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Research Article

A study on hunting activity of Sambar deer and Bearded pig in Paitan Forest Reserve, Pitas, Sabah, Malaysia

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ABSTRACT. This paper presents hunting activities in Paitan, Sabah, especially of Sambar deer (*Cervus unicolor*) and Bearded pig (*Sus barbatus*) through interviews with communities and analysis of hunting licenses issued by the Sabah Wildlife Department (SWD). The hunting activity was found to have a very close relation to the culture of the local people in Paitan; it provides not only monetary support but also recreational and social values. Hunting was mostly carried out by spearing and hunting dogs, followed by firearms, snares and blowpipes. From data obtained from SWD, there was a gradual decline in the number of licenses issued in Paitan. This situation may be due to the decline in the population of Sambar deer and Bearded pigs in Paitan Forest Reserve. Thus, the issuance of the hunting license on both the animals should be reduced in order to maintain the current population status of Sambar deer and Bearded pig. The result also shows that there is significant difference in the number of hunting licenses issued on a monthly basis for Bearded pig but not for Sambar deer.

Keywords: Hunting activity, Paitan Forest Reserve, Sambar deer, Bearded pig, hunting licenses.

INTRODUCTION

Wildlife is termed as "the life which is not tamed or cultivated or domesticated or inhabitated" (Mohanty, 2005). They contribute to the ecosystem in their respective way including being part of the food chain. Wildlife are used by humans for various reasons. These include bush meat, commercial value, recreational value (as game), aesthetic value, ethical value and scientific purposes. In long run, if the use of wildlife is not controlled, it may cause impacts that might lead to a reduction of wildlife population (Dasmann, 1964; Focardi *et al.*, 1996; Carpaneto & Fusari, 2000). Hence, wildlife management plays a very important role in ensuring that our biodiversity and ecosystems are well protected and conserved.

Wildlife depend on the forest as their habitat for survival (Liu *et al.*, 1999; Bennett & Robinson, 2000). Apart from that, they play a vital role in rural people's lives. Wildlife supplies rural people with food, shelter and income (de Merode, 2004). Thus, hunting was found to have considerable nutritional and economic significance to rural people, especially for those earn low income, yet can still enjoy meals that are rich in protein (Caldecott, 1988; Bennett & Robinson, 2000). Most of the villagers who live near the forest edge recognise hunting as a prominent activity in the forest. It is because, first, food rich in protein will be gained through hunting. Second, hunting can provide the hunter's household with monetary revenue. Third,

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hunting requires skills, experience and knowledge about nature, physical strength and keen insight. Hence, hunting implicates various cultural elements, not only material and monetary, but also part of social activity (Sasaki, 2001).

A study by Caldecott (1988), shows that ungulates are the most hunted species and contribute 60-90% of harvest in Sarawak. Bearded pig, Mouse deer, Sambar deer and Barking deer are included in this category, with Bearded pig being the most hunted species (77% out of the total harvest in Sarawak in 1984). Over-hunting also causes decline in the population of wildlife. One example is in China where the musk deer was hunted extensively for its musk. From an average annual musk production of about 104.15±37.33 kg, increasing to approximately 150 kg in 1960, musk production decreased continually until no musk was harvested locally since 1985 (Yang *et al.*, 2002). Products of wildlife are another factor that drives hunting activities, apart from being a source of protein and for game purposes.

Habitat disturbance by timber harvesting and uncontrollable logging without doubt lead to overexploitation of wildlife and threaten large number of mammal species. Logging causes immediate physical exploitation and long-term habitat change, and it will increase hunting opportunity by timber company workers and use of the logging road as a hunting path. All of these incidents turn hunting into another activity that causes deeper consequence on wildlife (Focardi *et al.*, 1996; Meijaard & Sheil, 2006). Research done on the evaluation of bush meat hunting shows that this situation gets worse when hunters shift their hunting methods from snaring to gun hunting (Damania, 2005). This is because snaring is a less efficient hunting method and thus fewer animals will be caught, but gun hunting enable hunters to obtain plenty of animals as gun hunting is more effective and less time consuming (Carpaneto & Fusari, 2000).

However, some wildlife was hunted down due to conflict with humans after damaging agricultural crops and livestock. The animal is caught to minimise agricultural damage. However, some non-target or less common animals will also get caught accidentally in some cases. For example, "babi rusa" (*Babyrousa babyrussa*) killed in snares that had been placed to catch wild pigs in Sulawesi (Caldecott & Nyaoi, 1985; Gulland-Milner & Clayton, 2002).

The forest which provides shelter for wildlife has been reduced throughout the years and with that, wildlife population. Efforts to restore and conserve wildlife and forest were initiated. However, there is always a conflict between conservation and development objectives (Bennett & Robinson, 2000). This is particularly where development programmes often allow rural people to hunt to sustain their lives by introducing the animal kampong licenses which enable villagers to hunt legally in a specific area as stated in their licence for one year.

However, there is a positive side to hunting. Hunting is used as a control method to manipulate the sustainability of wildlife at a certain area (Grau & Grau, 1980). When this conservation effort is done, the result is positive as it allows the sustainability of wildlife to be at a desired state in a particular area. Nonetheless, when looking from the perspective of population, the number of deer at that area have decreased. Hunting decreases the population of animals and if the hunting activities are done to animals where their density is at a threatened state, extinction can happen.

Sambar deer and Bearded pig

Sambar deer (*Cervus unicolor*), also locally known as *payau* or in other parts of the world known as *sambur, sambhur and Kadaththi man* (Tamil), is one of the animals being hunted by people in Paitan, Sabah. Ungulates (which also include Sambar deer) are favourable animals targeted by hunters (Meijaard & Sheil, 2006). This is supported by Bernard (1994), who also observed that it is the most hunted deer in the West Coast of Sabah. According to the Sabah

Wildlife Department (SWD), in 2007 licences issued for the hunting of Sambar deer were the highest followed by Barking deer and mousedeer, among a list of animals allowed for hunting. Fees for Sambar deer to be hunted is RM50 per head, and is valid for one week.

Wild boar in Borneo, also known as Bearded pig (*Sus barbatus*) or locally named "babi hutan", is one of the most hunted animals by local non-Muslim people in Borneo (Diong, 1973). This animal is by far the most preferred and most consumed species of wild meat or protein source throughout Borneo, where research shows that nearly half of the total annual protein requirement for Sarawak's 1.4 million population consists of Bearded pig (Hancock *et al.*, 2004; Caldecott & Nyaoi, 1985). *Sus barbatus* is a nocturnal animal, mostly active at night and in the evening. An adult is normally solitary, but female pigs will usually appear in a group of four or more, often seen consisting of an adult female and their young. Generally, Bearded pigs occur widely from lower montane to beach forests. They shelter in tall grass or reed beds and in burrows that are either self-excavated or abandoned by other animals. Bearded pigs are also good swimmers and good runners. They are omnivorous animals and feed on fungi, leaves, roots, bulbs, fallen fruits, seeds, other plant materials, earthworms, snakes and other small mammals. Bearded pigs have adapted to feed on crops and livestock and this has led them into conflict with human beings (Diong, 1973; Nowak, 1991).

METHODOLOGY

Study site

The present study was carried out in Paitan, which is located in Pitas. Paitan is under the district of Kudat and located on the northern part of Sabah. Pitas is situated approximately 130 km away from Kota Kinabalu city. It takes about three and a half hours to drive to Paitan. In 2000, there were 30,854 people living in Pitas with 29 villages around Paitan (Department of Statistics Malaysia, 2007). The interview was conducted in 10 villages in the vicinity of Paitan (Figure 1). The ethnic composition is mainly the Rungus (18.4%), which is a subethnic of Kadazan (Department of Statistics Malaysia, 2007).

Paitan Forest Reserve (Figure 1) is situated at the southeast of Pitas town, which is about 28 km from the junction of Pitas-Kanibungan highway (6°38.77' N; 117°12.88' E). The Paitan forest is classified as a Class VI forest which is a Virgin Jungle Reserve. This virgin jungle occupies approximately 129 hectares in two blocks of land. Only one block has been surveyed while another block was not visited due to access difficulty (Sabah Forestry Department, 2005).

Paitan Virgin Jungle Forest is surrounded by a larger forest called Sungai Paitan Forest Reserve. The Sg. Paitan Forest Reserve is a Class II forest (commercial forest) as classified by the Sabah Forestry Department. Paitan Forest Reserve is surrounded by 29 villages (Appendix A) that were established long ago.

The Sg. Paitan Forest Reserve has gentle slopes with low hills of about 30-60 m in height. Approximately 60% of this jungle is mature secondary dipterocarp forest. According to local communities, large mammals such as deer and wild boar are plentiful in this forest reserve. Forest fires occurred in 2003 and this caused a large portion of this forest to be burnt (Sabah Forestry Department, 2005).

Paitan Virgin Jungle Forest is a forest conserved strictly for forestry research purposes only. Logging is strictly prohibited in this forest reserve. Collectively, there are 91,914 hectares of Virgin Forest Reserves throughout 50 locations in Sabah. On the other hand, the Sg. Paitan Forest Reserve is a commercial forest which allows legal logging to supply wood and timber for the market and local use. Logging is carried out according to Sustainable Forest Management (SFM) principles. There are 2,683,480 hectares of Commercial Forest Reserves throughout 31

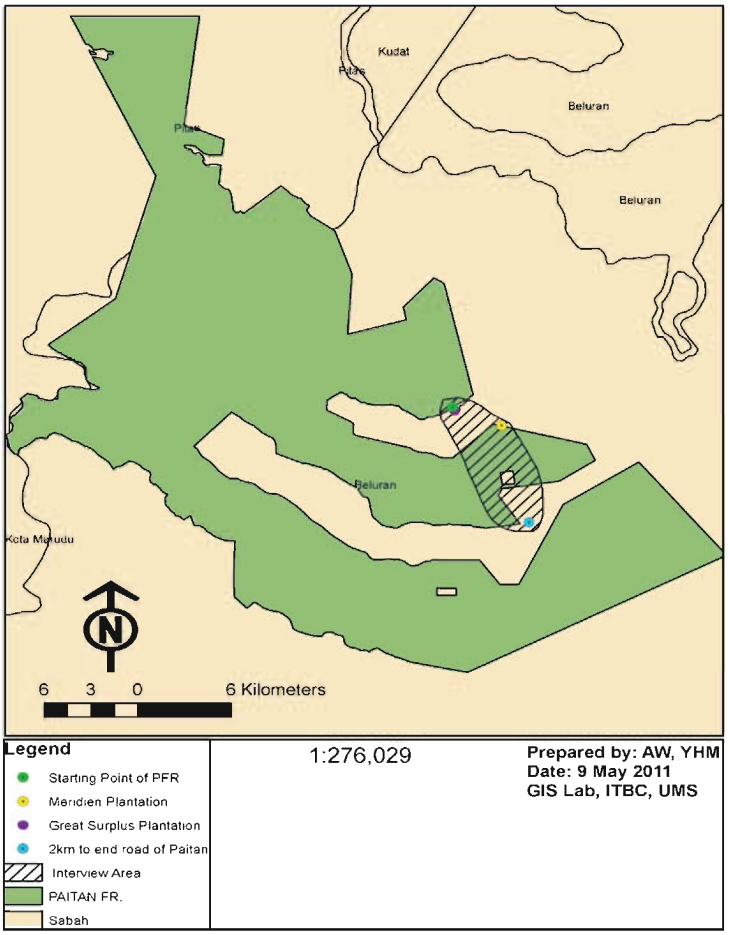


Figure 1. Map of Paitan where interviews and line transects were conducted.

locations in Sabah (Sabah Forestry Department, 2005).

Sampling methods

Interview

Interview with local people was carried out in order to understand and obtain basic data about hunting of deer and bearded pig in Sg. Paitan Forest Reserve. The interview method was chosen in this study as it provides important data concerning wildlife even if one does not enter the field, if the interview is carried out in a proper manner. Furthermore, interviews allow the collection of data that is hard to get with other methods, such as land use patterns, wildlife existence and chronological information (Rabinowitz, 1993).

Before the interview was carried out, questionnaires based on (1) hunting areas, (2) preferred hunting techniques and practices, (3) use of each animal that has been hunt down, (4) purpose of hunting, (5) the market price of the animal hunted, and (6) animals most hunted, were designed (Fusari & Carpaneto, 2006) (Appendix B). Two trips were done for the interview session, the first in August and the second in September, 2007. Interviews were

carried out during the day starting from 0900 hrs until 1800 hrs and were conducted in Bahasa Malaysia. These questionnaires were used to collect information related to hunting activities. Ten villages, which are located in the vicinity of Paitan Forest Reserve, were visited. Villagers from each village were randomly interviewed. The village head was consulted in order to assist in the selection of hunters to be interviewed. The respondents interviewed included the village head (Ketua Kampung), Chairperson of the JKKK and villagers. Requirements that should be met by villagers would be the people should still hunt, should have hunt regularly in the same area and should be considered as an expert by his peer group in that village (Hoeven *et al.*, 2004).

Hunting licences

Licenses (both commercial licenses and sports licenses) issued by the SWD from 1999-2006 were obtained. These licences were obtained in order to study the trend of hunting. Due to the non-normal distribution of data, Kruskal-Wallis in Statistical Package for Social Science (SPSS) was used to test whether there is a significant variation in the number of hunting licenses issued in each month over the period of eight years. In this analysis, the variance was considered significantly different when $P \leqslant 0.05$ (Coakes, 2005).

RESULTS

Interview

A total of 43 informants from 10 villages were obtained (Table 1). During the study trips, a total of 75 villagers were interviewed and only 43 admitted that they were active hunters, who hunt at least once in three months. All informants interviewed were males, aged between 23 and 55 years old.

Of all 43 local hunters, most of them obtained the Sambar deer and Bearded pig in Paitan forest (71% and 76%, respectively) (Figure 2). The rest were hunted in plantations such as oil palm and rubber estates. Fifteen percent of the informants hunted deer in Pulau Jambongan. A majority of them (60%) went to hunt in a group of three to four people per trip, while only 3% of villagers went to hunt in a group of five to six persons (Figure 3). From the interview, 62% of the hunters spent one night in the forest, followed by 24% spending more than three days in the forest. Eleven percent of hunters spent two to three days per

Table 1. The numbers of villagers interviewed in each village.

No.	Name of Village	No. of respondents
1	Kampung Sulit Bina Baru	2
2	Kampung Sulakolung	3
3	Kampung Ampungoi	3
4	Kampung Masin Kecil	4
5	Kampung Pias	5
6	Kampung Masin Besar	5
7	Kampung Pengkalan Kanibungan	5
8	Kampung Mendangan Darat	5
9	Kampung Kutoyon	5
10	Kampung Sinukap	6
	Total	43

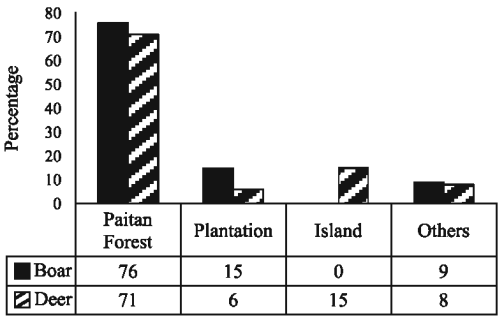


Figure 2. Hunting sites of local community.

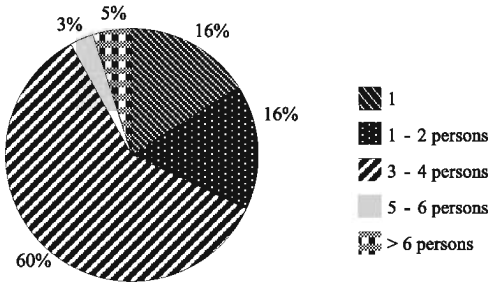


Figure 3. The number of persons involved in hunting per trip.

trip and a minority group (3%) spent one whole day in the forest (Figure 4). A majority of villagers (35%) went hunting three times a month followed by the group that went hunting twice a month (32%), and more than three times a month (19%). Only 14% of informants went for hunting once a month.

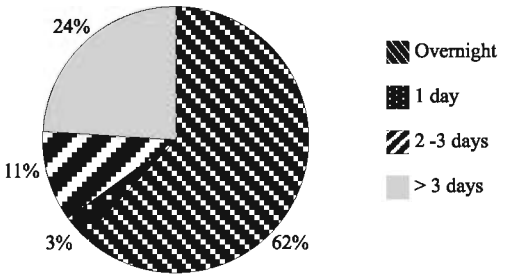


Figure 4. Hunting duration spent by hunters for one hunting trip.

For Sambar deer, 86.2% of the hunters managed to obtain one to two deer per trip, and only 13.8% of poachers managed to hunt down three to four deer per trip. Hunters managed to hunt down one to two bearded pigs per trip (68%), while only 20 % of hunters were able to obtain five to six bearded pigs per trip. And 11% of hunters managed to attain three to four bearded pigs per trip. Only 2% of them managed to hunt down more than six animals per trip (Figure 5).

	1 to 2	3 to 4	5 to 6	> 6
Boar	67.5	10.8	19.9	1.8
Deer	86.2	13.8	0	0

Figure 5. Numbers of animal taken down per hunting trip.

There were four hunting techniques that were used - 38% were using hunting dogs and spears and 34% used firearms. There were 21% of informants who used snares to obtain their catch and 7% of informants used blowpipes to hunt (Figure 6). A majority of the villagers (55%) hunted for their own consumption followed by for barter trade (30%), commercial purposes (12%) and for sports (3%). Around half of the interviewees (45%) took less than five days to consume their hunting yield, 23% of them spent 11-15 days, 20% of them spent five to ten days, and 9% spent 16-20 days and only 3% took more than 20 days to consume the animal. Seventy-nine percent of the interviewees were aware of the need to apply for licenses. However, there was still a small group who were not aware of the license application requirement. From the result of interviews, the market price for deer meat ranged from RM7.00 to RM10.00 per kg. The market price for bearded pig ranged from RM5.00 to RM8.00 per kg.

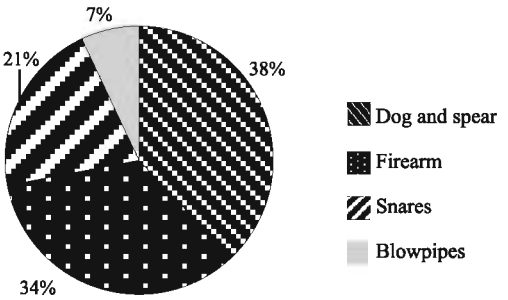
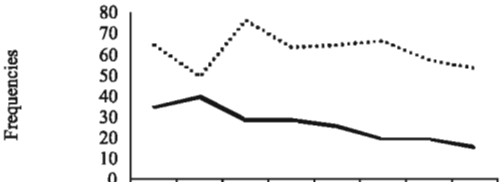


Figure 6. Hunting methods practiced by villagers.

Hunting licenses

A total of 34 licenses were issued in 1999 for hunting Sambar deer. It increased to a total of 39 the folowing year. The trend of licenses issued to hunt deer for following years showed a steady decline until the year 2006 (Figure 7). The number of licenses issued to hunt Bearded pig in 2001 was the highest throughout eight years, which was about 15% of total licenses for the eight years. Licenses to hunt for pigs were given out the least in 2000, where the number was only 10% out of the total licenses (Figure 7). From year 2004-2006, the numbers of licenses issued decreased gradually to 32, 29 and 26 licenses, respectively.



	1999	2000	2001	2002	2003	2004	2005	2006
Sambar deer	34	39	28	28	25	19	19	15
Bearded pig	64	49	76	63	64	66	57	53

Figure 7. Number of licenses given out in Pitas and Paitan.

In the case of Sambar deer, licenses were issued the most in the month of January, February and March, where 29 licenses, 27 licenses and 24 licenses were issued respectively. The least licenses were issued in the month of April (12 licenses) (Figure 8). For the Bearded pig, the accumulative number of licenses given out in January was 98 over eight years. It was also the highest number of licenses that have been given out. The accumulative numbers of licenses gradually decreased from March to July. The number of licenses issued continued to decreased in November, at only 4% out of the total hunting licenses. Thus, the licenses were given out the least in November (Figure 8).

	Jan	Feb	Mac	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Sambar deer	29	27	24	12	14	15	16	15	14	13	15	13
Bearded pig	98	72	48	36	35	31	25	29	42	29	22	25

Figure 8. Accumulative number of licenses given out at Pitas and Paitan from year 1999-2006.

There was no significant difference on licenses issued for Sambar deer between months of the years (Asymptotic Significant = 0.275, $P > 0.05$, $df = 11$). Yet, there was a significant difference in the number of hunting licenses issued for Bearded pig, according to months over a period of eight years (Asymptotic Significant = 0.001, $P < 0.05$, $df = 11$).

DISCUSSION

Only 13 out of 29 villages (Mukim Tengkarason, Pitas Forestry Department) were accessible during the study period, and 75 families were visited during the interview sessions but only 43 informants from 10 villages, each from a family, were successfully interviewed and they admitted to be hunters. Some of the villages were not accessible due to lack of infrastructure such as roads or boats that caused failure in interviewing representatives from each village. Moreover, some villagers who were afraid of rules and regulations of the Sabah Wildlife Conservation Enactment 1997, had refused to be interviewed. These circumstances had caused difficulty in obtaining more informants in Paitan.

For all of the interviewees, hunting was the second activity with agriculture as their main occupation. Hunting in Paitan was found to have substantial nutritional and economic significance to local people, especially for those with low income. Apart from economic importance and food resource, hunting is part of their traditional heritage inherited generations ago. Most of the informants claimed that hunting yields were used for direct consumption. If the hunting yields were plenty, then the informants would practice barter trade with relatives and neighbours. In a study carried out by Caldecott (1988), the practice of barter trade was one of the norms of local communities in Sarawak, typically to exchange for daily needs. However, 12% of interviewees hunt for commercial purposes as the sale of wild meat becomes extra income. There was no special market where wild meat was put on sale since it is illegal to do so. Sambar deer and bearded pigs were sold in cut pieces, for a price of RM 5-10 per kg. According to the informants, buyers normally consisted of local people from nearby villages, while if the timing was right, the hunting yield would be sold at the morning market held every Wednesday in Paitan.

The Paitan forest seemed to be the favourite place for most hunters in Paitan. In

the current situation, having a mode of transport and being able to travel far is still difficult for most villagers. As their villages are situated near Paitan forest, it is much more favourable for them to go hunting in Paitan compared to places which are further. As for poachers who are in better financial state, they own boats that can help them to travel to Pulau Jambongan to hunt. According to villagers, chances of spotting a Sambar deer were much higher at that island. There are poachers who own four-wheel drives on the island and hunt along the road. The third favourite hunting sites are oil palm and rubber plantation estates. This situation is due to the feeding behaviour of the animals, especially bearded pigs where crops and seeds are the main food source for pigs. These pigs were caught when they entered the plantation area to eat crops (Curran *et al.*, 2000; Baubet *et al.*, 2004; Wong *et al.*, 2005).

Hunting is not the main occupation for all of the interviewees, hence they did not spend much time on hunting. Most of the villagers only spend one night at a hunting site. Some of them went home with empty hands, but some were lucky enough to bring back one. However, during the fruiting season which stretches from June to September (source: Mukim Tangkarason, Pitas Forestry Department), some of the hunters prolonged the hunting duration to three or more days. This was to obtain more yield as most of the animals come out from the inner part of the forest to eat fruits and seeds produced during the fruiting season (Diong, 1973; Dardaillon, 1986).

Apart from that, interview results showed that a majority of the interviewees went for hunting thrice a month. On average, they went hunting once every 10 days. Approximately 20% of the villagers interviewed went to hunt more than three times a month. Almost half of the informants took less than five days to consume the wild animal caught. Hunting regularity was closely related to the stockpile they stored (Fraser & Speedy, 1997). They go to hunt again several days after they finish consuming the hunting yield.

Hunting is a social culture inherited from their ancestors. Consequently, most local people still practice traditional hunting techniques. The interview results show that 66% of the informants used traditional techniques such as snares, hunting dogs, spears (jubak) and blowpipes to obtain the animal. These techniques are combined only in certain cases; some of the interviewees used hunting dogs to chase the animal then killed the animal by spear. Snares were normally used in the backyard or own estate, to kill animals which are harmful to crops and poultry. Firearms are also used to hunt but some of the firearms were not legally registered. A policeman in Kg. Kanibungan provided information that there were a lot of locals who owned self-made guns. Even though the use of firearms is not popular among local people, yet it is seen as consolidated passage from traditional hunting methods to modern weapons. This situation is not a good sign, as when hunters shift from traditional hunting methods to modern hunting methods, they will cause a decline in the wildlife population in future (Damania, 2005).

Parts of Sambar deer were made into decoration ornaments. For some, it also became a track record of numbers of Sambar deer they had hunted. The antlers, which is the most beautiful part of the Sambar deer, is normally owned by the person who initiated the shot that brings down the animal. There were poachers that sold parts of the Sambar deer to interested buyers as it was also a form of business. The development of the area which involves the establishment of better roads allow poachers to transport bush meat to be sold further from the area of catch (Robinson *et al.* 1999).

According to the Wildlife Conservation Enactment (1997), application of licenses is needed if any individual wishes to carry out any hunting activities. On awareness among locals in Paitan, most hunters realize the necessity to apply for hunting licenses. However, 100% of the informants did not own licenses when hunting. Actually, there was exception in this

matter. Villagers are given permission to hunt as long as they take what they need only. This allows villagers to obtain their protein sources nearby. There were also a small number of them who did not realize the necessity of license application.

Cervus unicolor and *Sus barbatus* are listed in the protected species animal for which a hunting license is required (Wildlife Conservation Enactment, 1997, Schedule II). Thus, hunters should apply for a hunting license from the SWD before they can legally hunt down these animals. The application fee for a hunting license is RM50.00 per head of Sambar deer and RM5.00 per head of Bearded pig and another RM5.00 is charged as processing fee.

The licenses trend in Figure 7 had shown a gradual decline in eight years. Human population density in Pitas rural areas has increased approximately 45% during the past 20 years (Department of Statistic Malaysia, 2007). As the human population increased, the demand for wild meat increased and thus affected the number of animals (Bennett *et al*, 1996) but this was not the case for hunting activities in Paitan. It could be due to the reason that hunting licenses were mostly applied by hunters from outside of Paitan, the local community of Paitan did not apply for hunting licenses. The relative abundance of an animal population was proportionate to the licenses given out. When the number of hunting licenses decreased, this situation indicated that the relative abundance of a population might decrease as well (Bernard, 1994).

There was an increment in hunting licenses issued to hunt Sambar deer in 2000 compared to 1999. This could be due to popularity of hunting in Paitan having increased. Estates were newly opened and Sambar deer were more frequently seen near the estates. Altered roads are often being used by Sambar deer to travel to their destination (Meijaard & Sheil, 2006). Due to this reason, frequency of encountering a Sambar deer would be higher, thus attracting more hunters to Paitan for hunting. Licenses issued experienced a steady decline from year 2000 to 2006. One of the reasons could be the regularity of wildlife officers patrolling in Paitan following complaints made by the people in Paitan regarding the violation of rights at their surrounding areas.

As informed by locals, there is no specific season for hunting in Paitan, unlike some places or among tribes where hunting seasons exist. Hunting activities for Sambar deer in Paitan were carried out throughout the whole year. This was supported by data that there was no significant difference between the licenses issued for Sambar deer in the months of all eight years.

On the other hand, on average, there were 62 hunting licenses for Bearded pig given out annually (from year 1999-2006) in Pitas and Paitan. Hunting licenses were given out the least in year 2000, but increased to about 25% the following year, 2001. This was due to the SWD encouraging people to apply for commercial license instead of sports license by reducing commercial license fees in 2001. The department decided to do so in order to prevent sports hunting license holders to sell the pork illegally and thus exploiting the utilization of wildlife resources. From year 2002, the number of licenses issued declined gradually from year to year until 2006. The decline showed that the Bearded pig population started to decline from 2000.

Figure 8 shows a significant trend that licenses were given out the most in the early part of the year. There was a significant difference on months hunting licenses were issued. This circumstance may due to the habit of hunters who preferred to go out to hunt in the rainy season (Carpaneto & Fusari, 2000). The rainy season in Kudat and Tawau divisions is expected to occur from November to March (Yasunari *et al.*, 2007), and the number of hunting licenses given out by SWD decreased after February. This situation occurred due to the breeding season and lactation season of Bearded pigs (Muringkat, pers. comm.).

According to the Wildlife Conservation Enactment 1997, animals which are pregnant or in lactation period cannot be hunted. Thus, the hunting yield dropped as well.

CONCLUSION

There were 43 villagers from 10 villages interviewed in this study. Hunting was found to include various cultural elements, not only material and monetary values. Besides that, two main reasons for local people in Paitan to carry out hunting was for their own consumption and barter trade. Another reason was to protect crops from being damaged by Bearded pigs. Traditional hunting methods including snares, blowpipes and hunting dogs were used. All interviewees were hunters without license and this situation was due to the need for meat as a main source of protein.

The hunting licenses issued from 1999 to 2006 in Pitas district and Paitan district were obtained from the SWD. There was a gradual decline in the number of hunting licenses issued over an eight year period. Besides that, the Kruskal-Wallis result showed that there was a significant difference in the number of hunting licenses issued for Bearded pig on a monthly basis, where hunting licenses were given out mostly in January, February and March. Yet, there was no significant evidence to conclude that there was any specific hunting season for Sambar deer. The licenses issued trend shall be kept in view as to estimate the trend of population of Sambar deer in rough calculation as performed by Bernard (1994).

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Appendix A. The list of 29 villages in Paitan.

1. Kampung Simpang
2. Kampung Simpang Empat
3. Kampung Kutoyon
4. Kampung Sulakolung
5. Kampung Rugading
6. Kampung Kanibungan
7. Kampung Masin Kecil
8. Kampung Masin Besar
9. Kampung Manduring
10. Kampung Sinukap
11. Kampung Pantai Darat
12. Kampung Boribi Darat
13. Kampung Boribi
14. Kampung Taradas
15. Kampung Mapad
16. Kampung Limau Manis
17. Kampung Batangan Darat
18. Kampung Sulit Bina Baru
19. Kampung Lihing
20. Kampung Pengkalan Pantai
21. Kampung Pengkalan Kanibungan
22. Kampung Delima
23. Kampung Pias
24. Kampung Golom
25. Kampung Simpang Tiga
26. Kampung Ranggal
27. Kampung Kadayan
28. Kampung Kakaping
29. Kampung Pararau.

Appendix B. Questionnaires.

1. Where do you normally go hunting?

2. What are those animals that you normally hunt?
   a.) Most hunted animal –
   b.) Least hunted animal –
   c.) Did you see any Bearded pig or Sambar deer?

3. How many people that you go hunting with?
   a.) Alone
   b.) 1 - 2 persons
   c.) 3 - 4 persons
   d.) 5 - 6 persons
   e.) >6 persons

4. What is the duration for one hunting trip?
   a.) Half a day.
   b.) Over night.
   c.) One to three days.
   d.) More than three days.

5. How often do you go hunting?
   a.) Once a month.
   b.) Twice a month.
   c.) Trice a month.
   d.) More than trice a month (state out)

6. How many animal you hunt down per trip?
   a.) None
   b.) One to two animals.
   c.) Three to four animals.
   d.) Five to six animals.
   e.) More than six animals.

7. How many animal have you seen (escaped or not hunted down)?
   a.) Adult
      a.) One to two animals.
      b.) Three to four animals.
      c.) Five to six animals.
      d.) More than six animals.
   b.) Juvenile:
      a.) One to two animals.
      b.) Three to four animals.
      c.) Five to six animals.
      d.) More than six animals.

8. What do you think is the best way of obtaining a catch?
   a.) Hunting dog and spear
   b.) Firearm.
   c.) Snares.
   d.) Blowpipe.

9. What is the main purpose that you go hunting?
   a.) For commercial purpose.
   b.) Sports.
   c.) For trading (barter trade).
   d.) Others (state out)

10. What do you do with the remains of the animal? (horn and skin)
    a.) Throw.
    b.) Own collection.
    c.) To sell.
    d.) Traditional medicinal purposes.

11. Normally who will buy the hunting yield?
    a.) Local people.
    b.) Outsider.

12. For consumption purposes, how long could an animal last?
    a.) < 5 days
    b.) 5 – 10 days
    c.) 11 – 15 days
    d.) 15 – 20 days
    e.) > 20 days

13. How much did you sell per kg?

14. Is the number of the animal that you captured before is declining or increasing?
    a.) Decline.
    b.) Increase.

15. Will you go back to the same place to hunt?
    a.) Yes.
    b.) No.

16. Are you aware of application of licenses for hunting?
    a.) Yes.
    b.) No.