



Original research article

Illegal pangolin trade in northernmost Myanmar and its links to India and China



Mingxia Zhang^{a,b,*}, Ana Gouveia^b, Tao Qin^{a,c}, Ruichang Quan^{a,b,*}, Vincent Nijman^d

^a Southeast Asia Biodiversity Research Institute, Chinese Academy of Sciences, Yezin, Nay Pyi Taw, Myanmar

^b Centre for Integrative Conservation, Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences, Yunnan, 666303, China

^c Kunming Institution of Zoology, Chinese Academy of Sciences, Yunnan, 650223, China

^d Oxford Wildlife Trade Research Group, Oxford Brookes University, UK

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ABSTRACT

The northern Myanmar region has been identified as a potential transit and source place for the illegal trade of pangolins and their scales. In this study, we surveyed the trade links between Kachin State (northern Myanmar) and China and Kachin and India based on interviews, market surveys and online seizure data. From our results we cannot extrapolate that there is a link between Myanmar and India. Based on the results from interviews (17 of 38), we found that around 140–168 pangolins/year are smuggled into China via three different routes from Kachin to China. Scales are the most traded parts of pangolins in this part of Myanmar. Based on the online sources, 30 seizures of pangolin and their products were made on the Kachin–China route during 2010–2016, with all seizures made on the Chinese side of the border. We thus, recommend an increase in law enforcement on the Myanmar side, with focused effort at identifying trade hubs and deterring wholesalers. We further suggest investigating possible trade links between Kachin and other source areas. We recommend, a reclassification of the pangolins' protection status in China from a Class II to a Class I Key Protected Species, and the prohibition of the use of pangolins' scales for Traditional Chinese Medicine.

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1. Introduction

Pangolins (genera *Manis*, *Phataginus* and *Smutsia*), a once obscure taxon with limited conservation or conservation policy importance, have become one of the best known examples of the illegal transnational wildlife trade, alongside elephants, tigers and rhinos. The international trade, and to a lesser extent, the domestic trade of pangolins is now recognized as the most significant impediment for their conservation, for both Asian and African species (Bowen-Jones and Pendry, 1999; Chaber et al., 2010; Baillie et al., 2014; Pantel and Chin, 2009; Shepherd, 2009; Nijman, 2015a,b; Heinrich et al., 2016). Pangolins' meat is considered a delicacy and their scales and other body parts are used in the traditional Asian medicine, allegedly, used to cure a range of diseases and supposedly, increases wealth and larger disposable incomes. In both China and Vietnam, these fabled benefits have caused a significant increased exploitation of the species in the last few decades (Challender and Hywood, 2012; Chin and Pantel, 2009). Nijman et al.'s (2016) overview on the pangolin trade in Myanmar

* Corresponding authors at: Centre for Integrative Conservation, Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences, Yunnan, 666303, China.

E-mail addresses: zhangmingxia@xtbg.org.cn (M. Zhang), quanrc@xtbg.ac.cn (R. Quan).

Table 1

International and domestic regulations of pangolins (*Manis* spp.) in Myanmar and China. Key: ¹ = CITES (2017), ² = Win Naing (2008), ³ = NPCSCC (1988).

Source	Protect level	Note
CITES Appendix	CITES I	All commercial international trade banned ¹
The Protection of Wildlife and Protected Areas Law, Myanmar	Protected	License required (killing, hunting/wounding and exporting) ²
Law of the People's Republic of China on the Protection of Wildlife	Class II	License required (killing, transportation and selling) ³

indicates that this country is increasingly being used as a gateway for the trade from South Asia into China. Mohapatra et al. (2015) reviewed the illegal trade of pangolin in India, and found that some pangolin's products were smuggled through Northern Myanmar into China. Both the aforementioned studies demonstrate the strong trade links between Myanmar and China.

Two species of pangolin occur in Myanmar, the Sunda pangolin, *Manis javanica*, and the Chinese pangolin, *Manis pentadactyla*, and close to the Indian border possibly the Indian pangolin, *Manis crassicaudata*. Both the Sunda and the Chinese pangolin are listed as Critically Endangered on the IUCN Red List (Challender et al., 2014a,b), while the Indian pangolin is listed as Endangered (Baillie et al., 2014). In addition, all 8 pangolin species were elevated to Appendix of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) on the 17th meeting of the Conference of the Parties of CITES (Nature World News, 2016). In both Myanmar and China all pangolin species are protected by national laws and the domestic trade is banned or regulated (Table 1).

The combination of both laws and regulations, imply that all trade on pangolins and their parts within Myanmar and across the border is illicit. In China, pangolin scales presented in stockpiles can be used as Traditional Chinese Medicine (TCM) when labelled accordingly (CSFA, 2007), and they can be sold in 700 designated hospitals. But the scales were traded illegally in markets. Xu et al. (2016) found scales being sold in 62% (68 out of 110) of TCM retailers shop and 35% (73 out of 209) in TCM markets.

In recent years, Myanmar has made substantial progress in its political democratization. The reconciliation with the democratic opposition, the lifting of most of the financial sanctions by the West, and an improved relationship with the country's ethnic minorities has contributed to a dramatic change at the political, financial and economic levels. As of early 2014, only the Kachin Independence Army has been engaged in armed conflict with the government (Sun, 2014). Although the Kachin Conflict continues to hamper biodiversity conservation efforts in the State, recent progress has been made and an increased body of research and conservation teams are now allowed to work in the area. During December 2015–January 2017, the Southeast Asia Biodiversity Research Institute, Chinese Academy of Sciences (CAS-SEABRI), the Hponkan Razi Wildlife Sanctuary (HRWS) and the Forest Research Institute (FRI) of Myanmar jointly performed three general biodiversity surveys in Hponkan Razi Wildlife Sanctuary and Hkakabo Razi National Park, in the Putao area, northwest part of Kachin state in Myanmar. The first, third and fourth authors joined the surveys, and there was no need to be escorted by the army during the field season.

Here, we give an overview of the pangolins' trade in the study area. This area is close to both the Indian and the Chinese borders. Our data comes from a combination of field based interviews and online seizure data, and focuses on the links between China, Myanmar and India. Furthermore, we investigated which are the main traded pangolins' products and the conservation gaps in this area. We conclude, by suggesting possible ways to improve and establish suitable conservation laws and policies in order to protect these highly endangered species.

2. Methods

2.1. Study area

This study was conducted in Hponkan Razi Wildlife Sanctuary, south area to Hkakabo Razi National Park and surrounding regions in Putao, northwest of Kachin state, with a total area of around 5000 km², the elevation ranges from 400 to 3600 m asl. The local forests comprise subtropical rainforest, temperate rainforest, mixed deciduous forest, and bamboo-rhododendron forests (Renner et al., 2007). We have gathered evidence that *M. pentadactyla* occurs in this area, since it was captured by camera trap in the Hukaung valley, located at the southern part of our study area (Hla Naing, 2015), and also suggested by Challender et al. (2014a).

There are a diversity of local ethnic groups in this area, with the main ones being Lisu, Rawang, Kachin, Kayin and Shan, with a total population of around 6000 people (Renner et al., 2007). We have visited eight villages during the survey, Namse (30 households of Lisu ethnicity), Shang Guang (200 households, mostly of Rawang and some of Lisu ethnicity), Wasadam (24 households mostly of Rawang, and some of Lisu ethnicity), Ziadam (30 households of Rawang ethnicity), and Namhtomkhu (200 households of Lisu ethnicity), Katu (50 households of Rawang ethnicity), Naung Mung (1000 inhabitants of Lisu and Rawang), Gawlai (30 households of Rawang ethnicity).

2.2. Interviews and market survey

During our three field surveys, we performed semi-structured interviews (see questionnaire in [Appendix](#)) on the occurrence of and trade in pangolins, particularly, where it pertained to trade routes to and from India and China. In total, we have queried 38 people from eight different villages (3 from Ziadam, 4 from Wasadam, 1 from Namse, 1 from Namhtomkhu, 2 from Naung Mung, 2 from Gawlai, 7 from Katu and 18 from Shang Gaung). Of these 32 belonged to the Rawang ethnic group, three Lisu and three of unknown ethnicity. These included our field guides, some local villagers and villages' directors. In total, we have hired 90 field guides during the three field surveys, and we have only interviewed those who had a wide general knowledge of wildlife. We have also interviewed the villages' directors as they have detailed information of their people's life style and income. All the interviewees were male, with an age range of 20–60 years, and all could potentially be hunters in the trade chain. All discussions were held in Burmese, with the assistance of three HRWS's staff members and one FRI's staff (with a good spoken level of English). Taking into account the sensitivity of the subject, no question directly linked with the interviewee's involvement in the trade were asked, and no records were made during the interviews, but a short summary was subsequently written. After we obtained information on the trade routes out of Myanmar and into China from the aforementioned interviews, two volunteer were sent to confirm the trade routes in both Nabang and Yingjiang towns, on the Chinese side of the border, Yunnan province, bordering Liza in Myanmar. A third volunteer was stationed in the Qunatong village, Bingzhongluo of Gongshan, bordering Makung Ghang and Hkaung Lan Hpu. From April to June 2016, they have obtained information from ten people in total (4 from a local market, 1 pharmacist, 1 petrol station's staff, 1 restaurateur, and 3 local villagers). The reduced number of confirmations is mainly due to the fact that people are reluctant to talk about the illicit trade.

Additionally, we also visited five markets in Putao from December 21st 2015 to the 2nd of January 2016, and from 15th to 20th of May 2016; the largest market, with over 100 shops, located in the town centre was visited 15 times, the second largest 3 times and the other three (morning) markets were each visited once.

2.3. Secondary sources

We have reviewed the available Internet-based literature for records of the pangolins' trade. We have selected data indicating Kachin as a source, a destination or a transit area, during the relevant period of June 2010 to June 2016 in the pertinent area of Kachin and its neighbouring districts of Baksa (Assam), Nujiang Lisu Autonomous Prefecture, Baoshan Prefecture and Dehong Dai Autonomous Prefecture (Yunnan). We have searched information from 2005 onwards, but most seizure reports found were only after 2010, despite the arguably short period, we think that six years is a long enough period to capture the main trade information in the tri-border area. We used "pangolin", and the relevant county' names, (e.g. "Ruili", "Lianghe") as keywords on both Google and Baidu (the most common search engine in China) to search for pangolins' seizure data. The prices were recorded in Myanmar Kyat (MMK) and Chinese Yuan Renminbi (CNY), and then converted to US dollars using the exchange rate in effect at the time of the recording (MMK 1 = US\$ 0.0008, December, 2015; CNY 1 = US \$0.154, December, 2015).

3. Results

3.1. Interview and market survey

All informants ($n = 38$) were aware of the illegality of the pangolin trade (without perhaps necessarily being aware of the taxon's specific legal and regulatory status), but, all of them acknowledged that the trade still occurs in the Putao area of Kachin. All 38 informants were unanimous in their assertion that the trade of pangolins is either confined to Myanmar or, more commonly, that it is between Myanmar and China, but not between Myanmar and India. One informant mentioned that there is a trade of musk (from musk deer) between India and Myanmar. In five of the villages, 14 informants (37%) observed several pangolins' burrows in the period of one year. In the village of Wa Sa Dam, one informant (3%) confirmed that in 2015 four to six pangolins were caught and the scales were sold. Furthermore, three informants (8%) mentioned that the pangolins were caught using traps near the pangolins' burrows, or ant nests known for their relationship with a certain species of mushroom, with all of them being within 7 km from the village. One of the informants (3%) showed us a pangolin's claw. Eight informants (21%) indicated that pangolins' meat is consumed locally and the scales are smuggled through the border into China. Eight informants (21%) were able to provide information on the monetary value of pangolin scales, quoting a price of =US\$190–290/kg when sold to vendors. Based on 17 (45%) interviewees' answers, we have identified three routes for the pangolin's trade. In the west of Putao, pangolin scales are collected from A Wa Dam and Shang Gaung by vendors, and subsequently sold to the wholesalers in Putao. In Shang Gaung, for example, one vendor can collect around 7 kg of scales per year. One pangolin has approximately 500 g of scales ([Zhou et al., 2012](#)), and thus on average one vendor sells the scales of 14 pangolins per year. Generally, there are 5–6 vendors working for one wholesaler, and informants indicated that there are at least two large wholesalers in the Putao area (one is Kayin and the other of unknown ethnicity). If these figures are indeed representative of the region, this then amounts to approximately 70–84 kg of scales (from around 140–168 pangolins) being traded each year. The products coming from Putao then make their way to Makungkan (across the border at border marker

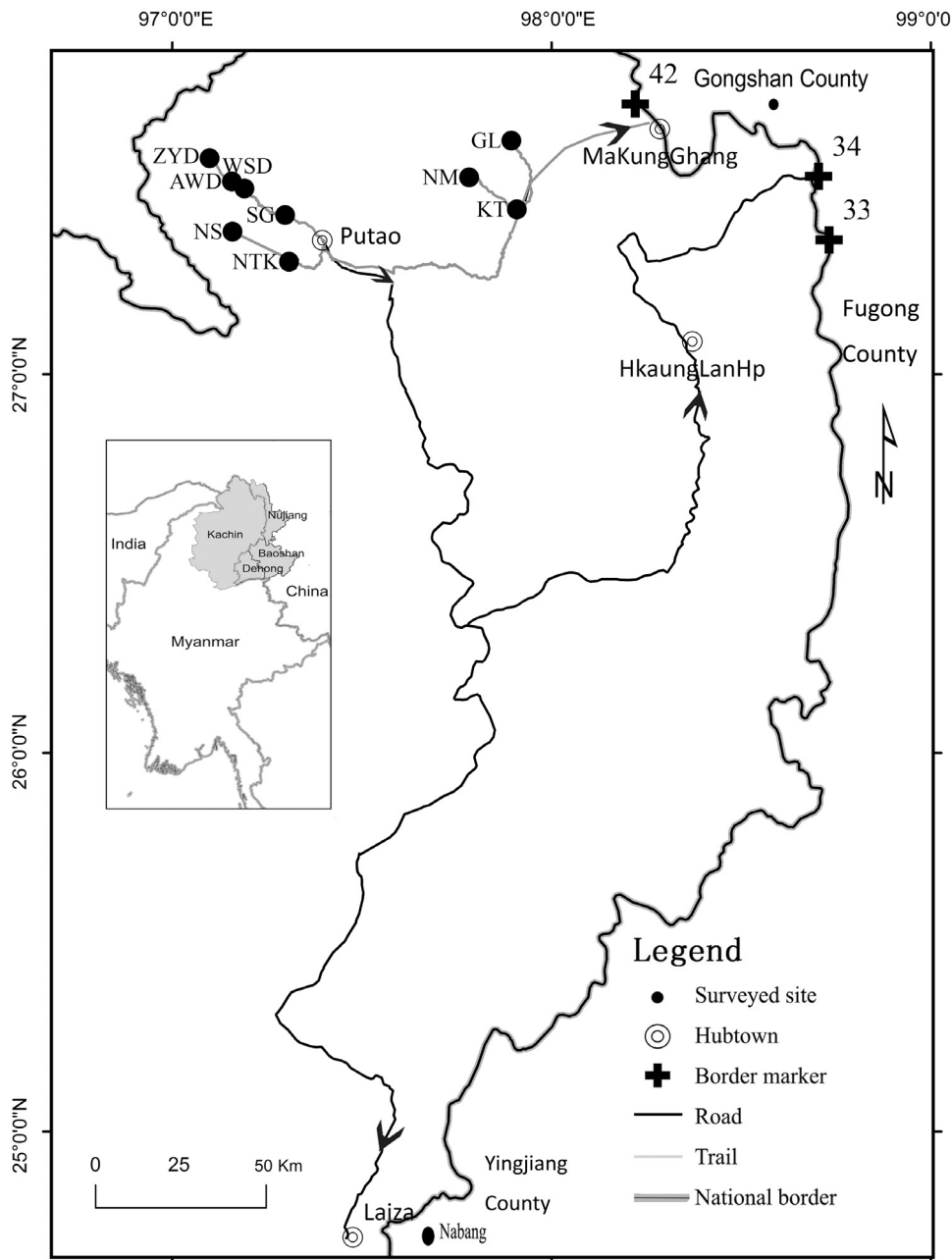


Fig. 1. The routes of the pangolin's (*Manis* spp.) trade from Kachin, northern Myanmar into China. AWD = A wa dam; NS = Namse; SG = Shang Gaung; WSD = Wasadam; ZYD = Ziadam; NTK = Namhtomkhu; KT = Katu; GL = Gawlai; NM = Naung Mung (part of the GIS data downloaded from <http://www.diva-gis.org/> and <http://ngcc.sbsm.gov.cn/>).

No. 42), Shing Hkong of HkaungLanHpu (across the border between border marker No. 33 and No. 34) or Liza on the border with China. In the east of Putao, pangolin scales are directly transported from local villages to Makungkan. (Fig. 1.)

The only other present information on the pangolin trade around our study area is from Nijman (2015b) who compiled information from surveys conducted between February 2010 and March 2014 in the Imawbum Mountains, around 150 km southeast of our study area. He reported, that on 15th of March 2014 near the town of Chibwe a local villager was observed carrying a Chinese pangolin, most likely caught locally. High-value wildlife from Chibwe is mostly smuggled into China via the Makungkan border crossing.

Furthermore, two informants (5%) mentioned that other wildlife is traded together with pangolins' scales along the same three trade routes; including gibbons' carcasses, bears' gall bladders, turtles, tortoises, and orchids.



Fig. 2. A pangolin's leg for sale at the Putao market, Kachin State, Myanmar in December 2015.

We have observed two impressed tortoises *Manouria impressa* and a keeled box turtle *Cuora mouhotii* and two *Cyclemys* spp. being traded during the survey. In the markets, we witnessed wild meat allegedly from mainland serow *Capricornis milneedwardsii*, wild boar *Sus scrofa* and barking deer *Muntiacus* spp. We have also observed the leg of a macaque *Macaca* spp., half a carcass of a gibbon (almost certainly eastern hoolock gibbon *Hoolock leuconedys*), the body of a kalij pheasant *Lophura leucomelanos*, two pangolin legs (either Sunda or Chinese pangolin) were also found in the Putao market on December 21st 2015 (Fig. 2). The informants also stated that pangolins' scales were sold underground at the Putao's airport, priced at ~US\$130/kg.

On the Chinese side of the border, all the informants in Yingjiang and Gongshan counties were fully aware that trade in pangolins and their products is illegal and that sanctions are in place. No pangolins or their scales were observed during the surveys. Six interviewees (60%) indicated that Liza town, on the Myanmar side of the border, as the right place to buy both pangolins and their scales. This was further supported by a restaurant owner who informed us that if one puts down a deposit she can order pangolin scales from Liza, priced at ~US\$500/kg. She further informed us that one can choose between two types of pangolin scales, i.e. "copper scales" and "iron scales". "Copper scales", are lighter in colour than "iron scales" and they are slightly more expensive. One informant from Gongshan county informed us that a villager in Qinlangdang (bordering town of Makungkan) was caught in 2015 smuggling pangolin scales and was consequently arrested.

3.2. Online information

We found two records of pangolin seizures in Assam in the last six years, both in the Assam's capital, Guwahati (Sharma, 2014). The first, on the 16th of June 2010, involved 550 kg of scales seized at the Guwahati International Airport. According to India's Wildlife Crime Control Bureau, these scales were most likely to be smuggled into Myanmar's Sagain Region through the Indian border town of Moreh (Manipur State). From there they would then be taken into China (Sharma, 2014); no link to Kachin State has been implied. The second seizure, recorded on the July 17th 2013 consisted of 85 kg of scales, bound to China via Myanmar, but no information is available on the trade route and whether or not there would have been a link to Kachin.

We further found data from 30 seizures from Nujiang Lisu Autonomous Prefecture, Baoshan Prefecture and Dehong Dai Autonomous Prefecture, all in China. During June 2010 to June 2016, 189 pangolins (alive or dead) and approximately 2155 kg of scales were confiscated in these three prefectures. The largest amount, 1461 kg of scales and 42 alive or dead pangolins was confiscated in 2011, with one seizure (340 kg of scales) from Kunming; one (1 metric ton of scales) from Ruili and two (120.7 kg of scale and 42 live animals) from Yingjiang (Table 1). Four seizures were made in Ruili, Dehong Prefecture, including the largest on record (i.e. 1 metric ton of scales). There were 6 seizures in Lianghe and five seizures in Longchuang, also located in Dehong Prefecture, demonstrating the importance of this prefecture for the pangolin trade as a gateway into China (see Table 2).

Amongst the 30 seizures, 16 cases were caught on the way from Myanmar to China, and 11 cases were likely within China, both the pangolins and/or their scale were transported from Nujiang and Dehong Prefectures to other provinces such as Anhui, Henan, Guangxi and/or Yunnan (including Kunming and Tengchong), or traded locally. There was no information about the trade routes for the other three seizures.

Table 2

Seizures of pangolins and pangolin's scales in the period of June 2010 to June 2016 in the Nujiang and the Dehong Prefecture of Yunnan, China.

Date	Volume	Location	Other species/product reported	Route	Source
06/07/10	21 alive, 13 dead	Kunming		Liuku, Nujiang–Kunming	Yunnan News (2010)
28/11/10	280 kg scale	Ruili, Dehong	Mixed with plant TCM	Myanmar–Ruili	Netease News (2010)
16/12/10	11 alive	Houqiao, Baoshan		Kampaiti, Myanmar–Houqiao	Chinese Court News (2010)
08/06/11	340 kg scale	Kunming	Raptors, reptiles, mammals specimen and products	Myanmar–Ruili–Guangxi	Yunnan News (2011a)
07/11	1000 kg scale	Ruili, Dehong	Mixed with CD	Myanmar–Ruili–Henan	Yunnan News (2011b)
13/07/11	120.7 kg scale	Yingjiang, Dehong	Mixed with plant TCM	Yingjiang–Techong	China News (2011)
24/11/11	42 alive	Techong, Baoshan		Longchuang–Tengchong	Netease News (2011)
02/06/12	76 kg scale	Lianghe, Dehong; Tengchong, Baoshan	Leopard's & tiger's bone and poppy seeds	Not available	Yunnan, C.N., (2012)
07/12	2 alive	Longchuang, Dehong	Plant and slow loris	Not available	Long chuang News (2012)
25/12/12	1.5 kg scale	Lianghe, Dehong	Gekko, elephant's skin; deer's antler; Saiga's horn	Within China	Dehong News (2012)
10/07/13	0.1 kg scale	Houqiao, Baoshan	Bear's gall bladder	Myanmar–Houqiao	Chinese Custom News (2013)
29/09/13	189.73 kg scale	Longchuang, Dehong		Within Longchuang	Dehong News (2013a)
26/11/13	6 alive	Longchuang, Dehong		Myanmar–Longchuang	Dehong News (2013b)
13/01/14	42 alive	Lianghe, Dehong	<i>Indotestudo elongata</i> ; <i>Cyclemys dentata</i>	Dehong–Kunming	Yunnan Police News (2014)
16/02/14	2.72 kg	Houqiao, Baoshan		Myanmar–Houqiao	Ifeng News (2014a)
05/14	2 alive	Shaba, Baoshan		Shaba–Lijiang	Baoshan News (2014)
19/05/14	3 alive, 1 dead	Dali	Bear's paw	Techong–Kunming	Ifeng News (2014b)
06/14	6 alive	Lianghe, Dehong	Elephant's skin	Myanmar–Lianghe	Legaldaily News (2014a)
26/08/14	4 alive	Houqiao, Baoshan		Myanmar–Houqiao	Chinese Custom, News (2014)
11/14	1.29 kg scale	Longchuang, Dehong	Elephant's skin, porcupines' spines, wild boar's meat	Locally	Dehong News (2014)
19/12/14	7 alive, 2 dead	Houqiao, Baoshan		Not available	Legaldaily News (2014b)
11/06/15	11 dead, 1.94 kg scale	Longchuang, Dehong	Plant, elephant's skin, owl, macaque	Locally	Dehong News (2015a)
15/7/15	2 pieces of scale	Ruili, Dehong	Tiger's bone, ivory, rhino's horn, fake ivory	Myanmar–Ruili	Dehong News (2015b)
06/08/15	11 dead	Wanding, Dehong		Myanmar–Ruili	China News (2015)
11/09/15	2 alive	Lianghe, Dehong		Myanmar–Lianghe	Aiwei News (2015)
14/01/16	1 alive	Shidian, Baoshan		Not available	Baoshan News (2016) ^a
21/01/16	96.9 kg	Tengchong, Baoshan	Bear bile, porcupine spine	Myitkyina–Tengchong	Xihua News (2016)
28/02/16	1 dead	Mangshi, Dehong	Wild boar, muntjac, rhino's horn, animal gall	Myanmar–Mangshi	China News (2016)
16/06/16	42 kg scale	Ruili, Dehong		Myanmar–Ruili–Anhui	Dehong News (2016a)
29/06/16	3 kg scale	Lianghe, Dehong		Myanmar–Lianghe	Dehong News (2016b)

^a 2016a, the pangolin was bought by a citizen and sent to the forest police.

4. Discussion

As recently covered in the mass media, pangolins are now considered as the “most trafficked mammal in the world” (Sutter, 2016; Actman, 2016). In both Africa and Asia the species are illicitly traded for their scales, as bush meat or for medicinal purposes.

It is clear, from our study that, both domestic and cross-border trade in pangolins continues both within Myanmar and across the border from Myanmar into China, despite of the legal protection from both countries and CITES. We have identified three routes along which pangolins and other illegal wildlife are traded from the Putao region into China, thus allowing for future intervention. The information we obtained from a substantial number of informants, including guides, on both sides of the Myanmar–China border was consistent with respect to their knowledge of the illegality of the trade, the trade routes, and the prices of the most of the commonly traded body parts.

4.1. Topology of the trade

The clear disparity between the number of pangolin's seizures made in Kachin State — zero, and just across the border in Yunnan Province — 30, suggests that the laws and policies that should curb the illegal pangolins' trade in Myanmar are not well enforced thus allowing traders to operate with impunity. The relatively large number of seizures made in China, and the absence of any open trade in pangolins or pangolins' scales may suggest that effective law enforcement has become an impediment to the trade.

Data obtained from the informants and the online seizure data, show that the trade in pangolin's scales is substantially larger than the trade in pangolins' meat or whole pangolins, particularly, due to their use in the Traditional Asian Medicine hence this trade has become one of the main threats to pangolins (Pantel and Chin, 2009). We acknowledge that, because of the non-perishable nature of the scales, it is easier to record this type of trade, especially given the remoteness of the region from where we have collected the data. With the development of better roads, the illegal wildlife trade (including pangolins, bears' parts, turtles, tortoises and orchid) will undoubtedly increase and intensify in the near future.

4.2. Trade links between India, Myanmar and China

The Kachin State borders, could act as a geographic gateway between South Asia and China. If there are links between the pangolins' traders and traffickers between India and northern Myanmar we were not able to obtain any information on the nature of these links. Our study was conducted in Myanmar and it may well be possible that when conducting a similar survey in India, information on pangolins' trade between the two countries may emerge. Links between pangolins' traders in Myanmar's Kachin State and China are clearer; Kachin is a source area for pangolins, perhaps less so at present than in the past.

Although, the precise role of the increasing Chinese diaspora in Myanmar (Poston and Wong, 2016) in the wildlife trade remains unclear, China's increasing influence and investments in the current Myanmar's political and economic issues contributes to the country's development by providing infrastructures and consequently increased trade links, which may in turn facilitate the illegal wildlife trade.

4.3. The road ahead in curbing pangolin trade

The socio-economic function of wildlife products, and price elasticity are complex (Challender et al., 2015), but increasing awareness in China, given the country's prominence in this trade, is vital to control the illegal trade in pangolins.

The potential solutions to control the illegal trade in pangolins need to be addressed in both Myanmar and China. In Myanmar, there are eight departments and agencies involved in the pangolins' conservation (Win Naing, 2008). Ideally, these institutions should collaborate to a greater degree than at present. Joint efforts, especially from the Forest Department, the Custom and Border Trade Department, and the police are needed to effectively protect imperilled wildlife and to curb the illegal trade. In China, a total ban on the pangolins' trade may be difficult to implement due to high demand from TCM practitioners and consumers, and the presence of large TCM companies (Zhang et al., 2008; Zhang and Yin, 2014), although it should not be impossible. A good example is the successful introduction of the total ban on ivory in China by the end of 2017 (The General Office of the State Council of China, 2016). Before the implementation of the total ban, a more reliable labelling system for stocked pangolins' scales should be introduced with immediate effect, in order to close a loophole for confiscated pangolins' scales to re-enter the market. Interventions to curb the trade in pangolins and their scales should be initiated by the Chinese State Forestry Administration in collaboration with TCM Associations. We advocate an elevation of the pangolins' status to Class I Key Protected Species in China as a main priority.

We have estimated the trade volume in the Putao area to be around 140 to 168 pangolins per year, but the seizure data along the Kachin's border suggest it may be substantially higher (the 1.4 ton of scales confiscated in 2011, estimated at 0.5 kg of scales from one animal, imply that these quantities will require at least 2800 pangolins to be killed each year). Kachin is a major source and transit area for the pangolins to be smuggled into China; hence we suggest that future research and surveys focus on uncovering links between Kachin and other source areas in Myanmar or elsewhere in Asia. Similarly, the intensification of monitoring efforts in the Chinese border towns and trade hubs is essential.

Furthermore, our results indicate Putao, Makungkan, HkaungLanHpu and Liza as important trade hubs, hence, taking into consideration the fact that in these areas there are limited human resources, law, policy enforcement, and funding, we recommend a targeted increased enforcement and investment in Myanmar particularly, in these areas and an increased vigilance at the borders. Additionally, we highlight the imperative need to target the wholesalers and that punitive measures are put into practice in order to protect both the pangolins and other targeted wildlife.

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Appendix. Questionnaire used to survey illegal pangolin trade in Putao area, Kachin state, Myanmar

1. When did you last see pangolin burrow?
2. Do local people sell pangolin (and scale) to India?
3. Do they sell pangolin (and scale) to China?
4. What's the price of pangolin scale?
5. Do you know trade route?
6. Do you think it's legal or illegal to sell pangolin and their scale?

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