American Journal of Primatology 72:877–886 (2010)

RESEARCH ARTICLE

Exploring Cultural Drivers for Wildlife Trade via an Ethnoprimatological Approach: A Case Study of Slender and Slow Lorises (*Loris* and *Nycticebus*) in South and Southeast Asia

K.A.I. NEKARIS[1,2*], C.R. SHEPHERD[2,3], C.R. STARR[1,4], AND V. NIJMAN[1,2]
[1]*Nocturnal Primate Research Group, Department of Anthropology and Geography, Oxford Brookes University, Oxford, United Kingdom*
[2]*Oxford Wildlife Trade Research Group, Department of Anthropology and Geography, Oxford Brookes University, Oxford, United Kingdom*
[3]*TRAFFIC Southeast Asia, Petaling Jaya, Selangor, Malaysia*
[4]*School of Animal Studies, University of Queensland, Gatton, Queensland, Australia*

Illegal and unsustainable trade in wildlife is a major conservation challenge. For Asian primates, economic and cultural traditions, and increased forest access mean that trade may have become detrimental for certain species. Slow and slender lorises (*Nycticebus* and *Loris*) are primates particularly prevalent in trade, determined until now by focused counts of lorises in regional markets. Here, we use international trade statistics and a participant–observer approach to assess culturally specific drivers for trade in lorises in South and Southeast Asia, to provide a broader context to help mitigate this practice. Analysis of international records for the last 30 years revealed that live animal trade was more prevalent than trade in body parts (slow lorises, 86.4%; slender lorises, 91.4%), with Laos, Cambodia, and Thailand the largest exporters. We then examine drivers of international and domestic trade based on long-term data from 1994–2009 in Sri Lanka, Cambodia, and Indonesia. We show that slender lorises are important in Sri Lankan folklore, but their use as pets and for traditional medicine is rare. Trade in Bengal slow and pygmy lorises in Cambodia for use in traditional medicines, a practice with deeply historical roots, is widespread. Despite its own set of myths about the magical and curative properties of lorises, trade in Javan, Bornean, and greater slow lorises in Indonesia is largely for pets. Conservation practices in Asia are often generalized and linked with the region's major religions and economies. We show here that, in the case of wildlife trade, culturally specific patterns are evident among different ethnic groups, even within a country. Revealing such patterns is the foundation for developing conservation management plans for each species. We suggest some participatory methods for each country that may aid in this process. Am. J. Primatol. 72:877–886, 2010.

Key words: CITES; Lorisidae; participatory approach; pet trade; traditional medicine

INTRODUCTION

Trade in wildlife for medicinal, consumptive, and ornamental purposes, and as pets, is recognized as a major conservation threat [Davies, 2005; Grieser-Johns & Thomas, 2005; Oldfield, 2003]. Although trade is prevalent in the Neotropics [Peres & Palacios, 2007] and Africa [Fa et al., 2002; Rose, 2002], economic conditions, cultural traditions, and changes in widescale agricultural practices with resultant increased access to biodiversity-rich forests mean that trade practices in Asia may be more detrimental to wildlife than on any other continent [Corlett, 2007; Nijman, 2010]. The presence of large-scale markets, poorly policed and offering a wealth of threatened species, seems to be especially prevalent in Asia [Davies, 2005; Oldfield, 2003], and facilitates this trade often to an increasing percentage of wealthy urban dwellers [Corlett, 2007; Nijman & Shepherd, 2007].

Nonhuman primates (hereafter primates) comprise a substantial proportion of traded mammal species in Asia, for both as pets and use in traditional

Contract grant sponsors: Primate Conservation Inc.,; Columbus Zoo; Margot Marsh; Primate Action Fund of Conservation International; People's Trust for Endangered Species; Australian Federation for University Women; TRAFFIC Southeast Asia.

*Correspondence to: K.A.I. Nekaris, Oxford Brookes University, School of Social Sciences and Law, Gipsy Lane, Oxford OX3 0BP, United Kingdom. E-mail: anekaris@brookes.ac.uk

Received 2 August 2009; revised 6 April 2010; revision accepted 6 April 2010

DOI 10.1002/ajp.20842
Published online 4 May 2010 in Wiley Online Library (wileyonlinelibrary.com).

medicines [Davies, 2005; Kavanagh, 1984; Nijman, 2005a,b]. This practice has probably occurred for thousands of years and, in the past, may have been sustainable owing to low extraction levels [Rose, 2002]. The advent of new technologies, including improved transport infrastructure, guns, wire snares, and high-powered search lights with more reliable batteries (for nocturnal hunting), are rapidly making these practices untenable [Wright et al., 2007], particularly for primates, with their characteristic long life histories [Cowlishaw & Dunbar, 2000]. In Asia, more primates are considered Endangered or Critically Endangered than in any other continent, partially owing to the impact of trade [IUCN, 2008]. The nature of illegal wildlife trade, however, can make methodologies with which to study it tricky. Most studies of primate trade involved a typical economic market approach, whereby a researcher enters a market, counts the number of primates seen, and issues a number of questions regarding price, origin, and use of the animals [e.g. Fa et al., 1995; Malone et al., 2002; Nijman, 2005a,b]. Some researchers, however, consider such practices as unethical, especially since revealing illegal practices, even if the respondent is anonymous, may cost them their livelihood. Faced with these dilemmas, a satisfactory system for ethically quantifying the anthropological elements that drive primate trade—e.g. social customs, economic factors, and traditional belief systems—is essential for developing region-specific strategies to curtail this practice [Dolhinow, 2002; Rose, 2002]. The emerging field of ethnoprimatology offers such an approach.

Initiated by Sponsel [1997], the diverse field of ethnoprimatology holistically aims to understand the range of interactions between human–nonhuman primates, including the exploitation of primates for human food, medicine, and as pets. Inspired by the traditional participant–observer approach used for decades by cultural anthropologists, Riley [2006] reviewed a series of ethnographical approaches to quantify human–nonhuman primate interactions. Essentially, a primatologist becomes a social anthropologist, and lives, often for months or years, with a group of local people. Over time, ethnographic techniques can help build an elaborate picture of the relationships between humans and sympatric primates [Cormier, 2002; Riley, 2007]. Techniques include free-listing, whereby participants list all words that belong to a particular category, allowing quantification of common concepts shared among the group; cultural consensus analysis, whereby participant responses to survey questions are assessed to estimate consensus regarding cultural norms; and narrative analysis, whereby people's stories are analyzed for commonalities [Bernard, 2002].

Here, we supplement available figures on lorises in international trade with qualitative data on drivers of this trade obtained through a participant–observer approach during a study of seven species of loris in South and Southeast Asia. Slender (*Loris*) and slow (*Nycticebus*) lorises are nocturnal primates distributed from Sri Lanka to the Philippines (Fig. 1). Almost all lorises are listed as Vulnerable, Endangered, or Critically Endangered [IUCN, 2009]. Decline of these species follows two patterns, with decline in *Loris* linked primarily to habitat loss and decline in *Nycticebus* associated with unsustainable trade [Nekaris & Jayewardene, 2004; Schulze & Groves, 2004]. Written records of the use of lorises as pets and for their parts go back at least 300 years [e.g. Pechuel-Loesche, 1890; Ridley, 1900; Schweitzer, 1688; Still, 1905]; oral traditions suggest that these uses are even older [Horsfield, 1851; Starr, 2010]. A sharp increase in national and international market demand for slow lorises [Malone et al., 2002; Nekaris & Jaffe, 2007; Ratajszczak, 1998; Stich & Krüger, 2002] resulted in the transferal of all species of *Nycticebus* to Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) [Nekaris & Nijman, 2007].

Here, we first present an overview of recorded international trade in *Loris* and *Nycticebus*. Such analysis, however, does not provide insight into why trade takes place. We then present data collected via a participatory approach in three range countries, Sri Lanka, Cambodia, Indonesia, to examine prevalence of lorises in folklore and how the use of lorises by humans differs in these countries. We demonstrate how an ethnoprimatological approach of trade in lorises reveals culturally specific patterns

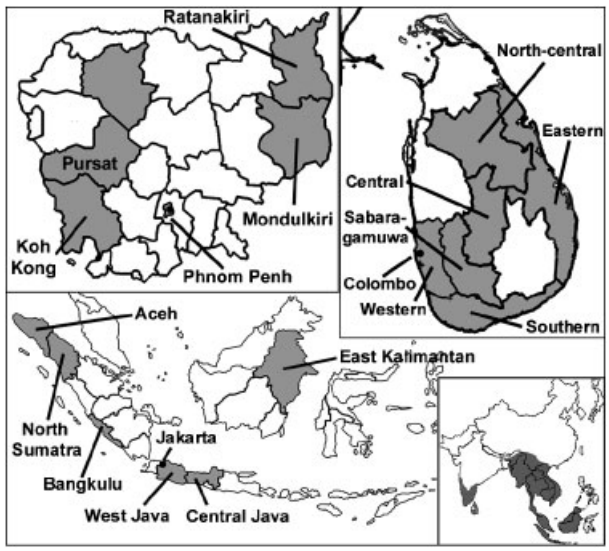

Fig. 1. Maps of the three countries, provinces, and capital cities reviewed in this study, within inset showing their position in Asia and in grey tones the geographic ranges of slender lorises [Southern India and Sri Lanka to the left] and slow lorises [remainder of Asia, right]: (clockwise from upper left) Cambodia, Sri Lanka, Indonesia.

regarding the use of these species that have direct impacts on their long-term conservation prospects.

METHODS

International Trade Analysis

For an overview of international trade on lorises, we present data from UNEP-WCMC CITES database (http://www.unep-wcmc.org/citestrade). This database provides all records of import, export, and reexport of CITES-listed species as reported by Parties to CITES. We focus on the period 1978–2007 (inclusive) with 2007 being the last year for which data are available, and focus on all 15 loris range countries (Sri Lanka, India, Bhutan, Bangladesh, Myanmar, China [excluding Taiwan, Hong Kong, and Macau], Thailand, Cambodia, Laos, Vietnam, Malaysia, Singapore, Indonesia, Brunei Darussalam, and the Philippines).

We follow the taxonomy of Nekaris and Bearder [2007] that recognizes seven species of slender and slow lorises. However, it should be noted that both in trade and field, not all these species are always recognized. The UNEP-WCMC CITES database recognizes only three species: *Nycticebus coucang* (comprising *N. coucang*, *N. javanicus*, *N. menagensis*, and *N. bengalensis*, and before 1985 *N. pygmaeus*), *N. pygmaeus* (after 1985), and *Loris tardigradus* (comprising *L. tardigradus* and *L. lydekkerianus*). Unidentified slow lorises are listed as *Nycticebus* spp. We distinguished between live trade vs. trade in animal parts (skull, skin, bodies, etc.); excluded are ''specimens,'' as this may refer to live individuals or e.g. hair samples and ''unspecified.'' Animals or parts may be imported and reexported, or individuals may go on international ''breeding loans''; when this occurred within the period of one calendar year, the individual was not counted twice. If these transfers occur over different years, the UNEP-WCMC CITES database does not allow us to identify this and, hence, these specimens may have been included twice; however, these would represent few of the total number.

Ethnoprimatological Data Acquisition

In order to understand potential cultural drivers of trade, we review the literature and provide narratives regarding lorises in three countries where we have employed long-term participatory data collection methods. The species we studied, the period of the fieldwork, and intensity of trade-specific surveys are detailed in Table III.

We convert data collected on numbers of animals sold in markets [Nekaris & Jawewardene, 2004; Shepherd et al., 2005; Starr, 2010] to ordinal categories for interspecific and intercountry comparison. These data provide a framework for narratives regarding lorises collected via our ethnoprimatological approach. Over the research period, we worked closely with hundreds of local informants in source villages, trade hubs, wildlife markets, and animal rescue centers through a participant observation approach. This allowed us to record stories and local people's beliefs regarding lorises, as well as to observe people's behavior toward lorises [Sandelowski, 1991]. The anecdotes we present here are not an attempt to quantify the prevalence of certain beliefs, but to document their existence in order to present a broad scale comparison across the three countries [Tedlock, 1991]. All authors are proficient in the languages of the countries where he/she worked longest, and thus discussions were normally conducted in the local language without the aid of a translator. The authors usually built rapport with people that use lorises, including traders and middlemen, by showing an interest in all aspects of the trade (i.e. not only lorises) [c.f. Bernard, 2002; p 368–369]. All studies involving human participants were approved by Ethical Review Committees of Oxford Brookes University [UREC, 2010], the University of Queensland [NHMRC, 1999], and studies of the animals followed the guidelines put forth by the Animal Behavior Society and the Association for the Study of Animal Behaviour [Anonymous, 2006], and the American Society of Primatologists principles for the ethical treatment of primates.

RESULTS

International Trade

Slow and slender lorises were traded in significant quantities both as live individuals and body parts (Table I; Fig. 1). In terms of absolute numbers, trade in slow lorises was on an order of magnitude higher than that of slender lorises. Trade in live lorises was more prevalent with only 13.6% of slow lorises and 8.6% of slender lorises traded as body parts. In general, trade from 1998–2007 compared with 1978–1997 was lower for all species but *N. pygmaeus*. The proportion of trade that comprises body parts remained relatively stable over time.

Although trade remained relatively consistent over time, clear differences are evident between exports from different countries (Table II). The highest levels of international trade are recorded from Laos, Cambodia, and Thailand, followed by Singapore and Malaysia. Both Indonesia and China show low levels of international trade, certainly relative to known domestic trade [Malone et al., 2002; Shepherd et al., 2005; Wenjun et al., 1996; Zhang et al., 2008]. In particular, Thailand and Cambodia export a high proportion of loris parts, whereas Malaysia and Singapore seem to export only live animals. Of the range countries, Singapore is the only significant reexporter, with Japan as its main trading partner. The main importing countries are Japan (641), United States (302, but note that 161 of these comprise confiscated items), and the European

TABLE I. International Trade in Slow and Slender Lorises Showing the Average Number of Individuals Traded Annually Alive and as Parts (Bodies, Skins, Skulls), Averaged Over 10-Year Blocks

	Slow loris						Slender loris	
	Nycticebus coucang		*Nycticebus pygmaeus*		*Nycticebus* spp.		*Loris* spp.	
Period	Live	Parts	Live	Parts	Live	Parts	Live	Parts
1978–1987	55.8	1.4	16.3	0	–	–	5.0	0.5
1988–1997	57.1	8.1	5.3	0.8	–	–	3.9	0.4
1998–2007	4.7	7.2	9.1	0.5	0	3.5	0.6	0

Note that *N. coucang* comprises *N. coucang*, *N. bengalensis*, *N. menagensis*, and *N. javanicus*.

TABLE II. International Trade in Slow and Slender Lorises From Range Countries

		Slow loris			Slender loris	
Country	Species present	*N.coucang*	*N.pygmaeus*	*Nycticebus* spp.	*L.tardigradus*	Parts (%)
Sri Lanka	*L. tardigradus*/*L. lydekkerianus*	–	–	–	32	0
India	*L. lydekkerianus*/*N. bengalensis*	2	–	–	6	25
Bhutan	*N. bengalensis*	0	–	–	–	–
Bangladesh	*N. bengalensis*	0	–	–	–	–
Myanmar	*N. bengalensis*/*N. coucang*	2	–	–	–	0
China	*N. bengalensis*	34	–	–	–	0
Thailand	*N. bengalensis*/*N. coucang*	133	2	12	3	36
Cambodia	*N. bengalensis*/*N. pygmaeus*	126	6	17	–	57
Laos	*N. bengalensis*/*N. pygmaeus*	511	12	23	1	8
Vietnam	*N. bengalensis*/*N. pygmaeus*	6	48	–	–	6
Malaysia	*N. coucang*/*N. menagensis*	75	–	–	–	0
Singapore	*N. coucang*	99	–	–	–	0
Indonesia	*N. coucang*/*N. menagensis*/*N. javanicus*	6	–	–	–	17
Brunei	*N. menagensis*	0	–	–	–	
Philippines	*N. menagensis*	2	–	–	–	0

The second column gives the species that are present in the respective countries and the subsequent columns give the species names as used in the UNEP-WCMC CITES database. Percentage of total trade that comprises body parts is indicated for each country. Zeros are presented when no trade is reported for species present in the country; dashes indicate when a species is not present or traded in the country.

Union (232, including 39 confiscated items), whereas the main exporting countries are Laos (575, including 65 confiscated items) and a non-range country, Hong Kong (210 of which 171 are confiscated items). Of the 400 illegal imports, 122 refer to body parts, 238 to live individuals, and 40 to unspecified items.

From the data presented in Table II, we estimated the minimum number of individuals exported for each of the seven species of loris. The two species that are most traded for their parts are *N. bengalensis* and *N. pygmaeus*. Data from Cambodia, Laos, and Vietnam indicate that 13% of international trade in *N. bengalensis* is as body parts ($N = 643$) compared with 56% ($N = 66$) for *N. pygmaeus*.

Ethnoprimatological Case Studies

Sri Lanka

Slender lorises are prevalent in the folklore of the two major ethnographic groups of the country—Sinhalese and Tamil. Historically, slender lorises had a variety of uses in traditional medicines by Sinhalese and Tamils, including wearing the bones or plucked hairs as talismans against the evil eye (a look from another person that can cause bad luck), eating the flesh to cure leprosy, and using the eyes as a love potion [Tennent, 1861]. This latter practice was accomplished by holding the animal above a fire until its eyes burst to collect the tears. Indeed, this practice is also probably linked to the proverb ''tears will not come from the eye of a loris''—a statement analogous to ''blood cannot be drawn from a stone'' [Still, 1930]. These tears, in addition to having medicinal properties, could be used to see a deity that would bestow riches on the observer. Slender lorises were also considered to bring ill luck, especially when leaving on a journey [Perera, 1917]. Although British residents of Ceylon considered them desirable pets [Still, 1905], a more prevalent view among Sri Lankans is that they are ugly creatures, a sentiment also present in a proverb—the young loris is a gem to its mother, meaning only a mother could love it. Similarly, loris is a derogatory term to describe a thin person

[Somander, 1969; Tennent, 1861]. Lorises are also widely known as the only animal quiet enough to be able to stalk a peafowl in its roost, eating only its brain [Still, 1930; Tennent, 1861].

Data collected during the study period indicate that domestic trade in slender lorises was virtually non-existent (Table III). We never recorded any trade in slender loris specimens, and encountered only five individuals kept as pets, all in the north of the country [Nekaris & Jawewardene, 2004; Fig. 2A]. Indeed, in the Eastern Province, an informant was against keeping lorises as pets, as she believed it would bring trouble from the servants. Despite lack of observations of lorises, people reported collecting them from the forest to use them personally for traditional medicines. Our informants revealed that rituals found in the historical literature are still practiced. In the Central Province, informants used the fur of slender lorises to accelerate the healing of wounds, their bones to ward off the evil eye, and one individual reported shooting two lorises to use their meat to treat a stomach ache. Informants in the Southern Province remembered their elder relatives using the eyes of the loris as an aphrodisiac or to cure eye disease, extracting the tears in the manner described above, but stated that this practice had ceased. They also described the loris as evil, said they were kept by gypsies as omens of bad luck, and noted that if one heard a loris upon waking or before leaving on a journey one would have bad luck.

Traditional beliefs may also drive people to kill lorises on sight. In North Central Province, a forest guard reported lorises may be stoned to death owing to a belief that they are witches. Another informant proclaimed that she always killed a loris upon encountering one, as they are ugly skeletons with skin. When discussing lorises with colleagues and villagers, these practices were common knowledge,

Fig. 2. Slender and slow lorises in trade: grey slender loris *Loris lydekkerianus* kept as pet in Sri Lanka (upper left panel: photo KAI Nekaris), greater slow loris *Nycticebus coucang* for sale at animal market in Sumatra, Indonesia (lower left panel: photo KAI Nekaris), and pygmy slow loris *N. pygmaeus* stretched and dried for sale for traditional medicine in Cambodia (right panel: photo CR Starr).

TABLE III. Overview of Trade in Slender and Slow Lorises (*Loris* and *Nycticebus*) in Selected Sites in Sri Lanka, Cambodia and Indonesia, Based on Surveys Conducted Between 1994 and 2009

					Levels of trade	
Country	Province	Number of months (period)	Survey intensity	Species	Dead	Alive
Sri Lanka	Southern and Sabaragamuwa	20 (2001–2006)	Intermediate	*L. tardigradus*	Low	Low
	Western	9 (2001–2007)	Low	*L. tardigradus*	Low	Low
			Low	*L. lydekkerianus*	Low	Low
	North-central and Eastern	7 (2001–2007)	Low	*L. lydekkerianus*	Low	Low
	Central	3 (2001–2004, 2007)	Low	*L. tardigradus*	Low	Low
Cambodia	Phnom Penh	5 (2006–2009)	High	*N. bengalensis*	Very high	Low
				N. pygmaeus	High	Low
	Mondulkiri	10 (2008–2009)	High	*N. pygmaeus*	Very high	Low
	Ratanakiri	1 (2006–2009)	Low	*N. pygmaeus*	Very high	Low
	Pursat and Koh Kong	2 (2006–2009)	Low	*N. bengalensis*	Intermediate	Low
			Low	*N. pygmaeus*	Intermediate	Low
	Siem Riep	2 (2006–2009)	Low	*N. bengalensis*	Intermediate	Low
Indonesia	North Sumatra	63 (1997–2009)	High	*N. coucang*	Low	Very high
	West and Central Java	36 (1994–2007)	Intermediate	*N. coucang*	Low	Very high
			Intermediate	*N. javanicus*	Low	High
	East Kalimantan	13 (1996, 1999–2004)	Low	*N. menagensis*	Low	Low

Key: Survey intensity: low, several surveys in a limited number of locations more than one or more years; intermediate, multiple surveys in several locations mostly more than 2 years; high, regular, often systematic, surveys over several years; Levels of trade: low, nonexistent or mostly one individual traded irregularly; intermediate, occasionally one to three recorded; high, one to three consistently recorded, or occasionally four to ten recorded; very high, consistent availability with more than ten at a time recorded regularly.

even if the informant did not use them him/herself. More often, however, people described lorises as shy, innocent, and rarely seen.

Slender lorises are fully protected by Sri Lanka's Fauna and Flora Protection Ordinance. Killing, wounding, setting traps, keeping pets, possessing body parts, selling, or even caring for sick or wounded animals is subject to imprisonment for 2–5 years and/or fines not less than USD 90 and not exceeding USD 260. Participants in our study keeping lorises (or other animals) as pets were never convicted, suggesting that enforcement may be low. Informants strongly believed that the prevalence of the Buddhist religion in Sri Lanka was the reason for limited wildlife trade.

Cambodia

In stark contrast to Sri Lanka, Cambodia's slow lorises are among the most commonly observed and requested mammals in traditional medicine stores (Table III; Fig. 2C). Although we could not locate any historic records of trade or folklore, recent research consistently shows their availability in domestic trade is common and widespread. During the 1990s, researchers observed up to 204 lorises in a single store in the capital Phnom Penh [Bezuijen, 1994]. Forestry Administration-Wildlife Alliance confiscated 234 lorises from 2002 to 2006 (N. Marx, personal communication). In 2007, up to 30 dried animals were openly displayed at a wildlife market in Mondulkiri Province [Starr, 2010]. Village traders reported high sale turnover of lorises, claiming it was often difficult to meet the demand. One reported selling approximately 1,200 pygmy lorises during 2001–2002.

Slow lorises are prized in Cambodia by traditional Khmer medicine practitioners who claim they cure 100 diseases. Primary users are women who consume a loris rice wine tonic following childbirth, but lorises also have long been used by Khmer and minority groups for the healing of wounds, broken bones, and treatment of sexually transmitted diseases and asthma. Village elders in Pursat-Koh Kong Provinces reported that the gall bladder of Bengal slow lorises was used historically as an ink in tattoos. Our informants saw no benefit of keeping lorises as pets, for they considered them to be ugly and to have a painful bite.

Our informants told us that formerly lorises were caught opportunistically, such as when a tree was felled. As demand by middlemen purchasing lorises for city dwellers has increased, so has capture of lorises. Bunong ex-loris hunters of Mondulkiri Province reported that while collecting other wildlife, they opportunistically took a loris if encountered by shaking a tree or catching it by hand, and then beat it to death with a stick. Ex-hunters thought lorises had medicinal powers, partly because killing a loris requires several blows. They also believed that if a loris fell from a tree and broke its arm, it would heal instantly and the animal could climb back into the tree, and that seeing a large loris at the beginning of a hunting trip would hamper the capture of other wildlife. Ex-hunters reported the benefits of catching lorises include the fact that they are easy to capture, there is little danger to the hunter (in contrast to larger animals), no equipment is required (such as snares or guns), they are easily transported, lorises are rarely confiscated by authorities, and a profit can be made.

Once caught, the hunter saws the loris in half, pins the loris on bamboo, and dries it over a fire. Buyers prepare lorises in their own homes on recommendation from their traditional medicine practitioner. Depending on the disease they treat, a loris may be prepared with rice wine, as a powder, or just the hair is used. These parts are combined with alcohol, honey, or charcoal. During a study of pygmy lorises in Mondulkiri Province in 2008–2009, 4 of 13 study animals were hunted. Radio collars allowed identification of these animals in nearby villages, where they were being processed for traditional medicine as described above.

In Cambodia, slow lorises are on the protected species list and prohibited to catch, hunt, poison, or transport them, with penalties for law breakers of 1 month imprisonment and fines of USD 2.5–250. Park rangers and police openly admitted to purchasing lorises themselves for traditional medicines. A major seller of loris parts in Mondulkiri Province was the wife of a police officer, highlighting the lack of enforcement.

Indonesia

Historical reports from Indonesia echo the feelings toward lorises seen in Sri Lanka and Cambodia. In Bengkulu Province, Sumatra, a fable recounts that ''once the slow loris was the only primate with a long tail. The other primates told him that his tail was so long that he could share it with them without any harm. Pitying the other primates the loris gave his tail to the monkeys bit by bit leaving nothing for him.'' The moral of the story is if you always help everyone, someone will abuse it [Helfrich, 1895]. In the North Sumatra Province, local people believed that burying lorises under the foundations of a house would bring good luck and that body parts of lorises could be used to curse enemies. Kruijt [1906] presents an ancient tradition in Java where putting a small piece of loris skull in a water jug would make one's husband more docile and submissive, just as the slow loris is during daytime. In interior Indonesian Borneo, the loris is said to be the gatekeeper to the heavens, with each human having his/her own loris awaiting him/her in the afterlife [Kruijt, 1906; Perelaer, 1870]. Nursahid and Purnama [2007] documented beliefs of eating slow loris meat as an aphrodisiac to increase ''male power.'' Anonymous [2008] mentions the use of loris oil (''minyak kukang'') used for traditional medicine and as a love potion.

More than mythical creatures or being useful in medicine, however, slow lorises are most popular as pets (Fig. 2B). In Indonesia, slow lorises are among the most commonly traded legally protected primates [Nekaris & Nijman, 2007]. Although occasionally vendors and buyers suggest that their meat may be used as a cure or relief from asthma, we never observed any slow loris body parts for sale in Indonesia. The majority of lorises we observed had their anterior teeth doctored or removed with pliers or nail clippers to be sold as ''tame.'' In the Medan bird market in North Sumatra, greater slow lorises were offered for sale in a consistently and omnipresent manner [Shepherd et al., 2005]. During 59 monthly surveys, 714 slow lorises were recorded (an average per survey of $12.1 \pm$ sd 9.2), which, based on recorded monthly turnover, represent an absolute minimum of 237 individuals. Based on the turnover reported by traders, the real number is more likely to approach the low thousands. Although in some months no lorises were present, frequently 15–45 were seen, with the majority reported to be sourced locally [Shepherd et al., 2005].

As in Cambodia, trade in lorises is considered profitable, and hunters in Sumatra, Java, and Borneo all reported that if they see one in the forest they will always catch it. A common method for catching lorises is by climbing a tree with a stout V-shaped stick. The stick is rapidly placed over the loris' neck, immobilizing it. As lorises are not profitable dead, this method is safer than shaking them out of a tree. A common time to procure lorises is when forests are felled for housing or e.g. oil palm (*Elaeis guineensis*) plantations. Informants in Aceh Province reported that they collected lorises from the felled timber and saved them for the ''loris man,'' who then transported them to a city for sale. Traders in Kalimantan and Aceh reported that they obtained lorises from timber merchants; a loris' tendency to cling to branches rather than flee means that they can be transported hundreds of miles clinging to already felled trees.

The trade in slow lorises, and indeed in other species, is carried out openly in cities, such as Medan, Jakarta, and Surabaya, indicating a lack of enforcement efforts on the part of the local authorities. Vendors spoke freely about how they obtained the animals, discussed usages, prices, and how many they sold over time. The markets are open daily, in a specifically designated part of town. Although all species of slow loris are protected by Indonesian law with penalties of up to 5 years imprisonment and fines of up to USD 10,000, clearly there was no incentive to conceal trade in these animals.

DISCUSSION

We show that in Sri Lanka, Cambodia, and Indonesia the use of lorises follows culturally specific patterns, and that while the descriptive narratives clearly differ regarding cultural beliefs of lorises there are also commonalities. Although our approach did not always allow us to quantify these differences, it provides guidance to develop a long-term conservation strategy for lorises in different countries. Below, we outline various points to consider in developing such strategies, which will differ based on whether lorises are used as medicine, pets, or have an important position in local folklore [Jacobson et al., 2006].

Our analysis of the UNEP-WCMC CITES database reveals different patterns regarding the trade in slender and slow lorises, with striking variation between countries in volume exported and usage. The ease of smuggling lorises and a focus on confiscating higher profile species means these numbers are just the tip of the iceberg in terms of international trade. Recognizing the limitations of relying on officially reported levels of international trade in assessing its overall impact on lorises, we focused on three countries. Through our long-term research in Sri Lanka, Cambodia, and Indonesia, we found marked differences in attitudes and beliefs toward lorises, making conservation in each country challenging at all societal levels.

Sri Lanka's reports of moderate levels of international trade in live lorises correspond to our findings of low levels of domestic trade. Although limited personal use of lorises for pets and medicine persists, intense habitat loss and forest fragmentation pose major conservation issue [Dasken, 2005; Nekaris & Jawewardene, 2004]. Although perceptions of Sri Lankan lorises may seem to be negative, lorises are considered by others to be ''redolent of the mystic aspect of'' the Sri Lankan jungle [Somander, 1969, p 300]. Arnell [2009] interviewed Sri Lankan wildlife enthusiasts and found that they considered the slender loris as a flagship species to represent Sri Lanka's small rainforest fragments. Their attitude was based on a desire to see this rare but locally well-known primate in the wild. In this case, prevalence in local folklore is having a positive affect on slender loris conservation.

Cambodia, also home to two species, reports high levels of international trade, mostly traded as body parts. This concurs with findings of ourselves and others of high levels of domestic trade, mostly for medicinal purposes [Baird, 1993; Broad, 1994; Martin & Phipps, 1996; Stich & Krüger, 2002; Walston, 2005]. Trade differed markedly across provinces. This may reflect cultural differences, but the rarity or local extinction of slow lorises in western Cambodia may also be a causal factor [Rogers, 2009]. Both Cambodian species are currently listed by the IUCN as Vulnerable, based mainly on habitat loss. A recent survey of Bengal slow lorises throughout their range in Cambodia found no animals at most sites [Rogers, 2009] while

pygmy lorises are showing a similar downward trend [Starr et al., in press]. In both these studies, trade seemed to play a major factor in low abundance. Lack of access to modern medicines, poverty, and lack of infrastructure all exacerbate the need for continued reliance on traditional medicines in remote villages [Dasgupta et al., 2005]. Furthermore, belief systems are so strong that users of loris medicine show a strong reluctance to use western alternatives [Starr et al., 2010]. Wealthy city dwellers further perpetuate domestic trade, providing an important source of income for rural hunters and traders [Starr, 2010]. A first step toward educating local people to use more sustainable medicines may be through scientific testing of the healing properties of loris-based remedies [Alves & Rosa, 2005] and the sympathetic introduction of synthetic alternatives [von Hippel et al., 2005]. Interestingly, during our study, we observed lorises consuming fruits with well recognized medicinal properties. Perhaps, deeper ethnographic inquiry would reveal this as the source for the belief that lorises offer the same properties.

Indonesia's three loris species are currently listed as Endangered (*N. javanicus*) and Vulnerable (*N. coucang* and *N. menagensis*). Indonesia reports low levels of international trade, yet we observed large numbers for sale as pets. True levels of international trade are probably significantly higher [cf. Nijman, 2005a,b, 2006]. The popularity of lorises as pets is not surprising from a western point of view. Descriptions of them from literature for the last two centuries highlight the traits that make them so appealing, using terms such as charming, beautiful, and engaging [Horsfield, 1851; Still, 1905]. Other features of lorises, however, including their strong odor and potentially lethal bite [Alterman, 1995], are being used in public education sessions to dissuade people from keeping them as pets [Parish & Nekaris, 2008]. In Indonesia, high-profile protected animals, such as orangutans *Pongo abelii* and *P. pygmaeus*, and to a lesser extent gibbons, *Hylobates* spp., are now rarely seen on sale in open markets, possibly owing to lobbying and intervention by NGOs that took up their cause [Nijman, 2005a,b, 2006]. Since the transferal of *Nycticebus* to CITES I, a number of NGOs with programs focusing on lorises have emerged in Indonesia that target public education and prosecution of offenders [Anonymous, 2008]. Keeping pets, especially birds, is deeply ingrained in Indonesian culture [Nijman et al., 2009], and the challenge is to channel this affection away from wild-caught individuals and to persuade people to value domesticated animals (including exotics) instead.

A few cases do show that it is possible to reduce and regulate primate trade and provide a framework that loris range countries may also follow. For example, international trade in rhesus macaques (*Macaca mulatta)* from India and in owl monkeys (*Aotus* sp.) from Peru and Colombia almost came to a halt after their governments implemented a fully enforced ban on trade [Maldonado et al., 2009; Southwick & Siddiqi, 1994]. Mares and Ojeda [1984] outline the difficulties of establishing such bans, especially when faced with lack of local infrastructure, capacity, and corruption, a pattern found also in many loris range countries. The current laissez faire attitude, where trade in protected wildlife is not considered a problem, not even by the authorities that should uphold the wildlife protection laws, is detrimental to the survival of rare or slow reproducing species, such as slow lorises. The law enforcement hierarchy in loris range countries needs to be targeted to persuade officials to convict wildlife traders that break existing laws, and attention needs to be given to providing incentives for law enforcers to carry out their duties with greater efficiency.

The emerging field of ethnoprimatology is fundamentally concerned with human–nonhuman primate interconnections [Sponsel, 1997] and has hitherto mostly been studied at the local level, i.e. assessing and documenting how populations of sympatric human and nonhuman primates coexist. At a global level, however, attitudes toward the protection of primates, and the levels of persecution they face, largely differ [Cowlishaw & Dunbar, 2000; Wolfe & Fuentes, 2007]. Although there have been reports of trade in slow lorises from Cambodia [Stich and Krüger, 2002], Indonesia [Malone et al., 2002; Shepherd et al., 2005], and throughout Asia [Schulze & Groves, 2004], we found that our narrative approach resulted in critical insight into the cultural context of loris trade. Conducting rapid counts of animals in markets may give us an idea of the proximate causes of trade. We hope we have demonstrated, however, that learning the local language, building rapport with traders, and spending long periods at each locality along the supply chain allowed us to uncover the ultimate causes of trade. It is only with such data that the trade mitigation programs discussed above can be implemented.

Although recent studies have shown a massive escalation in levels of hunting in Asia [Corlett, 2007], others suggest that the use of animals for meat is somewhat lower in Asia than in other parts of the world, partially because the major Asian religions (Hinduism, Buddism, Islam) tend to be tolerant toward primates [Cowlishaw & Dunbar, 2000]. Our study highlights the importance of recognizing regional differences within Asia as well. We urge other researchers not to disregard beliefs as ''just-so-stories'' and to consider them instead as a mode to enhance culturally sensitive conservation practices.

ACKNOWLEDGMENTS

We thank Á. Fuentes and K. Hockings for inviting us to contribute to this issue, and P. Garber for his patience throughout the editorial process. We

thank A. Brindle for producing the map. Fieldwork practices were approved by the Ethics Review Board of Oxford Brookes University and the University of Queensland Behavioural and Social Sciences Ethical Review Committee, and work in Indonesia formed part of an agreement between TRAFFIC and the Ministry of Forestry. Our work in Sri Lanka is supported by grants from Primate Conservation Inc., Columbus Zoo, Margot Marsh and Primate Action Fund of Conservation International, and the People's Trust for Endangered Species (to Nekaris), in Cambodia by a grant from the Australian Federation for University Women (to Starr), and Indonesia by TRAFFIC Southeast Asia (to Nijman, Shepherd). We thank three reviewers for comments and suggestions for improvement.

REFERENCES

Alterman L. 1995. Toxins and toothcombs: potential allospecific chemical defenses in *Nycticebus* and *Perodicticus*. In: Alterman L, Doyle GA, Izard MK, editors. Creatures of the dark: the nocturnal prosimians. New York: Plenum Press. p 413–424.

Alves RNR, Rosa IL. 2005. Why study the use of animal products in traditional medicines? Journal of Ethnobiology and Ethnomedicine 1:5. DOI: 10.1186/1746-Q5 4269-1-5.

Anonymous 2006. Guidelines for the treatment of animals in behavioural research and teaching. Animal Behaviour 71:245–253.

Anonymous 2008. Vet describes plight of Indonesia's primates. IPPL Newsletter 35:7–8.

Arnell A. 2009. Introducing the ''Rowboat'' concept: a novel surrogate species for the conservation of fragmented habitats. M.Sc. Thesis, Oxford Brookes University.

Baird I. 1993. Logging and lorises in Cambodia. IPPL News 20:19–20.

Bernard RH. 2002. Research methods in anthropology: qualitative and quantitative methods. Walnut Creek: AltaMira Press.

Bezuijen MR. 1994. Observations of the trade in wildlife products in medicine shops of street 166, Phnom Penh, Cambodia. Phnom Penh: IUCN Cambodian Liaison Office.

Broad S. 1994. Trip report: Phnom Penh, Cambodia. Petaling Jaya: TRAFFIC Southeast Asia.

Corlett RT. 2007. The impact of hunting on the mammalian fauna of tropical Asian forests. Biotropica 39:292–303.

Cormier LA. 2002. Monkey as food, monkey as child: Guaja symbolic cannibalism. In: Fuentes A, Wolf L, editors. Primates face to face: conservation implications of human-nonhuman primate interconnections. New York: Cambridge University Press. p 63–84.

Cowlishaw G, Dunbar R. 2000. Primate conservation biology. Chicago: The University of Chicago Press.

Dasken CD. 2005. The human impact on rain forests in Sri Lanka: the case of ''Sinharaja'' rainforest reserve. Acta Geographica-Trondheim Series A(10):49–63.

Dasgupta S, Deichmann U, Meisner C, Wheeler D. 2005. Where is the poverty–environment nexus? Evidence from Cambodia, Lao PDR, and Vietnam. World Development 33:617–638.

Davies B. 2005 Black market: inside the endangered species trade in Asia. Berkeley: Ten Speed Press.

Dolhinow P. 2002. Anthropology and primatology. In: Fuentes A, Wolf L, editors. Primates face to face: conservation implications of human–nonhuman primate interconnections. New York: Cambridge University Press. p 7–24.

Fa JE, Juste J, Perez del Val J, Castroviejo J. 1995. Impact of market hunting on mammal species in Equatorial Guinea. Conservation Biology 9:1107–1115.

Fa JE, Peres CA, Meeuwig J. 2002. Bushmeat exploitation in tropical forests: an intercontinental comparison. Conservation Biology 16:232–237.

Grieser-Johns A, Thomson J. 2005. Going, going, gone: the illegal trade in wildlife in East and Southeast Asia. Washington: World Bank.

Helfrich OL. 1895. Serawajsche en Besemahsche spreekwoorden, spreekwijzen en raadsels. The Hague: M Nijhoff.

von Hippel W, von Hippel FA, Chan N, Cheng C. 2005. Exploring the use of Viagra in place of animal and plant potency products in traditional Chinese medicine. Environmental Conservation 32:235–238.

Horsfield T. 1851. A catalogue of the mammalia in the museum of the East India Company. London: J&H Cox.

IUCN 2008. Eaten to extinction. Press release of the IUCN primate specialist group. Accessed at http://www.primate-sg.org/RL08.news.htm on 30 July 2009.

IUCN 2009. IUCN red list of threatened species. Version 2009.2. Accessed at http://www.iucnredlist.org on 11 February 2010.

Jacobson SK, McDuff MD, Monroe MC. 2006. Conservation education and outreach techniques: a handbook of techniques. Oxford: Oxford University Press.

Kavanagh M. 1984. A review of the international primate trade. In: Mack D, Mittermeier RA, editors. The international primate trade, vol. 1. Washington, DC: TRAFFIC (USA).

Kruijt AC. 1906. Het animisme in den Indischen Archipel. The Hague: Martinus Nijhoff.

Maldonado AM, Nijman V, Bearder SK. 2009. Trade in night monkeys *Aotus* spp. in the Brazil–Colombia–Peru tri-border area: international wildlife trade regulations are ineffectively enforced. Endangered Species Research 9:143–149.

Malone NP, Purnama AR, Wedana M. 2002. Assessment of the sale of primates at Indonesian bird markets. Asian Primates 8:7–11.

Mares MA, Ojeda RA. 1984. Faunal commercialization and conservation in South America. BioScience 34:580–584.

Martin E, Phipps M. 1996. A review of wild animal trade in Cambodia. TRAFFIC Bulletin 16:45–60.

Nekaris, KAI, Bearder SK. 2007. The strepsirrhine primates of Asia and Mainland Africa: diversity shrouded in darkness. In: Campbell CJ, Fuentes A, MacKinnon KC, Panger M, Bearder SK, editors. Primates in perspective. Oxford: Oxford University Press. p 24–45.

Nekaris KAI, Jaffe S. 2007. Unexpected diversity of slow lorises (*Nycticebus* spp.) within the Javan pet trade: implications for slow loris taxonomy. Contribution to Zoology 76:187–196.

Nekaris KAI, Jawewardene J. 2004. Distribution of slender lorises in four ecological zones in Sri Lanka. Journal of Zoology 262:1–12.

Nekaris KAI, Nijman V. 2007. CITES proposal highlights rarity of Asian nocturnal primates (Lorisidae: *Nycticebus*). Folia Primatologica 78:211–214.

NHMRC 1999. National statement on ethical conduct in research involving humans. Canberra: Commonwealth of Australia.

Nijman V. 2005a. In full swing: an assessment of trade in orang-utans and gibbons on Java and Bali, Indonesia. Petaling Jaya: TRAFFIC Southeast Asia.

Nijman V. 2005b. Hanging in the balance: an assessment of trade in orang-utans and gibbons in Kalimantan, Indonesia. Petaling Jaya: TRAFFIC Southeast Asia.

Nijman V. 2006. In-situ and ex-situ status of the Javan gibbon and the role of zoos in conservation of the species. Contribution to Zoology 75:161–168.

Nijman V. 2010. An overview of international wildlife trade from Southeast Asia. Biodiversity Conservation 19:1101–1114.

Nijman V, Shepherd CR. 2007. Trade in non-native, CITES-listed, wildlife in Asia, as exemplified by the trade in freshwater turtles and tortoises (Chelonidae) in Thailand. Contribution to Zoology 76:207–212.

Nijman V, Shepherd CR, van Balen S. 2009. Declaration of the Javan hawk eagle *Spizaetus bartelsi* as Indonesia's National Rare Animal impedes conservation of the species. Oryx 43:122–128.

Nursahid R, Purnama AP. 2007. The trafficking of kukangs or slow lorises (*Nycticebus coucang*) in Indonesia. Malang: ProFauna Indonesia.

Oldfield S. 2003. The trade in wildlife. Regulation for conservation. London: Flora and Fauna International, Resource Africa and TRAFFIC International.

Parish T, Nekaris KAI. 2008. Identifying the CITES Appendix I-listed slow loris: a training programme for enforcement officials and rescue centres in Southeast Asia. Winter Meeting Primate Society of Great Britain. Primate Eye 96:8.

Pechuel-Loesche E. 1890. Brehm's Tierleben-Allgemeine Kunde des Tierreichs. Vol. 1: Säugetiere. Third edition. Leipzig, Wien: Bibliographisches Institut.

Perelaer MTH. 1870. Ethnografische beschrijving der Dayaks. Zaltbommel: J. Noman.

Perera AA. 1917 Sinhalese folklore notes. Bombay: British India Press.

Peres CA, Palacios E. 2007. Basin-wide effects of game harvest on vertebrate population densities in Amazonian forests: Implications for animal-mediated seed dispersal. Biotropica 39:304–315.

Ratajszczak R. 1998. Taxonomy, distribution and status of the lesser slow loris *Nycticebus pygmaeus* and their implications for captive management. Folia Primatologica 69:171–174.

Ridley HN. 1900. On the use of the slow loris in Malay medicine. Journal of the Straits Branch of the Royal Asiatic Society 34:31–34.

Riley EP. 2006. Ethnoprimatology: towards reconciliation of biological and cultural anthropology. Ecological and Environmental Anthropology 2:1–10.

Riley EP. 2007. The human-macaque interface: conservation implications of current and future overlap and conflict in Lore Lindu National Park, Sulawesi, Indonesia. American Anthropologist 109:473–484.

Rogers L. 2009. Activity budget, habitat use and conservation status of Bengal slow lorises (*Nycticebus bengalensis*) in Western Cambodia. M.Sc. Thesis Oxford Brookes University.

Rose AL. 2002. Conservation must pursue human-nature biosynergy in the era of social chaos and bushmeat commerce. In: Fuentes A, Wolf L, editors. Primates face to face: conservation implications of human-nonhuman primate interconnections. New York: Cambridge University Press. p 208–239.

Sandelowski M. 1991. Telling stories: narrative approaches in qualitative research. Journal of Nursing Scholarship 23: 161–166.

Schulze H, Groves, CP. 2004. Asian lorises: taxonomic problems caused by illegal trade. In: Nadler T, Streicher U, Thang LH, editors. Conservation of primates in Vietnam. Frankfurt: Frankfurt Zoological Society. p 33–36.

Schweitzer C. 1688. Reise nach Java und Ceylon, 1675–1682. Reisebeschreibungen von deutschen Beamten und Kriegsleuten im Dienst der Niederländischen West- und Ost-indischen Kompagnien, 1602–1797. Vol. 11. The Hague: M. Nijhoff.

Shepherd CR, Sukumaran J, Wich SA. 2005. Open season: an analysis of the pet trade in Medan, North Sumatra, 1997–2001. Petaling Jaya: TRAFFIC Southeast Asia.

Sponsel LE. 1997. The human niche in Amazonia: explorations in ethnoprimatology. In: Kinzey WG, editor. New World primates: ecology, evolution and behavior. New York: Aldine de Gruyter. p 143–165.

Somander SVO. 1969. Ceylon's slender loris: queer habits of a small nocturnal forest monkey. Loris 11(5):298–300.

Southwick CH, Siddiqi MF. 1994. Population status of nonhuman primates in Asia, with emphasis on rhesus macaques in India. American Journal of Primatology 34: 51–59.

Starr CR. 2010. The use, distribution and ecology of two species of loris (*Nycticebus bengalensis* and *N. pygmaeus*) in Cambodia: implications for conservation. Ph.D. Thesis, Brisbane, The University of Queensland.

Starr CR, Nekaris KAI, Streicher U. Leung L. 2010. Widespread use of slow lorises (*Nycticebus bengalensis* and *N. pygmaeus*) in traditional medicines in Cambodia as an impediment for their conservation Endangered Species Research. DOI: 10.3354/esr00285.

Starr CR, Nekaris KAI, Streicher U, Leung L. Field surveys of the threatened pygmy slow loris (*Nycticebus pygmaeus*) using local knowledge in Mondulkiri Province, Cambodia. Oryx, in press.

Stich I, Krüger K-O. 2002. Artenschutz in Kambodscha. ZGAP Mitteilungen 18:7–9.

Still J. 1905. On the loris in captivity. Spolia Zeylanica 3:155–157.

Still J. 1930. The jungle tide. Edinburgh: Mackwood and Sons.

Tedlock B. 1991. From participant observation to the observation of participation: the emergence of narrative ethnography. Journal of Anthropological Research 47: 69–94.

Tennent JE. 1861. Sketches of the natural history of Ceylon with narratives and anecdotes illustrative of the habits and instincts of the Mammalia, birds, reptiles, fishes, insects, etc. including a monograph of the elephant and a description of the modes of capturing and training it. London: Longman Green Longman and Roberts.

UREC 2010. Code of practice for ethical standards for research involving human participants. Oxford: Oxford Brookes University.

Walston N. 2005. An overview of the use of Cambodia's plants and animals in traditional medicine systems. Phnom Penh: TRAFFIC Southeast Asia-Indochina.

Wenjun L, Fuller TK, Sung W. 1996. A survey of wildlife trade in Guangxi and Guangdong, China. TRAFFIC Bulletin 16:9–15.

Wolfe LD, Fuentes A. 2007. Ethnoprimatology: contextualizing human and nonhuman primate interactions. In: Campbell CJ, Fuentes A, MacKinnon KC, Panger M, Bearder SK, editors. Primates in perspective. Oxford: Oxford University Press. p 691–702.

Wright SJ, Hernandez A, Condit R. 2007. The bush meat harvest alters seedling banks by favoring lianas, large seeds, and seeds dispersed by bats, birds, and wind. Biotropica 39:363–371.

Zhang L, Ning H, Sun S. 2008. Wildlife trade, consumption and conservation awareness in Southwest China. Biodiversity and Conservation 17:1493–1516.