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Tigers at a crossroads: Shedding light on the role of Bangladesh in the illegal trade of this iconic big cat

Nasir Uddin[1,2] | **Sam Enoch**[3] | **Abishek Harihar**[3] | **Rob S. A. Pickles**[3] | **Alice C. Hughes**[4]

[1]Landscape Ecology Group, Centre for Integrative Conservation, Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences, Mengla, Yunnan, People's Republic of China

[2]International College, University of Chinese Academy of Sciences, Beijing, China

[3]Panthera, New York, New York, USA

[4]School of Biological Sciences, University of Hong Kong, Hong Kong SAR

Correspondence
Alice C. Hughes, School of Biological Sciences, University of Hong Kong, Hong Kong SAR.
Email: ach_conservation2@hotmail.com

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Abstract

Unsustainable wildlife trade is a major threat to many species, but quantifying trade remains challenging, as seizure data provides an incomplete understanding. For this reason, integrating multiple types of information, including interviews with actors involved in trade, is crucial if we are to understand the problem better. Hence, in this study, we digitized Bangladesh Forest Department tiger seizure records to identify trade routes and interviewed 163 individuals involved in trafficking tigers through Bangladesh's air, sea and land ports, including poachers, smugglers, and traders. We identified six ports used to import tigers, 14 ports used for tiger export and three ports showing bi-directional trade. Elite Bangladeshis were the most important consumer group, and tigers were sourced from populations in NE India, Myanmar and Bangladesh Sundarbans to supply domestic demand. Tiger products were exported to 14 countries, including seven G20 nations, with Bangladeshi expatriates as the consumer group in three countries (United Kingdom, Germany and Qatar). Rising economic development in Bangladesh over the last decade, combined with deep-rooted cultural ties to tiger consumption, has led to a rise in domestic demand. Additionally, rapid growth in international transport links has increased smuggling and connected local traders with global markets, increasing the complexity of global trade. These findings suggest Bangladesh is poised to play a pivotal role in tiger conservation over the next decade, requiring strong national strategies to reduce trade opportunities, disrupt networks and weaken demand.

KEYWORDS

CITES, endangered species, illegal trade, international markets, trade routes, wildlife trade

1 | INTRODUCTION

Illegal wildlife trade (IWT) is a lucrative global industry causing wild population depletion, local extinctions, socio-economic impoverishment, and undermining biodiversity and natural resource conservation policy and governance (‘t Sas-Rolfes et al., 2019; Bennett, 2011; Fukushima et al., 2020; Scheffers et al., 2019;

UNODC, 2020). Despite the global focus on IWT, it is clear that the problem is complex and changing and requires a suite of mitigation measures to counter the supply, transaction processes, and demand of wildlife (Challender & MacMillan, 2014; Di Minin et al., 2022; UNODC, 2020; World Bank Group, 2016). It also must be acknowledged that in some cases, certain illegal wildlife trades boost local rural economies and raise incomes, complicating efforts to reduce it (Felbab-Brown, 2017). Furthermore, emerging trends in IWT illustrate how even among issues that attract much attention (e.g., the illegal trade in tiger *Panthera tigris* parts and derivatives) (Esmail et al., 2020), changing poaching methods, new actors, and new trade routes and destinations require knowledge gaps to be filled to understand the patterns of supply, trade, and demand—which is complicated by the covert nature of the trade (Davis et al., 2020; Khanwilkar et al., 2022; Linkie et al., 2018; Musing, 2020; Nijman et al., 2019; Skidmore, 2021; Wong, 2019a, 2019b).

Tigers are illegally traded in large volumes, with severe declines occurring as a result of poaching, even leading to the local extinction of populations in some countries and priority protected areas (Goodrich et al., 2015, 2022; Gray et al., 2017; Jhala et al., 2021; Rasphone et al., 2019). While several factors likely contributed to these declines and local extinctions, poaching to meet domestic and international demand has been recognized to have, and continues to exert, the most significant influence on population viability (Chapron et al., 2008; Linkie et al., 2018; Robinson et al., 2015). Bangladesh is currently one of ten tiger range countries with breeding populations, and plays an important role in global tiger conservation (Goodrich et al., 2015, 2022). The Bangladesh Sundarbans population is still a considerable portion of the global wild tiger population, and the main population within Bangladesh, and losses here would reduce genetic diversity (Reza et al., 2000; Sanderson et al., 2006). The Bangladesh Sundarbans hosted an estimated population of 300–500 tigers in 2009 (Ahmad et al., 2009). However in 2015 only 106 tigers were counted (Dey et al., 2015), and a recount in 2018 recorded only 114, representing an over 50% decline since 2009 (Aziz et al., 2018; Dey et al., 2015; Khan, 2012). Poaching to supply the domestic and international demand for body parts is a major factor in this decline (Aziz et al., 2017; Hossain et al., 2018; Saif & MacMillan, 2016).

Tigers in Bangladesh are protected under national laws (e.g., Bangladesh Wildlife (Preservation) Act, in 1973 followed by the Wildlife (Conservation and Security) Act, 2012) and receive significant conservation attention (GTI Secretariat, 2010; Bangladesh Forest Department, 2016). However, studies highlight that illegal killing and poaching are prevalent, and strong domestic demand for tiger products exists (Aziz et al., 2017; Hossain et al., 2018; Saif et al., 2016; Saif & MacMillan, 2016). More recently, studies have documented changes in motivations, actors and methods among tiger poachers in the Sundarbans (Aziz et al., 2017; Saif et al., 2018; Uddin et al., 2022.). Until 2018 groups of pirate controlled territories in the network of tidal channels of the Sundarbans, extorting and ransoming forest users, and controlling tiger poaching as a business sideline. However by 2018, the success of Bangladesh's counter-pirate campaign had resulted in perpetrator replacement, as tiger specialist poaching teams and opportunistic tiger poachers took advantage of market opportunities created by the pirates' decline (Uddin et al., 2022). However, little is known about the trade routes used by traffickers to reach domestic and international consumers.

While enforcement and seizure records in Bangladesh indicate sporadic product movement within and across borders (Banks & Newman, 2004; Nowell, 2000), recent investigations have revealed a higher volume and frequency of seizures, primarily connected with India (Wong & Krishnasamy, 2019, 2022) (although it should be noted that changes in enforcement or reporting may also be responsible for such trends). Changes in domestic and international consumer demand, a booming export-based economy, and unprecedented economic and infrastructure growth in the country call for an understanding of Bangladesh's role in the illegal trade of wildlife, such as tigers (Esmail et al., 2020; The World Bank, 2021).

To understand Bangladesh's role in the illegal tiger trade, actors involved in the trade were interviewed to augment our knowledge about the trafficking of tiger parts that traditional seizure-based studies cannot fill. Interview-based data was combined with tiger seizure records from government agencies and open-source information from across Bangladesh. Our efforts aim to help identify national and international trade routes and destinations and potential tiger source populations supplying the trade and domestic consumption centers. Thus by combining and analyzing this data, we aim to obtain a comprehensive understanding of the patterns and processes of tiger trade in Bangladesh.

2 | METHODS

2.1 | Study site and strategy

A mixed approach was applied for data collection to establish the most comprehensive view of tiger trafficking patterns across Bangladesh. This involved (1) preliminary engagement with subject matter experts, (2) interviewing

people involved in the tiger trade, and (3) compiling seizure and arrest records from Bangladesh Forest Department (BFD). Approval for this research was granted by the Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences Ethics Committee (Date 13th December 2018), and by the Bangladesh Forest Department (Permit no: 22.01.0000.101.23.2019.922).

To ensure representative sampling across the Bangladesh, interviewees with knowledge of the tiger trade from towns close to Bangladesh's land, sea and airports were identified (detailed later). Major ports and cities within Bangladesh and communities adjacent to the Bangladesh Sundarbans, the largest tiger population in the country, were targeted.

Based on the expert suggestions, six sampling areas were identified: (1) The Sundarbans, Khulna and west Bangladesh; (2) Northwest Bangladesh bordering West Bengal and Assam; (3) Northeast Bangladesh bordering Meghalaya and including Sylhet; (4) East Bangladesh bordering Tripura and Assam; (5) Chittagong bordering Mizoram and Myanmar; (6) Dhaka. This covered the majority of land ports, seaports, unofficial border crossings and airports between Bangladesh and its neighboring countries.

2.2 | Subject matter expert engagement and defining sampling areas

Informal discussions were held with 50 local experts with expertise on tiger trafficking, including NGO staff, law enforcement officers, journalists, academics, tiger conservation volunteers, and community members around the Sundarbans, to establish general patterns, identify target regions for interview sampling, and refine questions for interviewees. Experts were selected based on their experience with tiger conservation, awareness of conservation issues in the country, conservation journalists, tiger researchers, and law enforcement officers who had handled tiger criminal cases. Discussions commenced in October, and continued until to December 2020 in person or by phone. Before in-depth discussions, the aims and objectives were described to the experts, and interviews were only conducted upon receiving their informed consent.

2.3 | Interviewing process

To initiate the process, lists of convicted wildlife offenders were collected from various law enforcement agencies in Bangladesh to identify potential interviewees. Individuals with intimate knowledge of tiger trafficking known to the first author from previous surveys while at Wildteam were also contacted. People with first-hand knowledge of the stages of tiger trafficking (poaching, trading, facilitation, smuggling, and consumption) were sought for interview. Interview respondents were selected by snowball sampling, a sampling strategy commonly used in criminal justice research and other wildlife trade-related research where active offenders are hidden (Brooks et al., 2010; Naderifar et al., 2017; Warchol & Warchol, 2007). Snowball sampling involves identifying one or several respondents who are then asked to identify and refer other knowledgeable subjects willing to participate in the study. Referrals were then sought to initiate further snowball interviewing in each of the six sampling areas. Between March and July 2021, interview work then took place in each of the six sampling areas systematically. Interviews involved strict safety protocols to protect both interviewees and field staff. During fieldwork, a safety officer was established, usually a contact in a local enforcement agency in one of the sampling areas. The field staff and safety officer followed an agreed protocol of phone check ins. Interviews were conducted in busy cafes in towns where neither the interviewee nor the interviewer were residing. Each interview location was preselected by project field staff ahead of the interview to review suitability.

Each interview was conducted in Bengali by the first author with a field staff present to provide interview support, and a third team member to assist with logistics and risk assessments. No payments were made to interviewees, however, travel expenses were reimbursed based on receipts. Human subject protection and sensitive data protection protocols were strictly followed throughout the study. Before interviewing, the study aims were explained to the respondents and informed consent taken. Personal details of respondents or contacts were not recorded. A unique numerical code was assigned to each respondent to protect anonymity while ensuring statements made during multiple interviews could be attributed to the correct interviewee. Transcripts were translated into English, assigned a unique reference number, anonymised so that no elements could allow interviewees to be identified, and stored and managed in "Spatial Monitoring and Reporting Tool (SMART) Profiles" (SMART-Profiles 7.01), an open software plugin specifically designed to enable the coding and management of unstructured narrative data for analysis designed to assist conservation management (https://smartconservationtools.org).

Respondents were asked about their wildlife trade activities over the past 6 years using a semi-structured questionnaire (Supplementary material S1). Although participants were asked informally about routes, methods

used, and the nature of tiger products traded, the dialogue was allowed to flow naturally to ensure the interviewee felt at ease while providing the maximum possible relevant information on the various dimensions of trade, including the price of items, how they might be used, and the types of materials traded as well as the degree of demand and value of different items. Interviews were concluded either when all topics had been discussed, or at the respondent's request, and responses were then transcribed.

2.4 | Compilation of enforcement records on wildlife trade

Twenty-two forest division offices under the BFD were visited across all eight of Bangladesh's administrative divisions to collect enforcement information and reports. Records were digitized from books and other paper-based records, and stored in a separate database from the offense registry for further analysis. The following information was recorded, the location of the incident, the destination of the tiger parts, and the origin of tiger parts to map in-country and international trade routes of tiger trafficking. In addition, a publicly available version of the record for each tiger incident was searched for in online news outlets and databases, including the Wildlife Trade Portal (TRAFFIC, 2022: https://www.wildlifetradeportal.org) and compiled in a separate database.

2.5 | Data management and analysis

To ensure our analysis described current patterns rather than reflect historical trends, the study was restricted to data from 2016 to 2021. Accordingly, January 1st, 2016 was selected as the earliest date for information to be used in the analysis as that year corresponded to when Bangladesh's counter-piracy campaign began disrupting tiger poaching operations. These disruptions targeted pirates initially involved in tiger-trafficking, but the successful 2016 efforts to eliminate pirates lead to the appearance of new traders, making control of wildlife trade more fragmented and challenging (Uddin et al., 2022).

The reliability of information from interviews is highly variable from respondent to respondent. Respondents may exaggerate, lie or repeat distorted anecdotes, while honest respondents vary in their awareness of a subject. While the effect of the error is reduced with increasing sample sizes, studies have shown that failing to account for information quality from diverse interviewees can produce highly misleading results (Martinez-Levasseur et al., 2020). Therefore, only information that the interviewee was aware of first-hand was used in our analysis, corroborated by at least one other independent interviewee or enforcement record. In most cases, interviewees were interviewed for the first time for this study and graded "untested" as they had not been featured in previous reports, and we could not easily assess the reliability of their information; however, a subset was graded as "reliable" based on previous engagements with the lead interviewer in the past and cross-checking the information they provided with that of other interviewees. Interviewees who were found to have provided misleading, irrelevant or demonstrably false statements were considered "unreliable," and their interview transcript was removed from the analysis.

Trade routes were assigned two levels of confidence: medium and high, based on the reliability of the source and corroboration of the information provided by multiple sources, including our original experts. A route was classed as "Medium" confidence if only described by untested interviewees, but "High" confidence if independently corroborated by a reliable interviewee. Any route description resulting from enforcement action was classed as high confidence. The evidence base for each route is provided in the Supplementary Material (Supplementary Materials S2). These important locations were first identified and then classified based on their function. These included the source of tigers, processing, distribution centers, transit ports or unregulated border crossing, and consumption centers (see Table 1 for definition). Values of tiger products were determined from interviewee responses. Individuals were asked to mention the price that they have heard or seen for different parts of the tiger and combined interviewee responses were used to create a price range, these are available in Table S4.

Whereas complex problems are extremely challenging to reduce, smaller, more clearly defined problems provide targets to concentrate resources more effectively. The routes, facilities, methods and actor groups where known were combined with previous research describing specific poaching and consumption problems to define highly specific tiger trafficking problems that span the wildlife crime continuum from poaching to consumption.

3 | RESULTS

Interviews were conducted with 194 interviewees, of which 31 responses were discarded due to the unreliability or irrelevance of the information provided (based on cross-referencing with other information). Of the 163 interviews retained, 56 were poachers, 70 traders in tiger parts, 24 transboundary smugglers, three

TABLE 1 Roles of different localities involved in tiger trafficking through Bangladesh based on descriptions from interviewees.

Function	Definition	Places/location	Notes
A. Source site	Landscapes with tiger populations, used as sources for tiger parts	Bangladesh: (1) Sundarbans Reserve Forest India: (2) Sundarbans National Park (3) Namdapha-Royal manas-Northern Forest Complex TCL (4) Kaziranga-Garampani TCL	155 interviewees, 14 enforcement records and 15 open-source news and non-government records. Locations described as source sites for the poaching and harvesting wild tigers for parts.
B. Processing centers	Areas for processing of parts prior to transported to distribution centers	Bangladesh: (5) Kaikhali (6) Satkhira (8) Mongla (9) Bagerhat (10) Patharghata (11) Khulna (13) Dhaka (14) Chattogram (20) Sylhet	113 interviewees and 14 enforcement records. Locations described as places where tiger parts are processed into finished products. For example, in Sylhet, tiger bone is ground into powder and made into small packages for export. In Khulna, freshly harvested tiger skins are treated with salt to prevent decomposition.
C. Distribution centers	Area used for stockpiling items prior to distribution and sale	Bangladesh: (6) Satkhira (8) Mongla (10) Pathargata (11) Khulna (13) Dhaka (14) Chattogram (19) Dinajpur (20) Sylhet India: (22) Guwahati, India (24) Siliguri, India (25) Kolkata, India	124 interviewees and one enforcement record described storage facilities which were used to stockpile tiger products and other felids together with other wildlife products and live animals for domestic and international buyers. Storage facilities were described as large private houses on the city's outskirts with vacant land surrounding them. Wildlife products were stored in private houses for a certain period before being distributed to local buyers or international traders.
D. Transit Ports	Border ports for international exports	Bangladesh: (7) Bhomra (Land port) (8) Mongla (Sea/river port) (12) Benapole (Land port) (13) Dhaka (Airport) (14) Chattogram (Air/Seaport) (15) Teknaf (Sea/river port) (17) Hili (Land port) (18) Banglabanda (Land port) (20) Sylhet (Airport) (21) Tamabil (Land port)(26) Sutarakandi (Land port) India (23) Kolkata airport	137 interviewees described these international ports as transit points for tiger trafficking.
E. Unofficial border crossings	Porous international borders used for informal unmonitored trading	Bangladesh: (2) Sundarbans national park (Indian border) (16) Shangu-Matamuhuri Wildlife Sanctuary	49 interviewees described these unguarded and illegal border crossings, which are used to transport tiger products between Bangladesh, India and Myanmar.

(Continues)

TABLE 1 (Continued)

Function	Definition	Places/location	Notes
F. Domestic consumption centers	Domestic/local markets	Bangladesh: (11) Khulna (13) Dhaka (14) Chattogram (20) Sylhet	126 interviewees described these locations as display a high demand for tiger products from Bangladeshi nationals for medicinal, ornamental or aesthetic uses.

Note: TCL, tiger conservation landscape. Numbers of responses and specific locations mentioned can be found in supplementary material.

transporters and three ex-pirates (Supplementary material S3); of the interviewees, 99 were classed as "reliable" and 64 as untested.

In addition to the interviews, 20 records concerning tiger mortality and trade were digitized from BFD records dating from 1st January 2016 to 31st December 2021 (Supplementary material S4). Excluding conflict and non-target mortality, 14 records concerning poaching and trade were included in this analysis, and they pertained to Khulna and Dhaka. Of these, only nine were publicly available through news articles, and six were listed on the Wildlife Trade Portal. The complete database of publicly available tiger seizure records is provided in Supplementary material S4.

3.1 | Transport within Bangladesh and across land borders

3.1.1 | Origins of tiger products and axes of flow

It was largely not possible to confirm the tiger source populations for the products moving through Bangladesh because this was beyond the interviewees' level of awareness. However, four tiger conservation landscapes were described by interviewees: Sundarbans ($n = 117$); Northern Forest Complex Myanmar ($n = 7$); Namdapha–Royal Manas (Assam) ($n = 17$); Kaziranga–Garampani (Meghalaya and Assam) ($n = 20$). In addition, four main domestic trade axes were described (Figure 1):

Kaziranga/Manas: Sylhet division (import)

Ten of the 20 interviewees familiar with the trade in tiger parts in northeast Bangladesh described Sylhet as a domestic consumption center and a location for exports via the airport. Tigers were described as being sourced from Manas Tiger Reserve and Kaziranga National Park. Interviewees described transboundary smugglers as opportunistic local traders holding permits to trade in legal goods, including clothing and fresh produce ($n = 7$). The laundering of illegal products with legal ones allowed traders to move bulky sacks and various containers through border crossings without being checked (Tamabil and Sutarakandi land ports). The movement was described as occurring year-round but increasing during the winter months ($n = 4$). Supply was described as being initiated when wealthy consumers place orders for tiger products with traders in Sylhet, who seek products from traders in Assam with direct connections to poaching groups ($n = 5$). Interviewees also mentioned that traders in Assam would seek to sell off tiger stock to traders in Sylhet in response to pressure from local law enforcement. Smugglers were described as both Indian and Bangladeshi, and Bangladeshi smugglers from Sylhet were described as traveling to Guwahati to purchase tiger products for import ($n = 9$). Values of items are recorded in Table S4.

Tiger products were primarily powder from ground bones for tonics, with some whole tiger bones and canines supplied. Tiger bone powder was concealed in bags of flour and other parts hidden inside bundles of clothes to smuggle them over the border ($n = 5$). Sylhet traders were also described as purchasing tiger products from Sundarbans via traders in Dhaka ($n = 12$). Local elite consumers in Sylhet and elite Bangladeshis living abroad were described as the primary consumers. Interviewees stated that tiger products were flown in passenger aircraft from Sylhet to the United Kingdom (UK) ($n = 7$).

Dhaka—Rangpur division-northern W Bengal (export)

Five of the seven interviewees familiar with the tiger trade in northwest Bangladesh described the trafficking of tiger products from Bangladesh to India through the north-western land ports of Hili and Banglabanda. Tiger products were described as being harvested from the Bangladesh Sundarbans ($n = 117$), after which they were processed at Bagerhat, Satkhira and Khulna before being transported to Dhaka by road. Interviewees stated Indian tiger traders visited Bangladesh as illicit goods traders or tourists to meet Bangladeshi tiger traders and finalize deals. Once deals were completed, tiger products were described as being transported by road from Dhaka city to the border districts

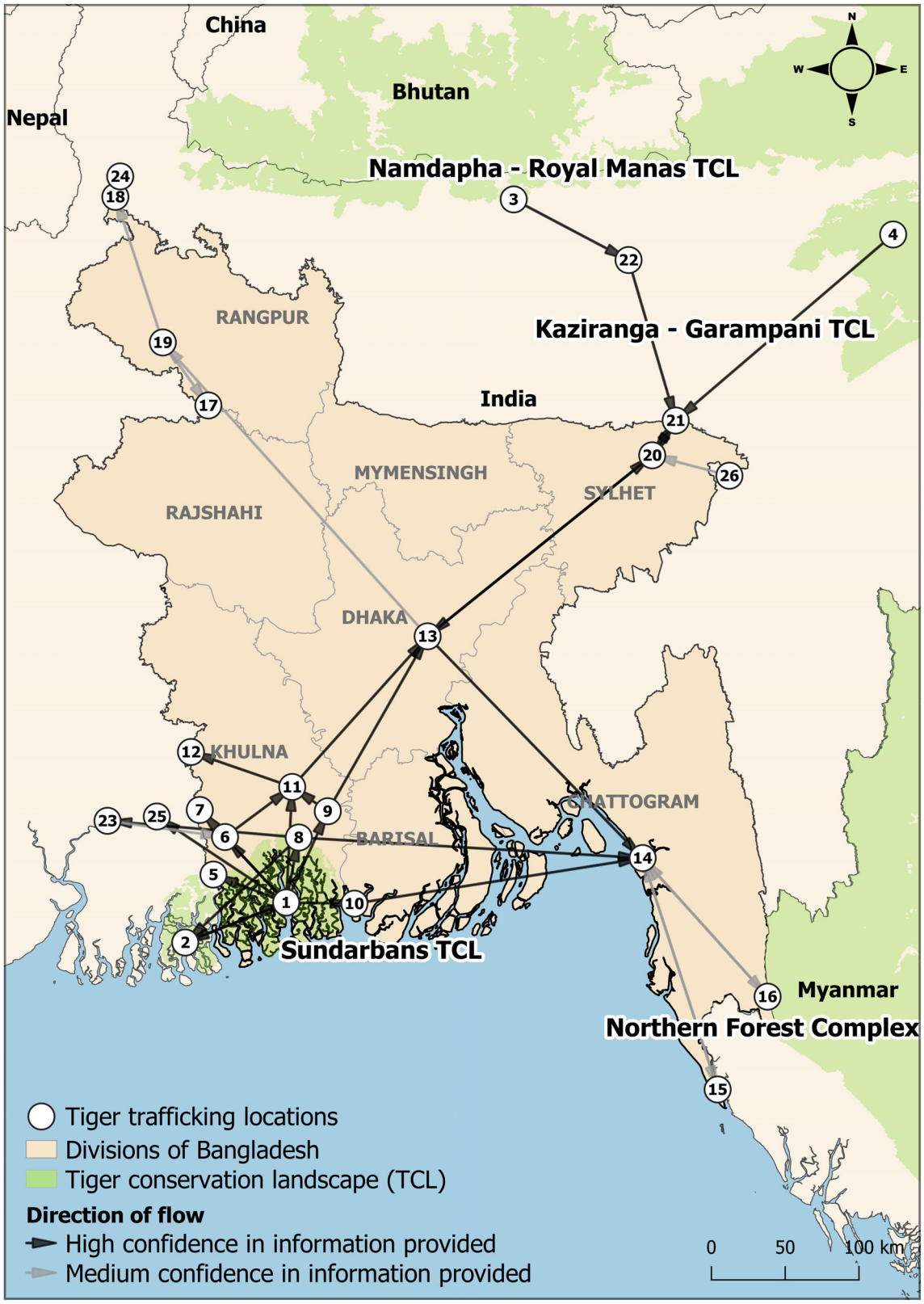

FIGURE 1 Routes used by traffickers to transport tiger products through Bangladesh. Administrative divisions are named in gray text. Arrows indicate the direction of travel to either high or medium confidence. Specific locations are numbered and described in Table 1.

of Dinajpur and Panchagarh for storage by local traders. These traders were then alleged to smuggle the tiger products into India using private cars or goods trucks across the border through Banglabanda land port to Siliguri in India or through Hili land port to other unspecified destinations in India ($n = 2$).

Myanmar-Chattogram division (import/export)

Four of the seven interviewees familiar with the tiger trade on both sides of the Bangladesh-Myanmar border described gangs formed by refugees from camps on both sides of the Bangladesh-Myanmar border controlling bi-directional trade in tiger products, running this as a side-line to methamphetamine and other illicit goods. Interviewees described Rohingya gangs leveraging family networks to smuggle tiger products between Teknaf river port in Bangladesh and Maungdaw in Rakhine State in Myanmar. Interviewees ($n = 4$) also described members of Mro tribal communities residing deep inside the Shangu-Matamuhuri Wildlife Sanctuary smuggling tiger products to and from Myanmar. In both cases, facilities were described in Chattogram functioning as distribution points, receiving Sundarbans tiger products before onward movement into Myanmar and tiger products from Myanmar before onward movement to Dhaka and Sylhet.

Southern W Bengal-Khulna division (import/export)

Twenty-one of the 32 interviewees familiar with the tiger trade in southwest Bangladesh described tiger trafficking flows in the region as bidirectional between India and Bangladesh. Wild tigers were poached from the Bangladesh and Indian Sundarbans before their parts were processed at Kaikhali Satkhira, Mongla, Bagerhat, Patharghata and Khulna. The tiger parts were described as being sold directly to Indian buyers or Bangladeshi distributors in Dhaka with international connections. In addition, the tiger parts were described as being frequently smuggled by road through the Benapole land port ($n = 39$) into Kolkata and other parts of West Bengal in India. Interviewees also described tiger parts being smuggled by air via Dhaka airport to Kolkata and New Delhi in India ($n = 33$). In some cases, tiger skins were described as being dried and processed inside the Sundarbans before being smuggled into India on fishing boats through poorly patrolled waterways along the international border. Interviewees also described the supply of tiger parts from Kolkata and West Bengal into Bangladesh. Linguistic, familial and cultural similarities among communities on both sides of the international border were described as an enabling factor for the bidirectional trade ($n = 25$).

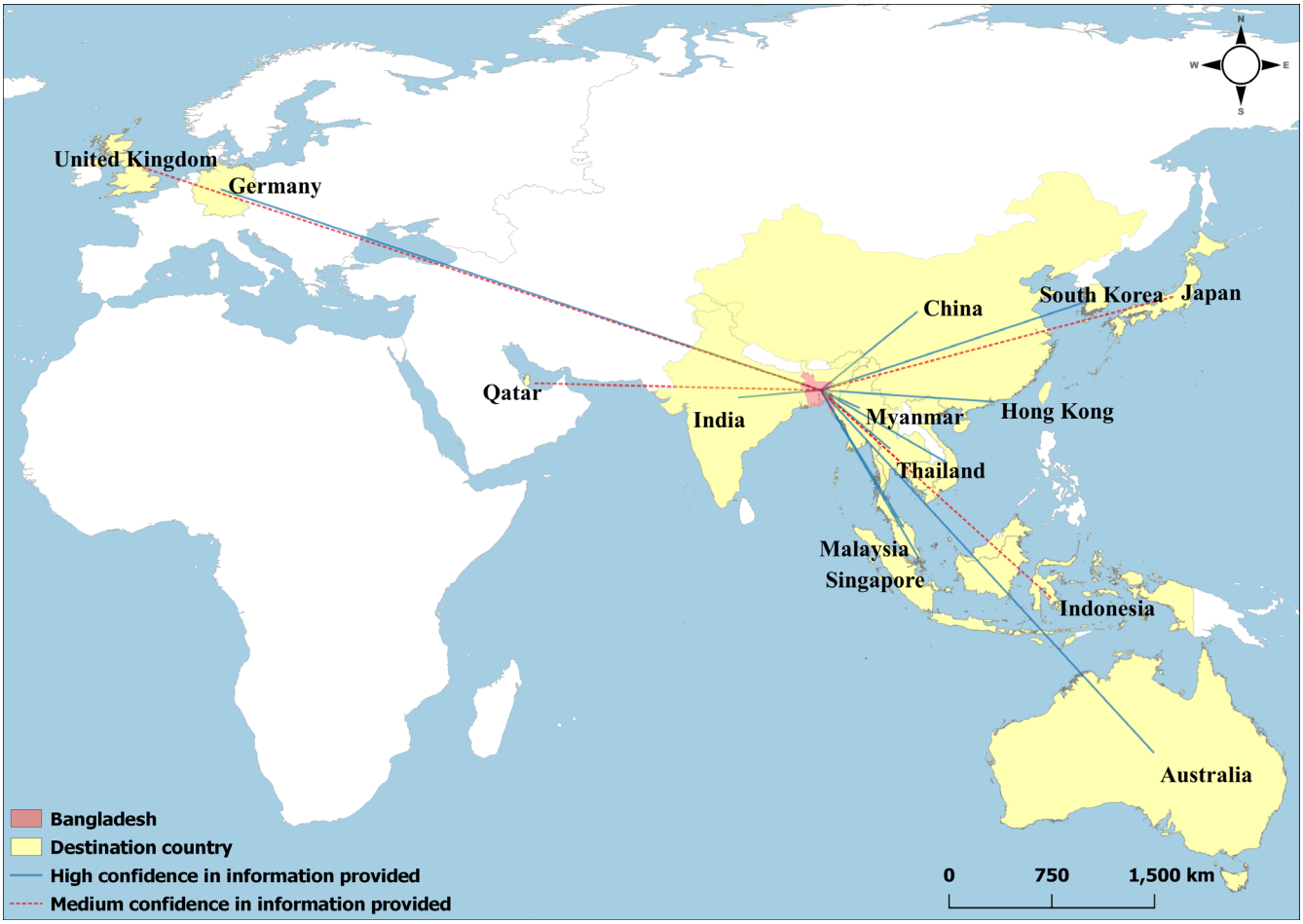

FIGURE 2 Countries receiving tiger products from/via Bangladesh from 2016 to 2021. Information derived from 163 respondent interviews, 16 media reports, and 1 enforcement records.

3.2 | International destinations for tiger products from Bangladesh

Interviewees reported that tiger parts were exported to 15 countries from Bangladesh (Figure 2), of which the three most cited destinations were India ($n = 44$), China ($n = 33$ [23 mainland, 10 Hong Kong]), and Malaysia ($n = 11$) (Figure 2). Skin, bones, teeth and dried meat were the priority products that were destined to most destinations, although dried bone powder was largely exported to the United Kingdom. In each case, the interviewees stated multiple instances of product movement (sometimes highlighting a number of cases and examples), suggesting transactions were not one-off deliveries. Tiger parts were exported from Bangladesh through three airports, seven of Bangladesh's 16 land ports, two seaports and two unofficial border crossings between Bangladesh and neighboring countries.

Exports to Europe were described as being carried by couriers on passenger planes ($n = 20$). In contrast, exports to Southeast and East Asia transport included passenger planes ($n = 112$) and cargo ships to China, Korea, Vietnam, Cambodia and Japan ($n = 34$). Overland, destinations were to neighboring India ($n = 44$) and Myanmar ($n = 7$); however, there was insufficient data to resolve any onward travel to other destinations. Four interviewees described fishing trawlers transporting tiger products to Malaysia and Thailand, specifically as bribes for enforcement agents during human trafficking operations.

3.3 | Consumption of tiger products by Bangladeshis

Eight distinct tiger product types were described by interviewees (Table 2), four of which were described as solely consumed by elite local consumers for medicinal, spiritual and/or ornamental purposes. Interviewees described wealthy Bangladeshi consumers, purchasing both medicinal and spiritual products such as bone powder for tonics, intact bones, canines, tiger meat, and milk, as well as large ornamental items for display such as skulls and skins. In most of the cases, people consumed meat to increase physical power and keep teeth and claws as a symbol of power and also keep away bad spirits, which is supported by eight interviewees as "We eat dried tiger meat to increase physical power, and hang teeth and claws as lockets to increase power and keep us away from harm of evil spirit." The interviewees also noted that before 2015 the sale of tiger parts to overseas was irregular. Consequently supplies were also irregular and suppliers not reliable, and as a result the risk was high relative to the possibility of reward. However, now there is regular demand and supply to buyers inside Bangladesh, and Bangladeshis living abroad who provide

TABLE 2 The nature of tiger commodity types consumed in Bangladesh.

Commodity	Value in USD	Purpose	Consumers and consumption centers
Ornamental tiger skin ($n = 163$)	$15,120–$17,450 per skin	As a symbol of prestige that is often gifted	Elite local Bangladeshis in Dhaka, Sylhet and Chattogram
Ornamental bones ($n = 163$)	$581–$1160 per kg	As showpieces	Local elite within Bangladesh (in Khulna, Dhaka, Chattogram and Sylhet)
Tiger bone powder ($n = 11$)	$1163–$1745 per kg	Wine and tonic for physical power	Elite local and international Bangladeshis and Bangladeshi expatriates, especially in the United Kingdom. Local communities in Myanmar and India
Tiger canine amulet ($n = 40$)	$230–$350 per canine	Source of energy and courage and to keep away evil spirits	Elite local and international Bangladeshis and local tribal community members in Khulna, Dhaka, Chattogram and Sylhet, Chattogram Hill tracts
Tiger meat ($n = 12$)	$60–$120 per 10 grams (dried)	For energy and increasing body weight	Local tribal community members in Sundarbans fringe communities and local majority communities
Tiger hair ($n = 19$)	$35–$58 per gram of hair	As a symbol of power to keep away evil spirits and reduce waist pain for both men and women	Local tribal communities living around the Sundarbans, Chattogram and Sylhet
Tiger claws ($n = 40$)	$117–$175 per claw	As a symbol of power used in pendants and amulets	Local communities of Bangladesh in Khulna, Dhaka, Chattogram, Sylhet and Bangladeshi diaspora
Tiger milk ($n = 2$)	$233–$350 per 100 grams	To increase milk production in pregnant women	Local communities of Khulna, Chattogram, Cox's Bazar, Chattogram Hill tracts, Sylhet and Bangladeshi Diaspora in Overseas

stable and guaranteed markets ($n = 20$). Specifically, 13 interviewees reported that Bangladeshi expatriates in London consumed tiger products exported from Bangladesh through Sylhet airport. Our interviews indicate that much of the trade between elite and international consumers are managed by Bangladeshi traders with strong international connections in Dhaka, Sylhet, Khulna and Chattogram ($n = 17$). These individuals are described by interviewees as owning logistics companies and, in some cases, holding licenses for legal wildlife export–import.

4 | DISCUSSION

To the best of our knowledge, this study provides the most comprehensive account to date of the tiger trade through Bangladesh. We suggest that the country plays a much more significant role in the global trade of tiger parts than previously recognized, a pattern that had been obscured due to fragmented seizure and enforcement records. Furthermore, this is the first instance reported of Bangladeshi imports of tiger products for consumption by an emerging group of nouveau riche and Bangladeshis exporting tiger consumption habits abroad.

A database on the illegal trafficking of tigers in the country was generated by consolidating seizure records from the BFD and using publicly available records of the trade in the country since 2016. Being a priority tiger conservation country, the records of tiger related law enforcement and seizures should be same in each of the government records, news reports, NGO reports and other international monitoring databases. However, international databases (such as the Wildlife Trade Portal) only listed six incidents between 2016 and December 2021, while news outlets reported nine. This suggests authorities lack the data and that there is a gap in tiger crime information (although it is unclear if this data represents all their data), which had prevented a clear understanding of trade. Furthermore, of the 14 enforcement records of tiger crime used in this analysis, all except one occurred in Khulna Division and involved trade in Sundarbans tigers. A solely seizures-based analysis would therefore not have detected Bangladesh's role as an importer of tiger products from three source populations in India and Myanmar.

While our approach aimed to achieve more representative sampling aligned with the place of enforcement records, our research produced a similar concentration of interviewees concerning trade from the Sundarbans and Dhaka (72% of interviewees). Nevertheless, interviews revealed that trade took place in at least 14 ports, two unregulated border crossings, and across eight towns and domestic consumption centers, emphasizing the need for better documentation and representation throughout the nation. Tigers are a protected species and Bangladesh has ratified CITES, Global Tiger Recovery 2010 Program and the 2030 Agenda (GTI Secretariat, 2010; Bangladesh Forest Department, 2016) and has the institutional infrastructure (e.g., the Wildlife Crime Control Unit) to address the trade in illegal wildlife products. Creating a centralized open database following the guidelines of Tigernet (https://www.tigernet.nic.in) could be a crucial first step to gain a better understanding to counter the trade domestically and internationally.

The primary findings of our study revealed that the majority of the illegal trade that we could collate information on occurred across land borders with India and Myanmar. It included trade from important tiger conservation landscapes such as the Sundarbans, Namdapha (Royal Manas), Kaziranga (Garampani), and the Northern Forest Complex. The four main domestic trade routes identified appeared to be linked to well documented hotspots for illegal wildlife trade in India, such as Kolkata, Guwahati, and Siliguri (Guha, 2021; Stoner & Pervushina, 2013; Utermohlen & Baine, 2018; Wong & Krishnasamy, 2019, 2022). Interview records provided strong support for the routes between Kaziranga/Manas (India) and Sylhet Division of Bangladesh, and Southern West Bengal (India) to Khulna (Bangladesh) (Figure 1). Interview records also helped us to identify trade routes between Dhaka—Rangpur Division-Northern West Bengal (India) and Myanmar Chattogram Division (Figure 1), and further highlighting the need for better detection and documentation of the trade. In addition, our interviews enabled us to identify several key enabling factors for this transboundary trade. These included the porous border with India and Myanmar, weak border enforcement at the land ports, ethnic and linguistic similarity, familial ties, and a cross-border economy.

Efforts to reduce tiger trafficking could benefit from adopting an approach based on Problem-oriented policing (POP) (Goldstein, 1979) in which specific trafficking problems are identified, analyzed, and interventions tailored to reduce them are evaluated for impact. A distinction between POP and other police approaches is that it is tactic-agnostic while emphasizing crime prevention, allowing practitioners to broaden the range of crime reduction tools they consider. A POP approach could complement and help refine existing broad-scale counter-trafficking initiatives. Examining each problem's criminal opportunities and motivations allows teams to pinpoint where interventions could be applied to prevent crime. Implementing a problem-oriented approach to wildlife

protection requires several key elements to be successful (Lemieux & Pickles, 2020) particularly including greater investment in information collection and analysis. Based on the information provided by interviewees and the study conducted by Uddin et al. (2022) and Saif et al. (2016) 12 specific tiger trafficking problems were identified (based on different protagonists and methods: Supplement S5) and two major groups of consumers. These add to previously described tiger trade problems in Bangladesh, including Sundarbans tiger poaching (Uddin et al., 2022) and local consumption problems (Saif et al., 2016). Specific tiger trade problems identified to date include poaching Sundarbans tiger by facultative specialist teams and poaching Sundarbans tiger by irregular opportunists (Uddin et al., 2022). These trade-related problems include a variety of routes and methods, which require case-by-case interventions. Specific problems are easier to solve through interventions which can be much more targeted, objectives clearer and evaluation more precise (Scott, 2015) (Figure 3).

According to our analysis, tiger products and parts have been exported to at least 15 countries since 2016. During this period, the nation's infrastructure and international trade links underwent rapid development. The country's fast-growing economy is primarily driven by exports, which facilitated enhanced trade connections (Ali Riaz, 2016). For example, the number of passengers carried by air has quadrupled from 1.5 million in 2011 to 6.3 million by 2019, and container port traffic and shipping connectivity have doubled during that timeframe (World Bank, 2022a, 2022b). Bangladesh is now better connected to overseas markets, opening opportunities for traffickers. In addition, some recent developments, including the Chattogram deep seaport, has been supported by the Belt and Road Initiative (Fahmida Khatun, 2020). In 2016, Bangladesh and China signed eight projects worth more than $9.45 billion with China's assistance, including the Special Economic Zone (SEZ) and Chinese Economic and Industrial Zone (CEIZ) in Chattogram employing over 95,000 Chinese nationals (Fahmida Khatun, 2020). In light of previous research indicating that Chinese development projects and the Belt and Road Initiative, in particular, pose a significant risk of carnivore poaching for body parts (Farhadinia et al., 2019; Fiona Macleod, 2013; Morcatty et al., 2020), exposure of potential tiger consumers to poachers in a country where there are tigers, can greatly shorten the supply chain. An example of this threat was highlighted recently by the arrest of a Chinese national at Dhaka airport for smuggling tiger bones to China (BI Report, 2021). Furthermore, our interviews revealed that local traders approached Chinese, Indian, and Malaysian

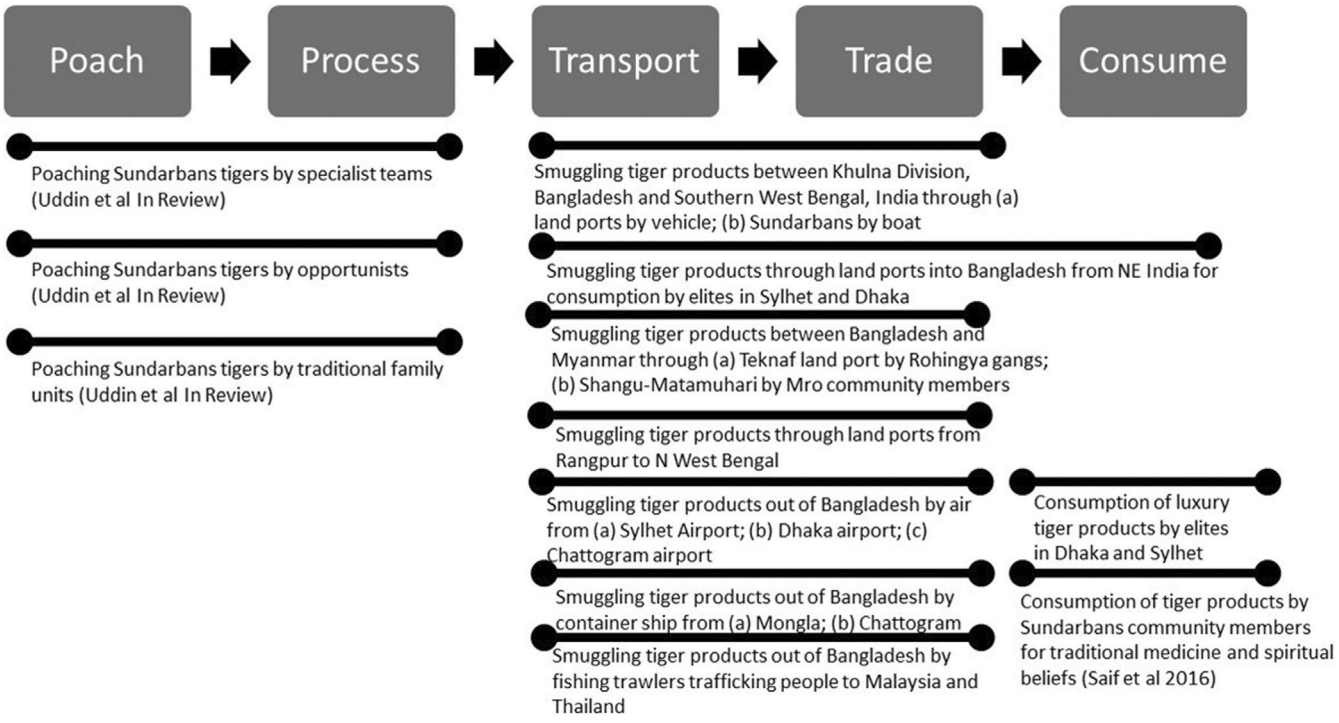

FIGURE 3 Classification of 12 specific Bangladesh tiger trade problems along the wildlife crime continuum. *Source*: Adapted and updated with permission from Lemieux and Pickles (2022).

workers working at ports and industrial developments in around Sundarbans, such as Mongla Port, Rampal Power Station, and Mongla Silo, to supply tiger products—a finding supported by research examining the poaching of tigers in the Bangladesh Sundarbans (Uddin et al., 2022). Bangladesh is a member of South Asian Wildlife Enforcement Network (SAWEN) thus could work with its neighbors, and with INTERPOL to strengthen transboundary collaboration, intelligence sharing and enforcement activities to bridge some of these enforcement gaps.

Lastly, one key result of our study was the identification of the rising elite of Bangladeshi consumers both domestically and internationally and the exportation of consumption habits to other countries. A previous study highlighted the consumption patterns of tiger products in the country, focusing on the local usage among communities on the fringe of the Sundarbans (Saif et al., 2016). Saif et al. (2016) observed a widespread belief in the medicinal properties of tiger products, and a growing desire for a variety of products designed to increase virility, prowess, personal beauty and fortune. In contrast, we found that among the elite Bangladeshi population both international and domestic, expensive luxury items were purchased either as status symbols or as gifts or for employers to solicit promotion. According to traders interviewed, sales to elite local urban consumers have increased over the past 6 years, with at least nine interviewees indicating that, prior to 2016, Tiger parts were sold to India, China, and Myanmar, but now they are receiving orders from wealthy individuals in Dhaka. With the rising Gross Domestic Product and the rapidly increasing number of high-net-worth individuals, our study has identified a possible shift in the market. There have already been similar trends in consumer demographics in other countries (Dang Vu & Nielsen, 2018; Davis et al., 2020), even driving demand, prices, and poaching pressures in source sites far from consumption centers (Linkie et al., 2018). Based on this analysis, Bangladesh's demand for tiger products is influencing poaching in critical tiger habitats in neighboring India and Myanmar.

4.1 | Meeting the interception shortfall

Addressing the low rate of interception and reporting of tiger products by enforcement agencies is a priority. Moving forward, detection capacity at land, sea and airports will need to keep pace with expanding transport infrastructure and traffic. Alongside this, mechanisms are required to protect and dissuade staff from soliciting bribes. Encouraging and empowering members of the public to report illegal activity, particularly in the rural border areas will be needed to identify where illicit trade is occurring, as a basis for efforts to prevent further illegal trade.

4.2 | Better trafficking metrics, more robust evaluation of interventions

Stronger evaluation of how effective various counter-trafficking interventions are, is needed. Metrics to infer trends in tiger poaching, product flow, and consumption for each of the distinct problems could involve greater use of interviews with convicted and active offenders and specific community groups. For example, examining the ratio of incidents of tiger product seized to incidents of tiger product successfully crossing a border (Utermohlen & Baine, 2018) provides a better appraisal of detection performance than seizure counts alone and can be scaled to division or individual port level. Alternatively, carefully controlled penetration testing provides a means of assessing detection performance (e.g., Van Doormaal et al., 2021).

4.3 | Resilient transboundary communities

Members of local communities play an essential role in wildlife crime prevention by establishing compliance norms and dissuading rule breakers (Whitcomb-Tavey et al., 2018). Other mechanisms to reduce demand for tiger meat include strategies which recognize gender dynamics in trade (Seager, 2021), and reflection of such dynamics could facilitate effective trade interventions, and our interviewees (in a community focus group held in Nov 2021) suggested that if women refuse to cook bushmeat, their husbands and children generally abstain from bushmeat consumption.

Transboundary communities straddling porous international borders present distinct challenges in controlling illicit trade. The three border regions between tiger source populations and consumption centers play fundamental roles in cross-border trade. Investing in research to understand the nature of community engagement in illicit transboundary trade and identifying options to work with these communities to encourage compliance would also help reduce various crime types.

4.4 | Focused demand reduction

Demand reduction targeting high volume consumer types must form part of a national strategy to counter trade. But, again, this strategy should be specific, rather

than a general attempt to influence the general public (Veríssimo et al., 2020). Elite Bangladeshis both within and outside Bangladesh are an important market to monitor, but further research about this group's consumption habits and motivations are needed to guide tailored interventions. This provides a target for NGOs, academics and government to collaborate. However, specific local demand reduction in Bangladesh could also be achieved by following CITES five steps process of demand reduction for wildlife products including "(a) Identifying the species and types of consumption behaviour to change; (b) Identifying the audience segment to target; (c) Identifying the most effective approaches to reduce demand; (d) Identifying messages and messengers to effectively deliver the message and implement, evaluate and refine measures" (CITES, 2021).

5 | LIMITATIONS

Although we are confident that the picture of the tiger trade emerging from our findings is more accurate and comprehensive than relying on seizure data, the patterns described depend on the knowledge of individuals interviewed and their awareness. For instance, it is notable that routes emerging from the Sundarbans were emphasized, in contrast with other parts of Bangladesh, where fewer interviewees were identified. Thus, the absence of data from other border crossings should not necessarily indicate a lack of trade. Given that our direct sampling was limited to Bangladesh, we could not determine the extent of overland trade routes connecting India and Myanmar to other destinations. Furthermore, we were unable to estimate volume to destination countries or identify priority trade routes, as it would be risky to extrapolate the relative volume of traded products based on the frequency of reporting by interviewees. We can nevertheless glean broad conclusions from patterns observed in our data, and we can make recommendations that assist in better understanding and mitigating threats to tigers that result from the trade.

6 | CONCLUSION

Bangladesh is a key country for countering the global trade in tiger parts in the next decade, playing a hitherto underestimated role in trafficking and consumption. Our findings of a complex web of trade connections sourcing from four tiger conservation landscapes appears daunting in complexity, however each of the specific tiger trafficking problems identified here relies on exploiting specific criminal opportunities, and presents a target for tailored counter-trafficking actions. This study also illustrates the value of using diverse sources to understand a complex wildlife trafficking problem.

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DATA AVAILABILITY STATEMENT

Supporting data is provided in appendices.

ORCID

Nasir Uddin https://orcid.org/0000-0003-3227-6506
Rob S. A. Pickles https://orcid.org/0000-0003-1756-3275
Alice C. Hughes https://orcid.org/0000-0002-4899-3158

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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