EMPTY FOREST SYNDROME IN SABAH: A PRELIMINARY ANALYSIS OF THE HUNTING ACTIVITIES IN SELECTED AREAS OF SABAH MALAYSIA.

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Abstract

Hunting has long been recognised as a danger to tropical wildlife conservation, but it has become a more pressing issue in recent years. For example, in the early 1990s, it was estimated that six million animals were hunted annually in Borneo, Malaysia, equating to about 36 animals per square kilometre (km²) of forest. The desire for game meat in the tropics is driving consumption well beyond sustainable levels. Furthermore, because of increased transportation and communications, markets can be hundreds of miles away from the source. As a result, the focus of this research is on the influence of hunting on the distribution and diversity of medium to large terrestrial mammals in a few selected regions of Sabah. Interviews with local people in the study sites of Sandakan, Tawau, Kota Belud, Tambunan, Keningau, and Tenom provided information on hunting pressure and community dependence on these mammals. In addition, the Sabah Wildlife Department provided reports on wildlife hunting to determine which wildlife species are more regularly hunted based on hunter arrests. Local communities were
discovered to hunt for food, and hunting is a traditional way of life for them. The most regularly hunted animal is bearded pigs. Pieces of bearded hogs were found in the vehicles of 76.97% of hunters apprehended, followed by parts of sambar deer (13.7%). The empty forest syndrome (EFS) is becoming a terrifying silent epidemic sweeping across Sabah. Although this study is not exhaustive, preliminary findings indicate an ominous EFS scenario in Sabah if the illness is ignored.

**Keywords:** Empty Forest Syndrome (EFS), Hunting, Poaching, Community, Bush Meat
Introduction

Hunting behaviour is more significantly connected with the present number of species in tropical forests than forest type, habitat size, or conservation status (Woodroffe and Ginsberg, 1998; Peres, 2009). Small forest areas near fishing villages in Borneo, for example, may have abundant wildlife, but large, isolated protected areas may experience declines because local people overexploit wildlife (Bennett et al., 2000; McConkey and Chivers, 2004). Peres and Palacios (2007) discovered that wildlife populations in the Amazon basin reflect the accessibility of a region to hunters rather than its conservation status, while Brashares et al. (2004) found that the availability of alternative protein sources in West Africa determines the extent of bushmeat hunting. Both logging (Clark et al., 2009; Berry et al., 2010) and oil concessions (Laurance et al., 2008) have been found to be valuable wildlife refuges when the respective managers have had an active interest in promoting non-hunting or limiting hunting within their concessions.

Forest goods and services are critical to the survival of rural communities in sub-Saharan Africa, Asia and Latin America (Angelsen et al., 2014). Low-income households use forest resources to generate a larger share of their total annual income than high-income households (Angelsen and Dokken, 2015). The results show that they rely on forests to a greater extent and may suffer additional hardship if access to and use of forests is restricted, e.g. as part of a conservation campaign. Forest revenues contribute to continued consumption (energy, food, medicines and building materials) and act as a safety net providing food or income in times of crisis, such as the current COVID-19 pandemic, and as a gap filler in seasonal poverty cycles (Angelsen et al., 2014).

According to a global comparative survey, hunting was practised by 39% of the households’ surveyed (Nielsen et al., 2017). This is a rough estimate, but it appears that at least 150 million tropical households hunt wild meat from forests and rely on it to some extent. Depending on faunal resources and income diversification techniques, the role of wild meat in rural livelihoods varies widely (Angelsen et al., 2014; Tieguhong and Zwolinski, 2009; Kuempel et al., 2019). In many regions, wild meat can be an important source of protein, fats and essential micronutrients, although its contribution to cash income is limited (Nielsen et al., 2017).

Apart from concerns about species directly harmed by hunting, studies of the effects of de-hunting have consistently shown that intensively hunted forests have greatly altered
ecosystems. Animals that eat fruit from trees, for example, are regularly targeted by hunters (Harrison, 2011). This has led to the extinction of animals, especially larger frugivorous mammals and birds. Because they can swallow larger seeds and travel longer distances between them, these species make up a significant proportion of seed dispersers. Plants with large seeds, which include many of the slower-growing tree canopies, have a harder time regenerating in forests damaged by hunting than species with smaller or abiotically dispersed seeds (McConkey and Drake, 2006; Nuez-Iturri et al., 2008; Wang et al., 2007; Terborgh et al., 2008; Brodie et al., 2009; Holbrook and Loiselle, 2009; Sethi and Howe, 2009).

Although there are no studies that directly address these issues, it is likely that the spatial and genetic patterns of plant populations are affected. Many other important ecological processes, such as seed dispersal, have been shown to be affected by hunting. Many other important ecological processes have been shown to be affected by hunting, including seed predation (Roldán and Simonetti, 2001; Beckman and Muller-Landau, 2007; Dirzo et al., 2007; Wright et al., 2007), seedling mortality (Roldán and Simonetti, 2001; Nuez-Iturri et al., 2008), nest predation (Posa et al., 2007) and food accessibility to large predators. In many cases, animal populations in tropical protected areas need to be rebuilt if they are not properly cared for. So-called "protected" forest areas are unlikely to survive in their original state.

Rather than improving compliance and management of existing protected areas, many conservation efforts in the tropics focus on expanding nominally protected areas. Indeed, the size of protected areas is the most important measure of conservation success (e.g. Brooks et al., 2009; Joppa et al., 2008). Protected area management agencies in tropical developing countries are typically understaffed and face a variety of secondary challenges, such as lack of political will, inadequate infrastructure, overburdened education systems, ineffective legal systems and corruption (Bruner et al. 2001, Wright et al. 2007, Yu et al. 2010). In these circumstances, the ability to maintain reserves, create alternative livelihood programmes for local people or even pay foresters' salaries may be limited (Yu et al., 2010).

Therefore, the Empty Forest Syndrome is used in this study to provide a new perspective on hunting and poaching (EFS). Through the concept EFS, a new awareness of hunting and poaching can be created among local communities in Sabah.
Materials and Method

2.1 Study sites

The survey was conducted in six districts in Sabah, Malaysia: Sandakan, Kota Belud, Tambunan, Keningau, Tawau and Tenom (Figure 1). Sandakan district was visited in June 2020, Kota Belud in October 2021, Tambunan, Keningau and Tenom in July 2020 and Tawau in September 2020 as study sites. The Malaysian government had introduced mobility control to combat the spread of COVID-19 in the country, so each visit took about seven days.
Figure 1 The selected districts (study sites) in this study
2.2 Respondent demographic profiles

The number of male respondents (51.6%) was higher than that of female respondents (48.4%) (Figure 2). According to Lovejoy (1981), the classic image of the hunter-gatherer nuclear family is based on a division of labour in which the men hunt wild animals and the women gather plant supplies. Furthermore, the pair bond is seen as a cooperative endeavour centred on the joint production of highly dependent children, with women bearing and caring for the offspring in exchange for long-term support (Isaac 1978; Lancaster 1978). Washburn and Lancaster (1968) corroborate this pattern, noting that family organisation goes back to the hunter-gatherer way of life, where men hunt and women gather and the results are shared and passed on to the next generation.

![Gender distribution of the respondents.](image)

2.3 Data Collection

In this study, data were collected using a multi-method approach that included both qualitative and quantitative methods. The questionnaire consisted of open and closed questions and was administered to people in the six districts in semi-structured interviews. The interviews were conducted in the respondents' mother tongue (Bahasa Malaysia), which was most comfortable and convenient for them. We received a total of 45 responses. A snowballing method was used
whereby participants in the study recruited others to participate in the study. This method was used in situations where it was difficult to find potential participants, in this case potential hunters. The interviews were transcribed verbatim and the transcripts were subjected to content analysis using the Leximancer analysis software.

2.4 Data Analysis

There were numerous critical processes in the data analysis. First, the transcripts had to be formatted. All responses were translated into English without changing the meaning of the sentence from the local language (Bahasa Melayu). Microsoft Word was used to record each transcript. The typical programmed ideas and thesauri were processed using Leximancer software. The conceptual map, spider web configuration and quadrant report show the result.

The same qualitative procedure was used in the content analysis as in the analysis of focus group or interview transcripts, where the information was classified into themes. Due to the increase in Covid-19 cases in Sabah, the Sabah Wildlife Department provided information on hunting and poaching in the state.

2.5 Content Analysis

Leximancer is a programme that analyses interview material from large amounts of qualitative data, extracts information and visualises the results in the form of an idea map (Leximancer, 2010). The application extracts a thesaurus of phrases for key concepts and uses them to create a coding scheme that shows the frequency and co-occurrence of certain concepts. This application works with two (2) languages, namely "concept" and "topics". The system is designed by analysing the frequency, occurrence and context of words.

The "concepts" were generated from interrelated concepts merged from a higher-level concept, while the "themes" were derived from semantic and rational connections of the concepts. The "themes" are represented by coloured bubbles, and the "concepts", which are text samples from the collected data, are also referred to as "linkage points" within the bubbles. The use of text mining is consistent with other traditional qualitative content analysis according to Haynes et al. (2019) and Ho et al. (2011), therefore this coherence could justify its use as a method of analysis.
Results and Discussion

3.1 Respondents demographic profiles

In the sample population, female and male respondents are evenly distributed: 22 (48.89%) are female and 51.11% (23%) are male. Young professionals (20 persons) constitute the majority of the respondents in terms of age group (44.44%). In terms of education, majority of the respondents have completed at least primary school (44.44%). Majority of the respondents (46.67%) are farmers and most of them belong to income group B1 (64.44%).

**Figure 3** The demographic profiles of the respondents.
3.2 Wildlife Hunting Hotspot in Sabah

Based on information from the Sabah Animals Department, hotspots of wildlife hunting in Sabah were mapped (Figure 4). It shows that hunters routinely travel to the east coast of Sabah to hunt. Most wildlife was shot in plantation areas, where the conversion of land to plantations has opened up new opportunities for hunters in terms of accessibility. This may be due to the fact that most oil palm farms are located near a wildlife sanctuary, nature reserve, protected area or forest reserve compared to areas on the west coast.

![Figure 4 The hotspot of wildlife hunting in Sabah.](image)

3.3 Types of Wildlife Hunted

The Sabah Wildlife Department report shows that bearded pigs are the most frequently hunted animals (Figure 5). Thus, bearded pigs accounted for 76.97% of all species hunted, followed by sambar deer at 13.70%, green turtles at 3.50%, barking deer at 1.46% and fruit bats at 1.17% (Figure 11). According to Bennett et al. (2000) and Mojiol et al. (2013), bearded pig hunting is widespread in many rural areas of Sabah, and bearded pig meat remains an important food source for many populations. According to a study by Kurz et al. (2021), food procurement was the most frequently cited motive for bearded pig hunting among Kadazan-Dusun-Murut (KDM) in Sabah.
Other reasons cited by Kurz et al. (2021) for bearded pig hunting among KDM communities in Sabah include pest control, gift-giving and hobby. Only 0.29% of respondents said they hunt pangolins, hornbills, crocodiles and pygmy elephants for their body parts, while 0.58% said they hunt porcupines (fur and ivory). One endangered, one threatened, two threatened and one endangered species were on the Red List of reported hunted species, the remaining (5) were least threatened. The native Bornean pygmy elephant (*Elephas maximus borneensis*) was reported as hunted.

![Figure 5](null)

**Figure 5** Types of wildlife hunted based on locations

![Figure 6](null)

**Figure 6** Types of wildlife confiscated from the hunters or poachers
3.4 Content Analysis: Factors that leading to Wildlife Hunting

The main themes we discovered were community and hunting. They could neither be separated nor increased, which underlines the intertwining of the concepts. Leximancer's route mode examines the frequency and weight of individual words in a sentence. In this scenario, a two-sentence block contributes to the increasing number of occurrences of the concept. In our case, community accounted for 100% of the motivations for hunting, while hunt accounted for 57%. The analysis of the interviews is shown in Figure 6, where ten words (in red circles) illustrate the community's motivations for hunting. Local culture and tradition, market needs, alternative livelihood, substitute meat, therapeutic purposes, nutritional purposes, free food and as a pastime are some of the reasons.

This is understandable, as hunting wildlife is an important source of income for indigenous peoples and contributes to the preservation of their traditional identity. Indigenous peoples are increasingly coming into contact with external actors, leading to a gradual acceptance of new values and attitudes that could influence their worldview, social organisation and behaviour towards nature. Several studies have shown that economic growth can change the livelihoods of indigenous peoples in general and their hunting habits in particular, although the direction of change varies.
Conclusion

In many parts of the tropics, hunting is currently the greatest threat to tropical biodiversity. Current efforts to protect the tropics are failing, which is a painful but unavoidable reality. Many protected areas currently have empty forests, and the loss of important symbionts would certainly cause ecosystems in such reserves to deteriorate much further if wildlife numbers are not restored. The management and enforcement of tropical protected area networks need to be significantly improved.

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References


