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THE OVERHARVEST OF PORCUPINE SPECIES FOR BUSHMEAT AND TRADITIONAL MEDICINE IN MALAYSIA

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ABSTRACT
The commercial harvesting to supply the demands of the regional market and beyond with bushmeat and traditional medicinal products has exerted pressure on porcupine species which has reduced population densities in Malaysia regions. This study determined the over-harvested and poaching of the porcupine species in Malaysia by investigating confiscated data of porcupine species, and their parts from 2011 to April 2021. A total of 31 confiscated cases were obtained amounting to an estimated 320 porcupines. Based on the results, porcupines are harvested for bushmeat, traditional medicines, and trophies. This study proved that porcupines are being illegally poaching and over-harvested in Malaysia because of poor legislation. Lack of awareness of the implications of unsustainable harvesting and difficulty in monitoring by the relevant authorities and organizations appear to be the main challenges to porcupine conservation in Malaysia. This study highlights the lack of research studies documenting the overharvesting of the porcupine and the implication of these results is important for future adaptive porcupine management in Malaysia.

Keywords: porcupine, overharvest, bushmeat, traditional medicine, poaching, confiscates

INTRODUCTION

The porcupine species is one of the endangered mammal species in Malaysia and they were protected by the Malaysia Government (KHAN ET AL., 2017). There is a total of four porcupines native to Malaysia (Malayan porcupine (*Hystrix brachyura)*, Brush-tailed porcupine *(Atherurus macrourus)*, Long-tailed porcupine *(Trichys fasciculata)*, and Thick-spined porcupine *(Hystrix crassispinis)*) and all of them are likely found in trade to varying extents (HEINRICH ET AL., 2020; IUCN, 2022). All four species are currently protected under Malaysian Wildlife Conservation Act 2010 (WCA 2010) and assessed as Least Concern under the IUCN Red List of Threatened Species (IUCN, 2022). Under the WCA 2010, the commercial trade of Brush-tailed porcupines, Thick spined porcupines, and Malayan porcupines is prohibited, even though these species can be hunted and sold with a valid gun permit and hunting licenses. But the act sets long-tailed porcupines as totally protected which bans their domestic trade and sale. (DWNP, 2021). However, the aboriginal people in Malaysia were permitted to hunt them since it is their tradition passed down by their ancestors to consume the porcupine as their food in the forest (LOKE ET AL., 2019).

One of the lesser-known species being illegally hunted and exploited for meat and traditional medicine in Asia is the porcupines (GOMEZ, 2021). According to Gomez (2021) surveys of wildlife trade across markets in Southeast Asia have frequently encountered porcupines for sale including live and dead animals, body parts (quills and bezoars), and trophies. Porcupine meat is consumed as a source of high nutritional protein (Che Dah, 2017) and there is a particularly high demand for porcupine bezoar in traditional Chinese medicine due to the local perception of healing properties (LEE ET AL., 2015; TAN ET AL., 2019). This study takes a closer look at the harvest of porcupine species in Malaysia to assess a potential conservation concern that needs to be addressed. The aim of this study is:

- i) to highlight the awareness about the over-harvested of porcupines in Malaysia; ii) to call for further research into, and monitoring of the impact of the potential overharvest population, and iii) to suggest improved management regulation to alleviate the threat posed by over-harvest.

MATERIALS AND METHODS

We collected records of confiscates of 4 porcupine species in Malaysia from 2011- to April 2021. Data were extracted from the Department of Wildlife and National Parks Peninsular Malaysia (open-access annual reports) and online articles. We conducted the study using both the English language (porcupine confiscates, poaching of the porcupine, etc.) and Malay language (e.g., *pemburuan haram landak, penyuludupan landak*, etc.) search terms. All reported confiscates were carefully checked to avoid repetition and duplication. We extracted and analyzed all the information based on the date of confiscation, porcupine species, porcupine parts (body parts, live porcupine, trophies, bezoars), quantities, and the purpose of hunting (bushmeat, traditional medicines, etc), and location of confiscates.

RESULTS

From 2011 to April 2021, 31 porcupines confiscated were recorded involving an estimated 320 porcupines of different species in Malaysia (*Table 1*). Four species of porcupine were identified in 27 confiscated cases with the majority of 57% being Malayan porcupine (24 cases), Brush-tailed porcupine (1 case), Long-tailed porcupine (1 case), and Thick-spined porcupine (1 case).

Table 1: Lists and total of porcupine parts confiscated in raids from 2011 to April 2021 in Malaysia

Species	Confiscate Cases	Estimated Total Specimens	Porcupine Parts Confiscated			
			Bezoar	Quills	Live	Trophy
Malayan porcupine (*Hystrix brachyura*)	24	177	30	128	69	1
Brush-tailed porcupine (*Atherurus macrourus*)	1	2	-	-	2	-
Long-tailed porcupine (*Trichys fasciculata*)	1	1	-	-	1	-
Thick-spined porcupine (*Hystrix crassispinis*)	1	1	-	-	1	-
Unknown species	4	139	-	129	10	-
Total	31	320	30	227	83	1

The most frequent porcupine parts confiscated was a live porcupine with 21 cases, followed by quills (5 cases), bezoar (4 cases), and trophies (1 case). Of 31 confiscated cases, 90.3% occurred in Peninsular Malaysia, followed by Sarawak at 9.7%. The most frequent species confiscated between 2011 and 2021 was Malayan porcupine (*Figure 1*). The gall bladder of the Malayan porcupine was believed for curing the pain of gastric conditions (MELYNDA ET AL., 2020). Malayan porcupine quills and bezoar stones were hunted for sale to Chinese buyers who acts as traders and were believed to be a panacea for curing pain, cold, fever, poisoning, and cancer (KHAN ET AL., 2019; TAN ET AL., 2019; MELYNDA ET AL., 2020).

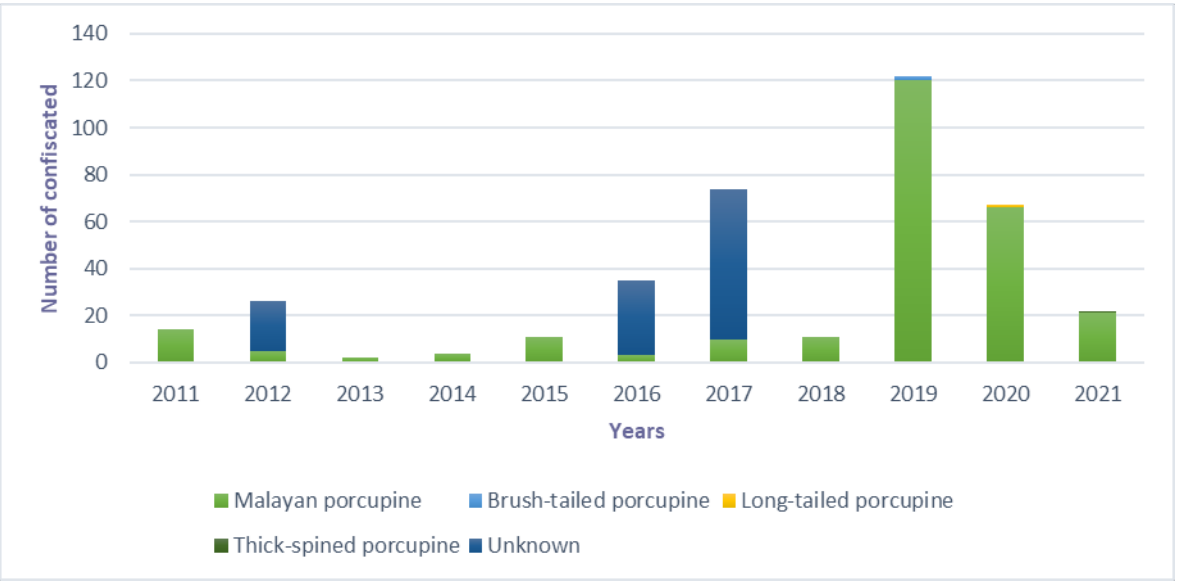

Figure 1: Number of confiscates in raids of porcupine species in Malaysia from 2011- April 2021

Knowledge of the utilization of porcupine parts as medicine in Malaysia indicates the perception of the local community on this species. All meat of four species of porcupines was utilized for high nutritional values for bushmeat (*Table 2*). A large number of cases were involved where suspects were reportedly caught in possession of porcupines intended to be sold to exotic restaurants. In several cases, porcupines were confiscated with other wildlife species such as pangolins, wild boars, eagles, and deer from individuals without a legal permit.

Table 2: Roles of porcupine species harvested as bushmeat and traditional medicine in Malaysia

Common name	Local name	Scientific name	Parts used	Medicinal value	WCA 2010	IUCN status	References
Malayan Porcupine	Landak Raya	*Hystrix brachyura*	Porcupine meat	High nutritional values, high calcium, potassium, and copper	Protected	LC	Norsuhana et al.,2012; Che Dah, 2017
			Gall bladder	Gastric			Melynda et al, 2020
			Gallbladder stone or bezoar or gallstone	Inflammation, pain, post-surgery, cancer, poisoning,			Khan et al., 2019; Tan et al., 2019; Melynda et al, 2020

				fever, cold, typhoid, dengue, influenza			
Brush-tailed porcupine	Landak Nibong	*Atherurus macrourus*	Porcupine meat	High nutritional values, high protein level, high calcium, potassium, and copper	Protected	LC	Hoffman et al., 2012; Che Dah, 2017
Long-tailed porcupine	Landak Padi	*Trichys fasciculata*	Porcupine meat	High calcium, potassium, and copper	Totally Protected	LC	Che Dah, 2017
Thick-spined porcupine	Landak Borneo	*Hystrix crassispinis*	Porcupine meat	High calcium, potassium, and copper	Protected	LC	Che Dah, 2017

DISCUSSION

Nutrition and Livelihood

This study showed a local community's demand for live porcupines and their parts in Malaysia. Porcupine meat is consumed by locals as an alternative source of high protein. According to CHE DAH (2017), porcupines meat was found to consist high in calcium, potassium, and copper as compared to beef. To meet these demands, live porcupines are obtained from hunters who capture them directly in nature (FARIDA ET AL., 2019). Based on the confiscation location obtained, the targeted hunting of porcupines was for commercial domestic trade. Most of the live porcupines were confiscated from local people that tried to sell them to exotic restaurants. Whole porcupines can fetch up to RM 180 or €40 per kg (CHE DAH, 2017)

Other than that, porcupine bezoar is also strictly controlled since the porcupine is one of the endangered species in Malaysia and they were strictly protected by the Malaysian government (KHAN ET AL., 2017). However, HEINRICH ET AL. (2020) stressed the international nature of the bezoars trade with approximately 20% of adverts selling porcupine bezoars offering international shipping. Gall bladder stones or bezoar from porcupines were sold depending on the quality and size of the bezoar and can reach RM 30,000 for one large size of bezoar. The local supplier collected the bezoars from the aboriginal people and sold them to the local Chinese traditional market (TAN *ET AL*., 2019). The prices of this bezoar are expensive, around RM300-RM1000 for 500g (WONG & ABU BAKAR, 2013) because the bezoar itself is not generally found in the stomach of the porcupine and contains only bile. Traditionally, many locals believed porcupine bezoar has various medicinal benefits and could be used as an antidote (KHAN ET AL., 2019) to cure many deadly diseases as indicated in Table 2. Hence, traders tend to sell it at remarkably high prices as it was valued as a gem and as a noble metal (KHAN ET AL., 2019).

Legislation Weakness

The majority of cases involving live animals have proven that the Malayan porcupine is likely the most species found in trade and confiscates in Southeast Asia due to its wide distribution (HEINRICH ET AL., 2020). The Malayan porcupine was the most frequently identified species confiscated between 2019 to 2021 (*Figure 1*). This can be explained by the legislation and protection of different species in Malaysia. The species is protected

under the Wildlife Conservation Act 2010 (WCA 2010) by the Malaysian government, respectively. Under this Act, species are categorized as "Protected" and not "Totally Protected". Protected species means the commercial trade of Malayan porcupines is prohibited, but the species can be hunted and sold with a valid gun permit and hunting license. Before 2021, the only porcupine species "Totally Protected" in Malaysia was the Long-tailed porcupine. The only time the "Totally Protected" porcupine species list has been revised, since it was gazette, was in 2010.

Along with the duration of this research period (2011-2021), no harvest quotas were established for the porcupine species found in Malaysia- contributing to the overharvesting. Generally, porcupines are caught using a net about a meter tall that is set up from the ground along animal pathways and can reach 30 m in length. These nets were set opportunistically and non-target species, such as pangolin and juvenile wild boar (MELYNDA ET AL., 2020). In addition, according to MELYNDA ET AL., (2020), porcupines are also hunted by dogs which help to detect the burrow and the hunter will smoke out the porcupines. Typically, the fire traps were used by aboriginal people to hunt the porcupines in the forest by setting fire to the porcupine burrows (LOKE ET AL., 2019). Overharvesting of Malayan porcupine for its meat and its bezoar seems to be a threat to the population (BORSCHBERG, 2006). Hence, proper monitoring and control must be implemented so that the porcupine will not become extinct (FARIDA ET AL., 2019).

Conservation and Management

Based on the results, it is proved that porcupines are being exploited in Malaysia for bushmeat and traditional medicines. Domestic commercialization of the exotic meat and traditional medicine trade is a key driver of the porcupine species decline (D'CRUZE ET AL., 2020; STANFORD ET AL., 2020), also declines in porcupine populations in Malaysia due to overharvesting have been documented (LOKE ET AL., 2020). Based on the three confiscated cases, farmers and aboriginal people were reported to be illegally hunting and trapping porcupines to sell to exotic restaurants. In another incident, two individuals were arrested for illegally trading porcupines near the forested area with other several species encompassing pangolins, eagles, and deer. This is concerning as porcupine species have a wide range throughout Malaysia, placing them at higher risk from over-harvesting and trade.

Porcupine species in Malaysia face various threats from habitat loss, targeted hunting for bushmeat, and traditional medicine that contribute to declining in population number. All porcupine species must be up-listed as "Totally Protected" species under the Wildlife Conservation Act 2010 to improve the regulations and enforcement against illegal hunting and trade. Besides, a thorough examination of the local commercial trade of porcupines is warranted so that proper mitigation can be developed to protect the porcupine species from over-harvesting and illegal exploitation. Further research is needed to fully understand the dynamics of the porcupine population in Malaysia to improve knowledge of their conservation status, establish proper harvest quota systems for ensuring sustainable harvest, and to monitor the impact of harvesting on wild populations. Last but not least, listing these species in Appendix II in CITES should be considered to monitor and regulate the international trade for porcupine species (HEINRICH ET AL., 2020)

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