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Cover: A bag worm with its beautiful heap of junk. Acrylics on 300 GSM paper by Dupati Poojitha based on a picture by Sanjay Molur.



## People perception on use patterns and conservation of Chinese Pangolin in and around Yangoupokpi Lokchao Wildlife Sanctuary, Manipur, India

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**Abstract:** The current study targeted people's perceptions and knowledge regarding the use patterns of Chinese Pangolins among the communities residing in and around the Yangoupokpi Lokchao Wildlife Sanctuary (YLWS). The sanctuary lies at the Manipur border with Myanmar in range of Indo-Burma Biodiversity Hotspot. A pre-structured questionnaire survey was conducted between October 2019 and December 2023 to collect information about the use pattern of Chinese Pangolin by consulting 71 local people, particularly traditional hunters from selected villages. The results revealed the use of Chinese Pangolins in bushmeat, medicine (piles, sore throat, asthma, smallpox, allergy), and social beliefs (to keep termites and ants away from wooden houses, gun proof jackets, sighting pangolins as unlucky). Many respondents lack knowledge on medicinal uses and social belief about the species in the study area. In addition, the treatment of sinuses and the excessive control of saliva in nursing babies by using the scales are the two novel findings recorded. Usage of scales to keep ants and termites away from wooden and bamboo house was common in all communities. Prior to the COVID-19 pandemic in 2020, there was a rising trend in cost of pangolin body parts like scales. The results of this study indicate that the main threats to the conservation of the Chinese Pangolin species in Manipur, especially in YLWS, are mainly due to the traditional uses of the animal and the trade of its scales for medicinal purposes. As the selected species is Critically Endangered worldwide hence requires immediate conservation and management strategies.

**Keywords:** Bushmeat, hunting method, illegal hunting, *Manis pentadactyla*, medicine, scales, socio-cultural belief, Tengnoupa, threatened, trade.

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**Author contributions:** YRZ involved from field work to result discussion, RS and DP involved in data organisation and computation, AK and OPT discussed the result leading to final manuscript.

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## INTRODUCTION

Millions of tons of animals are estimated to be hunted throughout tropical forest regions for wild or bushmeat and trade each year (Bahuchet & Lovea 1999; Fargeot & Dieval 2000; Bodmer & Lozano 2001; Bodmer et al. 2004; Newton et al. 2008; Nasi et al. 2011; Katuwal et al. 2013; Zhang et al. 2017). The large quantities of illegal hunting and poaching are leading several animal species towards threatened categories worldwide, with the majority being large and small mammals (Davies 2002; Holland & Bennett 2007; Challender et al. 2012; Abernethy et al. 2013). The trade amount of pangolin scales was estimated to be in tons, which equals the number of thousands of pangolins (Wu & Ma 2007; Challender & Hywood 2012; Challender et al. 2015; Aisher 2016). Rural tribal people inhabiting in and around the protected area use wild meat and body parts of animals as essential sources of food, medicine, socio-cultural belief, and cash income (Altrichter 2006; Fa & Brown 2009; Challender et al. 2012; Mohapatra et al. 2015; Ingram et al. 2018; Yang et al. 2018; Xing et al. 2020; Sexton et al. 2021). This is especially true for local communities in remote areas, who often depend on natural forest resources for their livelihood. Pangolins are illegally traded in Asia, including Chinese Pangolins (McMurray 2009). Before 1990, the quantity of pangolin consumed for meat, scales, and medicine purposes was relatively small and limited to domestic uses (Van et al. 2009). But, after the early 1990s, the illegal trade of Chinese Pangolin was boosted due to increased demand for meat (Heinrich et al. 2016; Cheng et al. 2017; Zhang et al. 2017; Sharma et al. 2020). In the region of southern and southeastern Asia, the demand for pangolin scales and meat for medical attention has pressured the pangolin populations to decline almost to the level of extinction (Aisher 2016).

The scales of pangolins (around 110-to 150-thousand per year) are used in traditional Chinese medicines (Wu & Ma 2007; Pantel & Chin 2009; Challender et al. 2015; Nash et al. 2016; Trageser et al. 2017) as well in clinical medicines (Wu & Ma 2007). Both meat and scales are used for treatment of various ailments (Challender 2011; Katuwal et al. 2013; Mohapatra et al. 2015; Aisher 2016; Xu et al. 2016). In India, it was not a surprise that people utilized pangolin parts and had traditional superstitious beliefs because of the relation between pangolin and the local community (Mohapatra et al. 2015; D'Cruze et al. 2018). Across the northeastern part of India, traditional remedies associated with ethnozoological practices are linked to wild animals and their

body parts, which are imbedded for generations in some local cultural practices (Solanki et al. 2005; Chutia 2006; Parbo et al. 2023). Katuwal et al. (2013) had reported the use of pangolin scales in treating communicable diseases in children. Similarly, various societal beliefs are also reported about the scales of Chinese Pangolins, such as cure in vomiting, protecting wood properties from termites, lucky charm, and magical power (Nash et al. 2016; D'Cruze et al. 2018). In contrast, the sighting of a Chinese Pangolin during the day is reported as a sign of an unlucky or bad omen (Nash et al. 2016). The skin and scales of Chinese Pangolin were used in the making of garland, jewelry, rings, bags, purses, and musical instruments (Katuwal et al. 2013; D'Cruze et al. 2018). Pangolin derivatives were used as an item in religious ceremonies and for decorative purposes (Mahmood et al. 2012; Mohapatra et al. 2015).

Earlier, eight species of pangolins were reported (Challender et al. 2012; Bao et al. 2013; Katuwal et al. 2013; Bhandari & Chalise 2014; Trageser et al. 2017; Yang et al. 2018), of which four species were from Asian countries (Challender et al. 2012; Mahmood et al. 2012; Nijman 2016; Trageser et al. 2017). In recent years, two new species of pangolins were added namely Asian Mysterious Pangolin *Manis mysteria* and Indo-Burmese Pangolin *Manis indoburmanica* from the Asian continent (Gu et al. 2023; Wangmo et al. 2025). These two additions makes six species of pangolins in Asia and total 10 species of pangolins globally. In India, two species of pangolins, namely Indian Pangolin *Manis crassicaudata* and Chinese Pangolin *Manis pentadactyla* are reported (Mohapatra et al. 2015; D'Cruze et al. 2018). The Indian Pangolin is distributed all over India (Mohapatra et al. 2015), while the Chinese Pangolin is restricted to the northeastern states (Mohapatra et al. 2015). The global distribution of Chinese Pangolin is reported in Bangladesh, Bhutan, Nepal, Myanmar, China, Lao PDR, Taiwan, Thailand, Vietnam, and India (Srinivasulu & Srinivasulu 2004; Shrestha 2005; Katuwal et al. 2013; Challender et al. 2015; Mohapatra et al. 2015; Sharma et al. 2020).

Pangolins (Pholidota: Manidae) are one of many animal groups used for ethnozoological purposes, and they are globally threatened with local extinction in many areas in its distribution range due to numerous anthropogenic threats (Wu et al. 2004; Liou 2006; Yang et al. 2007; Bhandari & Chalise 2014; Nijman et al. 2016). Conservation status of Chinese Pangolin is reviewed in 2019 by IUCN Red List of Threatened Species and listed the species as 'Critically Endangered' under criteria A3d+4d (Challender et al. 2019). Chinese Pangolin is also

listed in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) since 2017 (Challender & O'Criodain 2020) and Schedule I species under Indian Wildlife (Protection) Act, 1972 (Mohapatra et al. 2015). In order to draw attention to its current conservation concerns facing the species, we planned to investigate how communities living in and around the Yangoupokpi Lokchao Wildlife Sanctuary (YLWS), Manipur, India, perceive and use Chinese Pangolins. Our research is based on local people's understanding on the significance and utility of this species. In particular, the responses of various communities were emphasized according to their patterns of use, which could be helpful in creating conservation policies that are more equitable and successful.

## MATERIALS AND METHODS

### Study area: Yangoupokpi Lokchao Wildlife Sanctuary (YLWS)

Yangoupokpi Lokchao Wildlife Sanctuary is located within the Tengnoupal District of Manipur, covering an area of 184.80 km<sup>2</sup>. The sanctuary was established in 1989 in the Chandel District and is now in Tengnoupal District after bifurcating from Chandel in 2016. It lies on the border between Burma (Myanmar) and Manipur, which is also a part of the Indo-Malayan biodiversity hotspot. The important town of Moreh, which is a commercial town located on the border of India and Myanmar, is also a part of the sanctuary, and trade occurs between the two countries, i.e., India and Myanmar. The temperature recorded in January goes down to 4°C, and in June it reaches up to 40°C, with varying humidity fluctuating from 35% in winter to 80% in monsoon season. The annual average temperature recorded was 24.3 °C, and the average rainfall measure around 2,263 mm annually (Bungnamei & Saikia 2020). The sanctuary is home to various flora and fauna due to the convergence of Indo-Malayan biodiversity hotspots. Four types of forest are found in the sanctuary: tropical semi-evergreen forest, scrub forest, sub-tropical pine forest, and moist bamboo brakes. Some of the important floral species found in the sanctuary are *Tectona grandis*, *Dipterocarpus turbinatus*, *Terminalia tomentosa*, *Gmelina arborea*, *Bauhinia* spp., *Daubanga sonnoroeddes*, bamboo, and orchid species. This sanctuary also nurtures a diverse group of wildlife resources, starting with birds, mammals, reptiles & amphibians, fishes, and insects. A total of 40 species of mammals, 65 species of birds, 27 species

of reptiles, six species of amphibians, and 65 species of fish were recorded from the sanctuary (Bungnamei & Saikia 2020). Some of the important wildlife found in the sanctuary includes Leopard *Panthera pardus*, Jungle Cat *Felis chaus*, Asian Grey Mongoose *Urva edwardsii*, Sāmbhar Deer *Rusa unicolor*, Wild Boar *Sus scrofa*, Red Serow *Capricornis rubidus*, Capped Langur *Trachypithecus pileatus*, Stump-tailed Macaque *Macaca arctoides*, Western Hoolock Gibbon *Hoolock hoolock*, Porcupine *Hystrix brachyura*, Chinese Pangolins *Manis pentadactyla*, Tokay Gecko *Gekko gecko*, Burmese Python *Python bivittatus*, Indian Monitor Lizard *Varanus bengalensis*, King Cobra *Ophiophagus hannah*, Common Krait *Bungarus caeruleus*, Great Indian Hornbill *Buceros bicornis*, Rose-ring Parakeet *Psittacula krameria*, Red Jungle Fowl *Gallus gallus*, Blyth's Tragopan *Tragopan blythii*, Burmese Peafowl *Pavo muticus* (Sunil 2016).

### Data collection and methods

The study area was surveyed with a structured open and closed questionnaire between October 2019 and December 2023. The respondents were selected using a snowball sampling technique based on their experiences with wildlife, particularly the Chinese Pangolin. Later on, the questionnaire survey was conducted by taking prior appointments from the selected respondents from nine established villages around the YLWS (Table 1). These nine villages were represented by three communities, namely Naga Maring, Meitei, and Kuki. The questionnaire sheet comprised mainly of the following questions: (i) name, (ii) age, (iii) gender, (iv) occupation, (v) hunting reason, (vi) hunting method, (vii) trade, (viii) use pattern, and (ix) conservation issues or threats (Babbie 2013). The individuals were not asked direct questions; instead, an interactive communication approach was used.

The conversation was conducted in Manipuri, with a translator assisting in communicating a local Kuki dialect. This was then immediately translated into English and written down on data sheets.

## RESULTS

### Respondents' Socio-Demographic Characteristics

In the present study, we interviewed 71 respondents who were basically traditional male hunters. The age of respondents ranged between 36–65 years, with a mean age of  $52.3 \pm 5.80$  years. Majority (65%) of the respondent's age ranged between 46–55 years (Figure 2a). Furthermore, most respondents had lived in the area since their birth. Most of the selected respondents were

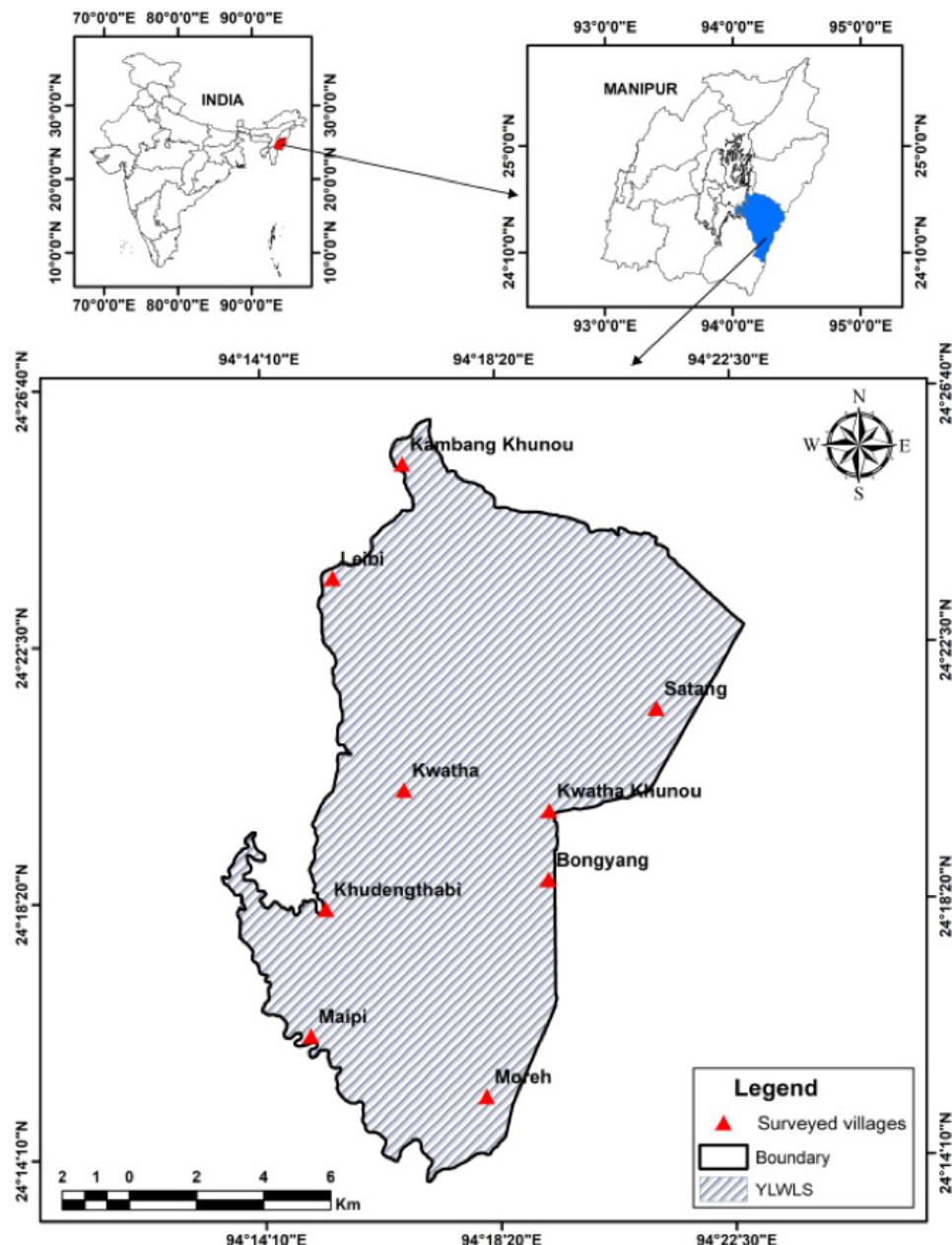


Figure 1. Map of the Yangoupokpi Lokchao Wildlife Sanctuary along with locations of surveyed villages.

uneducated (37%), followed by those having education up to class 10 (31%), class 12 (18%), and less than class 8 was 14% (Figure 2b). Most of the respondents were involved in hunting and poaching activities of wildlife in the past, but nowadays only a few (15%) are still active in hunting and poaching of Chinese Pangolin opportunistically or only if there is demand for scale or whole animal.

#### Hunting methods and reasons

The findings showed that, in addition to dogs, the

most common weapons used for hunting and poaching were spades, teiyon, spears, rifles, and traps. According to the respondents' opinions, the noose trap was the most widely used method (68%) for Chinese pangolin hunting and poaching, followed by the spear (46%), the gun (38%), the spade, and teiyon (41%) each, and the least popular method was the use of dogs 23% (Figure 3). The respondents categorized the motives for hunting and poaching of Chinese Pangolins into three groups: meat, scales, and whole animal. Seven percent of the 61% of hunters who go pangolin hunting also target and

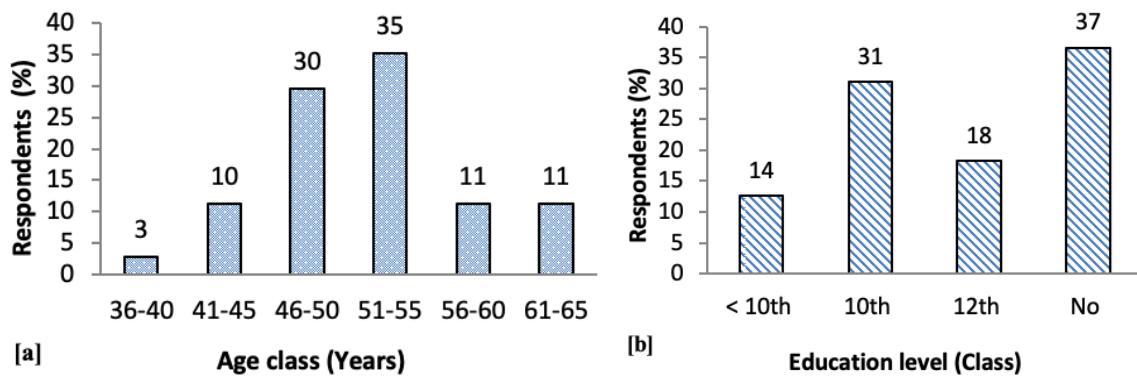


Figure 2a&amp;b. Descriptive profile of survey respondents in study area.

**Table 1.** Number of respondents, their gender, and community selected for interview and questionnaire survey from villages established in and around Yangoupokpi Lokchao Wildlife Sanctuary, Manipur.

	Name of villages	No. of respondents	Gender	Community
1.	Moreh	15	M	Mixture of communities
2.	Kwatha	7	M	Meitei
3.	Kwatha khunou	5	M	Meitei
4.	Khambang Khunou	12	M	Maring Naga
5.	Leibi	10	M	Maring Naga
6.	Satang	7	M	Maring Naga
7.	Maipi	5	M	Kuki
8.	Khudenghabi	5	M	Kuki
9.	B. Bongjang	5	M	Kuki

sell entire pangolins based on middlemen's demands. All respondents (100%) said that the Chinese Pangolin is hunted for its flesh, which is perceived to be extremely tasty (Choudhary et al. 2018).

It was found that most respondents (84%) had hunted pangolin either for bushmeat or to sell for cash income, with 7% hunting them when a middleman offered advance money for the species. During the survey, only in four incidents, the sale of live pangolins were recorded with prices ranging from Rs. 15,000 per animal in 2014 to Rs. 25,000 in 2019, prior to the COVID-19 pandemic. According to respondents, the Chinese Pangolin hunting and poaching have decreased in the present research area due to difficulties in spotting the species, possibly as a result of historical overhunting, declining forest cover, and changes in land use patterns. In addition, many respondents stated that other factors contributing to decline in hunting in the area included the migration of residents to towns for employment or settlement, as well as increased education and awareness of wildlife

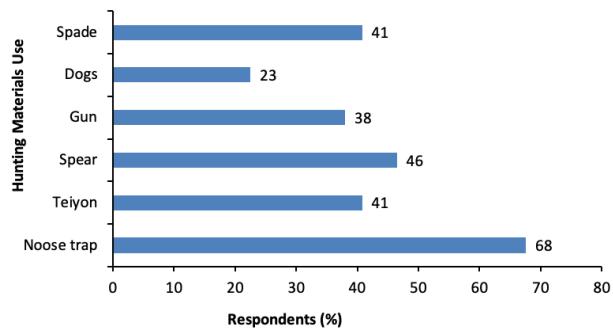


Figure 3. Hunting methods used for Chinese Pangolin in the study area.

and wildlife laws.

#### Price of scales

The correlation analysis of price and scale shows 0.873, which is significant at the 0.01 level. This suggests that as the year went on, the price of scales also increased. According to an elderly respondent, in the early 1980s, he used to sell pangolin scales for Rs. 400/kg. In the mid- and late-1990s, the cost of Chinese pangolin's scale grew significantly at the rate of average price per kg from Rs. 7,000–Rs. 8,000. According to the current analysis, the peak average price of pangolin scale selling was Rs. 23,000/kg before the Covid-19 epidemic (Figure 4). But, immediately after the COVID-19 pandemic, people were willing to sell pangolin's scale at the rate of Rs. 3000 to Rs. 5000 per kg. Despite this, no purchasers appeared due to the upheaval in Manipur and Myanmar.

#### Medicinal Uses

Chinese pangolins were generally used in Manipur, especially in the current study area, to treat a variety of ailments. The highest medicinal uses of body parts of Chinese Pangolin were in treatment of piles (29%) followed by asthma (18%), throat pain (14%), allergy

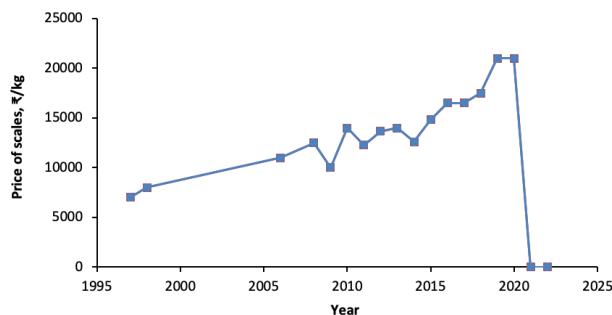


Figure 4. Average price of pangolin scale reported by respondents of study area.

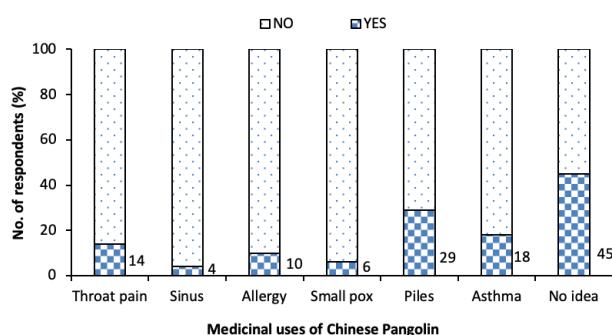


Figure 5. Respondents' knowledge on traditional medicinal uses of Chinese Pangolin.

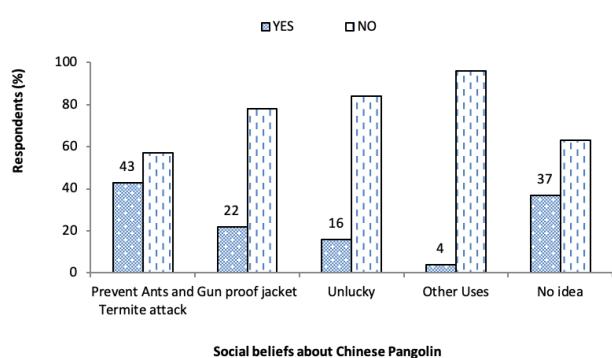


Figure 6. Respondent's knowledge on social beliefs about Chinese Pangolin.

(10%), Smallpox (6%), and the lowest use was in curing sinus (4%) while majority of hunters (45%) are unaware of the traditional medicinal uses of Chinese Pangolin (Figure 5).

#### Social Beliefs and other Uses

The understanding of medicinal uses is significantly impacted by age ( $p = -0.041$ ), as observed by the odd ratio and confidence interval (OR = 3.25; 95% CI:1.02–10.40). The relationship between age and the mode of

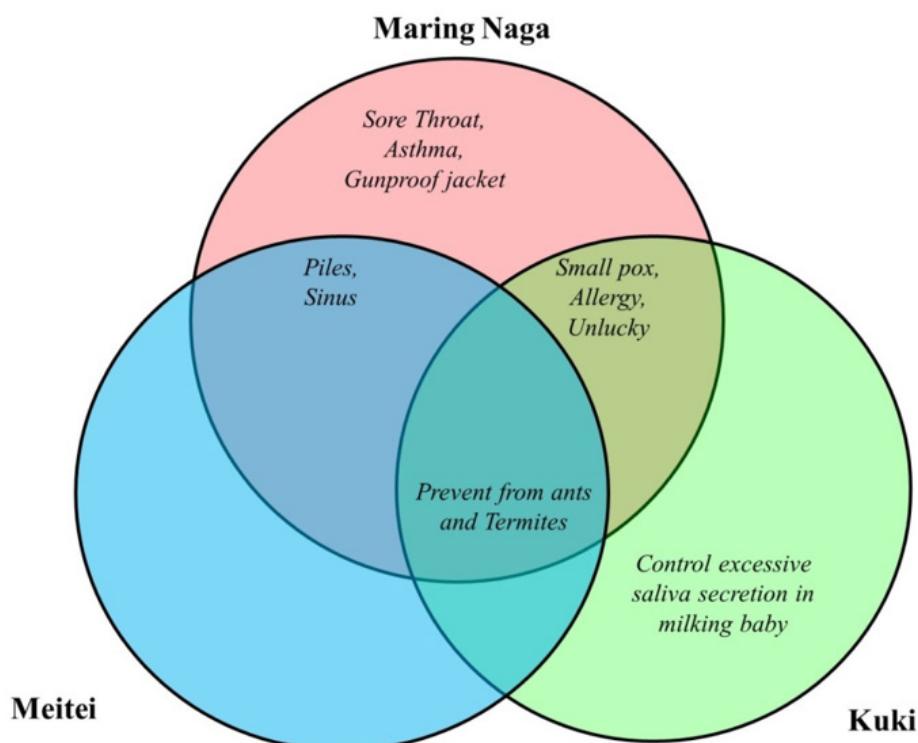
medicinal uses was also shown to be significant ( $p = 0.045$ ) (OR = 4.0; CI:0.96–16.61). The current occupation and knowledge of medicinal uses did not significantly correlate ( $p = 0.097$ ) (OR = 0.37; CI:0.11–1.28). For the modalities of uses knowledge, the influence of profession is significant ( $p = 0.003$ ) (OR = 0.11; CI:0.02–0.5). Data presented in Table 2 maintains a significance threshold of 0.05. There was no significant ( $p = 0.054$ ) relationship observed with current occupation (OR = 1.13; CI:0.35–3.71) while there was a significant ( $p = 0.006$ ) correlation with social views and age (OR = 5.34; CI:1.57–18.11) (Table 2). In order to prevent termites and ants from destroying their wooden and bamboo homes, the majority of respondents (43%) said they buried pangolin scales beneath the main pillar (Figure 6). Twenty-two percent of the respondents claimed that they used to stitch pangolin scales into clothing, believing it would protect against bullet from traditional weapons, although this belief is no longer relevant. The respondents who believe in seeing pangolin as unlucky were 16%, and 4% of respondents believe other uses like keeping pangolin scale on chest of milking baby during sleep stops excess saliva drops from mouth. A total of 37% respondents reported that they have no idea about social belief since they do not practice it in their society (Figure 6). Figure 7 depicts the Chinese Pangolin's community-wise use pattern, which reveals that the three groups solely shared the use of scales to keep out ants and termites from wooden and bamboo made houses.

#### DISCUSSION

The average age of respondents who participated in the survey was  $52.3 \pm 5.80$  years, ranging from 36 years to 65 years with most comparable to the research findings reported by Phuyal et al. (2023). Additionally, respondents stated that there has been a decreased trend in Chinese Pangolin hunting and poaching compared to previous years in the present study area. It is recorded that younger generations said to be leaving their villages for cities and towns to pursue higher education, better careers and livelihood that provide a steady income as opposed to occasionally making money from hunting and selling wild animals as well as increased wildlife awareness and strict implementation of wildlife laws and policies in the state. As a result, Chinese Pangolin hunting and poaching have declined in the study villages. Besides these, there could be some other factors for declining the Chinese Pangolin's

**Table 2.** Respondents' opinions on knowledge of social belief and medicinal uses.

	Social belief		Medicinal uses		Modes of uses	
	OR (95% CI)	p-Value	OR (95% CI)	p-Value	OR (95% CI)	p-Value
Age	5.34 (1.57–18.11)	0.006	3.25 (1.02–10.40)	0.041	4.0 ((0.96–16.61)	0.045
Present occupation	1.13 (0.35–3.71)	0.54	0.37 (0.11–1.28)	0.097	0.11(0.02–0.5)	0.003

**Figure 7.** Community-wise uses of Chinese Pangolin in the study area.

hunting, viz., decreasing quality and quantity of forest cover or the habitat of species, changes in land use and cover patterns, and possibly historical overhunting or low population density. These factors might be making it more difficult to spot or locate the species, which would further discourage hunting.

The results of the present study (Figure 3) showed that the noose trap was the most often used method for hunting and poaching Chinese Pangolins, which was corroborated by the results of several studies (Newton et al. 2008). Similarly, Aisher (2016) reported that Nyishi hunters in Arunachal Pradesh also used the same trapping method to hunt Chinese Pangolins. In contrast, just one respondent was reported in the study area utilizing a trap and digging out from a burrow to hunt Chinese Pangolins, which can be corroborated by other studies (Newton et al. 2008; Nash et al. 2016; Katuwal et al. 2017; Zhang et al. 2017). Additionally, the present

study recorded the use of trained dogs in Chinese Pangolin hunting. Similar observation was also reported by Archer et al. (2021). Although it was said that the usage of firearms for hunting had decreased following the early 1990s ban on private firearms (Sterling et al. 2006), most hunters at the present study area continue to use firearms to hunt various animals, including Chinese Pangolins. Numerous studies have also documented the usage of firearms for pangolin hunting (Friant et al. 2015; Mambyea et al. 2018). The shovel, spear, and 'Teiyon' (traditional digging tools) used for pangolin hunting in the past were also documented in this study and were not found to have been mentioned in other studies. Respondents also mentioned that because pangolin sightings are rare these days, they mostly concentrate on capturing whenever a new tunnel or other evidence of a pangolin's presence is discovered, as they believe it to be much simpler and more successful (Figure 3). Most

**Table 3. Utilization pattern of Chinese Pangolin reported from the present and other studies.**

Categories	Reported in the present study	Reported in other studies	Sources
Used in treatment of diseases	Piles	Piles	Mohapatra et al. 2015; D'Cruze et al. 2018
	Sinus	-	-
	Sore throat	Sore throat	Nash 2016
	Asthma	Asthma	Kaspal 2009; Boakye et al. 2015; Maurice et al. 2019; Mouafo et al. 2021; Sexton et al. 2021
	Small pox	Small pox	Sexton et al. 2021
	Allergy	Allergy	Sopyan 2009; Sexton et al. 2021
Used in social belief	Prevent from termites and ants in wooden house	Prevent from termites and ants in wooden house	D'Cruze et al. 2018
	Gun proof jacket	Gun proof jacket	Soewu & Ayodele 2009; Mouafo et al. 2021
	Unlucky	Unlucky	Katuwal et al. 2013; Khatiwada 2016; Nash et al. 2016; D'Cruze et al. 2018; Mouafo et al. 2021
Others uses	Controls excessive saliva secretion in milking baby while sleeping)	-	-

respondents had previously engaged in wildlife hunting and poaching, but today very few continue to hunt and poach Chinese Pangolins opportunistically or only when the demand for a large or entire animal exists.

Mouafo et al. (2021) reported in their finding that the majority of the hunters' aim for hunting pangolin was income generation in contrast to the present study where domestic consumption of meat was the primary reason for hunting pangolin. Pangolin meat is widely consumed locally and is thought to be among the best meats (Choudhary et al. 2018). A number of studies have revealed that people sold the meat to make money, but only a small number of them hold the opinion that people who can afford to eat pangolin meat come from higher social classes, have pride in their culture, and become unique individuals (Nasi et al. 2011; Mohapatra et al. 2015; Ichikawa et al. 2016; Archer et al. 2021). Shepherd (2009) noted that middlemen frequently make village visits, and Chinese Pangolin buyers and sellers get together at a hidden location. According to D'Cruze et al. (2018), hunters typically travel to cities to hunt for potential customers of pangolin scales. The current study revealed that the vendor purposefully avoided travelling to another town or village in search of a buyer, instead gathering information indirectly from reliable sources ahead of time for the sale of pangolins. Rather than engaging in open trade in the village or local market, they set up a rendezvous in a designated hidden location.

Several studies revealed that pangolins were stolen for their scales, which are thought to be connected to traditional Chinese and Vietnamese remedies (D'Cruze et al. 2018; Sexton et al. 2021). Giant Pangolin scales

were said to be used in times of conflict since people traditionally believed them to be bulletproof (Mouafo et al. 2021). A similar observation made in the current study is on the use of Chinese Pangolin scales to make a bulletproof garment that was utilized in Manipur during the 1992 Naga-Kuki war (Butalia 2008). The cost of pangolin scales is estimated to range from \$100–120 per kg in international trade (Challender et al. 2015). In Dima Hasao, the average cost of scale is Rs. 17,000 per kg according to D'Cruze et al. (2018) which is in line with the present study. Chinlampianga et al. (2013) reported a rise in scale prices in Mizoram between 1996 and 2012, from Rs. 1,000 per kg to Rs. 13,000 per kg. Wu et al. (2007) reported that the price of scales in China increased between the 1980s and 2000s, going from RMB (Renminbi) 8–12 in the early 1980s to RMB 420–450 in the early 2000s. In contrast, the current study reports that Chinese Pangolin scales sold for Rs. 800/kg in the late 1980s and as high as Rs. 23,000/kg by 2020. As proposed by Thapa et al. (2014) the price of pangolin scales varies not only between villages and individuals but also between sizes, with adult pangolin scales being preferred over younger ones. This variation in scale prices is also dependent on the level of knowledge about the value of the pangolin scales in the illegal trade market. According to Newton et al. (2008), respondents claimed that all pangolins that are caught are now sold to traders; however, the current investigation observed that the alive or whole body of pangolins are only sold when customers specifically request them.

Table 3 summarizes the utilization pattern of Chinese Pangolins from both the current study and previous research. According to earlier research, there



**Image 1.** Interaction with respondents and Chinese Pangolin's scales and cooked meat: **a**—interaction with respondent | **b**—cooked meat of Chinese Pangolin | **c**—old pangolin scale | **d**—fresh pangolin scale. © Yengkham Roamer Zest.

is a generational transfer of information regarding the traditional medicinal usage of pangolins in therapeutic practices, viz., kidney stones, asthma, dermatological issues, and tuberculosis (D'Cruze et al. 2018; Mouafo et al. 2021). According to Chinlampianga et al. (2013) and Mohapatra et al. (2015), bile is used to treat splenomegaly, or spleen enlargement, however a study participant claimed that bile is also used to treat smallpox in youngsters. According to Nash et al. (2016), some hunters claimed that Chinese pangolin parts could be used to treat sore throats. They also reported that scales and bile were used in traditional medicine, which is consistent with the results of the current study, which show that scales are typically used in treatment, with bile being used in a small number of cases (Table 3).

In contrast to the current study, which has no accounts of this concept, some investigations have suggested that pangolin scales are worn as rings to ward off evil spirits. A few people claimed that termites could be warded off with scale (D'Cruze et al. 2018). The

results of the current survey indicated that pangolin scales were used to keep ants & termites away from the bamboo & wooden materials used to build houses. According to several studies (Nash et al. 2016; D'Cruze et al. 2018; Mouafo et al. 2021), seeing a pangolin is said to be unfortunate. In contrast, sighting a pangolin once a year was reported as fortunate in the Philippines (Archer et al. 2021). According to the current study, seeing a Chinese Pangolin was once thought to bring bad luck, but this belief has since faded. But, Sharma et al. (2020) state that seeing a pangolin is only unlucky if a living one is slain or a dead one is spotted. Conversely, pangolin parts were used as a means of driving away ill luck (Ingram et al. 2018). Thus, use pattern of pangolins and its body parts varied place to place in their distribution range.

## CONCLUSIONS

From the present study it is concluded that only male local peoples belonging to an average age of 52 years old were mostly involved in hunting and poaching of Chinese Pangolin in the area. Most respondents had previously got engaged in wildlife hunting and poaching, but today a very few continue to hunt and poach Chinese Pangolins opportunistically or only when the demand for a large or entire animal exists. As anticipated, similar to certain previous research (Mohapatra et al. 2015; D'Cruze et al. 2018; Xing et al. 2020), the investigation also looked into the applications of Chinese Pangolin in meat, traditional medicine, and in social beliefs. The present study also revealed two novel findings that had not been reported in previous studies: the treatment of sinuses and the excessive control of saliva in nursing babies by using the scales. Using scales to keep out ants and termites was one feature that all the communities had in common in the study area. Although some respondents may not have been aware, the Chinese Pangolins are highly sensitive and trafficked animals (Challender et al. 2015; Nash et al. 2016). The average price shows an increasing trend through 2020, right before the Covid-19 outbreak. Respondents said that the pangolin trade had abruptly decreased, presumably as a result of intermediaries' restrictions, and that traders were endangered because of political upheaval in Manipur and Myanmar.

Overall, the study suggests that a combination of social, economic, and environmental factors have contributed to a decline in the hunting and poaching of Chinese Pangolins in the study area. However, this species in Manipur, particularly population of YLWS is highly threatened and need urgent conservation and management approach, as globally it is a 'Critically Endangered' species. Therefore, further exploration of these trends could provide more insight into the long-term sustainability of these changes for species.

## REFERENCES

**Abernethy, K.A., L. Coad, G. Taylor, M.E. Lee & F. Maisels (2013).** Extent and ecological consequences of hunting in central African rainforests in the twenty-first century. *Philosophical Transactions of the Royal Society B: Biological Sciences* 368(1625): 20120303. <https://doi.org/10.1098/rstb.2012.0303>

**Aisher, A. (2016).** Scarcity, alterity and value: decline of the pangolin, the world's most trafficked mammal. *Conservation and Society* 14(4): 317–329. <https://doi.org/10.4103/0972-4923.197610>

**Altrichter, M. (2006).** Wildlife in the life of local people of the semi-arid Argentine Chaco. *Biodiversity Conservation* 15: 2719–2736. <https://doi.org/10.1007/s10531-005-0307-5>

**Archer, L.J., S.T. Turvey, C.M. Apale, D.B. Corona, R.L. Amada & S.K. Papworth (2021).** Digging Deeper: understanding the illegal trade and local use of Pangolins in Palawan Province, Philippines. *Frontiers in Conservation Science* 2: 746366. <https://doi.org/10.3389/fcosc.2021.746366>

**Babbie, E. (2013).** *The Practice of Social Research.* 13<sup>th</sup> Edition, International Edition, Wadsworth, Cengage Learning, Wadsworth, 609 pp.

**Bao, F., S. Wu, C. Su, L. Yang, F. Zhang & G. Ma (2013).** Air temperature changes in a burrow of Chinese Pangolin, *Manis pentadactyla*, in winter. *Folia Zoologica* 62(1): 42–47. <https://doi.org/10.25225/fozo.v62.i1.a6.2013>

**Bahuchet, S. & K. Ioveva-Baillon (1999).** De la forêt au marché: le commerce de gibier au sud du Cameroun, pp. 533–558. In: Bahuchet, S., D. Bley, H. Pagezy & N. Vernazza (eds.). *L'homme et la forêt tropicale*, Chateauneuf de Grasse: Ed. du Bergier.

**Bhandari, N. & M.K. Chalise (2014).** Habitat and distribution of Chinese Pangolin *Manis pentadactyla* (Linnaeus 1758) in Nagarjun Forest of Shivapuri Nagarjun National Park, Nepal. *Nepalese Journal of Zoology* 2(1): 18–25.

**Boakye, M.K., D.W. Pietersen, A. Kotzé, D.L. Dalton & R. Jansen (2015).** Knowledge and uses of African Pangolins as a source of traditional medicine in Ghana. *PLoS One* 10(1): e0117199. <https://doi.org/10.1371/journal.pone.0117199>

**Bodmer, R.E. & E.P. Lozano (2001).** Rural development and sustainable wildlife use in Peru. *Conservation Biology* 15(4): 1163–1170. <https://doi.org/10.1046/j.1523-1739.2001.0150041163.x>

**Bodmer, R.E., E.P. Lozano & T.G. Fang (2004).** Economic Analysis of Wildlife Use in the Peruvian Amazon, pp. 191–208. In: Silvius, K., R. Bodmer & J. Fragoso (ed.). *People in Nature: Wildlife Conservation in South and Central America*. Columbia University Press, New York, 464 pp. <https://doi.org/10.7312/silv12782-012>

**Bungnamei, K. & A. Saikia (2020).** Park in the periphery: land use and land cover change and forest fragmentation in and around Yangoupokpi Lokchao Wildlife Sanctuary, Manipur, India. *Geographia Polonica* 93(1): 107–120.

**Butalia, U. (2008).** *Interrogating Peace: The Naga–Kuki conflict in Manipur.* Evangelischer Entwicklungsdienst e.V.(EED), Ulrich-von-Hassell Str.76, D-53123 Bonn, Germany, 64 pp.

**Challender, D. (2011).** Asian pangolins: increasing affluence driving hunting pressure. *TRAFFIC Bulletin* 23: 92–93.

**Challender, D. & L. Hywood (2012).** African Pangolins under increased pressure from poaching and intercontinental trade. *TRAFFIC Bulletin* 24: 53–55.

**Challender, D., S. Wu, P. Kaspal, A. Khatiwada, A. Ghose, N.C.-M. Sun, R.K. Mohapatra & T.L. Suwal (2019).** *Manis pentadactyla* (errata version published in 2020). The IUCN Red List of Threatened Species 2019: e.T12764A168392151. <https://doi.org/10.2305/IUCN.UK.2019-3.RLTS.T12764A168392151.en>

**Challender, D.W.S. & C. O'Criodain (2020).** Addressing trade threats to pangolins in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), pp. 305–320. In: Challender, D.W.S., H.C. Nash & C. Waterman (eds.). *Pangolins: Science, Society and Conservation*. Elsevier, 532 pp. <https://doi.org/10.1016/b978-0-12-815507-3.00019-8>

**Challender, D.W., S.R. Harrop & D.C. MacMillan (2015).** Understanding markets to conserve trade-threatened species in CITES. *Biological Conservation* 187: 249–259. <https://doi.org/10.1016/j.biocon.2015.04.015>

**Cheng, W., S. Xing & T.C. Bonebrake (2017).** Recent pangolin seizures in China reveal priority areas for intervention. *Conservation Letters* 10(6): 757–764. <https://doi.org/10.1111/conl.12339>

**Chinlampianga, M., R.K. Singh & A.C. Shukla (2013).** Ethnozoological diversity of northeast India: empirical learning with traditional knowledge holders of Mizoram and Arunachal Pradesh. *Indian Journal of Traditional Knowledge* 12: 18–30.

**Choudhary, A.N., S. Badola, M. Fernandes & D.B. Chhabra (2018).** TRAFFIC factsheet: the scale of pangolin trade in India. TRAFFIC India. [https://www.traffic.org/site/assets/files/2647/factsheet\\_scale\\_of\\_pangolin\\_trade\\_in\\_india\\_2009\\_2017](https://www.traffic.org/site/assets/files/2647/factsheet_scale_of_pangolin_trade_in_india_2009_2017). Accessed 12 March 2025

2021.

**Chutia, P. (2006).** Ethnozoological study of Nyishi, Monpa and Apatanai tribes of Arunachal Pradesh. Ph.D. Thesis, North Eastern Hill University, Shillong, Meghalaya, 212 pp.

**Davies, J.S. (2002).** The governance of urban regeneration: a critique of the 'governing without government' thesis. *Public Administration* 80(2): 301–322.

**D'Cruze, N., B. Singh, A. Mookerjee, L. Harrington & D. Macdonald (2018).** A socio-economic survey of pangolin hunting in Assam, northeast India. *Nature Conservation* 30: 83–105. <https://doi.org/10.3897/natureconservation.30.27379>

**Fa, J.E. & D. Brown (2009).** Impacts of hunting on mammals in African tropical moist forests: a review and synthesis. *Mammal Review* 39(4): 231–264. <https://doi.org/10.1111/j.1365-2907.2009.00149.x>

**Fargeot, C. & S. Dieval (2000).** La consommation de gibier à Bangui, quelques données économiques et biologiques. *Canopée* 18: 5–7

**Friant, S., S.B. Paige & T.L. Goldberg (2015).** Drivers of bushmeat hunting and perceptions of zoonoses in Nigerian hunting communities. *PLoS Neglected Tropical Diseases* 9(5): e0003792. <https://doi.org/10.1371/journal.pntd.0003792>

**Gu, T.T., H. Wu, F. Yang, P. Gaubert, S.P. Heintzel, Y. Fu & L. Yu (2023).** Genomic analysis reveals a cryptic pangolin species. *Proceedings of the National Academy of Sciences* 120(40): e2304096120. <https://doi.org/10.1111/1749-4877.12796>

**Heinrich, S., T.A. Wittmann, T.A. Prowse, J.V. Ross, S. Delean, C.R. Shepherd & P. Cassey (2016).** Where did all the pangolins go? International CITES trade in pangolin species. *Global Ecology and Conservation* 8: 241–253. <https://doi.org/10.1016/j.gecco.2016.09.007>

**Holland, G.J. & A.F. Bennett (2007).** Occurrence of small mammals in a fragmented landscape: the role of vegetation heterogeneity. *Wildlife Research* 34(5): 387–397. <https://doi.org/10.1071/WR07061>

**Ichikawa, M., S. Hattori & H. Yasuoka (2016).** Bushmeat crisis, forestry reforms and contemporary hunting among Central African forest hunters, pp. 59–75. In Reyes-Garcia, V. & A. Pyhala (eds.). *Hunter-gatherers in a Changing World*. Springer Calm, XXXVIII + 257 pp. [https://doi.org/10.1007/978-3-319-42271-8\\_4](https://doi.org/10.1007/978-3-319-42271-8_4)

**Ingram, D.J., L. Coad, K.A. Abernethy, F. Maisels, E.J. Stokes, K.S. Bobo, T. Breuer, E. Gandiwa, A. Ghiurghi, E. Greengrass, T. Holmern, T.O.W. Kamgaing, O. Ndong, A. M, J.R. Poulsen, J. Schleicher, M.R. Nielsen, H. Solly, C.L. Vath, M. Waltert & J.P. Scharlemann (2018).** Assessing Africa-wide Pangolin exploitation by scaling local data. *Conservation Letters* 11(2): e12389. <https://doi.org/10.1111/conl.12389>

**Jones & L. May (2012).** Time-budgets and activity patterns of captive Sunda pangolins (*Manis javanica*). *Zoo Biology* 31(2): 206–218. <https://doi.org/10.1002/zoo.20381>

**Kaspal, P. (2009).** Saving the Pangolins: Ethno zoology and Pangolin conservation awareness in Human dominated Landscapes. The Rufford Small Grants Foundation, 6 pp.

**Katuwal, H.B., H.P. Sharma & K. Parajuli (2017).** Anthropogenic impacts on the occurrence of the critically endangered Chinese pangolin (*Manis pentadactyla*) in Nepal. *Journal of Mammalogy* 98(6): 1667–1673. <https://doi.org/10.1093/jmammal/gyx114>

**Katuwal, H.B., K.R. Neupane, D. Adhikari & S. Thapa (2013).** Pangolins Trade, Ethnic Importance and its Conservation in Eastern Nepal. Small Mammals Conservation and Research Foundation and WWF-Nepal. Kathmandu, Nepal, 19 pp.

**Khatiwada, A.P. (2016).** A survival blueprint for the Chinese Pangolin, *Manis pentadactyla*. National Trust for Nature Conservation, Lalitpur, Nepal, 21 pp.

**Liou, C. (ed.) (2006).** The state of wildlife trade in China: information on the trade in wild animals and plants in China 2006. TRAFFIC East Asia, China, 20 pp.

**Mahmood, T., R. Hussain, N. Ishrad, F. Akrim & M.S. Nadeem (2012).** Illegal mass killing of Indian pangolin (*Manis crassicaudata*) in Potohar region, Pakistan. *Pakistan Journal of Zoology* 44: 1457–1461.

**Maurice, M.E., E.L. Ebong, N.A. Fuashi, I.I. Godwill & A.F. Zeh (2019).** The ecological impact on the distribution of pangolins in Deng-Deng National Park, Eastern Region, Cameroon. *Global Journal of Ecology* 4(1): 008–014.

**Mambeya, M.M., F. Baker, B.R. Momboua, P.A.F. Koumba, M. Hega, V.J. Okouyi & K. Abernethy (2018).** The emergence of a commercial trade in pangolins from Gabon. *African Journal of Ecology* 56(3): 601609. <https://doi.org/10.1111/aje.12507>

**McMurray, C. (2009).** Illegal Trade in Wildlife and World Environment Day. U.S. Department of State, Archive, New York, USA. 2001–2009. state.gov/g/oes/rls/rm/106259.htm. Accessed 10 January 2023.

**Mohapatra, R.K., S. Panda, M.V. Nair, L.N. Acharjyo & D.W.S. Challender (2015).** A note on the illegal trade and use of pangolin body parts in India. *Traffic Bulletin* 27(1): 33–40.

**Mouafo, A.D., D.J. Ingram, R.P. Tegang, I.C. Ngwayi & T.B. Mayaka (2021).** Local knowledge and use of pangolins by culturally diverse communities in the Forest-Savannah transition area of Cameroon. *Tropical Conservation Science* 14: 19400829211028138. <https://doi.org/10.1177/19400829211028138>

**Nash, H.C., M.H. Wong & S.T. Turvey (2016).** Using local ecological knowledge to determine status and threats of the Critically Endangered Chinese pangolin *Manis pentadactyla* in Hainan, China. *Biological Conservation* 196: 189–195. <https://doi.org/10.1016/j.bioco.2016.02.029>

**Nasi, R., A. Taber & N. van Vliet (2011).** Empty forests, empty stomachs? Bushmeat and livelihoods in the Congo and Amazon basins. *International Forestry Review* 13(3): 355–368. <https://doi.org/10.1505/146554811798293872>

**Newton, P., N. van Thai, S. Robertson & D. Bell (2008).** Pangolins in peril: Using local hunters' knowledge to conserve elusive species in Vietnam. *Endangered Species Research* 6: 41–53. <https://doi.org/10.3354/esr00127>

**Nijman, V., M.X. Zhang & C.R. Shepherd (2016).** Pangolin trade in the Mong La wildlife market and the role of Myanmar in the smuggling of pangolins into China. *Global Ecology and Conservation* 5: 118–126. <https://doi.org/10.1016/j.gecco.2015.12.003>

**Pantel, S. & S.Y. Chin (2009).** Pangolin Capture and Trade in Malaysia, pp. 143–162. In: Pantel, S. & S.Y. Chin (eds.). Proceedings of the Workshop on Trade and Conservation of Pangolins Native to South and Southeast Asia, 30 June–2 July 2008, Singapore Zoo.

**Parbo, D., P.K. Saikia, A. Kumar, N. Parbosa & B.K. Boro (2023).** Ethnozoological knowledge of Dimasa Kachari of Dima Hasao, Assam, India. *Mukt Shabd Journal* 12(7): 1278–1311

**Phuyal, N., B.M. Sadadev, R. Khulal, R. Bhatt, S. Bajagain, N. Raut & B. Dhami (2023).** Assessing illegal trade networks of two species of pangolins through a questionnaire survey in Nepal. *Journal of Threatened Taxa* 15(1): 22381–22391. <https://doi.org/10.11609/jott.8036.15.1.22381-22391>

**Sexton, R., T. Nguyen & D.L. Roberts (2021).** The use and prescription of pangolin in traditional Vietnamese medicine. *Tropical Conservation Science* 14(1): 1–13. <https://doi.org/10.1177/1940082920985755>

**Sharma, S., H.P. Sharma, H.B. Katuwal & J.L. Belant (2020).** Knowledge of the Critically Endangered Chinese pangolin *Manis pentadactyla* by local people in Sindhupalchok, Nepal. *Global Ecology and Conservation* 23: e01052. <https://doi.org/10.1016/j.gecco.2020.e01052>

**Shepherd, C.R. (2009).** Overview of pangolin trade in Southeast Asia, pp. 6–9. In: Pantel, S. & S.Y. Chin (eds.). Proceedings of the Workshop on Trade and Conservation of Pangolins Native to South and Southeast Asia, 30 June–2 July 2008, Singapore Zoo.

**Shrestha, B. (2005).** Distribution and diversity of mammals in Shivapuri National Park. M.Sc. Thesis, Central Department of Zoology, Institute of Science and Technology, Tribhuvan University, Nepal, 94 pp.

**Soewu, D.A. & I.A. Ayodele (2009).** Utilisation of pangolin (*Manis* spp) in traditional Yorubic medicine in Ijebu province, Ogun State, Nigeria. *Journal of Ethnobiology and Ethnomedicine* 5(1): 39. <https://doi.org/10.1186/1746-4269-5-39>

**Solanki, G.S., P. Chutia & O.P. Singh (2005).** Ethnozoology of the Nyishi Tribe and its impact on biodiversity in Arunachal Pradesh, India. *Rajiv Gandhi University Research Journal* 8(1): 89–100.

**Sopyan, E. (2009).** Malayan pangolin *Manis javanica* trade in Sumatra, Indonesia. *Proceedings of the workshop on trade and conservation of pangolins native to South and Southeast Asia* (30): 134.

**Srinivasulu, C. & B. Srinivasulu (2004).** Checklist of scandents and pholidots (Mammalia: Scandentia and Pholidota) of South Asia. *Zoos Print Journal* 19(2): 1372–1374. <https://doi.org/10.11609/JOTT.ZPJ.19.2.1372-4>

**Sterling, E.J., M.M. Hurley & M.D. Le (2006).** *Vietnam; A Natural History*. Yale University Press, New Haven, 92 pp.

**Sunil, K.C. (2016).** Biodiversity Impact Assessment Report for Part of Road Sections Passing through Yanggoupokpi Lokchao Wild Life Sanctuary Environmental Specialist. South Asia Subregional Economic Corridor (SASEC) Road Connectivity Project -India, 1–13 pp.

**Thapa, P., A.P. Khatiwada, S.C. Nepali & S. Paudel (2014).** Distribution and conservation status of Chinese Pangolin *Manis pentadactyla* in Nangkholyang VDC, Taplejung, eastern Nepal. *American Journal of Zoological Research* 2(1): 16–21.

**Trageser, S.J., A. Ghose, M. Faisal, P. Mro, P. Mro & S.C. Rahman (2017).** Pangolin distribution and conservation status in Bangladesh. *PLoS one* 12(4): e0175450. <https://doi.org/10.1371/journal.pone.0175450>

**Van, T.N., P. Newton, S. Roberton, D. Bell & L. Clark (2009).** Tapping into Local Knowledge to Help Conserve Pangolins in Viet Nam, pp. 163–168. In: Pantel, S. & S.Y. Chin (eds.). *Workshop on trade and conservation of Pangolins Native to Southeast Asia*, 30 June–2 July 2008.

**Wangmo, L.K., A. Ghosh, S. Dolker, B.D. Joshi, L.K. Sharma & M. Thakur (2025).** Indo-Burmese Pangolin (*Manis indoburmanica*): a novel phylogenetic species of pangolin evolved in Asia. *Mammalian Biology* 2025: 1–8. <https://doi.org/10.1007/s42991-024-00475-7>

**Wu, S.B. & G.Z. Ma (2007).** The status and conservation of pangolins in China. *TRAFFIC East Asia Newsletter* (4): 1–5.

**Wu, S., N. Liu, Y. Zhang & G. Ma (2004).** Assessment of threatened status of Chinese Pangolin (*Manis pentadactyla*). *Chinese Journal of Applied Environmental Biology* 10(4): 456–461.

**Xing, S., T.C. Bonebrake, W. Cheng, M. Zhang, G. Ades, D. Shaw & Y. Zhou (2020).** Meat and medicine: historic and contemporary use in Asia. *Pangolins* 227–239. <https://doi.org/10.1016/B978-0-12-815507-3.00014-9>

**Xu, L., J. Guan, W. Lau & Y. Xiao (2016).** *An Overview of Pangolin Trade in China*. TRAFFIC Briefing Paper. Traffic International, Cambridge, UK, 10 pp.

**Yang, C.W., S. Chen, C.Y. Chang, M.F. Lin, E. Block, R. Lorentsen & E.S. Dierenfeld (2007).** History and dietary husbandry of pangolins in captivity. *Zoo Biology: Published in affiliation with the American Zoo and Aquarium Association* 26(3): 223–230. <https://doi.org/10.1002/zoo.20134>

**Yang, L., M. Chen, D.W. Challender, C. Waterman, C. Zhang, Z. Huo & X. Luan (2018).** Historical data for conservation: reconstructing range changes of Chinese Pangolin *Manis pentadactyla* in eastern China (1970–2016). *Proceedings of the Royal Society B* 285(1885): 20181084. <https://doi.org/10.1098/rspb.2018.1084>

**Zhang, M., A. Gouveia, T. Qin, R. Quan & V. Nijman (2017).** Illegal pangolin trade in northernmost Myanmar and its links to India and China. *Global Ecology and Conservation* 10: 23–31. <https://doi.org/10.1016/j.gecco.2017.01.006>

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