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Cover: *Euphaea pseudodispar* shot at Kalindi River, Thirunelly, Wayanad district, Kerala. © Muneer P.K.

INTRODUCTION

The use of wildlife in traditional medicine is controversial as it has been associated with species extinction (Byard 2016; Van Uhm 2019; Wong 2019; D'Cruze et al. 2020). Wild plants and animals are crucial resources in a variety of traditional medicinal remedies that range from general health benefits such as the common cold to more severe conditions such as liver ailments and cancer (Costa-Neto 2005). It has been estimated that 80% of the world's population relies on wildlife based traditional medicinal remedies (Lee et al. 2014). This is particularly evident in developing countries, as it is often more affordable in comparison to modern medicine, and in remote areas, it can be the only form of medicine available (Sofowora 1996; Soewu et al. 2012; Alves & Rosa 2013). Commercialisation of the industry however has also made it a mainstream form of medicine in a globalised world which has triggered over exploitation of a vast and varied range of species and undermined the value and reputation of the industry/practice (Lee et al. 2014; Peng & Chen 2021). Traditional Chinese medicine (TCM), in particular, is a multibillion-dollar industry that is expanding through China's Belt and Road Initiative (Wong 2019; Hinsley et al. 2020). Species prized for the value of their parts regardless of their efficacy in TCM remedies are continually threatened by illegal hunting/poaching, to supply illegal and unsustainable trade (Alves et al. 2010, 2013; Nijman & Shepherd 2015; Nijman & Bergin 2017; Gomez & Shepherd 2019; Van Uhm 2019; Wong & Krishnasamy 2019).

Among the species drastically impacted by the TCM industry is the Saiga Antelope *Saiga tatarica* (Milner-Gulland et al. 2001; Mallon 2008; Doughty et al. 2019; Roberts et al. 2021). The global population of the species has declined by over 95% since the early 1990s largely due to hunting and exploitation for the TCM trade in Asia (Milner-Gulland et al. 2001; Mallon 2008; IUCN SSC Antelope Specialist Group 2018). Saiga populations have stabilised or increased in parts of their range through various conservation measures, signifying their ability to rapidly recover but disease outbreaks and persistent trade driven impacts continue to threaten their recovery (Milner-Gulland et al. 2020). Trade of the species predominantly revolves around the use of their horns in TCM remedies that treat fevers, liver ailments, and epilepsy (Zang 1990; Li et al. 2007). Only males carry horns, and overhunting has led to a skewed sex ratio and reproductive collapse, further contributing to population decline (Milner-Gulland et al. 2003).

Exacerbating the issue are the massive die-offs from disease and the effects of changing climatic conditions. For example, hemorrhagic septicemia attributable to the bacterium *Pasteurella multocida* led to a 2015 mass die-off of some 200,000 animals in central Kazakhstan in 2015 (Frankfurt Zoological Society et al. 2016; Saiga Conservation Alliance 2017; Kock et al. 2018; Fereidouni et al. 2019).

Historically, hunting and trade of Saiga for horns, meat and skins were legally allowed in parts of its range. However, the increasing demand of horns for the TCM trade in Asia led to conservation concerns, and in 1995 the species was listed in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) to regulate international commercial trade in Saiga parts and derivatives. Continued declines led to a hunting ban in all range States, implemented during different periods since the 1990s (Theng et al. 2017). A proposal to transfer *Saiga* spp. from Appendix II to Appendix I of CITES, which would have banned trade for primarily commercial purposes, was presented at the 18th meeting of the Conference of the Parties in Geneva in 2019 but was not adopted. Instead, the CITES Parties accepted an amended proposal that retained *Saiga* on Appendix II subject to a zero-export quota for wild specimens traded for commercial purposes (Milner-Gulland et al. 2020). Specimens in trade must be accompanied by a valid export permit, or by a certificate of pre-Convention status for specimens/stocks harvested prior to 1995, when the species was first listed on CITES (Milner-Gulland et al. 2020). Information is lacking or dated on current stockpiles of horns and derivatives harvested before the adoption of the zero quota or before the species was listed, inadvertently creating a loophole exploited by traders to launder illegally obtained horns (Meibom et al. 2010; EIA 2019; Milner-Gulland et al. 2020). However non-range states with existing stock are still permitted to trade in Saiga horn and derivatives (Milner-Gulland et al. 2020) which still leaves room for the laundering of wild-sourced horns. Despite protection measures in place for the species, illegal harvesting of Saiga horn persists due to continuing demand for its use in TCM in Asia.

Today, only five fragmented populations exist: one in Kalmykia, Russia (5,000–6,000 individuals), three populations in Kazakhstan (~154,600), and one in western Mongolia (~5,000 individuals) (IUCN SSC Antelope Specialist Group 2018). Populations in China and Ukraine are considered extinct, while migrating populations are no longer seen in Turkmenistan and those reaching Uzbekistan have declined. The IUCN Red List of Threatened Species (hereafter the IUCN Red List)

has assessed Saiga Antelope as Critically Endangered since 2002. This assessment treats Saiga Antelopes as a single species with two sub-species: *S.t. tatarica* found in Russia and Kazakhstan; and *S.t. mongolica* (equivalent to *S. borealis*) found in western Mongolia (IUCN SSC Antelope Specialist Group 2018). However, the Convention on Migratory Species (CMS) and CITES recognise them as two separate species, separating the single population of Mongolia (*S. borealis*) from other populations (*S. tatarica*).

Demand for Saiga horn has been reported to be significant in Southeast Asia (Meibom et al. 2010) yet there is a lack of research on the level of trade in the region aside from Singapore and Malaysia (Meibom et al. 2010; Theng et al. 2017; Doughty et al. 2019; Gomez & Krishnasamy 2019). Here we examine the sale of Saiga horn in TCM markets in Bangkok, Thailand. Based on records in the CITES Trade Database, Thailand is the third largest importer of Saiga horn products in Southeast Asia after Singapore and Malaysia. Thai-Chinese constitute the largest minority group in Thailand (West 2009). They first arrived in the country in the Sukhothai period, mid-13th century (Chaitiang & Sornsakdanuphap 2021) and since then the use of TCM has gained widespread acceptance in Thailand. In 2000, Thailand's Ministry of Public Health issued a notification on "Permission to persons to practise the healing arts with traditional Chinese medicine according to Section 31 of the Practice of Healing Arts Act B.E. 2542 (1999)", legally acknowledging the use of TCM for public health.

METHODS

In order to assess the trade of Saiga horn in Thailand, we conducted rapid physical market and online surveys and extracted trade data from the CITES Trade Database. We assumed that products observed/advertised for sale in physical and online markets were genuine. No products were purchased during this study for further testing. We also attempted to obtain seizure data (useful for understanding illegal trade dynamics such as trafficking routes, origins and onward destinations) for Saiga horn or derivatives in Thailand, both in the public domain and in government records, but no reported seizures were found.

Physical market surveys were undertaken in Bangkok on 23 September and 10 December 2020. The area surveyed was confined to Bangkok's 'Chinatown' area which is located along Yaowarat Road and Charoen Krung Road in the district of Samphanthawong. It is the

main area where Chinese businesses including medicine outlets are located and features bilingual signs in Chinese and Thai. Prior to initiating surveys, TCM outlets were identified on Google Maps using the search term "ร้านยาจีน (Raan Ya Jeen)" meaning "Chinese Pharmacy". This included contemporary pharmacies and traditional Chinese apothecaries. Surveys commenced at 1000 h and ended at 1300 h each day; and all outlets open during this time were surveyed. A total of 10 TCM outlets were visited, i.e., six contemporary pharmacies selling mainly modern medicines and four traditional Chinese apothecaries, selling mainly TCMs. These outlets were Thai-Chinese owned, and local researchers inquired about the product by its Chinese name, in Thai language. Researchers gathered information on type of Saiga horn products for sale and availability, stated uses, quantities and price. It should be noted that COVID-19 restrictions affected accessibility to TCM outlets in the area (with many closed permanently or temporarily during the survey period/time), resulting in fewer outlets being visited than would have otherwise been possible.

Online market surveys were undertaken on 13 October and 13 December 2020, using Google search and the top two e-commerce platforms in Thailand—Lazada and Shopee (Anonymous 2020). Two key search terms were used: (a) Kao-gui (เขากุย) which directly translates to Saiga horn, sold in a liquid infusion marketed as 'cooling water'; (b) Leng Yiang (เหลียงเอียง), a term derived from the original "Ling Yang", used most often for horn shavings. In a few instances, the term for "Deer Antler" (เขากวางอ่อน) was used interchangeably to describe Saiga horn shavings. All Saiga horn products that appeared for sale on the first two pages of Google and e-commerce platforms were recorded including prices. There were three main types of online 'sellers' observed which we differentiate as: direct producers (companies that produce and sell their own Saiga horn products); online pharmacies; and "health and wellness" product sellers. All prices were in Thai Baht and have been converted at a rate of 30 Baht per USD 1 (the exchange rate as of 30 January 2021).

Data from the CITES Trade Database (trade.cites.org) were extracted in April 2021, covering the period 1995–2019 (the most current available data).

RESULTS

Physical market surveys

Every TCM outlet visited ($n = 10$) stocked at least one and/or two types of Saiga horn product, i.e., cooling

water ($n = 2$), horn shavings ($n = 5$), both ($n = 3$) (Image 1). Horn shavings were either sold individually or mixed with herbs prepared as a “pre-packaged/ready-made boiling kit”. The price for horn shavings ranged from USD 20 to USD 32 per ready-made package. The price varied depending on the quantities of Saiga horn and other ingredients. Ready-made packages also included three herbal ingredients considered to have cooling properties, including bamboo leaves (*Lophatherum* sp.), Ophiopogon roots (*Ophiopogonis* sp.), and Medulla Junci.

Whole Saiga horns were not observed for sale in any of the 10 TCM outlets visited.

Online market surveys

There were three main types of Saiga horn products for sale online, i.e., cooling water, horn shavings and pills. Both cooling water and pills were being advertised as ‘staple household medicines’ used to relieve ulcers and fevers in children. The price for cooling water ranged USD 1–1.50 per bottle, while the price for pills was USD 5 per bottle (100 x 500 mg pills). Saiga horn shavings were being sold by weight or as pre-packaged ready-made boiling kits that included other medicinal herbs. The price per weight of Saiga horn was either USD 18/50 g or USD 19/37 g, while the price for ready-made boiling kits ranged from USD 10/kit to USD 30/kit, perhaps due to varying quantities of Saiga horn and combinations of herbal ingredients used.

Horn shavings were being advertised as having

cooling-remedial properties, suitable for reducing swelling and targeted specially for pre- and post-surgery care (e.g., cosmetic surgery) and chemotherapy patients.

Based on the Google search, we found three prominent Thai-based herbal medicine companies that produce Saiga horn products (registered under the Thai Food and Drug Administration), one of which offered both cooling water and pills, while the other two only offered cooling water. Only one of the three companies specifically indicated the amount of Saiga horn in each 240 cc bottle of cooling water which was 60mg of Saiga horn in addition to other herbal ingredients. Saiga horn shavings were offered by at least six traditional Thai-Chinese pharmacies (with an online shop interface).

On e-commerce platforms a total of 75 listings for Saiga horn were found during the survey period, 39 on Shopee and 36 on Lazada. Of these, 80% were for cooling water and 20% were for Saiga horn shavings. Cooling water products observed for sale were of the same three Thai brands found on the Google search, and one additional brand originating from Malaysia. Shavings were most commonly offered for sale in pre-packaged/ready-made kits (Images 2–3). The products listed for sale on the e-commerce platforms mostly originated from Thailand, predominantly from Bangkok. The original traditional Chinese name for Saiga horn “Ling Yang” was more frequently used on Shopee and Lazada in comparison to the search terms used in this study suggesting that these e-commerce sites cater to a wider range of target consumers including non-Thais,




Image 1. Type of products containing Saiga Antelope horn available in TCM shops in Bangkok: a—cooling water | b—Saiga horn shavings with other herbs prepared as a ready-made boiling kit. © P. Siriawat.

S Shopee Search for products, brands and shops

เวชภัณฑ์โฮสต์ หนังสือจอร์จ โรนงเท้าใบสีขาว น้าตาเทียม Rohlo เครื่องสำอาง แวนอนไทรคัพ เลือเชอร์ฟุตบอล กระเป๋าAdidas


Shopee > อาหารและเครื่องดื่ม > เครื่องดื่ม > ชาและสมุนไพร > เหล้งเอียง เหล้งเอียง (เซากุย) Ling Yang Jiao สมุนไพรจีนดับร้อน แก้วร้อนใน (1 ชุด)





เหล้งเอียง เหล้งเอียง (เซากุย) Ling Yang Jiao สมุนไพรจีนดับร้อน แก้วร้อนใน (ชุด)


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฿360

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Image 2. Saiga horn shavings pre-packaged into a ready-made boiling kit for sale (~USD 12) on Shopee.

Shopee > อาหารและเครื่องดื่ม > เครื่องดื่ม > ชาและสมุนไพร > สมุนไพรจีนปรับสมดุล เหล้งเอียง **จัดส่งฟรี**




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Image 3. Another type of pre-packaged ready-made boiling kit containing Saiga horn shavings for sale (~USD 18) on Shopee.

as opposed to the traditional Thai-Chinese pharmacies catering specifically to local Thai consumers (“Lin Yang” was not a term used on the Thai pharmacy websites). Sellers that offered health and wellness items were found to offer Saiga horn products as a post-surgery relief, whereas online pharmacies generally do not advertise in this way.

Thailand’s role in the international trade in Saiga Antelope products according to the CITES Trade Data

Between 1996 and 2018, 16 records of Saiga horn imports into Thailand were listed on the CITES Trade Database (Table 1). The majority of imports (15 records) were reported as medicine/derivatives amounting to 11.16 kg. Japan was the main country of export (69%) of medicines/derivatives to Thailand, followed by China (25%), although China exported larger quantities in comparison (Table 1). There was one import of 2,700 kg of horns from Russia in 1996. Exports from Japan were reported as pre-convention stocks (i.e., source code O) while exports from China and Russia were reported as wild-sourced (i.e., source code W).

There was only one export/re-export record of Saiga horn derivatives ($n = 5$) from Thailand to New Zealand. This was reported as source code ‘I’ which refers to a seized or confiscated item. In this case, it could be referring to an illegal shipment that was seized in New Zealand (possible due to a lack of a valid export permit) or it could be referring to a shipment of previously seized items that can be legally exported with a valid CITES permit.

DISCUSSION

We found an active local trade in Saiga horn products in Thailand, occurring in Bangkok’s Chinatown and on online platforms. Two main types of products were openly available: cooling water and shavings, the latter often observed in pre-packaged boiling kits. The Saiga horn is

marketed as a staple household medicine. It is also being targeted for post-surgical care, especially in relation to cosmetic surgery for which there is a substantial market in Thailand. Cooling water products have been observed on sale throughout the country, not only in ‘Chinatown areas’ and not only in TCM outlets (M. Phassaraudomsak, pers. comm. to L. Gomez on 5 August 2021). It appears that Saiga horn products are being commercially produced in Thailand, yet overall trade dynamics including source and scale remain unknown. However, given the lack of any recent reported imports, and the prevalent availability of Saiga horn products, it is likely that either some of these products are illegally sourced from outside Thailand, or that the Thai Management Authority has not reported trade into Thailand to the CITES Secretariat. It is also possible that some of these products may not contain Saiga horn and testing of these products would confirm this.

According to CITES trade data, Thailand has imported Saiga horn and derivatives from China, Japan, and Russia. Both China and Russia have been implicated in the poaching and illegal trade of Saiga horns (Li et al. 2007; Meibom et al. 2010; WWF 2020), while Japan is one of the biggest importers of Saiga horn products, predominantly importing from China. CITES trade data shows that Thailand imported about 2,711 kg of Saiga horns and medicine/derivatives over a 23 year period (1996–2018). The bulk of this came from the 1996 import of 2,700 kg of horns from Russia mentioned above. This was the only record of export from Russia, probably because Russia instituted a commercial hunting ban in 1997 (although hunting was also banned from 1987 to 1989 and again from 1992 to 1996), and because CITES Notification 2001/043, issued in 2001 and still in effect, recommended suspension of imports of Saiga horn from Russia and Kazakhstan until the two countries complied with recommendations that included implementation of a regional conservation strategy for the species (Milner-Gulland et al. 2020). According to Meibom et al. (2010), Russia had a stockpile of only 1,500 kg horns in 1995

Table 1. Import of Saiga Antelope horns into Thailand between 1996 and 2018.

Country	Exporter reported quantities (kg) ¹													
	1996	2001	2003	2005	2006	2008	2010	2012	2013	2014	2015	2016	2017	2018
China									2.09	2.61		2.61	2.61	
Japan		0.15	110 ²	0.12	0.12	0.12	0.12	0.12		0.12	0.12		0.12	0.25
Russia	2700 ³													

¹—All imports were of ‘medicine/derivatives’ with the exception of that from Russia, which was the only import of ‘horns’ reported; no importer reported quantities were listed | ²—one import record described as derivatives but no unit (i.e., g, kg) was mentioned | ³—only record of ‘horns’ imported into Thailand | Source: CITES Trade Database.

and Saiga Antelope continued to be poached to supply illegal demand. Aside from this massive import, Japan and China were the two main exporters of Saiga horn derivatives/medicine to Thailand amounting to 11.16 kg. China is one of the biggest consumers and exporters of Saiga horn and derivatives (Li et al. 2007; EIA 2019; WWF 2020). In 2006, China, Japan, Malaysia, South Korea, and Singapore reportedly had a combined stockpile of approximately 130 tons of Saiga horn. It was estimated this would be exhausted between 2016 and 2021 (EIA 2019). Trade in Saiga horns nonetheless continues, and illegally sourced horns continue to enter the market (EIA 2019; Van Uhm 2019; WWF 2020). Regular Saiga horn seizures in China and range States support this conclusion (EIA 2019; des Bois 2019, 2020a,b,c,d, 2021; Xinhua 2021). The most recent seizures occurred in: May 2021, when Chinese Customs authorities confiscated 200 Saiga horns smuggled from Russia (Xinhua 2021a); and December 2021 when Chinese customs officers in the Shandong Province confiscated six Saiga horns from two inbound parcels which were labelled as gifts (Xinhua 2021b). From 2015 to 2019, a minimum of 3,752 Saiga horns were seized in Russia and Kazakhstan (WWF 2020). Without current stockpile data, efforts to track source of products in trade remains difficult and undermines conservation efforts for these species.

This study reveals the existence of illegal trade in Saiga horn products in Thailand. Online market surveys show a Malaysian brand of Saiga horn product for sale, though no export records from Malaysia were found in the CITES Trade Database. Malaysia has been previously implicated in the illegal export of Saiga horn products, though the volume and significance of this trade was unknown (Meibom et al. 2010). Recent surveys of TCM outlets in Peninsular Malaysia revealed a substantial trade in Saiga horn products, though discrepancies in trade data and lack of information on stocks in the country made it impossible to determine to what extent legal stocks were permitted in domestic trade (Gomez & Krishnasamy 2019). CITES trade data also include at least one seizure record that potentially links Thailand to illegal re-export of Saiga horn derivatives to New Zealand. We could not find any record of seizures of Saiga horn in Thailand, and this may be a sign of low enforcement or perhaps weaknesses in the law prior to 2019. Saiga Antelope is not native to Thailand, and so was not listed as a protected species under its national wildlife law, the Wild Animal Reservation and Protection Act B.E.2535 (WARPA 1992). This law was amended in 2019 (Wildlife Conservation and Protection Act B.E. 2562 (WARPA 2019)) and now includes a new category, 'controlled wild animal', which

is defined as "wildlife which is afforded protection under CITES and any other wild animal necessitating appropriate control measures as provided under the new Act". Listing as 'controlled wild animal' would mean the possession, import, export and re-export, as well as trade (including online trade, publicising and advertisement) is regulated through a permitting system. Violations of the law are liable to imprisonment and fines amounting to: for illegal possession of 'controlled wildlife' – up to one year in prison and/or a fine not exceeding BHT 100K (>USD 3,000); illegal import or export of 'controlled wildlife' – up to ten years in prison and/or a fine not exceeding BHT1mil (>USD 30,000); Illegal trade of 'controlled wildlife' – up to four years in prison and/or a fine of up to BTH 400K (>USD 12,000). Prior to 2019, however, there was a major loophole in the law that hindered enforcement action against local trade of non-native species once they had been smuggled into the country as they were not protected after import (UNODC 2017). The 'controlled wild animal' list will reportedly be issued 2022 year-end under a Notification of the Minister. It remains unclear whether all CITES-listed species will be included. A current draft of the list does include the Saiga Antelope and if finalised could remove this loophole for the species.

CONCLUSION AND RECOMMENDATIONS

Thailand appears to be an important market for Saiga horn products. It is likely there is a mixture of both legally and illegally sourced Saiga horns in the market, partially due to the possible availability of pre-convention stock and partially due to loopholes in Thailand's national legislation. Greater scrutiny, monitoring and research is urgently needed to understand how the use of Saiga horn is being regulated in Thailand including the number of licensed traders, potential stockpile and management as well as the monitoring of traditional medicine outlets and online sale of commercial Saiga horn products. The addition of Saiga Antelope to the 'controlled wild animal' list is certainly warranted if it is to empower and enable enforcement in preventing the illegal trade of a Critically Endangered species.

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