



Institute of Biodiversity and Environmental Conservation

A Dependency on Non-Timber Forest Products Utilization by the Jagoi-Bidayuh in Bau District, Sarawak, Malaysia

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**Master of Science
2024**

A Dependency on Non-Timber Forest Products Utilization by the Jagoi-
Bidayuh in Bau District, Sarawak, Malaysia

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A thesis submitted

In fulfillment of the requirements for the degree of Master of Science

(Ethnobiology)

Institute of Biodiversity and Environmental Conservation

UNIVERSITI MALAYSIA SARAWAK

2024

DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Malaysia Sarawak. Except where due acknowledgements have been made, the work is that of the author alone. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.



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ACKNOWLEDGEMENT

I would like to take this opportunity to those who have guided and assisted me directly or indirectly, especially my Supervisor, Prof. Dr Gabriel Tonga Noweg, my teammates, Ms Julia Nelson, Ms Melisa Kimura, and Ms Anna Carmila, IBEC's staff, friends and also to my family for their endless support throughout this journey.

Not to forget, all respondents of the Jagoi community from Kpg. Duyoh, Kpg. Plaman Buow, Kpg. Serasot, Kpg. Bogag, Kpg. Sebobog, Kpg. Sri'eng, and Kpg. Pinomu in Bau District for their valuable's feedback inputs.

I sincerely thank the UNIMAS Graduate Studies and Institute of Biodiversity and Environmental Conservation for the advice and support given during my study at Universiti Malaysia Sarawak.

Finally, I would like to thank the management of the Universiti Malaysia Sarawak for making it possible for me to achieve my Master of Science. Thank you and God bless.

ABSTRACT

Non-timber forest products (NTFPs) are significant for the well-being of millions of individuals, particularly those living close to the forest and intently depend on them for day-to-day use. The study is aimed to determine the Jagoi community's dependency on NTFPs with the specific objectives; (1.) Examine the pattern of NTFPs utilization according to purpose of utilization, location of collection, and frequency of collection, (2.) Relate the socio-economic factor(s) influencing the NTFPs utilization, and (3.) Access the perceptions of the local community on aspects of community dependency on the Jagoi Heritage Forest (JHF), socio-economic implications from the conservation plan, and management of the heritage forest. A total of 235 respondents from seven villages surrounding Jagoi Heritage Forest have been selected and involved in the survey. The result of the study showed that the Jagoi Bidayuh community depends on forest resources for living and the forest also provided them with ecosystem services. A Spearman correlation analysis then found five significant correlations with only one showing some slight positive relationship, which was between the frequency of firewood collection and age level. It showed that the older respondents are, the higher the frequency of firewood collection. The other four correlations have weak relationships. The community has expressed their thoughts on wanting to preserve the history and culture of the old village on top of Mount Jagoi. They were also committed to join forces with the Jagoi Area Development Committee (JADC) to develop and manage the forest, and they believe a proper management plan should be prepared to ensure all the conservation goals are achieved.

Keywords: Conservation, culture, ecotourism, forest resources, heritage

***Kebergantungan kepada Hasil Hutan Bukan Kayu (NTFPs) oleh Kalangan Komuniti
Bidayuh Jagoi, Daerah Bau, Sarawak, Malaysia***

ABSTRAK

Hasil hutan bukan kayu (NTFPs) adalah penting untuk kesejahteraan berjuta-juta individu, terutamanya bagi mereka yang tinggal berdekatan dengan hutan dan sangat bergantung kepada hutan bagi tujuan kegunaan harian. Kajian ini bertujuan untuk menentukan kebergantungan komuniti Jagoi ke atas NTFPs dengan objektif khusus seperti berikut; (1.) memeriksa corak penggunaan NTFPs mengikut tujuan penggunaan, lokasi pengumpulan dan kekerapan pengumpulan, (2.) mengaitkan faktor sosio-ekonomi yang mempengaruhi penggunaan NTFPs, dan (3.) Mengakses persepsi masyarakat setempat terhadap aspek kebergantungan masyarakat tempatan terhadap Hutan Warisan Jagoi (JHF), implikasi sosio-ekonomi daripada pelan pemuliharaan, dan pengurusan JHF. Seramai 235 responden daripada tujuh kampung sekitar JHF telah dipilih dan terlibat dalam kajian tersebut. Hasil kajian menunjukkan bahawa komuniti Jagoi bergantung kepada sumber hutan untuk hidup dan hutan juga menyediakan perkhidmatan ekosistem kepada mereka. Analisis korelasi Spearman mendapati terdapat lima korelasi yang signifikan dengan hanya satu yang menunjukkan hubungan sedikit positif antara kekerapan pengumpulan kayu api dan tahap umur. Perkara ini menunjukkan bahawa semakin tua responden tersebut, semakin tinggi kekerapan pengumpulan kayu api. Empat korelasi yang lain mempunyai hubungan yang lemah. Masyarakat tempatan juga telah menyatakan pendapat mereka untuk mengekalkan sejarah dan budaya kampung lama di atas puncak Gunung Jagoi. Mereka juga komited untuk bergabung tenaga dengan Jagoi Area Development Committee (JADC) untuk membangunkan dan menguruskan JHF serta mereka juga percaya bahawa pelan

pengurusan yang betul dan teratur perlu disediakan untuk memastikan semua matlamat pemuliharaan tercapai.

Kata kunci: *Konservasi, budaya, ekopelancongan, sumber hutan, warisan*

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LIST OF ABBREVIATIONS

Bi-Jagoi	Bidayuh-Jagoi dialect community
FP	Food Plant
FW	Firewood
JADC	Jagoi Area Development Committee
JHF	Jagoi Heritage Forest
JKKK	<i>Jawatankuasa Kemajuan dan Keselamatan Kampung</i>
KK	<i>Ketua Kampung</i> (Village Head)
Kpg.	<i>Kampung</i> (Village)
MP	Medicinal Plant
NTFPs	Non-Timber Forest Products
STPM	<i>Sijil Tinggi Pelajar Malaysia</i>
SPM	<i>Sijil Pelajaran Malaysia</i>

CHAPTER 1

INTRODUCTION

1.1 Study Background

Non-timber forest products (NTFPs) are defined as any non-wood products that are taken from the jungle environment and used either for personal consumption or for sale, and NTFPs have significance to the aspect of the social norm of the local community, and cultural tradition or belief (Delgado et al., 2016). Bennett (2002) added that NTFPs were usually gathered for personal used and marketed either regularly or during emergencies. These kinds of products are obtained from the forest and do not involve any cutting or cut of big trees. NTFPs are important for the well-being of millions of people worldwide especially those that live near the forest area and closely rely on it for daily use (Razafindratsima et al., 2021). Human have a nature to live by depend on nature, including plant resources (Triyanto et al., 2024). The usage of plants is not only for monetary purposes but also for social values and spiritual interests, including using plants as diet sources, medicinal fixings and other human needs (Helida, 2021). NTFPs are also include fish, wild meat, damar, sources of aromatic oil, resin/dyes, raw materials for handicrafts, tools, and furniture, especially rattan, and bamboo.

NTFPs also provide raw materials for large-scale industrial processing including export commodities. According to Belcher & Ruiz-Perez (2005), there are about 100 NTFPs were listed in the international trade. Those products include animal parts, plants, bamboo, mushrooms, honey, rattan, resins, and essential oil. They added that trading of those NTFPs contributed more than 50% to the household income and are better than agriculture or timber

extraction economy. In addition, Chao (2012) also estimated that 300 million people have collected parts or food to support their livelihood from their nearby woods.

NTFPs are found in many types of forests, ranging from mangrove (Debrot et al., 2020) and peat swamp (Nath et al., 2017) forests on the coasts to mixed-dipterocarp forests in the interior (Sakai et al., 2016). Different type of forest has their own products that the surrounding communities can collect and provide them the benefit which can help to improve their livelihood.

This is including the Bidayuh Jagoi (Bi-Jagoi) community that lives surrounding Mount Jagoi in Sarawak as they utilise the forest resources as a source of food, religious cultures, ornaments, and used it as a traditional remedy (Ripen & Noweg, 2016). The forest surrounding the ancestral village on top of Mount Jagoi, and those nearby hills are supermarkets for the Jagoi community from the time when they established their home in that area. Some also gathered resources from the forest to be sold at the stalls in Duyoh, Sri'eng and Serikin weekend market to support their income in the family.

Mount Jagoi is an ancestral settlement of the Bi-Jagoi tribe in Sarawak (Sarok & Britin, 2016). It is also well known as Bung Jagoi which 'bung' means peak of the mountain or hills in their local dialect. The original Bi-Jagoi settled and occupy on Mount Jagoi in the early 1600s following migration from nearby Kalimantan villages (West Kalimantan, Indonesia). Mount Jagoi was a safe place for the Bi-Jagoi to protect themselves from other tribes when there was still a war happened between groups of the community. The war ended when Brooke came, and their rulers provide better administration and peace to the native people in the area and other places in Sarawak. Over time, farming became a major economic activity for the Bi-Jagoi at the top of the mountain due to the expanding population and

demand to sustain their livelihood. Therefore, this event resulted in the migration of the community to the lowland areas surrounding Mount Jagoi in the early 1900s.

Today, there are nine Bi-Jagoi villages in Bau District, Sarawak and five villages in West Kalimantan, Indonesia (Toaiang & Sayok, 2019). The abandoned old village at Bung Jagoi was revived as “Jagoi Heritage Site” in 2010 while its forested areas of Mount Jagoi (about 700 hectares) is then recognised by the community as the “Jagoi Heritage Forest” [Sarok & Britin, 2016]. The conservation area in Mount Jagoi includes both the ancestral village (heritage village site) and the surrounding forested land. A committee, namely Jagoi Area Development Committee (JADC) was established in 2007 to manage the area which consists of village heads and individuals from the local villages.

The Bi-Jagoi in general regard this community forest as their important heritage and would like to conserve the resources inside the forest and ensure this heritage can provide better services for generations. According to Toaiang & Sayok (2019), Mount Jagoi has the potential for a nature adventure, a culture showcase and an eco-tourism spot while getting some workout and sense the fresh atmosphere of the beautiful forest. This valuable experience and condition have to keep that way even in the middle of aggressive development in its surrounding area. The preservation of Mount Jagoi must include both cultural perspectives and biodiversity. Hence, JADC put their effort to enlist JHF in the IUCN Green List and applied for it. This study was done to supplement the existing information needed for that purpose as required in the application and to conserve Mount Jagoi and its surrounding forest.

The non-timber forest products serve as a food source for the local inhabitant, a wide diversity of resources used in medicine, help maintain favourable environmental conditions,

and provide chances for ecotourism and enjoyment. The forest resources not only provide for family needs for survival but also serve as a primary source of revenue. Some forest products are traded, while others are not. The local community's evaluation of the forest products is essential for gaining a better grasp of their significance to the socioeconomic situation of the local people. Local knowledge of specific plant species is useful for these endeavours since it contributes to cultural variety in the local ecosystem (Fasihuddin, 1993).

More data on NTFPs used by local communities is needed to comprehend the connection between human and natural resources in Mount Jagoi. Through this research, we can boost efforts to preserve NTFPs, which play a vital role in Bi-Jagoi culture and everyday lives. This study not only takes people closer to the benefits of NTFPs but also acts as a determination to include them in conserving natural resources of the nearby forest.

1.2 Problem Statement

Firstly, the pattern of the forest resources utilization by the Bidayuh Jagoi Dialect Community is still not fully understood even though several studies have been conducted but only targeted a few resources and not all the nearby villages. Excessive reliance on forest resources can lead to the depletion of biodiversity which can have deep and extensive consequences (Millenium Ecosystem Assessment 2005) on species distribution and structure (Sagar et al., 2003; Thapa and Chapman 2010) and regeneration (Murali et al., 1996; Popradit et al., 2015). Over-harvesting of forest resources can also detrimentally affect the long-term resilience and health of the entire ecosystem (Rew et al., 2005). Consequently, the inherent conflict between biodiversity conservation and resource use demands thoughtful and well-targeted administration approaches (Thammanu et al., 2020). The previous study by Ripen & Noweg (2016) in the Jagoi are only focused on the medicinal plants commonly

used by the Bidayuh community in the area. The focus of the study was the economic and cultural significance of the medicinal plants and did not include other NTFPs in their assessment.

A later study by Baling et al. (2017) then focused on the process of medicinal plant utilization near Mount Jagoi. They studied on the specific medicinal plants, the sections used, and the preparation and administration techniques for ailments. Last but not least, a study done by Toaiang & Sayok (2019) then focused on the utilization of NTFPs among the vendors in the Kampung Duyoh market. The study did not involve the participation of other community members beside the market vendors. Gathering and demand of NTFPs that have more than the capability of the plant to regenerate could be a burden to preserve the forest. The previous study also was carried out at only one or two villages that were closes to the Jagoi Heritage Forest. Hence, a broad access to the local's pattern of forest resources utilization could be used as a guideline to manage and keep those valuables plants from declining from the nearby jungle.

Next is on the traditional knowledge practice by the younger generation is decreasing over the year as the younger people mostly are moving to town for job and education. Scenario from the Dayak Linoh tribe in West Kalimantan as stated by (Rashid et al., 2018; Ege et al., 2021) that the local knowledge, such as the usage of plants for remedial purposes, is only conveyed verbally and lacks complete documentation. Moreover, within the Dayak Linoh tribe, the number of individuals who know about traditional medicine using plants has declined (Julung et al., 2023). The same thing happened to the Bi-Jagoi community within the study area. In many areas, traditional uses of many NTFPs have been forgotten or lost (Findlay et al., 2015; Sayok & Teucher, 2018) so most of the local studies of NTFPs have

put much emphasis on documentation on the variety of plants among different ethnic and cultural groups in Sarawak. Therefore, for this research purpose, the surrounding community (the Bi-Jagoi Group) is the targeted group, to gather as much information and knowledge on the resource's utilization, including their current fishing and hunting activities. The updated study is important to keep the communities' knowledge as things might change over the years and to keep track of the current forest resources status within the areas.

In addition, the third problem statement that has been identified is on the conserved areas that are now become one of the hotspots visited by various visitors locally as well international tourist annually, for outdoor activities like camping and hiking which potentially could destroy the attraction site in a long run without proper management plan in place. Nghi et al. (2007) said rapid but unplanned exploitation and utilization of the resources create a risk of losing their recovery capacities and destroying the basic functionalities within the tourism areas. Hence, it is important to have a basic idea of the importance of the conserved forest for the surrounding community and it will be useful to be incorporated into the management plan of the area in the future, both will benefit the local community and also keep the intactness of the forest. Besides, there is advocacy both locally and internationally for better forest management recognition that could be done by the local community to boost their attraction and economic development. This study only acts as only a small part of the journey for the Jagoi community to start with.

1.3 Objectives

The study aims to determine the Jagoi community's dependency on the NTFPs and with the specific objectives;

1. Examine the pattern of NTFPs utilization according to the purpose of utilization, location of collection, and frequency of collection,
2. Relate the socio-economic factor(s) with the NTFPs utilization, and
3. Assess the perceptions of the local community on aspects of community dependence on the JHF, socio-economic implications from the conservation plan, and management of the area.

1.4 Study Limitation

The study is only focused on the Bidayuh Jagoi Dialect Group in Bau District. The targeted group exhibit slightly different culture and practices towards the use of forest resources with other Bidayuh Dialect Group in Sarawak. This study is also biased to village residents since all the respondents are a full-time staying in the targeted villages. However, the result of the study does not reflect the characteristics of the members that are not a full-time resident. Five categories were assessed: medicinal plants, food plants, raw material for handicrafts, firewood, and fishing activity. The result of this study cannot represent the pattern of other native communities that depending on the forest resources. However, for the forest perception and evaluation could be a case study for reference and be able to improvise accordingly to fit the current situation.

1.5 Significant of Study

This study is focused on the forest resources utilization among the Bi-Jagoi Community in Bau, District. It is to access the rural community's dependency on the wild plants and other forest resources in their daily life. Each ethnic group are unique in their way of connecting themselves to the forest, and its resources. In addition, Bi-Jagoi group is practicing Community-Based Natural Resources Management, where they united to

preserve the nearby forest and the old village at the top of the Mountain as their heritage forest. Community forest management (CFM) is widely acknowledged as an effective approach to mitigate the overutilization of jungle resources (Thammanu et al., 2020). The responsible utilization of NTFPS within CFM frameworks can promote successful forest management, benefiting both ecosystem services and human well-being. This dual approach enhances rural livelihoods while simultaneously conserving forest biodiversity (Jumbe and Angelsen 2007; Coulibaly-Lingani et al., 2011; Soe and Yeo-Chang 2019b). People's involvement in management actions, perceptions and knowledge regarding forest management, management protocols, and benefit sharing can offer valuable vision into optimizing CFM to maximize the benefit while protecting the resources (Salam et al., 2006; Sunderlin 2006; Negi et al., 2018).

The initiative here are involving the participation of local community and also assistance from other parties to make it more successful and sustainable. From the pattern of the NTFPs utilization, we could gather a useful baseline data that will support the development of their management plan to be more effective and be able to cover broad aspect of forest management. Anything that could potentially become threats to the heritage forest could be easily addressed in the future.

Other than that, the implication of the socio-economic factor(s) will provide a better understanding on what should be prioritize and what should come next. The perception of local's inhabitant is crucial element in the development of management plan of the area. This is to avoid any breach to the local's right especially on the use of their existing land and what is the value of forest to them and how they could be part of the management team. This study is hoped to provide these set of important information for the preservation of Jagoi Heritage Forest. Overall conclusion, this study is to support the development of the plan to conserve

the remaining forested land in the area, ultimately, the local people are intending to preserve their precious cultural legacy of the Bi-Jagoi ancestors' use of plants.

CHAPTER 2

LITERATURE REVIEW

2.1 The Importance of Ethnobotany and NTFPs

The term ‘ethnobotany’ is defined as a research of the interactions between plants and people (Rahman et al., 2019). Overtime, the knowledge from the older generation of the community getting faded without a proper way to keep them ‘alive’ (Sharifian et al., 2022). A proper documentation will help to preserve this information, and to discover new uses (if any) and to improve the quality of production and products development. Hence, it will provide a way to promote and improve the well-being of local community.

In general, NTFPs are defined as wild, native or non-native biological organisms and materials, other than high value timber, that are harvested from any settings and habitats (including those that have been altered, managed, and dominated by humans) for direct or indirect uses (such as for cultural purposes) [Shackleton & de Vos, 2022]. The NTFPs can be categorized according to 14 groups including resin, essential oil, fatty oils, ornamental, medicinal, and fruits (Gusmailina et al., 2020).

There are approximately 60 million of indigenous people relying on NTFPs, and they encourage governments and local authorities to protect the forest and let rural people doing activities linked to NTFPs (Shackleton & de Vos, 2022). The government and other agencies are interested in NTFPS for three foremost reasons (Shackleton & Pullanikkatil, 2019). Firstly, on economically which NTFPS are particularly important to welfare and livelihood of the local people living and liable on the forest. Secondly, exploitation of NTFPS is more ecologically sustainable than timber harvesting where no major cutting of big trees and does

not affect it surrounding. Lastly, exploitation of NTFPS was increased to maintain the perceived value and preserve forest resources. In most developing countries, forest supplying services play important role in the total economic value of the livelihood of local communities (Mullan, 2014).

2.1.1 NTFPs as a Source of Nutrition and Medicine

According to the World Health Organization as cited in Baling et al. (2017), medicinal plants are any plants which one or more of its organs contain substances that can be used for therapeutic purposes, or which are precursors for chemo-pharmaceutical semi-synthesis. Humans used more than 35,000 plant species worldwide in several cultures for traditional medical purposes (Padulosi et al., 2002). A total of 608 species of medicinal plants that are being collected and used by 14 ethnic communities living in Sarawak have been documented (Chai, 2006). In addition, the different community has their own understanding and knowledge of each medicinal plant, hence the applications and handing out of that plant are varied within tribes (Baling et al., 2017).

Besides, within the Jagoi community, Baling et al. (2017) conducted their study with two selected villages and recorded 58 species of medicinal plants that were being used by the local community from the nearby forest but another six species were not registered in their survey as the Jagoi community did not use them. Also, 55% of the recorded medicinal plants were found wild and 45% were planted by the community in flowerpots and at their house area. Additionally, this traditional remedy is very unique because one species can cure a few illnesses and the same illness can be cured by using a few or combinations of medicinal plants and various parts of certain plants can be used as remedies for some ailments (these part include; foliage, roots, fruits, roots, stems, barks, seeds and whole plant) (Baling et al.,

2017). The Jagoi community sometimes depends on these medicinal plants although have good access to medical facilities because the cost was lesser than the conventional medicines.

2.1.2 Livelihood Significance of NTFPs

Indigenous people commonly depend on the natural environment and forests for their daily life. This was mentioned by Lye (2002) in her study in Pahang in which she stated that their main economic activities are fishing, cultivation, collecting forest products and hunting. In another study with the Bidayuh community of the Bau district, Ripen & Noweg (2016) showed that the community are still widely depending on forest goods as a source of traditional remedies, ornaments, food, and religious cultures. Anyoi (2013) related the use of wild plants among the Jagoi and Serembu Bidayuh communities to their tradition and custom. At the same time, these uses of wild plants are regarded as supplemental income.

NTFPs could generate sustainable income if proper harvesting was done, which is better than the plantation sector, usage of forest for agricultural sites and income from timber harvesting (Nambiar, 2019). Thus, referring to the study done by Kar & Jacobson (2012), the gathering of forest resources influence the economic status of a household. This is also supported by the study by Angelsen & Wunder (2003) which they had found that NTFPs provide more direct benefits to poor households than timber logging because timber logging mostly benefits the timber industries rather than directly contributing to the local people themselves. In addition, local market players have little control over their herbal and medicinal products, and this makes them not get the proper price for these products.

2.2 Utilization of NTFPs

Hazarika et al. (2022) in their study also stated that rural farmers look for NTFPs as a source of diet and food security for their family's need. Another study done by

Chamberlain et al. (2020) has mentioned about 300 million people gain their necessities and food from the jungles. Hence, NTFPs are significant because they can be concluded both indirectly and directly contributing to food security.

There are numerous studies have been done on the importance of NTFPs to the local community's income namely Mugido & Shackleton (2019), Shrestha et al. (2020), and Talukdar et al. (2021). The local communities get benefit from the use of NTFPs such as reducing daily household expenditure and being able to directly deal with buyers or brokers to sell their products. The main stakeholders in the collection and trade of NTFPs are including traders, rural collectors, government staff, politicians, and conservation and development-oriented institutions. A total of 3, 000 plant species are being exported around the world including rattan, bamboo, and medicinal plants (Timoshyna & Drinkwater, 2021). More people started to acknowledge that marketable NTFPs are significant to the income of rural people. In their study, Peerzada et al. (2022) found out that people in the rural area of the Kashmir Himalayas are greatly demanding NTFPs, both for domestic and commercial requests and thus play a vital part in the household incomes of the community.

The importance of NTFPs to the rural peoples is also mentioned in the research by Talukdar et al. (2021) and Ghanbari et al. (2022) where they stated it as a source of medications, nutrition, firewood and resources for house construction. Anyoi (2013) studies the pattern of utilization of NTFPs among the local communities around Mount Serembu and Mount Jagoi in the Bau district. A total of 134 plant species from 101 genera and 67 families were recorded to have been used by the communities. Some 62 species were for food, 46 species were for general construction materials and the remaining 42 species were for medicinal purposes. As in the Jagoi area, Toaiang & Sayok (2019) has done a

multidisciplinary study and they have recorded about 400 species of NTFPs that are still available. The community in Duyoh (one of the villages nearest to Bung Jagoi) gathered NTFPs for numerous needs which include a source of food, raw materials for handicrafts, medicinal, materials used in rituals and they also collected as ornamental plants and some people sold them at the nearby Duyoh and Serikin border-town weekend markets (Toaiang & Sayok, 2019). A similar and more recent study conducted in the same general area in Bau revealed that the NTFPS resources are on a declining trend since the 1970s (Billy 2021).

2.3 Community-Based Natural Resource Management

Worldwide, forest resources are crucial to the livelihoods of people whom live in proximity (Thammanu et al., 2020). Approximately 1.6 billion local people, or more than 25% of the world's population, depend on bio-diverse forest resources for their livelihoods (The World Bank 2001). Management of these forest is critical to their continued viability as a source of crucial resources. Consequently, there is inherent conflict between resource utilization and biodiversity conservation that requires purposeful and properly focused management practises to address (Thammanu et al., 2020). Community-Based Natural Resource Management (CBNRM) is an approach of forest protection that involving participation of surrounding local communities (Benyei et al., 2022). This approach also known as community forest management (CFM) and it has been widely recognized as an effective management approach to help resolve the conflict between resource utilization and biodiversity conservation (Thammanu et al. 2020).

In most cases, CBNRM focused on land management including soil and territories. CBNRM also involves the access and management of water, forests, and seeds. The institutional bodies that govern the natural resources is mostly based on the ancestral or '*Adat*.' This approach aimed for equal benefits and decision-making among the local

communities who depends highly on the natural resources (Mehta & Lichtenfeld, 2000). However, there are several key factors that often limits the CBNRM effectiveness including constitutional, institutional, and geographical constraints (Snorek & Bolger, 2022). This has resulted in hesitance among the local community in people in fear of losing the promised benefits.

An estimated 14% of all forests in developing countries are governed by CFM; it has been adopted and implemented in many countries (Gilmour et al., 2004). Successful implementation of forest management depends on local participation as well as on other factors and forms of engagement in CFM, the analysis and understanding of which can help to define effective CFM practises. People's participation in management activities, knowledge and perceptions regarding forest management, management regulations, and benefit sharing can all provide useful insight into how CFM can be implemented to maximize the benefit while safeguarding the resources (Ostrom et al., 1994; Pragtong 1995; Ostrom 2005; Salam et al., 2006; Sunderlin 2006; Negi et al., 2018).

Thammanu et al. (2020) has prepared a conceptual framework links between utilization of NTFPs and CFM in community forest for livelihood and biodiversity conservation as shown in figure 2.3.1.

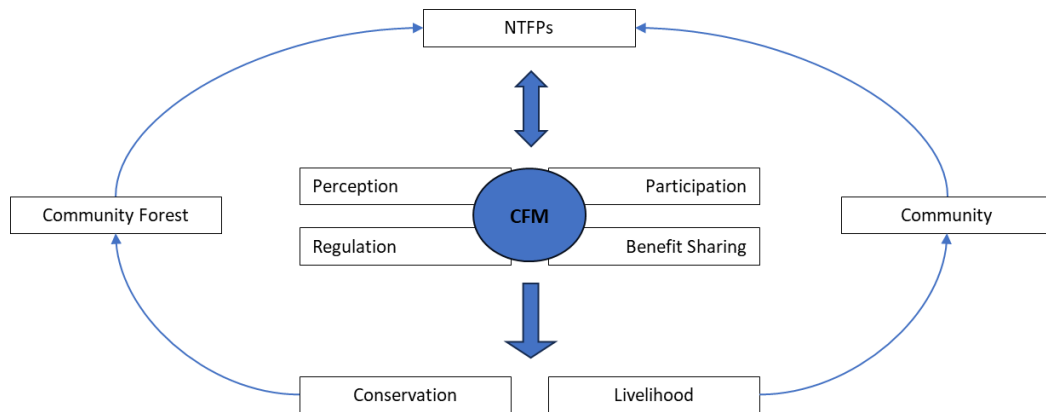


Figure 2.1: Conceptual framework links between utilization of NTFPs and CFM

In Thailand, the Royal Forest Department (RFD) has promoted CFM since 1987 (RFD 2014), and it has been widely implemented. Community forest establishment projects have been initiated in more than 17,400 villages, covering a total area of 1.2 million ha, or 7% of the country's total forest area (RFD 2020). The emphasis on local participation in management was reiterated by the Thai government's Community Forest Act B.E. 2562 of May 24, 2019 which granted local decision making authority to communities who managed community forest projects (Royal Thai Government 2019).

A study carried out in Jagoi Heritage Forest (a local Community Conservation Area managed by the Jagoi Area Development Committee) indicates that the forest contributes quite significantly to the local community in terms of NTFPs production (Philip 2021). The study also indicates that diversity and availability of NTFPs (particularly handicraft materials) are similar in both the primary and secondary forests (Philip, 2021). This is contradictory to the common belief that primary forests should hold more materials than the secondary forests. The author suggests that equal weightage has to be put in both the forest types (primary and secondary) in terms of management efforts.

The Jagoi Area Development Committee, therefore, has to re-align their current management strategy and not to favour or merely focussing on the primary forest area. Another study by Billy (2021) also suggests that the management of the valuable community heritage of the Jagoi Heritage Forest has to base on a strategic management plan which should consider long-term or sustainable supply of resources for the local community needs. Moreover, the importance of ethno-botanical resources to the native communities of Sarawak is one of the driving forces behind the current trend of community based resource management (Ripen & Noweg, 2016).

CHAPTER 3

METHODOLOGY

3.1 Sampling Site

Jagoi area is situated in the southern part of Bau District, Sarawak. It is approximately 45 km south-west of Kuching, the capital city of Sarawak or about an hour drive. The study was conducted among local communities surrounding the JHF. Some six villages in the immediate areas, namely Kpg. Duyoh, Kpg. Serasot, Kpg. Sebobog, Kpg. Plaman Buow, Kpg. Bogag and Kpg. Sri'ieng with a total of about 900 households, were focus of the study. Other villages which are Kpg. Serikin, Kpg. Stass and Kpg. Skibang were also involved but with fewer sampled household. These villagers are close-knitted communities and share the same cultural identities. These villages were shown in figure 3.1

The communities residing in this area are the people who speaking Bidayuh-Jagoi dialect (Bi-Jagoi) and they are also related to the other five villages in West Kalimantan, Indonesia as they were descendants of the settlers from the heritage village at Mount Jagoi at early of 1600s. Jagoi area can be reached by tar-sealed road via Bau town and about three km away from the weekend market at Serikin.

According to Toaiang & Sayok (2019), the forest surrounding Mount Jagoi is quite broad that it consists of the vegetation cover resulting from a substantial and long history of the uses of the forest by the ancestors of the Jagoi community in planting of hill rice. Some of their fallow lands have now been converted into an area to cultivate various cash crops such as rubber (*Hevea brasiliensis*), cacao (*Theobroma cacao*) and pepper (*Piper nigrum*).

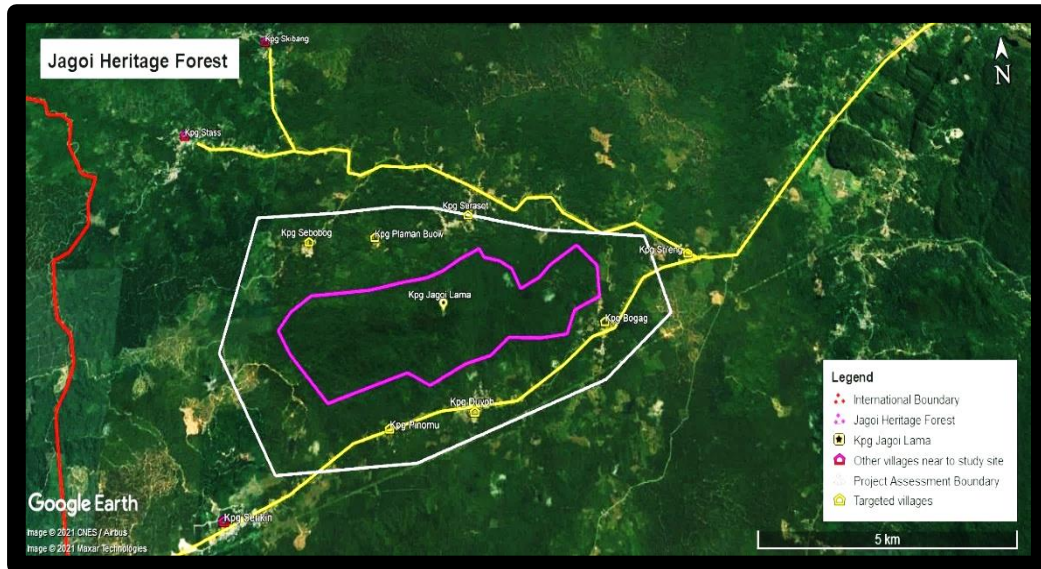


Figure 3.1: Location of Nine Jagoi Villages in the Jagoi Area, Bau, Sarawak

3.2 Field Data Collection

3.2.1 Preliminary Investigation

A preliminary consultation session was conducted with 16 community leaders including the Jagoi Area Development Committee (JADC) on 15 February 2020 at Bau Town. The goal was to obtain their approval to conduct the study and gather essential information for the proposed research plan. The consultation also aimed to discuss the purely academic research intents and to provide baseline data for the targeted area's management plan. Furthermore, the session inquired about any cultural practices, including the necessary rituals performed before entering their village. The participants raised no objections, and they granted consent for the study. Plus, no ritual was needed, as the majority of the community no longer adhered to traditional practices.

This session occurred during the JADC monthly meeting with all its members present. During the session, crucial information was also requested, and a key contact person for the study was identified. A preliminary visit to the study site was conducted to become

acquainted with the village area. Previous studies conducted in the area were reviewed to gather related materials needed for the research. Additionally, JADC members provided important documents and advice to support the study, as they are the primary connection with the local communities and play a central part in managing Jagoi Heritage Forest within their respective village areas. In addition, the secondary data is collected through literature, documentation, and published materials.

3.2.2 Community Interview

Group meetings were conducted with key individuals in each village to obtain village-level information concerning the Heritage Forest. The purpose was to gather feedback on the proposed plan for developing and managing the area. For this purpose, an interview list was set up with inputs from the Jagoi Area Development Committee. Key informants were chosen through a purposive sampling method aligned with the research objectives. The selection process involved recommendations from the *Ketua Kampung* (KK) who identified individuals with extensive knowledge about non-timber forest products. Purposive random sampling is a method for selecting samples based on specific considerations established by researchers (Sugiyono, 2015). The meeting took place at their community halls and at the KK's house with active participation from the local people throughout the session. Moreover, this session was scheduled based on their availability, whichever was more convenient for them to gather.

3.2.3 Household Interview

At least 147 families from seven villages were primarily targeted for face-to-face interviews, as determined by equation 3.1. In practice, the study successfully reached 235 respondents. The interview was conducted via a structured questionnaire which includes utilization of NTFPs, hunting activity, and perception of the local community on aspects of

community dependency on Jagoi Heritage Forest. It also addressed the socioeconomic implications of the conservation plan, and forest area management to the Bi-Jagoi community in the study area. The sessions took place from June to October 2020, primarily on weekends when most villagers were at home. The process was facilitated with the assistance of Ketua Kampung and his appointed local community. Free, Prior and Informed Consent was sought from each Ketua Kampung before entering the village. This is to let the Ketua Kampung, have sufficient lead time to notify their Village Development and Security Committee and other community members about our visit to avoid misunderstanding. Furthermore, the interview was conducted during the recovery phase of the COVID-19 pandemic, and all necessary precautions were observed while meeting the community following the guidelines prepared by the Ministry of Health and Local Authority.

3.3 Population and Sample

3.3.1 Calculation of Sample Size

In this study, seven villages namely Kampung Duyoh, Pinomu, Bogag, Sri'eng, Serasot, Plaman Buow and Sebobog) were chosen due to their proximity to the Jagoi Heritage Forest and their continued direct access to the forest area. The population was tallied based on the number of full-time residents in each village, as reported by their respective Ketua Kampung. The total population was 1000 people and assuming that the homogeneity is 80%, the confidence level is 95% and the margin of error is at 5%.

The calculation of sample size was as shown below:

$$n = \frac{(Z^2 \times p \times (1-p))}{c^2} \quad \text{Equation 3.1}$$

$$n = \frac{((\pm 1.645)^2 \times 0.80 \times (1-0.80))}{0.05^2}$$

$$n = 173$$

Where,

Z = Z value (± 1.645 for 95% confidence level)

p = Percentage of estimated population homogeneity

c = Margin of error

Final sample size = n_1

$$n_1 = \frac{N \times n}{N + n}$$

$$N + n$$

$$n_1 = \frac{1000 \times 173}{1000 + 173}$$

$$1000 + 173$$

$$n_1 = 147 \text{ households}$$

Where,

N = Population size

n = Sample size

n_1 = Final sample size

Therefore, the minimal sample size for this study was 147 respondents and the actual respondents involved were 235.

3.3.2 Pilot Test

Prior to the actual household interview with the targeted villages, the instrument was tested with Jagoi Area Development Committee members during their quarterly meeting.

This testing aimed to evaluate the question structure, appropriateness, clarity, and validity of the questions for each topic. Additionally, it provides an estimate of the time required for each respondent. Next, a reliability test analysis was conducted using Cronbach's Alpha to statistically evaluate the data's reliability. This is important for ensuring that the data collected is precise and can be reliable for making reasonable conclusions. Reliability test help find any inconsistencies or faults in the measurement process, thus supporting the whole quality and strength of the study's outcomes.

3.4 Data Analysis

3.4.1 Descriptive Analysis

Descriptive statistics are the first level of analysis, which is used to sum up and describe the data (Sarmiento & Costa, 2017). The frequency table, bar graph, histogram, Pareto chart, and pie chart are among the most used graphical representations (Fisher, 2009). In this study, both the frequency table and pie chart are used to summarize and display the data. A frequency table is a table that assigns a reasonable number of categories (classes) to a data collection. It assists in sum up and analyzing the distribution of data by displaying how often each value or group occurs. Only a selected number of observations associated with each class is presented in the table. Pie charts were then used to depict the data graphically after it had been recorded into a frequency table.

3.4.2 Comparative Analysis

The study outcomes indicated that the data did not follow a normal distribution when analyzed using the parametric one-way ANOVA. Consequently, the Kruskal-Wallis test, a non-parametric alternative was used to evaluate whether there were differences between the treatments. The statement of the parametric tests is not met; hence the non-parametric tests are more appropriate (Ostertagova, 2014). In this scenario, Mann-Whitney test and Kruskal-

Wallis's test are used to examine the relationship between the socio-economic factors of the Jagoi community and their pattern of NTFPs utilization. The non-parametric was also chosen because it can be used when normality conditions are not met and cannot be achieved through transformation (Nachar, 2008). The Kruskal-Wallis test does not assume normality; however, it does expect that the interpretation in each group come from populations with the same distribution shape and that the samples are random and independent (Ostertagova, 2014). Israel (2008) stated that the Kruskal-Wallis non-parametric one-way ANOVA does not require the assumptions of interval data, normal distribution, or homogeneity of group variance. This test is considered more manageable, handy, flexible, and powerful, offering alike benefits to parametric one-way ANOVA.

3.4.3 Correlation Analysis

Results from this study were not normally distributed and does not linearly related. Hence, a Spearman correlation was utilised in this study's statistical analysis to measure of the strength of a monotonic relationship between paired data. Spearman correlation assesses the relationship between two rankings (ordered lists) using the same value range, -1 to +1 as the Pearson regression (Sage Publication, 2017). Basically, a Spearman coefficient is a Pearson correlation coefficient calculated with the ranks of the values of each of the 2 variables instead of their actual values. A Spearman coefficient is commonly abbreviated as ρ (rho) or ' r_s ' (Schober et. al 2018). The correlation between variables is the focus of Pearson Correlation Analysis (Peter and Sindang, 2000). Pearson's correlation coefficient was utilised in this study's statistical analysis to gauge the strength of a linear relationship between the independent and dependent variables. The degree and direction of the association between two variables are determined by the Pearson Correlation value, which ranges from -1 to +1 (Rumsey, 2007). The indications that need to be thoroughly examined

are the “r” and “p” values. The significance level for this study is set at 0.05 or at the 95 per cent confidence level for two-tail analysis. Table 3.1 displays the forecast of the strength of the association between variables made by Gilliam (2007).

Table 3.1: Interpretation of the Value of Pearson Correlation Coefficient

Correlation coefficient r (+/-)	Relationship between variables
-0.20	Little or no relationship
0.20-0.40	Some slight relationship
0.40-0.60	Substantial relationship
0.60-0.80	Strong useful relationship
0.80-1.00	High relationship

Source: Gilliam (2007)

CHAPTER 4

RESULTS AND DISCUSSION

4.1 The Pattern of Utilization of NTFPs by the Jagoi Bidayuh Community in Jagoi Heritage Forest

4.1.1 Utilization of Medicinal Plants

Of the 235 households interviewed, only 63 respondents (26.81%) reported they still gather medicinal plants from the forest for emergency treatment and as traditional health supplements (Table 4.1). In contrast, 172 households (73.19%) no longer collect medicinal plants, relying instead on modern medication and treatment from the nearby clinic in Kampung Serasot, occasionally visiting the town hospital, or purchasing the medicines from the pharmacy.

Table 4.1 also reveals that the majority, 92% (58 households) collect medicinal plants for their own use. Only 3.2% (two households) gather them for sale at the local market or on request from buyers, while 4.8% (three households) collect them for both purposes. Some medicinal plants do not store well and must be consumed within a short period to retain their effectiveness, which is why some people only collect them upon request.

The medicinal plants were collected from both inside and outside of Jagoi Heritage Forest (JHF). According to the study, 16 households (25.40%) gathered medicinal plants from inside the JHF, while 43 households (68.25%) collected them from outside of JHF, as detailed in Table 4.1. Additionally, four households (6.35%) collected plants from both locations. The 43 households that reported collecting from outside the JHF typically grew these plants near their homes or on their farms, making them readily accessible, particularly in emergencies.

Table 4.1: Utilization of Medicinal Plants (MP) by the Jagoi Bidayuh Community

Utilization		n	Percentage of households involved (%)
Collect	Yes	63.00	26.81
	No	172.00	73.19
Purpose of collection	Sell	2.00	0.85
	Personal use	58.00	24.68
	Both	3.00	1.28
	NA	172.00	73.19
Location of MP being collected	Inside JHF	16.00	6.81
	Outside JHF	43.00	18.30
	Both areas	4.00	1.70
	NA	172.00	73.19
Frequency of collection	None	172.00	73.19
	When needed only	49.00	20.85
	Yearly	10.00	4.26
	Monthly	1.00	0.43
	Weekly	3.00	1.28

In their study, Jasamai & Jamal (2019) discovered that over 50% of Malay women use herbs for health purposes, possibly reflecting cultural differences between the Bidayuh and Malay communities. Similarly, Khadka et al. (2021) observed a significant rise in the use of medicinal plants in Nepal during the COVID-19 lockdown, likely driven by the urgent need to find remedies for the disease. Therefore, the extent of medicinal plant use might be influenced by the level of necessity, despite the accessibility to modern medicines.

A study conducted in Jagoi found that just over 55% (32 species) of the medicinal plants were wild in the area while 31% (16 species) were found in open spaces and were easily accessible (Anyoi, 2013). Additionally, Baling et al. (2017) noted that some community members cultivated medicinal plants in flowerpots and around the edges of their

houses, identifying about 26 species. This cultivation contributes to the easy availability of these plants, allowing the community to access them readily when needed.

In a previous study done by Toaiang & Sayok (2019) in Jagoi, it was found that only 8% of respondents sold the medicinal plants they collected at local markets. The study also indicated a high percentage of people collecting these plants, with most agreeing that they are safe and easily accessible to all community members in the nearby forest. The community sell these plants as a source of family income. Additionally, earlier research focused on the valuation of ethno-botanical resources in the limestone forests of Bau District and Maludam National Park in the Betong Division in 2004, reported that the annual value of these resources was estimated at approximately RM60 per household in Bau District and RM50 per household in Maludam (Noweg, 2004; Noweg et al., 2004).

Additionally, a previous study by Anyoi (2013) in the Jagoi area revealed that only 8% of respondents sold the medicinal plants they collected at local markets. The study also indicated a high percentage of collectors who agreed that traditional remedies are safe and easily accessible to all community members in the nearby forest. Various parts of these plants are used for medicinal purposes, with some plants having specific applications for treating certain illnesses (Baling et al. 2017).

Most of the households collected medicinal plants only as needed (77.78%) from the forest (both within and outside Jagoi Heritage Forest), with fewer collecting them yearly (15.87%), weekly (4.76%), or monthly (1.59%), as detailed in table 4.1. They noted that some medicinal plants must be processed or used immediately after collection, as they lose their effectiveness if stored for too long. This explains why many people collect them on an as-needed basis. Some individuals, especially those who have planted medicinal plants close

to their homes, use them daily as traditional health boosters, following the practices of previous generations. For the Bidayuh community, medicinal plants serve as direct therapeutic agents due to their accessibility and affordability compared to expensive modern medicines (Ripen & Noweg, 2016).

Most respondents agreed that traditional medicinal plants for common illnesses are easy to find and readily available from the forest when needed (Anyoi, 2013). This finding is consistent with the observations in this study, which also noted their accessibility when required.

According to Table 4.2, the study found that *dowon kapal* (*Hoya sp.*) was the most frequently collected plant by the communities, accounting for 64.5% followed by *tongkat ali* (*Eurycoma longifolia*) at 48.4%, and *durian Belanda* (*Annona muricata*) at 33.9%. other medicinal plants (43.5% included those cultivated in community farms or found near homes, such as *rumpun semalu* (*Mimosa pudica*), *daun sireh* (*Piper betle*), *popar doyak* (*Piper porphyrophyllum*), and *kacip fatimah* (*Labisia pumila*). Not all collected plants are wild, many are domesticated or ornamental plants. However, knowledge of wild medicinal plants in the forest is increasingly limited, with only a few older generations possessing the expertise, and this knowledge is gradually fading over time.

Ripen & Noweg (2016) discovered that the most frequently used plant species among the Bi-Jagoi community are *Alpinia galanga* Willd., *Andrographis paniculata* Nees, and *Uncaria gambier* Roxb. Next, the second common plants are *Curcuma domestica* Val., *Parkia speciosa* Hassk, and *Scoparia dulcis* L. This shows that Jagoi Heritage Forest remains abundant in medicinal plants, highlighting the importance of preserving this knowledge.

Table 4.2: Top three Species of Medicinal Plants (MP) Collected by the Jagoi Bidayuh Community

Type of MP	n	Percentage (%)
<i>Durian belanda (Annona muricata)</i>	21	33.9
<i>Tongkat ali (Eurycoma longifolia)</i>	30	48.4
<i>Dowon kapal (Hoya coronaria)</i>	40	64.5
Others MP	27	43.5

In a study by Toaiang & Sayok (2019), 68% of the commonly used medicinal plants among respondents were identified as *dowon kapal*, which is used to manage hypertension and diabetes. This highlights the significance of this plant to the local community. The finding also reveals that most respondents use *dowon kapal* themselves or have family members who do. Then, some are aware of its uses, even if they do not personally use it.

4.1.2 Utilization of Firewood

According to Table 4.3, 193 households (82.1%) continue to collect firewood from nearby forests (both within and outside Jagoi Heritage Forest), while 63 households (17.9%) have stopped gathering firewood. Despite having access to electricity and proper cooking equipment, the community still relies on firewood for activities such as barbecuing, boiling water, *pansuh* (cooking foods inside the bamboo tubes) and preparing their livestock's feed, including pigs.

The majority of respondents answered, that collected firewood was for personal use (96.3%) due to its relative ease of availability. A small percentage of households (2.1%) sold firewood upon request from buyers or neighbours, while 1.6% reported using it for both personal use and selling (Table 4.3).

The study revealed that 149 families (77.2%) gathered firewood from areas outside the Jagoi Heritage Forest (JHF) (Table 4.3). Some of this firewood was sourced from their farmland, which is relatively distant from the JHF. In contrast, 35 families (18.1%) living close to the Heritage Forest, such as Kampung Duyoh, Kampung Pinomu, Kampung Bogag, and Kampung Plaman Buow, gathered firewood from within the area, whereas nine families (4.7%) collected it from both locations. Respondents noted that firewood is readily available and abundant in the nearby forests, both within and outside the JHF. They also mentioned that they often collect any dried wood found in the forest for firewood purposes.

Firewood was used primarily for specific purposes or occasions. Consequently, 148 families (76.68%) collected it only as needed or when their wood stocks were depleted (Table 4.3). The community reported gathering a bulk of firewood to ensure a long-term supply. However, five families with livestock (including pigs) collected firewood weekly (2.59%) to cook the animal's feed daily. Additionally, seven households (3.63%) collected firewood monthly, and 33 (17.1%) did so annually. The need for firewood is typically increased during school holidays or festive seasons when family gatherings and various activities are more frequent

Table 4.3: Utilization of Firewood (FW) by the Jagoi Bidayuh Community

Utilization		n	Percentage of households involved (%)
Collect	Yes	193.0	82.1
	No	42.0	17.9

Table 4.3 continued

Utilization	n	Percentage of households involved (%)
Purpose of collection	Sell	4.0
	Personal use	186.0
	Both	3.0
	NA	42.0
Location of FW being collected	Inside JHF	35.0
	Outside JHF	149.0
	Both areas	9.0
	NA	42.0
Frequency of collection	None	42.0
	When needed	148.0
	Yearly	33.0
	Monthly	7.0
	Weekly	5.0

Table 4.4 presents the common types of wood gathered by the Bidayuh Jagoi community in the Jagoi area including both within and outside Jagoi Heritage Forest (JHF). Out of 193 households surveyed, 162 respondents (84.4%) collected *jotu* (*Hevea brasiliensis*) for firewood, mentioning its abundance and suitability for lighting fires.

They sourced it from their active and abandoned rubber farm. Additionally, 116 (60.4%) and 131 (68.2%) families gathered *sirumah* (*Ploiarium alternifolium*) and *ngiliwat* (*Vitex pubescens*) respectively from the nearby forest, noting that both were still plentiful and easy to find. Furthermore, 108 households (56.3%) reported using rambutan trees and other dried trees or trunks found in the forest for firewood.

Table 4.4: Top three Species of Trees Collected as Firewood (FW) by the Jagoi Bidayuh Community

Type of FW	n	Percentage (%)
<i>Jotu (Hevea brasiliensis)</i>	162	84.4
<i>Sirumah (Ploiarium alternifolium)</i>	116	60.4
<i>Ngiliwat (Vitex pubescens)</i>	131	68.2
Others FW (dried trees/trunk, rambutan)	108	56.3

4.1.3 Utilization of Food Plants

Food plants were among the most frequently gathered types of plants by the Bidayuh Jagoi community. Referring to Table 4.5, 87.7% of households (206) reported gathering edible plants, while only 12.3% (29 households) did not. The community found these edible plants abundant and easily accessible in the forest. Those who did not collect wild food plants indicated that they primarily obtained their vegetables from their gardens or farmland, or purchased them at the weekend market in Bau town. The proximity of their villages to the town area made it convenient for them to travel there on weekends to buy essential items.

The study results indicate that 85.92% of households (177) used the collected plants for personal consumption, 12.14% (25 households) used them for both personal use and sale, and 1.94% (four households) used exclusively for the source of income (Table 4.5). However, the COVID-19 pandemic led to the closure of weekend markets in Duyoh and Serikin, leaving the community with no physical market for their goods. In response, the community adapted by creating an e-market through a WhatsApp group, which demonstrated to be an alternative place, allowing them to continue earning income for their families. This platform remains active even after the weekend market stalls reopened. The new marketplace not only serves to promote their jungle produce but also for other

homemade products and foods. The group members were all residents of the community in the Jagoi area.

A total of 105 households (50.97%) collected food plants only when needed (Table 4.5). Additionally, 46 families (22.33%) gathered them monthly, 44 households (21.36%) annually, and just 11 households (5.34%) collected them weekly. Given the abundance of edible plants, 152 families (73.79%) collected them from the nearby forest outside the Jagoi Heritage Forest (JHF) area, as illustrated in Table 4.5. Meanwhile, 41 families (6.31%) with land within the JHF collected plants during their visits to their land, and 13 families (19.9%) gathered them from both locations.

Table 4.5: Utilization of Food Plants (FP) by the Jagoi Bidayuh Community

Utilization		n	Percentage of households involved (%)
Collect	Yes	206.0	87.7
	No	29.0	12.3
Purpose of collection	Sell	4.0	1.7
	Personal use	177.0	75.3
	Both	25.0	10.6
	NA	29.0	12.3
Location of FP being collected	Inside JHF	41.0	17.4
	Outside JHF	152.0	64.7
	Both areas	13.0	5.5
	NA	29.0	12.3

Table 4.5 continued

Utilization		n	Percentage of households involved (%)
Frequency of collection	None	29.0	12.3
	When needed	105.0	44.7
	Yearly	44.0	18.7
	Monthly	46.0	19.6
	Weekly	11.0	4.7

Toaiyang and Sayok (2019) documented that the Duyoh community in the Jagoi area collected 52 edible plant species, including 22 fruit species. Another study in Jagoi found that 54% of the local community did not sell their food plants, while 46% sold them at nearby markets (Anyoi, 2013). The individuals who sold food plants included housewives, farmers, and pensioners, consistent with findings from the previous study by Anyoi (2013). The collected food plants were both seasonal and available for weekly harvest. Christensen (2002) similarly reported that the Iban community in Nanga Sumpa collected wild vegetables from various locations within their area.

Table 4.6 displays the common types of plants collected by the community from the nearby forest in Jagoi Heritage Forest (JHF). The most frequently collected plant is *rebung* (92.2%), followed by *paku* (*Diplazium esculentum*) at 88.3% and *midin* (*Stenochlaena palustris*) at 84.0%. These plants remain abundant and easily found in both the JHF area and beyond. Other plants collected include *akar tibobuk* (*Smilax* sp.), *lengkuas* (*Alpinia galanga*), *lemba* (*Cucurliigo latifolia*), *tepus* (*Entlingera occinea*), *jambu hutan* (*Syzygium* sp.) and *petai liar* (*Parkia* sp.).

Table 4.6: Top three Species of Forest Resources Collected for Food by the Jagoi Bidayuh Community

Type of Forest Resources	n	Percentage (%)
<i>Rebung</i>	190	92.2
<i>Midin (Stenochlaena palustris)</i>	173	84.0
<i>Paku (Diplazium esculentum)</i>	182	88.3
Other Forest Resources	84	40.8

Toaiang & Sayok (2019) mentioned that 80% of the respondents surveyed talked about *gluming* (*Baccaurea angulata*) as a major wild fruit collected from the nearby forest, which was not mentioned in this study. *Gluming* is a seasonal fruit tree that typically bears fruit at the end of the year. In addition, Toaiang and Sayok (2019) noted some edible plants were not reported by the community including *inyuok* (*Arenga pinnata*), *opit* (*Arenga undulata*), *nibong* (*Oncosperma tigillarium*), *sidudui* (*Caryota mydis*), and *Trisum* (*Salacca affinis*) that obtainable in Jagoi Heritage Forest.

4.1.4 Utilization of Raw Material for Handicrafts

For the use of raw materials in handicrafts, only 80 families (34%) reported gathering them from the nearby forest, while 155 families (66%) no longer do so (see Table 4.7). The 155 families have indicated that they now purchase ready-made crafts from others or local markets. Before the COVID-19 pandemic, many people in the area frequented the popular Serikin market on weekends to find affordable handicrafts. Additionally, some households noted that they no longer possess the skills to make handicrafts, as these skills were not passed down from their parents, and they have been unable to acquire them due to the extensive practice required.

Among the 80 families who collected these materials, 69 (86.25%) reported using them solely for personal purposes. Eight families (10%) stated they used the materials for personal use and sale (either by request or pre-order). Only three families (3.75%) utilized the materials as a source of household income (see Table 4.7).

A total of 68 families (85%) collected useful plants for handicrafts as needed, either from their land or from the wild (outside Jagoi Heritage Forest), as shown in Table 4.7. Eleven families (13.75%) visited the forest (both within and outside JHF) annually, while one family (1.25%) that sold handicrafts went to collect materials monthly to meet demand.

In discussions with the community, it was noted that useful plant resources collected for handicrafts were relatively scarce and difficult to find, particularly in the nearby forest (see Table 4.7). As a result, some families chose to cultivate these plants on their land. Of these families, 59 (73.75%) have land outside of Jagoi Heritage Forest, 12 families (15%) have land within Jagoi Heritage Forest, and nine families (11.25%) collected plants from both areas.

Table 4.7: Utilization of Raw Material for Handicraft (RM) by the Jagoi Bidayuh Community

Utilization		n	Percentage of households involved (%)
Collect	Yes	80.0	34.0
	No	155.0	66.0
Purpose of collection	Sell	3.0	1.3
	Personal use	69.0	29.4
	Both	8.0	3.4
	NA	155.0	66.0
Location of RM being collected	Inside JHF	12.0	5.1
	Outside JHF	59.0	25.1
	Both areas	9.0	3.8

Table 4.7 continued

Utilization		n	Percentage of households involved (%)
Location of RM being collected	NA	155.0	66.0
	None	155.0	66.0
	When needed	68.0	28.9
Frequency of collection	Yearly	11.0	4.7
	Monthly	1.0	0.4
	Total	235.0	100.0

The most common plant collected for handicrafts from the forest was rattan species, comprising 86.3% of the collection (including *Calamus* sp. and *Korthalsia* sp.), followed by bamboo at 66.3% and *mengkuang* (*Pandanus artocarpus*) at 13.8% (see Table 4.8). Also, the Bidayuh Jagoi community gathered *bemban* (*Donax* sp.) and *wi buntak* (*Flagellaria* sp.) as their materials for handcraft products.

Table 4.8: Top three Species of Forest Resources Collected for Handicrafts by the Jagoi Bidayuh Community

Type of Plants	n	Percentage (%)
Rattan	69	86.3
Bamboo	53	66.3
<i>Mengkuang</i> (<i>Pandanus artocarpus</i>)	11	13.8
Others Forest Resources	16	20.0

4.1.5 Fishing and Hunting Activity by the Jagoi Bidayuh Community

The information on community's fishing activities was also inquired in this study (Table 4.9). The survey revealed that 156 households (66.4%) engage in fishing, while 79 households (33.6%) do not. Of the 150 families who fish, 96.2% do so for personal

consumption, two families (1.27%) mentioned selling their catch, and four families (2.53%) fish for personal use and to sell extra when they catch more.

Currently, 112 households (72.15%) reported fishing only as needed, followed by 22 households (13.92%) who fish annually, 16 households (10.13%) who fish monthly, and six households (3.8%) who go fishing weekly (see Table 4.9). According to the respondents, fishing has become more of a hobby since they can now easily purchase fish (including seafoods) at nearby markets in Kampung Sri'eng and Bau Town.

Table 4.9: Trend of Fishing Activity of the Jagoi Bidayuh Community

Utilization		n	Percentage of households involved (%)
Collect	Yes	79.0	33.6
	No	156.0	66.4
Purpose of collection	Sell	1.0	0.4
	Personal use	76.0	32.3
	Both	2.0	0.9
	NA	156.0	66.4
Location	Inside JHF	8.0	3.4
	Outside JHF	70.0	29.8
	Both areas	1.0	0.4
	NA	156.0	66.4
Frequency of collection	None	156.0	66.4
	When needed	57.0	24.3
	Yearly	11.0	4.7
	Monthly	8.0	3.4
	Weekly	3.0	1.3

Commonly caught species include *keli* (*Clarias* spp.) (92.4%), *seluang* (*Rasbora* spp.) (63.3%), and *ikan haruan* (*Channa* spp.) (51.9%). Other species caught include *labi-labi*, *kura-kura*, *toman* and *ketam Sungai* (potamid crabs) (see Table 4.10). The community uses nets, *bubu* traps and fishing rods in streams and nearby rivers within and outside Jagoi Heritage Forest). The respondents have reported that the aquatic species in their area are quite low and difficult to catch.

Table 4.10: Top three Species of River Fauna Collected for Food by the Jagoi Bidayuh Community

Type of River Fauna	n	Percentage (%)
<i>Keli</i> (<i>Clarias</i> spp.)	73	92.4
<i>Haruan</i> (<i>Channa</i> spp.)	41	51.9
<i>Seluang</i> (<i>Rasbora</i> spp.)	50	63.3
Others River Fauna	49	62.0

Out of 235 households, only 16 families (6.8%) reported engaging in hunting while 219 families (93.2%) did not (Table 4.11). According to residents, it is hard to find large animals unless they travel far from Jagoi Heritage Forest. Furthermore, respondents noted that animal tracks are also rarely seen in the nearby forest.

Of the 15 households that engaged in hunting, 14 (94%) primarily hunted for their consumption. One household (6%) hunted for personal use and sale, and none hunted exclusively for selling (Table 4.11). A total of 15 households (94%) that went hunting mostly hunted them for their consumption, while one household (6%) responded for both consumption and sale and none of them hunted to sell only (Table 4.11).

Table 4.11: Trend of Hunting Activity of the Jagoi Bidayuh Community

Utilization		n	Percentage of households involved (%)
Collect	Yes	16	6.8
	No	219	93.2
Purpose	Own Consumption	15	6.4
	Both	14	6.0
	NA	206	87.7

The most commonly hunted animals were squirrels (50%) and civets (43.8%). Other animals were seldom available (these include wild boar, deer, porcupine, and pangolin) and were mostly found outside of Jagoi Heritage Forest. A detailed list of the hunted animals is provided in Table 4.12.

Table 4.12: Top three Species of Wild Animals Hunted by the Jagoi Bidayuh Community

Type of Animals	n	Percentage (%)
<i>Tupai</i> (Squirrel)	8	50.0
<i>Musang</i> (Civet)	7	43.8
<i>Burung</i> (Birds)	1	6.3
Other Animal	12	75.0

4.2 Socio-Demographic Characteristics of the Respondents

The socio-demographic traits of the households were examined through demographic statistics, focusing on factors such as gender, age, household size, education, family income, and occupation. A survey was conducted with 235 respondents (Bidayuh Jagoi) living around the Jagoi Heritage Forest. These respondents were randomly selected with assistance

from their village heads, specifically targeting individuals knowledgeable about the forest's use.

4.2.1 Socio-Economic Profile

The socio-economic result reveals that most respondents fall within the prime working age of 25-54 years, comprising 47.2% as detailed in (Table 4.13, Appendix 1). The proportion of respondents in the mature working age bracket of 55-64 years is 29.4%, which is also higher than those in the early working age and elderly categories. Among the respondents, 57.4% are female, while 42.6% are male. The most frequent response from the Bidayuh Jagoi is they received a formal education, with the largest group having completed Form 5 (26.8%). Only 12.3% of respondents have no formal education. Furthermore, the most common household size is 5-8 members, representing 46.0%, indicating a medium-sized household.

There is a large variety of the respondents' occupations ranging from the professionals such as medical officers and teachers to non-professionals such as farmers and service workers. Majority of the respondents are housewives (31.3%). This may be due to the time of interviews conducted and the availability of respondents at the time of the interview. Besides that, respondents involved in the agriculture/plantation industry (23%) also are among the highest percentage. The lowest percentage of respondent's occupations are professionals namely, bank staff/managers (0.4%) and medical officers (0.4%).

The result also shows that the main family income among the respondents is from agriculture (including selling vegetables, fish, and livestock) activities (37.9%). Another 31.1% of the main income also comes from their salary. Besides that, the majority of the respondents do not have any secondary family income (76.2%). Only 23.8% of the

respondents have secondary income such as from their pension (5.1%), agriculture activities (4.3%), and salary (4.3%).

Table 4.13: Socio-Economic Profile of the Jagoi Bidayuh Community in Bau, District, Sarawak

Socio-demographic		n	Percentage (%)
Age	25-54 years old (Prime working age)	111	47.2
	55-64 years old (Mature working age)	69	29.4
Gender	Male	100	42.6
	Female	135	57.4
Education level	Primary 6	43	18.3
	Form 3	47	20.0
	Form 5	63	26.8
	No education	29	12.3
Household size	Less than 4 (Small)	107	45.5
	5-8 (Medium)	108	46.0
Occupation	Agriculture/plantation industry	54	23.0
	Banking industry	1	0.4
	Housewife	73	31.1
	Medical industry	1	0.4
Main family income	Agriculture (including selling vegetables, fish, and livestock)	89	37.9
	Salary	73	31.1
Secondary family income	Agriculture (including selling vegetables, fish, and livestock)	10	4.3
	Pension	12	5.1
	Salary	10	4.3
	None	179	76.2

4.3 Socio-Demographic Factors Influencing the NTFPs Utilization

4.3.1 Correlation Test with NTFPs Utilization

A Spearman Correlation analysis was conducted to see whether there is a correlation between the socio-demographic factors and NTFPs utilization. The result shows five correlations between the frequency of collection and socio-economic factors of age, education level, and household size (Table 4.14). From the study findings, five significant correlations were identified with only one result showing some slight relationship.

From the result, it is shown that there is some slight positive relationship at the $p < 0.05$ level between the frequency of firewood collection and age level, $r = 0.22$, $p < 0.00$. It shows that the older the respondents are, the higher the frequency of firewood collection. A similar result was found by Mushi et al. (2020) in which age only contributes partially to the frequency of firewood collection in Tanzania. Moreover, a previous study by Egwuonwu & Nweke (2019) in Nigeria found that the increase in age among the respondents also led to an increase in the frequency of collection and utilization of firewood.

Next, there are also correlations between the frequency of firewood collected with household size, $r = 0.17$, $p = 0.01$ and firewood with education level, $r = 0.14$, $p = 0.03$. However, the relationships are a little negative, hence the relationship is ignored.

Similarly, a study by Seboka & Kawo (2020) in Ethiopia found that the lower the education level of the respondents, the higher the fuelwood consumption level gets. A decrease in one standard deviation in the education level would yield a 0.247 increase in fuelwood consumption. However, another study by Amoah et al. (2019) in Ghana found no significance relationship between education level and variation in firewood collection.

Instead, the switch to modern fuels is more prominent among respondents with higher education levels.

Another correlation identified is the frequency of raw material for handicrafts with education level, $r = 0.19$, $p < 0.00$. The relationship is weak; hence the relationship is ignored. Likewise, the relationship is weak between fishing activity and age, $r = 0.13$, $p = 0.04$, even though the correlation is significant.

Most of our respondents answered that their education is in secondary school (Form 3 and Form 5), women are more than men and the women are mostly a housewife. Madeline (2001) has stated that for the rural people of Sarawak, involve in commercial handicraft production provides them with the opportunity to earn cash income and participate part-time, especially for the disadvantaged groups like poorly educated, women and the elderly in rural Sarawak. Then, Gapor et al. (2019) recorded that handicraft making is one of the rural community's activities that depend heavily on the availability of natural resources as the main raw material.

Fishing is not a main job or activity done by the Jagoi community in Bau, Sarawak and it shows that the older people know more about the activity and less anticipated by the younger generation. The local people here have other activities to do daily, and this was also similarly stated by Allison & Ellis (2001) where diversified livelihood is also a feature of the household strategies, with members of fishing households often being involved in different economic sectors to smooth the effects of resource variations.

Table 4.14: Socio-demographic Factors Influencing the NTFPs Utilization by the Jagoi Bidayuh Community in Bau District, Sarawak

NTFP category	Socio-demographic factors	Spearman coefficient	Significance (p-value)	n	Strength of relationship
Firewood	Age	0.22	0.00	235.00	Some slight relationship
	Household size	0.17	0.01	235.00	Little or no relationship
	Education level	-0.19	0.00	233.00	Little or no relationship
Food plants	Household size	0.13	0.05	235.00	Little or no relationship
Raw material for handicrafts	Education level	-0.19	0.00	233.00	Little or no relationship
Fishing	Age	-0.13	0.04	235.00	Little or no relationship

* Correlation is significant at the 0.05 level.

4.3.2 Comparison of NTFPs Utilization

Mann-Whitney Test and Kruskal-Wallis's test were used to see the relationship between socio-economic factors towards the utilization of NTFPS within the nearby forest by the Jagoi community. The factors involved were age, education, household size, main family income, secondary family income and occupation (Appendix C).

Several cases show a significant relationship with the utilization of medicinal plants, firewood, raw material for handicrafts and food plants. On the other hand, there is no significant relationship for fishing activity in this study (Appendix C). There are significant differences between ages in firewood collection, the purpose of collecting them, the location of NTFPS gathering, and its frequency. The collection is ($r(3) = 14.71, p < 0.00$), purpose ($r(3) = 10.39, p = 0.02$), location ($r(3) = 11.43, p = 0.01$), and frequency ($r(3) = 14.39, p < 0.00$). The highest mean difference for collection, purpose, and location is the same between 25 – 54 years old and 15 – 24 years old (Appendix D). The collection mean difference is 25-54 years old (mean rank = 129.82) and 15 – 24 years old (mean rank = 97.00). Next, the purpose is 25 – 54 years old (mean rank = 128.46) and 15 – 24 years old (mean rank = 97.50). Following the are location is 25 – 54 years old (mean rank = 130.90) and 15 – 24 years old (mean rank = 79.33). In contrast, for frequency, the early working age (15 – 24 years old) is the highest (mean rank = 146.67) and the prime working age (25 – 54 years old) is the lowest (mean rank = 103.26) (Appendix D).

Another significance relationship with the utilization of firewood is the education level ($r(12) = 22.64, p = 0.03$) (Appendix C). The highest mean difference is between form 4 (mean rank = 225.50) and degree holder (mean rank = 78.20) (Appendix F). For the household size factor relationship with firewood utilization, there are three significance relationships identified with a collection of firewood ($r(2) = 6.40, p = 0.04$) (Appendix C).

The highest mean difference is between small-size families [< 4] (mean rank = 125.55) and big family sizes [> 9] (mean rank = 102.88). Next is with the location ($r(2) = 7.57$, $p = 0.02$). The highest mean difference is between small-size families [< 4] (mean rank = 127.66) and big family sizes [> 9] (mean rank = 92.23) (Appendix G). Lastly is the relationship with the frequency of collecting the firewood ($r(2) = 9.87$, $p = 0.01$). The highest mean difference is in contrast with collected and location where big family size [> 9] (mean rank = 153.48) and small size family [< 4] (mean rank = 109.26) (Appendix G).

The main source of family income also has a significance relationship with firewood utilization. There are two significance relationships between firewood collection and the purpose of collecting them by the community. On the relationship of collecting firewood ($r(7) = 15.81$, $p = 0.03$). The highest mean differences are between own business (mean rank = 151.23) and contract work (mean rank = 97.00), Perkoso (mean rank = 97.00), and selling jungle produce (mean rank = 97.00). Between purpose is ($r(7) = 16.62$), $p = 0.02$). The highest mean difference is the same between own business (mean rank = 151.50) and contract work (mean rank = 97.50), Perkoso (mean rank = 97.50), and selling jungle produce (mean rank = 97.50) (Appendix C).

Furthermore, there are significance difference between occupations in the collection of medicinal plant ($r(13) = 24.62$), $p = 0.03$) (Appendix C). The highest mean difference is between armed forces, banking industry, education sector, manufacturing industry, and medical industry at (mean rank = 148.50) and service industry (mean rank = 61.38). Another significance different is between purpose of collecting medicinal plants ($r(13) = 22.95$, $p = 0.04$). Value of the highest mean different is the same as collection of medicinal plants with service industry (mean rank = 68.63) (Appendix H).

Likewise, the location also has significance different with the occupations in medicinal plant utilization ($r(13) = 22.21, p = 0.05$) (Appendix C). The highest mean different is still the same as the other two factors with lowest mean different of service industry at (mean rank = 58.50). Significance relationship between occupations and the frequency is on the other hand of the other three variables ($r(13) = 26.05, p = 0.02$). The highest mean different of service industry (mean rank = 185.50) is between armed forces, banking industry, education sector, manufacturing industry, and medical industry at (mean rank = 86.50) (Appendix H).

Furthermore, from Appendix C, there is a significance between ages in the collection of food plants ($r(3) = 7.83, p = 0.05$). The highest mean different is between the elderly of 65 years old and above (mean rank = 130.62) and the early working age of 15-24 years old (mean rank = 103.50) (Appendix D). Other than that, a significance also happened between education level in location of collecting food plants and with its frequency of collecting those plants in the nearby forest ($r(12) = 20.96, p = 0.05$), ($r(12) = 22.54, p = 0.03$) respectively (Appendix C). The mean different for location is between form 4 (mean rank = 219.00) and primary 1 (mean rank = 48.43) while for its frequency, the highest mean different is between form 2 (mean rank = 199.50) and form 4 (mean rank = 15.00). Another significance different found in the food plant collection is in between household size in the frequency of food plant gathering ($r(2) = 6.60, p = 0.04$). The highest mean different is between medium size family of five to eight people (mean rank = 129.56) and small family size of four people and below (mean rank = 107.23) (Appendix G).

The education level also has significance difference in raw material for handicraft (RM) collection, purpose, and on its frequency of raw material utilization. The significance of RM collection ($r(12) = 22.29, p = 0.03$) and the highest mean different are between form

4 (mean rank = 156.00), STPM/Matriculation/Diploma (mean rank = 156.00) and the lowest mean rank is primary 3 (mean rank = 73.81). Secondly, the significance of the purpose of collecting RM with the education level ($r(12) = 23.14$, $p = 0.03$). The highest mean difference is similar to the RM collection with form 4 and STPM/Matriculation/Diploma at the (mean rank = 156.00) and the lowest mean rank is primary 3 (mean rank = 73.81). Lastly, there is a significance difference between the education level in the frequency of RM use ($r(12) = 23.92$, $p = 0.02$). The highest mean difference is between primary 3 (mean rank = 163.38) and with two education level which is form 4 and STPM/Matriculation/Diploma (mean rank = 78.00) (Appendix C, Appendix G).

4.4 Involvement of the Local Community in the Conservation of Jagoi Heritage Forest

4.4.1 Level of Involvement of the Jagoi Bidayuh Community in JHF Management

A total of 210 respondents (89.4%) have said they agreed to be part in the management of the old village at the top of Bung Jagoi (Mount Jagoi) because it was their ancestor's heritage, then should be developed as the community legacy site in Bau District (Table 4.23). However, 25 respondents (10.6%) have not agreed to cooperate. This is because the respondents are actually not physically fit and few of them are the elders. They will support any development to protect the area, but they cannot be involved physically to maintain and protect it.

Table 4.15: Participation of the Jagoi Bidayuh Community in Conserving the Old Village

Participation	n	Percentage of the community agreed (%)
Yes	210	89.4
No	25	10.6
Total	235	100.0

Table 4.24 below lists options on how the community could be involved in the management of JHF. From the survey, most of the respondents have agreeing with the suggestion of reporting illegal activities to the JADC Committee (28.1%) as their main platform followed by ground and boundary patrol by the appointed villagers' (23.8%). Then, 23.4% of the respondents agreed with the installation of warning signboards on protected plants and animals in JHF and also conducting education and awareness programs with the local communities.

Table 4.16: Potential Activities that can be Implemented in the Management of Jagoi Heritage Forest

Role/Activity Category	n	Percentage of households saying that the activity was possible (%)
Ground and boundary patrol	56	23.8
Guard post	3	1.3
Install warning signboards on protected plants & animals	55	23.4
Conducting education on an awareness program	55	23.4
Reporting illegal activities	66	28.1

4.4.2 Significant Heritage to be Conserved and Improved in Jagoi Heritage Forest

On the significant heritage that should be protected, the community expressed and agreed that the water catchment area which is also their gravity feed sources must be conserved (42.6%) even though now they have access to water treatment supply by the Government (Table 4.25). Other significant heritage were ecotourism sites (12.3%) and *tibawang* (old fruit orchard) (11.9%). The least important was on the hiking trails to Bung Jagoi with 2.6% vote only. The trails are still in a good shape, and the community said they want to prioritize their focus in protecting their heritage.

Table 4.17: List of Significant Heritages in Jagoi Heritage Forest

List of heritage available	n	Percentage of households agreed on the importance of the significant heritage (%)
Homestay	27	11.5
Trails	6	2.6
Ecotourism sites	29	12.3
Source of gravity feed	100	42.6

Table 4.17 continued

List of heritage available	n	Percentage of households agreed on the importance of the significant heritage (%)
Gawai house at Bung Jagoi	21	8.9
Tibawang (old fruit orchards)	28	11.9
Flora and Fauna	24	10.2

4.5 Local's Perception on Natural Resources and Environment of Jagoi Heritage Forest

4.5.1 The Importance of Jagoi Heritage Forest to the Jagoi Bidayuh Community

Majority of the community agreed that they are still depending on the resources from the nearby forest (inside and outside JHF) when 37% answered agree, and 47.2% answered totally agree and only 1.3% of the households have answered disagree (Table 4.26).

Table 4.18: Dependency of the Jagoi Bidayuh Community on Forest Resources

Responses	No. of household	Percentage (%)
Totally Disagree	3	1.3
Disagree	25	10.6
Indifferent	9	3.8
Agree	87	37.0
Totally Agree	111	47.2

Next, JHF are significance to the Jagoi community when 76.2% of them responded totally agree that the forest supplied them with clean water for daily use (Table 4.27). They

preferred to use gravity feed instead of water supply from the Government. 2.1% of the respondents disagree as their home is only connected to the treatment water provided.

Table 4.19: JHF Plays an Important Role as Clean Water Source to the Surrounding Villages

Responses	No. of household	Percentage (%)
Disagree	5	2.1
Indifferent	1	0.4
Agree	50	21.3
Totally Agree	179	76.2

4.5.2 Future Management of Jagoi Heritage Forest

To keep the forest healthy and sustainable, the respondents believed and agree that a proper management plan is important to be prepared by JADC Committee and it is to be done with all villagers (46.4% agree and 46% totally agree) in ensuring all aspect will be incorporated and no one left behind to avoid misunderstanding especially on the farmland boundary. (Table 4.28).

Table 4.20: Perception of the Jagoi Bidayuh Community Towards Proper Management of Jagoi Heritage Forest

Responses	No. of household	Percentage (%)
Disagree	10	4.3
Indifferent	8	3.4
Agree	109	46.4
Totally Agree	108	46.0

The community also responded positively when most of them agreed that the forest should be managed and handle by the local communities itself (52.8% agree and 45.5%

totally agree). Only 1.7% disagreed as they were unclear on the direction of the project's goal (Table 4.29) lead by JADC Committee. According to a few of the respondents answered disagree because they are not being invited to the meeting and other event conducted by the committee. However, according to the JADC Chairman, the headmen as a member of the committee will be the one responsible to any communication delivery. Some of the communities might left behind and the information's are not well delivered to each one of them.

Table 4.21: Perception on JHF's Management by the Jagoi Bidayuh Community

Responses	No. of household	Percentage (%)
Disagree	4	1.7
Agree	124	52.8
Totally Agree	107	45.5

On the participation of the local people in managing JHF, the respondents have shown positive feedback (37.4% agree and 49.8% totally agree) as they want to preserve their legacy (Table 4.30). Minority of the respondents have replied disagree due to their health issues and age, but they still support the effort to conserve the forest for future generations. They are unable to help physically, but they really hope that the legacy will still be there for years to come.

Table 4.22: Participation and Involvement of the Jagoi Bidayuh Community in Managing Jagoi Heritage Forest

Responses	No. of household	Percentage (%)
Disagree	29	12.3
Indifferent	1	0.4

Table 4.22 continued

Responses	No. of household	Percentage (%)
Agree	88	37.4
Totally Agree	117	49.8

4.5.3 Conservation of Resources in Jagoi Heritage Forest

On the conservation of the forest resources, majority households responded positively (48.5% agree and 44.7% totally agree) that they should collect those useful resources in a small quantity to keep it always available and survive in the forest (Table 4.31). On the other hand, 3.4% of them disagreed with that idea as they believed not all local people will do that even though you asked them not to. Some of the communities will be gathered everything they saw.

Table 4.15: Collection of Forest Resources in Adequate Quantity in Jagoi Heritage Forest

Responses	No. of household	Percentage (%)
Disagree	8	3.4
Indifferent	8	3.4
Agree	114	48.5
Totally Agree	105	44.7

A total of 46.8% agree and 46.0% respondents totally agree that the community should collect forest resources at different places to maintain its population in the forest. The community should aware and know better on the resource's distribution and availability in the forest. Only Minority have responded disagree (3.4%) and totally disagree (0.4%) as they have planted some of the useful resources or plants at their own farm (Table 4.32).

Table 4.16: Collection of Forest Resources at Various Places in Jagoi Heritage Forest

Responses	No. of household	Percentage (%)
Totally Disagree	1	0.4
Disagree	8	3.4
Indifferent	8	3.4
Agree	110	46.8

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Pattern of NTFPs Utilization According to Purpose of Utilization, Location of Collection, and Collecting Frequency

In conclusion, a total of 235 respondent of the Bidayuh Jagoi dialect group were surveyed where they lived surrounding the JHF. The age of the respondents ranges from 22 years old to 90 years old. The household were selected randomly with full-timer resident were interviewed. The Jagoi community still depends on the forest resources for medicine, food, handicraft making, firewood, and they do fish and hunting.

From the study, only 26.81% of the local people living surrounding the JHF were using the medicinal plants from the forest. Majority of them went to a nearby clinic or pharmacy in Bau town to treat their illnesses. Some still rely on the medicinal plants for their own use in the families, especially in the event of emergencies and as their traditional health supplement. Those households that depending on the traditional medicines harvested it outside the JHF area and they also planted it near the house compound. For certain species, they only collected it when needed (77.78%) from the wild. Common species collected by the Jagoi community were *dowon kapal* (*Hoya* sp.), *tongkat ali* (*Eurycoma longifolia*), *durian belanda* (*Annona muricata*), *rumpu semalu* (*Mimosa pudica*), *daun sireh* (*Piper betle*), *popar doyak* (*Piper porphyrophyllum*), and *kacip Fatimah* (*Labisia pumila*). The abundance of medicinal plants was low, but still can be easily found by the local people.

Firewood was important for the Jagoi community. A total of 82.10% of respondent collected the firewood and majority (96.30%) were for their own use especially for barbeque, to cook livestock's food and to prepare local dishes that were cooked using bamboo. The

demand also increases during school holiday or festive season. The local people collected it only when needed and they normally gathered it in a large amount that can be kept for months. Firewood was said to be abundant in the area and easy to access. Common species that were used including *jotu* (*Hevea brasiliensis*), *ngiliwat* (*Vitex pubescens*), *sirumah* (*Ploiarium alternifolium*), and *rambutan*. The choices of these species were said to burn moderately easy, no excessive smoke and no unpleasant odour.

In Jagoi area, 87.70% of the community were still collecting wild vegetables for their own consumption (85.92%) from the nearby forest and at their own farmland that were located outside the JHF area. Those wild vegetables were easily found and still abundant. Most of them collected it when needed (50.97%) as they also planted vegetables at their house compound. Besides, the wild vegetables were also easily be found at the weekend market in town. Therefore, some of them prefer to buy it there. The common species that the Jagoi collected are *rebung* (bamboo shoot), *paku* (*Nephrolepis* sp.), *midin* (*Stenochlaena palustris*), *akar tibobuk* (*Smilax* sp.), *lengkuas* (*Alpina galanga*), *lemba* (*Cucurligo latifolia*), *tepus* (*Entlingera occinea*), *jambu hutan* (*Syzygium* sp.), and *petai liar* (*Parkia* sp.).

From the study, 34.00% of the households responded collected the materials to make handicraft from the nearby forest. The rest prefer to buy it, plus they do not have the skills and experience in making the crafts. The knowledge on making the handicraft has declined as fewer skilled older generations were left. JADC does their very best to overcome this situation by organizing several workshops to the community that are interested. According to the local people, now they have planted some of the useful materials at their own land such as rattan (*Calamus* sp. and *Korthalsia* sp.) and bamboo for their own use when needed in future. Common material utilized by the Jagoi community are rattan (*Calamus* sp. and

Korthalsia sp, and *Flagellaria* sp.), bamboo, *mengkuang* (*Pandanus artocapus*), and *bemban* (*Donax* sp.).

The Jagoi community were still fishing (66.4%) and the minority doing hunting (6.8%) activity. Fishing is a part-time activity by the community members, and they only do it as a leisure activity and seasonal. Similarly for hunting activity and from the respondent feedback, only small animals are available such as squirrel, civet, birds, porcupine, pangolin and sometimes, big animal like wild boar was found. Common aquatic species being catch were *keli*, *haruan*, *labi-labi*, *kura-kura*, and *toman*. Both purposes of the activities are for their own consumption, fishing (72.15%), and from 15 respondents for hunting, 94.00% said for their own use. As JHF was a community-conserved area, JADC always advocate for the local community not hunting within the conserved forest anymore. Therefore, the hunting game only happened further from JHF.

5.2 Socio-Economic Factors Influencing the NTFPs Utilization by the Jagoi Bidayuh Community

A correlation analysis (Spearman's correlation) was done and there were five significance correlations identified with only one showing a slight positive relationship which is between the frequency of firewood collection and age level. It showed that the older respondents were, the higher the frequency of firewood collection. The other four correlations between the frequency of collection and socio-economic factors showed weak relationships. Hence, the null hypothesis is rejected. There is a significant correlation between NTFPs utilization and the socio-economic factors of the Jagoi community in Bau, Sarawak.

5.3 The Importance of Jagoi Heritage Forest to the Jagoi Bidayuh Community

Majority (89.40%) of the respondents answered that they are still depend on forest resources for food, herbs, materials for handicrafts making, firewood and do fishing. Although they have access to a clean water supply, the community preferred to use gravity feed from the mountain. Only for certain reasons, especially after heavy downpour they will use the water treatment supply.

Next, most of the households (46.00% totally agreed, and 46.4% agreed) that a proper management plan is needed in managing the heritage forest. They also shared their opinion that the local communities should manage the forest themselves, and they were also willing to be part of the team (JADC), to conserve and protect the forest and its resources from declining.

As the forest resources were important to the community in the Jagoi area, many of the respondents totally agreed that they should harvest the resources in a small quantity and collect it from different places. They also believed that the resources needed some time to regenerate. They supported the effort made by JADC to conserve the forest and they were pleased with its current management. But most of the community were not aware of the JHF boundary, thus the committee needed to approach and share their current works with the local people.

JHF are a significance heritage to the Jagoi community. They depended on the forest resources for living and the forest also provided them with clean water and improve their economic activity through ecotourism activity. They wanted to preserve their history and culture in Mount Jagoi by preserving their old village and protecting the forest.

5.4 Recommendations

Traditional knowledge from each ethnic group is really important to be documented properly and well-studied. When times go by, the demand and needs to support the household, local community may overexploit the forest resources especially within the conserved areas. Hence, it is recommended for the local leaders (JADC Committee) to share important knowledge on harvesting the resources in a sustainable manner. Further effort is required from various agencies (if needed) to provide input in preparing the management plan of the heritage forest.

Furthermore, it is also suggested that JADC will conduct frequent dialogue session with their respective villages to explain on any works done within JHF to avoid any misunderstanding and to enhance the knowledge of local people on what is happening in the area. Lastly, study on ecotourism carrying capacity for Bung Jagoi is indeed important to be carried out in future, to ensure the ecotourism activity could be done sustainably which could benefit local community fairly and reduce the impact of tourism mass to Bung Jagoi. With the effort and commitment made by JADC so far, to go for the international recognition on the IUCN Green List for JHF, it is really important that all necessary requirement and better management approach are all in place.

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APPENDICES

Appendix A: Socio-Economic Profile of the Bidayuh Jagoi Community in Bau, District, Sarawak

Socio-demographic		No. of household	Percentage (%)
Age	15-24 years old (Early working age)	3	1.3
	25-54 years old (Prime working age)	111	47.2
	55-64 years old (Mature working age)	69	29.4
	More than 65 years old (Elderly)	52	22.1
	Total	235	100.0
Gender	Male	100	42.6
	Female	135	57.4
	Total	235	100.0
Education level	Primary 1	7	3.0
	Primary 2	5	2.1
	Primary 3	13	5.5
	Primary 4	9	3.8
	Primary 5	4	1.7
	Primary 6	43	18.3

Appendix A continued

Socio-demographic		No. of household	Percentage (%)
Education level	Form 2	2	0.9
	Form 3	47	20.0
	Form 4	1	0.4
	Form 5	63	26.8
	STPM/Matriculation/Diploma	7	3.0
	Degree holder	5	2.1
	No education	29	12.3
	Total	235	100.0
Household size	Less than 4 (Small)	107	45.5
	5-8 (Medium)	108	46.0
	More than 9 (Big)	20	8.5
	Total	235	100.0
Occupation	Agriculture/plantation industry	54	23.0
	Armed forces	3	1.3
	Banking industry	1	0.4
	Business	14	6.0
	Construction	10	4.3
	Education sector	5	2.1
	Housewife	73	31.1
	Manufacturing industry	2	0.9
	Medical industry	1	0.4
	Office administrator/manager	20	8.5
	Retiree	31	13.2
	Service industry	4	1.7
	Village head	5	2.1
	Unemployed	12	5.1

Appendix A continued

Socio-demographic			No. of household	Percentage (%)
Main family income	Agriculture (including selling vegetables, fish, and livestock)		89	37.9
	Contract work		2	0.9
	Own a business (besides selling agriculture/forest produce)		13	5.5
	Pension		33	14.0
	Perkeso		1	0.4
	Remittance from kids		21	8.9
	Salary		73	31.1
	Selling jungle produce (Including handicraft and stingless bee honey)		3	1.3
	Total		235	100.0
Secondary family income	Agriculture (including selling vegetables, fish, and livestock)		10	4.3
	Contract work		1	0.4
	Village head allowance		3	1.3
	Own a business (besides selling agriculture/forest produce)		4	1.7
	Pension		12	5.1
	Remittance from kids in town		9	3.8
	Salary		10	4.3
	Selling jungle produce (Including handicraft and stingless bee honey)		7	3.0
	None		179	76.2
	Total		235	100.0

Appendix B: Socio-demographic Factors Influencing the NTFPs Utilization by the Bidayuh Jagoi Community in Bau District, Sarawak

NTFP category	Socio-demographic factors	Spearman coefficient	Significance (p-value)	n	Strength of relationship
Medicinal plants	Age	0.00	1.00	235.00	Little or no relationship
	Household size	0.01	0.90	235.00	Little or no relationship
	Education level	0.01	0.87	233.00	Little or no relationship
Firewood	Age	0.22	0.00	235.00	Some slight relationship
	Household size	0.17	0.01	235.00	Little or no relationship
	Education level	-0.19	0.00	233.00	Little or no relationship
Food plants	Age	-0.08	0.23	235.00	Little or no relationship
	Household size	0.13	0.05	235.00	Little or no relationship
	Education level	-0.08	0.21	233.00	Little or no relationship
Raw material for handicrafts	Age	0.08	0.23	235.00	Little or no relationship
	Household size	0.10	0.14	235.00	Little or no relationship
	Education level	-0.19	0.00	233.00	Little or no relationship
Fishing	Age	-0.13	0.04	235.00	Little or no relationship
	Household size	0.04	0.57	235.00	Little or no relationship
	Education level	0.06	0.33	233.00	Little or no relationship

* Correlation is significant at the 0.05 level.

Appendix C: Comparison of NTFPs Utilization between Socio-demographic Factors of the Bidayuh Jagoi Community

Socio-demographic factor		Medicinal Plants				Firewood				Food Plants				Raw Material for Handicraft				Fishing			
		Collect	Purpose	Location	Frequency	Collect	Purpose	Location	Frequency	Collect	Purpose	Location	Frequency	Collect	Purpose	Location	Frequency	Collect	Purpose	Location	Frequency
Age	Chi-Square	1.44	1.63	2.01	1.50	14.71	10.39	11.43	14.39	7.83	7.24	1.28	4.17	5.34	5.78	5.87	7.29	5.82	5.76	5.12	6.43
	df	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
	Significance Value (p-value)	0.70	0.65	0.57	0.68	0.00	0.02	0.01	0.00	0.05	0.06	0.73	0.24	0.15	0.12	0.12	0.06	0.12	0.12	0.16	0.09
Gender	Mann-Whitney U	6375.00	6360.50	6501.50	6387.50	6412.50	6548.50	6546.50	6746.50	6710.00	6625.50	5919.00	6235.00	6285.00	6423.50	6578.50	6309.50	6117.50	6137.00	6137.00	5974.00
	Wilcoxon W	11425.00	11410.50	11551.50	15567.50	11462.50	11598.50	15726.50	15926.50	11760.00	11675.50	15099.00	15415.00	11335.00	11473.50	11628.50	15489.50	11167.50	11187.00	11187.00	15154.00
	Z	-0.95	-0.98	-0.62	-0.91	-0.99	-0.55	-0.46	-0.01	-0.14	-0.32	-1.90	-1.06	-1.10	-0.76	-0.40	-1.03	-1.50	-1.45	-1.44	-1.81
	Significance Value (p-value)	0.34	0.33	0.53	0.36	0.32	0.58	0.65	0.99	0.89	0.75	0.06	0.29	0.27	0.44	0.69	0.30	0.13	0.15	0.15	0.07

Appendix C continued

Socio-demographic factor		Medicinal Plants				Firewood				Food Plants				Raw Material for Handicraft				Fishing			
		Collect	Purpose	Location	Frequency	Collect	Purpose	Location	Frequency	Collect	Purpose	Location	Frequency	Collect	Purpose	Location	Frequency	Collect	Purpose	Location	Frequency
Education Level	Chi-Square	19.89	19.48	18.39	19.08	12.85	12.60	17.83	22.64	17.67	17.76	20.96	22.54	22.29	23.14	19.97	23.92	12.56	12.22	10.59	11.61
	df	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
	Significance Value (p-value)	0.07	0.08	0.10	0.09	0.38	0.40	0.12	0.03	0.13	0.12	0.05	0.03	0.03	0.03	0.07	0.02	0.40	0.43	0.56	0.48
Household size	Chi-Square	0.15	0.18	0.11	0.18	6.41	4.16	7.57	9.87	3.68	0.46	1.56	6.60	4.00	4.16	4.30	4.78	1.94	1.82	2.07	2.31
	df	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
	Significance Value (p-value)	0.93	0.92	0.95	0.91	0.04	0.12	0.02	0.01	0.16	0.79	0.46	0.04	0.14	0.12	0.12	0.09	0.38	0.40	0.35	0.32
Main Source of Family Income	Chi-Square	6.68	6.45	7.07	6.14	15.81	16.62	9.22	11.38	9.72	8.05	9.37	5.52	2.58	2.99	2.73	2.61	3.81	3.94	3.18	4.73
	df	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
	Significance Value (p-value)	0.46	0.49	0.42	0.52	0.03	0.02	0.24	0.12	0.20	0.33	0.23	0.60	0.92	0.89	0.91	0.92	0.80	0.79	0.87	0.69

Appendix C continued

Socio-demographic factor		Medicinal Plants				Firewood				Food Plants				Raw Material for Handicraft				Fishing			
		Collect	Purpose	Location	Frequency	Collect	Purpose	Location	Frequency	Collect	Purpose	Location	Frequency	Collect	Purpose	Location	Frequency	Collect	Purpose	Location	Frequency
Secondary Source of Family Income	Chi-Square	13.45	12.59	12.36	12.47	9.22	8.01	6.73	7.47	4.26	8.23	8.70	4.10	11.16	8.87	9.11	12.14	8.37	7.96	8.73	6.95
	df	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
	Significance Value (p-value)	0.10	0.13	0.14	0.13	0.32	0.43	0.57	0.49	0.83	0.41	0.37	0.85	0.19	0.35	0.33	0.14	0.40	0.44	0.37	0.54
Occupation	Chi-Square	24.62	22.95	22.21	26.05	16.36	14.68	9.13	12.86	16.17	13.77	16.82	14.95	10.24	10.92	9.09	11.36	14.87	14.95	14.22	16.86
	df	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00
	Significance Value (p-value)	0.03	0.04	0.05	0.02	0.23	0.33	0.76	0.46	0.24	0.39	0.21	0.31	0.67	0.62	0.77	0.58	0.32	0.31	0.36	0.21

Note: Significant at 0.05 level.

Appendix D: Ranks of NTFPs Utilization with the Age Group of the Jagoi Bidayuh Community

NTFP Category			15-24 years old (Early working age)	25-54 years old (Prime working age)	55-64 years old (Mature working age)	>65 years old (Elderly)	Total
Medicinal Plants	Collect	N	3.00	111.00	69.00	52.00	235.00
		Mean Rank	149.50	116.68	120.55	115.61	
	Purpose	N	3.00	111.00	69.00	52.00	235.00
		Mean Rank	149.50	116.55	121.31	114.88	
	Location	N	3.00	111.00	69.00	52.00	235.00
		Mean Rank	149.50	115.97	122.62	114.38	
	Frequency	N	3.00	111.00	69.00	52.00	235.00
		Mean Rank	86.50	119.94	115.01	119.65	
Firewood	Collect	N	3.00	111.00	69.00	52.00	235.00
		Mean Rank	97.00	129.82	108.92	106.04	
	Purpose	N	3.00	111.00	69.00	52.00	235.00
		Mean Rank	97.50	128.46	110.74	106.49	
	Location	N	3.00	111.00	69.00	52.00	235.00
		Mean Rank	79.33	130.90	110.33	102.88	
	Frequency	N	3.00	111.00	69.00	52.00	235.00
		Mean Rank	146.67	103.26	126.56	136.45	

Appendix D continued

NTEP Category			15-24 years old (Early working age)	25-54 years old (Prime working age)	55-64 years old (Mature working age)	>65 years old (Elderly)	Total
Food Plants	Collect	N	3.00	111.00	69.00	52.00	235.00
		Mean Rank	103.50	116.20	112.01	130.62	
	Purpose	N	3.00	111.00	69.00	52.00	235.00
		Mean Rank	126.67	112.39	114.14	134.60	
	Location	N	3.00	111.00	69.00	52.00	235.00
		Mean Rank	112.83	117.26	113.79	125.46	
	Frequency	N	3.00	111.00	69.00	52.00	235.00
		Mean Rank	186.50	120.79	114.51	112.72	
Raw Material for Handicraft	Collect	N	3.00	111.00	69.00	52.00	235.00
		Mean Rank	118.83	118.83	127.35	103.77	
	Purpose	N	3.00	111.00	69.00	52.00	235.00
		Mean Rank	118.00	118.35	128.37	103.50	
	Location	N	3.00	111.00	69.00	52.00	235.00
		Mean Rank	107.50	118.36	128.68	103.66	
	Frequency	N	3.00	111.00	69.00	52.00	235.00
		Mean Rank	115.17	116.95	107.09	134.89	
Fishing	Collect	N	3.00	111.00	69.00	52.00	235.00
		Mean Rank	79.17	114.10	114.93	132.64	
	Purpose	N	3.00	111.00	69.00	52.00	235.00
		Mean Rank	78.83	113.92	115.31	132.54	
	Location	N	3.00	111.00	69.00	52.00	235.00
		Mean Rank	81.50	114.31	115.07	131.88	
	Frequency	N	3.00	111.00	69.00	52.00	235.00
		Mean Rank	160.83	122.26	120.95	102.52	

Appendix E: Ranks of NTFPs Utilization with the Gender Group of the Jagoi Bidayuh Community

NTFP Category			Male	Female	Total
Medicinal Plants	Collect	N	100.00	135.00	235.00
		Mean Rank	114.25	120.78	
	Purpose	N	100.00	135.00	235.00
		Mean Rank	114.11	120.89	
	Location	N	100.00	135.00	235.00
		Mean Rank	115.52	119.84	
	Frequency	N	100.00	135.00	235.00
		Mean Rank	121.63	115.31	
Firewood	Collect	N	100.00	135.00	235.00
		Mean Rank	114.63	120.50	
	Purpose	N	100.00	135.00	235.00
		Mean Rank	115.99	119.49	
	Location	N	100.00	135.00	235.00
		Mean Rank	120.04	116.49	
	Frequency	N	100.00	135.00	235.00
		Mean Rank	118.04	117.97	
Food Plants	Collect	N	100.00	135.00	235.00
		Mean Rank	117.60	118.30	
	Purpose	N	100.00	135.00	235.00
		Mean Rank	116.76	118.92	
	Location	N	100.00	135.00	235.00
		Mean Rank	126.31	111.84	
	Frequency	N	100.00	135.00	235.00
		Mean Rank	123.15	114.19	

Appendix E continued

NTFP Category			Male	Female	Total
Raw Material for Handicraft	Collect	N	100.00	135.00	235.00
		Mean Rank	113.35	121.44	
	Purpose	N	100.00	135.00	235.00
		Mean Rank	114.74	120.42	
	Location	N	100.00	135.00	235.00
		Mean Rank	116.29	119.27	
	Frequency	N	100.00	135.00	235.00
		Mean Rank	122.41	114.74	
Fishing	Collect	N	100.00	135.00	235.00
		Mean Rank	111.68	122.69	
	Purpose	N	100.00	135.00	235.00
		Mean Rank	111.87	122.54	
	Location	N	100.00	135.00	235.00
		Mean Rank	111.87	122.54	
	Frequency	N	100.00	135.00	235.00
		Mean Rank	125.76	112.25	

Appendix F: Ranks of NTFPs Utilization with the Education Group of the Bidayuh Jagoi Community

NTFP Category			No education	Primary 1	Primary 2	Primary 3	Primary 4	Primary 5	Primary 6	Form 2	Form 3	Form 4	Form 5	STPM/ Matriculation/ Diploma	Degree Holder	Total
Medicinal Plants	Collect	N	27.00	7.00	5.00	13.00	9.00	4.00	43.00	2.00	47.00	1.00	63.00	7.00	5.00	233.00
		Mean Rank	144.19	98.57	101.90	103.69	109.67	61.13	107.86	148.50	121.23	148.50	113.37	131.86	148.50	
	Purpose	N	27.00	7.00	5.00	13.00	9.00	4.00	43.00	2.00	47.00	1.00	63.00	7.00	5.00	233.00
		Mean Rank	144.17	98.36	101.70	103.50	106.17	60.75	109.81	148.50	120.48	148.50	113.21	131.79	148.50	
	Location	N	27.00	7.00	5.00	13.00	9.00	4.00	43.00	2.00	47.00	1.00	63.00	7.00	5.00	233.00
		Mean Rank	144.41	96.93	104.30	106.00	107.72	65.63	110.22	148.50	120.13	148.50	111.90	132.71	148.50	
	Frequency	N	27.00	7.00	5.00	13.00	9.00	4.00	43.00	2.00	47.00	1.00	63.00	7.00	5.00	233.00
		Mean Rank	89.56	136.64	136.70	132.73	122.00	167.63	124.38	85.50	112.38	85.50	121.54	105.36	85.50	
Firewood	Collect	N	27.00	7.00	5.00	13.00	9.00	4.00	43.00	2.00	47.00	1.00	63.00	7.00	5.00	233.00
		Mean Rank	113.26	96.00	119.30	113.92	108.94	154.25	104.13	96.00	123.27	96.00	121.89	129.29	142.60	
	Purpose	N	27.00	7.00	5.00	13.00	9.00	4.00	43.00	2.00	47.00	1.00	63.00	7.00	5.00	233.00
		Mean Rank	113.69	96.50	119.70	114.35	98.94	154.50	104.57	96.50	125.64	96.50	120.79	129.64	142.90	
	Location	N	27.00	7.00	5.00	13.00	9.00	4.00	43.00	2.00	47.00	1.00	63.00	7.00	5.00	233.00
		Mean Rank	117.59	44.00	93.30	109.92	97.39	160.75	115.01	109.00	121.33	109.00	123.13	138.57	132.20	
	Frequency	N	27.00	7.00	5.00	13.00	9.00	4.00	43.00	2.00	47.00	1.00	63.00	7.00	5.00	233.00
		Mean Rank	146.74	128.86	97.10	129.15	125.50	68.75	126.73	116.00	102.07	225.50	111.42	101.86	78.20	

Appendix F continued

NTEP Category			No education	Primary 1	Primary 2	Primary 3	Primary 4	Primary 5	Primary 6	Form 2	Form 3	Form 4	Form 5	STPM/ Matriculation/ Diploma	Degree Holder	Total
Food Plants	Collect	N	27.00	7.00	5.00	13.00	9.00	4.00	43.00	2.00	47.00	1.00	63.00	7.00	5.00	233.00
		Mean Rank	128.39	102.50	125.80	120.42	115.44	131.63	107.92	102.50	109.94	219.00	119.14	135.79	125.80	
	Purpose	N	27.00	7.00	5.00	13.00	9.00	4.00	43.00	2.00	47.00	1.00	63.00	7.00	5.00	233.00
		Mean Rank	123.93	92.00	117.40	150.00	86.22	101.38	119.08	92.00	110.74	219.00	114.90	128.29	137.40	
	Location	N	27.00	7.00	5.00	13.00	9.00	4.00	43.00	2.00	47.00	1.00	63.00	7.00	5.00	233.00
		Mean Rank	132.56	48.43	99.00	136.73	107.00	118.50	117.83	117.00	108.60	219.00	118.92	146.14	99.00	
	Frequency	N	27.00	7.00	5.00	13.00	9.00	4.00	43.00	2.00	47.00	1.00	63.00	7.00	5.00	233.00
		Mean Rank	110.91	182.64	106.50	93.88	146.06	83.25	131.44	199.50	112.02	15.00	112.87	93.93	97.60	
Raw Material for Handicraft	Collect	N	27.00	7.00	5.00	13.00	9.00	4.00	43.00	2.00	47.00	1.00	63.00	7.00	5.00	233.00
		Mean Rank	108.54	106.07	132.70	75.35	117.17	97.75	120.78	97.75	103.95	156.00	133.81	156.00	109.40	
	Purpose	N	27.00	7.00	5.00	13.00	9.00	4.00	43.00	2.00	47.00	1.00	63.00	7.00	5.00	233.00
		Mean Rank	108.91	95.00	132.20	73.81	116.33	96.50	123.51	96.50	104.43	156.00	133.33	156.00	108.40	
	Location	N	27.00	7.00	5.00	13.00	9.00	4.00	43.00	2.00	47.00	1.00	63.00	7.00	5.00	233.00
		Mean Rank	106.39	96.64	132.90	81.12	117.50	98.25	123.40	98.25	104.35	156.00	132.36	156.00	109.80	
	Frequency	N	27.00	7.00	5.00	13.00	9.00	4.00	43.00	2.00	47.00	1.00	63.00	7.00	5.00	233.00
		Mean Rank	126.09	130.86	100.10	163.38	114.83	133.25	113.20	133.25	129.83	78.00	99.66	78.00	122.20	

Appendix F continued

NTEP Category		No education	Primary 1	Primary 2	Primary 3	Primary 4	Primary 5	Primary 6	Form 2	Form 3	Form 4	Form 5	STPM/ Matriculation/ Diploma	Degree Holder	Total	
Fishing	Collect	N	27.00	7.00	5.00	13.00	9.00	4.00	43.00	2.00	47.00	1.00	63.00	7.00	5.00	233.00
		Mean Rank	126.30	139.86	156.50	129.62	104.72	98.25	102.31	156.50	116.84	40.00	119.52	106.57	109.90	
	Purpose	N	27.00	7.00	5.00	13.00	9.00	4.00	43.00	2.00	47.00	1.00	63.00	7.00	5.00	233.00
		Mean Rank	126.17	139.79	156.50	129.50	104.50	98.00	103.00	156.50	116.67	39.50	119.36	106.36	109.70	
	Location	N	27.00	7.00	5.00	13.00	9.00	4.00	43.00	2.00	47.00	1.00	63.00	7.00	5.00	233.00
		Mean Rank	125.76	134.79	156.50	130.42	106.28	100.00	104.77	156.50	114.71	43.50	119.39	108.07	111.30	
	Frequency	N	27.00	7.00	5.00	13.00	9.00	4.00	43.00	2.00	47.00	1.00	63.00	7.00	5.00	233.00
		Mean Rank	104.85	98.79	77.50	101.85	124.39	130.25	131.76	77.50	120.13	183.00	114.86	122.71	128.40	

Appendix G: Ranks of NTFPs Utilization with the Household Size Group of the Jagoi Bidayuh Community

NTFP Category			<4 (Small)	5-8 (Medium)	>9 (Big)	Total
Medicinal Plants	Collect	N	107.00	108.00	20.00	235.00
		Mean Rank	117.65	119.04	114.25	
	Purpose	N	107.00	108.00	20.00	235.00
		Mean Rank	117.52	119.19	114.10	
	Location	N	107.00	108.00	20.00	235.00
		Mean Rank	118.78	117.86	114.58	
	Frequency	N	107.00	108.00	20.00	235.00
		Mean Rank	117.95	117.20	122.60	
Firewood	Collect	N	107.00	108.00	20.00	235.00
		Mean Rank	125.55	113.32	102.88	
	Purpose	N	107.00	108.00	20.00	235.00
		Mean Rank	124.15	114.62	103.35	
	Location	N	107.00	108.00	20.00	235.00
		Mean Rank	127.66	113.20	92.23	
	Frequency	N	107.00	108.00	20.00	235.00
		Mean Rank	109.26	120.09	153.48	
Food Plants	Collect	N	107.00	108.00	20.00	235.00
		Mean Rank	123.27	113.29	115.25	
	Purpose	N	107.00	108.00	20.00	235.00
		Mean Rank	120.49	115.92	115.90	
	Location	N	107.00	108.00	20.00	235.00
		Mean Rank	122.66	115.26	107.85	
	Frequency	N	107.00	108.00	20.00	235.00
		Mean Rank	107.23	129.56	113.23	

Appendix G continued

NTEP Category			<4 (Small)	5-8 (Medium)	>9 (Big)	Total
Raw Material for Handicraft	Collect	N	107.00	108.00	20.00	235.00
		Mean Rank	125.06	110.13	122.75	
	Purpose	N	107.00	108.00	20.00	235.00
		Mean Rank	125.10	109.87	123.93	
	Location	N	107.00	108.00	20.00	235.00
		Mean Rank	125.42	109.70	123.13	
	Frequency	N	107.00	108.00	20.00	235.00
		Mean Rank	110.43	126.72	111.45	
Fishing	Collect	N	107.00	108.00	20.00	235.00
		Mean Rank	121.26	112.89	128.13	
	Purpose	N	107.00	108.00	20.00	235.00
		Mean Rank	121.11	113.07	128.00	
	Location	N	107.00	108.00	20.00	235.00
		Mean Rank	121.25	112.75	129.00	
	Frequency	N	107.00	108.00	20.00	235.00
		Mean Rank	114.21	123.74	107.30	

Appendix H: Ranks of NTFPS Utilization with the Main Family Income Group of the Jagoi Bidayuh Community

NTFP Category			Agriculture	Contract work	Own business (besides selling agriculture/forest produce)	Pension	Perkeso	Remittance from kids	Salary	Selling jungle produce	Total
Medicinal Plants	Collect	N	89.00	2.00	13.00	33.00	1.00	21.00	73.00	3.00	235.00
		Mean Rank	119.13	149.50	95.27	106.77	149.50	115.93	125.36	110.33	
	Purpose	N	89.00	2.00	13.00	33.00	1.00	21.00	73.00	3.00	235.00
		Mean Rank	119.02	149.50	95.04	107.52	149.50	115.79	125.25	110.17	
	Location	N	89.00	2.00	13.00	33.00	1.00	21.00	73.00	3.00	235.00
		Mean Rank	118.96	149.50	91.23	110.20	149.50	112.02	125.78	112.33	
	Frequency	N	89.00	2.00	13.00	33.00	1.00	21.00	73.00	3.00	235.00
		Mean Rank	116.05	86.50	140.19	128.70	86.50	119.48	111.84	133.17	
Firewood	Collect	N	89.00	2.00	13.00	33.00	1.00	21.00	73.00	3.00	235.00
		Mean Rank	108.88	97.00	151.23	111.24	97.00	130.57	124.36	97.00	
	Purpose	N	89.00	2.00	13.00	33.00	1.00	21.00	73.00	3.00	235.00
		Mean Rank	106.12	97.50	151.50	114.55	97.50	130.93	126.04	97.50	
	Location	N	89.00	2.00	13.00	33.00	1.00	21.00	73.00	3.00	235.00
		Mean Rank	104.77	110.00	129.92	121.09	110.00	117.33	131.46	110.00	

Appendix H continued

NTFP Category		Agriculture	Contract work	Own business (besides selling agriculture/forest produce)	Pension	Perkeso	Remittance from kids	Salary	Selling jungle produce	Total	
Food Plants	Collect	N	89.00	2.00	13.00	33.00	1.00	21.00	73.00	3.00	235.00
		Mean Rank	120.66	103.50	112.54	110.62	221.00	120.29	117.99	103.50	
	Purpose	N	89.00	2.00	13.00	33.00	1.00	21.00	73.00	3.00	235.00
		Mean Rank	121.13	93.00	110.62	107.20	221.00	130.52	115.70	126.67	
	Location	N	89.00	2.00	13.00	33.00	1.00	21.00	73.00	3.00	235.00
		Mean Rank	113.87	158.75	88.35	118.73	221.00	117.17	125.72	117.50	
	Frequency	N	89.00	2.00	13.00	33.00	1.00	21.00	73.00	3.00	235.00
		Mean Rank	118.24	119.25	97.50	115.47	15.00	127.81	119.49	156.17	
Raw Material for Handicraft	Collect	N	89.00	2.00	13.00	33.00	1.00	21.00	73.00	3.00	235.00
		Mean Rank	114.43	158.00	112.81	115.27	158.00	124.43	120.98	118.83	
	Purpose	N	89.00	2.00	13.00	33.00	1.00	21.00	73.00	3.00	235.00
		Mean Rank	113.97	158.00	109.08	117.86	158.00	127.38	120.23	118.00	

Appendix H continued

NTFP Category			Agriculture	Contract work	Own business (besides selling agriculture/forest produce)	Pension	Perkeso	Remittance from kids	Salary	Selling jungle produce	Total
Raw Material for Handicraft	Location	N	89.00	2.00	13.00	33.00	1.00	21.00	73.00	3.00	235.00
		Mean Rank	114.56	158.00	107.92	116.76	158.00	124.71	120.92	119.33	
	Frequency	N	89.00	2.00	13.00	33.00	1.00	21.00	73.00	3.00	235.00
		Mean Rank	122.07	78.00	123.92	119.74	78.00	113.62	114.21	115.17	
Fishing	Collect	N	89.00	2.00	13.00	33.00	1.00	21.00	73.00	3.00	235.00
		Mean Rank	117.89	98.75	130.38	125.45	157.50	118.33	114.04	79.17	
	Purpose	N	89.00	2.00	13.00	33.00	1.00	21.00	73.00	3.00	235.00
		Mean Rank	117.29	98.50	130.27	126.50	157.50	118.17	114.39	78.83	
	Location	N	89.00	2.00	13.00	33.00	1.00	21.00	73.00	3.00	235.00
		Mean Rank	117.72	100.50	128.19	125.23	157.50	117.64	114.80	81.50	
	Frequency	N	89.00	2.00	13.00	33.00	1.00	21.00	73.00	3.00	235.00
		Mean Rank	116.31	148.75	109.04	109.61	78.50	119.76	122.75	164.00	

Appendix I: Ranks of NTFPs Utilization with the Secondary Family Income Group of the Jagoi Bidayuh Community

NTFP Category			Agriculture	Contract work	KK allowance	Own business (besides selling agriculture/forest produce)	Pension	Remittance from kids	Salary	Selling jungle produce	None	Total
Medicinal Plants	Collect	N	10.00	1.00	3.00	4.00	12.00	9.00	10.00	7.00	179.00	235.00
		Mean Rank	90.75	32.00	149.50	149.50	90.75	110.33	114.25	99.14	121.93	
	Purpose	N	10.00	1.00	3.00	4.00	12.00	9.00	10.00	7.00	179.00	235.00
		Mean Rank	93.55	31.50	149.50	149.50	90.50	106.83	117.15	103.29	121.65	
	Location	N	10.00	1.00	3.00	4.00	12.00	9.00	10.00	7.00	179.00	235.00
		Mean Rank	98.45	8.50	149.50	149.50	93.75	114.94	110.15	101.71	121.33	
	Frequency	N	10.00	1.00	3.00	4.00	12.00	9.00	10.00	7.00	179.00	235.00
		Mean Rank	141.75	197.00	86.50	86.50	146.67	123.33	122.60	138.07	114.23	
Firewood	Collect	N	10.00	1.00	3.00	4.00	12.00	9.00	10.00	7.00	179.00	235.00
		Mean Rank	108.75	97.00	97.00	155.75	145.96	110.06	120.50	113.79	116.69	
	Purpose	N	10.00	1.00	3.00	4.00	12.00	9.00	10.00	7.00	179.00	235.00
		Mean Rank	118.65	97.50	97.50	156.00	146.25	110.44	111.40	114.21	116.58	
	Location	N	10.00	1.00	3.00	4.00	12.00	9.00	10.00	7.00	179.00	235.00
		Mean Rank	144.15	110.00	79.33	116.25	145.88	109.94	120.40	124.93	115.40	
	Frequency	N	10.00	1.00	3.00	4.00	12.00	9.00	10.00	7.00	179.00	235.00
		Mean Rank	138.75	116.50	146.67	69.00	92.00	126.06	124.65	115.86	118.51	

Appendix I continued

NTFP Category			Agriculture	Contract work	KK allowance	Own business (besides selling agriculture/forest produce)	Pension	Remittance from kids	Salary	Selling jungle produce	None	Total
Food Plants	Collect	N	10.00	1.00	3.00	4.00	12.00	9.00	10.00	7.00	179.00	235.00
		Mean Rank	115.25	103.50	103.50	103.50	113.29	116.56	138.75	120.29	117.94	
	Purpose	N	10.00	1.00	3.00	4.00	12.00	9.00	10.00	7.00	179.00	235.00
		Mean Rank	136.10	93.00	93.00	93.00	104.54	140.89	141.50	125.71	116.24	
	Location	N	10.00	1.00	3.00	4.00	12.00	9.00	10.00	7.00	179.00	235.00
		Mean Rank	152.60	117.50	85.33	69.25	110.04	125.89	129.25	132.29	116.66	
	Frequency	N	10.00	1.00	3.00	4.00	12.00	9.00	10.00	7.00	179.00	235.00
		Mean Rank	127.45	82.00	131.33	111.88	107.38	104.39	91.50	100.14	121.16	
Raw Material for Handicraft	Collect	N	10.00	1.00	3.00	4.00	12.00	9.00	10.00	7.00	179.00	235.00
		Mean Rank	75.75	158.00	118.83	99.25	138.42	92.72	111.00	107.64	121.24	
	Purpose	N	10.00	1.00	3.00	4.00	12.00	9.00	10.00	7.00	179.00	235.00
		Mean Rank	81.70	158.00	130.83	98.00	138.00	95.61	110.00	112.07	120.50	
	Location	N	10.00	1.00	3.00	4.00	12.00	9.00	10.00	7.00	179.00	235.00
		Mean Rank	80.20	158.00	119.33	100.00	138.67	97.17	108.05	108.29	120.87	
	Frequency	N	10.00	1.00	3.00	4.00	12.00	9.00	10.00	7.00	179.00	235.00
		Mean Rank	160.00	78.00	115.17	153.50	96.58	144.33	122.60	125.79	114.68	

Appendix I continued

NTFP Category			Agriculture	Contract work	KK allowance	Own business (besides selling agriculture/forest produce)	Pension	Remittance from kids	Salary	Selling jungle produce	None	Total
Fishing	Collect	N	10.00	1.00	3.00	4.00	12.00	9.00	10.00	7.00	179.00	235.00
		Mean Rank	98.75	40.00	79.17	157.50	118.33	105.28	122.25	140.71	118.77	
	Purpose	N	10.00	1.00	3.00	4.00	12.00	9.00	10.00	7.00	179.00	235.00
		Mean Rank	102.40	39.50	78.83	157.50	118.17	105.06	122.10	140.64	118.61	
	Location	N	10.00	1.00	3.00	4.00	12.00	9.00	10.00	7.00	179.00	235.00
		Mean Rank	100.50	43.50	68.50	157.50	119.50	106.83	123.30	141.21	118.60	
	Frequency	N	10.00	1.00	3.00	4.00	12.00	9.00	10.00	7.00	179.00	235.00
		Mean Rank	135.15	185.00	149.50	78.50	114.00	129.61	115.35	93.71	117.80	

Appendix J: Ranks of NTFPs Utilization with the Main Occupation Group of the Jagoi Bidayuh Community

NTFP Category			Agriculture/ plantation industry	Armed forces	Banking industry	Business	Construction	Education sector	Housewife	Manufacturing industry	Medical industry	Office administrator / manager	Retiree	Service industry	Village head	Unemployed	Total
Medicinal Plants	Collect	N	54.00	3.00	1.00	14.00	10.00	5.00	73.00	2.00	1.00	20.00	31.00	4.00	5.00	12.00	235.00
		Mean Rank	121.21	149.50	149.50	107.54	114.25	149.50	126.97	149.50	149.50	131.88	88.85	61.38	126.00	100.54	
	Purpose	N	54.00	3.00	1.00	14.00	10.00	5.00	73.00	2.00	1.00	20.00	31.00	4.00	5.00	12.00	235.00
		Mean Rank	121.10	149.50	149.50	107.36	111.10	149.50	126.87	149.50	149.50	131.80	89.58	68.63	125.90	100.33	
	Location	N	54.00	3.00	1.00	14.00	10.00	5.00	73.00	2.00	1.00	20.00	31.00	4.00	5.00	12.00	235.00
		Mean Rank	120.47	149.50	149.50	107.57	118.40	149.50	126.50	149.50	149.50	131.30	93.27	58.50	121.30	95.67	
	Frequency	N	54.00	3.00	1.00	14.00	10.00	5.00	73.00	2.00	1.00	20.00	31.00	4.00	5.00	12.00	235.00
		Mean Rank	113.65	86.50	86.50	125.96	122.60	86.50	109.41	86.50	86.50	104.93	147.58	185.50	108.60	135.00	
Firewood	Collect	N	54.00	3.00	1.00	14.00	10.00	5.00	73.00	2.00	1.00	20.00	31.00	4.00	5.00	12.00	235.00
		Mean Rank	114.41	136.17	97.00	147.36	120.50	120.50	117.92	97.00	214.50	126.38	104.58	97.00	120.50	116.58	
	Purpose	N	54.00	3.00	1.00	14.00	10.00	5.00	73.00	2.00	1.00	20.00	31.00	4.00	5.00	12.00	235.00
		Mean Rank	116.58	136.50	97.50	140.86	111.40	120.90	118.34	144.75	214.50	126.75	108.10	73.75	101.90	117.00	
	Location	N	54.00	3.00	1.00	14.00	10.00	5.00	73.00	2.00	1.00	20.00	31.00	4.00	5.00	12.00	235.00
		Mean Rank	119.89	144.83	110.00	128.50	129.60	130.90	112.05	110.00	214.50	135.48	109.55	87.00	112.50	111.00	
	Frequency	N	54.00	3.00	1.00	14.00	10.00	5.00	73.00	2.00	1.00	20.00	31.00	4.00	5.00	12.00	235.00
		Mean Rank	131.80	115.00	116.50	88.71	106.55	119.60	116.68	161.75	21.50	102.80	122.69	139.13	115.60	115.75	

Appendix J continued

NTFP Category			Agriculture / plantation industry	Armed forces	Banking industry	Business	Construction	Education sector	Housewife	Manufacturing industry	Medical industry	Office administrator / manager	Retiree	Service industry	Village head	Unemployed	Total
Food Plants	Collect	N	54.00	3.00	1.00	14.00	10.00	5.00	73.00	2.00	1.00	20.00	31.00	4.00	5.00	12.00	235.00
		Mean Rank	116.56	142.67	103.50	103.50	127.00	127.00	122.82	103.50	221.00	109.38	111.08	132.88	103.50	123.08	
	Purpose	N	54.00	3.00	1.00	14.00	10.00	5.00	73.00	2.00	1.00	20.00	31.00	4.00	5.00	12.00	235.00
		Mean Rank	120.31	135.67	93.00	94.50	128.70	118.60	119.72	143.50	221.00	104.45	114.63	150.25	93.00	131.17	
	Location	N	54.00	3.00	1.00	14.00	10.00	5.00	73.00	2.00	1.00	20.00	31.00	4.00	5.00	12.00	235.00
		Mean Rank	121.33	152.00	117.50	83.04	136.80	154.70	112.04	117.50	221.00	126.10	118.81	119.25	78.90	132.42	
	Frequency	N	54.00	3.00	1.00	14.00	10.00	5.00	73.00	2.00	1.00	20.00	31.00	4.00	5.00	12.00	235.00
		Mean Rank	122.82	84.50	82.00	106.43	123.85	98.40	106.97	193.25	15.00	141.23	121.48	102.25	156.10	129.29	
Raw Material for Handicraft	Collect	N	54.00	3.00	1.00	14.00	10.00	5.00	73.00	2.00	1.00	20.00	31.00	4.00	5.00	12.00	235.00
		Mean Rank	110.13	158.00	158.00	124.43	122.75	111.00	124.20	99.25	158.00	93.38	123.89	128.63	134.50	109.04	
	Purpose	N	54.00	3.00	1.00	14.00	10.00	5.00	73.00	2.00	1.00	20.00	31.00	4.00	5.00	12.00	235.00
		Mean Rank	109.82	158.00	158.00	123.71	122.00	110.00	123.02	117.25	158.00	92.00	126.89	128.00	141.70	108.21	
	Location	N	54.00	3.00	1.00	14.00	10.00	5.00	73.00	2.00	1.00	20.00	31.00	4.00	5.00	12.00	235.00
		Mean Rank	111.97	158.00	158.00	124.86	123.20	104.50	121.23	100.00	158.00	94.13	127.61	120.13	134.80	112.38	
	Frequency	N	54.00	3.00	1.00	14.00	10.00	5.00	73.00	2.00	1.00	20.00	31.00	4.00	5.00	12.00	235.00
		Mean Rank	126.46	78.00	78.00	112.68	111.45	122.60	111.16	133.75	78.00	141.30	110.37	105.88	100.30	137.63	

Appendix J continued

NTFP Category		Agriculture / plantation industry	Armed forces	Banking industry	Business	Construction	Education sector	Housewife	Manufacturing industry	Medical industry	Office administrator / manager	Retiree	Service industry	Village head	Unemployed	Total	
Fishing	Collect	N	54.00	3.00	1.00	14.00	10.00	5.00	73.00	2.00	1.00	20.00	31.00	4.00	5.00	12.00	235.00
		Mean Rank	113.98	157.50	157.50	123.93	63.50	134.00	122.09	98.75	157.50	128.13	119.60	128.13	110.50	108.54	
	Purpose	N	54.00	3.00	1.00	14.00	10.00	5.00	73.00	2.00	1.00	20.00	31.00	4.00	5.00	12.00	235.00
		Mean Rank	113.80	157.50	157.50	121.04	63.10	133.90	122.47	98.50	157.50	128.00	120.69	128.00	110.30	108.33	
	Location	N	54.00	3.00	1.00	14.00	10.00	5.00	73.00	2.00	1.00	20.00	31.00	4.00	5.00	12.00	235.00
		Mean Rank	113.77	157.50	157.50	122.14	66.30	134.70	122.61	100.50	157.50	129.00	119.47	129.00	104.10	106.75	
	Frequency	N	54.00	3.00	1.00	14.00	10.00	5.00	73.00	2.00	1.00	20.00	31.00	4.00	5.00	12.00	235.00
		Mean Rank	120.99	78.50	78.50	112.04	178.25	108.50	113.00	156.25	78.50	108.53	115.05	113.63	121.10	129.33	

Appendix K: Research Questionnaire

Pattern of Utilization of Non-Timber Forest Products (NTFPs) among the Jagoi Bidayuh Community, Bau District, Sarawak, Malaysia

Questionnaire

Section A Respondent Background

1. Name : _____
2. Age : _____
3. Gender : ☐ M ☐ F
4. Family Size : _____
5. Family Income : Agriculture: Salary: Business: Others: : _____
6. Education : _____
7. Occupation : _____
8. Village : _____

Appendix K continued

Section B **List and Utilization of NTFPs**

	NTFPs	Purpose (√)		Location (√)		Frequency (per month/year)	List of NTFPs Collected (Local Name)	Gender	Abundancy
		Sell	Personal	(inside/outside JHF)					
				Inside	Outside				
9.	Medical Plants						Daun durian belanda Tongkat ali Kayu hujan panas		
10.	Firewood						Getah Sirumah Ngiliwat		

Appendix K continued

Section B List and Utilization of NTFPs (Cont...)

	NTFPs	Purpose (√)		Location (√) (inside/outside JHF)		Frequency (per month/year)	List of NTFPs Collected (Local Name)	Gender	Abundancy
		Sell	Personal	Inside	Outside				
11.	Wild Vegetables/Food Plants						Rebung Midin Paku		
12.	Raw Materials for Handicraft						Rotan Bamboo Sengkuang		
13.	Fishing (species)						Keli Haruan Seluang		

Appendix K continued

14. Name of nearby market (*tamu*) : _____
15. Distance from the village : _____
16. Do you know where the boundaries of Jagoi Heritage Forest? : ☐ Yes ☐ No

Section C Knowledge on Hunting Activity

17. Do you or family member hunt in this area? : ☐ Yes ☐ No
*#If the answer is NO, proceed to **section D***
18. What were the gears or items used to hunt? (✓) : Snare ☐ Shotgun ☐ Spear ☐ Dog ☐ Others ☐ : _____
19. What animal that you or family member have hunted? :
20. Hunted animal are for (✓) : ☐ Sell ☐ Own consumption
21. Do outsiders come to hunt in this area? : ☐ Yes ☐ No

Appendix K continued

Section D Ownership and Used of Land

No	Question	Answer
22.	Do you have land in the conservation area? <i>#if the answer is Yes, proceed to Q24. If No, continue with Q23.</i>	☐ Yes ☐ No
23.	Do you have land near to JHF?	☐ Yes ☐ No
24.	Can you estimate the total area? (acre/ha)	
25.	How long have you been used that land?	
26.	What type of crops planted?	Durian Getah Lada
27.	Planted crops are for (√)	☐ Sell ☐ Personal ☐ Both

Appendix K continued

Section E Opinions on Ways to Conserve the Jagoi Heritage Forest (JHF)

No	Question	Answer
28.	Do you support and agree with the effort to manage the JHF at Kampung Lama?	☐ Yes ☐ No
Q29: Using scale 1 to 5, please rate how communities can be involved in the conservation strategies. <i>Scale: [1] Inapplicable; [2] Minor; [3] Don't know; [4] Important; [5] Significant</i>		
29.	☐ Ground and boundary patrol	☐ Take part in conservation education and awareness program
	☐ Guard post/ checkpoint	☐ Reporting of illegal activities done by outsiders
	☐ Signboards on protected flora and fauna	☐ Others:
Q30: Using scale 1 to 5, please rate the significant thing that should be conserved. <i>Scale: [1] Not important; [2] Minor; [3] Don't know; [4] Important; [5] Significant</i>		
30.	What is the significant to the community to conserve JHF and ensure the sustainability of the project?	
	☐ Homestay ☐ Trails/Facilities ☐ Ecotourism ☐ Water for gravity feed	☐ Gawai house/ <i>Baruk (warisan budaya)</i> ☐ <i>Tipawang/Dusun</i> ☐ Flora and Fauna

Appendix K continued

Section F Perception Questions

1	=	Totally Disagree,	2	=	Disagree,	3	=	Indifferent,	4	=	Agree,	5	=	Totally Agree
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	Questions	Response
	The importance of JHF to the local community	
31.	We still depending on the resources inside the JHF.	
32.	The JHF are the heritage that we inherited from our ancestors. (<i>harta dan hak tanah yang diwarisi daripada nenek moyang</i>)	
33.	The forest and its resources provide benefit to us (e.g. fruits, wild vegetables, food)	
34.	JHF provide clean water supply to us, through our gravity feed system (<i>paip gunung</i>)	
35.	The JHF play significant role in term of traditional custom to our community.	

Appendix K continued

Perception Questions (cont....)

Section F

1	=	Totally Disagree,	2	=	Disagree,	3	=	Indifferent,	4	=	Agree,	5	=	Totally Agree	
Questions														Response	
Management of JHF															
36.	We need any assistance from other community to manage JHF area effectively.														
37.	Proper management plan and common community strategy are needed to manage the JHF area and its resources.														
38.	We should manage JHF area and its resources.														
39.	Support (financial, ideas, strategy, etc.) from government and other organisation are crucial for sustainability of JHF.														
40.	I am willing to take part in the activities to conserve the JHF (<i>perkongsian bersama</i>)														
Conservation of NTFPs															
41.	We should collect NTFPs in small quantity, to allow the sustainability of the resources.														
42.	We should collect NTFPs during certain periods of the year only (e.g. fruiting season)														
43.	We should collect NTFPs at different places to maintain its availability.														
44.	The forest resources are abundant as it was 30 years ago (<i>tidak banyak kemerosotan</i>)														
JHF as conservation site															
45.	The purpose of this project are to conserve the culture and history of the Jagoi community (<i>bertujuan untuk memelihara budaya, dan sejarah hidup orang Jagoi yang asli</i>)														
46.	I am pleased by the current management of JHF.														
Ecotourism															
47.	We should limit the number of visitors to Bung Jagoi														
48.	Recommended number of visitors per day									100	300	500	Others		
49.	Benefit from the ecotourism activity (direct/indirect)?														