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INTRODUCTION

The serow is an elusive creature that is highly sought after for its meat and parts. Belonging to a mammalian group known as the goat-antelopes, the serow is a bovid species with long legs, pointed ears, a long and coarse-haired coat with a mane of longer, stiff hair on the neck, a relatively bushy tail and short, slightly curved horns with ringed corrugations. Serow taxonomy has been subject to much debate and change over the past few



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RECENT OBSERVATIONS OF THE ILLEGAL TRADE IN SEROWS IN LAO PDR

decades and has yet to be completely resolved. Presently the IUCN Red List of Threatened Species recognizes six species, all within Asia: the Japanese Serow *Capricornis crispus*, Formosan Serow *C. swinhoei*, Sumatran Serow *C. sumatraensis*, Chinese Serow *C. milneedwardsii*, Red Serow *C. rubidus* and Himalayan Serow *C. thar*.

The Japanese Serow (endemic to Japan) and the Formosan Serow (found only in Taiwan) are both classified as Least Concern on the IUCN Red List of Threatened Species (Chiang and Pei, 2008; Tokida, 2008) and have been fairly well studied. In contrast, very little is known of the four remaining species, especially those from South-east Asia. Based on the IUCN Red List assessment, the Sumatran Serow, which is classified as Vulnerable, is considered to be in significant decline across its range (Duckworth *et al.*, 2008a). The Chinese Serow, Red Serow and Himalayan Serow are listed as Near Threatened and also believed to be in decline (Duckworth and MacKinnon, 2008; Duckworth *et al.*, 2008; Duckworth and Than Zaw, 2008), yet surprisingly little attention is given to their plight in the region, or to their current status and conservation needs.

The Chinese Serow is still considered to be relatively widespread in Lao PDR (Duckworth *et al.*, 2008b). Yet in the last decade, the country has emerged as a major hub in the illegal international wildlife trade, which may be attributed to weak environmental laws, poor enforcement and the high levels of corruption that have persisted over the years with little improvement (Martin, 1992; Nooren and Claridge, 2001; Anon., 2015; EIA, 2015; Gomez *et al.*, 2016; Krishnasamy *et al.*, 2016). This trade has been considered for some time now to be the leading threat to numerous species in Lao PDR, with records indicating depletion of taxa as diverse as cats, deer, pangolins, birds, snakes, turtles and even insects across the country (Nooren and Claridge, 2001; Phanthayong, 2008). According to Nooren and Claridge (2001), domestic demand for wildlife in Lao PDR, whether for subsistence, traditional medicine or trade, is high and

increasingly unsustainable, as evidenced by the rarity of species despite the availability of forest habitat.

Serows in South-east Asia are threatened by widespread poaching and illegal trade. Almost everywhere they occur, they are reportedly hunted for their meat and their parts which are used in traditional medicines (Duckworth *et al.*, 2008a; Duckworth *et al.*, 2008b; Duckworth and Than Zaw, 2008). Serow parts have consistently been observed during surveys of wildlife trade in markets and restaurants undertaken across South-east Asia (see: Martin, 1992; Shepherd, 2001; Shepherd and Krishnasamy, 2014). The same has been observed in Lao PDR where serow parts were commonly found in trade in both rural and urban markets (Duckworth *et al.*, 1999). Bones, feet, blood, teeth, innards and other body parts are widely used in local traditional medicine production, while the horns are coveted as trophies. There are also records of cross-border trade in serow parts from Lao PDR to China, Thailand and Viet Nam (Duckworth *et al.*, 1999).



Fig. 1. The distribution of Chinese Serow *Capricornis milneedwardsii*.

Source: IUCN Red List of Threatened Species
(<http://maps.iucnredlist.org/map.html?id=3814>)

This study was undertaken to shed light on the trade and its potential impacts on the remaining wild Chinese Serow populations in Lao PDR, and to make some recommendations for further action to ensure this species is not lost from that country.

CONSERVATION STATUS AND LEGISLATION

The Chinese Serow is the only naturally occurring species of serow in Lao PDR. The species is also native to Cambodia, China, Myanmar, Thailand and Viet Nam (Fig. 1) (Duckworth *et al.*, 2008b). It is currently classified as Near Threatened on the IUCN Red List of Threatened Species, but is nonetheless believed to be in significant overall decline (Duckworth *et al.*, 2008b).

While the Chinese Serow is thought to be widespread, especially in the country's eastern, central and southern mountain ranges where there are relatively large tracts of suitable habitat (Duckworth *et al.*, 2008b, J.W. Duckworth *in litt.*, 2017), little precise information on the conservation status of serow in Lao PDR is available. This lack of data complicates conservation measures, as it has for many other large ungulates in the region (Shepherd and Krishnasamy, 2014), which are thought to be in rapid decline due to over-exploitation to supply markets with meat, antlers, horns and other body parts (Steinmetz, 2010).

In Lao PDR, the Chinese Serow is nationally protected under the *Lao Wildlife and Aquatic Law 2007*. It is listed in the Prohibition category, under which species are defined as “rare, near extinct, high value and (...) of special importance in the development of social-economic, environmental, educational, scientific research”. The unlicensed extraction and/or possession of any animal (or its parts) listed in the Prohibition category is strictly forbidden and could result in a fine of at least LAK400 000 (Lao Kip) (approximately USD24.00) and/or a prison sentence of three months to five years. Lao PDR has been party to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) since May 2004. The Chinese Serow is currently listed in CITES Appendix I, which means that international commercial trade in wild-sourced specimens is prohibited.

METHODS

Market surveys of the open availability of serow items and products were carried out in various locations in the country on three different occasions in 2016 (between 18 and 28 April, 19 and 22 July and 6 and 20 December respectively) in order to provide a snapshot of the trade in serow. The first two surveys took place in Lao's central and northern regions; the third was carried out in the country's southern provinces (Fig. 2). The locations were selected on the basis of previous research into the country's wildlife trade during which outlets offering traditional medicine and fresh meat for sale were visited (Martin, 1992; Nooren and Claridge, 2001; Nijman and Shepherd, 2012; EIA, 2015). These two types of retailer were chosen for their likelihood of having serow items

for sale. Restaurants were omitted from the surveys due to time constraints. Surveyed venues were visited opportunistically, meaning that no predetermined list of venues was used during the surveys. These venues consisted almost exclusively of local markets. In these markets, each individual traditional medicine and fresh meat retailer was considered a “shop”, as were roadside stalls, vendors at bus stations and at tourist attractions such as caves and waterfalls. In some locations, such as Boten Specific Economic Zone and Golden Triangle Special Economic Zone, tourist-oriented traditional medicine and trophy boutiques were surveyed. Only those shops that were found to have serow products for sale are specifically mentioned in this paper.

The wild meat trade in Lao PDR is known to be largely seasonal (Nooren and Claridge, 2001). Although a year-round activity, hunting usually increases during the dry season (Johnson, 2005; Johnson *et al.*, 2010), which runs from November until the end of April. This study's two most intensive surveys took place during that period, suggesting that the wild meat quantities recorded are representative of the annual peak in the country's wild meat trade. Serow items were categorized as ointments (small bottles and large bottles), horns, frontlets (serow plates consisting of a piece of skull with fur and two horns still attached—these horns were considered part of the plate and were not separately counted as horns), skin pieces, skeletal items (bones, joints, jaws and skulls), meat and body parts (manes, hooves, scalps and ears). In cases where large numbers of a particular item were found (this was mostly the case with bottled ointments), exact quantities could not be determined and estimates were made. Horn fragments, which were found in several locations, were counted as full horns because their

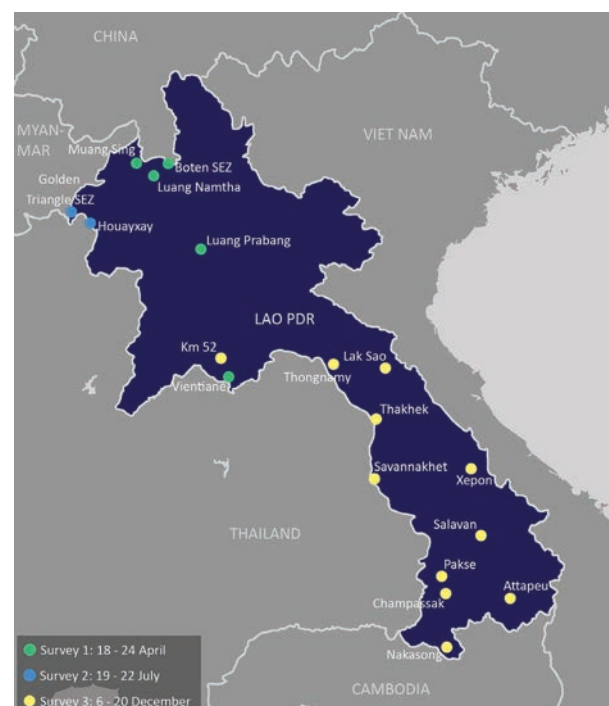


Fig. 2. Survey locations for serow study.

size made it impossible for more than one fragment to originate from a single horn. Information regarding the price and use of the serow products was collected directly from the vendors where possible. Prices were quoted in Lao Kip (LAK) or US Dollar (USD). In the case of the former, a conversion rate of USD1=LAK7963.24 was used (<https://www.oanda.com/currency/converter/>, viewed on 12 January 2017).

RESULTS

Serow items were seen in 59 shops, with a combined total of 1015 individual items recorded (Table 1). Most comprised bottled ointments (approximately 740 bottles of varying sizes). These ointments were confirmed on several occasions to be derived from serow. In some cases the vendor was asked to point out the animal that was used to prepare these ointments in a photographic field guide. Other items observed in relatively large quantities included horns (134), gallbladders (claimed to be from serow) (56) and frontlets (28). Serow items observed were predominantly ingredients for traditional medicine and as such, most items were found in medicine shops (in 50 out of 59 cases). Several frontlets and horns were found in jewellery shops (in seven cases). Serow meat was observed for sale on only two occasions. All items recorded (excluding the ointments) would have been derived from a minimum of 150 serows.

DISCUSSION AND CONCLUSION

Serow items are among the most commonly encountered wildlife-based traditional medicine products in Lao PDR. During household surveys carried out in Luang Namtha province in 2002–2003, 90% of respondents (n=10) stated that serow was the most frequently used animal in traditional medicine production (Johnson *et al.*, 2003), a fact attributable to the depletion of other large mammals



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Pieces of serow skin, bone and jaw, Pakse market (left); serow frontlet, bones and horns for sale, Thongnamy (right), December 2016.

such as Sambar Deer *Rusa unicolor* (Duckworth, *in litt.*, 2017) and several species of wild cattle. The current study's surveys only confirm this; serow was the only species of which items were found at nearly every traditional medicine shop surveyed. In particular, ointments purporting to contain serow were widely observed, often near containers of other serow body parts. These potions are used to heal bone fractures and can be bought for an average price of LAK15 000 (USD1.78) per small bottle. The fact that the items recorded are estimated to originate from at least 150 serows may be considered a worrying finding. It nonetheless remains unclear when these serows were poached (in the case of most medicinal serow items this may have been years ago). As a result, it is difficult to determine the potential conservation impact of the medicinal trade on this species. However, the rate at which comparably sized mammals have seen severe population declines and/or local extinctions/extirpations in Lao PDR and the fact that monitoring efforts are largely absent, are cause for concern. Therefore, increased research into the exploitation of serows for traditional medicine (including inquiries into the turnover rates of serow-based traditional medicine items) seems highly necessary in order to guide future conservation and enforcement efforts. Such research would have to start with interviews with vendors, poachers and consumers.

Serow meat was observed in only two instances, suggesting that serow poaching might play only a relatively limited role in Lao PDR's wild meat trade. However, there are at least three reasons why such a conclusion should not be too hastily drawn. First, the diversity of species encountered during the surveys suggests that poaching for meat in Lao PDR is largely indiscriminate, with hunters harvesting whatever animals they encounter, rather than targeting a specific species. This poses a direct threat to serow which is likely to increase as other species become scarcer. Second, wild meat observations are often coincidental (especially in cases where it is offered on the side of the road). Fresh meat is offered for sale as soon as it becomes available to the vendor, which may be at various times of the day. Because it is perishable, it is sold as fast as possible. Observations should therefore be considered snapshots and not representative of the true extent of the trade. Third, restaurants were omitted from this study's surveys, making it impossible to determine the

Item type	Quantity	No. of shops
Ointment (small bottle)	630 (approx.)	36
Ointment (large bottle)	110 (approx.)	10
Horns	134	25
Gallbladders	56	12
Skin pieces	34*	6
Frontlets	28	13
Skeletal items (bones, joints, jaws and skulls)	13	9
Miscellaneous (manes, hooves, scalps and ears)	8	5
Meat	2	2
TOTAL	1015	59

Table 1. Serow items (per item group) reported during surveys carried out in Lao PDR in April, July and December 2016. *of which 25 pieces were likely to belong to a single specimen. These pieces were observed in a box, were cut into uniform sizes and appeared to involve the same pelt.

levels of serow meat that are traded through this channel. In order to gain a better understanding of the serow meat trade and consumption patterns in Lao PDR, further research is highly recommended. Such research should include interviews with vendors, poachers and consumers and more extensive and frequent surveys of fresh meat markets, roadside stalls and, importantly, restaurants.

Enforcement efforts are currently weak in Lao PDR, allowing the open trade of (inter-) nationally protected species, including the Chinese Serow, to continue unhindered. This was underscored by the abundance and open availability of illegal serow products found in the country's traditional medicine shops. Vendors are generally aware of the illegality of the trade, but do not seem to fear prosecution. When asked about the illegal wildlife trade, a local policeman in the Savannakhet area stated that this is not a priority for local law enforcement, in part because the trade provides nutrition and/or income for the rural population. In the case of serow, hunting and trade is illegal, and therefore should be made a law enforcement priority. Increased enforcement is all the more important because the depletion of other large mammals appears to leave Laotian serows particularly vulnerable.

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