuggling was a large problem to Europe and to [the United States of] America, there were big batches and a lot of customers, all hidden.” The trader suggested this was as a result of artificial propagation, declining numbers of wealthy European consumers, and strong enforcement in many European countries.
Most of the orchids seized were of unknown species. The most common named species seized was *Vanilla planifolia*, one of the most cultivated orchids in the world and unlikely to be wild sourced. This was followed by *Paphiopedilum* species, a CITES Appendix I listed genus widely trafficked from the wild (Figure CS1.3). A trade source interviewed for this report claimed that prices of wild *Paphiopedilum* plants vary from $2 for a species that is widely artificially propagated to around $2,000 for a plant of a threatened, recently discovered species. Up to $5,000 can be offered for a rare colour form of an existing species, such as an “alba” form where the flower is white. In addition, flasks of seedlings of *Paphiopedilum anitum* from wild motherstock were reported by one trader to sell for $150–200.81
Destination markets

Previous studies suggest that orchid consumers fall into two key groups: hobbyist consumers, who dedicate time and resources to growing orchids and seek out specific plants, and casual consumers, who may buy orchids occasionally but do not have specialist knowledge or interests. Casual consumers are unlikely to seek out wild orchids but may buy them from street markets if they are readily available, cheaper or more attractive. This is also likely to happen online, where consumers with little knowledge of orchids who do not fit the definition of a hobbyist may find a plant for sale and buy it, without knowing that it is not legal. In some cases, wild plants sold online may be cheaper than artificially propagated plants, increasing the chance that unwitting consumers who find them may buy them instead of legal alternatives.

Hobbyists seeking out specific orchids may also buy wild plants unwittingly or intentionally. Intentional purchase may include hobbyists who travel internationally to orchid habitats to collect or buy specific wild plants personally, including by joining guided tours organized by traders or local hobbyist groups.

In South-East Asia, a trade source interviewed for this report said that “speculators” use social media groups to buy and sell large quantities of wild Paphiopedilum orchids in bulk, with the sole aim of selling them on quickly for a higher price to other dealers. According to one interviewed expert, scientists can be employed by, or work closely with, nurseries or breeders to describe new species from wild plants in the nursery, increasing their value in trade. One interviewee stated that they were unsure if corruption was involved, but knew of “judges, lawyers, many influential
people...involving the highest level” who were smuggling newly described orchid species from Brazil to Europe.⁹³

According to seizure records in the WWCR3 analytical dataset, most of the live orchids seized in Europe for which a country of shipping destination was specified were destined for the Kingdom of the Netherlands, Germany and the United Kingdom during 2015–2021. The Kingdom of the Netherlands has a large flower export trade and is the largest legal exporter of orchids from Europe according to the CITES Trade Database.⁹⁴ The Kingdom of the Netherlands and Germany are also two of the largest legal importers, according to CITES trade data.

Figure CS1.4. Number of live orchids seized in Europe by country of shipping destination, 2015–2021

Source: CITES Illegal Trade Database and World WISE (WWCR3 analytical dataset)

**Implications**

Plants present special challenges to wildlife crime enforcement. Particularly when processed, they can be difficult for inspectors to identify while the sheer variety of orchids make it almost impossible to distinguish between hybrids and newly discovered species.⁹⁵ When a container of tusks is found it is clear a crime has been committed, but the prevention of orchid trafficking cannot rely on physical inspections alone. To stop the decimation of wild orchid species, proactive investigation and monitoring are essential.

The research conducted for this report did not reveal the involvement of structured organized crime groups, but rather a complex network of dealers and collectors. Some may even regard themselves as conserving unique species in the face of habitat loss. Profits made by individual collectors are likely reinvested in their hobby, but the evidence from interviews indicates there are also some intermediary businesses, particularly nurseries, profiting from laundering of illegally collected wild plants into trade. At the same time, the world of collectors is competitive and the orchid business
can be lucrative, so it is difficult to disentangle the motivations of those involved. This scattered group is actually small and connected, which plays to the advantage of those monitoring illegal activity in this area. The social media used by both collectors and their suppliers in the field can be a rich source of information on species in need of protection.

Preventing poaching is more complicated, given that those collecting orchids from the wild are large in number and disconnected. It is clear that collectors can identify the next hotspot to be explored, and so officials can likewise be predictive and targeted in their enforcement efforts. Key to these efforts is building good relations with nurseries and traders in the source countries, as their vigilance to illegal activity could stop overcollection early, while it is still possible.

7 AC2, BO3, BO4, CTS1.
8 Simon Mackenzie and Donna Yates, ‘Collectors on Illicit Collecting: Higher Loyalties and Other Techniques of Neutralization in the Unlawful Collecting of Rare and Precious Orchids and Antiquities’, Theoretical Criminology, n.d.
10 Hinsley et al., ‘A Review of the Trade in Orchids and Its Implications for Conservation’.
12 Anna Kreziou, Hugo de Boer, and Barbara Gravendeel, ‘Harvesting of Salep Orchids in North-Western Greece Continues to Threaten Natural Populations’, Oryx 50, no. 3 (July 2016): 393–96, https://doi.org/10.1017/S0030605315000265.
14 Appendix II includes species not necessarily threatened with extinction, but in which trade must be controlled in order to avoid utilization incompatible with their survival.
15 The six species are Aerangis ellisii, Dendrobium cruentum, Laelia jongheana, L. lobata, Peristeria elata and Renanthera imschootiana. For details, see ‘Species+’, accessed 19 October 2023, https://www.speciesplus.net/.
16 Appendix I includes species threatened with extinction. Trade in specimens of these species is permitted only in exceptional circumstances.
17 Hinsley et al., ‘A Review of the Trade in Orchids and Its Implications for Conservation’.
18 Annotations to orchid listings in the CITES Appendices provide some limited exceptions. Under annotation P3 artificially propagated hybrids of Cymbidium, Dendrobium, Phalaenopsis and Vanda are not subject to the provisions of the Convention if certain conditions are met. Under annotation P4 for Appendix I orchid species, seedling or tissue cultures obtained in vitro and transported in sterile containers are not subject to the provisions of the Convention if the specimens meet the definition of ‘artificially propagated’. Also, for Appendix II listed orchid species, some parts and derivatives are not covered by the CITES listing, including seeds and cut flowers. https://cites.org/eng/app/appendices.php.
20 Hinsley et al., ‘A Review of the Trade in Orchids and Its Implications for Conservation’.
21 CITES CoP19 #4 provides an annotation exempting “finished products derived from artificial propagation, packaged and ready for retail trade of cosmetics containing parts and derivatives of Bletilla striata, Cycnoches cooperi, Gastrodia elata, Phalaenopsis amabilis or Phalaenopsis lobbii.”
22 The 17 experts consulted included academic researchers and field botanists based in Europe, Latin America and South-East Asia, scientists working in European CITES scientific authorities for plants, a specialist orchid hobbyist, commercial orchid traders based in Europe, and a senior customs officer in a European country.
23 AC3, BO1, BO2, BO3, BO4, CTS4.
24 AC2, AC3, BO4, CTS3.
25 AC2, BO1, BO2, BO4, CTS4.
26 HOB1.
27 BO4, TR2, HOB1.
28 BO4.
30 BO4.
31 BO2.
32 AC2.
33 AC2, BO1, BO2 CTS4.
34 BO1, BO2, CTS4.
35 AC2, CTS4.
36 AC2.
37 CTS4.
38 AC2, BO1, BO3, TR2.
39 BO2, TR2, CTS1, CTS3, EN1.
40 TR2.
41 TR2.
42 CITES database search was carried out in January 2023 at https://trade.cites.org/.
43 Taiwan Province of China is not a Party to CITES so it does not appear in the exporter-reported data, but it is the largest source in the importer-reported data between 2015 and 2022.
48 BO2.
49 BO2.
51 AC1, BO1, BO2, TR2, CTS4.
52 BO3, BO4.
53 CTS2, CTS3.
54 AC1, AC3, TR1, CTS1, EN1.
55 BO2, BO4, TR1, TR2, HOB1.


Hinsley, Verissimo, and Roberts, ‘Heterogeneity in Consumer Preferences for Orchids in International Trade and the Potential for the Use of Market Research Methods to Study Demand for Wildlife’.

Ibid.


AC2, BO4.

TR2.

AC1, AC2, AC3, BO2, BO3, BO4, CTS1, CTS3, TR1, TR2.

HOB1.
Case study 2: Illegal trade in dried seahorses

Previous editions of the World Wildlife Crime Report have examined illegal trade in several aquatic species, including eels, sea cucumbers, sturgeons and marine turtles, showing how criminal actions undermine regulatory measures.\(^1\)\(^2\) For the current report, a new case study on illegal seahorse trade similarly examines the dynamics of trafficking from source to market.

Poaching often takes place in areas where the cost of harvesting wildlife is low. People who farm, hunt and forage in rural areas may encounter protected wildlife species while going about their daily lives. If gathering this wildlife presents some prospects for gain, poaching may become a rational choice. The poaching of seahorses is essentially opportunistic, but it may feed into international organized trafficking when enforcement is weak.

Opportunistic poaching exists in the marine context in the form of illegal by-catch, a term used in fisheries to describe species that are inadvertently caught when other species are being targeted.\(^3\)\(^4\) While some of this wildlife can be returned to the sea alive, much of it will die due to injury and stress from capture. For fishers not licensed or not interested in making use of the additional species, this by-catch is simply waste and discarded.\(^5\)

In 2019, the FAO estimated that marine fisheries discards amounted to 9.1 million tons annually, equivalent to over 10 per cent of annual catches. Some 4.2 million tons of these discards came from bottom trawling, a fishing technique known to increase the rate of by-catch significantly.\(^6\)

Marine species caught as by-catch can include those with trade value and longstanding wildlife markets can be fed primarily from by-catch. A 2017 review of global seahorse fisheries found that “[t]he regulated international trade in seahorses ... is largely sourced from by-catch.”\(^7\) Very few seahorses caught in bottom trawlers will survive their injuries, find a suitable habitat and mate successfully.\(^8\)

Seahorses are traded for several purposes, including live for the aquarium trade. However, a recent review concluded that most live trade comes from cultured specimens, a separate market with little impact on wild seahorses.\(^9\) It is also a minor component of the international seahorse trade: 98 per cent of the total trade involves dried seahorses.\(^10\)\(^11\) Dried seahorses are sold as curios and decoratively, but the largest market appears to be for their use in medicine.\(^12\) Prior to CITES placing the entire genus Hippocampus in Appendix II in 2004\(^13\), an estimated 54 tons, or 19 million dried seahorses, were traded internationally each year.\(^14\)

Seahorses are found off the coasts of every inhabited continent and trade has historically been dominated by a limited number of countries.\(^15\) Since all species of seahorses are listed in CITES Appendix II, international trade is allowed if compliant with the Convention’s regulatory requirements. However, many of the key suppliers have banned exports following the CITES listing owing to implementation challenges, particularly with making the scientific non-detriment findings required before issuance of export permits.\(^16\)\(^17\)
In 2005, the peak year of CITES regulated trade, over 90 per cent of the wild-sourced seahorse commercial supply came from Thailand, which exported almost 20 tons of some 22 tons traded that year. Thailand voluntarily banned trade in 2016 after years of sharply declining exports. Several other leading supplier countries including India (2001), the Philippines (2004) and Peru (2004) banned exports before or at the time of the CITES listing. Other former suppliers have either subsequently instituted export bans or have been subject of CITES recommendations to suspend seahorse trade (Figure CS2.1). As a result, there has been very little legal trade in seahorses since 2012 and there was virtually none by 2020.

Figure CS2.1. Number of whole seahorses legally traded internationally 2004–2020

Source: CITES Trade Database

Notes: Analysis was based on bodies, fingerlings, live and skeleton data of Hippocampus spp. for commercial trade purposes and unknown purposes. Where data were reported by weight, they were converted to whole body equivalents (see methodology annex for details). CITES RST is the Review of Significant Trade.

Based on exporter reported data, CITES permits were only issued for just over 300 kg, or about 120,000, wild-caught seahorses in 2020.

The impact this decline in legal supply has had on consumption is unclear. It is theoretically possible that the international market demand for seahorses declined from an estimated 19 million animals annually before 2004 to some 120,000 animals in 2020. However, past studies to assess national dried seahorse markets following the CITES listing did not reflect this rapid decline. This begs the question as to what level of demand persists and whether it is being met by illegal trade.

Since there is very limited legal international trade in seahorses, most of the evidence over the past decade comes from seizures. These data, which are reliant on enforcement effort and levels of reporting, provide only partial insight into illegal trade levels. From 2015–2021, around 10.4 tons of...
dried seahorses were recorded in seizures in the WWCR3 analytical dataset, equivalent to an average of approximately 1.5 tons or 550,000 individuals per year (Figure CS2.2).29

**Figure CS2.2. Weight of dried seahorses seized globally 2015–2021**

![Graph showing weight of dried seahorses seized globally 2015–2021]

*Source: CITES Illegal Trade Database and World WISE (WWCR3 analytical dataset)*

Review of individual seizure records in the WWCR3 analytical dataset indicated that one country, Peru, played a prominent role in seahorse shipments. Together, the seven largest seizures linked to Peru during 2015–2021 amounted to over 5.4 tons of dried seahorses (Box CS2.1).

**Box CS2.1: Major dried seahorse seizures with links to Peru**

In December 2015, according to the Government of Peru, 570 kg of dried seahorses in 58 black sacks were seized from a container owned by a dried fish company in Paita, on the coast of Peru.a

In March 2016, according to the Government of Peru, 400 kg of dried seahorses were seized from a bus in Ica, southern Peru.b

In May 2016, according to the Government of Peru, some 648 kg of dried seahorses were found hidden in the hold of a Chinese vessel.c

On 10 March 2017, according to a media source quoting customs officials in Viet Nam, an estimated 900 kg of dried seahorses were seized by customs officers in Viet Nam in a container shipped from Peru. The seahorses were smuggled in bags under a shipment of donkey hides.d, e However, the species involved in this seizure were identified as *H. algiricus* (endemic to West Africa), suggesting the shipment may only have transited through Peru.e

In April 2019, according to a report by a Peruvian non-governmental organization and a Government of Peru social media post, 631 kg of dried seahorses destined for China were found hidden under bales of cattle skins during a routine customs inspection of a warehouse in Callao.f
In April and May 2019, according to a China Customs news release, in three connected seizures, Qingdao Customs in China seized 1,280 kg of dried seahorses from a gang importing them from Peru concealed under a shipment of horse hides.\(^g\)

In September 2019, according to the Government of Peru, 55 cardboard boxes of dried seahorses weighing 1,043 kg were seized from a registered artisanal fishing vessel from Peru about 300 km from the coast.\(^h\)

\(^a\) Ministerio de la Producción de Perú, Resolución Directoral No. 533-2018-PRODUCE/DS-PA, 7 February 2018.


\(^c\) Ministerio de la Producción de Perú, Resolución Consejo de Apelación de Sanciones, No. 065-2021-PRODUCE/CONAS-CP, 24 May 2021


\(^h\) Ministerio de la Producción de Perú, Resolución Directoral No. 03466-2021-PRODUCE/DS-PA, 16 December 2021

In 2022, UNODC conducted 22 interviews with fishers representing three small-scale fishery types in two locations in northern Peru, as well as with five local buyers of seahorses. Academics and authorities from Peru were also consulted.\(^{30}\) These interviews showed that, while they are mainly unintentionally captured in nets intended for other species, seahorses are being systematically channeled into the illegal export market.

In a manner akin to pangolins in Africa,\(^{31}\) seahorses in Peru are essentially “crowd sourced”. The interviewees explained that exporters, often Asian expatriates based in urban areas, make their interest in buying seahorses known. Local buyers, usually shop owners, act as points of consolidation. Fishers sell their seahorse by-catch to these consolidators. While each fisher contributes a relatively small number of seahorses, the cumulative impact can be significant.\(^{32}\)

While not intentionally poached, technically speaking, these seahorses enter illegal trade as soon as they are landed. Capture and trade in seahorses have been illegal in Peru since 2004.\(^{33}\) In addition, the fishing technique that appears to be the main way seahorses are caught—bottom trawling—is itself illegal in Peru within five nautical miles of the coast.\(^{34}\) The poaching may be unintentional, but it feeds directly into organized illegal trade.
**Sourcing**

Peru is one of the leading fishing nations in the world. In 2020, it ranked third globally in terms of marine catch, behind only China and Indonesia, responsible for more than 7% of the fish taken from the ocean that year. It is best known for its industrial anchoveta fishery, the single largest fishery in the world. Much of the anchoveta catch goes into the production of fish meal, used especially for animal feed and aquaculture, as well as fish oil.

While the industrial anchoveta fishery is dominant in terms of sheer tonnage, most of the marine landings in Peru for direct human consumption are caught by the local small-scale fleet. This includes exports, such as squid and mahi mahi, but also jack mackerel, an input essential for food security in the country and a source of sustenance for artisanal fishers. The importance of this sector was highlighted during the COVID pandemic lockdown in March 2020; the country was reliant on artisanal fishing for food security because the industrial fleet was docked.

There were an estimated 88,000 artisanal fishers in Peru in 2021, which represents over 80 per cent of those employed in the fishing industry. It has been estimated that for every person involved in the primary fishing industry at sea, two are employed in the secondary industry on land. This sector has experienced explosive and unsustainable growth in recent years, partly due to national policies designed to support artisanal fishing. In 1992, a new General Fisheries Law came into effect that, among other things, removed the regulation limiting the expansion of the fishing fleet. The result has been a rapid expansion in the number of vessels in the water, reducing fishing efficiency and undermining the well-being of the fishers.

For this study, fishers were interviewed in two locations in the extreme north-west of the country, an area known from past research for its role in the seahorse trade. Seahorse traders were interviewed in Sechura and Talara, a town situated between Mancora and Sechura.

The artisanal and small-scale fleet employs a wide range of techniques for fishing. According to one study, fishers using the least selective fishing gear, particularly bottom trawlers, and those engaged in illegal fishing had the most stable incomes over the past decade in Peru. In 2018, trawlers were estimated to earn over six times the national annual minimum wage, while gillnetters and handliners made less than half of it. In 2015, 31 per cent of surveyed small-scale fishers reported annual incomes below the equivalent of $1,500, while 39 per cent reported annual incomes between the equivalent of $1,500 and $3,000.

For this case study, longline, gillnet and trawl fishers were interviewed. Almost three-quarters of all fisher respondents and all of the trawl fisher respondents indicated that they incidentally catch seahorses while fishing. Nearly all said they would retain any seahorses caught, although one fisher said he would return them if alive. They referred to the seahorse catch as a kind of bonus for those who chose to collect and sell them, not part of the formal catch of the vessel that was always divided between the owner of the ship and the crew.

Most gillnet fishers reported by-catch of only one or two seahorses per month, but trawl fishers reported catching 5–20 seahorses per trip, with up to 20 trips per month. This suggests that trawl
vessels are catching upwards of 100 seahorses per month apiece. There are an estimated 20
trawlers in Secura Bay and 30 in the port of Mancora, with additional vessels also found in Talara
and Parachique. This suggests an annual offtake of many tens of thousands of seahorses from
the trawlers alone, in addition to the thousands of fishers employing other techniques with lower
seahorse capture rates.

Retained seahorses could be sold fresh or dried, and some reported selling them in both
forms. Those who sold them fresh were largely trawl fishers, and this is likely due to the increased
frequency that trawlers caught seahorses. Seahorses were typically dried on the roofs of the fishers’
houses. Drying reduced the weight of the seahorses by about two-thirds.

The fishers said that they could receive 1–5 Peruvian nuevo soles ($0.25–1.25) per individual fresh
or dried seahorse, with some variation by location, size and season. This suggests an additional
income per trawler of the equivalents of at least $1.25 per trip or $25 per month per vessel.

Most (57 per cent) of fishers interviewed said they did not know that national law prohibited the
capture and trade of seahorses in Peru, and of those that did know, only one felt that the
prohibition had reduced trade. Several of those who admitted trading seahorses explained that
since they caught them anyway, they might as well make use of them. Seventy-three per cent of
fisher respondents indicated that it was highly unlikely they would be caught or penalized for
participating in illicit trade of seahorses. Those operating bottom trawlers within five nautical
miles of the coast were already very openly breaking the law. Some analysts argue that the lack of
enforcement of this prohibition is due to a national decentralization effort initiated in the early 2000s.
Power was devolved to regional governments, but not all of these had the capacity to assume
responsibility for fisheries management.

Although there was little disincentive to gathering seahorses, most of the fishers, and all but one
of the traders interviewed, felt the trade had diminished in recent years. One said this decline
began around 2018. It was attributed to both dwindling seahorse numbers and reduced demand.

The first buyers or local consolidators were often local shopkeepers, like the first buyers in the
pangolin trade. According to all those interviewed, these local buyers were exclusively Peruvian.
Buying at the rate of 1–2 Peruvian nuevo soles per animal cited above, they sold for 250–300
Peruvian nuevo soles per kg (about $70–$80). If sold to a tertiary buyer, one dealer interviewed
indicated the rate could increase to 1,100 Peruvian Nuevo Soles per kg (about $300).

These buyers dealt in a range of dried sea products, not exclusively in seahorses, often species
catched as by-catch including shark fins, guitarfish, and eel swim bladders. Eel swim bladders
were said to be particularly valuable (800 Peruvian nuevo soles, or about $200, apiece). One fisher
interviewed said that both seahorses and shark fins could also be imported from Ecuador through
the terrestrial border in Aguas Verdes (Tumbes) to be sold in Peru.

The local buyers interviewed were not exporters. There is a small local market for seahorses, mainly
comprised of Asian expatriates, including employees of a national petroleum corporation, but
the primary market is for export. Three of the dealers interviewed said they sold to persons of Asian
The local buyers could call the exporters when they had sufficient quantity to sell or the exporters could place orders for a specific amount by a certain date. Some exporters would tour the fishing areas to buy from the local consolidators.

**Illegal trading**

As species listed in Appendix II of CITES, seahorses remain legal to trade internationally where sourcing is certified legal and sustainable. While the CITES data suggest that few legal exports are being permitted, other official international trade data indicate that some trade continues. A survey of traders carried out in Hong Kong, China in 2016 and 2017 found that 95 per cent of imports (by volume) had been imported into Hong Kong, China from countries for which CITES recommendations to suspend trade were in force.

Another study, carried out in India between 2015 and 2017 suggested that seahorse extraction was continuing despite the country’s ban and CITES regulations. Interviews with traders suggested that many tons of seahorses were exported from India each year between 2015–2017. More recently, an in-depth 2023 study of seahorse trade developments for six net exporters (Indonesia, India, Malaysia, Philippines, Thailand and Viet Nam), asserted that in all cases exports had continued, despite the fact that trade had been banned or suspended.

Analysis of the seizures during the period 2015–2021 suggests Peru, China and, more recently, Viet Nam seize the largest volumes of seahorses (Figure CS2.3). Of those seizures where a source of shipment was specified, Peru is the leading shipment source (Figure CS2.4). Only 9 per cent of the seizures specified a destination.

**Figure CS2.3. Share of dried seahorses by weight seized by country 2015–2021**

![Chart showing share of dried seahorses by weight seized by country 2015–2021](source)

Source: CITES Illegal Trade Database and World WISE (WWCR3 analytical dataset)
Figure CS2.4. Share of dried seahorses seized by weight by reported country of source of shipment 2015–2021

Source: CITES Illegal Trade Database and World WISE (WWCR3 analytical dataset)

All the fishers interviewed said that foreign vessels rarely visited their local ports. Based on seizures and interviews, the ports of Paita (in the north, close to the capture areas) and Callao (Lima) appear to be the primary points of export. One buyer mentioned that offshore transfer of seahorses does take place, although most of the fishers interviewed denied this. Skins from sheep, donkeys, horses, and cows have been used to conceal loads, highlighting the trade in a wide variety of animal skins in Peru.

In 2021, Peru was the world’s leading exporter of animal meal and pellets, as well as fish oil made largely from anchoveta. China, with its massive aquaculture industry, was the world’s largest importer of these products. This large bilateral trade in processed marine products may be one reason most of the largest detected illegal shipments proceeded directly between the two countries. However, a series of large seizures recently reported by media sources suggest Viet Nam could be emerging as a destination or transit area (Box CS2.2).
Box CS2.2: Recent seahorse seizures in Viet Nam

In December 2021, Viet Nam reportedly seized 500 kg of dried seahorses hidden in a shipment of sheep skins.\(^a\)

In May 2022, Ho Chi Minh City Customs in Viet Nam reportedly seized 573 kg of dried seahorses along with other undeclared products (tiger bones, a leopard skull, and 86 kg of Javan pangolin scales) in a shipment declared as imported snails.\(^b\)\(^c\)

In March 2022, Hai Phong Customs and Viet Nam Customs anti-smuggling and investigation department reportedly inspected a shipment of frozen fish from Indonesia where they found 350 kg of dried seahorses hidden at the bottom of the container.\(^d\)\(^e\)\(^f\)


Evidence from seized seahorse shipments indicates that the routing can be convoluted with multiple transit points, sometimes on different continents, perhaps reflecting the nature of the commodity (dried, durable and relatively light) as well as the evasion methods adopted by traffickers.\(^7\) While the seizure record indicates Peru as a key source of international supply today, past species identification studies conducted at traditional medicine markets have not found the giant Pacific seahorse, the only seahorse species found in Peruvian waters,\(^8\)\(^9\) to be particularly prominent.\(^10\) Updating this analysis would be essential to determine if the seizure record accurately reflects current trafficking trends.

Seizures made in China have found the involvement of complex organizations involved in smuggling seahorses into the country. For example, in 2020, a joint operation of customs and other enforcement agencies operating in seven locations in China resulted in the arrest of 26 suspects. The investigation determined that four gangs had purchased large quantities of wild animal products (including 716 kg of dried seahorses) and used ocean freight liner crew members, barge
crew members and passengers to transport the goods. These products were then mailed to the shipper or the consignee designated by the shipper through domestic express delivery. 101 102 103

Consumption
The primary use of dried seahorses in destination markets is medicinal. In many countries the domestic sale and use of legally imported supplies is not restricted and both unprocessed seahorses and manufactured medicines containing seahorses are available on the retail market.104 With legal trade sources increasingly limited, a critical challenge is to discern whether ongoing sales in destination markets are from legal stocks or illegal imports.105 Updated research on consumer market trends is clearly warranted.

Implications for policy
To limit the damage caused by wildlife trafficking, interventions are necessary that prevent poaching at origin. By-catch is particularly problematic in this regard. With species that are primarily harvested accidentally, like seahorses in Peru, preventing collection may be impossible, but it can be greatly reduced. While bottom trawling may be the most lucrative form of fishing in Peru, it is also illegal within five nautical miles of the coast, where the small-scale vessels appear to operate. 106 Until it is stopped, seahorses and other collateral species will continue to be unnecessarily adversely affected. This principle is true not just for Peru but for small-scale trawl fisheries around the world.107

The seahorse market is also difficult to counter because it is legal in much of the value chain. As a CITES Appendix II-listed species, seahorses remain legal to trade internationally where sourcing is legal and sustainable, but there have been very few permits for this trade issued in recent years. Despite this, there is apparently a large open market for seahorses in the primary destination countries. If these domestic markets are being supplied mostly by domestically harvested seahorses, the illegal international trade could be minor. However, if the species available in the consumer markets are of foreign origin, then the question of the legality of their entry into the country becomes relevant. For this reason, one of the best ways of monitoring the illegal trade is by continually assessing the geographic origin of seahorses in markets.

3 FAO defines "incidental catch" as the "Retained catch of non-targeted species." It defines "discarded catch" as "That portion of the catch returned to the sea as a result of economic, legal, or personal considerations." It defines "bycatch" as "Discarded catch plus incidental catch."
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13 Appendix II includes species not necessarily threatened with extinction, but in which trade must be controlled in order to avoid utilization incompatible with their survival.

14 Vincent, Foster, and Koldewey, ‘Conservation and Management of Seahorses and Other Syngnathidae’.

15 Foster, Wiswedel, and Vincent, ‘Opportunities and Challenges for Analysis of Wildlife Trade Using CITES Data - Seahorses as a Case Study’.


19 Foster and Vincent, ‘Holding Governments Accountable for Their Commitments’.


21 Ibid.


23 Recommendations to CITES Parties by the CITES Standing Committee to suspend trade in particular species are typically made under the terms of Resolution Conf. 12.8 (Rev. CoP18) on Review of Significant Trade in specimens of Appendix-II species, which was designed to identify Appendix-II listed species that may be subject to unsustainable levels of international trade, and identify problems and solutions concerning effective implementation of the Convention.

24 CITES, ‘CITES Trade Database’.

25 Ibid.

26 Conversion rate is 2.69 g per seahorse based on Melissa Evanson et al., ‘Tracking the International Trade of Seahorses (Hippocampus Species)’, n.d.


29 Again the conversion from weight to number of dried seahorses uses the average 2.69 g per animal based on Evanson et al., ‘Tracking the International Trade of Seahorses (Hippocampus Species)’.

30 These included representatives of the Superintendencia Nacional de Aduanas y de Administración Tributaria (SUNAT), the Peru government import-export agency including monitoring of illegal trade; the Peru-based NGO Sociedad Peruana de Derecho Ambiental (SPDA), which specializes in legal issues related to environmental protection; one Northern Peru based biologist for Instituto del Mar del Peru (IMARPE) and representatives of the Dirección de Conservacion Sostenible de Ecosistemas y Especies,
Ministerio del Ambiente (MINAM). Peru’s Ministry of Environment – the CITES focal point. For full details, see the online methodological annex.


32 Lawson, Foster, and Vincent, ‘Low Bycatch Rates Add Up to Big Numbers for a Genus of Small Fishes’.


36 Ibid.


50 F2, F3, F4, F5, F6, F12, F13-22.

51 F4.

52 F2-7, F18.

53 F11, F12, F15-17, F19, F21, F22.

54 F8, F10, F13, F14, F20.

55 F15-17, F19, F21, F22.

56 C1.

57 F4, F5, F6, F8, F9, F10, F11, F13, F18, C1, C3, C4.

58 F3-F10, F13, F15, F18-20.

59 F12.

60 F16, F17, F21, F22.
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61 F8-10, F13, F14 F16, F18-22.
62 De la Puente et al., ‘Growing Into Poverty’.
63 F1, F5, F6, F12-19, F22.
64 C1, C2, C4, C5.
65 C4.
66 For example, C1, C2, and C5 all owned local shops.
68 C2.
69 C1, C2.
70 C5.
71 C1, C3, F5, F9.
72 F8.
73 C1.
74 C5.
75 Foster et al., ‘Global Seahorse Trade Defies Export Bans under CITES Action and National Legislation’.
76 Ibid.
79 Ibid.
80 Ibid.
82 Ibid.
85 O1, C2, Ministerio de la Producción de Perú, Resolución Directoral No. 533-2018-PRODUCE/DS-PA, 7 February 2018.
86 Alfaro-Shigueto, Alfaro-Cordova, and Mangel, ‘Review of Threats to the Pacific Seahorse Hippocampus Ingens’.

UNODC World WISE.
Saarman et al assert that *Hippocampus ingens* is "the only seahorse found in the eastern Pacific."


General Administration of Customs of the People’s Republic of China. (2020). The customs of many places jointly cracked the case of smuggling 449.5 kilograms of seahorses by the 'water passenger’ gang (translated).

Gongbei Customs District P.R. China. (2020). Gongbei Customs: The war zone cracked down on the smuggling of 449.5 kilograms of seahorse by the 'Shuike' gang (translated).

Xiamen Customs District P.R. China. (2020). During the epidemic prevention and control period, Xiamen Customs cracked down on the smuggling of wildlife products (translated).


Foster et al., 'Global Seahorse Trade Defies Export Bans under CITES Action and National Legislation'.


Case study 3: Rosewood trade

Analysis of the trafficking of “rosewood” hardwood timber was a focus for both previous editions of the World Wildlife Crime Report. Reports of large-scale seizures of rosewood timber shipments indicated that illegal operators were circumventing national and international regulatory controls aimed to ensure the sustainability of harvest and trade in these high value tropical tree species. In addition to probing the context and possible motivations for rosewood trafficking specifically, the aim of previous UNODC analyses of this commodity was to gain insights into how wildlife crime operates within larger industrialized sectors of wildlife trade. The current case study extends this enquiry by examining how trafficking has adapted to circumvent increased international regulation of rosewood trade, with particular attention to factors influencing participation in associated crime at the sourcing end of the trade chain.

Context

Although a highly valued commodity globally, recent trade in rosewood has been largely driven by demand for use in traditional furniture and arts and craft industries in East Asia, where it fulfils the technical requirements of certain traditional furniture manufacturing or carving styles. Species valued for this use include those listed in the National Hongmu Standard of China, but also other trees producing timber with similar characteristics. Originally supplied by Asian tree species, the rosewood trade has a history of shifting to new sources as populations of the species originally targeted by industry buyers have been depleted and logging regulations have been adopted and enforced. As a result, the rosewood trade now encompasses at least 50 species of the Fabaceae family from Asia, Africa and Latin America that share similar characteristics.

International trade controls have also been introduced through the listing in the CITES Appendices some of the species traded as rosewood (Table CS3.1).

Table CS3.1. History of CITES regulation of tree species traded under the name “rosewood”

<table>
<thead>
<tr>
<th>TAXA</th>
<th>ORIGIN</th>
<th>LISTING IN THE CITES APPENDICES</th>
<th>CURRENT ANNOTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Aniba rosaeodora</em></td>
<td>South America</td>
<td>Appendix II: 23/06/2010</td>
<td>#12</td>
</tr>
<tr>
<td><em>Dalbergia nigra</em></td>
<td>Brazil</td>
<td>Appendix I: 11/06/1992</td>
<td>-</td>
</tr>
<tr>
<td>Other <em>Dalbergia</em> species</td>
<td>Central and South America, Africa, Madagascar and South Asia</td>
<td>Appendix II: 12/06/2013</td>
<td>#15</td>
</tr>
<tr>
<td><em>Guibourtia demeusei</em></td>
<td>Central Africa</td>
<td>Appendix II: 02/01/2017</td>
<td>#15</td>
</tr>
<tr>
<td><em>Guibourtia pellegriniana</em></td>
<td>West and Central Africa</td>
<td>Appendix II: 02/01/2017</td>
<td>#15</td>
</tr>
<tr>
<td><em>Guibourtia tessmannii</em></td>
<td>Central Africa</td>
<td>Appendix II: 02/01/2017</td>
<td>#15</td>
</tr>
<tr>
<td><em>Paubrasilia echinate</em></td>
<td>Brazil</td>
<td>Appendix II: 13/09/2007</td>
<td>#10</td>
</tr>
</tbody>
</table>
**Platymiscium parviflorum** #4  
Central America  
Appendix I: 01/07/1975  
Appendix II: 18/01/1990  
#4

**Pterocarpus erinaceus**  
West and Central Africa  
Appendix III: 09/05/2016  
Appendix II: 02/01/2017  
#17

**Pterocarpus santalinus**  
India  
Appendix II: 16/02/1995  
#7

**Pterocarpus tinctorius**  
Africa  
Appendix II: 26/11/2019  
#17

**Other Pterocarpus species (only the African populations; no other population is included in the Appendices)** *  
Africa  
Appendix II: 23/02/2023  
#17

**Senna meridionalis**  
Madagascar  
Appendix II: 12/06/2013  
-

* these genera include many species, only some of which are considered to be rosewoods  
# annotation symbols designate parts and derivatives subject to CITES trade control

Source: CITES Appendices and Species+ website

Case studies in the *World Wildlife Crime Report 2020* examined the complicated situation arising during rapid growth of rosewood supply from Madagascar to Asian markets from around the year 2000 and then from West and Central Africa after 2010. Concerns about unsustainable levels of logging and export in some countries triggered the adoption of national trade restrictions. Meanwhile, as detailed above, several rosewood-producing species were added to CITES Appendix II, a measure aimed to help ensure that timber entering international trade was legally and sustainably sourced and did not threaten the conservation status of the species involved.

Large volumes of timber from rosewood species were reported to have been licensed for export from West Africa during the 2010s. However, evidence emerged that some of this was being sourced illegally, including timber of *Pterocarpus erinaceus*, the most prominent rosewood species exported from the region at that time, even after introduction of CITES Appendix II trade controls for this species in 2017. Furthermore, regular seizures of illegal shipments of timber from this and other rosewood species within source countries and along the trade chain to end markets demonstrated that traffickers were seeking and finding opportunities to circumnavigate local and international trade restrictions. Analysis in the *World Wildlife Crime Report 2020* pointed to a range of trafficking problems, including illegal rosewood movements between countries to infiltrate legal trade flows, corruption and use of false documentation, misdeclaration of timber to take advantage of difficulties with timber identification, and smuggling through concealment in container shipping.
Sourcing

International trade data compiled for the World Wildlife Crime Report 2020 showed that Nigeria was the most prominent exporter of rosewood timber to Asia during the period 2015–2018. Following the listing of one of the main rosewood species exported from that country, *Pterocarpus einaceus* (known in Nigeria as “kosso”) in CITES Appendix II in 2017, formal concerns were raised about the legality of acquisition of exported timber and the scientific basis for non-detriment findings, which should help establish sustainable levels of trade. Lack of resolution of these concerns led to a CITES recommendation to suspend legal trade in this species from Nigeria in 2018. Threat assessments carried out by UNODC at that time and subsequently noted significant vulnerabilities. There was a risk that traffickers in the country, previously involved in laundering through legal exports timber they had sourced illegally in Nigeria or other countries, might try to continue exports through smuggled shipments. There was also a risk of leakage into illegal trade from timber stocks held by traders but now ineligible for legal export.

To assess the situation in greater depth, UNODC carried out fieldwork in Nigeria in 2022, particularly in Taraba state, which is known for its forestry industry. A total of 35 individual semi-structured interviews and six focus groups were conducted with various actors in the timber supply chain in May and June 2022. While the findings of these interviews cannot necessarily be generalized internationally, they provide useful insights into the ways rosewood trafficking has developed in West Africa. Some of the respondents had experience with aspects of the rosewood trade in other parts of Nigeria and even in other West African countries. In addition, most of the respondents had moved on to use of other valuable species after the trade in rosewood logs had declined.

While organized crime threat assessment research suggested a good deal of local involvement in promoting and managing rosewood trade in Nigeria, including that of high-ranking politicians, traders from Asia were playing an active role in the country in organizing trade, both legal and illegal. Field research conducted in connection with this and previous UNODC reports has shown these traders to be a heterogeneous group. Interviewed Nigerian nationals who had worked with them describe them as mostly quite young, in their late twenties and early thirties, and desperate to succeed. Many of them were poor people who borrowed heavily to try their luck in the “frontier” of Africa and felt unable to return to their home country empty handed. In some parts of the region they had engaged in the manual labour of logging themselves, while others had the resources to finance or equip sawmills of varying sophistication. During the rosewood boom, better resourced groups appeared primarily as buyers and traders from the larger urban areas, including some that appeared to be representatives of Asia-based timber firms, ranging from family-owned concerns to larger corporations. All these levels of participation occurred in parallel, so it is inappropriate to generalize about their role in the market.

The rosewood trade brought benefits to the countries of supply. When exported legally, it brought foreign exchange and tax revenues to national governments. The trade also brought resources to local authorities, including the traditional authorities who act as stewards over community owned forests in some countries. It brought jobs to local young people, who were employed in logging and transporting timber. However, in nearly every country of the region, unsustainable extraction
eventually prompted the imposition of regulations or laws designed to slow or prevent the export of rosewood.29

At least initially in some countries, foreign traders were not doing anything illegal. They were simply taking advantage of the lack of controls on logging in many countries of the region, some of which had never been major timber source countries before. Even when illegally harvested, the timber became legal to trade for most countries once it had left the national borders. Until Pterocarpus erinaceus was listed in the CITES Appendices, many states had no legal basis for helping to enforce the source countries’ timber laws by stopping imports.

Once local controls were put in place, the traders had several options. Many elected simply to move to a new country where controls were not present, like the traders from Benin discussed below. In other instances, traders remained in place as local loggers petitioned for moratoria on export controls.30 Others continued to export illegally, either moving the timber to countries with less regulation for export or colluding with local officials to export despite the laws and regulations.31

According to interviews conducted in Nigeria for this report, the rosewood trade came to Nigeria after Asian traders relocated there from Benin. According to one respondent, even in those days, many of the logs exported from Benin came from Nigeria.32 One informant said that the traders began to relocate around 2014 as the wood became scarcer in Benin and there was an attempt to “indigenize” the logging industry in that country. The traders brought with them Beninese skilled workers to train local Nigerians in the use of milling machines, and one informant said he still employed four of them.33

The Nigerians interviewed described Asian buyers as very exacting in the specifications they required for the wood.34 When asked about apparently abandoned stocks of logs, respondents said these were often because the wood did not meet specifications owing to flaws (such as hollow spaces known as “cancers”) or failure to meet the required dimensions.35 The buyers appeared to be filling the orders of counterparts back home, who had specific purposes for the wood and had no use for timber that did not meet their specifications.

Asian traders were reported to have assumed a commanding position in the processing of timber. The Taraba Timber Association invited foreign traders to establish sawmills in the state in 2014.36 While some locally owned sawmills did exist, the technical issues of acquiring and installing the equipment required cooperation with overseas buyers. As a result, even today, the Nigerian owned sawmills were dependent on imported parts and the machines could only be serviced by foreign technicians.37 Furthermore, not all the sawmills ostensibly Nigerian owned were really so—one Nigerian sawmill owner admitted being a front for an overseas firm that wanted to avoid the additional fees that came with foreign ownership.38 As discussed below, these sawmills are key to the way rosewood continues to be exploited in Nigeria. The foreign owners of the sawmills were also said to be owners of other businesses in Nigeria, including other types of industrial processing plants. One trader interviewed who worked closely with expatriates from Asia said they use timber to build a startup stake and then use the proceeds to start other, more “legitimate” businesses.39
According to those interviewed, the process of getting the wood to the point of export starts with receiving permission to log. This permission required authorization from several authorities. For example, in Taraba state, licences from state and local authorities were required. Those seeking to log in communally owned forests, like the forests of Taraba, were further required to approach the traditional leader in the area after receiving their official licences. Although gifts to these leaders were not required, respondents suggested they were expedient and could take the form of small monthly payments. Traditional leaders interviewed said consent was given because logging brought the promise of employment for local youth.

In addition to securing permission to log in an area, chainsaws were required to be registered and licensed, chainsaw operators were unionized, traders were required to be members of a national association, PROWPMAN (the Processed Wood Producers and Marketers Association of Nigeria, formerly the Timber Contractor Association), and logging depots required authorization. Each authorization required a fee. The local logging industry thus produced revenues for a range of regulators, formal and informal. Although these fees were modest in relation to the value of timber extracted, they were important in the local economy.

Summarizing insights from all interviewees for this research, a wide range of roles in sourcing and trade can be identified:

- The logging itself required a range of personnel and inputs. Scouts were employed to locate the best trees for cutting. Hunters, pastoralists, community guides and experienced loggers could be employed as scouts. Bulldozers (and bulldozer operators) were required to create logging roads that tipper trucks could navigate. Chainsaw operators were required to fell the trees. "Pushers" were required to move the fallen logs to a point where they could be loaded into a tipper truck.
- Loaders were responsible for getting the logs into the tipper trucks, often with the use of a mounted crane. The tipper trucks, which were in short supply, required an experienced driver, who could either be an independent contractor or in the employ of a major trader. They drove the logs to a depot for storage, which could be a privately owned facility where all loggers could store their logs for a fee, or a private facility owned by a major trader or sawmill for their own stocks. Here the loaders would unload the logs where they could be viewed by buyers.
- Once purchased, the logs were loaded onto trailers for transportation. A specialized agency, the Dan Commission, was responsible for assigning trailers to shipments of logs from source states like Taraba onward to export trading points in other states. Loading directly onto containers was possible but rare because the low-quality roads meant that containers could fall off or cause the truck to tip over. Instead, most Taraba log loads were reportedly squared and containerized at one of the five major wood processing sites, three associated with the ports of Apapa (Lagos), Tin Can (Lagos) and Onne (Rivers), plus Sagamu, a site outside of Lagos, which was prominently mentioned, as well as Owerrri for Onne Port.
- Several drivers interviewed reported being paid the same, apparently standardized, fee for the trip: 10% of the income realized by the trip after expenses were deducted. Several routes were described for reaching the destination, with the more direct routes being more expensive due to the cost of “tips” at roadblocks along the way. These tips were paid at checkpoints manned by a wide range of actors, including local, state, and federal.
government actors; trade organizations; police and military authorities; and informal “tax” collectors. One respondent said there were over 50 locations where police needed to be tipped between Taraba and Lagos, as well as 25 military checkpoints (which were more expensive). The standard amount of money deposited with the truckers to make these payments along the passage from Taraba to Lagos was cited by multiple sources as being between 80,000 and 150,000 naira (about $170–330),44 with each individual tip being small (equivalent to a few dollars).45 Those payments made under the guise of official revenue collection on the roads generally did not find their way into the government coffers.46

- At one of the export trading points, like Sagamu or Owerri, the wood was further squared and loaded into containers. Other sites where a similar function was performed included Ogere, Sapade, and Agbara, as well as Nsukka and Enugu, although more research is needed to determine whether they supply Onne or Lagos ports, or both. A different set of drivers were employed to transport the containers from the processing yards to the sea. Once at port, clearing agents were an expensive necessity to ensure that all the paperwork was in order and the container was cleared to be shipped. For various reasons, respondents said that some timber from Nigeria continues to be smuggled to Benin or even Ghana for export.47

All told, a single shipment of timber likely results in income for hundreds of families in Nigeria, directly and indirectly. A traditional leader interviewed reported that the timber industry, by providing employment for many of the youth, had reduced some types of crime in his area.48 A sawmill manager interviewed commented that the timber trade reduced poverty in the area by providing new opportunities for increased income from employment.49 A published academic study on socioeconomic impacts of the Pterocarpus erinaceus trade from Taraba reached similar conclusions about positive impacts on crime and jobs, but made it clear that there was a trade-off between economic benefits and depletion of timber resources and biodiversity in the state.50

The timber trade was reported to be a seasonal activity, with most activities suspended during the rainy season between June and October as the river fords and logging roads become impassible. The more industrious continued logging in the off season, creating stockpiles to be moved as soon as the weather allowed. Owing to decreased availability, prices for logs skyrocketed during the rainy season.51

By the time of the UNODC interviews in 2022, the rosewood supply had dwindled to a negligible level. The CITES controls seem to have come coincided with the time Pterocarpus erinaceus became commercially extinct in Taraba state. As one agent interviewed put it:

“It is true that CITES was a problem for rosewood. But even without CITES, rosewood trade would have come to an end because the tree is exhausted in the forest. The ban came at a time when the species has already finished. Until this day, there is still demand for rosewood, but there is none left in the forest.”52

According to some of those interviewed, rosewood was sometimes cut into smaller components at local sawmills rather than being exported as logs.53 The detailed specifications for these components were provided by the buyers in the destination countries. It was alleged that this processing helped exporters to evade CITES controls. Firstly, it was debatable whether semi-
processed items met the definition of “transformed wood”, one of the categories of items subject to CITES trade controls.54 Secondly, as some interview subjects suggested, inspectors might have been focused on looking for logs and were likely unable to differentiate between timber species when confronted with smaller components.55 Such deception may have been effective as no seizure of timber components coming from Nigeria appears in the WWCRT analytical dataset.

In addition to a shortage of trees to harvest and CITES regulations, the timber industry was said by those interviewed to be threatened by the rising cost of fuel, and this was before the recent suspension of Nigerian fuel subsidies. Concern about environmental impacts beyond the threat to tree species was also said to be a threat to continued logging. According to one interviewed expert, in 2021 a local traditional leader banned logging due to the impact it was having through wind exposure on local crop yields,56 but pressures from both the expatriates and locals involved in the trade compelled the leader to lift the ban after nine months.57

Concerns about security were also voiced. Owing to the perception of the wealth involved, kidnappers commonly targeted those involved in the timber industry, including loggers,58 drivers, and even forestry officials.59

Following the exhaustion of rosewood supplies in Taraba, traders recounted how the suspension of trade in 2018 caused economic hardship for many who had invested heavily in the timber industry and had not anticipated such an outcome, bankrupting some and exposing others to court proceedings due to unfulfilled contracts and defaulted loans.60 However, the large institutional and capital infrastructure that developed in Nigeria under the rosewood boom did not remain idle for long. Rather, the industry, including participants in Taraba, targeted another species of interest to the market: “apa” (Afzelia spp.). Trader interviews and review of export data show how rosewood exports from Nigeria to Viet Nam shifted to this species from 2014 onwards, with a sharp increase after 2018.61

Like Pterocarpus erinaceus, Afzelia species are nitrogen fixing legumes, and Afzelia africana is reported to reduce erosion and be somewhat fire-resistant.62 It grows to much greater sizes than rosewood and this has posed technical challenges for those involved in its extraction. Like Pterocarpus erinaceus, it is used as cattle fodder by Fulani pastoralists, and for this reason, they have been known to respond violently when it is cut down.63

Despite these difficulties, the apa trade has apparently allowed those who invested in chainsaws, tipper trucks, depots, and other aspects of the timber trade infrastructure to continue to operate in the aftermath of the rosewood boom, although with less profitability. The CITES Appendix II listing of Afzelia africana came into effect in February 2023 after the UNODC interviews were conducted, so its impact on the industry remains unclear although traders interviewed said apa is already close to being exhausted in the forests of Taraba.64

In addition to apa, respondents said “tali” (Erythrophleum spp.) was currently in demand in Taraba state. Tali is a multipurpose timber long known in the markets. It contains toxic compounds and special equipment is required for its extraction as skin contact or inhalation of its sawdust can be dangerous.65 The wood is dense and very heavy, posing challenges for the types of manual
extraction employed in Taraba.\textsuperscript{66} Despite these drawbacks, if implementation issues related to the CITES listing interrupt \textit{apa} exports, the importance of \textit{tali} to the local timber industry may grow.

**Illegal trading**

Traders interviewed explained the ways that timber could be trafficked through other countries in West Africa to avoid national export enforcement. For example, one logger interviewed had personally been involved in illegal logging in Cameroon for export through Nigeria,\textsuperscript{67} and traders that had worked in Benin recalled unofficially importing logs from Nigeria.\textsuperscript{68} Previous UNODC threat assessment research indicated that some of the rosewood exported through the Gambia was of Senegalese origin, and that exports from Sierra Leone may be diverted from Guinea.\textsuperscript{69} This illustrates that the country exporting outside Africa and the source country for the timber are not necessarily the same, for nominally legal or for illegal trade. Misdetection of species was also said to be one means of evading enforcement. A forestry official interviewed in Nigeria said that mixing loads of different species was a common trafficking technique.\textsuperscript{70}

Records in the WWCR3 analytical dataset of global rosewood seizures between 2011–2021 analysed by weight show peaks in 2014 and 2017 (Figure CS3.1).

**Figure CS3.1. Weight in tons of rosewood seized 2011–2021**

![Weight in tons of rosewood seized 2011–2021](source)

Source: CITES Illegal Trade Database and World WISE (WWCR3 analytical dataset)

Both the species composition and countries of origin appear to have varied considerably over this period. Up to 2015, Malagasy rosewoods (various \textit{Dalbergia} species) from Madagascar, red sanders (\textit{Pterocarpus santalinus}) from India and Siamese rosewood (\textit{Dalbergia cochinchinensis}) from South-East Asia predominated in seizure records.\textsuperscript{71}

According to rosewood seizure data for 2015–2021, for records where a country of departure for shipments was reported, Guinea-Bissau, India and Nigeria were the most prominent (Figure CS3.2). Detailed examination of records in the WWCR3 analytical dataset indicates that the prominence of Guinea-Bissau is largely owing to one spectacular seizure of over 1,200 tons of rosewood made in
Singapore in 2017. For India, regular large seizures of red sanders were reported. The prominence of Nigeria is owing to two very large seizures, one made in Ghana in 2019 and one reportedly made in Viet Nam in 2020.

Figure CS3.2. Reported country of departure of rosewood timber shipment seizures by weight 2015–2021

![Graph showing the country of departure for rosewood timber seizures by weight from 2015 to 2021. The source is CITES Illegal Trade Database and World WISE (WWRC3 analytical dataset).]

Other information on rosewood trafficking trade chains is discernable from analysis of where seizures took place and the intended destinations of shipments, where available (Figures CS3.3 and CS3.4). Particularly notable are the red sanders shipments regularly intercepted in India before export.

Figure CS3.3. Country or territory of rosewood timber shipment seizures by weight 2015–2021

![Graph showing the country or territory of rosewood timber seizures by weight from 2015 to 2021. The source is CITES Illegal Trade Database and World WISE (WWCRS analytical dataset).]
Figure CS3.4. Reported country or territory of destination of rosewood timber shipment seizures by weight 2015–2021

Source: CITES Illegal Trade Database and World WISE (WWCR3 analytical dataset)

End markets

After rosewood has reached destination countries where manufacturing operations and consumer markets are located, differentiation between timber that was legally or illegally sourced is extremely difficult. At the end market stage of the trade chain, rosewood manufacturing and retail is typically overt, and the nature of the products sold is such that the timing and location of raw material sourcing is unlikely to be clear to end consumers.72

In the absence of specific information on trafficked rosewood in end markets, analysis of official data for legal trade could provide useful insights into trends that might influence incentives for illicit sourcing. For example, published trade data for China allow comparison of declared import volumes and values of rosewood from West Africa (Figure CS3.5).
The trend shows a decline over time in the average value, from almost $1,800/m³ in 2011 to just over $1,200/m³ in 2021. Unit prices fell around the 2014 import peak, but were higher during the 2017 peak, perhaps reflecting supply concerns. Since 2018, volumes and values have fallen, perhaps indicating an overall decline in demand for rosewood imported from West Africa in China. However, such observations can only illustrate the overall market environment and without more precise understanding of the proportion of legally and illegally sourced rosewood timber entering end markets, it is not possible to draw firm conclusions or policy implications.

Another factor for consideration in trying to understand rosewood market dynamics is the possible influence of investment speculation. Timber dealers interviewed during research carried out in 2018–2019 into the rosewood market in China indicated that they were inclined to hold onto stocks of more valuable timbers as a capital investment. Interviews with furniture dealers during the same period as part of an academic study found that the investment potential of the furniture is always emphasized. One interviewee put it succinctly: “They use it as a bank.”

The fact that rare woods are being used as a value store could lead to imports in excess of immediate consumer demand, with substantial stockpiling possible. Trends in imports may therefore only partially correspond to trends in consumer demand, with other market factors, including indications of forthcoming international regulation, also affecting the trend.

For example, data gathered by the International Tropical Timber Organization show the export price of *Pterocarpus erinaceus* logs from Mali more than tripled between 2017–2019. This was at a time of increasing scrutiny of the legality and sustainability of sourcing for trade following the listing of *P. erinaceus* in CITES Appendix II, culminating in the recommendation to suspend trade with Mali.
and six other countries in 2022. It was also likely a time of increasing scarcity of the timber, so the two effects are difficult to disentangle.

**Implications**

This updated analysis of the evolving climate in which rosewood trafficking takes place provides important insights into factors that influence wildlife crime. As a high value non-perishable wildlife commodity sought in bulk for a specialist, but voluminous end market, it is clear that demand overall has been overstretching supply. Analysis of this sector in earlier editions of the *World Wildlife Crime Report* indicated that demand was already shifting between species in response to supply scarcity. The introduction of sourcing and trade regulations at national and international levels, aimed to protect forest resources and prevent threat to the species involved, has further shaped market dynamics.

These factors influence opportunities for participants in both legal and illegal sectors of this business and sometimes motivate participants to shift from lawful to unlawful activity. Evidence from field research in Nigeria detailed above shows that both overexploitation of forest resources and the introduction of restrictive regulations aimed to prevent such environmental harm can have significant impacts on the livelihoods and security of people working at early stages of the trade chain. Although benefits from employment in unsustainable extractive industry are likely destined to be short-lived, they have immediate importance. Such participants have low resilience to deal with the sudden consequences of regulatory interventions aimed to encourage legal, sustainable trade. If income can be sustained through involvement in sourcing rosewood for illegal trade, temptation is likely to be great.

This research also illustrates how individuals and businesses involved in different roles sourcing, processing and transporting rosewood timber prior to export adapt to these changing circumstances. For some, the willingness and capacity to operate outside the law is a specialism in itself, while for others criminal involvement is more likely a pragmatic business reaction to prevailing circumstances. In a situation where even legitimate trade is “taxed” by demands for roadside tips, the distinction between legal and illegal commerce is likely quite blurred. Evidence indicates that specialists shift to new locations and even to different countries as opportunities arise, whether to operate within or outside applicable laws.

At the other end of the trade chain, it is not clear to what extent rosewood buyers, manufacturers, and retailers are able to discern legal from illegal supply. Past research has shown that there are market preferences for particular species and timber qualities, but this is clearly also an adaptive market where speculative investment and prospecting for new sources of raw materials have deep roots. Whatever the level of knowledge or understanding of sources of supply, the end market plays a role in motivating rosewood trafficking.

While enforcement of regulatory interventions must play a crucial role in deterring illegal supply, there is also a case for positive engagement by and between business interests along the trade chain in finding solutions to rosewood trafficking. These might include investment in sustainable forest management, adoption of codes of good practice, and development of traceability.
mechanisms. There are existing models for such approaches through forest trade assurance standards. Without such interventions, there is a significant risk that crime in this wildlife trade sector will decline only when the species that supply rosewood trade suffer commercial extinction.

1 There is no definitive list of tree species traded under the common commercial name "rosewood". A list compiled in 2020 for the CITES Plants Committee listed 58 species traded under this name, but this is now under review. CITES Secretariat, "Rosewood Tree Species (Leguminosae (Fabaceae)) PC26 Doc 29," Plants Committee document (Geneva, Switzerland: CITES Secretariat, June 2023), https://cites.org/sites/default/files/documents/E-PC26-29_0.pdf.
4 Ibid.
6 See earlier note about lack of a definitive list of tree species traded under the common commercial name "rosewood" and the CITES Plants Committee process to refine such a list.
7 Appendix I includes species threatened with extinction. Trade in specimens of these species is permitted only in exceptional circumstances. Appendix II includes species not necessarily threatened with extinction, but in which trade must be controlled in order to avoid utilization incompatible with their survival. Appendix III contains species that are protected in at least one country, which has asked other CITES Parties for assistance in controlling the trade.
8 For annotation codes see: https://cites.org/eng/app/appendices.php.
9 See: https://speciesplus.net.
15 Ibid. See: rosewood case study Fig. 6 based on World Trade Atlas and UN Comtrade data.
16 UNODC, "West and Central Africa Wildlife Crime Threat Assessment."
18 UNODC, "West and Central Africa Wildlife Crime Threat Assessment."
20 Semi-structured interviews were held with various actors across Nigeria in the wood supply chain (supply chain nodes) from the forest, through all processing stages to export from both the public and private sectors. The interviews were conducted in May and June 2022. A total of 35 interviews were conducted with individuals, and 6 interviews were conducted with small groups ranging between 2 to 6 people in each group. Interviews are coded in other references.
21 UNODC, "West and Central Africa Wildlife Crime Threat Assessment."
22 CH1.
23 TE1 (Interview with a timber expert who worked in Guinea-Bissau and Gambia.) Also see Petra Tschakert, "Shifting Discourses of Vilification and the Taming of Unruly Mining Landscapes in Ghana," World Development 86 (October 2016): 123–132, https://doi.org/10.1016/j.worlddev.2016.05.008.
24 SM3, SM4.
25 AG1, AG7.
27 Ibid.


30 See, for example, the discussion of the log export ban in Sierra Leone between 2017 and 2019 in the World Wildlife Crime Report 2020.


32 SM3.

33 SM3.

34 TR1; TR2; SM2; SM3; DP1.

35 Ibid.

36 AG7, CH1.

37 SM5, SM1, SM4.

38 SM3.

39 AG3.

40 CL1; AG1; AG4; AG6.

41 CL1; CL2; CL3.

42 AG7.

43 Ahmed, Oruonye, and Ayuba, "Socio-Economic Impact of Commercial Production of Rosewood (P. Erinaceus) in Taraba State, Nigeria."

44 Conversion at January 2023 rates, since when there has been significant depreciation of the Nigerian Naira against the US Dollar.

45 DS1-4, CAG1.

46 FCO1.

47 CH1.

48 CL2.

49 SM3.

50 Ahmed, Oruonye, and Ayuba, "Socio-Economic Impact of Commercial Production of Rosewood (P. Erinaceus) in Taraba State, Nigeria."

51 AG1.

52 AG2 Many others agreed with this statement, including F01. Note that the CITES recommendation to suspend trade is commonly misrepresented as a "ban."

53 CH1; SM5; AG7; SM2.

54 In some cases, listings of species in the CITES Appendices are annotated to indicate that only certain parts and derivatives are subject to trade controls. For Pterocarpus erinaceus, the annotation code #17 indicates that 'logs, sawn wood, veneer sheets, plywood and transformed wood’ are included. 'Transformed wood’ is defined by Harmonized System code 44.09 as: ‘wood (including strips, friezes for parquet flooring, not assembled), continuously shaped (tongued, grooved, v-jointed, beaded or the like) along any edges, ends or faces, whether or not planed, sanded or end-jointed’.

55 CH1, CSV1.

56 CL2.

57 TR1.

58 CL2.

59 FCO1.

60 AG2, TR1.


62 CITES, "Consideration of Proposals for Amendment of Appendices I and II. CoP19 Prop. 46" (CITES, November 2022).

63 TR1; LM1; DF3; CO1.

64 AG2; CL3; AG7.

65 AG4, CO1.

66 AG4.

67 CH1, CO1.
UNODC, "West and Central Africa Wildlife Crime Threat Assessment."


Where data have been only available by weight, data have been converted from weight to volume using a conversion factor of 0.841 m³/1,000 kg for African logs and 0.966 m³/1000 kg for other logs.

Zhang, Chen, and Yang, “China’s Rosewood Market Survey.”


Case study 4: African elephant ivory

Around 2006, Africa began to experience a renewed wave of elephant poaching, with East and Central Africa most severely affected.¹ Seizure data analysed in the World Wildlife Crime Report 2016 showed that most of the extensive illegal flow of elephant ivory was headed for Asian markets.² However, the World Wildlife Crime Report 2020 presented evidence that the global ivory market was in decline during the period 2014–2018. It argued that this decline could have been the result of multiple factors, including the possible bursting of a speculative investment bubble after indications that legal ivory markets in several key countries were to be closed or sharply restricted.³

At that time, trends in indicators of poaching, trafficking, and the retail market all suggested that the supply of ivory began exceeding demand from the mid-2010s and that this trend accelerated as national ivory controls came into effect.⁴ Qualitative research found that some poachers were holding onto ivory in hopes of a price rise, and market surveys showed a shift away from large sculptures and toward jewellery.⁵

These market changes were not subtle. For example, based on several independent data sources analysed by UNODC, the destination market wholesale prices in 2018 were one-third what they had been in 2014.⁶ In addition, seizure data showed a shift in the geographic focus of the market. After a series of pivotal arrests in Kenya and the United Republic of Tanzania,⁷, ⁸ from about 2015, data indicated that Nigeria had become the primary country of ivory exports from Africa. Similarly, the same analysis showed that Viet Nam and Cambodia became increasingly prominent countries of destination for shipments of ivory during the period 2015–2019, perhaps due to increasing regulatory and enforcement pressure on other trade routes. Mixed loads of tusks and pangolin scales also appeared around the same time, occasionally including other wildlife parts.⁹

The latest information suggests that these trends are continuing. The number of detected poached elephants continues to decline overall, with 2021 being one of the lowest totals on record.¹⁰ ¹¹ After a brief spike associated with three massive seizures in the first half of 2019, ivory seizures have reduced too.¹² ¹³ The expensive works of art that were formerly prominent in the market are less common; most recent market surveys have detected primarily bangles, pendants, and other jewellery.¹⁴ By 2020, prices appeared to be dropping to new lows in both Africa and most of Asia.¹⁵ While reversals are always possible, it appears progress has been made in reducing the flow of illegal ivory.

The impact this trend is having on African elephant numbers is unclear. Although an update on African elephant populations is due soon, the most recent published continental estimate was made in 2016.¹⁶ The estimate found that, in the areas surveyed where comparable counts were available, African elephant numbers had declined by 93,000 in the decade after 2007. According to the International Union for Conservation of Nature (IUCN):

“The decline is largely caused by the surge in poaching for ivory that began around 2006 ... the worst that Africa has experienced since the 1970s and 1980s. Losses in [the United Republic of] Tanzania account for the major share of this decline.”¹⁷*
The previous decade included the period of intense poaching that peaked around 2011. It is not clear whether the overall decline in poaching since that time has allowed African elephant populations to start to recover. The United Republic of Tanzania, one of the countries most affected by poaching, reported a growth in elephant populations in 2019. The results of a 2022 aerial survey of the Kavango Zambezi Transfrontier Conservation Area (KAZA TFCA), which includes parts of Angola, Botswana, Namibia, Zambia and Zimbabwe and hosts the single largest savanna elephant population, were recently released. The survey produced an elephant population estimate of 227,900 for the KAZA TFCA area, an increase of 10,000 from the 2016 population estimate. Of the five countries considered, only Zambia showed a decline in the elephant population from 2016–2022 (Figure CS4.1), although the large number of carcasses seen (about one for every ten live elephants counted) across the KAZA TFCA area may be cause for concern and require further investigation into the reasons for such high mortality rates. It is likely that different regions of Africa have been affected differently so it is not possible to speak about the whole continent based on this sample, but the results appear encouraging.

Figure CS4.1. Comparison of elephant population estimates by country, IUCN 2016 estimates and 2022 KAZA TFCA survey

Source: KAZA TFCA Secretariat and IUCN African elephant status report 2016

Note: further details and methodology are available in the 2022 KAZA TFCA survey and the IUCN African elephant status report 2016

The following discussion reviews the major indicators that illustrate the current state of the ivory market, including the possibility that law enforcement action contributed to changes in the market.
Poaching

All evidence appears to point to a general decline in African elephant poaching over the last decade, although some have disputed the geographic spread of this trend. Under the auspices of CITES government authorities, the poaching of elephants is monitored through the Monitoring the Illegal Killing of Elephants (MIKE) programme, which operates in a sample of 69 designated “MIKE sites” that together hold more than 50 per cent of the African elephant population. When rangers in participating wildlife areas discover an elephant carcass, they determine if it was illegally killed (poached) or died of some other cause.

In 2012, of 1,880 elephant carcasses discovered at MIKE sites in Africa, the majority (1,048; 56 per cent) had been illegally killed, compared to 832 that died of natural causes. In 2022, of 1,832 carcasses found at MIKE sites in Africa, 306 (16 per cent, around one in six) had been illegally killed with the last three years showing some of the lowest counts of illegally killed elephants since 2003 (Figure CS4.2).

Figure CS4.2. Detected number of carcasses of illegally killed elephants versus those that died of other causes at MIKE sites in Africa 2003–2022

At a site level, it is clear some sites have continued to experience higher levels of illegal killing than others. In the 2019–2022 MIKE programme data, certain sites in Kenya, Zambia and the Congo showed higher shares of illegally killed elephants than those in other countries. While these countries have appeared prominently in previous DNA analyses of elephant ivory seizures, other sites that had previously been strongly affected (such as sites in the United Republic of Tanzania) were not reporting such high shares of illegally killed elephants. This suggests shifting patterns in
poaching, assuming patrolling efforts remained the same. Countries in Southern Africa (Zimbabwe, Namibia, Botswana) continued to report relatively low levels of detected poaching (Figure CS4.3). Based on the latest estimates, these three countries are home to more than half of the remaining elephants in Africa.29

Figure CS4.3. Detected number of carcasses of illegally killed elephants versus those that died of other causes at MIKE sites by country 2019–2022

Source: CITES Secretariat30

Illega trade

The downward trend in poaching is paralleled by a decline in ivory seizures. This matched trend might be expected although the relationship is not necessarily direct. Ivory is a non-perishable good so stockpiles (both official and illegal) present in source countries and elsewhere complicate the assessment of ivory supply. Official reports submitted to the CITES Secretariat indicate that there were almost 1,500 tons of ivory held in registered government stockpiles in 2022, including around 850 tons in Africa and 620 tons Asia.31 Concerns have been raised that ivory from some of these stockpiles has been leaking into illegal trade.32 If this is true, the illicit market need not be dependent on new poaching to fuel supply, and trends in the two indicators may not necessarily be synchronized.

Although declining, the trend in the volume of ivory in seizures has not been smooth. By weight, the ivory seizures recorded through the CITES Elephant Trade Information System (ETIS) generally trended downward after 2012, but the volume of very large seizures (defined as 500 kg or more in weight) increased and stayed high through to 2019 (Figure CS4.4). According to the 2022 ETIS analytical report, the first half of 2019 witnessed three of the largest ivory seizures ever made, together totalling over 25 tons, including almost 7.5 tons of tusks seized in China after being
exported from Nigeria, around 8.8 tons seized in Singapore apparently en route from the Democratic Republic of the Congo to Viet Nam, and 9.1 tons of raw ivory seized in Viet Nam, also exported from the Democratic Republic of the Congo.33

Figure CS4.4. CITES ETIS records of reported number of ivory seizures and weight seized by year 1989–2022

Without these three seizures, which may possibly have come from stocks rather than fresh poaching,34 2019 would have been yet another declining year. This was followed by 2020, a year possibly anomalous due to the introduction of transport and movement restrictions related to the COVID-19 pandemic, which had one of the lowest seizure totals on record with no recorded multi-ton seizures.35 Seizures reported for 2021, during which COVID-related restrictions persisted in some areas, remained low. Seizure totals in both 2020 and 2021 were the lowest since 2008, just after the time when the current elephant poaching crisis began.36 Preliminary analysis for 2022 reported in the most recent ETIS update indicates a further decline in the number and weight of reported seizures for that year and fewer larger (more than 100 kg) seizures than the previous year.37 However, the report cautioned that periodic seizures of several tons of ivory in 2021 and 2022 may indicate that organized criminal activity was still evident after the COVID-19 pandemic. The routing of shipments seized since 2020 provides further insight into geographic transitions previously observed. Larger seizures in the WWCR3 analytical dataset for 2021 were made in Nigeria (4.7 tons), South Africa (1.5 tons) and the Democratic Republic of the Congo (1 ton). The most recent ETIS update noted two large seizures linked to Mozambique in 2022, one made in that country (1 ton) and the other later along the trade chain in Malaysia (4.2 tons).38 Based on media sources, other large seizures still to be verified included another sizeable seizure in the Democratic Republic of the Congo in 2022 (1.5 tons),39 a seizure in Viet Nam of a shipment from Angola in 2023 (7 tons)40 and most recently a March 2024 seizure of 4.8 tons of ivory in Mozambique reportedly en route to the United Arab Emirates.41
This geographic shift in the source and destination of the largest seizures suggests that traffickers are responding to law enforcement, the kind of international displacement of trafficking routes seen with other illicit commodities. For example, before 2016, the port of Mombasa in Kenya had been the leading point of export for containerized ivory seizures. However, a series of important seizures and arrests reported by media sources, including those of freight forwarding agents and international traffickers, seems to have caused a major rerouting away from this port, even though some arrests failed to produce convictions. According to the WWCR3 analytical dataset, there were no major ivory seizures associated with Mombasa between 2016–2021.

Poor institutional frameworks as well as weak governance in West and Central Africa have also been quoted as possible factors influencing some of the shift towards these regions.

While law enforcement action may have affected trafficking routes, it is not clear whether it contributed to the overall decline of the market. As discussed below, several separate lines of analysis have suggested that the number of organized crime groups trafficking ivory internationally is limited. If so, then prosecution of a limited number of high-ranking individuals could have had significant impact on the ivory supply.

For example, one group of researchers was able to connect some seizures that occurred between 2006–2015 to one another through DNA analysis. Seizures containing ivory from the same elephant were assumed to be sourced from the same poachers. On the assumption that these poachers supplied individual trafficking groups exclusively, this could indicate that these seizures were connected to the same trafficking group. The analysis suggested that a large share of the major ivory seizures may have been trafficked by as few as three groups. More recent analysis linking seizures containing the ivory of closely related elephants found even more connections.

In addition to this scientific evidence, a number of non-governmental organizations and independent analysts have also concluded that the number of major trafficking groups has been limited, based on everything from court documents and law enforcement records to undercover investigations. Between 2016 to 2022, many of the individuals associated with these groups have been prosecuted according to various sources (including media) in China, Kenya, Thailand, the United Republic of Tanzania, the United States, and Viet Nam. If the claim that only a small number of groups dominate ivory trafficking is correct, then these prosecutions could have had a significant impact on the ivory flow.

**Trafficking groups and the 30 largest ivory seizures**

To test this theory, UNODC looked at 30 of the largest ivory seizures on record in the 20 years between 2002–2021 to see which could be assigned, by some form of evidence, to one of several recently prosecuted trafficking groups. Combined, these seizures accounted for 137 tons, or about 60 per cent of the total weight of ivory seized during that period.

If the seizures are reflective of the underlying trafficking patterns, then the share of these large seizures that can be associated with one of the main groups could reflect the share of the market controlled by these groups. Furthermore, just under a third of these 30 largest seizures in terms of
both number of incidents and weight of ivory seized can be assigned to known networks based in Kampala (Uganda) and Putian (China) through a combination of DNA analysis, court documents, and research by non-governmental organizations (Table CS4.1).

However, there were also several very large seizures that do not appear to be related to these primary networks. For example, in 2019, 8,795 kg of ivory and some 12 tons of pangolin scales were seized in Singapore coming from the Democratic Republic of the Congo and reportedly destined for Viet Nam. Court records from the resulting trial revealed that three of the owners of the shipment were businessmen from the Guangxi Zhuang Autonomous Region of China. These men were offered a ton of pangolin scales in payment of a debt incurred by a Congo-based Chinese businessman after a construction contract failed. Rejecting this initial offer, the three flew to Kinshasa in the Democratic Republic of the Congo and arranged a much larger shipment, to be sold to a buyer in Viet Nam. While not professional wildlife traffickers, their role in the shipment was more than that of mere investors and they were all sentenced to ten years or more in prison by the Chinese authorities in 2020.58, 59

These three were not the only ones to engage in wildlife trafficking as a side line to other business activities in Africa. The seizure of 3.9 tons of ivory in Togo in 2014 led to the investigation of a Vietnamese timber company and its employees in Africa and Viet Nam.60 Traders versed in international trade, including in protected species, appear to find it advantageous to include other commodities in their shipments and timber is a frequent cover load for ivory.61

Despite parallel flows associated with marginal business activities, a limited number of dedicated wildlife traffickers appear to be responsible for many of the large ivory seizures. If arrests of these dedicated traffickers affected the ivory supply in an environment where demand remained consistent, it should have pushed prices higher. Indeed, the theory behind supply control is to push prices out of the reach of users.62 Instead, as the following discussion illustrates, prices indicate that there was declining interest in whatever remained of the ivory market.
Table CS4.1. Analysis of groups associated with a selection of large ivory seizures 2002–2021

<table>
<thead>
<tr>
<th>Seizure</th>
<th>Associated groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. In January 2002, 3,207 kg of ivory tusk segments packed in 14 boxes were seized by police in the United Republic of Tanzania from a house in Dar es Salaam.</td>
<td>Unknown</td>
</tr>
<tr>
<td>2. In June 2002, 6,246 kg of ivory tusks and over 40,000 hanko ivory blanks (totalling 7.2 tons) from Zambia were seized by customs officers in Singapore.</td>
<td>Lilongwe-based group⁶³</td>
</tr>
<tr>
<td>3. In September 2005, six tons of ivory arrived in the Philippines from Zambia labelled as personal effects.</td>
<td>Unknown</td>
</tr>
<tr>
<td>4. In May 2006, customs officers in Hong Kong, China seized some 3,900 kg of ivory from Cameroon, hidden in a secret compartment of a container declared as timber, en route to Macao, China.</td>
<td>Unknown</td>
</tr>
<tr>
<td>5. In July 2006, customs officers in Taiwan Province of China inspected an unclaimed container and found 3,206 kg of ivory from the United Republic of Tanzania.</td>
<td>Unknown</td>
</tr>
<tr>
<td>6. In March 2009, 1,244 tusks (6.2 tons of ivory) from the United Republic of Tanzania were seized in Viet Nam by customs officers at Hai Phong port concealed in plastic waste.</td>
<td>Unknown</td>
</tr>
<tr>
<td>7. In March 2009, in two shipments, some 3.5 tons of tusks from the United Republic of Tanzania were seized by customs officers in the Philippines concealed in plastic waste.</td>
<td>Unknown</td>
</tr>
<tr>
<td>8. In December 2012, customs officers in Malaysia seized 2,341 pieces (6,034 kg) of ivory from Togo in two containers disguised as timber at Port Kelang.</td>
<td>Kampala-based group⁶⁴</td>
</tr>
<tr>
<td>9. In January 2013, customs officers in Kenya seized 3,827 kg of ivory from Uganda on its way to Thailand concealed under mazeras stones. This was one of three similar seizures made that month totalling almost 7 tons of ivory.⁶⁵</td>
<td>Kampala-based group⁶⁶</td>
</tr>
<tr>
<td>10. In July 2013, in two seizures, authorities in Kenya seized almost 4.8 tons of ivory on its way to Malaysia.</td>
<td>Kampala-based group⁶⁷</td>
</tr>
<tr>
<td>11. In July 2013, authorities in China reportedly seized 4,464 kg of ivory from Nigeria sent via Hong Kong, China and declared as rosewood.⁶⁹</td>
<td>Putian-based group⁷⁰</td>
</tr>
<tr>
<td>12. In July 2013, a fisheries officer was arrested in connection with the smuggling from Malawi of 1,120 ivory tusks (approx. 4,000 kg) by police in the United Republic of Tanzania in Mbezi, Dar Es Salaam.</td>
<td>Unknown</td>
</tr>
<tr>
<td>13. In October 2013, authorities in Uganda seized 2,903 kg of ivory.</td>
<td>Kampala-based group⁷¹</td>
</tr>
<tr>
<td>15. In January 2014, authorities in Togo seized 3,900 kg of ivory believed to be destined for Thailand and Viet Nam under a cover of timber.</td>
<td>Vietnamese timber trading group with local facilitators⁷²</td>
</tr>
<tr>
<td>16. In May 2014, 3,008 kg of ivory sent from Kenya via Malaysia was seized by customs officers in Cambodia at Kampong Saom in a shipment of beans.</td>
<td>Unknown</td>
</tr>
<tr>
<td>Case Study</td>
<td>Details</td>
</tr>
<tr>
<td>-----------</td>
<td>---------</td>
</tr>
<tr>
<td>17.</td>
<td>In April 2015, 4 tons of ivory sent from the Democratic Republic of the Congo via Malaysia was seized at Bangkok port, Thailand, in a shipment of beans on its way to the Lao People’s Democratic Republic. Johor-based facilitator</td>
</tr>
<tr>
<td>18.</td>
<td>In April 2015, customs officers in Thailand seized 3,230 kg of ivory from Mombasa, Kenya sent via Malaysia on its way to the Lao People’s Democratic Republic in a container of tea leaves. Kampala-based group, Kenya-based facilitator group</td>
</tr>
<tr>
<td>20.</td>
<td>In July 2017, customs officers in Hong Kong, China seized 7,031 kg of tusks in a container from Malaysia concealed beneath frozen fish. Unknown</td>
</tr>
<tr>
<td>21.</td>
<td>In August 2017, customs officers in Malaysia seized 3 tons of ivory from Nigeria on its way to China. Unknown</td>
</tr>
<tr>
<td>22.</td>
<td>In March 2018, customs officers in Singapore seized 3.5 tons of ivory from Nigeria on its way to Viet Nam. Kampala-based group to Vietnamese group, Singapore-based freight forwarder</td>
</tr>
<tr>
<td>23.</td>
<td>In April 2018, customs officers in Mozambique seized 3,354 kg of ivory on its way to Cambodia. Unknown</td>
</tr>
<tr>
<td>24.</td>
<td>In December 2018, customs officers in Cambodia seized 1,026 ivory tusks (3.2 tons) from Mozambique. Unknown</td>
</tr>
<tr>
<td>25.</td>
<td>In January 2019, customs officers in Uganda seized 3,299 kg of ivory from the Democratic Republic of the Congo in three containers of timber at the border crossing with South Sudan, alongside 423 kg of pangolin scales. The ivory included some marked as belonging to the stockpile maintained by the Government of Burundi. Kampala-based group to Vietnamese group, Burundi stockpile</td>
</tr>
<tr>
<td>26.</td>
<td>In March 2019, customs officers in Viet Nam seized 9,104 kg of ivory from the Congo at Tien Sa port of Da Nang. Unknown</td>
</tr>
<tr>
<td>27.</td>
<td>In March 2019, authorities in China seized 7,482 kg of ivory from Nigeria at a warehouse. Putian-based group</td>
</tr>
<tr>
<td>28.</td>
<td>In April 2019, customs officers and police in Viet Nam seized 3,446 kg of ivory and 3,977 kg of pangolin scales at Hai Phong. Unknown</td>
</tr>
<tr>
<td>29.</td>
<td>In July 2019, customs officers in Singapore seized 8,795 kg of ivory from the Democratic Republic of the Congo on its way to Viet Nam. DRC-based facilitator</td>
</tr>
<tr>
<td>30.</td>
<td>In January 2021, 4,752 kg of ivory and 5,239 kg of pangolin scales were seized in Nigeria on their way to Viet Nam in a shipment of timber. Nigeria-based group</td>
</tr>
</tbody>
</table>

Source: CITES Illegal Trade Database and World WISE (WWCR3 analytical dataset)
Prices

Data on prices from several sources, show a declining trend from 2014, which appears to have been the price apex. Based on the poaching figures, the supply of new ivory was also declining from 2011 and the general trend in the volume of seizures has been declining since 2013, despite strong incentives through the CITES National Ivory Action Planning process for countries to increase enforcement effort. The fact that prices declined as supply was constrained suggests that a decline in demand for ivory was driving the market downwards.

Within Africa, wholesale prices for raw ivory during 2014–2018 averaged just under $400 per kg, according to data compiled by UNODC for the World Wildlife Crime Report 2020. However, price data from research in Mozambique and Nigeria during 2017–2023 by a non-governmental organization indicate a decline to under $200 per kg (Figure CS4.5). Such a decrease would represent a significant decline in potential profit for traffickers in Africa. The price data for Nigeria do, however, appear to show stabilization in the post-COVID-19 pandemic period during 2022–2023.

Figure CS4.5. Average raw ivory price ($/kg) in Mozambique and Nigeria 2017–2023

In the Asian market, prices have also continued to decline. Prices from research by a non-governmental organization in Viet Nam, a primary destination market, dropped from over $1,000 per kg in 2015 to about $400 per kg in mid-2021 (Figure CS4.6). According to a periodic market research survey of urban areas of China commissioned by a non-governmental organization, the demand for ivory in 2021 was down considerably from the first survey in 2017, but up by 3% from 2020.
Conclusions and implications

All indications are that the wave of elephant poaching that began around 2006 has substantially subsided. The shrinking of the ivory market documented by the collapse in the price of ivory, decreasing seizures of ivory, and decreasing elephant poaching figures, seems to be the result of a combination of demand and supply interventions. Government policies leading to the closure of key domestic markets, such as those in China and Thailand, have constrained demand. On the supply side, a series of convictions of high-level traffickers who operated in Africa and Asia may have facilitated a constrained flow of illicit ivory, as captured in the decline in aggregated seizure volumes. However, this supply constraint has not resulted in an increase in ivory prices, suggesting demand for ivory has truly declined. The fall in price may also have reduced incentives for speculative consolidation and storage of ivory for investment purposes to some extent.

That said, the continued threat to some elephant populations, particularly forest elephant populations, remains unclear. The persistent detection of large shipments of ivory highlights the continued existence of both a market and those willing to invest in it. While progress has been made on many fronts, the threat to local elephant populations has not gone away.

To the extent that seizures represent the underlying trafficking, it appears that some of the high-volume shipments can be attributed to a limited number of networks that have been exposed to enforcement intervention. It also seems clear that interdiction and arrests have substantially changed the routing and techniques used by ivory trafficking networks. However, the decline of prices in the face of declining supply suggests that it is a genuine decline in demand, not just supply control, that has led to the decline in elephant poaching in Africa.
CASE STUDY | Elephant ivory


4 Ibid.

5 Ibid.

6 Ibid.


12 CITES, ‘CITES CoP19 Doc. 66.6’.


14 Many recent market surveys have reflected this shift. In Viet Nam, as early as 2017, TRAFFIC noted “ivory jewellery items accounted for over 90% of all the items found online and in physical outlets.” See Minh D. T. Nguyen, Rosa A. Indenbaum, and Madelon Willemsen, ‘From Tusk to Trinket: Persistent Illegal Ivory Markets in Viet Nam’ (Cambridge: TRAFFIC, December 2018). In a comparative survey of Hong Kong, China markets, TRAFFIC notes, “When grouped into categories, jewellery was the most common (46%), especially items such as amulets, beaded bracelets and necklaces, earrings and pendants. This was followed by figurines (30%) and household items (22%).” See Wilson Lau, ‘Ebbing Away: Hong Kong’s Ivory Trade’ (Cambridge: TRAFFIC, July 2021). A 10-market survey was conducted by IFAW in 2019. In Cambodia, it noted, “Small pieces of jewellery and accessories and Buddha amulets account for most products being sold, often made from African ivory.” In Japan, in most online platforms surveyed, more than three-quarters of the objects for sale were jewellery or hankos. In Laos, the survey found, “Recent surveys suggest that the ivory products most readily available in Laos are small items of jewellery and accessories – pendants, necklaces, bangles and bracelets...” In Singapore, the report quotes TRAFFIC surveys indicating “… where it remains available, ivory jewellery and accessories, including bangles, bracelets, earrings, necklaces, pendants, combs, brushes, handicrafts and decorative items dominate the objects for sale.” It notes similar findings from a number of studies in Thailand. See D. Bergin, E. Tops, and W. Meijer, ‘The Ivory Trade Landscape in Asia: A Ten-Market Synthesis’ (Hong Kong, China: IFAW, 2019).

15 See Wildlife Justice Commission (WJC), ‘Rapid Assessment of the Illegal Ivory Trade in 2020’ (The Hague, Netherlands, 2020); and analysis of price data supplied by Environmental Investigation Agency (EIA) and WJC, below.


17 Ibid.

18 A report of a 2018 study of the Selous-Mikumi reserve, states, “The Selous-Mikumi elephant population is stable at about 15,500 animals based on recent censuses (2014 and 2018). No fresh carcasses (less than one-year-old) were recorded and the carcass ratio dropped from 39% in 2014 to 16% in 2018, indicating significant management intervention of curbing poaching. More effort and time is needed to reach 8%, which represent natural mortality.” TAWIRI, Aerial wildlife survey of large animals and human activities in the Selous-Mikumi ecosystem, dry season, 2018, p.i. However, according to Reuters, the Tanzanian Presidency announced in 2019, “As a result of the work of a special task force launched in 2016 to fight wildlife poaching, elephant populations have increased from 43,330 in 2014 to over 60,000 presently.” Fumbuka Ng’wanakilala, ‘Tanzania says elephant, rhino populations rebounding after anti-poaching crackdown’. Reuters, 10 July 2019. See also:
14

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‘Are Africa’s Elephant Populations Increasing or Decreasing?’, Tsavo Trust, 11 March 2022, https://tsavotrust.org/are-africas-elephant-populations-increasing-or-decreasing/.


16 Ibid.

17 Ibid.


21 Ibid.


24 Ibid.


26 Ibid.

27 Ibid.

28 Ibid.


One person was convicted in 2022, nine years after being charged with facilitating the transport of almost seven tons of ivory in three separate container shipments through the port of Mombasa. See Chris Morris, ‘After Nine Years, a Kenyan Court Hands Down Guilty Verdict in Ivory Case’, International Policy Digest, 14 April 2022, https://intpolicydigest.org/after-nine-years-a-kenyan-court-hands-down-guilty-verdict-in-ivory-case/.


Ibid.


See, for example, Daniel Stiles, 'Ivory Trafficking, Transnational Organized Criminal Networks in Eastern and Southern Africa 2009-2020, and the Emerging New Threat.'

For example, in December 2020, the Chinese authorities convicted 17 members of a network from Putian, accused of smuggling at least 20 tons of ivory out of Nigeria, with sentences up to life imprisonment and confiscation of all assets. See Guangzhou Intermediate People’s Court New Media Studio: https://mp.weixin.qq.com/s/z-rPEdanqpArpY-fWp9VoQ, accessed 8 April 2024 (in Chinese).

For example the Zhanjiang Intermediate People’s Court convicted eleven members of a group associated with Shuidong accused of involvement in smuggling 8.5 tons of ivory and almost 800 kg of pangolin scales during 2014 to 2017, with sentences ranging from 3 to 15 years along with confiscation of property. Zhanjiang Intermediate People’s Court, ‘The Municipal Intermediate People’s Court sentenced Wang Kangwen and 11 others in the case of smuggling ivory and pangolin scales in the first instance.’, Zhanjiang Intermediate People’s Court Website, 7 March 2018, http://www.zjcourt.gov.cn/web/content?gid=10033&lmdm=1017.


Kenya also arrested three other individuals (relatives) in 2015, in a case that only concluded in March 2023. See Chris Morris, ‘After 8 Years, Kenyan Ivory Case Comes to a Close.’, International Policy Digest, 23 March 2023.


For example, the United States extradited an individual and his associates from Uganda and convicted him to 63 months in prison. Another individual was also extradited from Thailand. United States Attorney’s Office, Southern District of New York, ‘Wildlife Trafficker from Uganda Sentenced to 63 Months for Large-Scale Trafficking of Rhinoceros Horns and Elephant Ivory’, US Department of Justice, 18 August 2022, https://www.justice.gov/usa-sohdn/pr/wildlife-trafficker-uganda-sentenced-63-months-large-scale-trafficking-rhinoceros-horns.


Unlike ETIS, World WISE does not impute a weight for seizures of ivory jewellery (IVJ) or ivory carvings (IVC) due to the variability of weights in these classes. As a result, it contains over 5000 ivory seizures without weights.


This was one of the key seizures identified by Wasser et al., with links to a number of seizures associated with the Kampala-based group. Ivory from a very wide range of locations in East and Central Africa was detected in the DNA analysis.

The other two, according to World WISE, being 1,323 kg seized in Hong Kong, China on 3 January and 1,833 kg seized in Singapore on 23 January, both originating in Kenya.

This was one of three seizures with a cover of mazeras stone made around the same time and having other logistic similarities, totalling 6,990 kg (2,516 tusks and tusk pieces). See Chris Morris, ‘After Nine Years, a Kenyan Court Hands Down Guilty Verdict in Ivory Case’.


DNA evidence connects this seizure with one of the two seizures in 10 above. See Wasser et al., ‘Combating Transnational Organized Crime by Linking Multiple Large Ivory Seizures to the Same Dealer’.

EIA, ‘Exposing the Hydra: The Growing Role of Vietnamese Syndicates in Ivory Trafficking.’


Previously recorded as 3,127 kg; revised weight of ivory in the shipment confirmed by Thailand CITES Management Authority in correspondence to UNODC, 8 May 2024.

Chris Morris, ‘After 8 Years, Kenyan Ivory Case Comes to a Close.’

Chris Morris, ‘After 8 Years, Kenyan Ivory Case Comes to a Close.’
This seizure was linked by DNA to another seizure associated with the Kampala-based group. See Wasser et al., ‘Elephant Genotypes Reveal the Size and Connectivity of Transnational Ivory Traffickers’.


Ibid.


Ibid.


CITES National Ivory Action Plans (NIAPs) are a practical tool applied by selected Parties to the Convention to strengthen their controls of the trade in ivory and ivory markets to help combat the illegal trade in ivory. See: https://cites.org/eng/niaps.


Data communicated directly from the Wildlife Justice Commission to UNODC, April 2024.


Wander Meijer, Dr. Daniel Bergin, Timothy Cheng, Crystal Yang, and Dr. Eugene Kritski, ‘Demand under the Ban: China Ivory Consumption Research 2021’ (WWF, October 2021).

Data communicated directly from the Wildlife Justice Commission to UNODC, April 2024.
Case study 20

rhinoceros horn
Case study 5: African rhinoceros horn

Rhinoceros horn trafficking was the subject of case studies in both previous editions of the *World Wildlife Crime Report*. The analysis in the 2020 report noted mixed signals, with decreases in poaching levels and price indicators standing in contrast to a consistent upward trend in seizures during the period 2014–2018, after which comprehensive data were at that time unavailable. It was speculated that increased seizures could be owing either to improved enforcement interdiction or the entry into the market of new supply from private stocks. The current case study aims to update knowledge on rhinoceros horn trafficking, particularly the evidence on overall market trends. It benefits in particular from regular comprehensive updates on rhinoceros status, poaching and illegal trade carried out for CITES by the International Union for the Conservation of Nature (IUCN) and TRAFFIC.

Context

Knowledge about rhinoceros populations is clearer than that available for species such as elephants and pangolins because there are far fewer rhinoceros left in the world and those that remain are relatively well monitored. There are five rhinoceros species today with a combined global population at the end of 2021 estimated to total just over 26,000 animals, with over half residing in a single country, South Africa (Figure CS5.1).

Figure CS5.1. Estimated rhinoceros population in 2021 by range country

Source: Compiled from data in CITES CoP19 Doc 75, Tables 1 and 3
The vast majority of this global population is comprised of the two African species, the black rhinoceros and the white rhinoceros, for which more recent population estimates at the end of 2022 totalled 6,468 and 16,801 animals respectively.4

Between 1970 and 1990 the combined populations of the two African rhinoceros species declined from about 70,000 to close to 10,000 animals under heavy poaching pressure for their horns, after which they recovered to over 25,000 by the early 2010s owing to increased protection and suppression of end markets.5 After that time, the most recent wave of renewed poaching caused a decline of almost 20 per cent in the total number of rhinoceros in Africa between 2012–2021.6 Although revised population data for the end of 2022 indicate that these populations were 5 per cent higher than estimated a year earlier,7 poaching remains the biggest threat to the two African species.8

Rhinoceros horn is a solid continuously growing material that consists mostly of keratin, calcium and melanin and can be removed with minimal adverse physical effects to the animal, beyond those related to immobilization for dehorning, so long as the horn is not cut too close to the growth plate.9 Dehorning of rhinoceros has been conducted as a management measure to deter poaching by reducing the potential rewards from poaching. The widespread adoption of dehorning as an anti-poaching tactic has also resulted in a considerable increase in stockpiled rhinoceros horn; at least 2,217 rhinoceros were dehorned between 2018–2021, mostly in South Africa and Namibia, which means over 4,000 rhinoceros horns were added to private and government stockpiles during this period.10

The possibility of non-lethal horn removal has also been a feature of advocacy that the legal trade in rhinoceros horn from managed rhinoceros populations be allowed as a way of financing conservation measures on public and private land.11 As of 2021, more than 50 per cent of the remaining white rhinoceros were privately owned in South Africa,12 where acquisition and breeding has been motivated by different reasons, including attraction of tourist visitors and the hope that commercial horn sales might be allowed.13 However, a 2017 survey of some 10 per cent of the private rhinoceros owners in South Africa found that, owing to the high price of security, they believed the costs of having rhinoceros generally exceeded the revenues generated by them, and some private rhinoceros owners had considered removing the animals from their lands.14

In 2009, the Government of South Africa placed a moratorium on the legal domestic sale of rhinoceros horn, which was lifted by the Constitutional Court in 2017.15 Once domestic sales in South Africa again became possible, a major auction was organized by the largest commercial rhinoceros breeding operation but, likely due to uncertainty about export possibilities, revenues were not as high as anticipated.16 Eventually, according to media sources, owing to its high maintenance costs the breeding facility itself was put up for auction in April 2023, but failed to attract any bids.17 The herd of some 2,000 white rhinoceros was finally purchased by African Parks in September 2023, and the buyers expressed their intent to release the animals into the wild over a ten year period.18
With all commercial international trade in rhinoceros horn prohibited under CITES, \(^9\) trade in horn from poached animals is trafficked to be marketed in several Asian countries in contravention of their long-standing legal prohibitions on domestic trade and use. In 2018, Viet Nam strengthened its legislation on possession, transport and trading of rhinoceros horn products to include up to 15 years imprisonment and high fines, after which enforcement efforts are reported to have increased. \(^20\) In China, some uncertainty about the continuation of the 1993 ban on rhinoceros horn trade and use arose when a new regulatory circular was issued in October 2018 that appeared to provide room for sale under “special circumstances”, including for traditional medicines. \(^21\) However, in December 2018, the State Council issued a statement asserting that, after study, the ban on the import, sale and medical use of rhinoceros horn would remain in place. \(^22\)

**Poaching**

Owing to their limited numbers and because of their location, it is possible to give a relatively reliable estimate of the number of rhinoceros poached annually. \(^23\) According to IUCN data, between 2006–2022, at least 11,700 rhinoceros were poached in Africa. \(^24\) If each was bearing about 5 kg of horn, \(^25\) then at least 58 tons of rhinoceros horn entered illegal trade.

Like elephant ivory, however, rhinoceros horn can also enter the market from other sources, including government and privately held stocks. A CITES survey with responses from seven out of 13 African rhinoceros range states concluded that at least 87 tons of horn was being held in 2020, a significant proportion of which was held privately, with the rest comprised of state stocks from legal sources (e.g. retrievals from natural mortalities and dehorning activities), and illegal sources (seizures). \(^26\) Court proceedings from a 2020 conviction of traffickers in Namibia demonstrate how such horn enters the trafficking chain: those convicted had stolen 33 rhinoceros horns from one private property and were connected by investigators with a syndicate spanning several towns in Namibia and Angola that specialized in illegally obtaining rhinoceros horns and selling them internationally. \(^27\)

The recent continental wave of rhinoceros poaching in Africa began around 2006, about the same time as the current wave of elephant poaching began. It peaked later, around 2015, and like elephants, the trend showed a decrease in the following years, with less than half the number of poaching incidents in the last three years as during the peak years (Figure CS5.2).
As might be expected, South Africa accounted for the bulk of the detected incidents, having lost almost 10,000 rhinoceros to poaching between 2006–2022. Efforts to suppress poaching have been substantial, with greater focus in recent years on anti-corruption measures, financial crime investigations and large-scale dehorning.

While South Africa saw the largest gross losses, some countries with smaller populations experienced greater relative losses (Figure CS5.3). Mozambique is clearly one of the countries most impacted by poaching, with 141 recorded poaching incidents over the 16 years (2006–2021) and a remaining population of only 16 rhinoceros. Losses in Zimbabwe also comprise a larger share of the remaining population than in South Africa, although reported incidents have declined in recent years. The overall losses in Namibia and Kenya are relatively small since 2006 compared to the current population as both countries have imported rhinoceros from South Africa over the years.
Figure CS5.3. African rhinoceros lost to poaching 2006–2022 compared to the 2021 rhinoceros population by country

Source: Compiled from population data in CITES CoP19 Doc 75\textsuperscript{32} and IUCN poaching data\textsuperscript{33}

Although poaching levels for African rhinoceros species are significantly lower than they were in the peak years in the mid-2010s and are now below the threshold level likely to cause continental population decreases,\textsuperscript{34} there remains cause for concern.

In recent years alarms were raised when Botswana, a country known for the relative safety of its wildlife, saw a rash of rhinoceros poaching incidents between 2018–2021.\textsuperscript{35} The Government of Botswana reported to the CITES Secretariat subsequently a 90 per cent reduction in poaching incidents for 2022 and 2023, attributing this to several measures including the dehorning of over one-third of the white rhinoceros population.\textsuperscript{36} In 2022, Namibia experienced a sharp increase in the number of rhinoceros poached, from 47 in 2021 to 93 incidents in 2022,\textsuperscript{37} and the most recent poaching data for South Africa indicate an increase in 2023, with 499 rhinoceros poached, compared to 448 in 2022.\textsuperscript{38} However, Kruger National Park, where heavy poaching pressure was a problem in the past and strong remedial measures have been recently implemented, recorded a 37 per cent decrease from 2022 with a total of 78 rhinoceros poached in 2023.\textsuperscript{39}

**Trafficking**

As a high value and reasonably portable commodity, most rhinoceros horn is trafficked by air.\textsuperscript{40, 41} From 2017, however, a number of mixed-species containerized shipments have been found to contain rhinoceros horn. Combined shipments of rhinoceros horn and lion bone have been detected coming from South Africa where lion farming for the bone trade has been widespread but subject to increasing regulatory restriction,\textsuperscript{42} according to the WWCR3 analytical dataset. Research by a non-governmental organization has highlighted the important role multi-species brokers can play in connecting seller and buyers in this market.\textsuperscript{43}

With a lag of about two years, up until 2018 there is some correspondence between the pattern of rhinoceros poaching and the amount of rhinoceros horn seized. Annual seizures varied from about
5–25 per cent of the new horn entering the market, with one exceptional year: 2019 (Figure CS5.4). Just as the three largest seizures ever made of elephant ivory and pangolin scales occurred in 2019, two of the three largest recent rhinoceros horn seizures were made that year, as well as the largest annual total. This spike has in part been attributed to mixed signals about legalizing the sale of rhinoceros horn under “special circumstances” and then an immediate ban on the trade and medical use in China in late 2018; tougher wildlife legislation in Viet Nam as of 2018; and better international cooperation. The peak was followed by a trough during the early phase of the COVID-19 pandemic in 2020, but seizures in 2021 increased again. Once data from 2022 are available the underlying trends should become clearer.

Figure CS5.4. Rhinoceros horn seized (kg) and number of rhinoceros poached in Africa 2006–2021

Source: CITES Illegal Trade, World WISE databases (WWCR3 analytical dataset) and CITES CoP19 Doc 75

The bulk of recent global rhinoceros horn seizures in the WWCR3 analytical dataset were made in or coming from South Africa. For many of the seizures in South Africa, no source or destination are specified, since the horn was not yet in international transit (Figure CS5.5).
When a country of shipment departure was reported, in the majority of cases between 2015–2022 it was either South Africa or Mozambique (Figure CS5.6).

Source: CITES Illegal Trade and World WISE databases (WWCR3 analytical dataset)
For the majority of reported seizures (69 per cent), no shipment destination was reported. In cases where a shipment destination was reported, Viet Nam, mainland China, Malaysia, Hong Kong, China and South Africa were most often cited (Figure CS5.7). As with ivory and pangolin scales, it appears, based on examination of records in the WWCR3 analytical dataset, that the size of individual shipments had become larger over time.

Figure CS5.7. Distribution of rhinoceros horn seizures (kg) by country or territory of shipment destination
2015–2021

![Distribution of rhinoceros horn seizures (kg) by country or territory of shipment destination](image)

Source: CITES Illegal Trade and World WISE databases (WWCR3 analytical dataset)

**End market use**

As noted above, Viet Nam remains the primary destination of detected rhinoceros horn shipments where the destination is known and appears to be the primary place where it is processed into objects for sale, but processing has also been detected in Southern Africa. On 12 June 2017, police seized a large quantity of beads, rhinoceros horn powder, and manufacturing equipment from a house outside Johannesburg. This was not the only seizure of beads and powder made in South Africa. Transforming the horn in Africa, or simply cutting it into blanks or disks, makes it more difficult for law enforcement to detect.

The nature of the demand for rhinoceros horns appears to have changed over the years. Reports closer to the beginning of the present poaching wave emphasized its use as a traditional medical product, albeit one with some non-traditional applications and undertones of being a status symbol.
In Viet Nam, in addition to being used in a last resort to treat terminal diseases such as cancer, it was employed to cure hangovers and as a general tonic. According to academic research published in 2021, some Vietnamese consumers expressed the belief that its price and use by the wealthy proved its efficacy. In Viet Nam, rhinoceros horn has been associated with corruption, since it is purportedly used as a gift to those in power in return for preferential treatment. One study found that part of the attraction of rhinoceros horn for consumers in Viet Nam was that it was illegal.

From around 2017, however, rhinoceros horn has found a different use as a carving medium, similar to ivory. This use is also rooted in tradition, as antique objects carved of rhinoceros horn can be found. Rhinoceros horn is carved into beads, libation cups, and other objects, sold in Asian end markets. The most recent data and research indicate that this channel of demand (ornamental) may have eclipsed medical uses. An academic paper claimed that the importance of the arts and antiques market for rhinoceros horn products has been overlooked for some time. On the basis of weight, the carved objects sell for ten times the price of the raw horn.

Yet another new market development emerged during research monitoring online advertisements in Viet Nam for wildlife products in 2022, where multiple offers were made to sell rhinoceros horn “glue”, a relatively new commodity made from a combination of rhinoceros horn, rhinoceros skin, pangolin, seahorse, gecko, and other medicinal ingredients.

If the market for rhinoceros horn has transitioned between different demand types, there is some likelihood that the supply of rhinoceros horn is driving the market, with traffickers finding new uses for the product as old markets wane. There is past evidence of other supply driven markets in the illegal wildlife trade, such as a 2012 study of trade in manta gill-rakers.

**Implications**

There are positive signs that multiple interventions to deter and intercept rhinoceros horn trafficking along the trade chain and suppress end markets may have contributed to decreases in both poaching and seizure trends. However, neither poaching nor illegal trade have stopped and evidence from end markets suggests that traffickers continue to innovate to create new opportunities for illegal sales. This is a business characterized by high unit values for smuggled horn and large profit margins for traffickers, which has clearly attracted the involvement of organized crime groups and a significant degree of corruption. Nevertheless, compared to some other wildlife crime challenges, rhinoceros trafficking operates within relatively restricted geographical areas at both ends of the trade chain. Significant resources are being committed to remedial interventions and key indicators of progress are accessible. This is a problem that can be solved if these efforts continue.
September 2023 (n.d.).

conversion figure of 2.45 kg per horn is used by IUCN. Both African rhinoceros species have two horns. See Annexure 8 of CITES, Rhinoceroses (Rhinocerotidae Spp.).

Dziba, 'Rhinoceros Accounting in Kruger National Park.' (Unpublished data, 2022). As cited in CITES, 'CoP19 Doc. 75 (Rev. 1) Rhinoceroses (Rhinocerotidae Spp.).'

27 UNODC, 'Sharing Electronic Resources and Laws on Crime (SHERLOC) knowledge management portal', Case law database, Queta v S. Available at: https://sherloc.unodc.org

28 CITES, 'CoP19 Doc. 75 (Rev. 1) Rhinoceroses (Rhinocerotidae Spp.).'


30 CITES, 'CoP19 Doc. 75 (Rev. 1) Rhinoceroses (Rhinocerotidae Spp.).'

31 CITES, 'CoP19 Doc. 75 (Rev. 1) Rhinoceroses (Rhinocerotidae Spp.).'

32 Ibid.

33 Ibid.
33 Knight, Mosweu, and Ferreira, ‘African Rhino Specialist Group Chair Report’.
34 CITES, ‘CoP19 Doc. 75 (Rev. 1) Rhinoceroses (Rhinocerotidae Spp.).’
35 Ibid.
36 CITES Secretariat, ’77th Meeting of the CITES Standing Committee SC77 Doc. 45 Rhinoceroses (Rhinocerotidae Spp.’.
39 Ibid.
43 Ibid.
44 If calculated at approx. 5 kg horn per rhino.
45 CITES, ‘CoP19 Doc. 75 (Rev. 1) Rhinoceroses (Rhinocerotidae Spp.)’.
46 Ibid.
50 Ibid.
51 Tom Milliken and Jo Shaw, The South Africa-Viet Nam Rhino Horn Trade Nexus: A Deadly Combination of Institutional Lapses, Corrupt Wildlife Industry Professionals, and Asian Crime Syndicates (Johannesburg, South Africa: TRAFFIC, 2012).”
52 Milliken and Shaw, The South Africa-Viet Nam Rhino Horn Trade Nexus.
54 Ibid.
58 Gao et al., ‘Rhino Horn Trade in China’.
60 CITES, ‘CoP19 Doc. 75 (Rev. 1) Rhinoceroses (Rhinocerotidae Spp.).’
Case study 6

Pangolin scales
CASE STUDY 6
PANGOLIN SCALES
Case study 6: Pangolin scales

Unsustainable local and international trade in their meat, skin and scales for use as food and medicine has been recognized for the past two decades as a primary threat to the conservation of the eight pangolin species distributed in Africa and Asia. National conservation measures in range states have been supplemented by increasingly strict CITES controls on international trade, culminating in the inclusion of all pangolin species in CITES Appendix I in 2016. However, as analysis for the *World Wildlife Crime Report 2020* illustrated, the reduced legal supply of pangolin parts to predominantly Asian end markets from within that region and later from Africa was increasingly supplanted by trafficking.

Pangolin skin trade was prominent in the past, with legal trade in over 500,000 skins reported to CITES during the period 1975–2000. The bulk of this trade was from South-East Asia to the United States where skins were used in manufacture of leather goods, such as handbags, belts, wallets and boots. However, as legal supplies became less available, recorded pangolin skin seizures over the past two decades have been negligible and most transactions involved single figure numbers of items.

Pangolins are used as food in parts of Africa and Asia, and demand for pangolin meat has continued to be a source of pressure on pangolin populations on both continents in recent years. However, analysis of seizure data in the *World Wildlife Crime Report 2020* compared pangolin meat and scale trade in terms of the equivalent number of live pangolins likely to have been harvested to supply each market and concluded that the primary product in international illicit trade today is scales. While the use of pangolins for meat remains an issue of concern (see Box CS6.1), this updated analysis of pangolin trafficking focuses on the market for scales.

**Box CS6.1. Pangolin meat**

The previous editions of the *World Wildlife Crime Report* noted a decrease in seizures of pangolin meat and bodies after 2008 based on records then available. Whether this decline reflected growing pangolin scarcity was unclear. The Asian pangolin meat market appeared to be supplied entirely domestically or through international trade within Asia as there had been few detected exports of pangolin meat from Africa.

An updated analysis of seizure records in the WWCR3 analytical dataset demonstrates that illegal meat trade has in fact continued since 2008 (Figure CS6.1). For the purposes of this analysis, records reported as meat, bodies or live animals have been converted to weight. Seizure levels showed significant fluctuation during this period, with a downward trend overall.
The spike in seizures in 2019 is largely due to a single enforcement operation in Malaysia referred to in the World Wildlife Crime Report 2020. A pangolin meat processing factory and warehouse in Borneo, Malaysia were found and almost 30 tons of pangolin products seized, including 1,800 boxes of frozen pangolin meat sourced locally.\(^{\text{c}}\)

Seizure records in the WWCR3 analytical dataset show no significant indications of trade for meat from Africa to Asia during the period 2007–2021. Seizures made in African countries were typically small numbers of live animals that were likely destined for local consumption. Similarly, seizure records suggest that the larger volumes demonstrating ongoing meat trade in Asia were sourced within that region.

The apparent overall decline in pangolin meat seizures could also be related to a decline in demand in some markets.\(^{\text{d}}\) Measures are being taken to reduce pangolin meat consumption in Asia, including targeted demand reduction campaigns.\(^{\text{e}}\) In addition, eating and trading terrestrial wild (non-livestock) animals for food was banned in China on 24 February 2020.\(^{\text{f}}\) The impact these measures have had on demand for pangolin meat has not yet been assessed, nor has there been a comprehensive assessment of the scale of domestic sourcing, trade and consumption of pangolin meat within range states, which could be an ongoing concern.

\(^{\text{b}}\) Conversion factors are detailed in the methodological annex of this report.
\(^{\text{e}}\) For example, see TRAFFIC, ‘Guidance for CITES Parties to Develop and Implement Demand Reduction Strategies to Combat Illegal Trade in CITES-Listed Species’ (CITES Secretariat, September 2021), https://cites.org/sites/default/files/eng/prog/DR/CITES_Guidance_Demand_Reduction.pdf.
Illegal sourcing

Unlike elephants or rhinos, there are no reliable estimates of the size of pangolin populations. Population survey techniques used for elephants, such as aerial flyovers or dung counts, cannot be applied to pangolins. Owing to their size, wide distribution, and reclusive habits, it is unlikely a comprehensive programme to monitor the global pangolin population will emerge soon. Some recent research in West Africa has indicated that the frequently trafficked white-bellied pangolin is still abundant in some areas, while giant ground pangolins are relatively rare.

There is also no easy way to monitor poaching as pangolin carcasses do not remain detectable in the field for rangers to count as they do with elephants. Some monitoring has been done around local meat markets, but a comprehensive poaching surveillance programme would pose logistical challenges not encountered with the larger species, especially when monitored in controlled reserves. Using meat market data from a variety of sources, a 2017 academic study estimated that between 400,000 and 2.7 million pangolins were hunted annually in Central African forests.

Some individual seizures of pangolin scales have weighed over 10 tons (see examples below). With different pangolin species yielding between 0.5–3.5 kg of scales per animal, individual seizures of scales represent many thousands of pangolins. Pangolins are solitary so each of the animals had to be located and killed individually, unless trapped. Their scales are often removed by fire or boiling water and dried in the sun, with the results consolidated locally before being moved to urban centres for export. Thus, the sourcing of pangolin scales involves the actions of hundreds of people, coordinated primarily through market forces.

Hunting of pangolins requires no specialized weaponry or expensive equipment and the necessary trapping and tracking skills are reportedly not difficult to learn, so there are minimal barriers to involvement in sourcing pangolins from the wild. As long as the buyers or sales points are adequately known, the poaching of pangolins becomes a viable source of income to a wide range of local people. Outside protected areas the poaching can be so diffuse that it is difficult to prevent, but there is some bottleneck at the consolidation points, associated with local meat markets or businesses that have the logistics to move the scales to urban areas for export. The dynamics of local trafficking chains in source countries were explored in depth in a 2019 UNODC regional wildlife crime threat assessment and in the World Wildlife Crime Report 2020, drawing on fieldwork in Cameroon, the Democratic Republic of the Congo, Gabon and Uganda. Among the findings were insights into the connection between the export trade in scales and the established market chains for moving pangolin and other wild meat from rural to urban areas.

More recent UNODC fieldwork carried out in 2021 in border areas between Benin, the Niger and Nigeria found that many countries were mentioned by experts as contemporary sources of pangolins, including Benin, Burkina Faso, Cameroon, and the Democratic Republic of the Congo. Two interviewed traders reported that pangolins were sourced by funding young men on motorbikes to make the rounds of rural villages in areas where pangolins were plentiful. After informing local poachers that pangolins would be bought for cash, the young men made a second round to pick up the results of the hunts. In some areas pangolins were transported live, possibly because the fresh meat provided additional value in local markets. Special bags were used to
transport individual pangolins and special boxes were used to transport up to 100 live animals in a single truck at a time.25

Based on five observations in 2020, one academic study found that tree pangolin scales (those from black-bellied and white-bellied pangolins) were sold in a Cameroon wild meat market for an average price of 8,100 CFA francs/kg (about $14/kg), with giant pangolin scales selling for just under twice that amount at 15,000 CFA francs/kg (about $25/kg).26 Another recent academic study of wild meat markets (surveying 110–1,340 vendors at 10–18 markets per month) in three locations in Liberia found a sharp drop in prices during the survey period, from the equivalent of $30/kg in August 2020 to $5/kg in February 2021. Owing to low prices, pangolin traders were said to have moved onto other commodities such as currency or cocoa trading.27

**Illegal trading**

Analysis of the WWCR3 analytical dataset indicates there was a strong increase in pangolin scale seizures after 2014, about the same time that mixed pangolin and ivory seizures began to be detected (Figure CS6.2). This trend accelerated in 2017, the year when the listing of all species of pangolins in CITES Appendix I entered into force.28 Seizures in the WWCR3 analytical dataset peaked in 2019, when the three largest seizures of scales on record were made in Singapore within a four-month time span: seizures of 12,913 kg and 12,768 kg, both in April 2019, and a seizure of 11,912 kg in July 2019. The total weight of pangolin scale seizures fell sharply in 2020, with a significant contribution of the overall annual total made up by a single 9.5 ton seizure in Nigeria, according to the WWCR3 analytical dataset. While the global volume of seizures decreased overall in 2020, trafficking continued—an academic study in India found an increase in seizure incidents there in 2020.29 Preliminary data suggest that seizures rose again in 2021 but remained much lower than the peak in 2019.

**Figure CS6.2. Pangolin scales seized (kg) 2007–2021**

![Graph showing pangolin scale seizures from 2007 to 2021](image)

*Source: CITES Illegal Trade and World WISE databases (WWCR3 analytical dataset)*
It is unclear what impact the COVID-19 pandemic had on the trafficking of pangolin scales in 2020 and beyond. While the livelihood impacts of pandemic lockdowns could have motivated an increase in poaching in some areas, the shutdown in commerce and tighter border controls could have interfered with the outputs being transported internationally. If so, it might be expected that stockpiles accumulated during the lockdowns would be transported once the destination markets opened to shipping, but this has not been seen. It is important to bear in mind that seizures are a very imperfect reflection of contraband flows, and since some countries have only recently relaxed border controls, it is possible that evidence of renewed trafficking will emerge in the future.

Analysis of seizure data by shipment source subregion indicates that the previously observed sourcing of scales from African pangolin species has continued (Figure CS6.3), an outcome long predicted by conservationists. Although the first detections began as early as 2008, the first larger seizures in Asia of African pangolin scales were seen coming from Uganda in 2012, and the volumes increased rapidly from there. There has also been a rise in the proportion of shipments with unknown source in recent years.

![Figure CS6.3. Pangolin scale seizures (kg) by subregion of the country of shipment source 2007–2021](image)

Source: CITES Illegal Trade and World WISE databases (WWCR3 analytical dataset)

Examination of detailed records in the WWCR3 analytical dataset shows that from about 2015, many of the largest seizures of pangolin scales have involved mixed loads with ivory or other wildlife commodities. There is some evidence from trafficker statements in Asia that ivory exporters, facing a declining market, made use of their existing knowledge and international connections to capitalize on growing demand for pangolin scales.
The size of individual pangolin scale seizures has generally increased over time. This also appears to have begun around 2015, coinciding with the consolidation of pangolin scale and ivory shipments and what appears to be a general increase in the pangolin scale market (Figure CS6.4). One possible explanation is that due to increasing attention to pangolins in CITES deliberations and other fora, traffickers predicted increased enforcement pressure on international trade routes and decided to move their stocks as quickly as possible from Africa to Asia. It is known that large privately held stockpiles of pangolin scales have been maintained in several African countries in addition to those in government custody from seizures.34 For example, the CITES Management Authority of the Democratic Republic of the Congo estimated that there were some 22 tons of scales in private hands in their country in 2017.35

Figure CS6.4. Largest single pangolin scale seizures (kg) on record 2007–2021

Source: CITES Illegal Trade and World WISE databases (WWCR3 analytical dataset)

A recent evaluation of pangolin scale seizures associated with Nigeria analysed 77 seizures totaling over 190 tons made between January 2010 and December 2021.36 Samples taken from 67 sacks of pangolin scales seized by the Nigerian authorities were analysed to identify the share represented by different species in these loads. It found that 90 per cent came from white-bellied pangolins. On this basis, the researchers were able to estimate that at least 799,300 pangolins were represented by these seizures alone.

Based on analysis of the WWCR3 analytical dataset, in 2018 and 2019 more than 130 tons of pangolin scales were seized in shipments emanating from Nigeria (Figure CS6.5). Although in two-fifths of cases, the country of departure was not reported, in those cases where it was, more than 60 per cent were shipped from Nigeria between 2015–2021 (Figure CS6.6). Not all the scales came from pangolins captured in Nigeria. UNODC interviews with poachers in 2018 indicated that
pangolins sourced from Cameroon, Uganda, the Democratic Republic of the Congo, and possibly other countries were exported through Nigeria.37

Figure CS6.5. Pangolin scale seizures (tons) seized by Nigeria or where Nigeria was reported as the country of shipment 2014–2021

Source: CITES Illegal Trade and World WISE databases (WWCR3 analytical dataset)

Figure CS6.6. Pangolin scale seizures (kg) by country of departure of shipment 2007–2021

Source: CITES Illegal Trade and World WISE databases (WWCR3 analytical dataset)
Although in three-fifths of records the destination was not reported, in those cases where it was, the largest proportion of pangolin scale shipment seizures during 2015–2021 were headed for mainland China and Hong Kong, China (Figure CS6.7). Analysis of detailed records in the WWCR3 analytical dataset indicates that since 2019 Viet Nam has emerged as a secondary destination. Other destinations reported for seizure shipments included Nigeria and locations in South-East Asia. Nigeria is presumably cited as both a source and destination because the destination of a shipment may be different from the final destination of the product. An academic study of seizures made in China between 2008–2016 identified the border between Viet Nam and southern China as a key transit point for the illicit pangolin trade.38

Figure CS6.7. Pangolin scale seizures (kg) by country or territory of destination of shipment 2007–2021

End markets

It is challenging to understand if the large increases in pangolin scale seizures up to 2019 and sudden decreases in seizures in 2020 and 2021, are linked to changes in demand. This is a well-established market, since pangolin scales have been mentioned in the traditional Chinese medicine pharmacopoeia as a treatment for a wide range of conditions since at least the 5th Century.39 They are also used in traditional medicine in Viet Nam,40 as well as in parts of Africa.41 There may be a range of different influences on demand trends. On the one side, there has been a sustained effort to promote traditional Chinese medicine internationally since at least 1996,42 on the other side, China removed pangolin scales from the official TCM pharmacopoeia in 2020.43
The overall scale of demand in the primary destination markets has not been systematically assessed. Consumer research conducted in Viet Nam in 2018 suggested that around 4 per cent of the adult urban population of one large city consumed pangolin scales annually. However, given the wide variety of conditions for which scales are consumed, dose and duration of treatment are likely to vary, and therefore the potential market is difficult to estimate.

Government and privately held pangolin scale stocks in end market countries have been reported in response to past CITES enquiries, but current volumes are unknown.

**Implications**

There is some complexity in interpreting pangolin scale market trends overall. As explained in the *World Wildlife Crime Report 2020*, for most of the period when scales from some pangolin species could be legally traded with CITES Appendix II permits (1995–2017), reported legal trade in scales was minimal. It was only immediately before the Appendix I listing was adopted in 2016 and came into force in 2017 that reports of legal international scale trade increased. Even then, the total volumes permitted were significantly smaller than those appearing in seizures at the same time. More recently, seizure volumes peaked in 2019, but it is not yet clear to what extent the subsequent decline in 2020 and 2021 was in some way linked to the COVID-19 pandemic.

There could be a combination of factors explaining recent market developments. One relates to interdiction, with the listing in 2017 possibly increasing the capacity and priority of law enforcement to interdict pangolin scales and a sudden change of this capacity during the COVID-19 pandemic. It is also possible that the trend reflects uneven flow in the trade chain, with stocks accumulating in source countries as possibilities for legal export closed, but then being exported illegally when necessary illicit business connections had been established. Increasing shipment sizes indicated through seizures could reflect such a reorganization of trade linkages.

Equally difficult is to predict what is likely to happen next with this market. Unlike the largely closed end markets for ivory or rhinoceros horn, for example, some legal end uses of pangolin scales continue. Given the CITES Appendix I listing of all pangolin species makes it unlikely that legal supply from wild populations will resume in the foreseeable future and commercial breeding is not currently viable, such end uses can only be supplied by previously imported stocks. While demand for pangolin scales continues and legal outlets remain open, a critical priority in efforts to deter trafficking will be measures to prevent laundering of new illegal supply into legal stocks in end markets. Such measures might include stock inventories, usage reporting and regular inspection. If laundering is not prevented, incentives for trafficking will persist.
For a history of CITES listings for pangolins see for example: ‘Species+’, accessed 17 April 2024, https://www.speciesplus.net/species#/taxon_concepts/9849/legal.

3 CITES Appendix I includes species threatened with extinction. Commercial trade in specimens of these species is permitted only in exceptional circumstances.


6 Linh Bao Nguyen et al., ‘Understanding Consumer Demand for Bushmeat in Urban Centers of Cameroon with a Focus on Pangolin Species’, Conservation Science and Practice 3, no. 6 (June 2021), https://doi.org/10.1093/csp/czap005.


12 According to the International Union for the Conservation of Nature (IUCN) Red List entry on the white-bellied pangolin, “There are few quantitative data on populations at any level i.e. local, national or global.” On the blackballed pangolin, IUCN says “There are no formal quantitative data available on densities or abundance.” On the giant ground pangolin, IUCN says “There is no reliable information on population abundance or densities.” On Terminick’s Pangolin, the IUCN says “South Africa is estimated to have 16,239–24,102 mature individuals (Pietersen et al. 2016) but abundances in other regions of Africa are unknown.” On the Indian Pangolin, IUCN says “There is very limited information or data on population of this species at any level, and generally there is a lack of research on abundance.” The remaining three species are all considered Critically Endangered. See also CITES, ‘CoP19 Inf. 39’ (CoP 19, Panama City, 2022), https://cites.org/sites/default/files/documents/E-CoP19-Inf-39.pdf.


23 NY1, GY1.
24 GY1, GY2.
25 GY1, AY2.
28 In 1975, the Asian species (M. pentadactyla, M. javanica and M. crassicaudata) were listed in Appendix II and the Southern African species (M. temminckii) in Appendix I. In 1994, M. temminckii was transferred from Appendix I to Appendix II, and all remaining African species were included in Appendix II. Despite this listing, very little legal trade was seen in pangolin products relative to the detected illegal trade. In 2000, the Asian species (M. pentadactyla, M. javanica and M. crassicaudata) were proposed for transfer to Appendix I. However, the proposal was not accepted because the species were at that time still under the CITES Review of Significant Trade process. Instead, the CITES Parties adopted zero export quotas for wild-caught Asian pangolins traded for primarily commercial purposes. African pangolins were not subject to the zero quota but the species were protected in many of their range States and various significant trade recommendations to halt exports were adopted. In 2016, all pangolins were transferred to CITES Appendix I (came into force in January 2017), source: Species+ (speciesplus.net).
37 UNODC, ‘CITES CoP18 Doc. 34, Annex 4’.
41 Swiacké et al., ‘Perceptions and Uses of Pangolins (Pholidota) among Remote Rural Communities in the Republic of the Congo’.

44 Olmedo et al., ‘Uncovering Prevalence of Pangolin Consumption Using a Technique for Investigating Sensitive Behaviour’.


48 CITES Decision 19.202 encourages Parties in whose territories stocks of parts and derivatives of pangolins exist to take urgent steps to establish and apply, where not yet done, strict control measures to secure these stocks, as called for in paragraph 3 of Resolution Conf. 17.10 (Rev. CoP19) on Conservation of and trade in pangolins and report on the implementation of this Decision to the Secretariat.