

## RURAL FOREST COMMUNITIES' DEPENDENCY ON THE NATURAL FOREST ECOSYSTEM

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### ABSTRACT

For developing countries, the benefits that forests bring to their people are incredibly significant, especially true for rural communities that are often made up of forest communities and indigenous people. With the continuous forest floor depletion by mass production of forestry commercialisation which juxtaposed with the reliance of the rural communities towards the forest; the paper aims to dissect the issue using localised case studies as it enables a clearer view into how local-level resources are used by related communities that moves in smaller units. Adopting a multiple case study approach, this exploratory paper contributes significantly to understanding the extent to which communities depend on forest ecosystems for their livelihoods. It provides a contextual account of rural income sources while also highlighting the employment opportunities that forests can generate. The exploration of this subject matter enables the possibility of extending the forest and/or the natural resources' conservation value, especially for the forest communities. Findings show how the diversification of economic activities is important for livelihood sustenance. Lack of control over land rights and over-commercialisation of activities from external forces can be impact rural economies and cause them to fall deeper into poverty due to scarcity of resources.

**Keywords:** Rural Communities, Natural Resources, Forest Ecosystem

## 1. INTRODUCTION

Rural development is a process and is very much outcome-based. It is a process of deliberate induced change led by the state and is multidisciplinary and the outcome is for the betterment of the rural population, for example, improved quality of life, increased income and productivity, reduced poverty, better infrastructure, health, and education. Poverty has declined significantly since 1970, however, the incidence of poverty is still common in the rural areas and is expected to continue. This fact shows that there is a gap between the rural economy and the resources that exist in our country, especially natural rural resources.

Natural rural resources are abundant in Malaysia because the forest covers most of the land in the country. Malaysia retains an estimated 18.1 to 18.3 million hectares of forest cover, accounting for approximately 54–55% of the country's total land area (Global Forest Watch, 2020; Malaysian Timber Council, 2017; WWF Malaysia, n.d.). This substantial coverage highlights the continued ecological importance of forests in sustaining biodiversity and supporting rural livelihoods. From the total forest cover, about 12.4 million hectares (56 percent) are production forests which can be exploited for its economic benefits mainly timber. For a developing country, the economic and social benefits that the forest brings to its people are incredibly significant, and this is especially true for the rural communities who are often made up of forest communities and indigenous people.

The Sabah Forestry Department (2021) reported that out of the total land areas of Sabah (7.79 million hectares), the forested area of the State is about 4.68 million hectares (60 percent). Its forested area can be further categorised into gazetted forest reserves (3.57 million hectares) and other forest lands (1.11 million hectares). The former consists of protected forest reserve (1.42 million hectares), commercial forest reserve (1.66 million hectares), as well as a combination of domestic, amenity, mangrove, virgin and wildlife forest reserves which make up a total of 0.49 million hectares. While the latter include parks, wildlife sanctuaries and conservation areas as well as state land and alienated land. On the other hand, the Forest Department Sarawak (2020) reported that out of Sarawak's total land area of 12.45 million hectares, 7.72 million hectares (62 percent) are forested areas. From these forested areas, 3.96 million hectares are permanent forests in the forms of communal forests, forest reserves, protected forests and government reserves, while the protected areas of 0.87 million hectares are made up of wildlife sanctuaries, national parks and nature reserves. All of which are either hills, swamps or mangroves.

According to the Forestry Department of Peninsular Malaysia (2022), about 81 percent of the total land area in the area of Peninsular Malaysia is either a forested area (5.72 million hectares), permanent reserved forest (7.45 million hectares), or proposed permanent reserved forest (0.09 million hectares). The same official statistics further reported that the permanent reserved forest in Peninsular Malaysia are categorised into inland forest (4.41 million hectares), peat swamp forests (0.21 million hectares), mangroves (0.09 million hectares), state land forest (0.27 million hectares), wildlife forest park (0.51 million hectares) and forest plantation (0.14 million hectares).

Most of the permanent reserved forest in Peninsular Malaysia can be used for production purposes (2.92 million hectares), while 1.93 million hectares are protected forest (Forestry Department of Peninsular Malaysia, 2022). The two most produced forest products are logs and sawn timber. Other forest products include veneers, mouldings, and plywood. Perhaps it is due to these very economic activities that illegal forest encroachment and over-logging have always been the country's persisting and pressing issues. Supporting this notion, Parnwell and Taylor (2005) stressed that there is growing evidence indicating the decline of sustainable non-timber forest products due to reasons not limited to the conversion of forest lands to industrial agriculture and human settlement, extinction of flora and fauna species as well and large-scale logging.

Contrasting with the way the rural communities 'use' the forest, they are often linked with agriculture plantation for subsistence, small-scaled hunting, and harvesting of non-timber forest products (Singh, Chaudary and Bhatia, 2020). Natural resources in the form of non-timber forest products bring tangible and intangible economic benefits to the communities that rely and depend on them. To quantify the economic values of forest services, Nitanan et al. (2020) found that past studies often overlook the net benefits that the ecosystem services bring to their people. For example, the economic values of medicinal plants (Othman and Zain, 2013), nutritional values (Parnwell and Taylor, 2005) and cultural services that support tourism activities (Van Beukering, et al., 2003) were always neglected in previous studies. These intangible supplementary elements may have been economic multipliers that generate job opportunities and income and provide subsistence stability for its communities. Furthermore, Parnwell and Taylor (2005) reiterated Peluso's (1991) narration that the processes of harvest, utilisation and trading of non-timber forest products, regardless of the scale of business, brings great value in supporting the livelihood and overall well-being of the forest communities. In many cases, it is also evident that

the activities revolving around non-timber forest products are carried out in a manner that is sustainable, humane and does not result in massive harm to the forest ecosystem.

To make matters worse, studies are currently highlighting the declining faith and confidence among forest communities towards the economic sustenance of trading such products. The change in terms of land status, land zonings, land activities as well as human mentality and mindset, can be seen to slowly bring negative implications to forest preservation efforts. This causes vulnerability to the entire forest ecosystem. Concerned with the continuous forest floor depletion by mass production of forestry commercialisation, which juxtaposed with the reliance of the rural communities towards the forest, the paper aims to dissect the issue using localised case studies as it enables a clearer view into how local-level resources are used by related communities that move in smaller units. The village, community or local-level sustainable use of the natural resources contrasts with that of globalised mass commercial activities. The former offers a glimpse into optimal and sustainable long-term exploitation of the natural environment without jeopardising its integrity. Sadly, it is also because these communities are small in size and number that their needs are often overlooked, neglected and deemed unnecessary to be addressed.

Within the context of Malaysia, the paper outlined three objectives; i.) to identify communities that represents the linkage of dependency or reliance on the forest ecosystem services for livelihood sustenance; ii.) to assess the tangible and/or intangible evidence of their dependency or reliance on the forest ecosystem services for livelihood sustenance; and iii.) to highlight the common characteristics of the case studies and the challenges they face for being reliant on the forest ecosystem services. Grasping the picture of forest reliance by these communities involved can also offer a glimpse into the impacts and consequences that external forces bring to their livelihoods. This case study exploratory paper is significant in the sense that by identifying the communities relying heavily on the forest ecosystem services for survival, it gives a contextual narration into the sources of rural income as well as the job opportunities that the forest can provide. Apart from explaining rural livelihood, the exploration of this subject matter enables the possibility of extending the forest and/or the natural resources' conservation value, especially for the forest community.

## 2. LITERATURE REVIEW

The rural community is a backward area that develops less than an urban area, showing progress in various aspects. Rural areas are also known as areas with poor economic resources. This situation indirectly causes rural communities to be labelled as a low social status compared to urban residents. Although in reality, rural areas have resources and those resources cannot make significant change to the socioeconomic of rural sector if there no effort from any parties. Rural areas are usually associated with economic problems such as low wages, lack of skills, lack of job opportunities, and lack of comfortable infrastructure, which can contribute to a lack of worker productivity and rural growth potential. However, this statement can be refuted with the data stated by Organisation for Economic Co-operation and Development (OECD), agriculture and forestry is a significant sector in Malaysia, especially in rural areas.

Based on Department of Statistics Malaysia (DOSM), the Malaysian rural economy has become a common trend in the decline in the importance of the agricultural industry and other land-based sectors in the rural economy as a result of the impact of the surrounding development. Rural tourism, commercial services, and public services are growing more diverse in non-agricultural sectors (Rashid M.F,2019). The situations of migration in and migration out of the rural community, young adults, continue to migrate to cities in search of better job possibilities, rural areas have been net recipients of people in their mid-to-late forties, pre-retirees, and retirees but it is different for rural areas that near to regional development corridor that can attract inward migration to rural areas to find shelter and infrastructure because of job in centre of regional development areas. The move for income and poverty in some rural areas are changing positive impact which the income of rural community was rising rapidly. However, there are also problems in access to unsecured social services and facilities. This may result in the global goals of hunger and poverty reduction in rural areas not being achieved (ChampionT. 2006)

The economic diversification in the rural areas allows for the generation of opportunities and new economic chains. In Malaysia, apart from emphasising development policies, economic diversification began to take place in rural areas through positive developments in the economic sectors other than rural agriculture, such as tourism and small and medium industries (Ubong, 2020). In addition, it is necessary to understand that the state government governs the land, agriculture, forestry, and local administration, as stipulated in the Federal

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Constitution. The Constitution sanctions the power to operate the land administration in Malaysia to the state government, while the federal government plans and drafts policies and laws through the Department of Director-General of Land and Mines (Federal) under the Ministry of Energy and Natural Resources. The council's main function is to develop a national land policy to administer laws, promotions, and controls of land use for mining, agriculture, forestry, or any other purpose.

According to the Rural Development Policy (2019) published by the Ministry of Rural and Regional Development Malaysia, 86 percent of the lands in Malaysia are categorised as "rural", of which consists of forest covers, water bodies, agricultural and estate lands, as well as villages not exceeding 10,000 population at any one point in time. Agriculture is the third most important economic sector, which contributed 6.6 percent to the Gross Domestic Product (GDP) in year 2022 and is expected to grow by 1.1 percent in the following year (Economic Performance and Outlook Report, 2022). This may be attributed to stable market price which causes yield to improve and labour availability for works in the plantation fields.

Based on the Selected Agricultural Indicator Report 2018 published by the Department of Statistics Malaysia, oil palm is a major economic contributor to the country where it confers about 47 percent of Gross Domestic Product (GDP) to the country's agriculture sector. Specifically, Ahmad, Ismail and Ghani (2023) found that the plantation of oil palm is very much encouraged among the rural independent and managed smallholders as a way to address the issue of rural poverty. The study highlighted that the activity of planting oil palm positively impacts the job market while increasing the income level of many rural inhabitants. This in return also benefits the rural community in terms of socio-economic gains including healthcare and education access.

This explains the mass conversion of natural forests in Peninsula Malaysia to industrial plantations specifically to plant oil palm trees between 1988 to 2012 (Shevade et al., 2019), where the country also had the highest loss of tree cover relative to its land area between year 2000 and 2012 (Hansen et al., 2013). According to Taheripour, Hartel and Ramankutty (2019), the global demand for palm oil has grown tremendously due to the ever-increasing consumption and product diversification, e.g. food and cosmetic products, as well as energy sources. This concurs with the predictions of Brookfield and Byron (1990) where they claimed that the conversion of natural forest to industrial plantations for economic prosperity in Malaysia will keep expanding because the country depends heavily on nature-based economy.

Natural resources encroachment for national economic growth is also continuously exuberated by global forces (Shevade et al., 2019). It highlights the unsustainable relationship shared between the environment and economy in the outskirt areas where it directly threatens the biodiversity, habitat loss, animal species relying on the forest for survival (Turner et al., 2008; Clements et al., 2010). This is supported by other studies which highlighted that the forest land conversion induced land degradation is showing consistent patterns of decreasing soil quality, increasing soil sensitivity and encouraging soil erosion (Bajocco et al., 2012). Not only that, the issue also aggravates negative climatic impacts where the loss of forest and vegetation covers is directly linked to the increment of carbon dioxide emission and high greenhouse gas level in the atmosphere (Azadi et al., 2021).

### 3. METHODOLOGY

This paper uses a qualitative approach to the research. A multiple case studies research design was employed as the paper intends to showcase the forest communities' reliance on the forest ecosystem services through an exploratory approach. Through this, it enables inquiries into the subject matter while taking into consideration the contextual condition of the targeted population. According to Yin (1994), the selection of multiple case studies can follow a literal replication method where all cases are selected based on their ability to explain a phenomenon. The primary goal of a multiple case study is to explore a phenomenon in depth by examining it across different contexts or settings, rather than focusing on a single case. Multiple case study research is a qualitative methodology that allows researchers to contrast between individual cases, represent a diversity of qualities and extremes to create depth, and understand a broad phenomenon without losing the individuality of the single case studies (Baxter & Jack, 2008; Thomas, 2011). Then, cross-case analysis will be using to comparing and contrasting different cases to identify patterns, similarities, and differences. An inclusion of four cases is sufficient to satisfy this method. However, this paper included five case studies. This is mainly due to the need to have at least one representation of case based on the spatial distribution of study cases related in Malaysia.

Geographically, the distribution of the cases study can be categorised into the Northern, East Coast, and

Central areas, while East Malaysia consists of the Federal Territory of Labuan, Sabah and Sarawak. Hence, the paper selected one case study to represent each location and is presented as evidence linking the dependency or reliance of forest communities towards the forest and its surrounding areas for resources, regardless for subsistence or self-consumption. The cases selected from each region can be characterised as critical cases, defined by Patton (1990) as those that can be locally generalised to other cases due to high similarity.

It is to note that, according to the meta-analysis conducted by Vedeld et al. (2004) on 54 non-timber forest products papers, a community is said to be reliant on the forest for non-timber produce when it constitutes about 22 percent of their total income. In the context of Malaysia, these findings can be significant due to the country’s rich biodiversity and reliance on forestry resources for economic development. Malaysia has implemented various community forestry initiatives that align with the principles found fit into the Malaysian context, especially for community engagement, Sustainable Livelihoods and Conservation. The findings from Vedeld et al. (2004) can inform Malaysia’s community forestry practices by highlighting the importance of local involvement in sustainable forest management, ultimately contributing to ecological and socio-economic benefits.

#### 4. RESULTS

The five case studies included were the Mah Meri, Jah Hut, Iban, Kadazandusun, and Temiar communities across West and East Malaysia (Figure 1). All the cases included are of indigenous tribes (Table 1). This result is as expected due to the said cohort mainly living around rural areas in or bordering forests. The indigenous communities are also traditionally known for depending on the forest ecosystem for sustenance. None of the cases used solely quantitative methods for their studies. The case studies mainly used a mix of quantitative and qualitative method, as well as purely qualitative method for data collection as well as analysis.

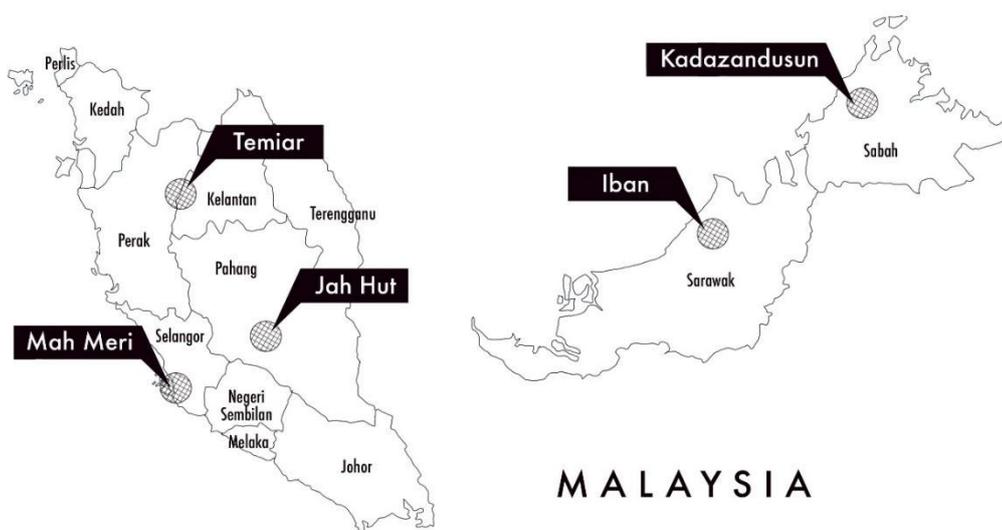


Figure 1: The Distribution of the Five Case Studies by Location Across West and East Malaysia

Table 1: The Profiling of the Five Malaysia Case Studies Linking Forest Dwellers to Their Reliance on the Forest Ecosystem for Sustenance and Livelihood

Author (Year)	Community Type (Name)	Location	Sampling	Benefits from the Forest
Kunasekaran et al. (2017)	Indigenous (Mah Meri)	Klang, Selangor	159 individual adult villagers from Mah Meri Cultural Village residing on Carey Island	Weaving and woodcarving as cultural tradition for sustainable indigenous tourism
Howell, Schwabe and Samah (2010)	Indigenous (Jah Hut)	Krau, Pahang	259 households from 8 Menkuang villages	Hunting, harvesting plants, fruits and legumes for selling at market and self-consumption

Table 1: The Profiling of the Five Malaysia Case Studies Linking Forest Dwellers to Their Reliance on the Forest Ecosystem for Sustenance and Livelihood (continued)

Author (Year)	Community Type (Name)	Location	Sampling	Benefits from the Forest
Parnwell and Taylor (2005)	Indigenous (Iban)	Bintulu, Sarawak	13 Iban longhouses, 294 doors from Bintulu division	Shifting agricultural cultivation, e.g. rice, hunting in the form of wild game, handicrafts, fruits and fishing for selling at market and self-consumption
Andersen et al. (2003)	Indigenous (Kadazandusun)	Tambunan, Sabah	8 households from Kuyongan Village	Harvesting plants as medicine, handicrafts, food and construction, firewood and cultural hunting in the form of a game
Baharom and Zaki (2020)	Indigenous (Temiar)	Hulu Perak, Perak	150 villagers involved in the Kemar Resettlement Plan (RPS) in Gerik	Fisheries, hunting, farming, handicrafts, fruits and plants as medicine, ornaments, selling at market and self-consumption

#### 4.1 Case Study 1: The Mah Meri Community, Selangor

Based on the case study of the Mah Meri community in rural Selangor, natural resources are considered important facilitators in ensuring the economic livelihoods of the native people. This is because, apart from living near the natural environment, i.e. the forest land and mangroves, they are highly dependent on non-timber forest products for tourism purposes as their sources of income. Karim (2013) denoted that the natural environment ecosystem of Carey Island, Klang is very much in danger as the mangrove area faces depletion partly due to the massive conversion of mangrove and rainforest into industrial plantations of palm oil. The negative impacts include but not limited to disruption of basic necessities, flora and fauna extinctions, declining accessibility for traditional activities such as hunting, fishing and recreation.

Through the case study presented by Kunasekaran, et al. (2017), the use of non-timber forest products in maintaining sustainable indigenous tourism by the Mah Meri indigenous community is reported. For the community, the cultural activities of weaving and woodcarving, as well as the traditional Mah Meri dance and their ancestral celebration of Ari Moyang day are extremely important to them. They perceived these acts to be uniquely theirs, and cements their identity as an ethnic group in Malaysia. Thus, the Mah Meri are reportedly very willing in defending and maintaining these traditions through tourism activities.

Nyireh Batu and Bakau, which also scientifically and respectively known as *Xylocarpus moluccensis* and *Rhizophora sp.* are important main materials for woodcarving activities as a tourism cultural attraction. Mengkuang, which is also scientifically known as *Pandanus sp.*, serves as the main material for weaving the tourism product by using the technique of the Mah Meri community. These tourism activities are reportedly efficacious in diversifying job opportunities, thereby raising the income generation opportunities and purchasing powers of the native people.

The study successfully links natural resources to raising a sense of economic security for the rural community through tourism activities. However, Kunasekaran, et al. (2017) stated that the Mah Meri community's efforts in conducting the tourism activities and economic condition can be further improved with financial support from the government as well as the easement of rules and regulations surrounding the tourism activities. This indicates that governmental involvement and support plays a crucial role in keeping this relationship sustainable.

Mangroves serves as an important entity which ensures continuous provision of water, food and energy resources to its stakeholders. Globally, Malaysia is ranked fifth in terms of mangrove forest coverage (Spalding et al, 2010). Hence, it is not surprising that besides providing for blue economic activities to those living near the area, it also brings plenty of opportunities for tourism. In understanding the challenges of achieving a balanced symbiotic relationship between the people, the mangroves and livelihood, Hattam et al. (2021) used the case study of the Mah Meri community living around the Klang Islands in Malaysia to showcase opportunities for better mangrove management in improving their economic condition.

In the past, the coastal Mah Meri community is able to do fishery activities by the mangrove such as shellfish harvesting to generate income. However, it is reported that the mangrove is eroding over time due to illegal logging and sand dredging as well as mangrove clearance by outsiders in the form of developers and land owners. These entities also expanded their agriculture and aquaculture activities causing negative impacts on the locals. The negative externalities brought about by climate change and dying reefs also worsen the situation where the mangrove's natural function to oxygenate the waters to allow for fish breeding is disrupted.

On the other hand, the Mah Meri community were into making masks and leaf origami from forest produce; and this too has eroded with time due to the scarcity of people willing to continue this tradition (Hattam et al., 2021). The study suggests that local Klang Islanders gravitate towards alternative economic sources, especially eco-tourism and aquaculture as future income generation activities. They are progressively shunning away from small-scale mangrove-fishery activities.

The study also highlights the fact that stakeholders with higher interest in the mangroves tend to have low influence over how the natural resource is being managed; this indicates a low public engagement and participation in the governance of such an important environmental ecosystem service. Faced with disappointments over the governance and management's negligence of the Klang Island mangroves, the community felt that conservation efforts are vital to slow down mangrove loss. Replanting mangroves should be prioritised over new developments, while awareness and capacity building programmes among the younger generation should be conducted.

#### **4.2 Case Study 2: The Jah Hut Indigenous subgroup, Pahang**

Recognising that the non-timber forest products enables rural and indigenous families to cope with the problem of poverty, Howell, Schwabe and Samah (2010) dwells into the subject matter by presenting the case study of the Jah Hut Orang Asli subgroup living across small villages near the Krau Forest and Wildlife Reserves.

The Jah Hut were reportedly quite diversified in their income generation activities. Firstly, they work on agriculture such as rubber and rice, as well as fruit plantation including banana, durian and tapioca. From these activities, there are also odd jobs including rubber tapping, herbicides spraying and land clearing. Some would hunt for frogs, reptiles and mammals, as well as gather non-timber forest products for subsistence such as medicinal herbs, fruits, seeds, flowers, legumes and even leaves from the forest floor.

From the study, it was revealed that the Jah Hut mostly deemed the forest as their food source and for general livelihood. Frogs, terrapins, resin and medicinal herbs were largely retailed for money where these were claimed as the most lucrative products for sale. Mammals were hunted as the main food source for household consumptions. Other non-timber forest products including fruits, legumes and rattan were both put up for sale and for self-consumption. The latter was not being sold massively because these sources are not able to fetch higher prices.

The calculation of income generated from these produces took into consideration of the community's labour output and also their market access. For those villages involved mostly in the daily harvesting of non-timber forest resources, they tend to fall into the category of the poorest households. These are also the villages located at remote areas and needed more time to collect non-timber forest resources due to far distances.

The average revenue generated from non-timber forest products constitutes about 20 percent of the Jah Hut's total income, indicating their reliance on the forest ecosystem for livelihood sustenance. The study also reportedly found that there is a strong significant inverse relationship between income and forest reliance. In other words, the inhabitants tend to be poorer when their reliance on the forest for non-timber products are higher, and vice versa.

As for the villages involves infrequently in the harvesting of non-timber forest resources, they tend to have a higher income by conducting rubber tapping activities. They also favour more towards seasonal non-timber forest resources rather than daily harvesting. Through the government's initiative in the form of subsidised rubber programme for the natives, it dramatically increases their access to the rubber market and becomes the key income generator for the villages involved.

#### **4.3 Case Study 3: The Iban Communities, Sarawak**

The Iban communities in Sarawak has always carry the image of being a self-sufficient cohort that relies on the natural resources that the forest ecosystem can offer. However, this conception is slowly eroding over the years due to many external forces. Parnwell and Taylor (2005) offered a glimpse into the crux of the issue by exploring

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the impacts of environmental degradation towards the activities and economic returns involving non-timber forest products among 13 Iban communities of the Bintulu Division in Sarawak.

The Iban communities to this day, are still heavily reliant on forest produce as sources of not only food and medicines, but also raw materials for building, construction and handicrafts. As for their income, it comes from farming and non-farming activities.

For farming activity, they are great supporters of shifting cultivation in the forest where they largely grow rice in paddy fields. However, with the loss of virgin forest that enables the tradition of shifting cultivation, it was reported that many has ceased to operate this sustainable agriculture activity altogether. This then imposed pressure on the families to have to buy rice instead, thus increasing their household monthly expenditure.

Non-farming activities mostly involves in utilising non-timber forest resources for handicrafts and everyday items. Baskets and mats are made using different types of rattan such as *rotan sega*, *rotan tut*, and *rotan semut*, as well as non-rattan materials including *seru*, *akas*, *bemban* and *senggang*. *Cit* and *batu* are used to make the basket rims. A type of bamboo called *daun biruk* can also be made into baskets and mats. *Tunggal* is suitable to be processed and made into fish traps and hats, while *kempait* is used to make knife handles.

For building of houses and boats, the Iban communities uses a variety of tree products such as *meranti*, *merebau*, *perawan*, *ru* and *tekam*. They also harvest fruits from the forest including *puak*, *binjai*, *raba* and *mawang*, as well as catch fish, prawns and turtles for self-consumption and for sale. Even with so many avenues and materials being sustainably sourced from the forest, most expressed that the income generated from these non-timber forest products are not enough for survival, and not suffice for their own consumption needs.

One such factor, as have been exclaimed by many Iban communities, is the difficulties they encountered when trying to access and obtain these raw materials from the forest floor. The issue is further amplified by the government's policies on forest access restrictions and large-scale land conversion from forest to industrial-scaled agricultural zonings. Furthermore, it was discovered that the commercial felling and logging of trees are also a major cause of decline in harvesting raw materials from the forest to be produced into other products. In fact, many have expressed their discontentment because apart from disrupting their livelihoods, the commercial felling and logging of trees also degrades water and soil quality, as well as causes the decline of fish, wild animals and forest produce as a whole. Due to these changes, it influences the market pricing of products and services in the area.

#### 4.4 Case Study 4: The Kadazandusun, Sabah

Sabah echoes similar image as Sarawak, where both are regarded as having an age-long tradition of relying on the forest ecosystem for resources. For Sabah, the main activities can be categorised into gathering of forest produce and land cultivation. Due to the scarcity of studies looking into the economic importance that the forest can bring to the Sabah people, Andersen et al. (2003) explored the issue by presenting the case study of the Kadazandusun people residing along the valley of Kuyongon in the Tambunan district. The village of Kuyongon is located about 90 minutes of walking distance to the Crocker Range National Park of Sabah. Despite relying heavily on the forest, the Kadazandusun were not aware about the existence of the Crocker Range National Park near their villages. This is largely due to the unclear border demarcation of the national park.

The Kadazandusun largely relies on the farming of rice by practising shifting cultivation for subsistence, as well as the plantation of ginger and selected vegetables. They favour carrying out these activities very near to where they live. The study revealed that the forest produce harvested by the community including animals from hunting, firewood, as well as a variety of plants are to be used as food sources and medicine, or used for construction purposes or turned into handicrafts.

With the majority of villagers having knowledge of medicinal plants to some extent, it is not surprising to note that a whopping total of 38 plant species (the actual number could be more) are usually recognised and collected on the forest floor, mostly for self-consumption. Even though the efficacy of those plants were never formally investigated, the villagers were confident in their uses to treat minor conditions such as insect bites, or as a pain reliever for conditions such as twisted joints, toothaches and headaches, as well as for major conditions such as asthma and cancer. Most tend to shun away from going to modern healthcare facilities for minor conditions, but will still visit for major conditions.

Wild vegetables, fruits and mushrooms such as *ruhoi*, *tondoloung*, *botu*, *kobu*, *tapah*, *tukaruk*, *kodop* and

many more are mostly collected along the valley of Kuyongon and the secondary forests. These resources are gathered mainly for self-consumption while some will be put up for sale at the local market. The Kadazandusun community do not buy wild vegetables, fruits and mushrooms from the market; they will only consume what they have gathered themselves from the forest. Hence, these self-gathered fibre sources become an important part of their diets. They expressed that it is easily obtainable and fits their tastebuds better for daily consumption. Seasonal mushrooms when sold, are able to fetch good prices for the villagers, while other wild vegetables are usually sold at a cheaper price. It was found that the households that mainly sells wild vegetables are usually poorer.

About 14 species of plants are generally gathered from the forest to be made into handicrafts or to be used as binders for construction works. Handicrafts are reportedly extremely important for the villager's daily use even when other alternatives can be bought from the market. For example, plastic bowls are an abundant in the market. However, it is only regarded as a supplementary tool instead of a replacement for the current self-made handicrafts. Another example would be the use of bamboos and rattans, where these materials are largely turned into strings, bags, animal traps, music instruments, animal nests, storage items and many more. The study found that the Kadazandusun holds high regards for bamboos and rattans compared to other hard woods because they mainly use these materials for the construction of their houses and to build bridges, floorings and walls.

The forest, especially the secondary forest, serves as an important facilitator to the continuation of monthly or yearly cultural activity for the Kadazandusun. It is crucial in the sense that it serves as a gaming ground for the villagers to hunt for animals such as pigs, monkeys and deer. The meat from the activity will not be sold for money, instead, it will be distributed among the hunters and cooked by the wives accompanying the trips. It seems to be a good activity that strengthens social integration and cohesion among the villagers. However, with environmental degradation and the decline in wildlife population, hunting trips needs to be conducted deeper into the forest.

#### 4.5 Case Study 5: The Temiar tribe, Perak

The Temiar ethnic community's reliance on the forest around Perak was studied by Baharom and Zaki (2020). As with other indigenous communities presented, this tribe also prides on to knowing that the forest is able to cater for most, if not all of the essential services needed by the members. In achieve self-sufficiency, the community traditionally exercises seasonal hunting, sustainable agriculture and harvesting of forest resources. They rely on the forest resources for daily sustenance such as food, medicine, building materials and ingredients to carry out religious activities. Hunting weapons are also forged by themselves using materials that they can find around the forest.

It was found that most villagers involved in the collection of non-timber forest produce are women. They usually collect *mengkuang*, *tanduk rusa*, rattan, palm leaves, and bamboo. These will then be used as materials to be made into handicrafts and ornaments such as bracelets and baskets and mats. As for food, Baharom and Zaki (2020) reported that the Temiar mainly collects, but not limited to *Maniho tesculenta* and *Parkia speciosa*, as well as fruits such as durian and keranji for selling and self-consumption. Apart from that, they also collect herbs such as *Euricoma longifolia* for medical purposes. Those resources collected or harvested for income generation includes spawning of eels and other fish types, as well as birds. It was interesting to note that the harvesting of flora brought in more income than fauna did.

For the Temiar, aloe veras, agarwood and rattans were able to fetch good prices in the market and are thus were treated as the primary income source compared to other forest produces. The profitability of these products however, was disrupted by external parties that take advantage of them by gaining more profits through export and distribution activities without the Temiar's involvement. Due to this, as well as other factors such as forest conservation policies that made it difficult for the forest communities to harvest forest produce, the Temiar was said to shift their attentions to modern farming activities instead.

In order to keep up with monthly living expenses, many has rapidly gravitated towards taking up forest-related jobs that were not traditionally available back then. For example, the activity of rubber tapping, oil palm harvesting and modern manufacturing were found to be some of the main sources of their incomes. These new economic activities are supported by the government where most are encouraged to join the agricultural-related development schemes.

Baharom and Zaki (2020) stressed that, if this trend were to continue, the forests located at the lowland will gradually disappear by the end of the century. Additionally, the Temiar will also slowly lose its traditional and

cultural identity where they are largely removed, resettled and conditioned to become sedentary farmers. These negative costs are definitely not worth it as the Temiar do not get as much benefits out of it. The study showed that 94 percent of the Temiar villagers are still earning less than RM700 per month, which is way below the Malaysia's national poverty line.

## 5. DISCUSSION

The paper centers on five case studies or communities in Malaysia which demonstrates high dependency and reliance on the forest ecosystem services for sustenance and livelihood. As Malaysia can be divided into several locations, one community from each region was taken as an example to showcase this linkage; i.) the Mah Meri indigenous community, Selangor from the Central Peninsular; ii.) the Jah Hut indigenous subgroup, Pahang from the East Coast; iii.) the Iban indigenous communities from Sarawak; iv.) the Kadazandusun indigenous communities from Sabah; and v.) the Temiar tribe, Perak from the Northern. It can be detected that most communities that depend and rely on the forest tend to be those from the indigenous community. Based on the case studies presented, several points are highlighted and discussed.

Diversification of economic activities is important for livelihood sustenance of the forest communities. Taking the Jah Hut Orang Asli subgroup households as an example, apart from earning income from subsistence agriculture plantation, as well as selling produce from their hunts and non-timber forest handicrafts in the market, they also embark into factory or government jobs with stable salaries, contract works and seasonal odd jobs. On the other hand, instead of selling produce at market like the old days, the Mah Meri community cleverly took advantage of their traditional weaving and woodcarving activities as attractions to support indigenous tourism activity in their village.

Apart from that, the community living near the Klang Islands mangroves have also leaned in to alternative income generating economic activities such as opening up seafood restaurants and practicing aquaculture, on top of their traditional fishing activities near the area. Due to government programmes and coercion, the Temiar are also driven to diversify their economic activities to include large-scale agricultural farming such as oil palm and rubber tapping.

This diversification of economic activities can be an indication that i.) the reliance on forest produce alone is not enough to allow for a basic nor comfortable living for the forest communities, thus forcing them to turn to other alternatives; and ii.) there is a possibility that the forest products are depleting, thus causing the lack of its availability for harvest and continuation of tradition. The affected communities are evidently in the lack of control over land rights and over-commercialisation of activities from external forces. From all of the case studies discussed, forest land conversion which causes dramatic environmental degradation becomes the denominator that drives the communities to either abandon their traditional economic sources, accept activities diversification or stay poor.

In the cases of communities that prefers to maintain their income sources from the gathering of forest produce, this can be disastrous as they fall deeper into poverty due to scarcity of resources to begin with; thus, stuck in the vicious cycle of poverty. This can be true as can be seen from the cases of the Iban and Kadazandusun communities which prefer to maintain their traditional way of lives, they reportedly have to endure more hardships and economic vulnerability due to their persistence. Another point that can be made from this is that, when poor households tend to depend heavier on the forest as their income sources, the non-timber forest products becomes incredibly important for the poorest cohort's sustenance. On the other hand, even though the Jah Hut is said to be reliant on the forest for livelihood sustenance, they are doing better due to being more receptive of economic activity diversification.

As suggested by Chin (1985) in Parnwell and Taylor (2005), for some communities, even when they have a quite high adaptability to their surroundings and conditions, they still prefer familiarity over something new due to lack of confidence in the effects of the latter. This sentiment is shared across all communities in the four case studies presented. It highlighted the fact that tradition and maintaining the old way of life is important for the rural and indigenous communities. It holds the identity of the individual communities and facilitates to the preservation of sense of belonging among its members.

Additionally, it is through these traditional ways that the forest is able to be kept safe and used in a sustainable

manner. Supporting the tradition holds the key to minimising identity, heritage and cultural erosion that is happening so rampantly in the modern society. These traditions should be uplifted, celebrated and taken into consideration by the government when devising related policies. Subsequent to this narrative, the access to the forest and sustainably harvesting its produce are important facilitators to the continuation of the traditions.

## 6. CONCLUSION

Forest ecosystems provide a wide range of services that are crucial for the well-being and livelihood sustenance of forest communities. In response to this, the study has focused on identifying the linkage of dependency or reliance of forest communities on the forest ecosystem services for livelihood sustenance and the challenges faced. The study concluded that it is evident that forest community rely on the forest ecosystem services especially the indigenous community. The forest ecosystem services benefited the community's economic development in numerous ways; direct and indirect means, which together contribute significantly to the livelihoods and economic stability of these communities.

The diversification of economic activities is crucial for livelihood sustenance in which forest communities create or enhance the value of the forest ecosystem services from merely collecting and selling forest product into processing and manufacturing that provides more added value. However, the exploration of forest areas to large-scale agricultural activities where forest land is massively cleared affects the livelihood of forest communities. The shrinkage of forest areas indicates the reduction of forest natural resources that can be exploited by forest communities. They can either continue to rely on forest resources which may result in them to fall deeper into poverty due to scarcity of resources or adapt with the market trend and shift to other more stable economic sources.

Nonetheless, the shift from the traditional to the modern way of life affects the identity, heritage, culture and sense of belonging amongst the forest community. Thus, to ensure that economic development from forest resources is sustainable, this study recommends that land degradation and its consequential impacts should be looked at from an inter-disciplinary perspective. There is a need to balance forest conversion, conservation and rural development, especially within forested regions. Continuing this narrative, introducing policies specific to protect land in terms of its status, tenure, and ownership is important. Current development policies need to be improved in the sense that it considers the intersections of planning, economy, sustainability, and the environment. Attractive incentives for forest and natural resource conservation are also encouraged. On the other hand, this paper's limitation is on how to conduct further research for the future, especially for exploration on Sabah and Sarawak forestry. They are a lot of time and resources are needed to explore for future research.

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