

Curtin Business School

**The Commercialization of Traditional Subsistence Hunting
Activities in Bario, the Kelabit Highlands, Sarawak,
Malaysian Borneo**

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This thesis is presented for the Degree of
Master of Philosophy
of
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DECLARATION OF ETHICS

The research presented and reported in this thesis was guided by the Australian National Statement on Ethical Conduct in Human Research (2007) which was updated in May 2013; and the joint NHMRC/AVCC statements on “Value and Principles of Ethical Conduct”, “General Requirements for Consent”, “Qualifying or Waiving Conditions for Consent”, “Qualitative Methods”, “Databanks”, and “Process Report”. The researcher has also been fully informed about the indigenous rights of the Kelabit people in general by reading the “United Nations Declaration on the Rights of Indigenous People”.

The research has received the Ethics Approval from Curtin University under CSEA 221013 approval code. Furthermore, a Forest Department Sarawak Permit had also issued Permit to conduct the interviews for this research (Permit code# NCCD.907.4.4 [JLD.10]-223).

Akram Akbari

16 September 2016

DEDICATION

کزین برتر اندیشه برنگذرد

به نام خداوند جان و خرد

It's a great feeling to be loved, but it's profound to be understood. I am authentically myself. And the only reason is I've been blessed by having an admirable mother, father and brother. I would like to dedicate this thesis to my only beloved ones, Mom, Ashraft, Dad, Ali, and my brother, Alireza.

عالم پیر دگر باره جوان خواهد شد	نفس باد صبا مشک فشان خواهد شد
چشم نرگس به شفاق نگران خواهد شد	ارغوان جام عقیقی به سمن خواهد داد
تا سر پرده گل نعره زنان خواهد شد	این تطاول که کشید از غم هجران بلبل
مجلس و عطر دراز است و زمان خواهد شد	گر ز مسجد به خرابات شدم خرده مگیر
مایه نقد بقا را که ضمان خواهد شد	ای دل ار عشرت امروز به فردا فکنی
از نظر تا شب عید رمضان خواهد شد	ماه شعبان منه از دست قدح کاین خورشید
که به باغ آمد از این راه و از آن خواهد شد	گل عزیز است غنیمت شمردش صحبت
چند گویی که چنین رفت و چنان خواهد شد	مطربا مجلس انس است غزل خوان و سرود
قدمی نه به وداعش که روان خواهد شد	حافظ از بهر تو آمد سوی اقلیم وجود

حافظ (غزل 164)

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STATEMENT OF ORIGINAL AUTHORSHIP

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgment has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

Akram Akbari

16 September 2016

ABSTRACT

Hunting wildlife for human consumption is now widely acknowledged as unsustainable throughout the world's tropical forests. Yet, many people in Asia live at the margins of the cash economy and depend on the harvest of wildlife for both subsistence and income purposes. This situation especially holds true Malaysian Borneo. Wildlife in the Kelabit Highlands of Sarawak, in Malaysian Borneo, is increasingly hunted for commercial purposes to satisfy demand for bush meat from both local residents and migrants to distant urban centers. There is no clear data on the extent to which wildlife consumption is affected by price compared to domestic alternatives; and, to what extent price drives hunting activity. This study aims identify the factors driving the commercialization of hunting in the Kelabit Highlands and undersand the impact of hunting on the biodiversity in the studied region.. The research methodology applied a qualitative, ethnographic approach which included semi-structured interviews with local hunters, on and off-site observations and photo-documentation. Fifty-six semi-structured interviews were conducted across 17 Kelabit villages and a Penan village over a two month period between August 2014 and December 2015. Data collect periods included the dry season (August and September 2014), the wet or animal season (February 2015) and Occasional Event hunting times (the Slow Food Festival in late July and the Christmas Feast in late December 2015). Observations were made during August and September 2014, February 2015, sporatically throughout August 2015, and during late December 2015. The data elicited includes a compilation of species hunted in the dry season by their English, Kelabit and Penan names. The prices paid for bush meat by species and target market are also catalogued. Contemporary and traditional Kelabit hunting methods, along with bushmeat cooking and preservation methods are compiled and described. Findings indicate that there are several categories of hunters in the Kelabit Highlands. Moreover, price has impacts on the species hunted. There are several categories of bushmeat consumers in and outside of the Kelabit Highlands who influence the species to be hunted depending on the seasons. In addition, the preferred hunting grounds of locals were studied; finally, the number of Kelabit hunters who hold gun and hunting licenses and how many permits have been issued to the hunters were studied.

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Key definitions

The terms used in this research are defined below to clarify the perspectives taken in this report.

Biodiversity: Biodiversity or the ‘diversity of life’ is the number and type of organisms in a habitat, ecosystem, region or environment. It can refer to genetic, species or habitat variation on any scale at all levels in any form (Hunter & Gibbs, 2007; Butler, 2006).

Commercial hunting: Commercial hunting involves the catching the live animals and either the sale of the live or dead animals to obtain monetary profit from their meat or other products (Ojasti, 1996). Generally, the main purpose in commercial hunting is economic benefit (Browne, 1982; Bennett & Robinson, 2000 a&b; FAO, 1996). Commercial hunting which is also known as ‘market hunting’ (Browne, 1982) or ‘harvesting’ (Chiras, 2004) can be relegated into ‘large-scale efforts’ or ‘smaller operations’ which can be legal or illegal (Chiras, 2004).

Hunting tourism: Hunting tourism is defined as tourists who experience adventurous hunting trips (Foote & Wenzel, 2007). However, participating in hunting tourism can provide good opportunities and motivation for the local communities to become involved in conservation and tourism activities; thus, it is additionally known as ‘conservation hunting’.

Ethnography: Kottak (2000) defines ethnography as an ‘account’ of a culture or a society. Ethnographers accumulate data predicted on their personal experiences and ‘firsthand’ observation with the culture (Miller, 2008). They analyze and interpret the collected data to engender the narrative account and provide the context for categorical cultural features and traditions (Kottak, 2000).

Poaching: According to Belvins and Edwards (2009), poaching is considered as the illegal wildlife resources use, kill and trap of endangered or protected species. As human population grows, other factors such as subsistence, recreation, commercial gain, and trophy poaching are considered the motivation of poaching which causes unsustainability in demand for natural resources (Robinson & Bennett, 2004; Grey-Ross et al., 2010; Liu et al., 2011).

Recreational hunting: Bennett and Robinson (2000 a&c) define recreational hunting as

hunting for pleasure. Most hunters in tropical forests hunt for their 'nutritional and economic needs', but relish the process of hunting (Bennett & Robinson, 2000 a&c). Recreational hunting is also known as 'hunting for sport' (Ojasti, 1996).

Sustainable hunting: Hunting that does not adversely impact wildlife populations is considered as sustainable hunting (Bennett & Robinson, 2000 a,b&c). To achieve the goal of sustainable hunting, three factors must be completed: (a) the number of animals harvested should be some optimal fraction of the overall birth rate of the targeted species, (b) species management goals should be clearly defined; and, (c) the environment has to have 'appropriate' conditions in terms of biology, society and politics (Bennett & Robinson, 2000 a,b&c).

Wildlife trafficking: The illegal wildlife exchange or commercial trade of wildlife starts with wildlife poaching (Wyatt, 2013) that occurs nationally and internationally (www.traffic.org, 2015; wwf.panda.org, 2015) and contributes to biodiversity loss and the extinction of species (Cao Ngoc & Wyatt, 2013). However, Legal wildlife trade is regulated by the United Nations' Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which currently has 170 member countries called Parties (CITES, 2013).

CHAPTER 1: INTRODUCTION

Chapter One Overview:

- 1.1 Introduction*
- 1.2 Bushmeat crisis*
- 1.3 Bushmeat consumption and crisis in Bario*
- 1.4 Commercial hunting*
- 1.5 Sustainability of hunting*
- 1.6 Conclusion*

1.1 Introduction

Bushmeat is the meat from wild animals killed for human consumption (IUCN, 2009). Bushmeat has long been a staple of forest-dwelling peoples in tropical areas worldwide and continues to provide the main source of protein for many local communities, especially remote villages (Albrechtsen et al., 2007; Robinson & Bennett, 2000). Wild species are also hunted for cultural reasons such as food, sale and gregarious activities, as they regarded as agricultural or community pests (Robinson & Bennett, 2000).

1.2 Bushmeat crisis

In 1999, a consortium of conservation organizations and scientists dedicated to the conservation of wildlife populations threatened by the hunting of wildlife founded the Bushmeat Crisis Task Force (Bushmeat.org, 2015). However, according to the Bushmeat Crisis Task Force (2015), the unsustainable utilization of bushmeat now threatens numerous species in Latin America, Africa and Southeast Asia. The scale of the commercial sale of bushmeat is of such concern that the situation is referred to as the ‘Bushmeat Crisis’ (Bushmeat.org, 2015). The bushmeat crisis is derived from a number of factors that create tremendous pressures on wildlife resources such as overexploitation or overhunting (Milius, 2005; Bulte & Horan, 2002; Rodmer et al., 1997), poaching (Liberg et al., 2012; Poudyal et al. 2009; Osborne, 2000; Kenny et al., 1995; Pagel & Mace, 1991) and low governance (Yu et al., 2010; Smith et al., 2003; Whitten et al., 2001; Putz et al., 2001).

The bushmeat crisis in Southeast Asia is further exacerbated by the threats to the region's biodiversity. Deforestation, forest fragmentation, mining, urbanization, logging, wildfires, alien species incursion, disease, nutrient enrichment (Corlett, 2007; Bennett et al., 2000), road construction (Rytwinski et al., 2015; Loro et al., 2015; Mata et al., 2008; Ling et al., 2002) are the additional factors that further the bushmeat crisis in Southeast Asia.

1.3 Bushmeat consumption and crisis in Bario

Similarly, according to Bennett et al. (2000) the hunting of bushmeat (known as 'wild meat' or 'game meat' by Nasi et al. in 2008) is driving a life that may be potentially unsustainable in terms of wildlife consumption in Sarawak, a state in Malaysian Borneo Rainforest. This study examines the commercialization of bushmeat hunting in the Kelabit Highlands (Figure 1.1) in northeastern Sarawak.

Referring to Figure 1.2, Sarawak is a plateau over 1,000m above the sea and located between Tama Abu Range and Apo Duat Range on the Sarawak-Kalimantan border (googlemap.com, 2016a). Sarawak is the most eastern Malaysian state (out of to states in East Malaysia) on the Borneo Island; Kuching is its capital. The state has 11 administrative divisions. Bario, in the Kelabit Highlands is located in the Miri districts within the Miri division (Sarawak Government, 2015).

Figure 1.1 Top left: Map of the Kelabit Highlands. Southeast Asia Link- SEALINK (2016);
 Bottom right: Map of Bario town center in the Kelabit Highlands.

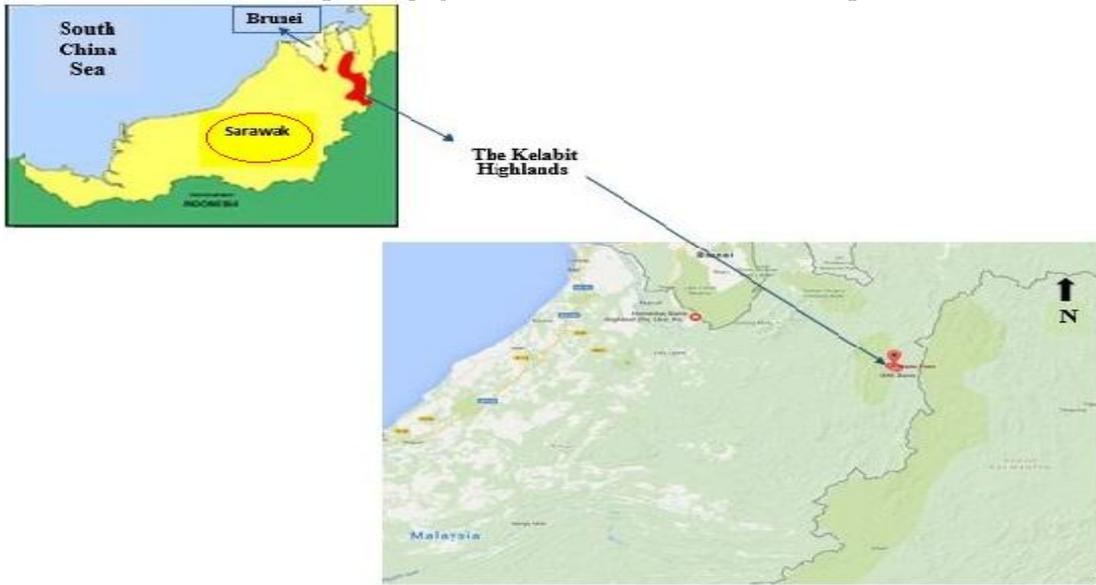
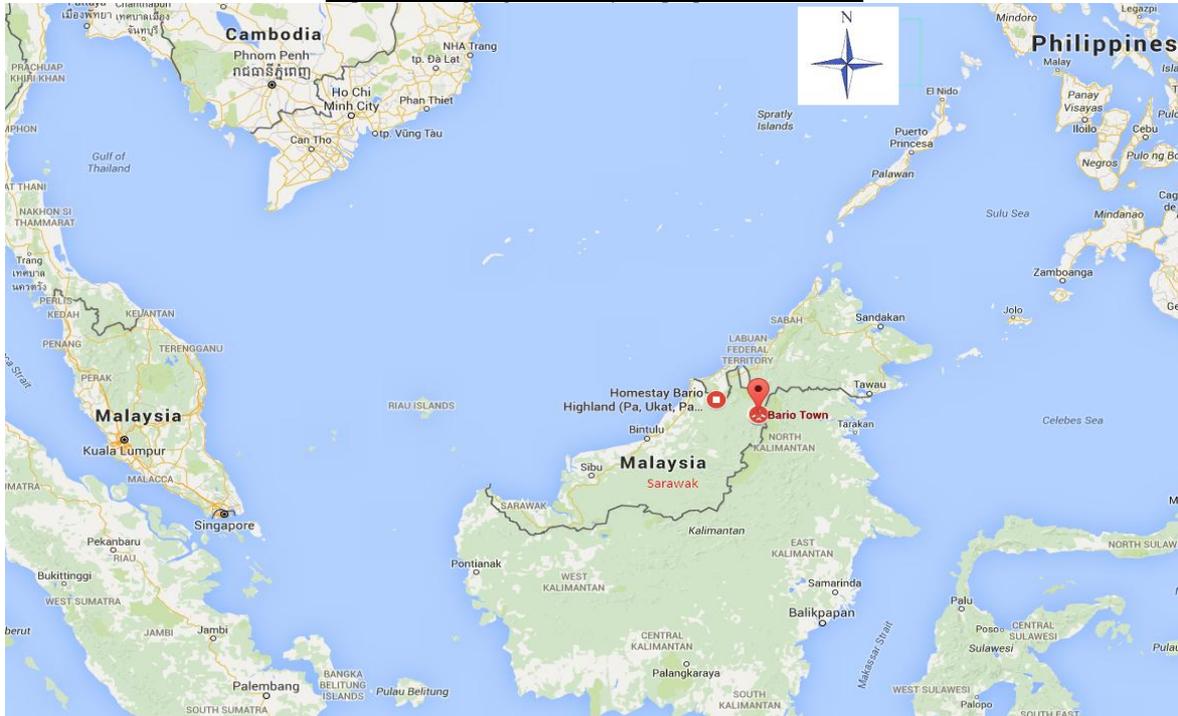


Figure 1.2 Map of Sarawak. Googlemap.com (2016b). Retrieved from:
<https://www.google.com.my/maps/place/Sarawak/>



The Bario region which is called civilized and anachronistic by Alexander (2006) has a town center called Bario as well, which is about 15km west of the Indonesian Kalimantan border (De Ledesma et al., 2003). Approximated 4,900 Kelabit plus a few hundred Penan and migrated (legal or illegal) Indonesians are the majority of the population in the Kelabit Highlands (JoshuaProject.net, 2016; Batu Bala, 2014; Langub, 2008). The Kelabit hunt their protein consumption from the forest (Janowski, 2014, 2003, 2002; 1996; Bala, 2002a; Harrison 1959); therefore, hunting wildlife is considered as a career and source of income for the family, as well as protein subsistence for the households. The most desired species among the Kelabit and Penan communities are wild boar (*Sus scrofa*), bearded pig (*Sus barbatus*), or sambar deer (*Cervus unicolori*). Furthermore, according to Langub (1988), the Penan community hunts according to their need; they mainly consume vegetables and wild sago, as they believe that they have to keep the wildlife for future and next generations. However, in this study the Penan's opinion regarding the wildlife consumption is studied according to their current situation in the area; as well as the Kelabit perspectives.

1.4 Commercial hunting

The incremental commercial consumption of bushmeat is driven by a variety of factors including the demand for meat which might lead to the extinction of the species (Bennett et al., 2000; Rodmer et al., 1997; Alvard et al., 1997). Wyatt (2013) classified demand for food, for collecting components of the animals, traditional medicines, and processed commodities. However, she argues about supply side of wildlife demands, and wildlife trafficking [illegal exchange or commercial trade of wildlife (Wyatt, 2013)] that happens within the country or across the borders (www.traffic.org, 2015; wwf.panda.org, 2015).

Furthermore, Cao Ngoc and Wyatt (2013), allude to green criminology as the new method of biodiversity theft and they suggest creating strategies for combating the illegal wildlife trade. They draw attention to the notions that the value of the environment and species are due to the worth for people and also having the right to survival. Cao Ngoc and Wyatt (2013), in their Vietnam case study, argue that this approach will lead to the green economy wellness and eco-friendly regulations.

Moreover, endangered and protected species, such as Sunda pangolin (*Manis javanica*), bear

cat (*Arctictis binturong*, also known as the Binturong) and sun bear (*Helarctos malayanus*) are killed and used to satisfy the demand by the Chinese for traditional medicines (Boakye et al., 2014; Chouvy, 2013; Katuwal et al., 2013). Pangolins are killed in such high numbers that they are threatened with extinction (CITES, 2016; WWF, 2016a; Wyatt, 2013). Other animals such as small wild cats, shrews and monkeys are collected for the pet trade (Gong et al., 2009; Nekaris & Jaffe, 2007). Some body parts of particular species are purchased as wall trophies (Wilkie et al. 2011).

Furthermore, ecotourism is increasingly being embraced as an economic development tool by the villagers, including in the Kelabit Highland (Lo et al., 2012) and “would-be” entrepreneurs. As the number of visitors to the Kelabit Highlands increases, the pressure on wildlife resources will increase too. The desire of visitors to taste exotic meat could further expand commercialized bushmeat hunting activities.

An interesting twist to the commercial sale of bushmeat in Bario is that the Sarawak government requires all hunters to obtain a permit to kill or sell any species. However, based on The Wildlife Protection Ordinance 1998, the natives in native area land who hunt non-protected species do not need to obtain any licenses. Yet, in Part IV of the “Protection of Wildlife” it is mentioned that

“any person who hunts, kills, captures, sells, offers for sale or claims to be offering for sale, imports, exports, or is in possession of, any totally protected animals or any recognizable part or derivative thereof, or any nest thereof, except in accordance with the permission in writing of the Controller of scientific or educational purposes or for the protection and conservation of such totally protected animal, shall be guilty of an offence: Penalty (a) if the animal concerned is rhinoceros, imprisonment for five years and a fine of fifty thousand ringgit; (b) if the animal concerned is an orang-utan or proboscis monkey, imprisonment for two years and a fine of thirty thousand ringgit; (c) in the case of totally protected animals not mentioned in paragraph (a) or (b), imprisonment for two years and a fine of twenty five thousands ringgit (Laws of Sarawak, Wild Life Protection Ordinance, 1998, Chapter 26, Part IV, 29-1 (a), (b) & (c)).

Therefore, all commercial sales of mammals, birds, reptiles and amphibians in Sarawak are illegal under the Wildlife Protection Ordinance (1998).

The proportion of hunters who actually comply with this mandatory licensing requirement is

unknown. Thus, in this study, Objective 4 is to determine the proportion the hunters who hunt outside their territory and hold hunting/gun permits. Lastly, there is little data in the Kelabit Highlands region concerning the number of hunters utilizing the area, the techniques used, and the preferred species targeted for commercial purposes (Wong et al., 2012).

1.5 Sustainability of hunting

The World Conservation Strategy (1980) states that sustainability is considered as the natural population capital and its utilization and harvest is counted as the taken interest. To achieve the goal of sustainable hunting, four factors must be fulfilled: (a) the number of animals harvested should be some optimal fraction of the overall birth rate of the targeted species (in other words, the harvested animals population cannot consistently decline in number); (b) the density of the harvested animals should not be affected as the species are vulnerable and might extinct; (c) the density of the harvested animals should remain the same in terms of ecology in their ecosystem; and (d) the population of harvested animals should be same in terms of being the significant source of protein for the communities (Bennett & Robinson, 2000).

Furthermore, changes in the environment in terms of social, physical, cultural and economic may lead to unsustainable hunting. Forest loss decreases the population of wildlife and limits the source for the hunters. The increase of the population among the community due to migration causes changes in wildlife harvest patterns. Hunting the most desired or more convenient and easier to catch species, changes of hunting tradition, techniques through breaking the hunting taboos against certain species, and utilizing more advanced hunting techniques may lead hunting activities to the unsustainable level as well. And last but not least, the commercialization of wildlife hunting through higher preference of hunting by local hunters and non-resident commercial hunters can cause unsustainability in hunting (Milner-Gulland et al., 2009).

Additionally, the individuals hunting their desired species may affect the ecology and evolution of the species as well (Milner-Gulland et al., 2009). Therefore, culling the desired species and frequently hunting them may cause changes on the population of the species.

In this study, the aim is to try to understand the sustainability of hunting in the Bario region by considering all or some of the factors listed by Milner-Gulland et al. (2009). However, in the previous studies conducted by Bennet et al. (2000) and Wong et al. (2012), in Malaysia, it is stated that hunting in Borneo rainforest is unsustainable; so this study aims to understand the current situation in the Bario region of the Kelabit Highlands in Sarawak, Borneo.

1.6 Conclusion

Consequently, the aim of this study is to help determining the sustainable use of wildlife in the Kelabit Highlands for the benefit of the local indigenous communities and agency decision makers. While gathering valuable baseline data for the suggestion of a potential community based hunting management framework, and to find the right balance between the maintenance of regional biodiversity and local livelihoods. Hence, the following objectives have been developed after a review of the literature:

- 1) to document the contemporary hunting activities of resident and non-resident hunters in the Kelabit Highlands region;
- 2) to document which species are hunted for commercial purposes among the hunters in Bario region and study how bushmeat prices are determined for each species;
- 3) to identify the general economic and commercial pressures on hunting activities and to assess their overall impact; and,
- 4) to determine the proportion of the hunters who hunt outside their territory and hold hunting/gun permits.

The last studies of this nature conducted in Sarawak was by Dr. Elizabeth Bennett, Anna Wong and her colleagues (2012), and a variety of researchers in the early 2000s and after (Bennett et al., 2000); Chin, 2002; Chai et al., 2008; Hitchner, 2009; Halim et al., 2012; Gaveau et al., 2014). The related studies will be described in detail in Chapter 2.

CHAPTER 2: LITERATURE REVIEW

Chapter Two Overview:

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- 2.2 *The Kelabit Highlands, natural and demographic background*
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2.1 Introduction

This chapter reviews the literature directly applicable to this study and details the gaps in literature this research aims to fulfil. The literature review is divided into four sections. Section 2.2 aligns with the Objectives 1 of this study; and overviews the biodiversity in the Sarawak Borneo rainforest and introduces the indigenous communities in Bario region of the Kelabit Highlands. The current hunting patterns, types of hunting trips and contemporary hunting practices among the Kelabit and Penan hunters are presented as well. To fulfill the second objective, in Section 2.3, the hunted species, as well as the most preferred and least desired species are recorded. Section 2.4 covers the literature concerning the bushmeat crisis, and what factors influence the pressure on hunting activities (Objective 3); as well as the techniques of hunting by passing times in Section 2.4.3.3. In Section 2.6, the laws and regulations about hunting activities. The possible solutions and the related theories are

understood and addressed in Section 2.6.

2.2 The Kelabit Highlands, natural and demographic background

To better understand the demography of the wildlife hunters in the area and their contemporary activities in the Bario region, the literature on the peoples who live in the Kelabit Highlands and the ethnic groups who live in the surrounding area was reviewed in detail. The two primary ethnic groups who live in the Highlands are the Kelabit and the Penan.

2.2.1 The Kelabit Highlands

The Kelabit Highlands covers an area of approximately 2500 km² within Sarawak. About 1500 people live within the Kelabit Highlands; however, the entire population of Kelabit people is approximately 5000 individuals (Batu Bala, 2014; Hitchner, 2009). The Kelabit people of the (hereafter referred to as the Highlands) live a highly nature-based lifestyle alongside ancient megalithic monuments and plenty of mythological cultural heroes (Hitchner, 2009). More details are provided in the introduction of the Study Site in Chapter 3.

2.2.2 The Kelabit

The first objective of this study is to record the hunters within the Kelabit Highlands and the ones who belong to outside the region. According to Ritchie (2015), Westerners recognized the first Kelabit man by his hairstyle, which was similar to a 'Beatles' look (to expose the forehead by cutting the hair and a pig-tail loose on the back). Ritchie generally describes the Kelabit as an attractive people who are intelligent and charismatic. Older Kelabit women have had their ear-lobes stretched down to their shoulders using heavy earrings. However, nowadays, only a few women are seen with stretched ear-lobes. Kelabit are skilled in handicrafts such as basket and bead work (Mashman, 2006). In general, Kelabit live in longhouses connected to each other, with a kitchen with a wood fire for each household (Steiner, 2007). Additionally, Bala (2002a, 2009) states that the Kelabit longhouses are equipped with running water piped from nearby streams and some have generators.

Rice cultivation is still the main economic activity among the Kelabit people and it is an important part of their diet. Salt trade and pineapple farming have also been a part of the community's activity for decades (Steiner, 2007). Additionally, as Kelabit obtain most of their protein from jungle wildlife (Janowski, 2014, 2003, 2002; 1996; Bala, 2002a; Harrison 1959). Hunting is considered a career and in some cases, the primary source of income to local households.

The blowpipe was one of the main weapons used among the Kelabit for smaller sized animals such as monkeys or squirrels. For larger game, such as wild boar (*Sus scrofa*), bearded pig (*Sus barbatus*), or sambar deer (*Cervus unicolor*), they used spears and bush knives. Dogs are very important to Kelabit hunters, both for spear and gun hunting. As Batu Bala (2014) notes, Kelabit have become very good with guns over the years. Thus, today the gun is the preferred tool to hunt with and has replaced the blowpipe and spear for most hunters (Steiner, 2007). Kelabit men hunt (individually or in groups) in any of the three salt springs within the Bario region and Ba'Kelalan.

Hunting is also part of the common rituals among the Kelabit community for feasting occasions such as weddings, Christmas Eve, or name changing ceremonies. As an example, for the changing name ceremony, called *Irau Mekaa Ngadan* (Bala, 2002 a&b), happens when a new baby is born. The parents and the grandparents have to completely change their traditional names and they have to inform the community. As an example, Ritchie (2015) mentions a name that was Tiri Maran and changed to Mawan Bala which the new name is presented as Tiri Maran @Mawan Bala. This ceremony is followed by a great feast for which Kelabit hunt in a group for big game such as wild boar and sambar deer. In this study, observation of occasional event hunting activities during ceremonies and festivals is one of the methods used for data collection to better understand the culture of hunting, its techniques and methods, among the Kelabit.

The majority of the Kelabit have moved out of the Highlands to large urban areas in Sarawak, such as Miri, Sibul, or to West Malaysian cities, such as Kuala Lumpur or even overseas (Bala, 2002a). Moreover, Bala (2002a) states that the main reason for this emigration is to secure better job and education opportunities.

2.2.3 *The Penan*

The other main indigenous group who lives in the Highlands are the Penan. Ritchie (2009, p. 4) describes the Penan as having “Mongolian-type features, are fair-skinned and pale in appearance and many suffer from anemia”. Janowski and Langub (2011) describe them as the people who trade-off jungle products, such as fruits and vegetables in exchange for clothes and sugar. They also sell handicrafts such as baskets and mats.

The Penan have been studied by anthropologists and ethnographers such as Langub (2011, 2008, 2001, 1989 & 1974), Chai et al. (2008), Brosius (1999, 1997, 1993, 1992, 1990 & 1986), Davis, Mackenzie and Kennedy (1995), Chen (1990), Davis and Henley (1990), Needham (1972, 1954 & 1953). These researchers have focused on or are still studying the Penan’s lifestyle, customs, leadership, and hunting and gathering.

Needham (1953 & 1954) has studied and observed Penan’s language, life style, and kinship in northwest and eastern Borneo and Sarawak. Needham and Sercombe (2010), Martin and Sercombe (1996) studied Penan’s language and education in Brunei. Brosius referred to Penan as the foreigners in Malaysia who were affected by logging company activities and political perspectives; he considered Penan as an endangered people who inherited traditional indigenous knowledge (Brosius, 1997).

Anthropologist and ethnographer, Jayl Langub, studies the nomadic and settled life of Penan (Langub, 1989); their adaptations to new Western lifestyle (Langub, 1974), their folk stories (Langub, 2001), and different aspects of their contemporary living adjacent Pulong Tao National Park in Sarawak (Langub, 2008). He has also studied aspects of leadership and kinship among those Penan. Sopher(2010) shared her two month story of living with a group of settled Penan in Long Lamai, Sarawak. She collected local Penan stories and observed the community’s lifestyle.

Puri (2005, 1999), Donovan and Puri (2004) and Chin (2002) studied Penan hunting patterns and techniques. In addition, Puri (2005) researched hunting methods, knowledge and culture among Penan from an anthropological perspective. Similar to the study of hunting knowledge and culture,

Penan are also found outside of Sarawak. Wong et al. (2012) studied hunting activities of the

groups living in Sabah, Malaysian Borneo. Puri (2005) studied Penan who live in Indonesian Borneo. He studied their hunting knowledge and culture from an anthropological perspective. Additional Penan live in Brunei Darussalam, the smallest country located on the island of Borneo; and linguists, such as Sercombe (2010 & 2003) studied them in Sukang Brunei. The Penan's language, education, and also their ethno-linguistic changes in two places, Sukang, Brunei and Penan in Long Buang in Sarawak are studied by Sercombe (2003) and Martin and Sercombe (1996). However, the majority of the Penan communities in Malaysian Borneo are located in Sarawak.

Needham (1972) divides the Penan of Sarawak into two separate groups: Eastern and Western Penan. Jayl Langub, as a researcher and ethnographer, divides (1) nomadic Eastern Penan into Baram and Limbang groups with 20-40 people in each group; (2) Semi-settled Western Penan who live in 60-200 population in each group (Langub, 2011).

As Solhee and Langub (2013) state, in 1980s, the estimated population of Penan in Sarawak was about 10,000 people; however, in their study they categorize Penan into three groups: permanently settled, semi-settled and nomads. He claims that 60 percent of Sarawak's Penan are semi-settled. In his study, Langub describes his experience of being with Penan while they establish their new life-style and relationships with the surrounding and situations they are in. He explored the area between Mulu National Park and Pulong Tao National Park that the Penan are distributed.

The nomad Penan avoid contacting other ethnic groups even other Penan and they move wherever they can find enough resources for living (Langub, 2011). However, semi-settled Penan, are those who the government built settlements for them in the jungle, but they still move around for short period of time (Langub, 2011).

The majority of the Penan are semi-settled who sometimes live in the forest and sometimes live in settlements provided by the government; however, they prefer not to remain in these settlements because they have no access to medical care, education and the opportunity to find work and earn money (Steiner, 2007). Similarly, Janowski and Langub (2011) describe the Penan in the Bario region as semi-nomadic/settled. They are from Ba' Tik A and B whose main settlement is Ba' Medamut (Figure 2.1) which was built by the Sarawak government (Ritchie, 2009). In Figure 2.1, the location of the Penan settlement in Ba' Madamut, Bario

Individual Penan frequently join others protesting against the logging of the Borneo rainforest.

Langub (1988) states that depletion of wildlife is not an issue in the areas where Penan communities live as they hunt just what they need. Their main diet consists of vegetables and wild sago that are not overexploited by them. Hence, according to Lau (1987), the Penan knowledge of the plants, animals and how to survive in the jungle is unsurpassed among other indigenous groups in Borneo.

Bruno Manser (1996) had visited the Penan at Long Lamai and Long Beruang and mentioned that, in general, Penan prefer to live as an isolated community. Nevertheless, Malone (2014) and Janowski and Langub (2011), note that the Penan are connected to the Kelabit through the exchange of forest products. Similarly, according to Bala (2001 & 2002b), the Kelabit are tied to other ethnic groups in the Highlands and surroundings, such as Penan. These two indigenous communities, the Kelabit and the Penan intersect in Bario, a small village located in the Highlands. The semi-settled Penan work on the Kelabit owned rice paddies to earn seasonal monies in which to purchase key goods. Additionally, by living close to Bario, they have better and easier access to the government clinic and the local school.

This research studies 18 villages in the Highlands - 17 Kelabit villages and one Penan settlement. The Penan settlement, Galangayung, has three separate parts which overall consists of about 15 households and shanties. There are two schools located between Pa' Ramapuh Atas and UlungPalangBawah, a primary and secondary school. These schools are similar to boarding schools and Penan children are allowed to study and stay in them.

2.2.4 The biodiversity

In this section, An attempt has been made to better understand the distribution of species in Bario, and how hunters aim for these species. Consequently, an overall view of the biodiversity in the rainforests of Borneo and Sarawak is made.

The Earth is covered by 16 million square miles of forests (Butler, 2006). Tropical rainforests, which are defined as species-rich ecosystems by Wilkie et al. (2011), are one of the most important places that affect ecosystems and human lives as they hold natural

reservoirs, biological diversity and forest products (Butler, 2014). In general, tropical rainforests cover less than 2% of the surface of the planet, yet are home to approximately 50% of its entire terrestrial species (Butler, 2006). To better understand about the ecology of tropical rainforest, in general, Corlett (2014) and Corlett and Primack (2011) overviewed the biodiversity in rainforests such as carnivores and herbivores primates, birds, fruit bats, and gliding animals and insects; as well as, they studied the threats on rainforests and impacts of human and climate changes on rainforest biodiversity. In addition, Corlett (2014) studied the ecology of tropical East Asia in detail and discussed the issues in tropical forests and possible solutions.

The Borneo rainforest, as one of the oldest rainforests in the world, holds less than half of its original forests (Park, 1992). Figure 2.2 illustrates the tropical regions in East Asia within the dashed line. However, Figure 2.3 shows Borneo deforestation over the past 70 years.

Figure 2.2 Tropical East Asia (dashed line). Adapted from “The ecology of tropical East Asia” by R.T. Corlett, 2014.

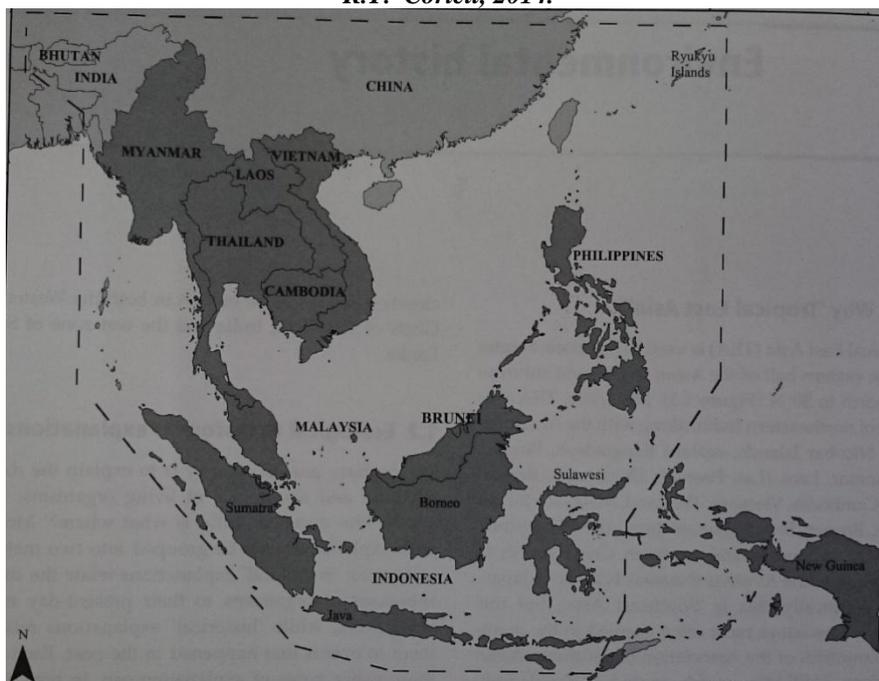
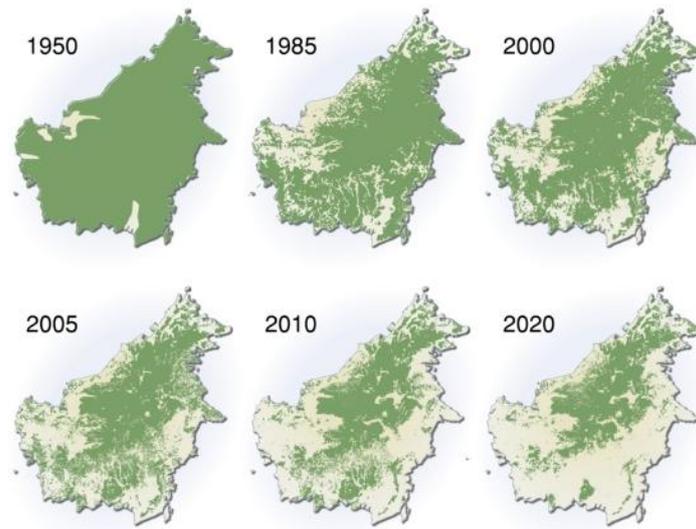


Figure 2.3 Borneo deforestation since 1950. Adapted from “Extent of deforestation in Borneo 1950-2005, a projection towards 2020” by H. Ahlenius, 2007.



Borneo rainforest is located between 4-7° N and 4° S of the Equator in Southeast Asia with the 743,294km² (Thiessen, 2016). Three countries have ownership of territories on the island of Borneo: Brunei, East Malaysia (consisting of Sarawak and Sabah) and Indonesia (consisting of South, East, Central and West Kalimantan (Ritchie, 2015). The Borneo rainforest is the third largest rainforest in the world. According to the World Wildlife Fund (WWF) (2016a), there are approximately 222 species of mammals, 420 species of birds, 394 species of fish, 100 species of amphibians in Borneo; and 44 species of mammals, 37 species of birds (8 hornbill species) and 19 species of fish that are endemic. These species include: the orangutan (*Pongo pygmaeus*), clouded leopard (*Neofelis diardi nebulosa*), Borneo pygmy elephant (*Elephas maximus borneensis*), Borneo gibbon (*Hylobates muelleri*), banded linsang (*Priondon linsang*), sun bear (*Helarctosmalayanus*), the hornbills [8 species such as bushy-crested (*Anorrhinusgaleritus*) and helmeted (*Rhinoplax vigil*), the rhinoceros (*Buceros rhinoceros*) which are endangered], and the pheasants (WWF, 2016b).

The Borneo rainforest is also famous for its rich plant life which includes the *Rafflesia*, the carnivorous *Nepenthes* and numerous species of orchids (Hinsley, et al., 2015; Lamb, 1991). Many new species are continually being discovered in Borneo as well, such as three species of freshwater halfbeaks (as *Teleostei: Zenarchopteridae: Hemirhamphodon*) (Tan & Lim, 2013) and Polypedates (as *Anura: Rhacophoridae*) in Gunung Murud, Sarawak (Das & Haas, 2013).

Malaysia holds the rank of twelfth most biodiverse country in the world and fourth most biodiverse in Asia (Halim et al., 2012). Gaveau et al. (2014), by analyzing LANDSAT images, have estimated that 75.7% of the native forests of Borneo are impacted by selective logging, fire, and the conversion to plantations at an unprecedented scale in the past 40 years. In 2010, according to forest GIS maps, the original forest has decreased up to 30.2%, which equals almost 168,493 km². Sarawak also holds the distinction of having one of the highest logging road densities in the world, at 0.89 km/km² (Gaveau et al., 2014).

However, some species are protected and have received better protection for instance, the Sunda or Malaysian pangolin (*Manis javanica*) is the most widely or distributed pangolin in Southeast Asia (Challender et al., 2015). However, it also has the misfortune of being the most heavily trafficked mammal in Asia (Challender et al., 2015; Shepherd et al., 2007). Sunda pangolin is internationally protected under Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Today, the Sunda pangolin is a protected species in all the states of Borneo, except for Brunei Darussalam; and it receives more general protection under three different Acts and Orders (Challender et al., 2015). The Sunda pangolin has had devastating decline across its range due to persistent illegal hunting by both local communities and international trade, largely to supply the demand in China and in the illegal international trade for its meat and scales (Challender et al., 2015; TRAFFIC, 2011; Coggins, 2003). Many Chinese believe that pangolin scales cure a number of ills and skin infections while supposedly the meat aids in kidney function. Pangolin meat is sold in restaurants and affluent Chinese seek it out to relish at their leisure (TRAFFIC, 2011). The several hundred seizures totaling more than 50 tons of live and dead pangolins over the last decade is evidence pangolins are being heavily trafficked (TRAFFIC, 2011). As Pantel and Anak's (2011) reported at TRAFFIC.org, more surveys on the pangolin trade should be conducted in Malaysian Borneo, especially Sarawak.

Furthermore, the Binturong, a bear cat, a dark coloured, heavy and ponderous mammal that is arboreal, but frequently moves to the ground to find food or change location when appropriate tree branches are unavailable, is also facing potential decline (Widmann et al., 2008). While the Binturong is widespread across Southeast Asia it is threatened by habitat loss and degradation, justifying the species being classified as 'vulnerable' on the IUCN Red List by Widmann and his team. Additionally, it is noted at IUCN Red List (2015) that some

Arctitis binturong are taken for the pet trade in the Philippines, and it is considered a delicacy in parts of Laos and is a regular food item in Viet Nam. However, the IUCN has little data related to the population status, use and illegal trade of the Binturong in Borneo.

Sarawak, as part of Malaysian Borneo that encompasses an area of 124,967 km², is not excluded from this. However, some species such as the Sunda Pangolin (*Manis javanica*) and bearcat or binturong (*Arctitis binturong*), sun bear (*Helarctos malayanus*) and Rhinoceros Hornbill (*Buceros rhinoceros*) are protected species and fully legally protected.

2.2.5 Contemporary hunting activities among the communities

In this section, to understand the contemporary hunting activities of resident and non-resident hunters in the Kelabit Highlands region (Objective 1), the works of Agarwal and Redford (2008), Bennett et al. (2000), Bennett and Robinson (2000 a & b), Horowitz (1998), Condon et al. (1995), Caldecott (1988), and others are discussed in detail.

Both Caldecott (1998) and Bennett and Robinson (2000 a & b) classified hunters into four distinct groups: recreational, cultural, nutritional and economic. Caldecott's classification is based on the people of Sarawak while Bennett and Robinson's classification is a broader, more general overview of peoples living in tropical rainforests. However, the hunters' classification categories are listed below:

- Economic hunters - (classified into two subgroups): rural hunters who believe wildlife is their most important animal protein source; and, hunters who wish to earn an income by hunting wildlife and selling the meat or as a trophy or live capturing wildlife and selling it as a pet.
- Cultural hunters – (also classified into two subgroups): hunters of wildlife for personal trophy or artifacts that is more valued for themselves, and also the hunters who gain respect and prestige in the wider scope such as internationally; and,
- Recreational hunters - those who hunt for the enjoyment and fun; however, in this study few hunters are considered only recreational hunters; whereas, most of the guests to the region enjoy hunting for the sake of fun and joy of hunting.

The hunters in the Bario region are studied using this classification system. This study will

determine if these categories are still applicable or might have changed over time. This classification of hunters will be discussed according to this study in detail in Chapter 5.

To estimate the populations of hunters in the Bario region, based on Bennett et al.'s work (2000) demographic questions were used to document the number of hunters in each of the villages, their (mixed) ethnicity and age group. Bennett and her colleagues conducted interviews among sixteen sites in Sarawak and Sabah, eight in each. They studied Kubah National Park (Sarawak), Mantung Merau (Sarawak), Ulu Engkari (Sarawak), Nanga Gaat (Sarawak), Mukah (Sarawak), Ulu Kabus (Sarawak), Mulu National Park (Sarawak), Long Peluan (Sarawak), Long Pa'Sia (Sabah), Crocker Range National Park (Sabah), Inarad (Sabah), Kuala Karamuak (Sabah), Luasong (Sabah), Merotai (Sabah), Tomanggong (Sabah), Danum Valley (Sabah), and one additional survey in Brunei Darrussalam at Belalong. The ethnic groups included in the study were Kelabit, Bidayu, Iban, Melanau, Penan Murut and Orang Sungai.

Furthermore, Bennett and her team (2000) conducted general hunting interviews from Penan Ba' to understand the overall picture of hunting in the areas, the importance of hunting for the communities and the influence on wildlife. The questions consisted of frequency of hunting, the applied hunting methods and techniques, types of animals that usually they hunt, the special or preferred species to be hunted by hunters, reasons for hunting, commercialization of hunted animals, and the overall rate of access to the animals. Additionally, the interviews examined individual hunts after each hunting trip, regardless if the trip was successful or not.

2.3 Commercial hunted species and their commercial prices determination

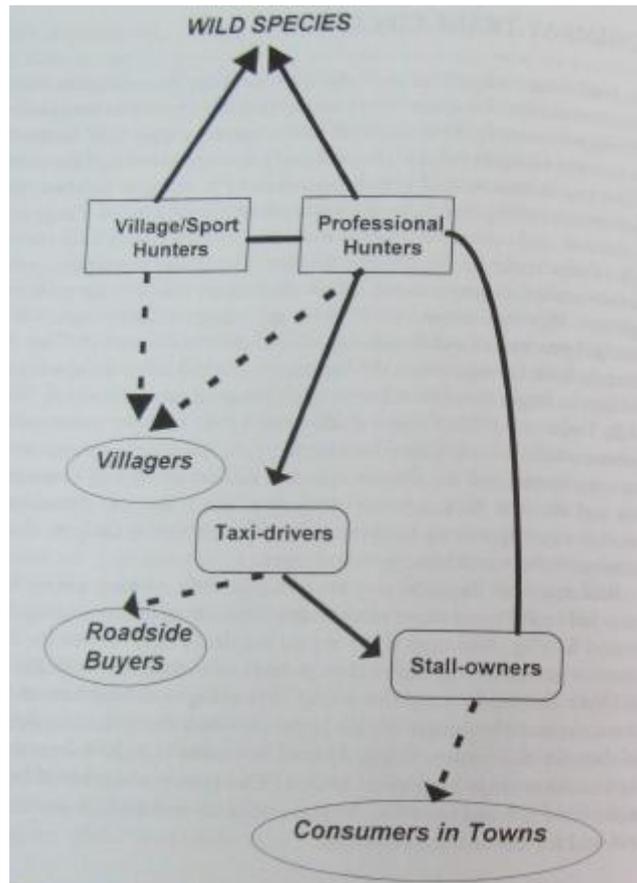
This section discusses the general literature regarding the species hunted for commercial purposes in order to study the hunted species in the study area; and study how bushmeat prices are determined for each species (Objective 2).

2.3.1 Overview of wildlife hunting

Hunting strategies and activities vary from hunter to hunter. The type of hunting is significantly influenced by the seasons and the demand for the specific bushmeat (Griffin & Griffin, 2000). Not surprisingly there is a relationship between the household income and hunting activities (Coad et al., 2010). Coad et al. (2010) studied two communities, Dibouka and Kouagna, in Central Gabon between 2003 and 2005. They conducted a census of 76 households in September 2003. Information was collected on age, ethnicity, place of birth, paid employment, daily activities, education and religion. Between February 2004 and February 2005, they collected data from 90 adult men. Coad et al. (2010) concluded that the households who hunt were significantly wealthier than those that did not. They observed that as the hunting offtake increased, the money spent on alcohol and cigarettes among the households that hunted increased as well. Furthermore, they concluded that snare and gun hunting offtakes were the main types of hunting based on the daily data collected by members of the team in each village. The caught animals, their state of meat and weight, hunting methods, reason of trip, hunting location, duration of trip, number of snares that had been set or removed, and the number of animals that had been eaten or sold were recorded in the daily data collection. Coad and the team recorded the prices of sold animals [such as brush-tailed porcupines (*Atherurus africanus*), blue duikers (*Cephalophus monticola*), bay duikers (*Cephalophus dorsalis*), tree (*Uromanis tetradactyla*) or long-tailed pangolins (*Phataginus tricuspis*)] and the locations of the animals sold such as . the main shop in Dibouka.

In Bioko Island, west coast of Africa, the northernmost part of Republic Equatorial Guinea, based on two 8-month study periods in 1991 and 1996, Fa et al. (2000) concluded that local community harvest a wide range of vertebrate species; i.e. twenty-one mammals (out of 65 species), two birds (out of 187 species), and two reptiles (out of 55 species) that are regularly hunted. Fa et al. (2000) concluded that hunters (producers) take their catch to the intermediates. Some of the catch flows to the villages; however, the great proportion is sold to outsiders through the mediators (Figure 2.4). They also stated that it is observed that women (20 women) are the principle bushmeat distributors. Furthermore, the bushmeat price at the market is higher than the villages and the amount of the bushmeat varies during the seasons.

Figure 2.4 Bushmeat flows among the villages and mediators based of Fa et al. (2000)



In Borneo, Hancock et al. (2005) states that bearded pigs are the most desired species for hunting for the island's people. They documented the bearded pig's fatness index and their abundance in two villages in the Kelabit Highlands, Pa' Dalih and Long Lellang. They concluded that a single fruiting season could not lead to a rapid increase in the bearded pigs' population. However, the focus of this study is not to estimate the fatness index of any species, but to better understand the relationship between the fruiting season and the population of some species such as wild boar. Additionally, wild boar (and bearded pigs), barking deer, mouse deer and Sambar deer (Dahlan & Dawend, 2013) were the Kelabits' targeted species (Steiner, 2007; Janowski & Langub, 2011). This is true for the Penan as well (Solhee & Langub, 2013; Langub, 1988).

Thus, as Bennett et al. (2000) suggested, to better understand and interpret the current hunting activities and the hunted species among the community, there are questions that have to be answered such as: the general questions on the number of hunters joining the trip, how long a single trip would take for them, how often they go hunting and mode of transportation.

Similarly, Wong et al. (2012) studied the hunting activities in Paitan Forest Reserve, Pitas, Sabah, in Malaysian Borneo. Wong and her team particularly studied sambar deer and bearded pig. They conducted interviews with the local community to better understand the hunting activities in the area. The team inquired about the hunting area, preferred hunting techniques, use of the hunted species, the purpose of hunting, the price of the species in the market, and the most hunted animals.

2.4 Economic and commercial pressures on hunting activities: Overall impact

2.4.1 Commercial hunting

As mentioned above, to fulfill the second Objective of this study, not only the hunted species that are caught for any purposes by the local hunters are considered, but also the commercial hunting activities and the bushmeat prices determination for each species is studied. Threats to sustaining tropical rainforest biodiversity are not unknown in Borneo. Hunting protected, endangered or threatened species, in or out of protected areas or national parks, and unsustainably “off-taking” (“the proportion of animal sold or consumed in a year”, according to Otte and Chilonda, 2002) species for commercial purposes is considerable. Hence, all commercial hunting of mammals, birds, reptiles and amphibians, is considered illegal hunting. These species, whether they are protected or not, or from a protected area or not, cannot legally be sold.

Commercial hunting heavily influences species population as well. Any discussion of bushmeat would include wildlife depletion (Leclerc et al., 2015; Bennett et al., 2007; Robinson and Bennett, 2004; Rosser and Mainka, 2002; Rao and McGowan, 2002; Bennett, 2002; Bennett et al., 2002; Davies, 2002; Bennett and Robinson, 2000 a, b & c) including preferential hunting of high market value species and high reproductive rates. A review of some of the key literature examining this issue is presented below in different areas such as Equatorial Guinea, Bolivia, Mexico, Congo, and Indonesia.

A number of bushmeat related research has been conducted in different locations around the world. Albrechtsen et al. (2007) conducted a study to determine if bushmeat market data could be used to determine hunting sustainability by using variables such as the decline of the

volume of bushmeat sales and price increases over time on Bioko Island in Equatorial Guinea between March 1996 and October 1998. The bushmeat consisted primarily of ungulates, rodents and primates. In this two phase study, the team documented the market price related to the carcass weight and preparation (fresh or smoked) of the species being sold.

Albrechtsen's team found a sudden decline in the total number of bushmeat carcasses being sold as well as individual animal group carcass volumes (ungulates, rodents, and primates) between the two phases. The prices were also higher in the second research phase. The researchers proposed hunting, especially into the southern part of Bioko Island, may have resulted in dramatic mammalian faunal losses perhaps due to a spike of overhunting, as the team determined years later that the number of animals entering the market had not increased.

In some communities, such as within the Azande village of Kiliwa, in the Democratic Republic of Congo, over 90% of the bushmeat ended up sold at the market (Merode et al., 2004). As Merode and his team stated, besides the community protein source, poverty can be one of the main reasons to hunt wild meat and commercialize it. The findings of this 16-month study showed even though the scale of commercialized bushmeat might be low, it played an important role as an income source for this rural community.

Similarly, Apaza et al. (2002) concluded that poverty might lead the poor communities to their primary source of protein and causes the unsustainable status for the wildlife hunting and consumption. By surveying 510 households in Tsimane' Amerindians in the Bolivia rainforest, Apaza and her team investigated the influence of price for the wildlife on the game consumption. Hence, they indicated that price of the meat and fish from livestock is correlated to the consumption of wild meat. They suggested that in order to decrease the unsustainability of wildlife hunting, decrease in price of domesticated animals to compare to the wild meat might be the long-term public investment plans; otherwise, it might lead to the over-exploitation of river and lacustrine fish due to the lack of sustainable management programs.

In a different study from Equatorial Guinea, linking bushmeat hunting to a depletion of high value species, Fa and Yuste (2001), from January 1998 to April 1999, observed shooting and cable snare trapping activities by 42 hunters in the Monte Mitra forest of Equatorial Guinea. The purpose of the study was to understand the off-take patterns among the hunters

and their impacts on species during their 16 months of data collection. They also interviewed hunters during their hunting trips.

They found most of the hunters targeted large animals which were more profitable to sell and possessed a higher quantity of bushmeat. For instance, the bay duiker (*Cephalophus dorsalis*) was one of the main exploited species. The hunting trips decreased towards the end of the study due to a decrease in the populations of the targeted species compared to the beginning of the study. In other words, the average body mass, number of captures, and general hunting activities all declined during the study period. The Monte Mitra forest hunters used cable snares more often than guns as snares were more affordable, involved less work and were more efficient (Fa & Yuste, 2001).

Additionally, in the Lacandon forest, located in Chiapas, Mexico, Naranjo et al. (2004) interviewed hunters from Lacandon, Tzeltal and Mestizo indigenous groups living in five different communities. The team conducted field observations during local hunting activities. Naranjo's team put forth the idea that subsistence hunters chose to hunt species with higher reproductive rates.

They found the number of species hunted among the three villages were same. The communities used the wildlife for food resources, handicrafts, medicine and hides; they also hunted them to protect their farms or domestic animals from damage (Naranjo et al., 2004). The hunters used rifles, shotguns and machetes as their hunting tools along with trained dogs. The researchers stated that pacas (*Agouti paca*), red brocket deer (*Mazama americana*), white-tailed deer (*Odocoileus virginianus*), and collared peccaries (*Tayassu tajacu*) were hunted the most due to their high reproductive rates. Naranjo et al. (2004) concluded harvest rates correlated positively with reproductive rates; the higher the reproductive rate of the species, the more frequently the species was targeted by hunters. They also concluded that there was no relationship between the harvest rate and body mass of the targeted animals.

Lee et al. (2005) studied the influence of the commercialization of hunting on the reduction of wildlife in North Sulawesi, Indonesia. Nearly a dozen members from the Indonesian Wildlife Crime Unit, forestry staff, police officers, media representatives and conservationists assisted Lee and his colleagues in a study between December 2001 and December 2003. Observers from their team monitored six traditional markets, three each in the city of Manado

and the surrounding Minahasa areas. Lee et al. (2005) found 6963 individual dead wild mammals enroute to the markets to be sold as bushmeat and 96,586 wild mammals already in the markets when observations were made. The researchers concluded the trading of protected animals significantly decreased during the two years of the study, but the overall trade of wild mammals had increased by 30% within 2 years. Lee and his group recommended continued efforts to reduce the trading of protected animals, and the continuance of a community awareness program so the locals would understand the impacts of hunting on wildlife populations and the need for wildlife conservation.

To recognize the status of the species hunted for subsistence or commercial purposes, the Albrechtsen et al. (2007) and Lee et al. (2005) studies are the reference point to the study of hunting activities, particularly for bushmeat, and the impact on wildlife populations. Moreover, in order to eventually reduce the bushmeat crisis and commercial hunting, community awareness the impact hunters' perspectives.

According to the findings of both Albrechtsen et al. (2007) and Lee et al. (2005), community awareness program is marked the declines in targeted bushmeat species. Findings by Albrechtsen (2007) highlights intensive short term hunting of particular species can still have potential long term consequences on wildlife populations years later. Both studies suggest comprehensive community awareness education programs as one method to discourage the overexploitation of wildlife resources.

In conclusion, the market price of the hunted species based of the weight and preparation of the species being sold, the easier access to the previously inaccessible areas by using the logging roads, the off-take patterns among the hunters and their impacts on species all influence and increase the number of hunters and hunted species. All the above studies have noted the commercialization of hunting has a negative impact on wildlife populations.

2.4.2 Bushmeat crisis

According to Zuraina (1983) wildlife has been hunted by humans for some 40,000 years in Southeast Asia. However, Nasi et al. (2011) states that hunting wildlife as an animal protein source is considered as a crucial matter for the communities in tropical areas; hence, the scale

of hunting now being practiced in tropical forests poses a real threat to many species living in those ecosystems (Nasi et al., 2011 & 2008). This situation has to be noted in terms of conservation of wildlife (Coad et al., 2010). Nevertheless, hunting for bushmeat has become unsustainable in many areas due to changes in the social, physical, cultural, and economic environment (Bennett & Robinson, 2000a). Based on the cultural ecology theory, the changes due to social, economical and environmental influences have yet to be investigating in the Bario region. Investigating wildlife hunting in the Highlands area would lead to better solutions toward sustainable approaches for wildlife conservation.

Bennett and Robinson (2000b) identify three reasons why the hunting of wildlife for food in tropical forests has now become an important issue. First, the increase in hunting and “habitat fragmentation” results in declines and extinctions of wildlife that leads to the degraded quality of life for tropical communities. Second, the serious nature of the bushmeat problem in tropical forests is further compounded by the relatively low reproductive rates of wildlife of such ecosystems. Third, as mentioned by Robinson and Bennett (2002) as well, is that the depletion of wildlife impacts the food security and livelihood of local people as they may have few alternative sources of income and protein.

Biodiversity in tropical rainforests has been significantly impacted by deforestation, wildlife hunting and trading, overhunting, timber degradation, palm oil plantation conversion, etc. (WWF, 2016 a&b). Additionally, bushmeat, the meat from wildlife living in the jungle or bush, which is also known as ‘wild meat’ or ‘game meat’ (Nasi et al, 2008), is the target for commercial hunting. The commercialization of bushmeat is recognized to be unsustainable throughout most of the world's tropical forests and threatens many tropical wildlife populations (Ofori & Attuquayefio, 2010; Alves et al., 2009; Nasi et al., 2008; Roe, 2008; Groom, 2006; Milner-Gulland et al., 2003; Bailey, 2000). Unfortunately, the Borneo rainforest has not been excluded from commercial hunting activities.

2.4.3 Factors affect hunting

2.4.3.1 Overexploitation

Regarding the increase in hunting wildlife, overexploitation of wildlife is one of the top threats to species and ecosystems (Bennett & Robinson, 2000 a,b&c; Bennett et al, 2001).

Overexploitation is defined as “over-use of wildlife and plant species for food, clothing, pets, medicine, sport and many other purposes” (National Wildlife Federation [NWF], 2016); therefore, one form of wildlife exploitation is the hunting of wildlife for bushmeat.

However, hunting by considering conservation aspects might lead a more motivated hunting experience for the communities (Kühl et al., 2009). Factors which influence the exploitation of species include poverty, ownership conditions and access to alternative hunting sites (Holmes, 2003; Adams et al., 2004; Agrawal & Redford, 2008). According to Caldecott (1988), poverty can cause damage to living systems. Besides, he stated that some factors significantly influence the method of hunting which are (1) tradition; (2) knowledge of hunting techniques; (3) access to light and ammunition; and, (4) access to markets for meat and trophies. He stated that nutritional and economic hunting play important roles in the rural people’s life.

2.4.3.2 Logging roads and economic factors

As mentioned above, the logging industry and logging roads strongly influence the consumption of bushmeat and population of hunters in the area (Poulsen et al., 2009). Poulsen and the team studied the human demographics, the bushmeat supply in the markets and bushmeat consumption in the households over 6 years, between January and March from 2000 to 2006 in five logging towns in northern Republic of Congo. They randomly choose 10 or 20 households on 10 randomly selected days in each month. They concluded that the easier access to the previously inaccessible areas using the newly built logging roads has resulted in the increased number of hunters. This attracts more development near the frontier forests and bushmeat consumption increases by 64% (Poulsen et al., 2009).

According to Bailey (2000), economic and social factors could also be the reasons for overhunting and recommends the Bushmeat Crisis Task Force (BCTF) approach to take actions against the unsustainable exploitation of wildlife in Africa. According to Bailey (2000), BCTF provides an informative worldwide database on ecological, economic and/or social perspectives of commercial bushmeat trade. The aim is to raise awareness and support for decision-making and conservation on the bushmeat trade. Some of the factors that affect market hunting (Bailey, 2000) include:

- a) nomadic communities who hunt for subsistence, ceremonies or medicinal consumption; or the wildlife/bushmeat is a good traded
- b) roads built for traders, vehicles or timber products which are increasingly expanding and allowing easier access to wildlife habitat, raising the unsustainability level of hunting at the markets; and,
- c) the transition of traditional hunting methods (as traps which need more patience and skill) for shotguns, cable snares, etc., which make hunting easier and a less time consuming activity.

Similarly, Bennett et al. (2001) comment that the overexploitation of bushmeat is highly influenced by road development, forest clearing, increased demand for bushmeat from urban centers and advanced technologies. They argue that logging companies are the only institutes active in rainforest areas which provoke wildlife trading; however, their presence is the way to control the areas.

Bennett et al. (2001) claims that hunting activities occur five times closer to logging roads than areas further away from road access. Bennett and her team concluded that working with local communities, logging companies, government, and reducing wildlife demand are possible solutions to the commercial hunting issue. They believe that by studying community hunting patterns, offtake rates, hunted animals' consumption destination, the subsistence and commercial hunting among the communities, and the effect(s) of hunting on wildlife population, the bushmeat crisis might be solved (Bennett et al., 2001).

Bennett et al. (2000) studied the hunting pressure on an area by for example, multiplying the population of community A to the percentage of the community who hunt; and, dividing it by the square of the distance of community A from the study site. However, in this study, the hunting pressure is not calculating the same way as Bennett et al. (2000) had done; yet, the most preferred areas for the hunting trips among the hunters in Barrio region, their methods of hunting and percentage of various hunted species are recorded for this study and updates the current status.

Furthermore, Bennett and her team state that reducing wildlife demand in different aspects might influence the hunting and bushmeat crisis. They mention that the economic factors influence the demand, as the households' income that might be affected by wild meat. In

addition, the medical purpose of trading wildlife products, particularly among the traditional Chinese medicine practitioners, is one of the considerable aspects to study in order to monitor the wildlife hunting and reduce the demands.

Along the same lines, Horowitz (1998) studied seven Iban longhouses around Batang Ai National Park in Sarawak between May and June 1996. She conducted semi-structured interviews and participant observation for two months. She had chosen to interview the senior knowledgeable members of the community. She studied their forest, land ownership and management; as well as the integrated conservation and development program (ICDP) at the park. Horowitz (1998) attempted to apply the indigenous traditional legislative infrastructure along with the management programs. She recognized that there were some socioeconomic changes among the communities. For example, the replacement of the communities from their settlements to other places due to hydroelectric projects. This situation led them to look for the employment in urban areas.

Additionally, the cohesion within the communities broke down due to technology changes and increased participation in a cash economy. The restricted state control over the area and privatization of forest for the farmers caused overexploitation of land and forest products. Horowitz (1998) concluded that better road access through the logging roads provided easier access to market for the forest products. Therefore, she aimed to identify a new conservation strategy for the benefit of local people and the park planners. The strategy was to seek the cooperation of park planners with the local communities and work closely with the existing authority of the area. This approach gave the view to the local communities that they have exclusive rights to protect their areas and resources from outsiders' exploitation. However, it should be noted that laws around hunting are very different in Sabah and Sarawak, including the need for hunting licences. In Sabah, the hunters have to obtain licences under the Wildlife Conservation Enactment 1997. In Sarawak, the Sarawak Wildlife Protection Ordinance 1998 is the law which hunters have to refer to.

Similarly, Agrawal and Redford (2006) argue that as more local communities become involved in wildlife management programs, the more cost efficient conservation protection programs will become. By studying the selected studies with peer-reviewed articles from Social Science Citation Index (SSCI), Agarwal and Redford (2006) compared the empirical description of each case.

Hence, from Agarwal and Redford (2006), Bennett et al. (2000) and Horowitz (1998), it can be concluded that access to the surroundings is easier due to better transportation condition which is provided by timber and logging companies. This might lead the communities to more participation in cash economy from the forest products and easier access to the markets.

2.4.3.3 The change of hunting techniques over time

To understand the contemporary hunting activities of the Kelabit and Penan, the techniques of hunting will be studied in the Highlands study area. The existing literature is reviewed below.

According to Bogar (2014) and Noss (1997) some traditional hunting are still practiced while others have been completely abandoned due to changes in lifestyle, the hunters' employment, and law enforcement. Some of the practices and techniques have been replaced with newer techniques. For example, the bow and arrow, blowgun and other traditional weapons have been used for centuries among Ye'Kwana and Yanomamö communities in southern Venezuela, but have recently been replaced by modern shotguns (Hames, 1997). Hames (1997) collected the data through behavioral observations and field notes to record the names of the hunters, the species harvested and its' weight, date of the successful hunt, hunting methods and the location of the hunted animals.

The findings of 216 days of data collection were: a) shotguns had the greatest range compared to arrows and darts, b) shotguns had the greatest effect on large animal hunting due to the success rate in killing the animal, c) more cartridges can be carried for a shotgun compared with the number of arrows and darts which can be carried; and, d) shot guns are a more accurate weapon to hunt moving animals compared to other traditional techniques. But Hames (1997) also concluded that darts and arrows are quieter than a shotgun, so frightening the other animals in the area is less likely compare to the loud noise of a shotgun. Hence, some hunting techniques may never be replaced; for instance, in the case of the BaAka people of the Central African Republic, Noss (1997) observed the net hunting practices for blue duikers (*Cephalophus monticola*), brush-tailed porcupines (*Atherurus africanus*), the bay duiker (*C. dorsalis*), and the Peter's duiker (*C. callipygus*) for 19,656 person-days from September 1993 to December 1994. He stated that net hunting was one of the traditional

hunting activities still practiced.

Noss (1997) explained how to set nets ranging from 2m to 20m which are nearly enclosed circles. He described that the nets hang to the small tress as a wooden hooks that one end is attached to some vegetation around the net and the other end pin to the ground. He concluded net hunting had not disappeared because of: (a) an increased demand for local bush meat, (b) the Baka people combined forest products collection along with net hunts, and (c) the inconsistent and undependable economic alternatives. Interestingly, the hunters who were practicing net hunting more often were women, about 158 times in a year (Noss, 1997).

On the other hand, Wadley (2010) studied snaring and trapping in Sibudu, South Africa. He reviewed previous studies and data on Sibudu which was a Middle Stone Age site. Based on the collected data from Howiesons Poort and Still Bay, he argued snaring was more economical because less time is spent searching for the animal. But because of the modern hunting techniques and the high demand for bushmeat, snaring is not associated with the hunting of the larger number of big-game hunting; as it is difficult to exploit low-ranked animals such as birds and using spears or bows and arrows to hunt larger animals.

Furthermore, in the Lurah River area in the Kayan Mentarang National Park, in East Kalimantan, Indonesia, Puri (1999) studied the Penan Benalui and Kenyah Badeng's hunting ethics, species hunted, hunting techniques and knowledge of hunting. He documented most of the hunting trips between March 1991 and November 1992. One of the significant parts of Puri's (1999) study which has influenced this current study is that he recorded six hunting techniques among the Penan and the Kenyah tribes, the culture of sharing the hunts and the comparison of past and modern hunting techniques.

Similarly, Bennett et al.'s (2000) work in Borneo concluded that the hunting techniques have changed from traditional to modern ones. Most of the hunters in Borneo now use shotguns. Following the Sarawak Wildlife Master Plan, in Sarawak each shotgun owner is now only allowed to purchase ten shotgun cartridges per month. They state that the restriction on only using cartridges for the security purposes is relaxed after mid-1980s, the import of cartridges to Sarawak and Sabah increased to 5 million per year (Bennett et al., 2000); therefore, this eases the access and availability for the less-skilled people who are mainly not hunters to use shotguns. More animals will be hunted, concluded Bennett et al. (2000) due to the easy

availability of cartridges to buy, and hunt more animals to sell.

Regarding the methods and techniques of hunting, Caldcott (1988) collected data about the family weapon ownership. He divided the mean weapons into shotguns, spears, blowpipes and dogs. Using spear generally applies during hunting with dogs. Moreover, shotguns are considered as the only means at night hunting which the hunters bring spotlight to the better sight observation. Caldecott (1988) classified shotguns into two groups: shotgun and sporting guns.

In an Indonesian study, Milner-Gulland and Clayton's (2002) research came up with a different conclusion. They documented an endemic wild pig species known as the Babirusa (*Babirusa*) traded over the course of a ten year market survey in three districts of Minahasa, Bolong Mongondow and Gorontalo, in Northern Sulawesi. They concluded that the availability of bushmeat from protected and endangered endemic wild pigs was influenced by the enforcement of wildlife laws. As laws were more strictly enforced over the course of the study, pig dealers purchased fewer Babirusa, although, the price for Babirusa bushmeat was higher due to market demand. Therefore, based on Milner-Gulland and Clayton (2002), the law enforcement factor in Bario region as it is adjacent to Pulung Tao National Park, and the availability of commercialized bushmeat around protected area are considered.

Additionally, Pangau-Adam et al. (2012) interviewed 147 hunters at twenty one villages (total 84 interviews at 18 villages in Nimboran and 63 interviews at eight villages in Kemtukgresi); they found that in terms of bushmeat consumption, only 15-20% of villagers practice hunting to supplement their farming besides subsistence and commercial hunting. They quantified the hunting efforts among the households, the harvest rate and the consumption of wild meat in terms of its consumption for subsistence or commercial interests in west of Jayapura, the capital city of Papua, Indonesia. Pangau-Adam et al. (2012) conclude that even a small amount of wild meat commercialization is considered as a very important economic activity for these impoverished communities. Agarwal and Redford (2006), Adams et al. (2004) and Robinson and Bennett (2004 & 2002) came up with the similar conclusion. However, subsistence hunting might be important economically, but if it is not biologically sustainable, it won't be sustainable economically in long term.

In the literature on Borneo hunting, Chin (2002) studied the hunting patterns among three

Penan villages, Long Sabai, Long Main and Ba'Buboi, in the Upper Baram, in northeastern Sarawak. She states that better access via logging roads allows the communities to have a better access to their surroundings. Hence, the number of hunted game increases in the areas closer to the logging roads. Chin (2002) collected her data from July 1999 to June 2000. She concluded that the level of accessibility to the communities through the logging roads causes pressure on hunting activities. Therefore, with increased pressure from hunting activities, wildlife populations decline. This Highlands hunting study will also try to determine if a conclusion similar to Chin (2002) can be reached in the study area.

Bennet et al. (2000) conducted interviews (total of 192 in Sarawak and 161 in Sabah) between February 1993 and June 1995 including the types of animals hunted, the frequency of hunting and the methods used. The authors precede the individual hunter interviews with questions focusing on 'hunting off-take' (which species and how many animals a hunter harvests per unit area) and 'hunting effort' (the total weight of animals harvested and number of animals killed per man hour). Collecting biometric data of the animals hunted and recording the community's diet were also part of the data collection. Bennett et al. (2000) reported that 28.9% of evening meals in Sarawak and 13.9% in Sabah included wild meat.

Fitzmaurice (2014) studied the direct and indirect impacts of logging roads on mammals in Sabah, a neighbor state of Sarawak. She referred to the lack of data on the threats on biodiversity, due, in part that research on hunting activities is the sensitive and difficult topic to study. In order to understand the indirect impacts of logging roads, she conducted questionnaire-based interviews. The questions asked included the local community's knowledge about wildlife, their perceptions about wildlife, their activities affect wildlife and biodiversity within their immediate environment. The indirect impacts were studied through using random camera traps in the Obah Suluk estate, logging bulldozer data, and logging extraction data. Fitzmaurice (2014) concluded that some species such as stink badger (*Mydausjavanensis*) can only occupy unlogged forest. Whereas, some species, such as Sunda clouded leopard (*Neofelisdiardi*), can be found in areas with high logging activity. As well as, Laurance et.al. (2006) remark that road expansion and logging activities increase the pressure on wildlife populations in the tropical rainforests.

Other considerable factors in sustainability of hunting are law enforcement, community involvement and improving the information on the local population, ecosystem and

biodiversity. This can lead to a more effective conservation program for wildlife (Constantino et al. 2008; Naranjo et al., 2004; Bulte, 2002; Milner-Gulland & Clayton, 2002; Bennett & Robinson, 2000 a & b).

However, a quick glimpse of the daily newspapers and news websites, such as *The Star*, *The Borneo Post*, *Daily Express*, *The Star Online*, *The Malaysian Reserve*, *New Straits Times*, , there are daily reports on wildlife trafficking in Malaysia; and reports on the decline in and potential extinction of species in Malaysia (Lee, 2015).

The Star, reported on the necessity of public cooperation to enforce the laws and provide an educational environment for the public to know the value of wildlife, and protect it, as pointed out by Ariffin (2015). In STAR2, Cheng Li (2015) mentions that the sun bear bile and gallbladder is considered as a Chinese traditional remedy and are still sold nationwide. Vanar (2016) announced the illegal bushmeat trade by the timber camp workers as “Crackdown on bushmeat trade” in *The Star*.

2.5 Hunting under the lens of laws and rules

To fulfill the fourth objective of this study, to determine the proportion of the hunters who hold hunting permits and the proportion that hold gun permits, the laws and regulations in Malaysia will be examined. In this section The Laws of Malaysia Act 716, Wildlife Conservation Act 2010, Laws of Sarawak (Wild life Protection Ordinance, 1998), Quran, and Bennett et al.’s work ‘the Master Plan for wildlife in Sarawak’ (1996) are the sources reviewed.

In whole, Malaysia (the Laws of Malaysia Act 716, Wildlife Conservation Act 2010), and more precisely Sarawak (Laws of Sarawak, the Wildlife Protection Ordinances, Chapter 26, 1998) regulate the rules to protect wildlife. According to the rules, the hunter needs to apply for permission for hunting activities (Law of Sarawak, Section 12 (1)).

In Section 26 of the same Act, a person can only hunt by means of shooting and must hold an arms license under the Arms Act 1960. Section 3 of Arms Act 1960, mentions that “subject to this Act and regulations made thereunder, no person shall have in his possession, custody or

control any arms or ammunition unless he is the holder of an arms licence in that behalf granted to him under Section 4”.

According to Section 4 of Arms Act 1960, “an application for an arms licence or arms permit shall be made in the prescribed form to the Chief Police Officer or the State in which the applicant resides, and shall state such particulars as may be required by the said form.” However, “No licenses granted under the Act shall be transferable (Section 45, Law of Sarawak).”

Additionally, in the Laws of Sarawak (Wildlife Protection Ordinance 1998), Section 29 (2), the totally protected animals may not hunt, kill, capture, sell, or offer for sale, import, export or being possessed; except for scientific or educational purposes with the written permission from the Controller. Furthermore, in Section 33, it is mentioned that:

without prejudice to Section 29, no person shall sell or offer for sale or claim to be offering for sale, any wild mammal, bird, reptile or amphibian or any recognizable part or derivative thereof other than a wild mammal, bird, reptile or amphibian which is bred, reared or kept in accordance with a licence issued under Section 35.

Hence, in Section 35 states that “no person shall breed, rear or keep any wild mammal, bird, reptile or amphibian for the purpose of trade, sale or commercial usage without a licence” from the Controller. However, it is mentioned in Section 37 (a & b) that,

A native residing within a Native Area Land or Native Customary Land may have in his possession, for his own consumption or use, any wild mammal, bird, reptile or amphibian or other recognizable part of derivative thereof; and any other person may have, for his own consumption, not more than five kilograms of wild mammal, bird, reptile or amphibian.

According to Section 40 (2) of Laws of Sarawak, the only licence issued is for the breeding of wild mammals, etc., which under the ordinance is valid for one year. In Section 40 (3) it insists that the license “shall not be transferred, sublet or assigned to any other person” and under Section 40 (6) it is only available for “the locality specified therein”.

As Sharia and Islamic laws are also practiced in Malaysia, according to Dasgupta (2015, December) at conservation.org (2016), the Fatwa (Islamic rule) has issued an ‘haram’ (never do) rescript for illegal hunting. This Fatwa was issued in Terengganu state, west Malaysia

and it is hoped to be applied in the whole country. In Quran and Prophet Mohammad's (SAW) hadiths, wildlife, the importance of wildlife and environmental conservation are obliged as a social duty for Muslims. For example, in hadith, it says, that "Do no mischief on the earth after it has been set in order; that will be best for you if you have faith (Qur'an 7:85). This haram would only apply to those practicing the Muslim faith in the Highlands area.

Beside laws and regulations in Malaysia, in 1996, Bennett et al. initiated one of the significant and reliable resources to understand the status of wildlife in Sarawak named *The Master Plan for Wildlife in Sarawak* (1996). The Master Plan includes discussions on the density and hunting pressure of some wildlife species, such as bearded pigs, barking deer, primates, hornbills, etc., in protected areas as well as in areas open to development (The Master Plan for Wildlife in Sarawak, 1996). Moreover, as the pressure for more development increases, the protection of wildlife sanctuaries need to be acknowledged as mentioned in the Master Plan for wildlife in Sarawak (1996, p.40):

- (a) the value of Sarawak wildlife sanctuaries has to be understood by local communities and by government;
- (b) both local community and Forest Department have to be beneficated by the wildlife sanctuaries to protect the area.

It was suggested the Master Plan be "updated after five years and reviewed and revised after ten years". However, unfortunately the update, review and revision of The Master Plan have never occurred.

2.6 Possible solutions: review of the fundamental research stream

2.6.1 Materialistic theory

In this study, the materialistic theory (Fetterman, 2010) is considered. Fetterman (2010) states that materialists believe that the materialistic conditions such as ecological resources, money, and modes of production, are the primary and essential factors for moving. They view the world through the 'observable behavior patterns'.

Additionally, the economic forces, class consciousness, class conflict, and various

organizational forms in the society may cause changes in social and cultural perspectives. Consequently, in this study, about the materialistic cause of ecological resources in the study area, researcher studies the factors that socially, culturally, and economically influence the traditional subsistence hunting. These factors might have positive effects or reverse influence. However, predicated on the theory, the effects have mutual influence. The hunters from the region and the potential hunters from outside of the region might affect the hunting activities and even techniques.

2.6.2 Cultural ecology theory

According to Frake (2009) and Kottak (2009), the study of the culture among any ecosystems which human beings appertain the ecology, defines cultural ecology. Julian Steward, the founder of the cultural ecology theory in the 1950s- 1970s, defines this theory as to account the influence of the environmental forces on human and the effect of human activities on the earth and environment (Steward, 1955). In ecological ethnography, the knowledge of animals, climate, plants and even soil of the society is an essential factor to study (Frake, 2009).

Hence, in this study, researcher reviews the environmental factors that affect the traditional subsistence activities in the Bario region; however, the research studies the local hunters and outsiders influence (the hunters from outside of the Bario region) on the environmental and biodiversity in the surrounding areas.

2.6.3 Possible solutions

In Borneo, Wadley et al. (1997) studied Iban forest farmers and hunters in the Danau Sentarum Wildlife Reserve (DSWR) (based on Wadley's interviews data in 1993-94) in West Kalimantan, Indonesia. The research involved observing six hunting trips during the year, with each trip lasting for one month that average of 22.2 hunting trips revealed per month. Large mammal species were the focus of the study. Data on large mammal encounters, numbers, and their habitat was collected.

Wadley and his colleagues concluded primates were less frequently hunted compared to large

mammals. Primates and large mammals' main habitat is in old-growth and secondary forests, but primates are more common in unfarmed old growth forests (Wadley et al., 1997). Moreover, Wadley et al.'s findings pointed out the threats from shotgun use increased as human populations and deforestation increased. Therefore the local communities' awareness of land rights and managing resources for future generations is required for any conservation programs in these areas.

However, as Wadley et al. (1997) pointed out in their study, the hunters' game preferences can influence conservation of wildlife. This guides the current study to better understand communities' awareness role in conservation and community-based programs.

In a study conducted between 1993 and 1995 on the importance of bush meat in rural indigenous community diets in Malaysian Borneo, Bennett et al. (2000) obtained data via "general" and "individual" hunting interviews among 16 communities in Sarawak and Sabah to understand hunting activities among the communities. Similarly, Bennett and Robinson (2000 a, b&c) argued for sustainable hunting to occur, biological and social factors need to be considered. Bennett and Robinson (2000 a, b & c) and Naranjo et al. (2004) argued to create a sustainable hunting culture requires improved economic opportunities in these rural communities, a comprehensive wildlife conservation and awareness program, along with stricter enforcement of regulations for subsistence hunting perhaps including community-based management.

Furthermore, Bennett and Robinson (2000 a & d) have emphasized on greater regulations for timber companies along with addressing hunting issues in the context of international standards and processes (such as Environmental Impact Assessments, EIAs, Integrated Conservation Programs, ICDP's, etc.) can lead to improved conservational and community-based management approaches towards managing wildlife resources.

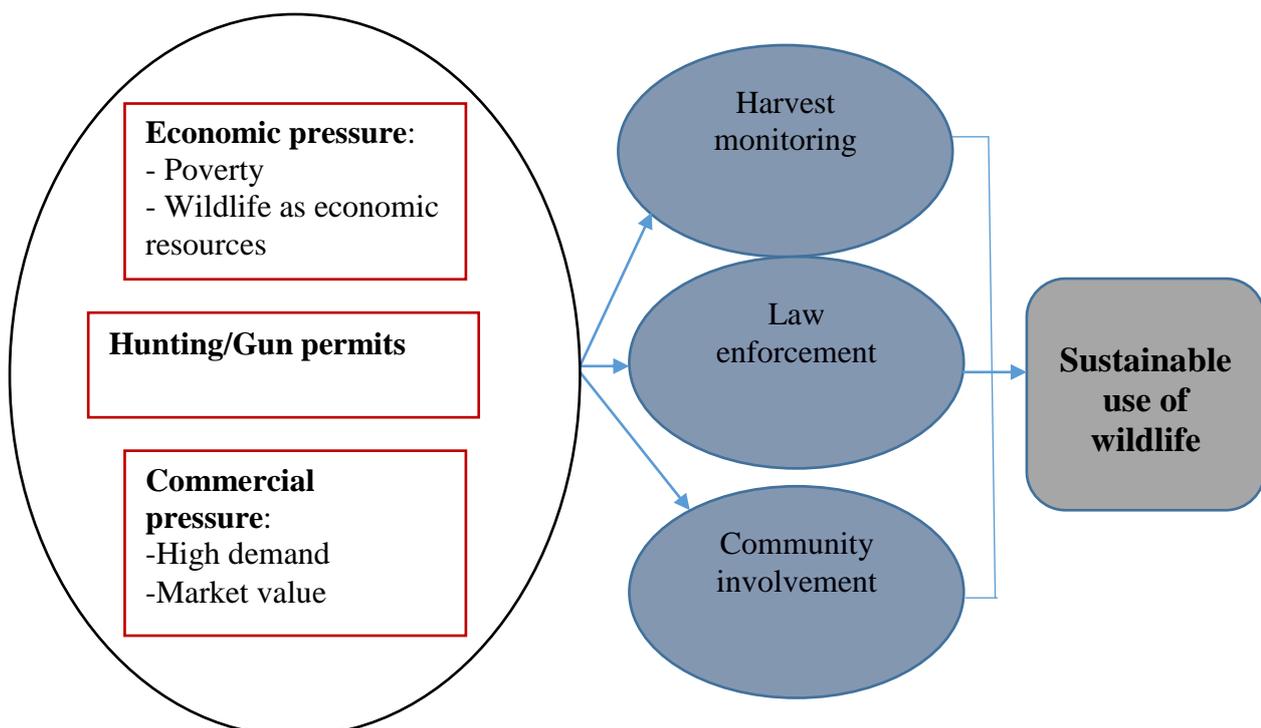
As Bennett et al. (2000) and Bennett and Robinson (2000 a, b & c) mention the wildlife harvest becomes commercialized in tropical forests. Although, they had offered possible solutions regarding the issues, nowadays, the situation of hunting in Malaysian Borneo, precisely Bario, the Kelabit Highlands, is not clear. Hence, some species such as Borneo sun bear and rhino are threatened to be extinct. Bennett and Robinson (2000) study found that 67% of the Kelabit meals contain wild meat. There is no information regarding the current

consumption rate for the people of the Kelabit Highlands.

Furthermore, Albrechtsen et al (2007) recommended the need to heighten community awareness on the impact hunting had on wildlife populations if the implementation of legal and funding instruments were going to work for the long term. Hence, in this study, to better understand the communities' awareness about species and wildlife protection, questions of this nature were included in the questionnaire.

This section briefly reviews the theories that express the relationship between humans and the environment; and attempts to understand the dwellers' influence on their surrounding, and the environmental pressure on the dwellers life. The proposed conceptual framework of the study is based on the materialistic theory in ethnography and cultural ecology theory. The two elements of these theories, economical and commercial pressures, were utilized to understand the current situation of sustainable hunting activities in the Bario region. Furthermore, the previous studies such as Bennett et al. (2000), Fa & Yuste (2001), Fa et al. (2000), Fimbel et al. (2000) and other related researchers suggest that harvest monitoring, law enforcement, and community involvement in the conservational projects are the considerable factors to enhance the sustainable use of wildlife in the study region. These possible solutions can be illustrated in Figure 2.5.

Figure 2.5 Considerable solutions



2.7 Conclusion

Consequently, this study aims to better understand the sustainability or unsustainability use of wildlife in the Kelabit Highlands that benefits the local communities and government sectors. For this reason, by following the studied approaches and aims, the question on age of hunters, their perspective and techniques in hunting, their hunting tools, their hunting trips type, and their past and present hunting activities were the best clues to bear in mind for the interview questions (Bennett et al., 2001; Bennett & Robinson, 2000b) . Thus, this study provided data regarding the bushmeat consumption among the interviewed hunters in Bario region.

Additionally, according to Fitzmaurice (2014), Laurance et.al. (2006), Chin (2002) and other researchers road expansion and related activities such as logging in tropical forests, increases the pressure on wildlife populations. Therefore, in this study, it is tried to better understand the overall economic status of each hunter, economic and commercial pressure, development of logging roads, and direct and indirect implications of these factors on the hunting activities of the Kelabit and Penan communities in the Kelabit Highlands.

CHAPTER 3: METHODODOLOGY

Chapter Three Overview

- 3.1 *Introduction*
- 3.2 *Research methodology*
- 3.3 *Study site*
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 - 3.4.1 *Participant observation, field notes and photo-documentation*
 - 3.4.2 *Semi-structured interviews*
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- 3.6 *Interview questions design*
- 3.7 *Analyze and evaluation of collected data*
- 3.8 *Limitations of the study*
- 3.9 *Conclusion*

3.1 Introduction

This chapter discusses how this study was conducted in accordance with scientific methods widely accepted and practiced across social sciences. In section 3.1 and 3.2, the research methodology and study site are described in details. In Section 3.3 the methods applied for collecting data such as (a) participant observation, field notes and photo-documentation (Section 3.3.1) and (b) semi-structured interview (Section 3.3.2) are explained.

The chapter continues by stating the limitations of the study in Section 3.4 and providing the design of interview questions in section 3.5. In Section 3.5 the questions in the interview questionnaire are detailed within its categorization and how they are related to the objectives of the study. Lastly, this chapter ends by explaining the analyses and evaluations of the collected data in Section 3.6.

3.2 Research methodology

Research is seen as an investigation of idea or topic (Clough & Nutbrown, 2002) that requires a careful consideration of appropriate research design (Bernard & Gravlee, 2015). The appropriate research design assists the researcher for better research process planning and

implementation; therefore, the researcher has a chance to deal and handle the unexpected and unavoidable cases or eventuality. Furthermore, the implementing of the research procedure can be clarified, as well as recognition of the possible bias in the research. Thus, researcher leads the research to the most reliable, generalizable and valid findings and analysis.

To have a better understanding of the content and meaning of the data gathering, a qualitative approach is used to help the researcher achieve the goals. Moreover, as this study is a study of social interaction and qualitative description of various social actions (Jensen, 1974; Sandin, 1980), it will consist of "ethnographic interviews (O'Reilly, 2012, p. 127) and semi-structured interviews (ibid, 2012, p. 142). One of the main reasons to apply a qualitative approach is that this is the emerging method which is more appropriate for these type of studies; furthermore, the questions are open-ended questions and the researcher may have a better chance for inquiry such as simulations or sequentially data collection (Bernard & Gravlee, 2015). Therefore, some relevant experts' works in the field, such as Bernard & Gravlee (2015), Creswell (2013, 2007, 2003, & 1998), O'Reilly (2012), Bryman (2012), Silverman (2011), Blaikie (2010), Jennings (2010), Sarantakos, S. (2005). etc. are considered in this study.

As Creswell (1998, 2007) mentions, in the qualitative approach, researcher explores the fact and tries to understand the meaning individuals or groups ascribe to a particular social or human condition. Hence, as the study moves forward, the research process often involves emerging questions and a relatively flexible methodology. Data is usually collected on-site in good time with data analysis advanced inductively from broad socially-based themes. The researcher then interprets the acquired data to analyze and report the detailed views from the participants while conducting the study (Creswell, 2007 & 2013).

As O'Reilly (2012) recommended, the direct and sustainable contacts with the communities over the prolonged period of time provided the better chance for the researcher to observe the participants and communicate with them. Furthermore, according to Hammersley and Atkinson (2007), studying the people's action based on their daily life through observation and interviews among the small-scale of the group of people and lastly verbal description, explanation, quantification, and analysis of the data are the features of the ethnographic works. Hence, as the study is considered as the ethnographic study, according to Bryman (2012) researcher takes roles to confront with ongoing access in the field.

In this study, as Bryman (2012) explains about the researcher's participation and involvement, the researcher was a covert full researcher who lived for a significant length of time or traveled for a short period of time at the study areas. Hence, Delamont (2007) states that qualitative research consists of interviews, documentary works, observation and personal construction collection. She believes that fieldwork and participant observation, both carry the same meaning as to observe and watch people for long period of time, as well as communicating and involving in their daily lives.

Additionally, according to Kopnina and Shoreman-Ouimet (2013) besides understanding the culture among the community or communities, there is an end goal for the study which is finding the solution(s) for the potential factor(s) damages influence the environment. Accordingly, in this study, the ultimate goal is to assist the communities in Bario region and government agencies to find an appropriate and practical solution of the hunting activities in the region.

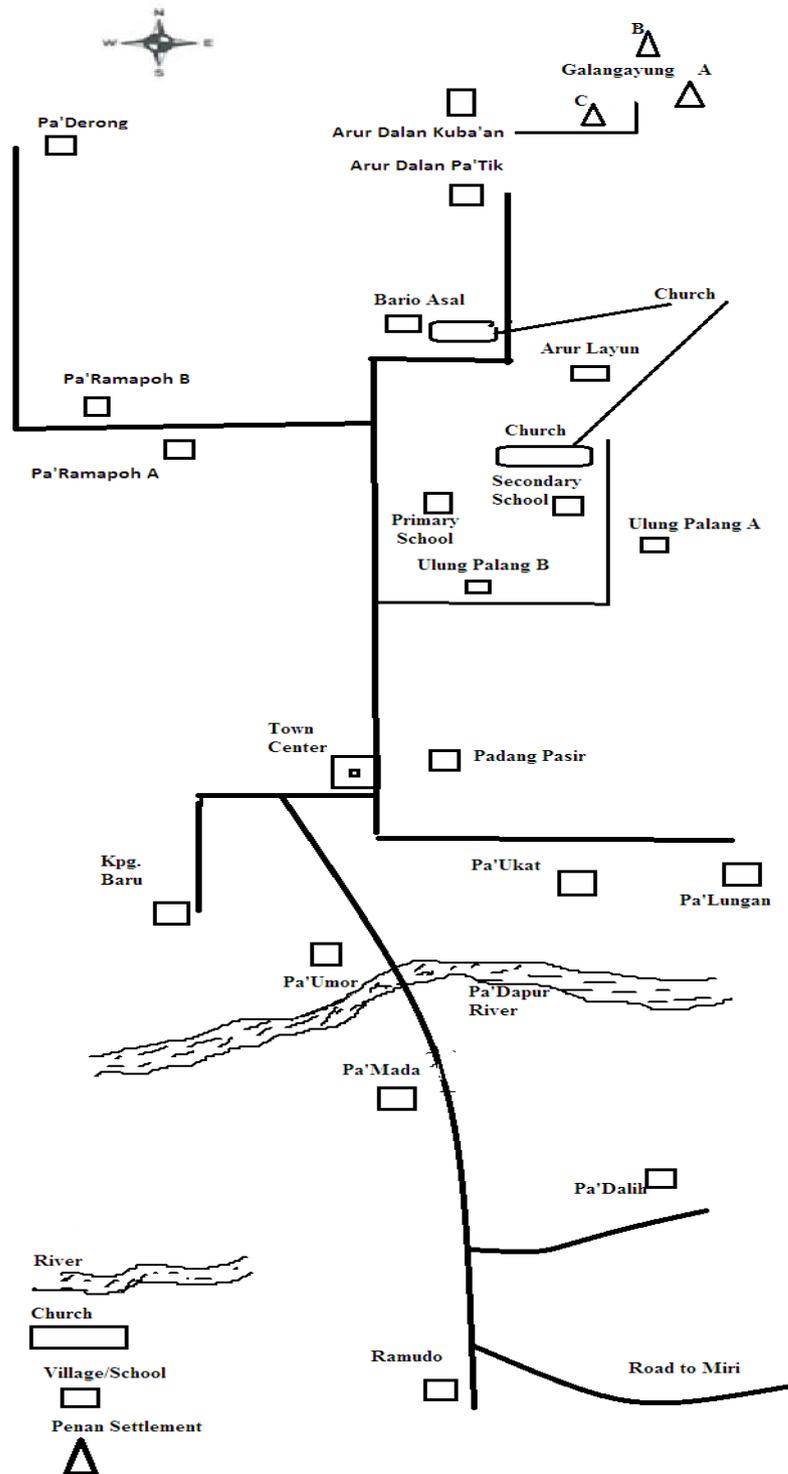
Based on Bernard & Gravlee (2015), the process of research can be exploratory (theory development) or explanatory (alternative explanations for the finding are studied and estimated); this study explores in depth and details of current hunting activities and understands the relationship between the recent situation to compare it to the previous studies that are conducted about a decade ago. Moreover, to understand and identify the current state of hunting activities and bushmeat consumption among the Kelabit and Penan communities in Bario region of Malaysian Borneo, and investigate the factors that influence the situation in order to present the reasons, the researcher contemplates the explanatory approach as well.

3.3 Study site

Bario region is located in the Kelabit Highlands plateau between 915-1067m above the sea level (Janowski, 2002) in Malaysian Borneo, in the northeastern part of Sarawak, Malaysian Borneo. Located near the border with Indonesia, the average temperature in Bario is 21.5 °C and the average annual rainfall is 3075 mm (climate-data.org, 2015). The hillsides are covered with tropical forest while the valleys are primarily used by the Kelabit for rice production (Jiwan et al., 2006).

As mentioned earlier in Chapter 2, the resident population is approximately 1,000 but swells to more during special occasions such as Christmas Eve and Slow Food Festival (Batu Bala, 2014; Hitchner, 2009). Access to Bario is via Twin Otter or a 14 hours 4-wheel drive ride on logging roads. During special occasions, the MasWing (Malaysian Airlines flights for rural areas) allocates extra daily flights besides the usual timetables. In this study, total 18 villages, 17 Kelabit and one Penan (Galangayung three-parted settlement) in Bario region, were studied (see Figure 3.1 for the sketched map detailing the locations of each village included in the study.). A brief description of each village is given in Appendix 1.

Figure 3.1 Sketched map of Bario town center and the location of each villages included in this study, Sarawak, Malaysian Borneo. A. Akbari, 2014



The following sections will explain how the Kelabit and Penan communities hunt in the north, south, and eastern parts of the Kelabit Highlands. In the northern part, Pa' Derung and Pa' Tik are the favorite hunting places and they are nearer to Aurur Dalan Kuba'an and Arur Dalan Pa Tik. Majority of the Kelabit community prefer Pa'Main jungle near to Pa' Umor and Pa' mad; however, the remote villages such as Ramudu and Pa' Dali are the more adventurous places for the communities as well.

3.4 Data collection methods

This study applies qualitative methodology in accordance due to the nature of the study; i.e. study the hunting activities within the cultural and environmental perspectives. As Bryman (2012) mentions, the qualitative research strategy emphasise on words than quantification. It has three features, inductive, constructive, and interpretive. However, the researcher might not always subscribe to all these three features. Additionally, the research methods in qualitative approach subsume different methods that differ from each other (Bryman, 2012). The methods include (1) ethnography/participant observation, (2) qualitative interviewing, focus groups, (3) language-based approach to collect qualitative data (such as discourse analysis and conversation analysis), and (4) the collection and qualitative analysis of texts and documents. Similarly, Patton (2015, 2002) remarks that the qualitative data may comprise of: interviews, observations, and field note, and documents.

According to Malinowski (1922, p. 24) ethnography has certain logic which follows three steps as shown below:

1. The organization of the tribe and anatomy of its culture must be recorded in firm, clear outline. The method of concrete, statistical documentation is the means through which such an outline has to be given.
2. Within this frame, the imponderabilie of actual life and type of behavior have to be filled in. They have to be collected through minute, detailed conversations, in the form of some sort of ethnographic diary, made possible by close contact with native life.
3. A collection of ethnography statements, characteristic narratives, typical utterances, items of folk-lore and magical formulae has to be given as a corpus inscriptionum, as document of native mentality.

By bearing this in mind, as Delamont (2007) states ethnography, participant observation, and fieldwork are synonyms and are used interchangeably in literature. In this study, the qualitative methods applied for data gathering are participant observation and interviewing. Each is explained separately in detail in the following sections.

3.4.1 *Participant observation, field notes, and photo-documentation*

Hammersley and Atkinson (2007) state that during an ethnographic study, the ethnographer participates "overtly or covertly" in the participants' daily routine to listen, observe, record and analyze what happens in their lives to discover the answer(s) to the research topic. Kothari (2004) defines the observation method as the most relevant method in behavioral studies. Observation is considered as a 'scientific tool and method' for collecting data, so the researcher can frequently check the 'validity and reliability' of the data collected (Kothari 2004). According to Kottak (2000), the ethnographer can also collect data via books, journal articles, films, or other materials; or, can live within a small community group to study and analyze, for example, the group's attitudes, beliefs, customs, or economic activities (Kottak 2000).

Therefore, one of the qualitative methods used in this study was overt and covert observation. Overt observations were made in the field by joining two different hunting trips that researcher followed the Kelabit hunters as an observer in August and September 2014 during the dry season. The trips started in Bario to Pa'Main jungle and Pa'Lungan; both trips were followed by the car, but each had followed in different ways. However, the first trip, after about 10 minutes drive, the hunters had following the way to Pa'Lungan by boat and then walk into the jungle. The second trip, after driving the car for about 20 minutes, the researcher had followed the hunters by walking into the Pa'Main jungle. The trip to Pa'Lungan was the overnight trip that started from noon time and finished about 2 in the morning next day. The trip consisted of three hunters beside the researcher. The trip to Pa'Main jungle included three adult hunters, the researcher, and the two teenage boys who were the two hunters' sons. This trip started at noon time and finished next day at five in the afternoon which ended with a feast at Padang Pasir church. They served the sambar and mouse deer stomach as a fried dish called Buri that prepared with onion, garlic, ginger and black soy sauce; moreover, the civet cats and deer meat was served as soup and carry

respectively.

Besides walking into the deep jungle, the researcher visited some restaurants, markets and handicrafts shops or centers in the urban areas outside Bario, such as Marudi and Miri. Moreover, by attending to the local gathering, the food preparation for the church gathering is observed. As Hoare (2002), who studied the diet and management of forest by Lundayeh in Ulu Padas, in Sabah, Malaysian Borneo, in this study the researcher had the direct observation and informal conversation with the local community. Therefore, in this study, recording the species that were hunted for the feast or church gathering was another approach to better understand the current hunting activities status. Moreover, listening to the hunters' stories and current news among them, noting the participants' (hunter') activities were the full-time job for the researcher.

Field notes, recording observation (Silverman, 2011) or researcher diaries (Bryman, 2012) are one of the approaches to record the data and process of research (Appendix 2, Field note sample). The initial orientation trip to Bario had made the end of January 2014 about six months prior to the first data collection trip in the first week of August 2014. The introduction to the local community and walking short distance of some villages between Pa'Ramapuh (Atas and Bawah) and Arur Dalan were the purposes of the trip. Additionally, observing the Saturdays' Market assist the researcher to easier proceeds the data collection phases in the following months.

During each trip to Bario, the Kelabit and Penan communities were visited, observations were made and recorded along with any pertinent casual conversations in the researcher's field notebook (See Appendix 2 for the sample). Hence, in this study, the combination of direct participants observation and interviews makes the fieldwork and data collection more effective (Patton, 2015). Observation leads the researcher to be more informed and aware of the whole situation while conducting the interviews; therefore, the observation during interview session accompanies more perspective and guidelines for the researcher. Hence, the observation skill and focus was improved as the study progressed.

Additionally, as Silverman (2011) and Yin (2009) state, documenting the information can be implied in many ways; in social science studies photo documentation and photography is a visual presentation (Flick et al., 2004; Blaikie, 2001) of data collection and documenting the

collected information of the topic being studied. Similarly, El Guindi (2015) describes photo-documentation as ethnographic photography or visual anthropology. This method adds visual tools, as a medium, to picture the culture as a record and further analysis. Furthermore, Silverman (2011) believes that electronic recording (audio- or videotapes) can be supplemented with the observational data. The electronic records can be replayed and detailed transcriptions can make sense of conversation for the researcher (Silverman, 2011).

Hence, the written permission is provided prior to each interview as an ethical point of view. The hunters' prior written permission had given a chance to the researcher to not only interview the hunters, but also observe their hunting activities, and visit the hunters' houses to see their personal collections of animal remains; moreover, the researcher had photographed the hunted animals and remaining of the bodies as decoration in the houses during the interview sessions and hunting trips.

3.4.2 *Semi-structured interviews*

Bernard (2013) suggests face-to-face verbal interviews are appropriate style of interviewing different ethnic groups due to the possibility of illiteracy among the interviewees, ambiguity of the questions for the interviewees, and more opportunities to ask probe questions to achieve clearer and more complete answers from the respondents. Furthermore, according to Brinkmann and Kvale (2015), talking to people leads to knowing how they describe their experiences or enunciate their perspectives on why they do the certain action.

However, according to the translation of the interviews has to be viewed as "contextually situated emergent dialogic acts that have become the focus of productive and provocative analytic inquiry (Bernard & Gravlee, 2015, pp. 408-409; Haviland, 1996). Hence, according to Bernard and Gravlee (2015), work with native assistants in transcription and translation, including meta-commentary and elicitation, helps tease out further significant features and it conveys additional social meaning in communicative acts; however, to control the direction of the interviews and avoid the misinterpretation and misleading the interviewees, the researcher had reviewed the interview questions in advance with the translator(s) and consultant.

Therewith, Bewley (2003) argues that the ability to see the contradiction in the individual's answers, to understand the influence of the key questions, and become assured regarding the reliability of the answers is an asset in research using interviews as a methodology – a researcher can repeatedly ask key questions but in different ways to ensure understanding and clarity. Additionally, according to Patton (2015), by following the interview principles, the interview can be cultivated effectively. Therefore, it is tried to conduct effective and efficient interview sessions by considering the ten principles suggested by Patton (2002, p.432 & 2015, p.428):

(1) ask some open-end questions; (2) be clear; (3) listen; (4) probe as appropriate; (5) observe; (6) be both emphatic and neutral; (7) make transitions; (8) distinguish types of questions; (9) be prepared for unexpected; and, (10) be present throughout.

Therefore, by bearing the principles in mind, in this study researcher chose the semi-structured interview approach. According to Bryman (2012) semi-structured interviews, covers various types of approaches as the interviewer asks series of questions which are arranged in the interview guide. However, it varies on the sequences of questions to be asked. It is beyond structured interview questions as the researcher asks the further question regarding the significant response.

Accordingly, the semi-structured interviews, as called semi-structured ethnographic interviews by O'Reilly (2012), have been suggested by many researchers (Bernard, 2013; Jennings, 2010; Yin, 2009; Hammersley & Atkinson, 2007; Bewley, 2003) to study participant attitudes and their perceptions on the current hunting status. Additionally, the procedure of conducting interviews had set based on Bryman (2012) suggestion to design the qualitative research; he outlines the design as the following steps: (1) general research questions, (2) Select the relevant site location for study, (3) collection of relevant data, and, (4) interpret the collected data. Therefore, the type of interview questions was selected after reviewing Fitzmaurice (2014), Wong et al. (2012), Chin (2002), and Bennett et al.'s (2000) works.

Hence, the study aims to achieve the following research objectives: (a) to understand the contemporary hunting activities of resident and nonresident hunters in Bario region

(Objective 1), (b) to document the target species for the subsistence and commercial use and their market price (Objective 2), (c) to identify the economic and commercial hunting pressure on hunting practices (Objective 3), and, (d) to recognize the proportion of the hunters who hunt in the area and hold gun/hunting licenses (Objective 4). Therefore, by achieving all the Objectives, the informed decisions for recommending managerial framework and conservation of wildlife will be made (Objective 5).

By using semi-structured interview questions, the data about the current Kelabit and Penan resident or non- Kelabit or Penan hunters who hunt in the area, and the species are hunted for commercial purposes in the Kelabit Highlands region are documented (Objective 1 & 2). Hence, the well-known and active hunters from each of the 17 Kelabit villages in the Kelabit Highlands were the participants of the study. However, as most of the Penan are known as active and well-skilled hunters by Kelabit people, in the case of their availability and willingness to be interviewed were chosen as participants of the study as well.

Through the interviews, the study attempts to elicit the hunters' hunting knowledge and skills as well as their perceptions and their culture (Vaske, 2008). To achieve this, the hunters' trust must first be obtained, According to Spradely (1979), the trust can be obtained through friendly conversation. However, few of the Kelabit hunters were not initially willing to be interviewed; whereas, building up trust and communicating with the Penan hunters was easier as they are less familiar with the law and less likely to be subject to any law enforcement.

In addition, one of the considerable aspects prior to conducting the interview is sampling method. In the qualitative approach, as Guest (2015) states that sampling strategy is one of the most considerable aspects in research design that consists of multiple phases. Therefore, in this study different sampling techniques were chosen from different sampling types as recommended by Flyvbjerg (2004 & 2011) and Guest (2015). The initial sampling technique was random sampling to avoid any systematic bias and to obtain representative samples for generalization (Flyvbjerg, 2004 & 2011).

However, during the initial phase of data collection, the researcher had employed a time-space sampling (TSS) strategy as well. This strategy might be used at the beginning phase as the researcher has no individual level of sampling frame (Guest, 2015). Furthermore, according to Guest (2015) TSS has three steps to be followed: a) the ethnographer interviews

with the key participants; b) enumeration, as the location of interviews and observation can assist the researcher to have a better understanding of the factors affect the interview sessions; and, c) the location is an important step to be considered for conducting an efficient and effective data. Meanwhile, the personal networking among the hunters' community leads to interconnect people to conduct the interviews (Neuman, 2006). As, the interviewees who were professional in hunting techniques and methods, assist the researcher to connect to other hunters either in their villages or other ones. Hence, snowball sampling (Hesse-Biber & Leavy, 2011) initiate the close connection between the researcher and interviewees in the Brio region.

3.5 Sampling

In this study, the initial sampling strategy to select the samples (respondents) for the interviews was randomly chosen from any potential hunters in each village; as the information about the number of the hunters in Bario region was limited. However, by using an appropriate location for the interview sessions, and eventually selecting the well-skilled and active hunters who are known most among the Kelabit or Penan communities, TSS sampling strategy was applied as well (Guest, 2015). Furthermore, by using snowball sampling, interview other recommended hunters introduced by the interviewed hunters, gradually communicate with the hunters' network, therefore, manage to approach other participants who share the same characteristics of the research participants (Bernard, 2013; Bryman, 2012; Gobo, 2007).

Hence, Bryman's (2012) interview guide was the guidance of the interviewing procedure. He recommends the following steps to formulate the questions (Bryman, 2012, p. 476):

- general research area;
- specific research questions;
- interview topics;
- formulate interview questions;
- review/revise interview questions;
- pilot guide;
- identify novel issues;
- revise interview questions; and,

- finalize guide.

Accordingly, by following Bryman's recommended steps and reviewing the relevant studies interview questions, the interview questions were designed. Furthermore, the questions are designed according to the objectives of the study. The questions were selected according to the previous studies such as Bennet et al (2000) and Wong et al. (2012); however, the questions have tested and analyzed after the first few interview sessions as suggested by Bryman (2012).

In total, 56 semi-structured interviews, 10 Penan and 46 Kelabit, were conducted between August 2014 and December 2015. The observations have been made during the dry season, wet season, and special events, such as the Slow Food Festival and Christmas Eve Feast. Moreover, two hunting trips were followed by the research to the deep jungle during the dry season. Interviews were conducted at the homes of some hunters, in outdoor restaurants or at friends' houses in the case of some hunters' request of researcher's preference (Plate 3.1). Some of the Kelabit hunters' interviews were conducted at the eBario center, Joe's mini market at Padang Pasir, or Y2K small pub at Padang Pasir. The Kelabit hunters' interviews were conducted in either English or Kelabit languages, depending on the abilities of the interviewee. Sometimes both languages were employed.

On the other hand, the Penan interviews were conducted in their settlement, Galangayung, or the translators' house. The Penan hunters were interviewed in Penan language with the assistance of paid translators and interpreters who were currently working with local Penan and could fluently communicate in their language.

Plate 3.1 Interview sessions in Ramudu, top and bottom left, and Ulung Palang Bawah, bottom.

L. Tarawe and M. Gerau, September, 2014



Additionally, as Rapley (2007) and Patton (2015) suggest, using tape-recorder is one of the practical and reliable tools during interview sessions; as it facilitates the researcher to spend more time on observing the interviewees and the surroundings during interview sessions, and less time on being worry to take notes. However, using tape-recorder or voice-recorder, might and might not influence the interviewees (Rapley, 2007); therefore, the user can completely rely on the interview-interaction and the moments to start and conduct the interview.

Hence, the information sheet that was originally printed in English explaining the purpose of the research was orally explained to the potential interviewees in their preferred language. See Appendix 3 for a copy of the information sheet. It was also printed in Kelabit to present it to the participants or help the translator properly explain it to the potential participants. Additionally, a consent form (Appendix 4) that was also translated into both English and Kelabit was verbally translated to the person. Only when the consent form was signed, did the semi-structured interview begin.

The translators for this study were Lian Tarawe of Bario, who had arranged most of the

interview sessions. Dayang Nalin from Arur Dalan Kubaan, who fluently speaks Kelabit and Penan and has a close connection to Penan settlement as some of the Penan women work for her. There were some on-the-fly translators (Bernard, 2013) as Stephan Nalin from Arur Dalan Kuba'an assisted as Penan translator; Lucie Tarang from Ulung Palang Atas, as a Penan translator; Ricky Paranse from Arur Dalan Pa'Tik as a Penan translator; Lian Lagun from Bario Asal as a Penan translator; Florence Apu from Ulung Palang Atas as a Kelabit translator; and Martin Gerau, as a leader of the trip and on-the-fly Kelabit translator.

As Bernard (2013) recommends writing the questions of the interviews or questionnaires in the native language and then translate it to the language the researcher working in can result to a good survey. In this study, better communicate to the communities, the translation of questions and information sheet were asked from one of the Kelabit community. However, as Penan were not included in the initial sampling, they were added to the respondents post the preparation of interview questions.

According to Bernard (2013) there are some imperative reasons to choose the translators and back translators from the community: 1) easier procedure of communicating with the local hunters, 2) being more familiar with the attitudes and personality of the hunters, and 3) knowing the language fluently. However due to some unexpected situations, which are discussed in the limitations (Section 3.4) the translators had to be changed; therefore, the backup translators was the researcher's consideration from the first day of field trips and data collection. The translators, the arranged and backup translators were the relevantly reliable and well-informed Kelabit residents. The translators were well-informed prior to the interview session a day before the day the interviews being conducted. All of the questions were clearly explained to the translators by the researcher and the method of asking questions without giving them any clues or direction to answer the questions while they ask the queries were one of the most important parts of the training and briefing sessions with the translators.

Out of 17 interviews conducted during the first trip in the first data collection phase, 10 interviews were subsequently back-translated by translators other than the one's assists during the interviews (Bernard, 2013). As previously mentioned, the assistant contacted the available hunters and arranged the time for the interview sessions in their convenience. The interviews commenced by the brief introduction delivered by the assistant and preceded by the

researcher's questions. The assistant translated the question to the respondents and then after receiving the answer, he or she translated the answers in English for the researcher.

Then, the recorded interview voice was repeatedly replayed for the back translators. The Kelabit part of the initial interview was the target of the back translation. The back translators' voices were recorded to be transcribed; therefore, the researcher could have a chance to later compare the translated Kelabit part with the back-translated ones. The comparisons led the researcher to take charge of the subsequent interviews to be more controlled. Moreover, it guided the researcher to be cautious about assuring that the question has been accurately conveyed to the interviewees and the responses are properly reiterated to the researcher by the first translators. Therefore, the researcher has a chance of verifying the quality of the interview sessions and the data according to the objectives of the study.

Additionally, the built trust on the researcher among the whole communities of Kelabit and Penan, and learning the local name of the species and some key terms by the researcher, assisted the researcher to have more dominant and control on the interviews. Hence, the more researchers became comfortable and knowledgeable, the quality of the interviews improved more.

Each interview lasted approximately one hour. Most of the interviews were recorded. However, five of the interviewees (Kelabit hunters) were not comfortable with their voices being recorded. Therefore, for the uncomfortable interviewees, only taking the notes on the questionnaires and field notes during the interviews was strategized.

The recorded interviews and notes were transcribed by the researcher for 4 months in total. The voices were transcribed word-by-word and the surrounding circumstances and the interviewees' facial reaction, body language, and appearance were explained briefly in the brackets.

3.6 Interview questions design

The fundamental research question in this research addresses is, "What are the factors that fuel the commercialization of hunting and impact hunting activity?" Other sub-questions include:

- *How many hunting areas are in the Bario region and what percentage are commercial, subsistence or recreationally motivated hunters?*
- *What species do hunters take and how many animals are harvested in a given period?*
- *What percentage of bush meat is used for subsistence purposes and what percentage is sold to urban markets?*
- *How do price increases or reductions impact commercial hunting activity?*
- *What are the patterns and relationships between hunting, location, time of year (i.e. approaching holidays) and species?*
- *As accessibility to the forest increases, what are hunter perceptions of the densities of popular species?*

Furthermore, the interview questions used in this research was based on similar interview questions or main objective of the interviews which conducted previously in this field by Robinson & Bennett (2000), Wong et al. (2012), and Fitzmaurice (2014). In general, by following the objectives of this study, the questions are divided into the following target groups and their relevant questions:

(a) Contemporary hunting activities: the questions on sociodemographic data of the Kelabit or Penan hunters and the hunters' classification are focused by asking these questions:

- **Please circle the village you are live in.**

- | | |
|---------------------------|----------------------------|
| a) Kpg. Arur Dalan Kubaan | j) Kpg. Pa'Mada |
| b) Kpg. Arur Dalan Patik | k) Kpg. Pa'Ramapuh Atas |
| c) Kpg. Arur Layon | l) Kpg. Pa'Ramapuh Bawah |
| d) Kpg. Bario Asal | m) Kpg. Pa'Ukat |
| e) Kpg. Baru | n) Kpg. Pa'Umor |
| f) Kpg. Galangayung | o) Kpg. Padang Pasir |
| g) Kpg. Pa'Dalih | p) Kpg. Ramudu |
| h) Kpg. Pa'Derung | q) Kpg. Ulung Palang Atas |
| i) Kpg. Pa'Lungan | r) Kpg. Ulung Palang Bawah |

- Questions regarding their gender (male / female) and age
- | | | | | | | |
|----------|-------|-------|-------|-------|---------|-----|
| Under 18 | 18-20 | 21-29 | 30-39 | 40-49 | 50 – 59 | +60 |
|----------|-------|-------|-------|-------|---------|-----|

(b) Hunting Patterns: Getting information on the hunted species and bushmeat price in- and outside Barrio is the main purpose of the following questions:

- Their main purpose of hunting (commercial, sport, barter trading or self-consumption) and which animals are focused for that particular purpose of hunting?
- What are the animals they normally hunt? Which one of the animals they hunt often and which one less often and accidentally?
- Normally who are the buyers of the hunted animals?
- How much is each animal per kg or for the whole body? What is the difference between the price in and outside of Barrio area?

(c) The market (commercial) hunting and illegal hunting, the duration and frequency of hunting activities and the number of hunts be caught are the questions were asked to better understand the current sustainability of subsistence hunting

- How many of the hunters go to the jungle each hunting trip?
- How often do they go hunting in the jungle?
- Do they share their catch with their neighbors or family members?
- How many animals do they hunt down per trip? During each season, dry or wet.
- What are the animals they focus more on the fruit season and rest of the year?
- How is the meat delivered to the outside of Barrio people?
- For consumption purposes, how long does a deer or pig last?
- What percent of the meat that they eat comes from hunting?
- Their awareness regarding the hunt of hornbill or sun bear for the commercial purpose.
- Their opinion regarding the difficulties of the hunting to compare to past.
- Their opinion regarding the increase or decrease of a number of hunters to compare to past.
- Their preference regarding the way of going hunting? By car or walk into the jungle. And how often they do each way? Why?
- The hunters' opinions about the increase or decrease in the number of the animals to compare to past.

(d) Regulations on hunting questions are one of the important aspects of this research to understand the local communities' knowledge about laws and regulations about hunting licence (for hunting outside their territory) and gun licences.

- Their awareness about acquiring license for hunting in general, killing protected species and selling them; and whether currently, you have got the license.

(e) The willingness of following any community-based management program by the local community in order to keep their hunting activities sustainable and provide more secured hunting atmosphere for the hunters in each village was asked by the following questions:

- Where are their favourite places in the Bario area for hunting? Why? And do they usually in the same place or not, and what is the reason for that?
- Would they be willing to participate in a Bario community-based programme to help ensure there are always plenty of animals to hunt in the future?

(f) Hunting techniques, past and present

- a) What hunting method do they use most often? Hunting dogs with the gun; hunting dogs with spear/knife; snares; blowpipe; driving down a road in a car /motorcycle with a gun; baiting and waiting; others.

(g) Hunting is part of the culture among the people of Borneo, particularly Kelabit and Penan hunters. Therefore, hunters' thoughts and beliefs about species and the hunted animals' parts is one of the targeted questions in the interview sessions.

- Explain what do they do with the remains of animals they kill? Which animals do they throw away? Which animals do they add to the personal collection? Which animals do they sell? Which animals do they use for traditional medicinal purposes?

3.7 Analyze and evaluation of collected data

As Potton (2015 & 2002) mentioned, entry-to-the-field reflection from a part-time observer is considered as one of the reliable resources to evaluate the accuracy of the collected or in the process of collecting data. This approach gives the researcher to clear the ambiguity of data. In addition, managing relationships and feeling during fieldwork (Potton, 2015 & 2002) are considered as the key aspects to bear in mind. Separating interpretation and description will decline the level of bias during data collection.

Furthermore, to assure that the collected data are reliable from both the interviewee and interviewers side, the steps recommended by Silverman (2011) are followed. He suggests that to decline the level of uncertainty in the questions being understood or not, researcher needs to: (1) pre-test the interview schedules, (2) train the interviewer(s) [in this study the assistants or translators], (3) apply more fixed-choice answers, and (4) “inter-rater reliability checks on the coding of answers to open-ended questions” (Silverman, 2011, p. 365). Additionally, the researcher can (a) tape record the interactions and (b) carefully transcribe the records to proceed reliable analysis. As mentioned earlier in this Section, conservation analysis is one of the reliable approaches in interview-based methodology (Bryman, 2012; Silverman, 2011). Hence, cross-validate and triangulate the accuracy and reliability of the data, is the internal reliability approach that is suggested by Bryman (2012). Therefore, to understand the consistency in the interviewee’s responses, the key questions were asked in different ways.

The initial approach for analyzing the collected data was conversation analysis by coding the answers for better classifying and understanding the interviews (Bryman, 2012). As recommended by Bryman (2012), overviewing and attending into detailed interviews transcriptions, represents the importance of fine details to achieve the objectives. However, it was decided to use NVivo data analysis as this study is majorly based on interviews. Unfortunately, due to the expensive cost of purchasing the NVivo software, the beginning approach was declined and changed. Therefore, the manual transcription was provided by the researcher. In addition, basic coding such as highlighting the key words, sentences and labeling them according to the related objectives (Rapley, 2007) was the approach conducted in the analysis of the data.

However, after Phase I of data collection, dry season of hunting, the collected data were analyzed and according to Bernard’s (2013) iterative process in analyzing the data. The

analyzed data lead the researcher to more probe questions or observation during the next Phase of data collection. Hence, the collected data through the interviews, field notes and observations are illustrated by using a mixed data analysis design (Hesse-Biber & Leavy, 2011). Therefore, the data are shown in some Tables, Plates, and Figures in Chapter 4.

Furthermore, visual media such as photography is the standard of fieldwork nowadays (El Guidi, 2015; Patton, 2015 & 2002). In order to understand and evaluate the accuracy of the conducted interview, these approaches are resourceful: taking photography (Patton, 2015 & 2002), recording the voices in the case of possibility and convenience, and back-translate the initial interviews that are conducted in the local language.

Moreover, in the third millennium, ethnography is embraced the new concept; as mentioned earlier through the World Wide Web, virtual ethnographer or online ethnography, the culture through and within the electronic communication and environments can be studied (Snodgrass, 2015). Eventually, by communicating the communities in Bario region and get familiar with them, some of the hunters showed their hunting photos in their social media such as FaceBook. They also shared some photos that they have shared in their chat-group in WhatsApp (one of the common free of charge communication application that almost all of the Kelabit use it). Therefore, even though, checking the social media was not the initial approach for this study, however, later some of the hunters' profile pages on FaceBook (Krishnasamy & Stoner, 2016) are followed to better understand the thought on wildlife consumption and hunting activities among the communities.

Additionally, the triangulation of findings (Hesse-Biber & Leavy, 2011) by including the field notes and participants observations and combining the data with interviews provides the better understanding of the research. In this study, including the data collected through interview sessions from the local hunters, their observation during dry, wet and occasional events hunting activities, and the extracts of observations on the fieldnotes, it is easier to understand the hunting activities in the Bario region and validate the findings.

3.8 Limitations of the Study

Every study has limitations and this one is not excluded. The limitations of this study can be categorized into the following areas.

Unexpected interviewee behavior: As Bryman (2012) mentioned, some unexpected interviewee behavior and in some cases environmental distractions may occur prior to or during the interview sessions. For example, trust in some instances was an issue for some hunters. For instance, two of the active Kelabit commercial hunters initially did not accept the invitation to be interviewed. However, after building trust among the hunting community, the mentioned hunters accepted to be interviewed. In another instance, a Kelabit hunter decided not to be interviewed and failed to show up at his own house for the interview session and left the researcher waiting due to potentially illegal activities. In another village, a Kelabit hunter asked for money to be interviewed.

Furthermore, during some of the interviews, the hunter was distracted by a phone call and had to leave the session. This led the interview to be held in a rush. After doing the follow-up with the translator on the content of the hunter's phone call, the translator explained that the hunter was called to deliver two wild boars he had caught the night before to the buyer. Additionally, some younger hunters refused to be interviewed as they either didn't recognize themselves as a hunter, or they didn't feel comfortable to have the conversation with the female interviewers.

Interview locations: Most of the active hunters who are domiciled in Bario region gathered together at the Mini Pub in Padang Pasir which is called Y2K. They used to start drinking once they arrived from their hunting trips. Some preferred to be interviewed in the Pub. Therefore, there were two points to be concerned: to conduct the interviews prior to confront the drunken hunter and tolerate the loud music during the interview sessions. Therefore, they were either been convinced to conduct the interview in another quitter place or there were no other options than conducting the interview in the pub before they get drunk.

Confidentiality: In this study, conducting the interviews needed to build up the trust during the initial steps of keeping the interview voices and transcriptions anonymous was the only concern of the interviewed hunters. They agreed to sign the consent forms as long as their

name and voices are not revealed to any organizations or person. However, some of the interviewees were uncomfortable with the idea of having their words recorded. Therefore, taking notes during the interview sessions on the questionnaires was strategized. However, some of them had expressed their worries in Kelabit language to the translator regarding their safety and status and had mentioned to the translator that "do not tell her this" or "I don't want to answer this question, or I don't know".

Honesty: As the researcher was new to the Kelabit community, starting communication was not easy in the initial phase. Hence, the local assistant played the most important role in introducing the researcher to the community and eventually building up the trust between the researcher and the hunters. However, not all hunters were honest during their interviews, especially when they discuss the protected species. For example, during the interview in Pa'Mada, it is noticed that the hunters replied the word 'Mu' [which means 'Yes' in the Kelabit language] after asking about the animals that they might hunt accidentally in the jungle. The hunters had told the translator to translate it no. They have asked the translator to not share the truth with the researcher. However, the translator later informed the researcher about this fact.

Translators: Being unable to converse in Bahasa Malaysia, Kelabit or Penan languages, the researcher anticipated foreseen issues. However, this issue was concerned about hiring translators who were able to fully communicate in the Kelabit and Penan languages. Prior the interview sessions, the translators and assistants in the field were informed about the procedure of interview sessions and how to ask the questions without leading the interviewees to answer in the certain respond. Unfortunately, in the beginning of phase one of data collection, after proceeding back translation of two interviews, it is noticed that the translator had asked the key question in a way that led the participants to answer in a certain way. Therefore, to achieve the reliable and accurate answers to some key questions, the researcher had to do the follow-up sessions with some of the hunters in their convenient time to fill the gaps. Or, in another case, the translator did not appear the day of conducting the interview. Hence, a researcher had to arrange with back-up translator in a short notice. Although the back-up translator was a very proper and pertinent decision, the possibility of interview cancellation and the risk of not accessing to the back-up translator were high.

Furthermore, even though the researcher used seasoned translators and then back translators to verify the accuracy of the information gathered, some of the data could be misrepresented, particularly in the species name section as some hunters call different species of animals by the same common word that the translators gave the general terms for them. For example, according to the Kelabit interviewees, the term 'Kuyad' for monkey, conveys many species of monkey in general; even among the Penan interviewees, they use the same term for monkeys; thus, there will be limitations on the Kelabit or Penan terms for animals compared to the English language or vice versa.

Transportation: Transport from Miri to Bario is completely unreliable during Christmas time. Some trips had to be booked a couple of months in advance; for example, the researcher had missed the Food Festival celebration in 2014 because it had to be booked in five months in advance. On the other hand, unfortunately, the flights are completely controlled by the Bario airport counters. For instance, on booking online, the web shows empty seats but the passenger is not able to book the flight, whereas, when he/she follow the flight, it is noticed that the plane has plenty of seats to offer. Travelling on road also has its own difficulties. As some of the transporters could not be enough reliable in terms of time and keeping their words for leaving on time. The possibility of experiencing miscommunication with them is needed to be considered.

Adverse weather conditions: Some interviews were postponed by heavy area rains. The wet weather impeded the interviews in several ways. First heavy rain on tin roofs, such as those found in the Penan settlement shanties, made it very difficult to hear what was being said; thus, the interview had to wait to continue until after the rain lightened up so the audio recording would be audible. Secondly, it made participants late for the interview, or change their minds about coming to the interview at all, forcing the researcher to find them later to reschedule for another try. Lastly, in Penan settlements, some interviews were conducted while it was heavily raining.

Cultural barriers: The researcher's gender (being a female) had limited the interviews in terms of location choice. The public places, the hunter's house with the presence of the translator or any reliable assistance were the only solution to prevent from any misunderstanding. Furthermore, being female might have impacted how hunters behaved in the jungle, how they talked to the researcher and how they share their stories about hunting

trips experiences, and so on.

Privacy: In the case of conducting interviews in the public areas, such as eBarrio center or restaurants, the hunters' friend had joined the interview sessions and the interviewee is distracted by their presence. Moreover, they might hesitate to share some of the information, particularly the questions regarding the number of hunts and frequency of hunting during the seasons.

Personal safety: For participant observation, the researcher could only follow the hunters who have had a good reputation among the local community. For example, very few hunting trips had to be rejected because of the hunters, who had offered the researcher to follow them, were drunk or had not asked in an appropriate manner. Therefore, for the personal safety, the offers were declined.

Gender: Being a young woman researcher in the field, sometimes limited data collection in the fieldwork (Bernard, 2013). This factor influenced the selection of the hunters in the Barrio region as well. Majority of the young hunters in the Barrio region were not willing to sit and to be interviewed by a young researcher. However, approaching to the family members of the family, such as parents or cousins, was one of the solutions. By starting the casual conversation and bringing up the questions regarding the hunting activities, motivated the young hunters to share their opinions regarding some key questions. Moreover, as the interview was moving forward, they were even willing to share more information based on the interview questions. The demographic information could be answered by observing the surrounding and few random questions from the family members

Device malfunction: Unfortunately, a few interview voices could not be recorded due to the malfunction of the voice recorder. Luckily, the researcher took the notes while doing the interviews; however, later it was noticed that the voice files were corrupted.

3.9 Conclusion

To answer the Objectives of this study, by studying the relevant methodology resources and literature, the applicable methods for collecting the data are considered during three phases of data collection. Therefore, besides direct observation of the community in hunting activities and event or occasional hunting, the data collected during the interview sessions with the Kelabit and Penan hunters. However, as there are restrictions to proceed the study, the researcher had attempted to be impartial and patient.

CHAPTER 4: RESULTS

Chapter Four Overview:

- 4.1 *Intoduction*
- 4.2 *Socio-demographic data of current hunting activities*
 - 4.2.2 *Age and gender*
 - 4.2.2 *The diferrent classifications of hunters*
- 4.3 *Hunting strategies and hunted species*
 - 4.3.1 *Duration and types of hunting activities*
 - 4.3.2 *Frequency of hunting activities*
 - 4.3.3 *Means of transport for hunting trips*
 - 4.3.4 *Animals hunted during the seasons*
 - 4.3.5 *Species hunters prefer to target*
- 4.4 *Bushmeat consumers*
- 4.5 *Bushmeat prices*
- 4.6 *Meat preservation methods*
- 4.7 *Hunting licenses and gun licenses*
- 4.8 *Bushmeat hunting techniques of Kelabit and Penan in Bario region*
- 4.9 *Remaining uses for bushmeat body parts*
- 4.10 *Conclusion*

4.1 Introduction

Based on the identified objectives in Chapter One, Chapter 4 is divided into the following parts: contemporary hunting activities; species hunted (protected and not protected); illegal hunting (such as commercial hunting and totally protected species hunting without a license), and hunting regulations.

To achieve the first objective, to document the contemporary hunting actitives of resident and non-resident hunters in the Kelabit Highlands, the sociodemographic data of current hunting activities amongst the hunters in Bario was gathered. This data includes age, gender and the information about the hunter's domicile. In addition, data regarding hunting trips, means of transportation and the frequency of trips made during the dry and wet/animal seasons was collected.

To fulfill the second objective, to document the species hunted for commercial purposes and study how bushmeat prices are determined for each, the second section discusses the species hunters prefer, listing their names in Latin, English, Kelabit and Penan languages.

To achieve the third objective, to identify the general economic and commercial pressures on hunting activities and to assess their overall impact, the section examines the overall economic and commercial pressures on hunter activities. The data was gathered through interviews about the frequency of hunting during the seasons, focussing on the current number of species compared to earlier days, and the difficulty of finding many species now. The resident and non-resident Kelabit and Penan hunters were queried regarding their income sources and daily activities to better understand their economic pressures.

The fourth section presents data on the current license status for guns and hunting permissions; and, asks hunter opinions on holding such licenses. Thus, the percentage of hunters who hold hunting permits and the percentage of those who hold a gun permit to fulfill objective four is achieved. Furthermore, their perspectives or suggestions were asked regarding the community-based programs designed to protect their traditional hunting areas from outside hunters from other areas or villages.

The final Section traces the traditional knowledge of hunting in Bario, the Kelabit Highlands. In addition, this section studies the hunting techniques, the methods of using the inedible parts of the hunted prey and trapped animals, the superstitions and beliefs surrounding the hunting of certain species, the medical or ritual uses of the animals, and the methods of preserving bushmeat. The main purpose of collecting data on these areas was to further understand the locals' contemporary hunting activities in relation to the most desired species among them, with respect to daily consumption and commercial uses. Moreover, the preservation methods and types of consumption are documented.

4.2 Socio-demographic data of current hunting activities

4.2.1 Age and gender

Age and gender are the primary socio-demographic data collected in this study. Table 4.1 shows the age categories of the hunters interviewed. Among the 56 interviewees, half of the interviewee's population (41%) are between 40-49 years old (23 hunters). Note that there are no hunters under 20 years old among either the Kelabit or Penan hunters; and there is only one active Kelabit hunter who was 60 years old when interviewed. There are younger people

who hunt but they either avoided being interviewed or they did not consider themselves as a hunter.

Table 4.1 Interviewed hunters' age categories in Bario villages, the Kelabit Highlands.

Age classification	Gender of hunters				
	Kelabit		Penan		Total
	Male	Female	Male	Female	
Under 18	0	0	0	0	0
18-20	0	0	0	0	0
21-29	0	1	2	0	3
30-39	6	3	7	0	16
40-49	22	1	0	0	23
50-59	12	0	1	0	13
60 and above	1	0	0	0	1
Total	41	5	10	0	56

Of those interviewed, the male Penan hunters who fit in the age group of 30-39 have the greatest number among all of the Penan hunters and Kelabit men and women hunters. The majority of the Penan hunters, 7 out of 10 are in age group of 30-39 categories as well.

The Penan female hunters were not interviewed in this study as they were more involved in the rice plantation harvest for the Kelabit community. Penan women usually take care of their children and stay at their homes; however, 2 or 3 Penan women were observed during the Bario Saturday market selling smoked mouse deer, Sambar deer or wild boar.

In addition, the population of the Kelabit hunters in the 40-49 (22) age group is significantly higher than the other categories followed by age groups of 30-39 (15) and 50-59 (13), respectively. Three of the interviewed Kelabit female hunters are included in the 30-39 age group categories.

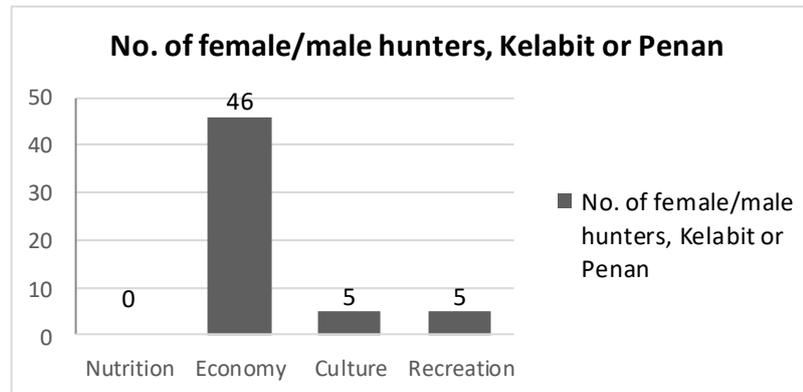
4.2.2 The different classifications of hunters

The classification of hunters in Bario according to the classification scheme developed by Caldecott (1988) and Bennet and Robinson's (2000), is used in Figure 4.1. However, the new classification of hunters determined as a result of this study is introduced in Chapter 5.

As mentioned in Chapter 2, Caldecott (1988) and Bennett and Robinson (2000) classified the

four reasons for hunting as: nutrition, economy, culture and recreation. Therefore, Figure 4.1 presents the interviewed Bario hunters based on this classification system.

Figure 4.1 Bario hunters categorized according to Caldecott (1988) and Bennett and Robinson's (2000) hunting classification system



As shown in Figure 4.1, hunting solely for nutrition no longer exists among the hunters interviewed in Bario. Therefore, there are no longer any hunters who only hunt solely for subsistence purposes. However, economy oriented hunters, 82% (46) of the total 56 Kelabit and Penan hunters interviewed comprised by far the highest total of interviewed hunters in Bario region, regardless to their gender and ethnicity. These hunters catch a variety of species for commercial purposes, yet, only a small portion of their hunt is consumed as part of their household subsistence. Moreover, the number of hunters who solely hunt for cultural reasons or for recreational purposes, is quite low (five hunters each). Only men make up both of these latter categories.

However, the Kelabit hunters state that depending on the season, the hunting categories become obscure and there is more than one reason to go hunting. The new categories are presented and discussed in Chapter 5. The male Penan hunters go hunting anytime of the year that they need or are asked to hunt.

Most of the Kelabit women (5 women who were interviewed) and Penan women hunters are primarily involved in their daily life duties besides their own needs. Penan women do not hunt and instead collect vegetables and fruits from jungle as their subsistence and income resource and sell the jungle products in the Bario Saturday market or during the weekdays to villages near their homes such as Arur Dalan Kuba'an, Arur Dalan Pa'Tik, Bario Asal and

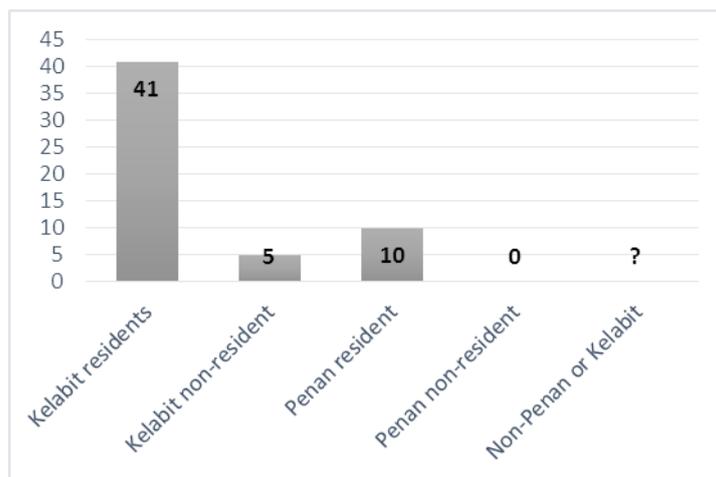
Arur Layon. However, the Kelabit women may occasionally involve in the bushmeat flow (based on the researcher’s conversation with them); they take orders from outside Bario or within Bario region and whenever their husband or themselves catches any desired animals, they will inform the community or their mediators outside Bario region.

In addition, Penan hunters, even though their style of living and settlements has changed, are largely classified under economy group. It is quite rare to find a Penan man or woman who hunts just for fun or cultural reasons as they are semi-settled and their remote life style is still simple.

Hence, in this study, the classification categories developed by Caldecott (1988) and Bennett and Robinson (2000) have been revised. The new classification is explained in greater detail in the next chapter.

In Figure 4.2, the total population of hunters in Bario region is shown. However, the total number of the hunters fluctuates as unpredictable number of hunters who are not Kelabit or Penan who are known as ‘outsiders, frequently travel to hunt game in the Highlands. Unfortunately, there was not an opportunity to interview this group of hunters as their arrival was generally and they often hunted along the road and within village lands without permission.

Figure 4.2 Origin of interviewed Bario hunters



As Bala (2002a) mentions, some Kelabit migrated out of Bario to secure better work opportunities or to pursue additional studies. Some of them return to Bario regularly during weekends or holidays to visit their parents or relatives. One of the main hobbies this group has in Bario is hunting. They either hunt alone or go with friends or relatives to the jungle. Among the interviewed hunters in this study, five hunters are considered the Kelabit non-resident hunters. No Penan were included in non-resident hunter group.

The non-Kelabit and non-Penan hunters are those who hunt along the lengthy road to Bario while in their 4-wheel drive vehicles. The researcher had observed some Hilux pick-up trucks parked along a logging road between Pa'Dalih and Ramudu; however the researcher were unable to interview outsider hunters. Study interviewees noted that these hunters used guns but rarely use dogs for hunting. The local community often complains about their uninformed and unpredictable presence due to safety issues and the frequency of hunting by this group. The number of this group of hunters is unknown at this time.

Additionally, the five hunters who were women, one each from Pa'Umor, Arur Dalan Kubaan, Arur Dalan Pa'Tik, Ramudu and Padang Pasir, are also considered as economic hunters. They market the bushmeat for the consumers from their husbands or their own catches. There are also bushmeat consumers from outside of the Bario area who communicate with these women and order bushmeat from them, mostly wild boar.

Table 4.2 tabulates the number of hunters in Bario region by their village of origin and primary purpose of the hunt. Of the categories listed, one with the highest number of hunters is the economic hunting category at 88% (49). However, the economic hunters also call themselves recreational hunters as they enjoy hunting and it is one of their favorite hobbies.

Table 4.2: Distribution of interviewed hunters types by villages in Bario, the Kelabit Highlands

Village name	No. of nutrition hunters		No. of economic hunters		No. of recreational hunters		No. of cultural hunters	
	Male	Female	Male	Female	Male	Female	Male	Female
N=56								
Arur Dalam Kubaan	0	0	3	1	3	0	0	0
Arur Dalam Pa'Tik	0	0	4	1	2	0	0	0
Arur Layon	0	0	1	0	1	0	0	0
Bario Asal	0	0	4	0	2	0	1	0
Baru	0	0	4	0	4	0	1	0
Pa'Dalih	0	0	2	0	2	0	0	0
Pa'Derung	0	0	1	0	1	0	1	0
Pa'Lungan	0	0	2	0	2	0	2	0
Pa'Mada	0	0	2	0	2	0	0	0
Pa'Ramapuh Atas	0	0	1	0	1	0	0	0
Pa'Ramapuh Bawah	0	0	2	0	2	0	0	0
Pa'Ukat	0	0	1	0	1	0	0	0
Pa'Umor	0	0	2	1	2	0	0	0
Padang Pasir	0	0	4	1	4	0	0	0
Ramudu	0	0	2	1	2	1	0	0
Ulung Palang Atas	0	0	3	0	3	0	0	0
Ulung Palang Bawah	0	0	1	0	1	0	0	0
Galangayung	-	-	-	-	-	-	-	-
A	0	0	3	0	3	0	0	0
B	0	0	3	0	3	0	0	0
C	0	0	4	0	4	0	0	0
Total	0	0	49	5	45	1	5	0

This Table was obtained with the assistance of some village headmen who were interviewed. However, there are other hunters in the region who were not willing to be interviewed or haven't been in the region during the data collection.

4.3 Hunting strategies and hunted species

4.3.1 Duration and types of hunting activities

According to Wong et al. (2012) and Bennett et al. (2000) the general queries on frequency of hunting, type of hunted animals and duration of a single hunting trip, in general, bring a clearer understanding of hunting activities in the community; therefore, the following questions were asked of the 56 interviewed hunters:

- How many hunters go with you in per trip?
- Do you prefer to go hunting alone or in a group?
- How long is your usual hunting trip into the jungle?
- How often do you go of hunting?
- Does the number of your trips vary by season?

Hunting trips in which a hunter goes into the jungle alone or in a group are significantly influenced by the seasons. As noted in Table 4.3, most of the male Kelabit hunters, 54% (30 respondents), prefer to go into the jungle alone to hunt solo, during fruit season rather than go in a group of two or more. The main reason for hunters preferring to hunt alone is that there are plenty of wild pigs during fruit season which starts from October and ends about March next year. But sometimes they go in a group to bring more meat for the community or the the commercial purpose.

However, during the dry season, which is from the end of March through October of the same year, there is less rain and fewer animals around, particularly wild boar. Wild boars migrate and move considerable distances to find fruits, their favorite food. Therefore, hunters go hunting in a group as there is a greater chance of catching animals even though they share the day's catch among themselves. During this season, they look primarily for other choices such as sambar deer, mouse deer, barking deer, monkeys, civet cats or whatever comes their way.

Table 4.3 Solo or group hunting trip in percent, during dry and fruit season

Type of hunting trips Seasons of hunting	Group hunting					Solo hunting				
	Kelabit		Penan		Total	Kelabit		Penan		Total
	M	F	M	F		M	F	M	F	
Fruit season	10	2	10	-	22	30	2	10	-	42
Dry season	31	3	10	-	44	11	3	10	-	24

As Plate 4.1, it is shown that hunters go by boat for overnight hunting at Pa'Lungan. A total of three hunters were in the boat though only one is visible in the photograph. One of the hunters is from Pa'Lungan. He has already informed the local community hunters about their trip via a Bario Radio announcement.

*Plate 4.1 Group hunting, three hunters on the Dapur River to Pa' Lungan, in Bario, the Kelabit Highlands
A. Akbari, 2014*



The hunters in Plate 4.1 from Arur Dalan Pa'Tik took the road trip to Pa'Lungan by using one of the hunter's handmade boat. They used shotguns to shoot the wild pigs and long thin tree logs to carry their catch to the boat. The hunters took a day trip to the place where they had spotted the location the last night. Usually, the hunters had mentioned that they saw some wild pigs the night before this trip while they were coming back from the jungle in Pa'Lungan. Immediately after they brought back their catch, they took another trip to the jungle while hoping that other hunters wouldn't target 'their' particular animals. As they noted, they were lucky to see the animals the next day and shot only two wild pigs as they could only carry not more than that in their boat. See Plate 4.2.

Plate 4.2 Two wild boar taken in one hunting trip during the fruit season which was shared between three hunters, according to Hunter # 8, 2014



All ten of the Penan hunters interviewed preferred to hunt alone during any season. They believe that this is more fun and any type of animal can be caught.

The number of Kelabit hunters in group depends on the hunting occasion. Kelabit hunters go hunting in multiple groups of two to three people. Kelabit women who are hunters are more flexible and have no preferences. They may follow their husbands; or, hunt alone.

4.3.2 Frequency of hunting activities

Table 4.4 shows the frequency of hunting trips among the Kelabit and Penan hunters during the two recognized hunting seasons. The frequency of the hunting trips fluctuates during two seasons. As Table 4.4 illustrates, among the categories of hunting frequency, number of hunters, 18 or 32%, who hunt twice in a month during dry season is the highest among all, 17 Kelabit and one Penan; whereas, it is sequenced by the hunting for more than three times in a

month, 16 or 29% of the hunters, 11 Kelabit and 5 Penan.

Table 4.4 *Frequency of hunting trips among the Kelabit and Penan hunters in Bario region*

	Dry season			Fruit season		
	Kelabit	Penan	Total	Kelabit	Penan	Total
Once a month	7	2	9	0	0	0
Twice a month	17	1	18	0	0	0
Three times a month	10	3	13	0	0	0
More than three times a month	11	5	16	46	10	56

Each trip might be overnight, starting their trip in the afternoon and returning back after midnight or early in the morning; or, they might go for a day hunt which is usually from early morning to noon or afternoon. They also might go for a longer than a day trip. In general, the duration of trip depends on what species and when they catch it, the sooner they catch all they want or need, the sooner the hunters return back to their villages. During the fruit season, hunters take more frequent trips to the jungle anticipating to catch more game in less time compared to the dry season.

4.3.3 Means of transport for hunting trips

According to Figure 4.5, the primary means of transportation for hunting in the Kelabit Highlands is 4-wheel drive (40 or 24%), car and walking into the jungle (35 or 21%), walking into the jungle (20 or 12%), boats (15 or 9%), motorbikes (10 or 6%), and/or any combination of these (45 or 28%). The hunters, who prefer 4-wheel drive mode of transportation, use their car along the logging road and while driving they shoot the animals from their cars. As they describe, this is the easiest and one of the most common mode of transport for hunting trips among the Kelabit community. See Plate 4.3.

However, the most common mode of transport is the combination of driving a 4-wheel drive vehicle to a certain site on a logging road, parking the car and walking into the jungle. The parked car is also the sign for other hunters to be informed about the presence of hunters already in the area. The combination of the modes of transport also depends on the terrain to the destination and its proximity to rivers or forest paths.

Figures 4.3 Means of transportation among the 56 interviewed hunters in Bario, in percent

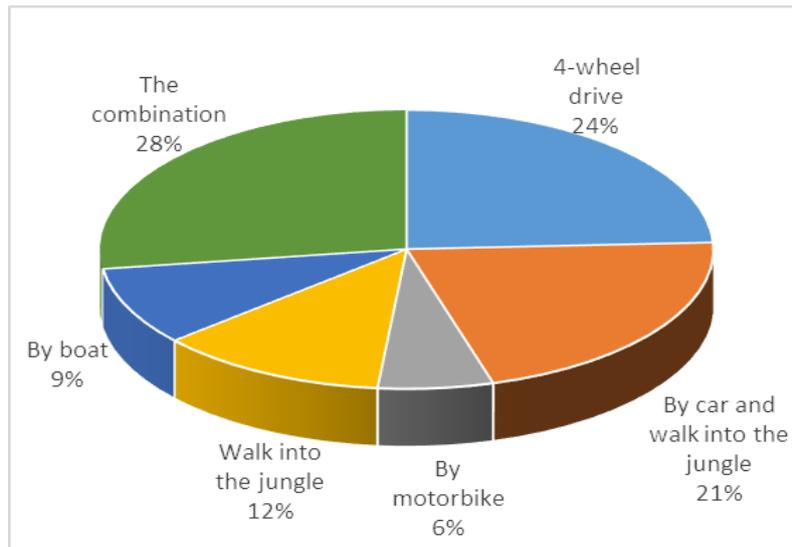


Plate 4.3 Hunting by car along the road; hunters # 5, 8 & 25, 2014



Motor bikes are one of the most common modes of general transportation within Bario region (Figure 4.3). The type of motor bike varies from a Honda 4-stroke starter to other small Honda models. As long as there is road access to any village or within a village, everyone will use a motorbike. However, the use of a motor bike for hunting purposes is uncommon with only 6% of hunters using them. No doubt the difficulties in carrying hunting gear on the

bike and the number of trips to bring all the bushmeat back are the main reasons for not using a motor bike very often for hunting trips.

A handmade logboat or plank boat as is simply called boat by local hunters is widely used for hunting . It is made of a hollowed tree trunk or planks nailed together. Boats are one of the most common and favorite means of transport among the Kelabit hunters, particularly the hunters from Pa' Lungan, Pa' Umor, and Pa' Ukat as they are near the Pa'Dapur river. The combination of a boat with other means of transportation is a more common means of transportation among the Kelabit hunters. Most of the interviewed Kelabit hunters prefer to combine car, boat and walk into the jungle during hunting trips.

Among Penan hunters, the use of car, boat or motorbike is not common; therefore, they seldom go hunting by car, motorbike or boat unless any of these means of transport are offered to them by their Kelabit employers, contractors or friends. Sometimes they follow a Kelabit hunter in their car as their hunting assistant and share the hunt; or, they might work for the Kelabit hunters by being periodically contracted to hunt; or they might share the bushmeat between themselves and a Kelabit who let them borrow their shotgun or motorbike. As it is shown in Plate 4.4, some Penan men are waiting for their Kelabit friend at Arur Dalam Kuba'an near their shanties at Galangayung, part C. However, in general, all the ten interviewed Penan hunters preferred to walk into the jungle to catch what they are asked for or when they wish to hunt for themselves.

Plate 4.4 Penan hunters before their over-night hunting trip, waiting for the Kelabit friend in Galangayung A & C; A. Akbari, 2014



Elder hunters (45 out of 56 interviewed hunters, 81%) prefer to use a car to hunt as most claim to have less strength to walk for long hours and become tired while reaching the hunting area. They also note that the timber companies have paved most of the road from Bario town center to the surrounding area and even to Miri. This means it is more convenient for them to drive their vehicles to their favorite hunting spots and then park their car(s) and walk into the jungle for day or overnight hunting. When they finish the hunt, they carry their kill in *bakang*, the local basket made of rattan, and bring the bushmeat back to their vehicle. See Plate 4.5. Most of the hunters are seemed pleased about the better roads condition which save more travel time, car repair costs and bring easier access to their favorite local destination as compared to the past (81% of the hunters, such as Hunters # 8, 11, 22, 26 & 32, 2014).

Traditionally, as mentioned by many Kelabit hunters in their interview sessions, “contemporary cultural protocol dictates that the hunters [Kelabit or Penan] should inform the villagers in the hunting destination area prior their trip to the designated hunting destination. According to some of the interviewees, one of the main reasons of enforcing and applying his protocol is that about five years ago, “two groups of hunters went into the jungle without informing the destination villagers. Unfortunately, one of the hunters shot the other group’s hunter as he assumed that he is shooting the animal at dark night-sky; therefore, the locals set

this rule as to be followed to inform the hunters of the target jungle or village before they start their hunting trip”. However, they also believe that it is culturally correct to notify and get the permission from a village when the other hunters from other villages might go and hunt on their perceived lands; as they take away their personal resources of animals. Nevertheless, based on the Kelabit interviewees, prior announcement to the target destination for hunting is not always done, especially from the Penan and outsider hunters, as they are not bound by the rules have been set among the Kelabit. The Penan hunters claim that they go to other areas where Kelabit usually do not hunt. These jungles such as Pa’Derung and Pa’Tik jungles are remote and access to them is available only by walking. Nevertheless, this creates a potentially dangerous situation for all concerned.

4.3.4 Animals hunted during the seasons

Resident Kelabit hunters divide their hunting times into two different seasons: the fruit/animal season and the dry/low season. The Penan hunters do not follow the hunting seasons as they go hunting anytime of the year they want and catch any species for their consumption or the Kelabits’ request or order, as they are faster and more skilled in hunting (Hunters # 4,7,11,19,25,38, etc.). There is no certain date on the calendar that marks for the start and end for these seasons. However, numerous interviewees, as previously noted, agreed that the end of October until mid-March is considered as the fruit or animal season. The rest of the year is considered as dry season due to less rain in the Highlands; therefore, this leads to less fruit and fewer animals in the immediate area. Table 4.5 shows the species hunted by the interviewees (both Kelabit and Penan); the animal names in English and Latin (IUCN RedList, 2015; Payne & Francis, 2007; MacKinnon & Phillipps, 1993) along with their Kelabit and Penan equivalents (with the assistance of local translators and the Forestry Department ranger); the status of the species of the according to Sarawak Wildlife Protection Ordinance 1998; and, the time of year the species is hunted. The list of protected and totally protected wildlife in Sarawak that is issued by Sarawak Forestry Department Corporation is included in Appendix 5.

Table 4.5 illustrates the hunted animals of the Kelabit Highlands which their names in Latin, Kelabit, and Penan languages are presented plus the time of year they are being hunted.

Almost all of the animals can be caught during dry and fruit seasons. All the listed species are hunted the whole year; however, bearded pig is seasonal; it is hunted most during the fruit season, but it can be found in a quite small number in the off season.

Table 4.5 Species hunted in Bario region, the Kelabit Highlands, named in English, Latin, Kelabit and Penan*

English	Latin	Kelabit	Penan
Wild Boar (Bearded pig)	<i>Sus scrofa</i>	Baka	Babui
Sambar Deer	<i>Cervus unicolor</i>	Bayo	Bayou
Barking deer	<i>Muntiacus app</i>	Tela'o	Tela'o
(Greater) Mouse deer	<i>Tragulus napu</i>	Pelanuk	Pelanu
Bearcat	<i>Arctictis binturong</i>	Payu	Busan
Pangolin	<i>Manis javanica</i>	Aram	Aram
Sun bear	<i>Helarctos malayanus</i>	Beruang	Buang
Black wild cat	<i>Felis silvestre</i>	Badan	Munin
Long-tailed macaque. Chocolate colored (Rhesus macaque)	<i>Macaca mulatta</i>	Kuyad	Kuyad
Gray leaf monkey	<i>Presbytis hosei sabana</i>	Barangad	Barangad
Long-tailed or Crab-eating macaque	<i>Macaca fascicularis</i>	Beduk	Beduk
Muller's gibbon or Bornean gibbon	<i>Hylobates mulleri</i>	Kuyad	Kuyad
Pythons	<i>Regius</i>	Selengui	Kemanen
Clouded Leopard	<i>Neofelis nebulosa</i>	Kuir	Kuir
Small-toothed palm civet	<i>Arctogalidia trivirgata</i>	Badan	Munin
Masked palm civet	<i>Paguma larvata</i>	Rebuan	Busan
Hose's civet	<i>Hemigalus hosei</i>	Rebuan	Busan
Malay Civet or Tangalung (that locals by mistake call it wild cat)	<i>Viverra tangalunga</i>	Payuh	Pasun
Horsefield's flying squirrel	<i>Iomys horsfieldi</i>	Pawat	Pawat
Porcupine	<i>Hystrix brachyura</i>	Terutung	Ketung
Grey Leaf monkey or Hose's langur	<i>Presbytis hosei</i>	Kuyad	Kuyad
Spotted dove	<i>Streptopelia chinensis</i>	Kukur	Kukur
Dark-backed Imperial-pigeon	<i>Ducula lacernulata</i>	Tabuan	Tabuan
Thick-billed green-pigeon	<i>Treron curvirostra</i>	Matto	Matto
Sumatran Peacock-pheasant	<i>Polyplectron chalcurum</i>	Manok lung	Manok lung

* IUCN RedList, 2015; Payne & Francis, 2007; MacKinnon & Phillipps, 1993.

The only limitation for Table 4.5 concerns the common name for the animal listed as interviewed hunters called different species of one type of animals with only a single common word. As an example, "Kuyad" is the name for any monkey species among the Kelabit community.

4.3.5 Species hunters prefer to target

Figures 4.4 and 4.5 show “the most” and “the least” common animals that the hunters prefer to hunt during the seasons in the Kelabit Highlands. According to some of the interviewed Kelabit male hunters, there are some animals that they never seek; or, whenever they do see them in the jungle, they reluctantly shoot them or leave them alone. Two main reasons for this came from many of the numerous hunters interviewed. First, the hunter may have been asked or contracted to hunt a particular species to hunt them. Second, the hunter had to evaluate the benefit of killing the animal compared to the price of the bullet (Hunters # 3, 8, 11, 15 & 46).

Figure 4.4 Preferred species hunted during fruit season by interviewed Kelabit and Penan in Bario region

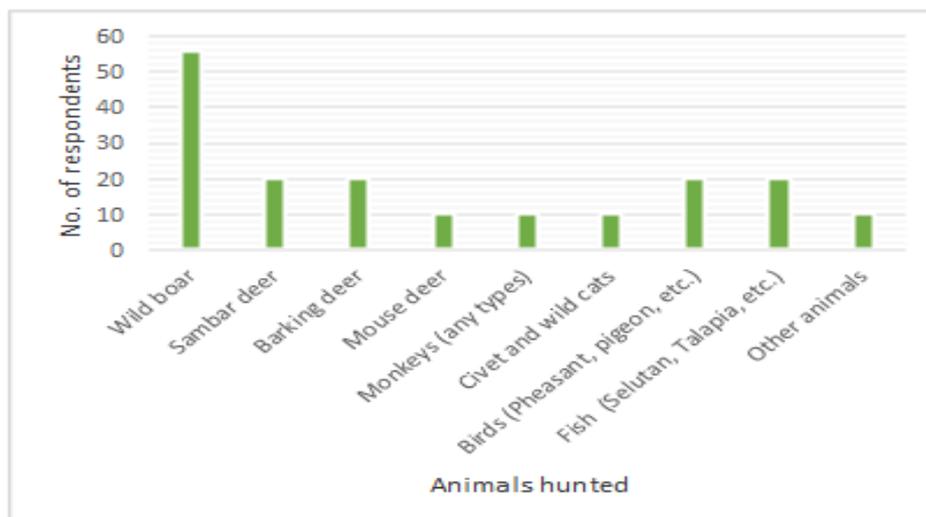
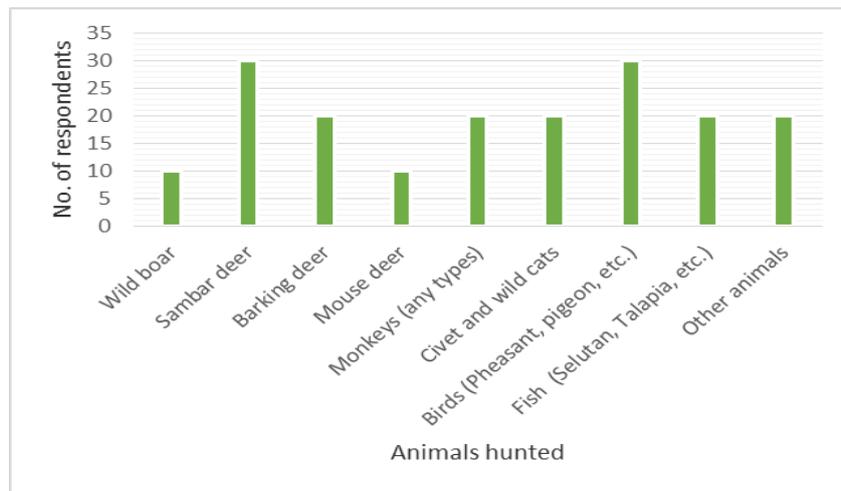


Figure 4.5 Preferred species hunted during dry season by interviewed Kelabit and Penan in Bario region



According to interviewees, the most desirable and targeted animal is wild boar, which is hunted seasonally. As previously mentioned in Section 2.3.1, wild boar is the socio-economic animal among the Highland communities. Other preferred animals were Sambar deer and mouse deer (Jenowski & Langub, 2011; Steiner, 2007). These animals have more meat and all parts of the animal are used. The Penan do not follow the hunting seasons. They go hunting anytime of the year they want, and catch any species that crosses their path. Alternatively, they will hunt to fill a request or order by a Kelabit friend or customer, as they are faster and more skilled in hunting; however, nowadays the first choice of animals to hunt among the interviewed Penan hunters is also wild boar, but they prefer to hunt mouse deer and Sambar deer to sell in the Bario market (Plate 4.5). The Kelabit catch fish during their hunting trips along the Pa’ Dapur river as well. However, the Kelabit community purchase chicken wings in bulk from Miri as they are the cheapest and most preferred meat to purchase ‘in town’ for a dietary change or when wild meat is hard to obtain. Furthermore, they either themselves drive to the urban areas surrounding them or ask their relatives to send chicken wings or lamb through post or other passengers travelling to Bario.

Plate 4.5 Bakang, the basket to carry the hunted animals, filled with 3-4 mouse deer and part of Sambar deer, part of the hunters share from the hunting trip. R. Chee, 2014



The availability of day and night hunting animals is different in the dry/low and fruit/animal seasons. Table 4.6 below shows two categories of daytime and night-time hunting trips during the fruit and the dry seasons. During the fruit season, during nighttime hunting, hunters look for any type of tree climbing animals, because most of the ground animals move during the night to drink water or relocate elsewhere for the season. Wild boar is seldom hunted during dry season, especially during night-time hunting.

Table 4.6 Day/night time hunted species during fruit/dry seasons

Fruit/Animal Season		Dry/Low Season	
Daytime hunting	Nighttime hunting	Daytime hunting	Nighttime hunting
Wild boar Sambar deer	Wild boar Monkeys Civet	Bear cat Monkeys Wild cat Pheasant Pigeons	Barking deer Wild boar Wild cat Civet cat Sambar deer Monkeys

4.4 Bushmeat consumers

Based on the data collected, bushmeat customers can be categorized into three groups: Bario Kelabit residents; relatives of the Kelabit community who have migrated to nearby cities such as Miri, Bintulu, Kuching and Kota Kinabalu and are now ‘urban Kelabit’; and, general urban market middlemen consisting of non-Kelabit, business people such as Chinese restaurant owners, outdoor markets vendors, and street vendors in Miri, Bintulu, Kuching or Kuala Lumpur. A small number of non-Kelabit consumers in urban areas might also be serviced by commercial hunters. They contact the hunters via their cell phones and order their preferred meat.

The local Kelabit communities obtain their bushmeat in two ways: 1) they contact the hunter and order the meat in advance; or, 2) purchase it during the Saturday morning market in Bario town. Sometimes hunters sell bushmeat during the week as well in the community area. See Plate 4.6.

Plate 4.6 The Kelabit hunter is selling his fresh catch wild boar at Bario town center, Saturday Market. A. Akbari, 2014



Urban Kelabit, those who are mostly close relatives or friends of the Kelabit hunters, can purchase bushmeat from the 4-wheel drive transporters who continuously travel to the bigger cities outside Bario region, such as Marudi or Miri, to move people and commodities. Additionally, MasWing flight passengers between Bario and the nearby cities such as Marudi or Miri might take the role of intermediaries and carry smoked meat to consumers outside Bario region. See Plate 4.7. The smoked meat is wrapped in newspaper and packed in cardboard or Styrofoam boxes. The boxes may also be transferred through the transporters

between Bario and Miri who have a cooler box and can keep the smoked or fresh meat for a longer period.

Plate 4.7 Smoked civet cat, Bario town center. A. Akbari, 2014



4.5 Bushmeat prices

The Kelabit or Bario Council of Elders, known as Jawatan Kuasa Keselamatan den Kampung (JKKK) Induk Bario, consists of pemanca, enghulu and Tua Kampung (TK). TK is the traditional leader who looks after “adet” among the community. JKKK Induk Bario has agreed upon a set of fixed prices for bushmeat sold in the Bario region (Appendix 6). The next higher level is the “Penghulu who is vested authority over several Tua Kampongs, and then moving up to the next level as Pemanca” (Ibuh, 2014, p. 32)

To investigate the price within Bario and outside, the questions regarding the hunted species price in and outside of Bario were asked from the interviewed hunters. Many interviewees stated that one of the main reasons the chiefs decided to regulate bushmeat price was the fluctuation of the bushmeat prices within the villages, caused largely by the Penan community. Penan hunters used to sell the bushmeat at their own desired price to Kelabit people. Therefore, all the headmen from the Kelabit villages in Bario agreed on the fixed bushmeat price list (Appendix 6). The official price list was arranged four years ago in January 2012 and has remained the same. However, the prices documented in this study are

the current prices for the bushmeat that is being bought and sold in Bario, and it does not always agree with the fixed price. Thus, there is some talk of updating the list.

All hunters are supposed to sell their bushmeat according to the official price list to the locals from their same village or other villages in the Kelabit Highlands. However, sometimes they might sell the meat for less to a local middleman if they don't have the time to sell it directly at the market. Moreover, the price of the bushmeat outside Bario is slightly different from the price of the bushmeat within Bario. For example, wild boar is RM10 in Bario for the Kelabit and Penan communities, as well as the outside consumers who travel to Bario and buy the meat in Bario. Whereas, the meat costs RM18-25, depending of the negotiated price in nearby cities. The transfer fee for bushmeat outside Bario region adds on the price.

Bushmeat parts, such as the head, or a haunch, are usually sold by the kilogram. The whole body is sold for a different price, known sometimes as a contract among the local community. In Bario communities, a contract means the dead carcass or a live animal. For example, monkey, wild cat and civet cat are sold by the whole body size, small or bigger, the prices legitimately vary.

Table 4.7 shows the fixed price/unofficial price of the hunted species inside and outside Bario. Additionally, the status of the animals based on "Laws of Sarawak, Wild Life Protection Ordinances, Chapter 26, 1998" is also presented as "totally protected" [the species that are extremely rare and may not be kept as pets, hunted, captured, killed, sold, imported or exported, or disturbed in any way" (Sarawak Forestry, 2006)] or "protected" [th species that "need a license to keep them as pets, hunt, kill, capture, sell import or export them, or possess any recognizable part of these animals" (Sarawak Forestry, 2006)] columns. The list of 'protected' and 'totally protected' species in Sarawak is contained in Appendix 5.

Table 4.7 Price of bushmeat in Bario and surrounding and their status according to Laws of Sarawak, Wild Life Protection Ordinance, Chapter 26, 1998

Animal Name	Legal Status in Sarawak	Price per kg in Bario in MYR	Price/kg outside Bario in MYR	Pricelist in MYR
Wild boar	Legal	10	18-25 outside Bario, like Marudi or Miri	8
Sambar Deer	Protected	10	18-25 in Miri (15 in Miri with bones, meat is 18-25)	8
Barking deer	Protected	25-30 for the whole body	25	8
Mouse deer	Legal	20-50	40-50 in Miri	8
Bearcat	Protected	30-50 for the whole body	>100	6
Pangolin	Protected	1500	--	8
Sun bear	Protected	10 per kg; Bile more than 100-500; Claw worths 5 each	Claw in Miri 95; In Brunei few hundred	--
Any types of monkey	Some types are protected; Such as Kuyad; Grey leaf monkey; <i>Presbytis rubicunda</i>	30-50 for the whole body	50	6
Borneo Gibbon	Totally Protected	30-40	50	6
Pythons	Protected	15-20	30-50	5
Clouded leopard	Totally Protected	Never sold in Bario	100	--
All civet cat species	Protected	20-50 for the whole body	30-80 whole body depending on the size	6
Wild cat (Black wild cat)	Some types are protected; such as <i>Felis silvestre</i>	30-50	30-50	6
Red-cheeked flying squirrel	Protected (all flying squirrel)	The whole body 10-20; Skin for 20-30	Skin: 10-20	5
Malayan porcupine	Protected	100	> 100	5
Borneo Peacock Pheasant	Totally Protected	30-50	40-50	--
All imperial pigeon	Totally Protected	15-30	20-30	--
Hose langur	Totally protected	20-50 (depends on the body size)	30-50	-

As Table 4.7 presents, there is a difference between the fixed prices on the official Price List and the current prices in Bario region. For example, wild boar is recorded RM5 in the Price List, whereas it is being sold RM10 in Bario, among the Kelabit community and at the Saturday Bario Market. However, in Pa'Dalih, interviewed hunters mentioned that wild boar is RM6-7 per Kilogram in their village. One wild boar weights approximately between 60 to 200 kg. As previously noted, Pa'Dalih has one of the greatest concentrations of hunters in the Highlands as it is close to a logging road and access to the deep jungle is easier.

The price for bushmeat is not fixed outside of Bario and the selling price is higher. Interviewed hunters remarked that “the main reason of adding up to the fixed price for selling bushmeat outside Bario is the fuel, drivers’ cost and more profit” (Hunters # 1, 5, 8). On the other hand, the Penan hunters also follow the fixed price list, unless they agree on different price with their Kelabit friends.

Most of the hunted animals are categorized as “totally protected” or “protected” according to “Laws of Sarawak, Wild Life Protection Ordinances, Chapter 26, 1998” and the IUCN RedList. Sadly, most of the animals under this category are being hunted and sold within and outside of Bario. For example, bearcat and porcupine which are “protected wildlife animals” under Part II-Game Animals, Laws of Malaysia, Act 76, are hunted because certain parts of their body are used for medical purposes. The bile of both the porcupine and bearcat is in high demand. The price in Bario is about RM100, whereas, the consumers from outside of Bario has to pay more. The price for pangolin meat fluctuates between RM60-100/kg. A live pangolin sells for RM700 per kg. One pangolin might weight 5-12 kg. Moreover, in general, pangolin is not sold in the Saturday Market or in public areas. They are traded over phone calls or mediators as everyone knows it is against the law to sell pangolin.

Plates 4.8 and 4.9 show some protected species that are regularly hunted in the Bario Highlands. In Plate 4.8, two mouse deer are being prepared for having their skin peeled off and one civet cat is ready for being smoked after their stomach is removed. Similarly, Plate 4.9 shows a dead wild cat, on the left, and a dead bearcat, on the right, both of which are protected species. The hunter of wild cat was one of the famous and well-skilled hunters from Pa'Lungan who had a clean shot. The bear cat was bought by one of the Kelabit from Arur Dalan Kuba'an whom some Penan work for on one of the logging roads.

Plate 4.8 Protected animals regularly hunted in the Bario Highlands Part 1; Right side - two mouse deer and one civet cat. A. Akbari, 2014; left side, three wild boar, R. Chee, 2013



Plate 4.9 Protected animals regularly hunted in the Kelabit Highlands Part 2; wild cat, left side, A. Akbari, 2014; Bearcat, right side. L. Tarawe, 2014



The parts of some species are used as house decorations or trophies in longhouses. For example, in Plate 4.10 the red-cheeked flying squirrel is hung as part of the house decoration in Arur Dalan Pa'Tik. Similarly, the Sambar deer with nicely-shaped horns is hung as a trophy at the Bario Asal longhouse.

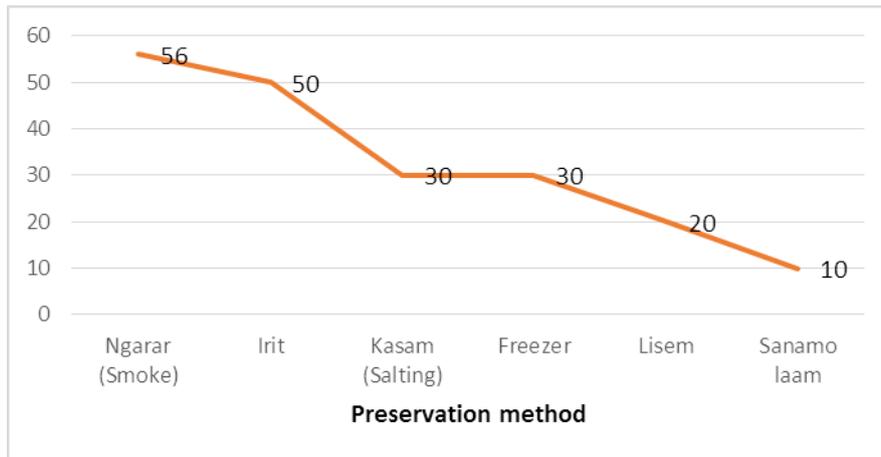
Plate 4.10 Protected animals Part 3; left side, red-cheeked flying squirrel, at Arur Dalan Pa'Tik; and right side, Sambar deer horn in Bario Asal longhouse. A. Akbari, 2014



4.6 Meat preservation methods

The size of the animal hunted and the distance between the hunting area and where the hunter lives are the two factors which affect the methods of meat preservation, and later consumption. Meat preparation is considered as part of the Kelabit and Penan traditional culture. All of the interviewed hunters prefer to smoke (**Ngarar**) the meat from their kill in the jungle as seen in Plates 4.7 and 4.11. The Kelabit hunters smoke the hunted animals and bring their smoked meat, usually wild boar or any type of deer, to the Saturday market (Figure 4.6). Some interviewees indicated that sending smoked meat through planes or post with the help of the individual passengers to carry it is one of the options for the hunters during fruit or specific animal seasons. They also stated that it is more convenient for them to send the meat through this way rather than wrap up fresh meat and carry it in a heavy ice-box. Based on airport observations in Bario, Miri and Marudi, some meat transfers outside of Bario through passengers who are the relatives of hunters or just ordinary passengers who help the community to deliver their box to the person at the designated destination.

Figure 4.6 Different methods of bushmeat preservation among Bario hunters



*Plate 4.11 The Kelabit hunter is smoking the civet cat at the hunters' shelter at Pa'Main jungle.
A. Akbari, 2014*



According to Figure 4.6, the next most desirable meat preservation method is **Irit**. As wild boar is the most common meat for the Kelabit and Penan communities, Irit requires the wild boar meat to be fried and salted. During the process the fat leaks out and is collected and used for general cooking purposes. The fried meat is then hung and dried.

As mentioned earlier, Kelabit produce their salt. One of the uses of Kelabit salt is in local meat preservation. **Salting** or **Kasam** [an Iban term adopted into the Kelabit language according to interviewed Kelabit hunters; Kelabit produce their own salt] is the other most common preservation methods among them. There are tips on the amount and quality of the salt used that can be learned by practice; as it is said that too much salt makes the meat tough.

Some of the interviewed Kelabit hunters, 35%, prefer to **Lisem** the meat, one of the traditional methods of preserving meat which is still practiced among the hunters. The term **Lisem** refers to cutting the fresh meat into pieces, mixing it with half-cooked rice, putting it in any type of container and keeping it there for long time. According to Kelabit hunters, this is one of the methods used where the meat can be kept for a long period and the taste is better than some other methods.

Mixing wild boar meat with half cooked or fried rice in a medium length piece of hollowed Bamboo is called **Sanamo laam**, another method of meat preservation. This method is rarely practiced among the Kelabit community now-a-days. In this method, the fat from the wild boar meat is extracted and then the meat is placed in the Bamboo piece. The filled Bamboo is kept in a cooler place such as in the riverside near the hunter's house, in a fish pond or even in the ground to keep it cool. Using this method the meat can last for two to three months. The Bamboo must always be covered until the meat is consumed.

Moreover, preserving the bushmeat in a fridge or freezer among Kelabit has been practiced for the last eight years as they have limited access to electricity. Nowadays, almost every household has a white chest freezer to keep meat for longer periods. However, according to interviews, Penan hunters still smoke or barbeque their hunt. As previously mentioned, Penan use fresh meat and they hunt as much as they consume. They only keep meat as needed.

4.7 Hunting licenses and gun licenses

By considering the Law of Sarawak (1998) regarding hunting and carry arm regulations, Table 4.8 shows the number of interviewed Kelabit or Penan hunters in Bario who hold hunting and gun licenses. It clearly shows that there are no hunters in Bario - either Kelabit or Penan - who have applied for or have received any hunting permit or gun permit. However,

according to Sarawak law, the local community may have guns for their self-protection their surrounding. Some of the Kelabit hunters stated that their father's gun license had been transferred to their name.

The Penan hunters were not aware of the rules and regulations regarding using gun or hunting wildlife. They expressed that they don't own guns. However, whenever they are asked for sharing bushmeat, particularly wild boar, and their Kelabit friends share their own gun with them. In addition, the female hunters did not have gun or hunting licenses and they claimed that they were not aware of the laws.

Table 4.8 Gun and hunting licenses holders among the interviewed Kelabit and Penan hunters

Name of village	No. of hunters holding a gun license	No. of hunters holding a hunting license	No. of hunters using a gun	Have ever applied for gun license	Have ever received hunting license
Arur Dalan Kubaan	0	0	3	No	No
Arur Dalan Pa'Tik	0	0	3	No	No
Arur Layon	0	0	1	No	No
Bario Asal	0	0	4	No	No
Baru	0	0	4	No	No
Pa'Dalih	0	0	2	No	No
Pa'Derung	0	0	1	No	No
Pa'Lungan	0	0	2	No	No
Pa'Mada	0	0	2	No	No
Pa'Ramapuh Atas	0	0	2	No	No
Pa'Ramapuh Bawah	0	0	2	No	No
Pa'Ukat	0	0	1	No	No
Pa'Umor	0	0	3	No	No
Padang Pasir	0	0	5	No	No
Ramudu	0	0	3	No	No
Ulung Palang Atas	0	0	2	No	No
Ulung Palang Bawah	0	0	1	No	No
Galangayung	0	0	0	No	No

Some of the hunters claim that they use their father's or grandfather's guns and that they already have a carry-arm license that which is different from a gun permit. However, either they are unaware of the regulation in The Laws of Malaysia Act 716, and the Wildlife Conservation Act 2010, which state that they cannot transfer the ownership of a carry-arm permit; or, they pretend that they are unaware of this fact. Everyone is allowed to use a shotgun to protect their house as long as it is not precisely used for the purpose of hunting.

One of the outdated licenses was shared with the researcher. See Appendix 7. In this study, the interviewed hunters claimed that they use the gun from their father or other ancestors who held gun licenses.

4.8 Bushmeat hunting techniques of Kelabit and Penan in Bario region

In this section, the Kelabit knowledge about the method and techniques used in the hunting different species is discussed; the usage of the hunted animals' body part or the benefits of catching the live animals in terms of medical or spiritual perspectives, and the bushmeat preservation methods in the past and now are studied as well.

Kelabit hunters may use guns (Plate 4.12), knives (Plate 4.12), snares (Appendix 8) spears and nets to help ensure successful hunting activities. Different methods of hunting in the Kelabit Highlands are shown in Table 4.9.

Plate 4.12 Top image shows the big knife (Tungul, Kelabit name, or Bu'a, Penan name), and the smaller knife (Eyo, Kelabit name, or ngahan, Penan name). The bottom image shows a shotgun (Selapan, Kelabit name); A. Akbari, 2014



Table 4.9 Obsolete or still being used snares among interviewed hunters in Bario and the target species

Type of snare	Obsolete, rarely being used, or often being used		Target species
	Kelabit	Penan	
Toman repik	Rarely used	--	Small and fast animals
Ruing	Rarely used	Rarely used	Small animals
Ukung	Still used	Rarely used	Small animals
Elud ruing	Rarely used	Rarely used	Big animals
Apung	Rarely used	Rarely used	Big animals
Pung telik	Rarely used	Rarely used	Small animals
Rupan/ Bepan	Rarely used	Rarely used	Birds
Pung alad	Rarely used	Rarely used	Small animals
Pung lubang	Rarely used	Rarely used	Small animals
Bubuh/Bubu	Rarely used	Rarely used	The bottle shaped one for fish; The cubic shaped one, for birds and small animals
Maring	Rarely used	--	Big size fish
Buan(Blowpipe)	Obsolete	Still used	Small size animals

Some types of snares and traps are still being used, whereas, some are now obsolete and being replaced by new methods. However, some techniques and tools are still being practicing, but more rarely among the Kelabit or Penan hunters in Bario region. In the following paragraphs, some of these hunting methods briefly described.

Toman repik is a hunting technique using a trap. This trap is made of sharpen Bamboo sticks like a spear. The sharpened ends face towards the animal trail. The animal does not see the sharp Bamboo because they are covered by Bamboo leaves. When the animal passes along the trail it will be surprised and automatically run toward the sharpened Bamboo and kill themselves. The hunter can check the trap after setting up the trap after a day or more. This trap is rarely used now-a-days as it needs patience. Moreover, if the hunter, who set the trap, doesn't place a sign to inform other hunters about the location of the trap, it can be dangerous for the other area hunters as well. Small animals which move quickly, such as mouse deer, or civet cats, are the target of this type of trap.

Ruing, looks like a hole or gate space that is made from the branches of tree with some food placed at the end of the hole. The hunter uses Bamboo sticks to fix the branchy hole on the ground, and then they tie a rope or string to another tree near the trap. While the animal

passes through the hole to get the food, the sudden move of the animal's body traps the animal inside the loop. The more the animal tries to get out of the snare, the more it chokes itself by the pulling the rope, if the loop catches the animal's neck. Usually, the hunter waits in a tree or he/she can leave the trap and check it the next day. In this method, small-sized animals such as mouse deer are the target; however, Sambar deer, monkeys and even pangolins can be caught.

Ukung is a trap consisting of a fenced area covered by Bamboo or leaves. It is like a door that is tied with string. When the animal eats the food, the string releases; then the animal sticks on the hook which the food was hooked on. By eating the food, the hook will release and the door will be closed. Therefore, the animal is stuck inside the closed area or the box. Mostly banana or tapioca is used as a food to trap the animal. In this method, the aim is to catch the animal alive. Small-sized animals, such as birds or even monkeys are the target animals.

Elud ruing, is a slippery Bamboo trap. The hunter put the Bamboo on an animal trail and makes it slippery by putting loose dirt on top. By chasing the animal on their trail, they run on the slippery Bamboo platform and they fall into the hole. Larger animals, such as Sambar deer, can be caught by this method.

Apung is a type of snare whereby some logs are fixed on the trail where the trap is there to block the way. The hunter lets the animal follow the trapped trail. The animal steps on the trap and ties itself in the loop. By this method, larger animals such as Sambar deer and wild boar can be caught.

Pung Telik is a method where the hunter uses a string. He/she pulls the tree and puts the rope on it. Later the animal's foot will be trapped. Small animals are targeted such as mouse deer and birds.

Rupan/Bepan is a snare made of a loop and gum. The hunter places the gum on a stick on a tree. The aim of this trap is to catch birds.

Pung Alad is a type of traps that in made by some intervals. The hunter takes the tree stick and ties a string to the stick. Then he/she fixes one end of the stick on a fence, and ties the other end to the food which is placed in the space. This space leads the animal to the trapped

trail. This trap can be made in a line to catch as much as the hunter wants. This trap aims to catch more small size animals such as mouse deer and birds such as pheasants.

The **Pung Libung** trap (Appendix 8 (a)) is where the hunter uses a string or rope, makes a loop and then ties the other end of the string to the tree. The loop part of the string is covered by the leaves. At the center of the loop, is the place where the food is put which is called 'Boa salad'. Boa salad is a type of local fruit to attract the animals such as mouse deer or birds; however, sometimes wild boar can be caught using this trap.

Bubuh/Bubu is a type of fish trap. It is a bottle shaped trap that is made of Bamboo and like the bottom of the bottle, the base end is bigger than the top end. At the middle of the bottle-shape basket, there is a layer which fish can move in but it cannot move backward. This trap can be placed along the river stream from the head face to the opposite of the water flow. So while the fish moves along the river stream, it goes in the Bubuh, and remains alive but trapped there

Bubuh can also take the shape of a cube shape in which on one side has the same hole with the same structure as the layer at the middle of the bottle shape one. Birds or any type of small animal can go in, but they cannot come out. It has a door-shape entrance that the hunter can grab the animal from inside of the trap (Appendix 8(b)). The bottle-shaped Bubuh is used for fish and the cubic shaped one, is an appropriate trap for birds.

The **Maring** trap is the same as Bubuh, the bottle shaped trap. The only difference is that this one is used in the river to catch larger fish.

Table 4.9, shows each of the techniques regarding the targeted species and the status of the methods application by Kelabit and Penan hunters. The status of the technique is categorized into three groups: obsolete, rarely being used, and often used by the Kelabit and Penan hunters in Bario region.

Currently, snaring is not common among the interviewed hunters in Bario region. Some of the traps are obsolesced for their time consumption and danger even though they are very economic for the hunters compared to shotguns. According to interviewees, the reason that some of the traps or snares are not practiced among the hunters in Bario region anymore is the danger that the trap might have for the hunters themselves. For example, Ruing, is one of the traps that is completely obsolesced. Some of the Ruing traps are big and they are not

recognizable at night by the other hunters. Therefore, in the past some hunters had hurt themselves, because they were not informed in advance about the ruing trap had been set in the area; or the hunter who set the trap before had not put the sign on the road to inform the other hunters that there is a Ruing trap in this direction (hunters #5). Therefore, some of the traps or snares have been obsolescent or eventually replaced by other methods and tool such as shotguns.

Additionally, it has to be mentioned that Penan terminology regarding snares and traps is limited. In general, Penan use the word “paan” for waiting for animals. The Penan word for blowpipe is ‘aput.’ However, there is no exact equivalent word in Penan for each snare named found in this study named in Kelabit.

Hunters do not really use snares or traps anymore, particularly among the new generation of hunters. The younger generation of Bario hunters are not willing to set up traps or snares because they prefer to use faster methods such as using shotguns while driving along the road, compared to all the time it takes to set up traps or snares and then wait in the jungle for the animals to be trapped or return the next day to check the device (Hunters # 3, 5, 7, 8, 14). Some interviewed Kelabit hunters who were over 45 years old used to practice snaring during their childhood (Hunters # 2, 3, 5, 6, 11, 12, 13, 19, 22, 26, 28, 33, 36, 41, 45, 51, 53, & 55). However, now, because of the better and easier access to the jungles around Bario and having access to guns, they seldom practice snaring. Moreover, there was no difference between using snares or traps during dry or wet seasons.

Additionally, Penan are well-known for being hunter and gatherers, they practice particular hunting techniques as well. Of the interviewed Penan in this study, 90% (9 out of 10) either hunt for the Kelabit; or, hunt and sell their catch to them. These hunters, of course, look for easier and more convenient methods and techniques to use, such as using shotguns. They either borrow their Kelabit friend’s gun, hunt, and then share their catch with them as much as they would like; or, they are asked to hunt for a Kelabit who then shares half the catch with the Penan hunter. Penan still hunt with their blowpipes which they call it *kelaput*. However, blowpipes are primarily for decorative use in most of the interviewed Kelabit hunter’s homes (Plate 4.13).

Plate 4.13 A Kelabit hunter poses with his blowpipe decoration. A. Akbari, 2014



Additionally, nets are used to catch particularly highly valued species alive, such as pangolin. According to one of the interviewed Kelabit hunters, pangolin is in very high demand, especially one that is still alive; therefore, the hunters who supply this illegal market, try hard to catch the animals alive. This animal is also one of the most highly demanded animals as a pet, particularly the baby pangolins.

In terms of fishing, the Bario hunters purchase their fishing equipment and nets from larger cities such as Miri (hunters # 3, 5, 8, 11, 22 & 45). They no longer make their own hooks or fishing nets.

Among Penan, dogs are one of the inevitable companions during hunting trips (Steiner, 2007). Each family has one or two dogs that are trained to catch certain animals. Similarly, the Kelabit hunters keep dogs and bring them along during their hunting trips. The Kelabit hunters can recognize the special dog for hunting based on the position of the nipples. When the nipples are not positioned regularly on the same rows, the hunters know that this dog is good for training. Using a car and bringing dogs along in the vehicle is one of the options for the Kelabit hunters; however, Penan hunters walk into the jungle and bring the dogs along. In general, during nighttime hunting, dogs do not accompany the hunters as dogs are noisy and might frighten the animals away.

Figure 4.7 shows hunting methods during the two seasons. The most used methods of hunting among the respondents during dry and animal seasons is “hunting with gun”, 100% (56).

However, using the blowpipe is no longer practiced at all among Kelabit hunters, whereas all of the Penan hunters use the blowpipe when they want to catch small animals as they are well-skilled in using it. As noted earlier, Penan hunters usually borrow guns from Kelabit hunters. some Kelabit hunters mentioned that buying a gun is not a difficult matter as people can easily access to the Indonesian border and find guns (shotguns) cheaper and easier (Hunter # 5, 11, 26 & 29) than purchasing them in Malaysia.

Figure 4.7 *Hunting methods during seasons in Bario*

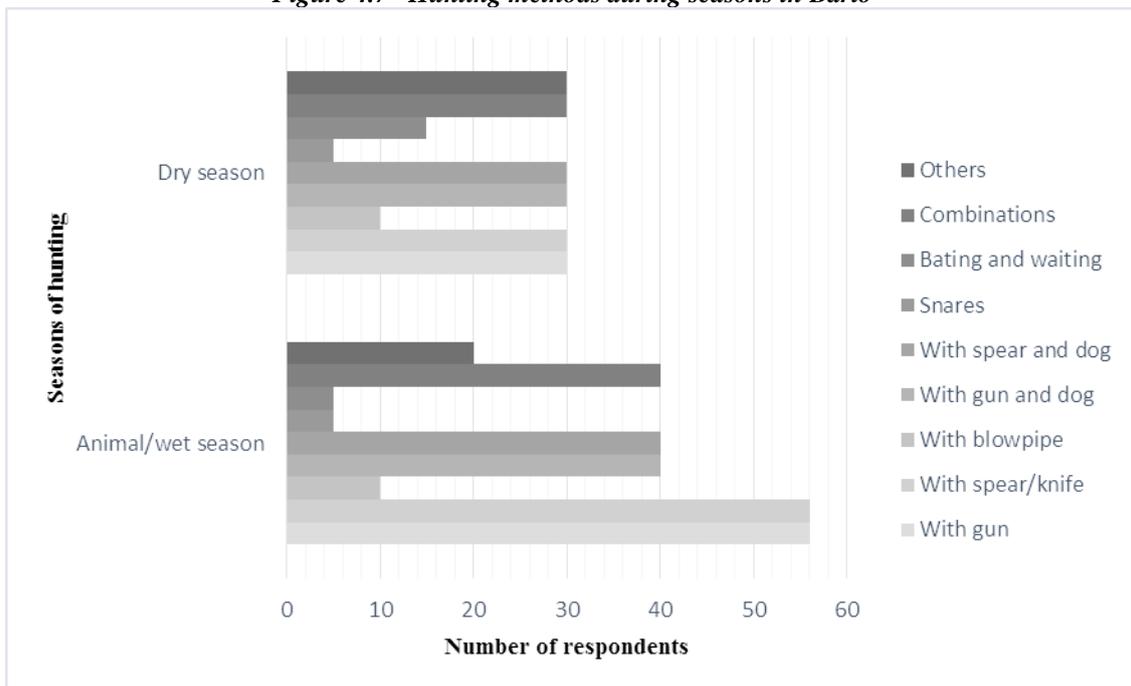
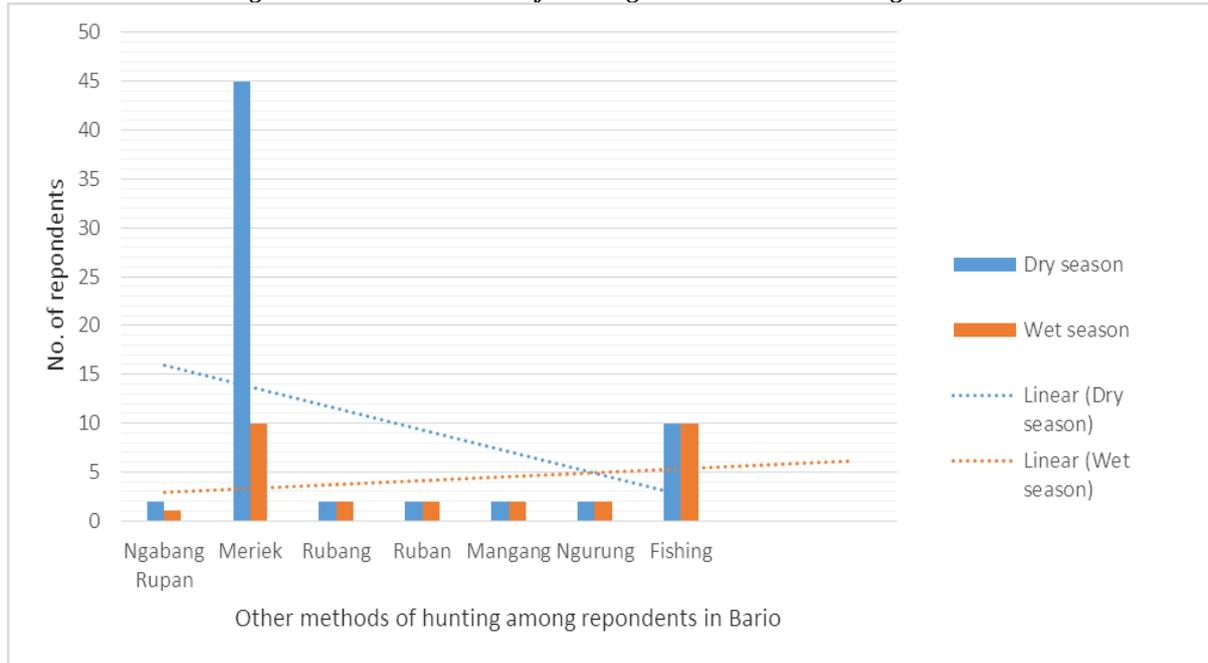


Figure 4.7 shows that the combination of different methods is less practiced during animal/wet season, but doubles during dry season when preferred animals such as wild boar are much harder to find.

On the next page, Figure 4.8 shows other methods of hunting that are practiced less frequently among the Kelabit and Penan hunters. Some methods such as fishing and ‘meriek’ are used most often compared to the other methods. Fishing is an inevitable part of hunting by boat or the combination of methods. But few hunters own a boat so those hunters follow their friends who have a boat.

Figure 4.8 Other methods of hunting and their trends during seasons



Ngabang Rupan is practiced during both seasons and is used to hunt all types of animals including wild boar, Sambar deer, mouse deer and barking deer. In this method the hunter makes a platform type of space on tree branches, sits still, and waits and looks down until the animal comes and passes on the trail. (In general, the hunters use a spotlight during night time hunting. However, while they wait on top of the tree, they seldom use their spotlight to check the surroundings). Then they use their gun when the animal is on the trail. As Figure 4.8 shows, this method is seldom used by hunters today as it is time consuming. Penan call this method “paan”, as in general it means ‘to wait’ in the Penan language.

Meriek, as previously mentioned, uses any type of fresh leaf from the trees along the trail to make a kind of sound which attracts Sambar or mouse deer. It is one of the methods that can be easily combined with other methods during seasons. The hunters repeatedly make the sound in uncertain intervals. This call attracts the animals to come toward them to be killed.

Waiting by a watering hole in the daytime where birds or smaller size animals such as monkeys and mouse deer come to drink water and is mostly near the Bario salt spring, is called **rubung**. The larger animals can be targeted at the bigger salt spring. In this method most of the animals come to this spring, but they might not come at the same time; therefore, the hunter has a chance of catching two to three animals. In this method the hunter waits for a longer than during **Ruban** where the hunter waits shorter time waiting during daytime

hunting.

Mangang is hunting with spear when a dog barks and chases the animal. This method is practiced at night (Malan, the Kelabit term for night); whereas in **Ngurung**, the hunting dog(s) recognizes the animal during the daytime (Norong, the Kelabit term for daytime). Small size animals are targeted while practicing this method because the bigger animals is preferred to be killed by gun which is faster and there is guaranty to be caught based on the hunters experience.

From Figure 4.8, it can be concluded that currently hunters do not prefer to wait for the animals in the jungle; whereas according to Figure 4.7, they prefer to set up the traps while they practicing other methods of hunting and check the traps on the way back from their trip or the next day.

4.9 Remaining uses for bushmeat body parts

Besides the meat, other parts of the body of certain species are sold as house decorations, trophies and as traditional medicines. Following Wong et al. (2012), the remaining body parts of the animals were classified as skin, fur or scales, horns, teeth and claws; and, internal organs.

There are a variety of traditional uses for animal parts beyond bushmeat. For some animals, such as wild boar, most of the hunters cook the skin and eat it as a snack or cracker. The scale of the pangolin is a noted traditional remedy for ringworm and skin disease. Nicely shaped horns of particular Sambar deer can be used as a house decoration or trophy. The teeth and claws of a sun bear is one of the goldsmiths' favourite ornaments for making necklaces. These are just a few examples of the many uses for body parts.

Table 4.10 presents the animal parts in the greatest demand and the price of each part; the data collected on parts of the animal used as a trophy, house decoration or traditional medicine are also included. Moreover, the data about the approximate price for each part is shown according to the interviewed hunters in Table 4.10.

Table 4.10 Animals parts as trophy and traditional medicines or other use

Animal	Demanded Parts of the animals	Price in RM	Use of the parts
Wild Boar	Skin	Skin snack (about 100gr) 15;	Trophy, commercial
	Tusk	50 to few thousands	Trophy & ornament as personal collection
	Claws	10	Trophy & ornament as personal collection
	Organs	10	Food
Pangolin	Scale	120-600 per kg	Food, traditional medication
Bear cat	Bile or gall bladder	Up to few hundred RM	Traditional medicine
Bear	Skull	Has not been sold	Trophy & ornament as personal collection
	Skin	Has not been sold	Trophy & ornament as personal collection
	Bile	Few hundred	Traditional medicine
	Teeth	15-20	Trophy & ornament as personal collection
	claws	15-20	Trophy & ornament as personal collection
Clouded leopard	Skin	Has not been told	Trophy & ornament as personal collection
Sambar deer	Horn	well-shaped ones 300-800 In Brunei even about 3000	Trophy & ornament as personal collection
Barking deer	Horn	Well-shaped 400-800	Trophy & ornament as personal collection
Porcupine	Quill	5 each	Traditional medicine
Squirrel	Skin	20-30	Trophy & ornament as personal collection
Snake	Meat	30	Food & commercial use

Referring to Table 4.10, wild boar skin can be fried and used as crackers or snack. Wild boar tusks (**traren** in Kelabit) and bear claws are used for decoration and for necklaces. The internal organs of the pig (internal parts, such as heart, liver, intestines, etc.) have high nutrition value for Kelabit. Well-shaped round tusks might worth about few thousands Ringgit to the right buyer. The Penan, due to their simple lifestyle, usually don't keep any animal parts as personal collections in their shanties; however, they will wear a tooth or claw as a necklace, and share their catch with their community [other Penan around them in their village] as part of their culture (Janowski & Langub, 2011).

Pangolin has a significant value for the local community. The hunters take the skin and eat

the meat; however, according to the interviewed hunters, the hunter's first choice is to sell the pangolin to transporters or a Chinese trader in the bigger towns such as Miri. The scales of the pangolin have medical purposes. The scale is burnt and then pound into powder and finally the ash is put on the skin for two days without washing the skin. It is said that the ash of scale is good for skin disease such as ringworm. Most of the demands for this animal are from the local people and local Chinese. The scale price depends on where it is being sold. The price of pangolin for the customers in Miri is RM150 per kg. A live pangolin in Kuching sells for RM1200 for the whole animal. In Bakalalan a live one is RM90-120 at about 15 to 16kg. Even in Kalimantan the offered price is RM600/kg. The hunters mentioned that previously pangolin was not in high demand and it was just thrown away; or, if someone liked to eat it, he could just have it. But now, according to the respondents, the demand for this animal is high due to the traditional thought among Chinese that drinking the pangolin blood will heal asthma; therefore, nowadays a live pangolin is more preferred among the dealers. According to the interviewed hunters, pangolin bile is especially good for stomach ache and backache. They dry the bile from and when they want to use it, they soak it in water and drink it.

The bile and gall bladder from bear and bearcats are also in high demand. Same as the bile from the pangolin, local hunters either sell the bile for up to few hundred RM or dry the bile, and when they want to gain energy, lower their high blood pressure or obtain relief their sore muscles, soak a piece of it in the water and drink it. Even though it tastes bitter, it is widely believed among the Kelabit hunters that it has medical value. Moreover, the hunters explain that they have to keep the animal upright after they hunt it to prevent the bile from being spoiled in the stomach with other internal discharges.

The skin from a bear can be used as a cover that can hold on the back to prevent the blood drops at the back of the hunters; or, as a mat or cloth for a traditional dancing costume. See Plate 4.14. The claws and teeth are used as necklace and key chain. See Plate 4.15.

Plate 4.14 A Kelabit hunter posing with his bear skin as part of his traditional cloth and part of his house decoration. A. Akbari, 2015



Plate 4.15 One of the interviewed Kelabit shows his bear claws as a key chain. A. Akbari, 2014



Additionally, clouded leopard (or leopard cat) is one of the very rare species that in the case of accidentally hunting the animal, the skin, claws and teeth are highly prized. The meat can be eaten; the bile has the same medical purposes as bear and bearcat's. Some of the interviewed Kelabit and some Kelabit hunters who were not interviewed but had ordinary conversation stated that they dry the leopard teeth and give it to the dogs to make them aggressive during hunting trips. The local hunters might not share or sell leopard with other hunters because as

leopard is a protected species and they are completely aware of this. Therefore, if by any chance, they manage to see one in the jungle, they prefer to kill it and take the bile, skin, teeth, paws and claws and keep this completely confidential and private.

Sambar deer, mouse deer and barking deer are the most desired species after wild boar, and almost all parts of the animals are used except for the skin of the Sambar deer, which is thrown away. The internal organs, according to hunters, are the best part of these species. The horn of Sambar or barking deer can be sold up to a few hundred ringgit and well-shaped horns can fetch up to few thousand to the right buyer. Some hunters make knife or machete handles and cloth hanger out of the horn. Generally, the Muslim Kelabit look for deer meat to eat, particularly Sambar deer, as in Islamic thought, the meat of a deer is Halal. In houses that have a hunter in them one or two Sambar or barking deer horns or skulls can be found.

Kelabit hunters also believe that the food in the stomach of porcupine, after being dried, can cure gout. The meat and skin of porcupine are edible and can consume as part of the food.

Squirrel skin is also in high demanded as a personal home decoration. See Plate 4.10.

In general, the tradable parts of the wild animals are not sold in public or at the Bario Saturday Market. In Plates 4.16 and 4.17 some tradable parts of animals are documented.

Plate 4.16 The nice curved-shape wild boar tusks, Ramudu, Bario. A. Akbari, 2014



Plate 4.17 Sambar deer horn in Ulung Palang Bawah as house decoration and personal collection.
A. Akbari, 2014



4.10 Conclusion

This chapter presented the data collected during this study on the commercialization of traditional hunting in the Bario region of the Kelabit Highlands. It began with documenting the age and gender of Kelabit and Penan hunters in the region and determined that most hunters were in their 30s and 40s and that some Kelabit women hunted as well. It documented the wide variety of hunting methods used by the Kelabit and Penan and found that increasingly, Kelabit are opting for easier and less time consuming hunting methods while Penan largely still use traditional hunting methods. However, the Penan also like to hunt with guns but must borrow them from Kelabit friends to do so. The study also documented that totally protected and partially protected species are still widely hunted across the Kelabit Highlands and their commercial sale is commonplace. In order to

standardize prices for bushmeat, the Kelabit elders agreed upon a formal bushmeat price list. While traditional means of preserving bushmeat are still being used, they may soon fall to the wayside as Kelabit gain greater access to electricity and freezer chests. The study also found that no Kelabit or Penan individual possesses a current gun or hunting license. Finally, the study documented that there is a strong demand for particular body parts of many species for home and personal decoration and traditional medicines.

CHAPTER 5: DISCUSSION AND IMPLICATION OF FINDINGS

Chapter Five Overview:

- 5.1 *Introduction*
- 5.2 *Contemporary hunting activities*
 - 5.2.1 *Sociodemographic data*
 - 5.2.2 *Classification of hunters in this study*
 - 5.2.3 *The overlapped classification of hunters in the Kelabit Highlands*
- 5.3 *Hunting patterns*
 - 5.2.1 *Hunted species*
 - 5.2.2 *Bushmeat price*
- 5.4 *Current sustainability of subsistence hunting*
- 5.5 *Hunting regulations*
- 5.6 *Traditional and modern hunting techniques and beliefs about species*
 - 5.6.1 *Preservation and preparation of bushmeat*
- 5.7 *Conclusions*
- 5.8 *Future work*

5.1 Introduction

This chapter reports and discusses the findings of the study based on the identified objectives introduced in Chapter 1. In Section 5.1, the chapter begins with a general sociodemographic overview of the Kelabit and Penan communities with their age and gender classification and the hunters' distribution in the villages. The study classifies hunters in Sarawak as suggested by Caldecott (1988) and by Bennett and Robinson (2000), a new classification is suggested for hunters based on the findings of this study. In addition, it provides information about the age group of the hunters to better understand the current influence of hunting on the younger generation of Kelabit and Penan (as similarly the young adults in Holman in Victoria Island, Canada, studied by Condon et.al. in 1995). Additionally, the chapter reports on the influence of foreign hunters of the focused animals in the studied area, and the hunters in Bario region classified into different categories based on their origins. The data in this section are based on the interviewed hunters in 18 villages of Bario, the Kelabit Highlands.

Section 5.2 analyses species hunted for the bushmeat trade, the commercial trade of

bushmeat, and documents the revenue the meat generates in the Bario region. The section also provides details of the price demanded of by consumers outside the region. The duration of hunting trips, the types of trips made, the mode of transportation employed and the number of trips per season is recorded. Furthermore, the chapter explains preservation methods and techniques used by the local community and local ways of preparing meat. The four sections of the interview questions focusing on the main purposes of hunting are based on Bennett and Robins's (2000) study for the purpose of hunting. Further, the target animals in each classification were sought from each interviewee.

The study investigated the current sustainability of subsistence hunting in Bario and the economic pressures on hunting activities. This was done through a documentation of the hunters' other income resources, as well as recording their perspectives regarding the current amount of prey hunted. This information was then compared with their knowledge regarding their past hunting activities and their opinions on the factors that impact their current success for hunting species or lack thereof.

In Section 5.4, the laws and regulations about hunting and related activities are analyzed. This was effected through an analysis of the transcripts of the interviews held with Kelabit or Penan hunters where they commented on community-based programs in their villages, set up to protect various species in their territory yet sustain the hunting activities.

The last Section, 5.5, discusses the traditional and modern methods and techniques of hunting, the use of other parts of the prey beside the meat, as well as the belief about the use of other parts and the possible medical or ritual use of the parts.

5.2 Contemporary hunting activities

5.2.1 Sociodemographic data

Bario is located in the Kelabit Highlands near the eastern edge of Sarawak, Malaysian Borneo. Both the Kelabit and Penan hunt bushmeat for commercial purposes. By considering the previous studies such as Bennett and Robinson (2000) and Wadley's (2010) age group classification, , in this study the age classification is divided into: those under 18; 18-20; 21-

29; 30-39; 40-49; 50-59; and those 60 and over; as it is shown in Table 4.1 as well.

The largest age group of hunters interviewed was those between the ages of 40-49 (45%). The second largest group was those between 50 and 59 of age (32%). The new generation of hunters, few of them who agreed to be interviewed was working or traveling in other places during the interview times. Those, whose fathers are also hunters, were generally in the age group of 20-29 years. Moreover, the majority of the interviewed Penan hunters did not know their age (5 out of 10 interviewed Penan), even though the identification cards were issued to them. The main reason is that all of the Penan are not able to read and write and they are not used to the new lifestyle they are forced to follow. However, their Kelabit employers were aware of their age as they work with them. Moreover, the Penan hunters tend to have a smaller physique than the Kelabit hunters. So by holding Ritchie (2009) and Steiner's (2007) description about Penan and knowing their appearance, it becomes hard to guess their age based on their appearances.

Focus on female hunters in the Bario was not the initial objective of this study. However, observing that three Kelabit and two Penan women were selling fresh bushmeat at the Saturday Market, drew the attention of the researcher to the existence of hunting practices among the Kelabit or Penan women. Unfortunately, there were limited opportunities to interview Penan female hunters, as they are often very shy and introverted compared with Kelabit. However, it was observed that some of the Penan hunters' wives accompany their husbands into the jungle to bring and sell the bushmeat in the market themselves. One reason that the Penan women are close to the Kelabit community is that they often work for them planting and harvesting rice during the season, as well as, selling fruits and vegetables to them. As a result, selling their bushmeat is achieved easily by these women, as generally they are considered more trustworthy.

The Kelabit women usually help their hunter husbands by sometimes hunting with them, and assisting them with the selling of the bushmeat either prior to or after it is caught. Very few of the hunters' wives practice hunting by themselves, so the researcher had a chance to have the short conversation with a few of them in this study or agreed to share their experiences (5 female hunters interviewed amounting to 9% of all hunters. In general, the female hunters, either Kelabit or Penan, are considered as mediators between the hunters (the male hunters who are either happening to be their own husbands or the other male hunters in their own

villages) and the consumers in their own villages or the surrounding villages and/or consumers from other towns or cities.

Penan is famous for their knowledge of hunting techniques and how to find and maintain their direction in the deep jungle. They walk quickly and can easily hunt whatever they choose. Therefore, this is a good chance for the Kelabit community to have mutual cooperation with the Penan community in their neighborhood. One of the main reasons that Penan communicates and approaches the local Kelabit community is because they have moved into their villages or occupy lands that originally belonged to the Kelabit. Along with the significant changes recently affecting their lifestyle, as well as migrating from their main settlement in Pa'damud, the Penan community has discovered the value of money and need cash to afford some of the commodities they cannot obtain from the jungle. Therefore, they will often follow a group from their Kelabit friends when an invitation is offered. So, this is a mutually beneficial relationship and most of the Penan hunters are headed by the small number of Kelabit hunters, and follow their rules and orders.

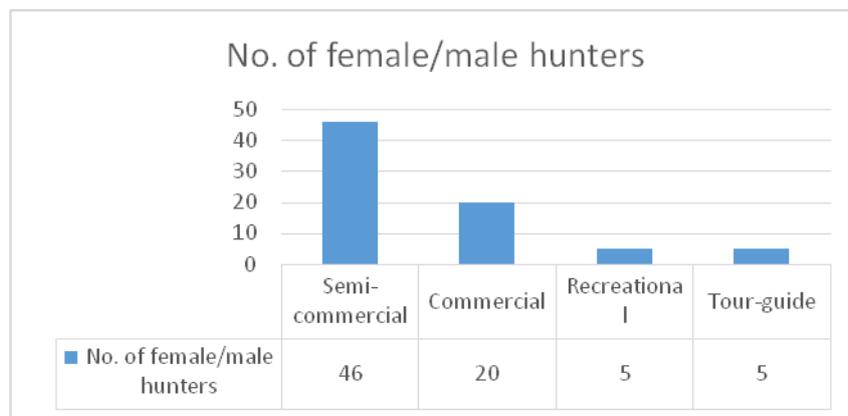
The researcher did not interview any female Penan hunters. There was no chance to meet any Penan women who were hunters if such were the case. They were only involved with house/children chores or they had no interest in sharing their experience to the researcher. However, it should be kept in minds that, in general, Penan hunt only as much as they need. Yet, as currently they are considered as semi-settled Penan, but some of them are settled and have lived in Arur Dalan Kuba'an for more than 5 years, this situation might change their methods and attitudes towards hunting.

5.2.2 Classification of hunters in this study

To better identify the hunters in Bario (Objective 1), it is better to understand the type of hunters in the region. By considering Bennett and Robinson's (2000) method of classification of the type of hunters, however, in the Kelabit Highlands a new category of hunters was found - semi-commercial, commercial (active), recreational and touristic-guide. Based on Figure 5.1, the new hunter category, men, and women are defined according to the current hunting activities in Bario region, the Kelabit Highlands.

As it is discussed earlier in Chapter 4 (Figure 4.1) to fulfill Objective 1, there are no more subsistence hunters exist in Bario region. In Figure 5.1 it is tried to illustrate and interpret the current hunters in Bario region. A new category of semi-commercial hunters was found among the classification that consists of hunters who hunt for subsistence as well as selling any extra catch for money; selling to their entire village, longhouse or any potential consumers from the surrounding areas other than Bario. This category comprises of 84% (47) of the interviewed hunters, 37 Kelabit, and 10 Penan hunters. They sometimes exchange or barter their hunt for other items, such as bullets (the most common trade) or other kinds of bushmeat (least common trade). The hunters in this group are located in Bario, the Kelabit Highlands, and one Penan settlement. In addition, the Penan hunters are considered as a semi-commercial group; they hunt for the Kelabit hunters, sell their catch to them or share it with them, and accept orders from them, using their guns and taking their share of the hunted catch for their own family consumption. This group usually requests cash for their catch in order to purchase their necessities from the mini-markets in Bario.

Figure 5.1 Current hunters classification in Bario, based on the interviews



The commercial group of hunters is those that hunt with the intention of selling bushmeat to the consumers, regardless of where the order is coming from. This classification is closely related to the economic purpose of hunting according to Bennett and Robinson's (2000) categories. Twenty hunters (36%) out of 56 interviewed hunters took orders originating within and outside of Bario. They also transported the bushmeat along the logging routes to the main big cities. But this category of hunters overlaps with recreational hunters at times.

According to Robinson and Bennet (2000), hunting as a 'culture' could be described as hunting for trophies (Plates 5.1 & 5.2), or, for improving their personal social status in their own community. However, trophy hunting also moves into the commercial hunting category, through the selling of parts from the trophied prey to earn more money. Therefore, in cases that hunters catch any species that are, by categorization, either protected or totally protected (such as pangolin, bear (Figure 5.3) or porcupine), they usually keep that to themselves rather than sell their community, so as to not to get into trouble with the law. Cultural hunters (Robinson & Bennett, 2000; Caldecott, 1988), are also classified as 'tour-guide hunter' in this study which is a new category identified. This group consists of guides who provide services for both Malaysian and foreign tourists for hiking, nature walks, and bush-roaming tours.

Based on Robinson and Bennett's (2000) definition of cultural hunting, almost all of the hunters could be classified in this group. This is due to the fact that hunting is inherent in their culture and includes the use of animal parts for decorating their houses (Plates 5.1 & 5.2), keeping animals as pets (Plate 5.3), and use of parts such as horns, paws or claws to present to their respected relatives and friends, which is typical in Kelabit culture, but particularly prevalent among Penan hunters due to their nomadic style of living. Penan has simple nomadic life with fewer belongings which makes their moving from place to places easier (Ritchie 2009; Steiner 2007).

Plate 5.1 Sambar deer horn, Bario Asal. A. Akbari, 2014



Plate 5.2 Piece of Clothing for the dance performance made out of bearskin hangs on the hunter's house in Ulung Palang Bawah, A. Akbari, 2014



Plate 5.3 Pet mouse deer (Tragulus napu), Ulung Palang Bawah. A. Akbari, 2014



Five hunters lead tours (9% of the total interviewed hunters population). For example, according to hunter #3, the hunters from Germany and Russia who traveled to Malaysia, experienced hunting trips in Borneo. They came to Bario and joined a hiking tour to Pa'Lungan while enjoying the scenery and the pleasure of hunting Bornean species such as civets, monkeys and wild boars.

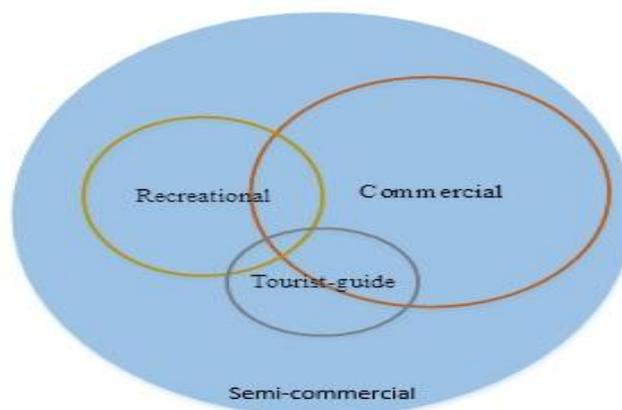
On the other hand, one of the hunters in Pa'Umor who was not willing to be interviewed, during the short conversation, expressed that there are tours that arranged for Malaysian or foreigner tourists to follow the trails for Hornbill watching into the deep jungle on top of the hill as hornbills prefer to live at the highest part of the hills. These hunters consider this as

their part-time job which is completely seasonal and depends on the demand; therefore, they cannot rely on it as a full-time career during the whole year and mostly work as a transporter in between Bario and Miri and vice versa. In general, they offer hunting tours that include transport, hiking and providing gun, bullet and camping facilities. These tours consist of two types of tours: hiking or a combination of boat and car trips. The hunting tour by hiking costs RM200-300 per day and by boat, RM300-500 per person per day. The tours by car cost about RM500 and above, per person for each trip that can be a day trip or exceed to a month. The hunters provide all the hunting gear requirements such as the gun, net, knife etc. According to the local Kelabit hunters, these hunting tours could be considered as less expensive for foreigners when compared to the expensive hunting tours in Africa, where they have to pay thousands of US Dollars (hunters #3, 11 &24).

5.2.3 The overlapped classification of hunters in the Kelabit Highlands

Most of the hunters in this study could be classified into two or three categories of hunters depending on the seasons, demands and their location of living; however, the initial consideration during data collection was based on Bennett's classification. Therefore, there is interrelated overlap among the Kelabit hunters categorization (Figure 5.2). For example, the semi-commercial hunters can be tour-guide whenever they want or have an opportunity to lead a group of tourists; moreover, they are recreational hunters as they hunt for fun and they believe it is the inseparable angle of their job. On the other hand, the commercial hunters enjoy hunting as part of their hobby and the economic source in their life.

Figure 5.2 The classification of the hunters: overlapped classification



High demand from the market has considerable influence on the hunting activities. For example, according to hunters #1, 2 & 5, there is higher demand for wild meat because the meat is fresh, particularly during the fruit season that animals, precisely wild boar, have more fruits to forage. The hunters believe that this fact affects the animal's meat and they taste better.

On the other hand, the hunters' distribution significantly affects the number of hunters. For example, based on the estimated semi-commercial and commercial hunters distribution in the second Table in Chapter 4, the distribution is high in Pa'Dalih, Pa'Lungan, the Kelabit villages, and Galangayoung, the Penan settlement, 15, 10 and 15 respectively. Pa'Dalih is the village beside the logging road from Bario to Miri. According to one of the interviewed hunters from this village, 'almost all of the males in Pa'Dalih are hunters' (Hunter #17, 2014); moreover, the other non-Kelabit and non-Penan hunters from the other areas follow the road to Bario and hunt from their cars. Therefore, the number of hunters in Pa'Dalih and the surrounding villages, such as Pa'Mada and Ramudu, is higher than the whole estimated population of hunters in the study area.

Pa'Lungan remotely located at the eastern part of the Bario region jungle is accessible by 4-5 hours hiking, or an hour boat ride on the Dapur River and then walking from the river drop-off point less than half an hour (Plate 5.4). Pa'Lungan has the privilege of attracting more adventurous hunting activities among the local and outsider hunters. Some of the local prominent and leading tour-guides are from this village and the researcher was fortunate to have interviewed two of them for this study. This village consists of the combination of the recreational and tour-guide hunters from other villages. The hunters believe that the terrain is more challenging; therefore, the recreational hunters are more satisfied with their hunting trips.

*Plate 5.4 On the way to Pa'Lungan on Dapur River for night-time hunting at the start point in Pa' Umor.
A. Akbari, 2014*



The Penan hunters live in the isolated and remote settlement at the northern part of Bario region closer to Kuba'an and Pa'Derung jungles (Plate 5.5). All of the male Penan, ten out of ten interviewed Penan hunters, still hunt for their subsistence, even though their way of living has changed from nomadic to semi-settled mode, and their migration from deep jungle leads them to experience the different living style. However, their association with some Kelabit hunters in their trips to the jungle and/or being employed by the Kelabit to hunt for them, institute the new methods to the Penan hunters along with their own methods of hunting. They work individually or in a group for two or three Kelabit hunters who lead them and connect them to the Kelabit community. Therefore, there is the higher chance for the Penan to get paid cash and establish better living conditions for themselves. The population of other villages varies as the residents in some villages are just limited to 4-5 households. The hunters in these Kelabit villages plus the Penan settlement can be recognized as the semi-commercial, commercial and recreational hunters.

Plate 5.5 Galangayung, Part C, Bario region, the Kelabit Highlands. A. Akbari, 2014



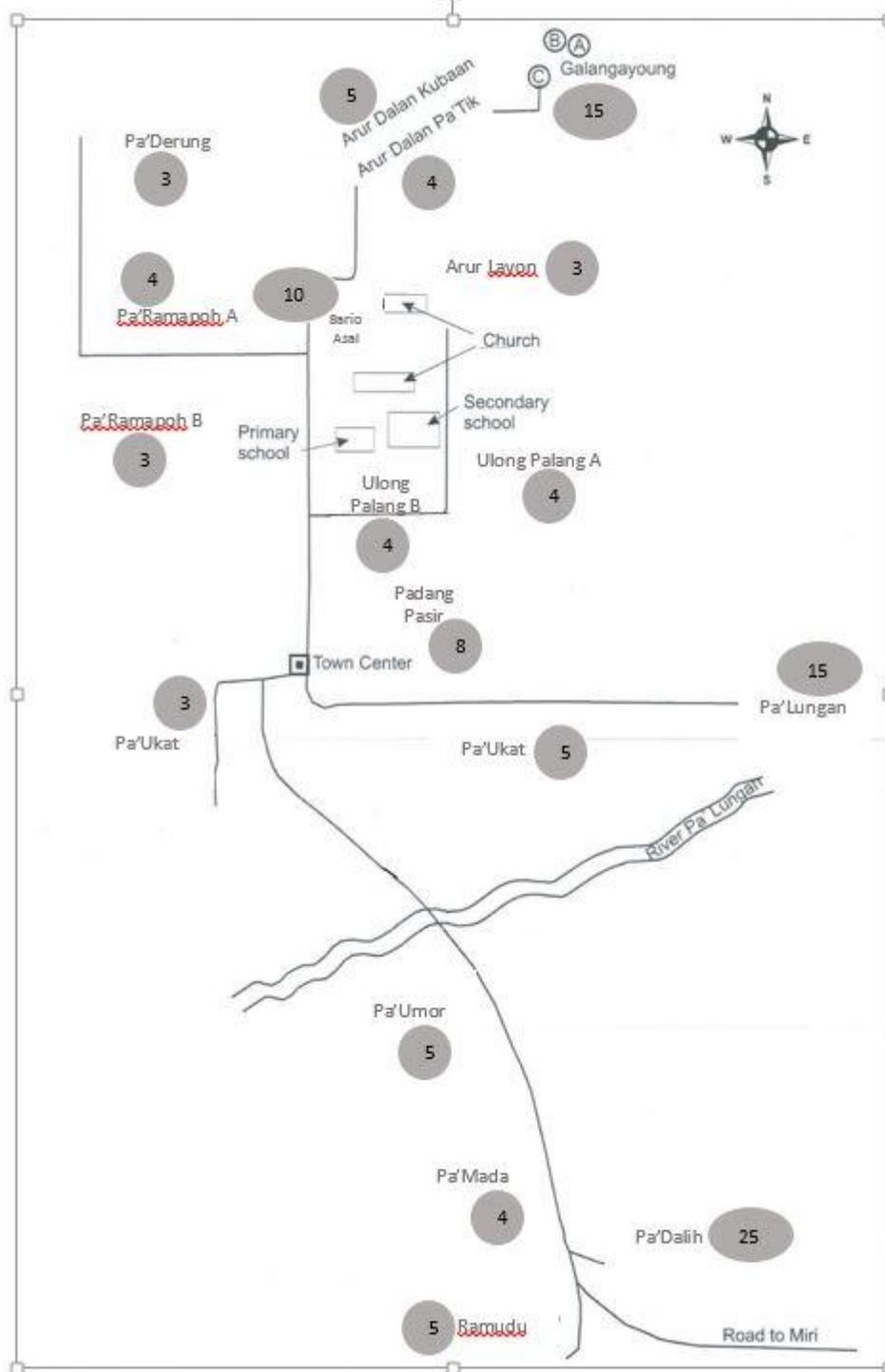
In general, Penan occasionally travels to their main settlement in different places such as Long Iman, near Mulu National Park; or, Pa'Tik and Pa'Damout. They do not own cars or motorbikes, but the few Penan who do work for the Kelabit families do have motorbikes for themselves (based on observation of three Penan who are working for two Kelabit hunters). The rest of the interviewed Penan and other Penan who were observed, working for the Kelabit, accepted some odd jobs on a monthly basis or for longer periods of time for jobs such as breaking rocks and working on the logging roads. Therefore, in general, the modes of transport among the Penan hunters walk into the jungle and catch their desired animals.

With the new style of living, the female Penan mostly cooperate with their husbands to sell their bushmeat to the Kelabit community directly in the town center or by word of mouth through their Kelabit friends. In general, according to some Kelabit hunters, "Penan are all very skillful hunters who dare to go deep into the jungle alone and never come back empty hands" (Hunters # 29). At the same time, they try to earn cash by selling their catch for their daily commodities. Moreover, the five interviewed women hunters in this study were interviewed from Pa'Umor, Arur Dalan Kubaan, Arur Dalan Pa'Tik, Ramudu and Padang Pasir, one from each village, because they agreed to be interviewed. These female hunters are

considered as semi-commercial hunters who market the demand for their or their husbands' catch.

Based on conversations with some of the interviewed headmen, as well as full-time occupational hunters, it is estimated that about 125 male hunters currently live in the 17 Kelabit villages and one nearby Penan settlement (Figure 5.3). This figure is also in agreement with the estimation of the names were given by the shopkeepers and local business owners in Bario, and complies with direct observation. However, during some events such as Christmas Eve Feast or the Slow Food Festival, there can be a rise in the number of hunters who are originally Kelabit but live outside Bario region.

Figure 5.3 The estimated number of hunters among the Kelabit and Penan in Bario region. A. Akbari, 2014



In addition, it should be noted that there are strong limitations on estimating the number of Kelabit or Penan women involved in hunting because hunting is not assigned to their normal duties as women in the community. However, five Kelabit women, who hunt occasionally in order to supplement their income, were available for interview. Hence, these women, wives

of occupational hunters, tended to have more contact with their community (the Kelabit), both local and regional, and often function as mediators for the sale of bushmeat and its distribution. For example, according to hunter #27, his wife caught live pangolin adjacent to their house in Pa' Ramapuh Bawah and decided to sell the animal to earn some money for herself. A few of them, tend to do this especially during some events such as Christmas Eve Feast or Slow Food Festival because hunting is part of the Kelabit culture and those hunters who migrated from Bario regions and live in other urban areas, travel to Bario to hunt.

Taking the challenge of walking into the jungle to go alone on a hunt is one of the most prestigious ways of hunting both Kelabit and Penan hunters. However, the possibility of doing this is strongly affected by the seasons. According to Mysetrud et al. (2006), Griffin and Griffin (2000), and Bennett and Robinson (2000), due to the current road improvements, changes have occurred in the pattern of hunting activities. The easier access to each village, jungles and even surrounding bigger towns, have been taken advantage of by local Kelabit and Penan hunters, as well as hunters from outside those areas. Based on Steiner's (2007) experience of being in Borneo, using a 4WD as a new mode of transportation in Bario also has significantly changed, not only the community's lifestyle but also their methods and techniques of hunting. As Gaveau et al. (2014) mentioned, the logging road density in Sarawak is very high; thus, affecting access to the Bario region as well.

The Kelabit hunters prefer to use their own vehicle, or that of their friends, to access easier to the starting point of their jungle hunting trip. Alternatively, they simply hunt along the road. They claim that the new road access is easier and faster compared to five years ago when it used to take them about 5-6 hours to reach to their jungle starting point. Moreover, during the fruit season that they hunt more, they carry the animal(s) for about 1-2 hours before bringing it back to the village by car; this is one of the most convenient benefits of the new logging roads. However, not only the use of older methods of transportation has been retained, but also the combination of these modes offers more and better opportunities for the hunters to catch their animals, particularly during the low or dry seasons. On the other hand, the Penan hunters still prefer to walk into the jungle on foot, even though in recent times the majority of them work for Kelabit employers and have been instructed to follow the logging roads.

5.3 Hunting Patterns

As Griffin & Griffin (2000) stated, hunting strategies vary among the hunters and the season of hunting highly influences the hunting activities. Therefore, to better understand the current hunting activities, as well as the hunters in the area (Objective 1) and their catches in the region (Objective 2), based on Bennett et al.'s (2000) work, the interview questions posed to hunters centered on: hunted species, number of hunters in each trip, the duration of each hunting trip, and the frequency of hunting during seasons.

Hunting trips are directly influenced by two seasons in the Kelabit Highlands- the fruit season and the dry season. According to the local hunters, the fruit season starts when the wild boars [Badan in the Kelabit language and Babui in Penan] migrate to the Kelabit Highlands. Even though there is no certain date for the wild boar migration, the local hunters differentiate the seasons by looking for Saled [Bua Salad]; this fruit tree is similar to a fig tree. During the fruit season, the Kelabit hunters prefer to hunt alone. However, the dry season leads hunters to follow more solo or individual hunting trips. The main reason for this is the better condition of roads that provide easier access to the jungle. Group hunting during fruit season is more preferred among the Kelabit hunters.

On the other hand, Penan hunters do not limit their options of hunting. They hunt as they wish. They grow up in the jungle and the jungle is considered as their home (Steiner, 2007; Manser, 1996; Lau, 1987). They enjoy solo hunting while walking into the jungle. Yet, nowadays they follow their contractors' advice which is also chosen by agreement as their Kelabit employers believe that the Penan are very professional hunters.

The main reason why Kelabit and Penan hunters prefer solo hunting, in general, is to seek for the desired (targeted) prey and enjoy the challenge and the fun of hunting during fruit season (Chapter 4, Table 4.3). Yet, during the dry season, the Kelabit hunters enjoy group hunting to get better chance to catch prey.

Using dogs during the dry season is because the leaves are dry, which makes jungle noisier than during fruit season. Thus, hunters prefer not to bring the dogs for hunting. However, bringing dogs along during fruit season (wet season) makes the process of hunting quicker as dogs are trained to smell specific prey and can run fast and catch the animals.

Group hunting usually occurs during some marked events such as Koman Pade Beruh (eating together to celebrate harvest), Bapat Pul, or changing name ceremonies (hunters # 7, 9, 15, 24, etc.). Palibut is hunting in a group that hunters try to round up the animal with the help of dogs, and then eat the bushmeat together. Kelabit practices their religious commands as Christians; they give 10% of the hunted animal share, Bapat Pul, to God; this share is to help those in their ministry work or their pay to serve. Nevertheless, the Penan hunters do not practice these events.

Furthermore, changing name ceremonies happen after the girls get married and the new baby is born (Bala, 2002); the married girl will be called by another name, and after having their first child, they are also given a new name; and, by the time they have their first grandchild, they are given another new name. All of these name-changing events are followed by ceremonies that are celebrated among the villagers. Usually, the hunters who are followed by other males in the village divided into two or three groups that each group consists of up to five or more people. They almost never come back empty-handed, so they stay in the jungle until they catch enough for the feast in their longhouses. The preferred animal is wild boar (Plate 5.6).

As Penan are not Christian or practicing the Kelabit culture, they are excluded from hunts for festivals and naming ceremonies. The Penan in the Bario region do not practice any occasional trips to have a feast and hunt for it; however, few of the Penan were observed attending church during a feast time. Unfortunately, recording the Penan hunting trips and following them into the jungle, seemed impossible as all of the interviewed Penan hunters were shy and obeyed what their employers instruct them to do.

Moreover, each trip during fruit season is divided into daytime (daily) or overnight (night-time) trips. The hunters have the knowledge of the animals' availability whereabouts during the season and during the day- or night times. Therefore, they hunt as much as they can carry; the frequency of hunting during fruit or animal season is more, as they return to rest during the following day, and go back in a day or two. But during the rest of the year, each trip lasts longer due to the scarce less availability of the animals. As a result, the hunters stay in the jungle until they catch enough animals for family consumption and/or partially fulfill the market demands. Hence, day or night-time (overnight) hunting trips have the inverse relationship with the frequency of hunting. The hunters prefer night-time hunting and spend

less time for hunting because animals are active and more accessible at night. Whereas, during the day, hunters have to spend more time as animals are less mobile and rest during the day.

One of the factors that affect hunting activities considerably among the hunters in the Kelabit Highlands is the mode of transportation. This factor attracts more outsider hunters toward the Highlands as well. As it is shown in Figure 4.3, the most preferred means of transport is the 4-wheel drive, 24%; in contrast, using the motorbike for hunting has just consisted of 6% of the total means of transportation. However, other options, such as car and walking into the jungle, boat, and solely walking into the jungle, are respectively the least preferred choices for the hunters in Bario region, particularly the Kelabit hunters. Additionally, there is another method which is hunting by car along the road. The Kelabit hunters describe their hunting trip by car as hunting while driving along the logging road. They either use their gun to hunt or spear and also bring their dogs along. This method of hunting is new among them, but they also complain about the hunters who are not Kelabit and coming from outside Bario region without informing them and they catch as much as they want or can. There is no accurate or precise calculation for this type of outsider hunters.

In contrast, the Penan hunters' first choice is solely walking into the jungle in order to enjoy the fun and challenges of nature while having sufficient time to hunt the desired species. Out of 56 interviewed hunters, 45 hunters (81%) combine these two type of trips because they are more convenient and efficient hunting trips. On the other hand, the hunters who are in the category of 40-49, prefer to follow the logging route in the Bario region to access to their hunting spots in an easier and faster way.

Unfortunately, the use of cars as the main means of transport in the highland and hunting areas, that has lateral implications on the number of the species; moreover, it influences the hunting techniques. For example, spending the shorter time to reach the starting point to walk into the jungle than before, allows the hunters to hunt continuously. On the other hand, the duration of the dry season is getting longer in Malaysian Borneo in general; therefore, hunters prefer to catch as much as they can during the shorter period of time. Namely, during the dry season, the access to some parts of the river is limited or become bounded; therefore, most of the time, hunters prefer to follow the reliable option which is using their vehicle or combining the modes of transport. The combination of means has the greatest preference among the

Kelabit Hunters at 28%. Hence, the frequency of hunting and number of catches are influenced by the seasons. The dry season leads to less hunting frequency and less catch; whereas, the fruit or wet season conducts more frequent hunting trips and more animals to be caught.

5.3.1 Hunted species

As mentioned earlier, hunting activities are classified into 'daytime' and 'night-time' hunting in the Bario region. Different species are hunted according to the different time of the day. The season of hunting influences the type of species hunt as well shows that all of the animals are caught during the whole year. However, some species are less available or more available in dry or wet seasons; for example, wild boar availability is totally influenced by the seasons.

In addition, according to Steiner (2007), Hancock et al. (2005), Bennet et al. (2000a), bearded pig (wild boar), sambar deer, barking deer and mouse deer are the main prey that Kelabit and Penan prefer the most. However, as Naranjo et al (2004) state that faster reproduction rates have the direct influence on the harvest rate. The wild boar has a gestation period of 114 days and can have 2 litters round a year (animaldiverity.org, 2015); Whereas, sambar deer has longer gestation period which is 259 ± 12 days. Similarly, Bennett et al. (2000) state that bearded pig is the most preferred species among Sarawak and Sabah in 2000 and consist of 72% of the animals killed in Sarawak. This is due to the fact that, this animal provides a large amount of meat in one catch for the Kelabit and Penan hunters as all parts of the animal is consumed. As mentioned above, the Kelabit hunters may catch some other species or may accidentally confront them in the jungle. As Table 4.6 shows, by far bearded pig and wild boar is the most hunted species by all of the Kelabit and Penan hunters round a year. Deer meat consumption is less due to the cause of gout by more consumption. However, interestingly, the demand for deer meat is high among the Muslim Kelabit families and homestays; as they believe the meat is Halal (Hunter #27).

As shown in Figure 4.10, the consumption of other species such as all type of birds, sambar deer, barking deer, monkeys, civet and wild cats is higher compared to Figure 4.9. This

classification is based on the species consumption during fruit season. Wild boar is rare during the dry season; therefore, it is substituted by chicken wings or sambar and mouse deer. Other species such as the gibbon, python, sun bear, and bearcat, etc. are on the list of species of animals hunted recorded during the interviews; most of these species are protected and they are not allowed to hunt them.

Additionally, Kelabit and Penan hunters are, concerned about bullets utilization. Purchasing bullets are not easy as the price for each bullet is RM15 which is very expensive particularly for Penan hunters. However, they may use borrowed guns from their Kelabit friends to hunt for them or share the hunt with them. The hunters usually get their bullets from the shop in the Bario town center.

According to the desired hunted species in Figures 4.9 and 4.10 and Table 4.7, most of the species recognized protected or totally protected under the Laws of Malaysia (Act 76) are being hunted; for example wild boar, sambar deer, barking deer, and more. All have the market value, regardless of their protected status. Additionally, most of the interviewed Kelabit hunters are aware of the regulations about these animals. The posters of Protected and Totally Protected animals of Sarawak are displayed at the Bario Airport and the town center. Yet, on the other hand, Penan hunters may not be aware of the status of wildlife in their area.

5.3.2 Bushmeat price

Bushmeat price varies in the Bario villages; however, in some cases, it increases to twice or three times outside Bario region compared to the net value in Bario. The Kelabit hunters claim that price list was arranged and fixed prices were offered because:

- 1) Initially, Penan had offered the highest price for their catch to Kelabit people; because previously it was assumed that Kelabit people cannot hunt as they are not skilled in the jungle as Penan.
- 2) Price for each bushmeat was offered differently in Kelabit villages; therefore, the Kelabit community had circulated the agreed price list and announced it at one of the most well-known eatery places in Bario (Joe's local eatery place. However, the copy of the price list was not found there when the researcher looked for it). Another

copy was kept at Bario high school in order to control the unstable situation. All the chiefs have copies as well.

Therefore, the Kelabit decided to have price lists to prevent any confusion among themselves. As a result, from January 2012 onwards all of the Bario region hunters were asked to follow the agreed price for their catch. The prices on the list are different from the real prices that are currently negotiated in the Bario market. Moreover, the value of the bushmeat for the consumers from outside Bario region is higher than the local value. The Hunters also add the cost of transportation to their offered price. However, the price for the outside consumers who come into Bario and request to purchase meat is the same price as for the local Kelabit community price in Bario region.

Based on conversations with some hunters, such as hunters #5, 11, 19, 27, 41, 45 & 53, it is claimed that the price list is not affected by the GST which has been implemented since April 2015. GST doesn't affect the price of bushmeat in Bario, the Kelabit Highlands because hunting is illegal. Therefore, the bushmeat is not registered for GST and the price is already high.

In addition, some of the species are not sold at the Saturday market and instead sold off fresh from the jungle. For example, hunters sell and trade sambar deer, civet cat, pangolin or flying squirrel which are protected or totally protected species to the local consumers and outside of Bario consumers. They know the market value of these species; therefore, they might deliberately hunt them to earn more cash to add to their income. For example, in some cases, the pangolin is sold to the local transporters. The skin (scale) of the smaller sized individuals cost about RM100/kg and the larger individual pangolin cost about RM300-400rm. In Miri, the pangolin is worth RM150/kg; whereas an entire live pangolin in Kuching has a value of RM1200, and RM600/kg near Kalimantan, Indonesia. In Bakalalan, pangolin scales cost RM90/kg and the entire living pangolin is RM120/kg (which the average weight is 15-16 kg that trades to Thailand).

The Penan hunters are not excluded from this aspect of commerce. As Hunters # 9 & 51 phrased, Penan hunters are the good hunters; they can hunt whatever they want or being asked for from the jungle as they know jungle very well. However, they also follow the Kelabit price list as there is a chance for them to have regular costumers among the Kelabit

community.

On the other hand, technology has made an appearance in the Bario region since 1998 following the setting up of the eBario Telecentre project (ebario.org, 2016). This technology has improved the communication network for the local Kelabit. Similarly, basic mobile phones are commonly found among the Penan, although they sometimes only use them for listening to radio and music or to improve their social status by being seen with them. It was observed that very few of Penan hunters [3 out of 10 interviewed hunters] can actually communicate through their mobile phone. However, the cell-phones have made the procedures of letting the other people in the community about the new catches easier.

5.4 Current sustainability of subsistence hunting

Utilization of protein sources from the jungle for food is inevitable in rural households as community incomes are low and village stores either do not have the meat available or only carry meat on an irregular basis. In Sarawak, Borneo, according to Bennett et al. (2000), 29% of all meals in the interior include bush meat, rising to 67% in the more remote locations. An unknown number of bearded pigs, sambar deer, mouse deer, and barking deer are harvested regularly for food. Other species such as leopard cat, porcupine, squirrels, snakes, monkeys and other species are harvested opportunistically (Hunters #40).

The commercialization of hunting is further fueled by Bario area residents who move away from their lands and live in the urban areas. They create an increasing market for traditional meats such as wild boar, deer, and other wildlife. Bushmeat of all types is sold openly from car trunks, in the outdoor market stalls, and within particular restaurants throughout Sarawak. Wild boar comprises nearly half of the total protein consumed by Sarawakians (Hancock et al., 2004). There is little up-to-date information regarding the number of animals being killed or the kilograms of wild meat leaving the Bario area and traveling outward to urban sites.

Hunting is a deeply intertwined part of Borneo culture. Yet, with the commercialization of traditional subsistence hunting, the main question arising among wildlife conservationists around Pulung Tau National Park, that hunting is still sustainable in Bario, the Kelabit Highlands, Malaysian Borneo, or not.

According to the World Wildlife Fund (WWF) organization, 1.6 billion people rely on forests, and 60 million indigenous people provide use forests for subsistence purposes (WWF.panda.org, 2015). WWF reports that illegal harvesting of wildlife, trading it through international networks and selling it as food, trophies, personal ornaments and traditional medicines is increasing. This rising flow of activity is "directly threatening the survival of many species", particularly protected and endangered wildlife (WWF, 2016 a&b).

The proportion of hunted species in Bario, the Kelabit Highlands, presents similarity to the proportion of animals hunted in Sabah and Sarawak in Bennett et al.'s (2000) research. However, Bennett and her colleagues illustrated that pigeons are hunted the most which followed by the bearded pig. Whereas, currently bearded pig (wild boar) is the most common animal hunted among the Kelabit and Penan hunters.

Additionally, as Laurence et al. (2006) mentioned, "road expansion" and related activities by timber companies increase the "pressure" of hunting activities and the surrounding environment. Tropical forests in the Highlands area have been heavily impacted by deforestation and road construction. This factor impacts the lives of those for whom forest is home. However, the logging roads have improved during the past five years in Bario region. This provides more chances to attract more recreational and commercial hunters to the Kelabit Highlands. This is not just limited to these two classification; even trafficking wildlife and illegal hunting increases throughout the area as one of the resourceful regions. The recreational hunters consist of the local Kelabit who lives in Bario villages and has other sources of income besides hunting. The number of hunters in this study who hunt just for the sake of fun and challenging part of hunting is 5 out of 56 interviewees; however, based on the interviews, almost all of the hunters in Bario region are recreational hunters as well. This is because they are satisfied by challenges of hunting and catching their favorite animals.

On the other hand, one of the reasons for the nonexistence of subsistence hunters in Bario region is that, unlike the past, now the hunters are not completely reliant on hunting. They have paddy cultivation, engaged in other businesses or employed in oil and gas companies besides being a hunter. They have easy access to the surrounding areas and can provide meat from other places. Moreover, there are unpredictable hunters who are not originally Kelabit or Penan and they are not domiciled in the Kelabit Highlands but they travel to Bario and surrounding to hunt. These hunters are considered as commercial hunters since they just hunt

to fulfill the market and demand in their own region.

Similarly, Bennett (2002) states that the hunting and consumption of bushmeat in tropical forests have increased massively, and the harvest of bushmeat was 23,500 tons in Sarawak in 2002. Wild meat is mostly consumed by locals Kelabit, those nearby or the consumers in urban areas (Milner-Gulland & Clayton, 2002). Furthermore, Milner-Gulland et al. (2003) emphasize on the wider view of wild meat on "economic and institutional context" of hunting within the households and global wildlife trading. In the Bario region and, the Kelabit Highlands, wild meat, particularly wild boar is the most preferred meat among the local households.

Based on the number of catches per trip during fruit and dry seasons, it is revealed that the high consumption of wild meat is leading to overhunting of certain species which may cause local expatriation of these species from particular regions. On the other hand, easier access to the forests through logging roads, deforestation, using more 'efficient modern hunting techniques' (as Bennett and Robinson discussed about), and minimizing the control on traditional hunting (i.e. frequently using guns due to easier access to bullets and less inconvenience) are problematic for commercialized hunting. If these issues are addressed, there would be a greater protection for biodiversity in the Kelabit Highlands.

The data from this study reveals that hunting about 2 or 3 wild boars per week during the fruit season and 2 or 3 mouse deer per week during dry season lead to overhunting of certain species which may cause local migration of these species from particular regions. Easier access to the forests through logging roads, deforestation, using easier more efficient hunting techniques, and minimizing the control on traditional hunting (i.e. frequently using guns because it is easier to find bullets and more convenient) cause issues for commercialized hunting as well. Moreover, overhunting is reducing populations of many game species as the easier reach of rural communities (Hunter #41, personal communication, 2014). However, most of the hunters (such as hunters #31, 42 & 51) believe that easy road access to deep jungle saves more time and it is more convenient. They state that instead of walking half day to reach the jungle and then start the hunting trip in the jungle, the current situation and condition of the road increases the number of hunters in Bario and eventually decreases the number of species in Bario and surrounding jungles. They also believe that today Bario residents largely rely on individual commercial hunters within their village to go out and kill

the game for them (Hunter #4).

Furthermore, the palm oil plantation in Malaysian Borneo, according to Fitzmaurice (2014) highly affects the wildlife, particularly mammals. According to Kelabit hunters, the logging roads from Miri to Bario, the Kelabit Highlands, is one of the main factors that decrease the number of animals to compare to the past as it eases the transport of wild meat through the roads from the Highlands. However, for the Penan hunters, the number is same, as they generally hunt for their own consumption.

5.5 Hunting Regulations

According to the Laws of Malaysia Act 716, Wildlife Conservation Act 2010, hunting protected species is illegal. The Penan hunters are considered as excluded from laws as they live in Bario region and believe that the forests belong to them. Therefore, they are completely unaware of hunting permit requirements. In general, they prefer to use their blowpipes and machetes. Nevertheless, they work for their Kelabit friends and use their guns to hunt for them so they can share the meat.

Moreover, as Bennet et al (2001) stated law enforcement and road control might be one of the applicable solutions for wildlife hunting in Bario and its region. Based on conversations with one of the well-known timber company reforestation manager, unfortunately, some of the employees in these companies participate in illegal hunting and trafficking of wildlife in Sarawak that the management might not be aware of or may ignore the fact. The employees set nets in the jungle to catch live pangolins due to the high demand in the market.

5.6 Traditional and modern hunting techniques and beliefs about species

The traditional hunting techniques are significantly influenced by the current hunting activities. The frequent use of guns and cars during hunting trips has changed the traditional techniques of hunting activities.

As Bennett et al. (2000) found, this study also concluded that hunting using firearms was the most common hunting method used by the Kelabit in the Kelabit Highlands compared to

guns with dog, dogs and spears, and guns with dogs and spears. Kelabit and Penan hunters usually have 2-3 dogs for their hunting trips (Plate 5.6).

Plate 5.6 The mother hunting dog is breast-feeding her puppies in Bario Asal, the Kelabit Highlands. A. Akbari. (2014)



In general, the hunters in the Kelabit Highlands, Borneo, Malaysia, have a variety of hunting techniques based on the time of day, the season, hunter safety and the general availability of the animals to hunt; therefore, studying the method of hunting, the ones obsolete and the current practice ones, is one of the focus of this study.

Hunters sometimes use dogs for hunting. The ordinary local dogs are particularly used for hunting certain species, such as bears, porcupines, wild boars, and different deer species (Figure 4.19). According to the interviewees, the dogs that have unparalleled nipples are considered as the appropriate one to be trained for particular species hunting (Hunter #54, 2014). Accordingly, hunting with a dog or dogs has its own benefits and can increase the efficiency of hunting experience for the hunters (Bogar, 2014). Conversely, as Bogar (2014) notes, one of the main disadvantages of hunting with dogs is the time-consuming, complex training procedure needed to prepare them to be useful.

5.6.1 Preservation and preparation of bushmeat

Most of the hunters in the Kelabit Highlands still preserve their meat by following traditional methods. The micro-hydro project in Bario Asal is an avenue to the chance of having two to

three hours of power each day for villages in Bario. However, since December 2015, all the villages have 24 hours of power in their longhouses or houses; and it is assumed that small refrigerators are steadily replacing traditional preservation methods. Therefore, the preservation of bushmeat is highly influenced by this factor. Few hunters preserve their meat by Kasam (salting), Irit, Lisem, and Sanamo Laam (Figure 4.14). However, smoking the bushmeat, Ngarar the Kelabit word, is the most used method among the hunters. Freezing is the second option, but probably will be the first choice among the hunters as they think, in general. Moreover, the new opportunity of accessing longer to electricity leads the hunters to use their freezer to keep their meat.

The Penan hunters often smoke their meat in the jungle to easier bring the catch for sale at the town center. This choice makes the catch lighter as the internal organs are consumed for the hunters traveling meal and the meat blood dried up for better and cleaner option to bring it back.

This researcher predicts that in future the methods of preserving bushmeat will be influenced by the current availability of electricity power day in day out. Nevertheless, to what extent the traditional ways of preserving meat will still be practiced in the foreseeable future; is unknown and is dependent on, the local community's access to electricity for 24 hours; and, how this situation will affect the Penan's life in Bario. Because the Penan hunters still live with the minority of living facilities and they have no access to electricity; therefore, they still smoke their catch either in the jungle or for their personal consumption. In general, there are the questions that need to be answered in the near future.

In this study, very few, but common food preparation of bushmeat is observed. The Penan and Kelabit hunters prepare the internal organs of animals such as wild boar, sambar deer, mouse deer, etc. with soya sauce, which is called Kechap [kɛtʃʰɔp]; they believe that the best part of the animals' body is the internal organs. Therefore, they cut the organs into pieces and fry it with black soya sauce. This method is the most desired method of preparing food in the jungle as hunters' meals or at the household for the family consumption and/or the village feast. The meat part is boiled and prepared as curry or soup; in Plate 5.7, a civet cat boils and serves as soup.

Plate 5.7 Boiling civet cat is served with Bario rice, Kampung Baru. A. Akbari (2015)



5.7 Conclusions

In conclusion, the hunting activities in Bario, the Kelabit Highlands, in Malaysian Borneo lead to be unsustainable. Overhunting during the fruit season, trading the high demanded species, such as wild boar, and some "totally protected" or 'protected" species such as pangolin are the factors that provided more pressure on hunting activities in the studied area.

Additionally, the easier road access to the jungle, at the meanwhile, and cutting of more trees by the timber companies, are significantly influencing the wildlife in the Kelabit Highlands and particularly in Bario villages. Unfortunately, the local communities are not completely aware of the economic value of the species in their environment. Hence, they might embrace the activities that will offer profits, and bring more environmental issues..

This study provides recent data regarding the current state of subsistence hunting activities in the Bario region, the Kelabit Highlands. Therefore, to assist in the better understanding and determination of sustainability of hunting among the Kelabit and Penan communities in Bario, five Objectives were aimed to be achieved. Hence, as Robinson and Bennett (2000) mentioned, a management program that is based on community involvement, might lead to the sustainable hunting. The scientific knowledge of wildlife and openly introducing wildlife issues (Bennett et al., 2002) may draw the attention toward this issue. Nowadays in Bario,

there is a community rule to protect the villages' right and better control over the wildlife in the area. But unfortunately, Kelabit hunters emphasise that outside hunters cause more risk to their community by their random and uninformed presence for hunting in Bario region. The frequent random and commercial hunting activities have to be considered more serious to compared to the past ,as this may lead to provide more control on the local and non-local hunting activities and conservation of regional biodiversity and livelihoods.

5.8 Future work

Further investigation should be conducted on the poaching patterns in Sarawak, the impact of international hunting trips on wildlife, and the scope of this emerging new form of hunting. Furthermore, the links between Indonesia and the Highlands for the transport of bushmeat and animal parts between the countries need to be investigated.

Future studies should include the percentage of illegal meat products transported via air and transporters and via easier access to the jungle. Moreover, the climate changes and recently the haze from Indonesia impact the Borneo wildlife, fauna and flora. However, the longer duration of the dry season and the haze in the surroundings influence on the large area of rainforest within the land of Indonesia, as well as Malaysian Borneo is needed to be studied. Additionally, the direct or indirect effects of haze on the species loss or migration are needed to be investigated. Additionally, the future works also include the impact(s) of the Kelabit School and modern culture on children and their desire to go hunting or eat bushmeat.

Furthermore, the suggested solutions that are explained in detail above in this chapter might change the current uncontrolled and unsustainable status of wildlife conservation. Therefore, application of laws and regulations on the logging roads within Sarawak, precisely the Kelabit Highlands needs to be studied in the area.

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APPENDICIES

Appendix 1. Description of villages involved in the study

Arur Dalan (Kubaan & Pa'Tik): Located at the foothills of the Tama Abu range. The area is been divided into two parts - Kubaan and Pa'Tik. Arur Dalan is about two km from Bario Asal. There are two longhouses in the area. The longhouse in Arur Dalan Kubaan has 7 doors and the one in Arur Dalan Pa'Tik has 4 doors.

Arur Layun: There is a very small longhouse in Arur Layun behind the church where the people who were moved from Pa'Bangar and Pa'Lungan now live, the longhouse has only seven doors (www.kelabit.com, 2014). The elevation in this village is 862 m (2,828 ft.) (googlemap.com).

Bario Asal: Bario Asal is about 20-30 minutes walking distance from Bario's town center and about 10 minutes drive from Bario Airport. The original longhouse in Bario Asal was built in 1963 (www.kelabit.net, 2014).

Pa'Dalih: In the Kelabit language "Pa" means "water" or "river". This village is about one hour drive from Bario's town center and about ten hours walking distance. This village is near Long Dano. The village is about 3000 feet above sea, with a longitude of 115.5500° and a latitude of 3.5500°.

Pa'Derung: Pa'Derung is about an hour walk from Bario Asal. The people from Kubaan and Long Lelong are the most recent residents of this village (www.kelabit.net, 2014).

Pa'Lungan: Having a longitude of 115.5333° and latitude of 3.8000° (googlemap.com), this village is one of the desired spot of hunting for hunters from all the villages in the Kelabit Highlands. It is about half an hour boat-riding [sailing] from Pa'Ukat river and then about 15-20 minutes trekking in the jungle, whereas the distance from Bario town is about 4 hours trekking.

Pa'Mada: It is about 1 hour four-wheel drive from Bario's town center.

Pa'Ramapuh (Atas & Bawah or Pa'Ramapuh Upper & Lower): There are two side-by-

side longhouses in Pa’Ramapuh. There is a small stream along these longhouses that ends at the Primary school. The residents of these longhouses are originally from Pa’Main (where the people from this part of the forest are known as Ulong Palang) and Pa’Umor (www.kelabit.net, 2014).

Pa’Ramudu: This village is about ten hours from Bario’s town center and one hour from Pa’Dalih; it is about 823m (2700 ft.) above sea level (www.kelabit.net, 2014).

Pa’Ukat: Pa’Ukat is about one hour walking distance from the Bario Airport and about 10 minutes driving distance from Bario’s town center. Pa’Ukat was built in 1970s as the Kelabit from Pa’Umor and Pa’Lungan moved into this area. The longhouse located in Pa’Ukat has 10 doors.

Pa’Umor: This village is located in the east part of Dabpur river. This village is inhabited by Kelabit from a longhouse of the same name once located on the hills adjoining Kalimantan(www.kelabit.net 2014). It is about 10 minute drive from the Bario Airport and about one hour walking distance on the asphalt road from the town center.

Pasir Puteh (Padang Pasir & Kampung Baru): “New longhouses have built since 1963” (www.kelabit.net, 2014). Previously, Pasir Puteh had two parts, Padang Pasir and Kampung Baru which is one the way to the Bario Airport. The Forestry Department office is located near Kampung Baru. Most of the residents in these villages are from Pa’Ramudu, Pa’Dalih and Long Dano (www.kelabit.net, 2014).

Ulung Palang (Atas & Bawah or Upper & Lower): The residents of Ulung Palang Atas are originally from Pa’Main area; whereas the residents in Ulung Palang Bawah are from Pa’Mada near Long Dano (www.kelabit.net, 2014). It is about 20-30 minute walk from Ulung Palang to Bario’s town center.

Galangayung: The Penan settlement is on the outskirts of Arur Dalam Pa’Tik and Arur Dalam Kuba’an hills. It takes about 10 minutes smooth hiking to reach the first part of the three-parted Penan settlement. The accommodation of this community has low standard with very limited facilities.

Appendix 2. Field Note (Sample)

Date	6 th August 2014,
Time	6:55pm
Place	Bario, Kelabit Highlands
Description	<p>12:20pm, I arrived Bario from Marudi Airport; I met Lian and Dayang at the airport; Mrs Dayang Nalin dropped me in her house in the Aurur Dalan Kuba'an longhouse.</p> <p>1:30pm: I had a talk with Dayang about the whole project, aims and objectives.</p> <p>2:30pm: We headed to town center to meet my translator. Lian Tarawe.</p> <p>2:30-5:15pm: Lian and I arranged the whole studied places, their distances, their locations, the relevant costs and arrangement. And most importantly we had got through all the questions one by one.</p> <p>At the meanwhile, I met some of the hunters who are active and also owning shops at Bario town center.</p> <p>7:30pm: Invited to the Mustafa lodge, where the owner (Mustafa) invited us for dinner.</p>
Analysis	<p>The possibility of confronting the hunters from other villages in the tomorrow's plan is high.</p> <p>I suggested to Lian is to try to memorize the questions or just translate the questions I want him to ask rather than showing them the questionnaires, because starting conversation with them and during the conversation asking all those questionnaires can help us to get our answers easier and the possibility of getting right and true answers will be high due to the friendly atmosphere.</p> <p>It will be very interesting to sit and talk to the hunters who own shops in Bario town center.</p> <p>I have noticed that one of the owners of the shop who is apparently an active hunter, was wearing the RayBan sunglasses which were original and his outfit was brands like Adidas and Nike.</p>
Tomorrow's plan	<p>We are hopeful to find the hunters from Pa'Derong in our first day investigation and interview.</p> <p>Walk to Arur Dalan Kubaan and Arur Dalan Pa'Tik about 4pm, to meet some Penan after their daily work.</p> <p>مشاهده رفتار "پننها" و اینکه چگونه در فعالیتهای شکار همکاری میکنند، برنامه مشاهده فردا خواهد بود.</p>

K.H. = The Kelabit Highlands; B.T.C.= Bario Town Center; A.D.K

Appendix 3. Information sheet



A study of hunting activities in the Bario region of the Kelabit Highlands, Borneo

I am a social science researcher from Curtin University Malaysia to investigate hunter activities in the Bario region.

The aim of this study is to determine the number of hunters in the Bario region and learn about their hunting activities. It will lay the ground work in determining if a hunter self-monitoring programme is feasible here in Bario at some point in the future.

I would like to ask you to **please take the time to complete the attached questionnaire thoughtfully**. The information you provide cannot be traced to you. There is no identifiable information asked – it is completely anonymous. After completing the survey, please place it in the envelope and return it to your village contact person, _____.

You participation is completely voluntary. The questionnaire will take about 1 hour to complete.

My ethics clearance number for this project is _____. If you have any questions regarding this project, please contact

Ms. Akram Akbari.

Curtin Sarawak Research Institute
Curtin University Malaysia
Tel: +60 85443939 ext 5039
Email: akram.akbari@postgard.curtin.edu.my

Thank you in advance for taking the time to complete this survey!

Appendix 4. Consent form

(This form will be orally translated to Penan to assure informed consent)



“A study of Commercialization of traditional subsistence hunting activities in the Bario region of the Kelabit Highlands, Borneo” Consent Form

I am Ms. Akram Akbari, a Master of Philosophy student in Cultural anthropology and Ethnography at **Curtin University Malaysia in Miri, Sarawak, Borneo**, investigating the cultural tourism for the Penan community in Bario in the Kelabit Highlands. To do this research I need your help. I would like to ask you some questions about your makeshift house, your lifestyle, your daily activities and your opinions about hunting activities in Bario. Your interview is **voluntar** and **completely confidential**. The ethics clearance number for this project is **NCCD.907.4.4[JLD.10]-223**.

Our talk or interview will take about **1 hour or more** to complete.

What I am trying to learn in my study are:

- 1) to document the contemporary hunting activities of resident and non-resident hunters in the Kelabit Highlands region;
- 2) to document which species are hunted for commercial purposes and study how bushmeat prices are determined for each species;
- 3) to identify the general economic and commercial pressures on hunting activities and to assess their overall impact;
- 4) to determine the proportion of the hunters who hold hunting permits and the proportion who hold gun permits; and,
- 5) to help the Kelabit and Government agencies make more informed decisions about wildlife hunting in the Kelabit Highlands by synthesizing the information into a new management framework.

Your participation in my study would be very greatly appreciated.

“I, _____, have been informed of and understood the purpose of the study. I understand I can withdraw at any time without prejudice. Any information which might potentially identify me will not be used in published material.”

“I agree to participate in the study as outlined to me.”

Name: _____

Date: _____

Signature: _____

Witnessed by: _____

Signature/Date: _____

Thank you so much for being willing to participate in my study.

Ms. Akram Akbari
Curtin University Malaysia

Appendix 5. Protected and totally protected wildlife in Sarawak.



PROTECTED WILDLIFE OF SARAWAK HAIWAN TERLINDUNG DI SARAWAK

Don't hunt, kill, keep, sell or eat without licence from Controller of Wild Life Sarawak
Tidak dibenarkan memburu, membunuh, menyimpan, menjual atau makan tanpa lesen daripada Kottroller
Hidupan Liar Sarawak

Penalty:
Imprisonment for 1 year and fine RM10,000
Hukuman:
Denda RM10,000 dan dipenjara 1 tahun



All primates
Semua primat: kera; beruk
Nyumboh (lhas)



Porcupines
All species of Hystricidae
Landak



Bear cat
Binturung



Raja Brooke's birdwing



Sun bear
Beruang



Pangolin
Tenggiling



All flying squirrels
All species of Petauristinae
Tupai terbang



All bats
Kelawar



All otters
All species of Lutra and Aonyx
Semua memering



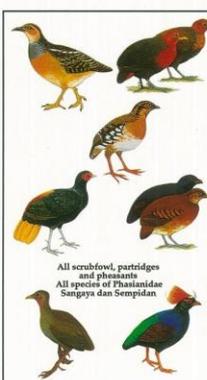
All treeshrews
All species of Tupaiidae
Semua jenis tupai kecil /
tupai muncung



All civets
All species of Viverridae
Musang



Flying lemur / cotugo
Kubung



All scrubfow, partridges
and pheasants
All species of Phasianidae
Sangaya dan Sempidan



Nisobar pigeon
Pergam



Osprey
Lang menaul



All owls
Semua burung hantu



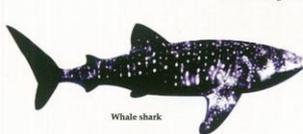
All mungoses
All species of Viverridae
Musang



All wild cats
Kucing hutan



Metallic pigeon
Pergam



Whale shark



Asian paradise fly-catcher
Burung sambar ekor panjang



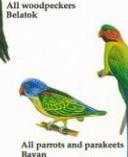
All woodpeckers
Belatok



Arowana (dragonfish)
All species of Osteoglossidae
Semua jenis ikan seruk; ikan siluk



All sea horses
Semua kuda laut



All parrots and parakeets
Bayan



All herons, egrets & bitterns



All hard and soft corals
Semua batu karang



Christmas frigatebird



All falcons
Rajawali; menas



Estuarine crocodile
Buaya katak



Burmese brown tortoise and
All soft-shelled turtles
Kura-kura / Banting / Labi labi



Crackle or hill myna
Burung tiang



False gharial
Buaya pejuang



All kingfishers
Semua pekaka



All monitor lizards
Semua biawak



All swiftlets
Burung layang-layang



All waders
Semua kedidi dan camar



White-rumped shama



All pythons
Semua ular sawa



King cobra
Ular tedang

For inquiry or report of any offence and further clarification, please contact:
SARAWAK FORESTRY CORPORATION



TOTALLY PROTECTED WILDLIFE OF SARAWAK

HAIWAN TERLINDUNG SEPENUHNYA DI SARAWAK

Don't hunt, kill, keep, sell or eat
Tidak dibenarkan memburu, membunuh, menyimpan, menjual atau makan

Penalty:
Maximum fine of RM50,000 and 5 years jail
Hukuman:
Denda maksima RM50,000 dan 5 tahun penjara



Orang-utan
Mawas, malas (Iban)



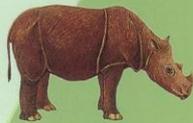
Proboscis monkey
Orang belanda, zsaong (Iban)



All langurs
Lolong, Besangad,
Puan, Penetat,
Jelu merah (Iban)



All hornbills
Semua enggang



Rhinoceros
Badak



Bornean gibbon
Wak-wak, empellau (Iban)



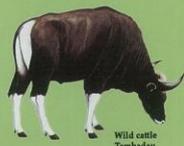
Naked bat
Kelawar



Bulwer's pheasant
Bekia



White-bellied fish eagle
Lang laut



Wild cattle
Tembadau



Giant squirrel
Tupai kerawak



Argus pheasant
Ruai



Grey-headed fish eagle
Lang laut



Oriental darter



Western tarsier
Kera haatu, ingkat (Iban)



Slow loris
Ukang, benggang (Iban)



Tufted ground squirrel
Tupai



Bornean peacock pheasant
Ruai



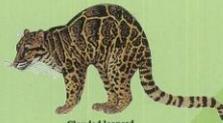
Bornean bristlehead



Silver (grey) wood pigeon
Pergam



Bay cat
Kucing merah



Clouded leopard
Rimau dahan, engkuli (Iban)



Lesser adjutant stork
Bangu botak



Storm's stork
Bangu



Green Imperial Pigeon
Pergam



All pittas
Semua burung pacat



Marbled cat
Kucing dahan



Flat-headed cat
Kucing hutan



Black-naped tern
Burung laut



Cattle egret
Burung apuh, burung
lima ringgit



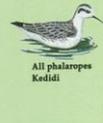
All imperial pigeons
Kawa



Straw-headed bulbul
Barau-barau



Bridled / brown-winged tern
Burung laut, entala putih (Iban)



All phalaropes
Kedidi



Pacific reef egret
Ujah laut



All whales, dolphins and porpoises
All species of Cetacea
Paus, lumba-lumba



Dugong
Dugong, duyong



All marine turtles
All species of Cheloniidae &
Dermochelyidae
Semua penyu-penyu laut



Painted terrapin
Beluku



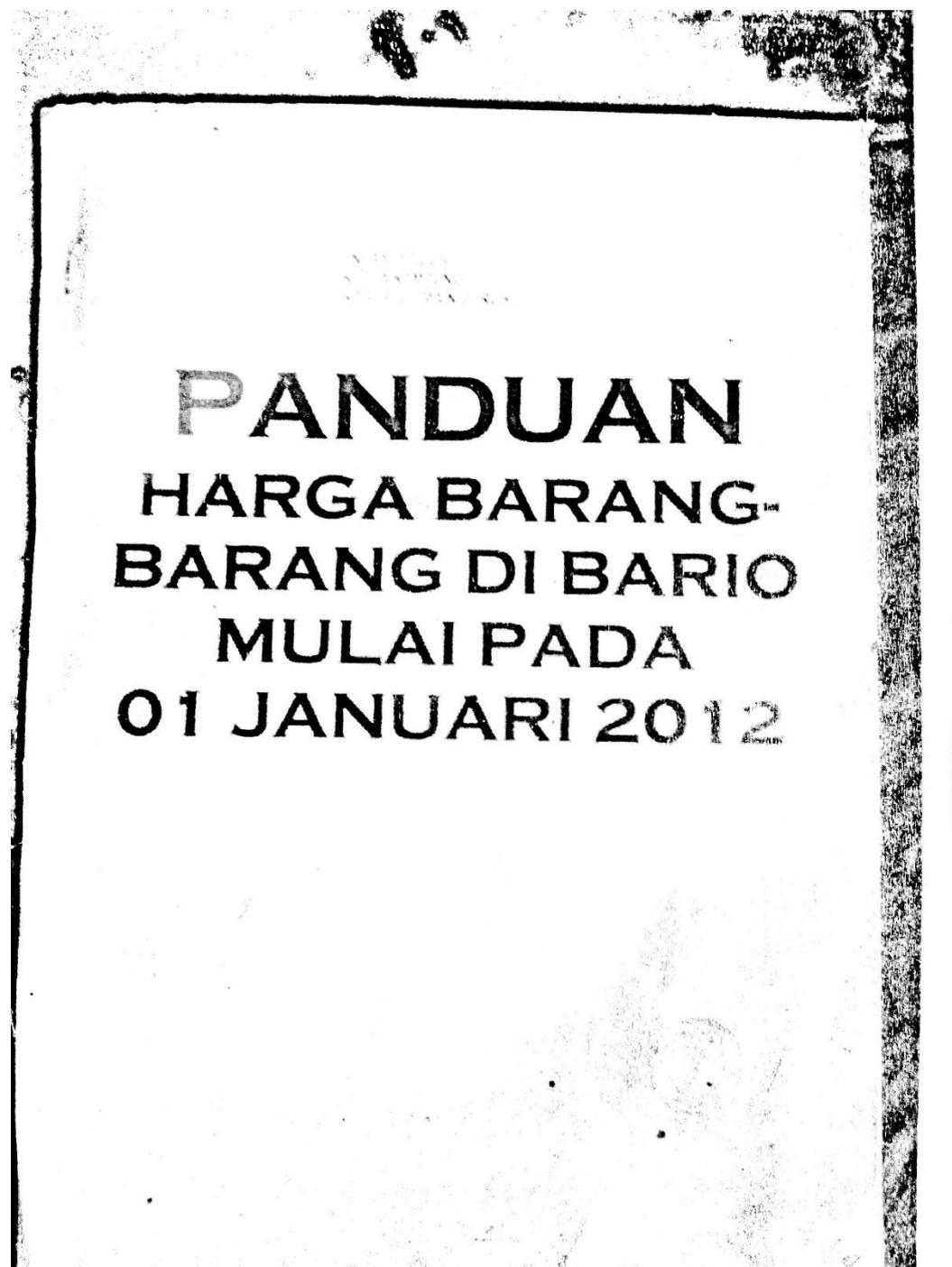
Earless monitor lizard
Ciaik purba



Terrapin
Beluku



Niah cave gecko
Ciaik Cua Niah



B.	DAGING DAN BINĀTANG (MEAT AND LIVE ANIMALS) :		
1.	Daging Babi Hutan (Wildboar meat)	1 Kg.	RM8.00
2.	Daging Babi Kampung / Breed / Cina	1 Kg.	RM15.00
3.	Daging Kerbau	1 Kg.	RM8.00
4.	Daging Lembu	1 Kg.	RM8.00
5.	Daging Rusa (deer)	1 Kg.	RM8.00
6.	Daging Kijang (Antelope)	1 Kg.	RM8.00
7.	Pelanduk	1 Kg.	RM8.00
8.	Musang:-		
	(i): Badan	1 Kg.	RM6.00
	(ii): Rabuwan / Palang Alud etc.	1 Kg.	RM6.00
	(iii): Payuh (Tenturun)	1 Kg.	RM6.00
	(iv): Kuyad	1 Kg.	RM6.00
9.	Tedayo / Kabuk	1 Kg.	RM5.00
10.	Ameh (goat)	1 Kg.	RM7.00
11.	Daging Kambing Beri-Beri (Sheep)	1 Kg.	RM8.00
12.	Kambing Beri-Beri Hidup (Alive)	1 Kg.	RM10.00
13.	Ayam Kampung	1 Kg.	RM18.00
14.	Ayam 'Current'	1 Kg.	RM18.00
15.	Itek:-		
	(i): Bibek (Ordinary Duck)	1 Kg.	RM15.00
	(ii): Manila	1 Kg.	RM15.00
	(iii): Angsa (Goose, Swan)	1 Kg.	RM15.00
16.	Python Meat	1 Kg.	RM5.00
17.	Terutong (Landak)	1 Kg.	RM5.00
18.	Beladan:-		
	(i): Daging saja	1 Kg.	RM3.00
	(ii): Beladan Hidup	1 Kg.	RM2.00
19.	A'ae (Edible frog)	1 Kg.	RM6.00
20.	Kelawa (Pawat)	1 Kg.	RM5.00
21.	Manuk Long (Jungle fowl)	1 Kg.	RM5.00
22.	Burong yang lain:-		
	(i): Kukur, Mato, Limon or any wild pigeon.	1 Kg.	RM5.00
	(ii): Others:- (not listed)	1 Kg.	RM2.00
23.	Anak Babi Hidup berumur 5 bulan	1 Ekor	RM120.00 seekor

23.	Labo Narar (Smoke Meat):- (i): Babi Hutan	1 Kg.	RM10.00
	(ii): Payo (Rusa) & Kijang (Antelope)	1 Kg.	RM9.00
24.	Telor:- (i): Ayam Kampung & 'Current'	1 Biji	0.70 sen
	(ii): Bibek & Manila	1 Biji	0.80 sen
	(iii): Angsa / Swan	1 Biji	0.90 sen
C.	BUAH-BUAHAN (FRUITS): 		
1.	Oranges:- (i): Sunkiss (Buyo Duru')	1 Kg.	RM2.00
	(ii): Mandrin Oranges (Buyo Lipi)	1 Kg.	RM3.00
	(iii): Lemon (Buyo Pade)	1 Kg.	RM2.00
	(iv): Buyo Laam (Big & very sour)	1 Kg.	RM1.50
	(v): Buyo Dari (small & sour)	1 Kg.	RM4.00
2.	Pamelo (Buyo Tuwan)	1 Kg.	RM2.20
3.	Pisang (semua jenis pisang)	1 Kg.	RM2.00
4.	Buah Kiran (sudah masak):- (i): Big size	1 Kg.	RM3.00
	(ii): Small size	1 Kg.	RM2.00
5.	Bread Fruit (Buah Sukun) :- (i): Big size	1 Kg.	RM3.00
	(ii): Small size	1 Kg.	RM2.00
6.	Buah Datuh (Durian):- (i): Big size	1 Kg.	RM8.00
	(ii): Small size	1 Kg.	RM5.00
	(iii): Others (Madalah :- purple , red, yellow flesh etc).	1 Kg.	RM2.00
7.	Buah Datuh Alo	1 Kg.	RM2.00
8.	Buah Puwak	1 Kg.	RM1.00
9.	Buah Pangin:- (i): Big size	1 Biji	RM1.50
	(ii): Small size	1 Biji	RM1.00

D.	IKAN (FISH):		
1.	Ikan Semah :- (i): Jika berat seekor Ikan MELEBIHI 1 KG atau BERATNYA 1 KG. (ii): Berat seekor KURANG 1 KG.	Lebih 1 Kg. Kurang 1 Kg.	RM18.00 RM15.00
2.	Ikan Baung:- (Seniyen, Duder, Tuding, Dalo)	1 Kg.	RM10.00
3.	Ikan Kelad, Buwing, Kulab, Ayah	1 Kg.	RM10.00
4.	Ikan Talapia (Merah & Amazon), Toni, Pait, Lawang Beruh, Udu, Lapini :- (i): Jika berat seekor Ikan MELEBIHI 1 KG atau BERATNYA 1 KG. (ii): Berat seekor KURANG 1 KG.	Lebih 1 Kg. Kurang 1 Kg.	RM18.00 RM15.00
5.	Ikan Selutan	1 Kg.	RM18.00
6.	Ikan Lampan Jawa	1 Kg.	RM17.00
7.	Ikan Patin	1 Kg.	RM17.00
8.	Ikan Chow Hu & Lian Ho	1 Kg.	RM18.00
9.	Ikan Lee Koh (Red & White variety)	1 Kg.	RM17.00
10.	Ikan Kusuma	1 Kg.	RM18.00
11.	Stream Crabs	1 Kg.	RM10.00
12.	Udang (diternak dlm. Kolam)	1 Kg.	RM10.00
13.	Beladan :- (i): Soft Skin (ii): Hard Skin (Bigger type)	1 Kg. 1 Kg.	RM5.00 RM3.00
14.	Luwang Narar (Smoked Fish):- (i): Ikan Semah (ii): Kelad, Buwing, Ayah, Kulab. (iii): Luwang Selutan, Lampan Jawa, Ikan Patin, Lee Koh, Chow Ho, Lian Ho, Talapia Merah. (iv): Ikan Sawah:- Toni, Pait, Luwang Beruh, Udu, Lapini (v): Seniyen, Duder, Tuding, Dalo	1 Kg. 1 Kg. 1 Kg. 1 Kg. 1 Kg.	RM20.00 RM15.00 RM16.00 RM14.00 RM12.00

D.	IKAN (FISH):		
1.	Ikan Semah :- (i): Jika berat seekor Ikan MELEBIHI 1 KG atau BERATNYA 1 KG. (ii): Berat seekor KURANG 1 KG.	Lebih 1 Kg Kurang 1 Kg.	RM18.00 RM15.00
2.	Ikan Baung:- (Seniyen, Duder, Tuding, Dalo)	1 Kg.	RM10.00
3.	Ikan Kelad, Buwing, Kulab, Ayah	1 Kg.	RM10.00
4.	Ikan Talapia (Merah & Amazon), Toni, Pait, Luwang Beruh, Uduh, Lapini :- (i): Jika berat seekor Ikan MELEBIHI 1 KG atau BERATNYA 1 KG. (ii): Berat seekor KURANG 1 KG.	Lebih 1 Kg. Kurang 1 Kg.	RM18.00 RM15.00
5.	Ikan Selutan	1 Kg.	RM18.00
6.	Ikan Lampan Jawa	1 Kg.	RM17.00
7.	Ikan Patin	1 Kg.	RM17.00
8.	Ikan Chow Hu & Lian Ho	1 Kg.	RM18.00
9.	Ikan Lee Koh (Red & White variety)	1 Kg.	RM17.00
10.	Ikan Kusuma	1 Kg.	RM18.00
11.	Stream Crabs	1 Kg.	RM10.00
12.	Udang (diternak dlm. Kolam)	1 Kg.	RM10.00
13.	Beladan :- (i): Soft Skin (ii): Hard Skin (Bigger type)	1 Kg. 1 Kg.	RM5.00 RM3.00
14.	Luwang Narar (Smoked Fish):- (i): Ikan Semah (ii): Kelad, Buwing, Ayah, Kulab. (iii): Luwang Selutan, Lampan Jawa, Ikan Patin, Lee Koh, Chow Ho, Lian Ho, Talapia Merah. (iv): Ikan Sawah:- Toni, Pait, Luwang Beruh, Uduh, Lapini (v): Seniyen, Duder, Tuding, Dalo	1 Kg. 1 Kg. 1 Kg. 1 Kg. 1 Kg.	RM20.00 RM15.00 RM16.00 RM14.00 RM12.00

Appendix 7. Carry-arm license (Sample)

7
REKOD SENJATA YANG DIBELI ATAU
DIBERIKAN, DAN DIBAWA KELOMPOK
RECORD OF SALE OR TRANSFER OR
DISTRIBUTION OR EXPORT OF ARM

Tarikh Date	Apa atau kepada Senjata itu Method of Disposal	Keterangan pembelian atau kepada siapa atau sumber senj Reference to License No. or to correspondence no.	Tandatangan dan Cop Pejabat Pegawai Lesen Signature and Office Stamp of Licensing Officer

LESSEN MEMILIKI SENJATA DAN
PELURU
LICENCE TO POSSESS ARMS
AND AMMUNITION

No. Lesen
(License No.) MDA/1336

No 074082

AKTA SENJATA, 1960 - Seksyen 4(3)
ARMS ACT, 1960 - Section 4(3)

LESSEN MEMILIKI SENJATA DAN PELURU
LICENCE TO POSSESS ARMS AND
AMMUNITION

Orang-orang yang mempunyai Lesen ini
adalah dibenarkan memiliki, menyimpan atau
mengawal dan menggunakan senjata atau senjata-
senjata, perihalnya yang dinyatakan pada muka 4 dan
5 dan peluru, perihalnya yang dinyatakan pada muka
8-13, sehingga 30 hari bulan Jun, satu tarikh berikut
selepas Lesen ini diberi atau dibaharu.

The holder of this Licence is hereby autho-
rized to have in his possession, custody or control and
to use the arm or arms, the particulars of which are
given on pages 4 and 5 and the ammunition, the
particulars of which are given on pages 8-13, until the
30th June next following the date on which this Licence
is issued or renewed.

Nama Pemilik
(Full Name)

Nombor Kad
(NRIC No.) (Baru) (Lama)

Alamat Pemilik
(Full Address) 12, Pasir
Damas, Ulu Baram

Tarikh dikeluarkan
(Date of Issue) 11 Ogos 2010

Nombor Resit
(Receipt No.) (Copy)

Daerah
(District)

Bitangan dalam Da
Lesen-lesen Senjata
Daerah
(District Arms Licence Receipt Serial No.)

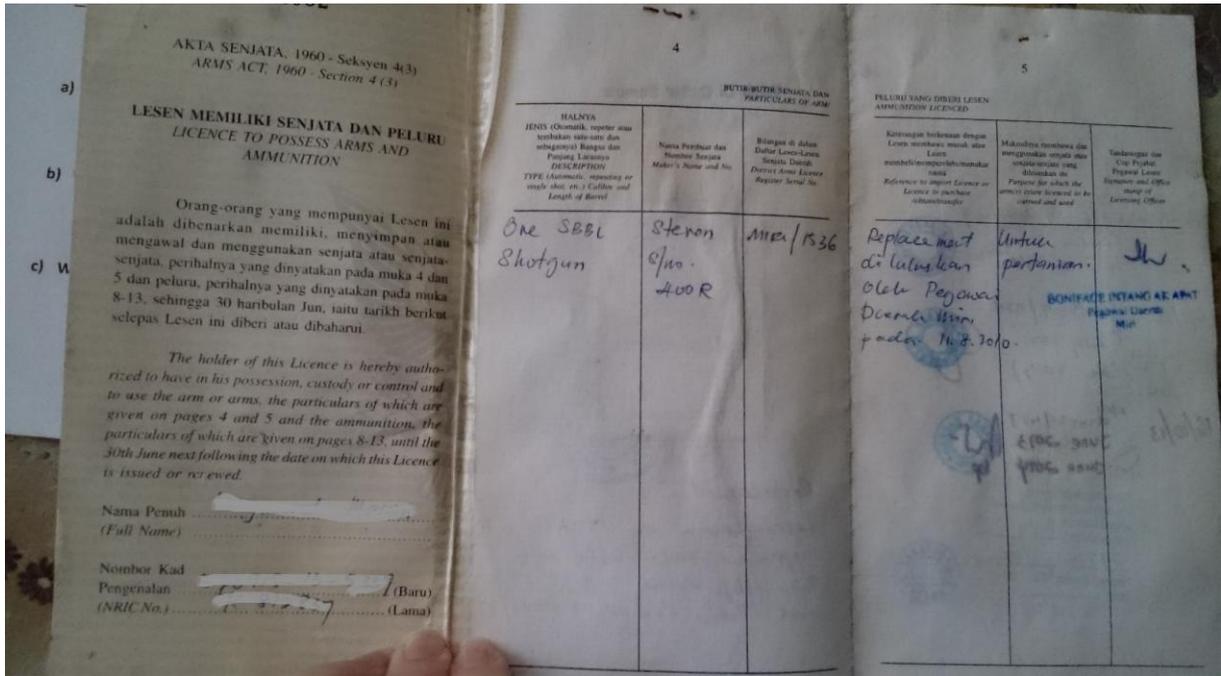
Tarikh
(Date)

Nama, Tandatangan dan Cop Pejabat Pegawai Lesen
(Name, Signature and Office Stamp of the
Licensing Officer)

PERINGATAN
SEGALA PERMOHONAN PERMIT
UNTUK MEMBELI PELURU SENAPANG
PATAH TIDAK AKAN DILAYAN JIKA
TIDAK MEMBAWA KELOMPOK
KOSONG MULAI 01 SEPT 2010

ARAHAN : PEGAWAI DAERAH MIRI

Replacement:
Lesen lama no. 4523 (mei)
approval note letter ref.
DO-4/4/1 dated 7.11.1997
mel Police Report no 9425/97

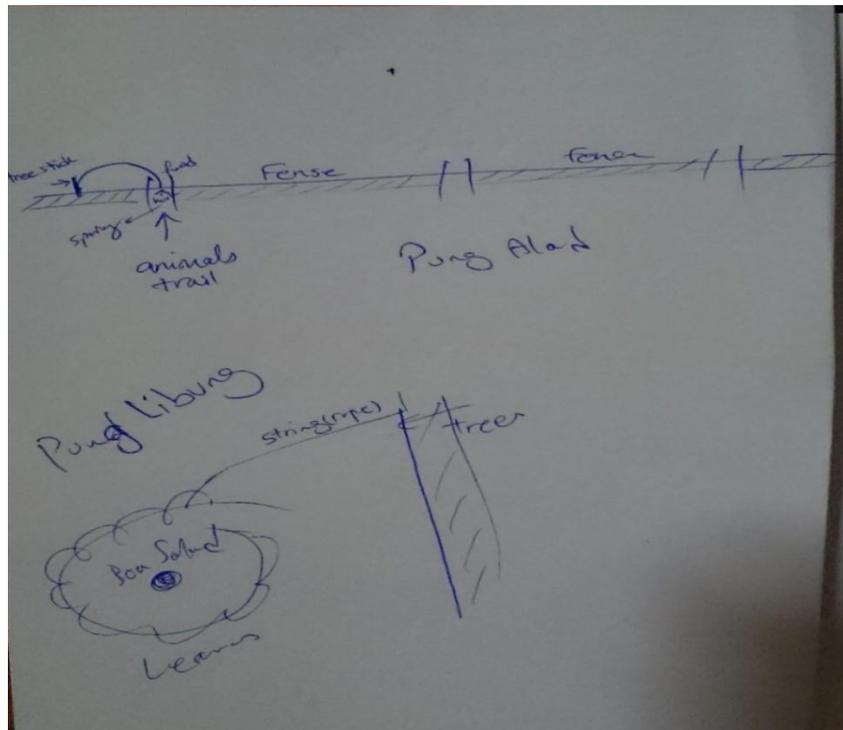


SYARAT-SYARAT - Seksyen 4 (3)
CONDITIONS - Section 4 (3)

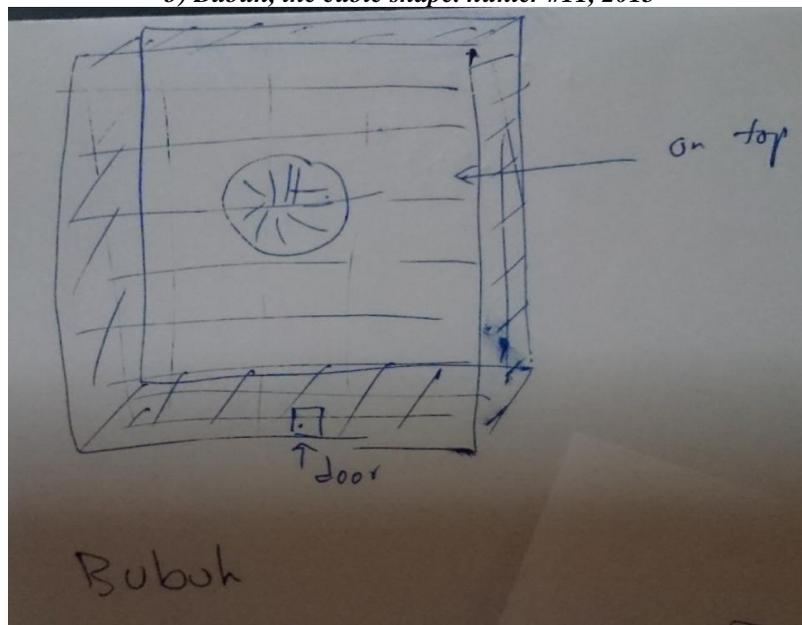
1. Lesen ini boleh dibatalkan;
This licence is liable to be cancelled:
 - (a) Jika tujuan ia dikeluarkan pada mula-mulanya tidak ada lagi;
If the purpose for which it was originally issued ceases to exist;
 - (b) Jika senjata yang telah dilesenkan itu didapati digunakan lain daripada tujuan ia diberi lesen;
If the arm licenced is found being used for a purpose other than that for which the licence was granted;
 - (c) Jika senjata yang dilesenkan itu didapati disimpan di tempat yang tidak selamat;
If the arm licenced is found not to be in safe custody;
 - (d) Jika senjata yang dilesenkan itu didapati dimiliki oleh orang yang tiada kebenaran memilikinya;
If the arm licenced is found in possession of any unauthorised person;
 - (e) Jika senjata yang dilesenkan itu didapati dibawa oleh orang yang mabuk atau berkelakuan tidak senonoh;
If the arm licenced is found being carried by a person who is drunk or behaving in a disorderly manner.
 - (f) Jika yang mempunyai lesen ini membenarkan senjata itu digunakan oleh orang yang tiada diberi lesen membawa atau menggunakannya;
If the licensee allows the arm licenced to be used by any person not licenced to carry and use it;
 - (g) Jika yang mempunyai lesen ini menjualkan senjatanya kepada orang yang tiada berlesen membeli senjata;
If the licensee sells the arm to any person not in possession of a licence to purchase it;
 - (h) Jika senjata yang dilesenkan ini digunakan untuk melakukan sesuatu kesalahan; dan
If the arm licenced is used in the commission of an offence; and
 - (i) Jika syarat-syarat dikeluarkan lesen ini dilanggar atau lain-lain kesalahan yang dilaku melanggar isi-isi kandungan atau peraturan-peraturan yang dibuat di bawah Undang-Undang Senjata ini.

Appendix 8. Snares

(a) Pung Alad and Pung libung. Hunter #2, 2015



b) Bubuh, the cubic shape. hunter #11, 2015



Appendix 9. Copyright Ownership/Publisher

16 September 2016

Dear **Akram Akbari**

It is my understanding that you are the copyright holder for the following material:

Description of material- e.g., digram/illustration/photograph (title or description of image, name of publication), etc.

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