

A SOCIOECONOMIC EVALUATION OF THE PERMANENT FOREST ESTATE (PFE) IN SABAH

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Abstract

Sabah covers an area of approximately 7.4 million hectares large, of which 3.8million hectares are legally designated for forest use. These 3.8 million hectares consist of forest reserves, state parks, and wildlife sanctuaries, collectively referred to as the Permanent Forest Estate (PFE). The PFE is managed by three government agencies, namely the Forestry Department, the Sabah Parks, and the Wildlife Department. The PFE is crucially important for biodiversity conservation, environmental protection and also an important socio-economic resource for Sabah. It has generated revenue for Sabah largely from timber production and tourism related activities. External funding is also extracted from various sources for projects and forest restoration and research related activities, thus creating employment opportunities and livelihoods associated with broad array of skills. Local and international NGOs were also involved in such projects as they depend largely on external funds to support their work. However, there are obvious shortcomings and knowledge gaps in the evaluation of the forestry sector's contribution to Sabah's Gross Domestic Product (GDP), let alone the contribution of the PFE per se. The official GDP data on the forestry sector is often lumped together in one category, which is the Agriculture, Forestry and Fishing category. This highly aggregated data does not provide a clear picture on the role and importance of the forestry sector and grossly undervalued the economic contribution of the forestry sector, given that the existing national accounting method only accounts for activities in the formal forestry sector and their direct economic impacts on the state's economy. The economic importance of the sector must be properly ascertained to generate critical inputs to the strategic planning process for the forestry sector in Sabah. In order to protect and maintain the integrity of the PFE, as a matter of government policy, there is a need to quantify the value of the PFE in a more comprehensive manner that more accurately reflects its socioeconomic value. This study aims to evaluate the socioeconomic contribution of Sabah's PFE and to provide recommendations for improving the existing data collection and compilation approach and methodology for the forestry sector in Sabah.

Keywords: Permanent Forest Estate (PFE), socioeconomic evaluation, Gross Domestic Product, tourism, economy, forestry

1.0 INTRODUCTION

1.1 STUDY BACKGROUND

Permanent Forest Estate (PFE) is defined as a forest area designated to be retained as forest and may not be converted to other land use. This study will focus on forest areas under the jurisdiction or management of the Sabah Forestry Department, Sabah Parks, Sabah Wildlife Department and Yayasan Sabah. There is a significant knowledge gap in understanding the economic and social contribution of the Permanent Forest Estate (PFE) in Sabah. This is partly because no single government agency is responsible for collecting and compiling such statistics. The official Gross Domestic Product (GDP) data on the forest sector in Sabah is often grouped into one category, namely Agriculture, Forestry, and Fishing. Such highly aggregated data does not provide a clear picture of the role and importance of the sector. The long-term decline of the logging industry in Sabah has given rise to a general perception that the forest sector is relatively unimportant to the socio-economic development of Sabah. The socioeconomic importance of the PFE must be adequately and systematically assessed and quantified for informed policy decision making and strategic planning. Without this the PFE may not be taken properly into account in national and state decision-making processes, resulting in under-provision of the forest sector in potentially beneficial situations, and distortion of policies around the use of land for which the forestry industry competes (e.g., oil palm plantation). This study shows that the contribution of the PFE is indeed significant if the scope of the forest sector is enlarged to cover a wider range of forest-based or forest-dependent economic activities such as ecotourism, construction, fisheries, bird's nest, water supply, hydropower and conservation. Due to the paucity of reliable estimates, this study does not cover the value of subsistence forestry, non-timber forest products and many of the forest ecosystem services (e.g., erosion protection and pollination). The economic, social and environmental contribution of the PFE should be more significant if these values are properly accounted for. The results underscore the importance of adopting a fresh approach towards managing the PFE, focusing on developing new revenue streams across a wider range of forest-based products and services and at the same time optimising its social and economic benefits in a sustainable way.

2.0 OBJECTIVES

This study has three main objectives:

- a) To provide a more accurate account of the contribution of the PFE to Sabah's economy through adopting a broader and more inclusive definition of the forest sector;
- b) To recommend a consistent and comparable dataset on the economic and social contribution of the PFE. The key dataset should be easily compiled and updated for progress monitoring and reporting in future Sabah Forestry Department (SFD) Annual Reports; and
- c) To assess the potential role of the PFE in the economic, social and environmental development of Sabah. The results of which will serve as an input to the long-term strategic planning process for the PFE.

3.0 METHODS

This study undertakes a three-step method, as follows:

- a) **Identifying limitations in the existing official statistics:** Identify gaps in the official statistics and potential weaknesses in the existing data collection and compilation methods, which may have resulted in the underestimation and underreporting of the contribution of the PFE. This task entails an extensive review of the relevant publications of the Department of Statistics of Malaysia (DOSM), SFD and related government agencies;

- b) Capturing the contribution:** Determine the contribution of the PFE through assessing the traded and non-traded values of its products and services. This involves extensive consultation with key stakeholders via field surveys and analysing of published and unpublished data shared by the relevant public and private stakeholders; and
- c) Strategic recommendations:** Based on the results of Item (b), this study assesses the possible role and potential contribution of the PFE and recommends strategic directions to support its long-term growth and development. This task involves identifying and evaluating emerging local, national and global trends that may potentially influence and shape the long-term growth and performance of the forest sector. In addition, the key drivers behind these trends are identified and analysed.

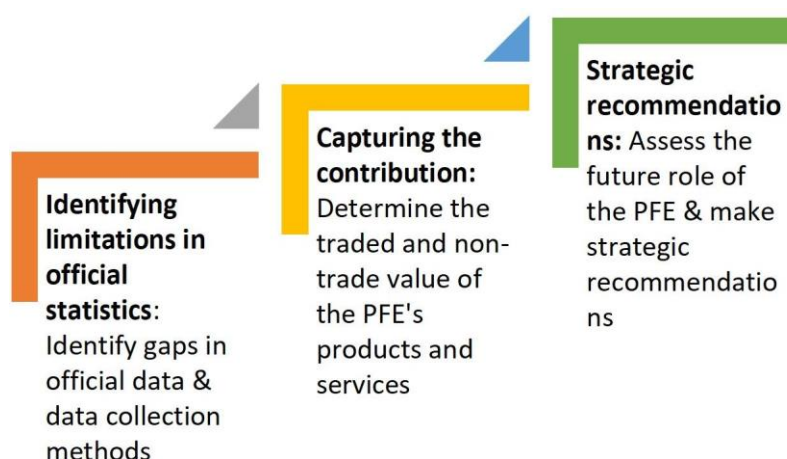


Figure 1: A summary of the methodology

4.0 RESULTS AND DISCUSSIONS

4.1 Economic Contribution of the Forest Sector

There is no standard definition of the forest sector. According to the International Standard Industrial Classification of All Economic Activities (ISIC) of the United Nations statistics division, the forest sector is defined to comprise three subsectors: Forestry and logging (ISIC Revision 4, Division 02), Wood manufacture (ISIC Revision 4, Division 16); and Paper manufacture (ISIC Revision 4, Division 17) (FAO, 2019). For international comparability, the Malaysia Standard Industrial Classification 2008 (MSIC 2008) Version 1.0 prepared by the Department of Statistics Malaysia (DOSM) conforms closely to the ISIC Revision 4. Following this, the DOSM's definition of the forest sector is similar to that of the ISIC of the United Nations. Based on the definition of MSIC 2008 Version 1.0, the forest sector in Sabah contributed two percent to the state's GDP in 2018, down steadily from the 2.9 percent registered in 2015 (Table 1).

Table 1: Forest sector's contribution to GDP, RM million, 2015-2018 (at constant price 2015)

	2015	2016	2017	2018	2019	2020
Sabah's GDP	73,776	77,518	83,793	85,012	85,646	77,506
Logging	1,356	1,119	1,039	995	n.a.	n.a.
Wood products: furniture, paper products and printing	803	719	675	697	739	604
Total forest sector	2159	1838	1714	1692.5	745.9	n.a.
% share of Sabah's GDP	2.9	2.4	2.0	2.0	n.a.	n.a.

Source: DOSM

In tandem with this declining trend in the forest sector's contribution to the GDP, the export of forest-based products such as sawlog, sawn timber and mouldings, paper and pulp products and wood products are also on a downward trend. Together, these products generated RM 1.2 billion of export earnings for Sabah in 2019, a significant drop from RM2.4billion registered in 2015 (Figure 2).

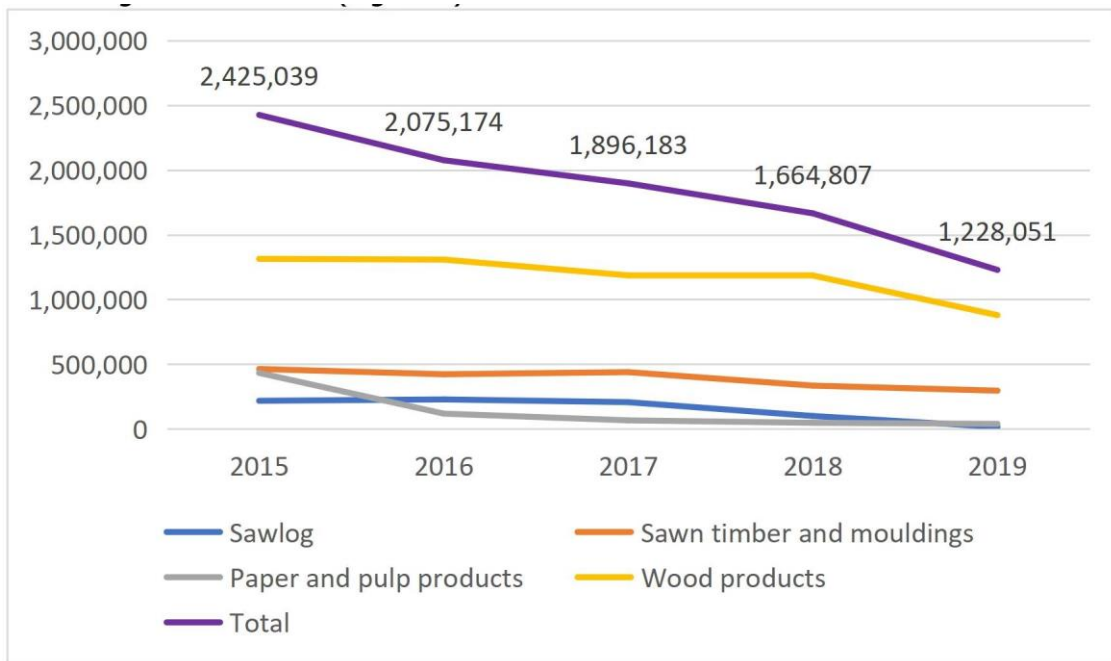


Figure 2: Export of Forest-based products, RM '000, 2015-2019

Source: DOSM, External Trade Stats, Sabah, 2016-2020

Following the same downward trend, the combined investment received by the wood and wood products, furniture and fixture and paper, printing and publishing industries in Sabah contracted to RM35.7 million in 2019, from RM123.4 million in 2016 (Figure 3).

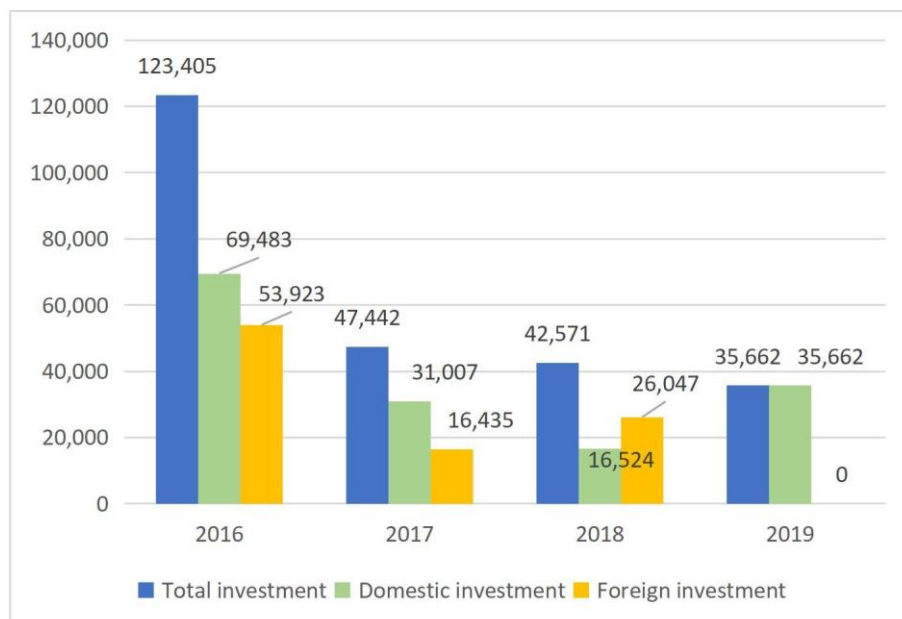


Figure 3: Total investment in wood & wood products, furniture & fixture and paper, printing & publishing, RM '000, 2016-2019

Source: Malaysian Investment Development Authority data (reported in DOSM in various years and My Local Stats Kota Kinabalu)

The contraction of the forest sector has translated to a drop in forest revenue. SFD collected RM112.5 million in forest revenue in 2020, representing a steady decline from RM225.4 million in 2016 as shown in Figure 4.

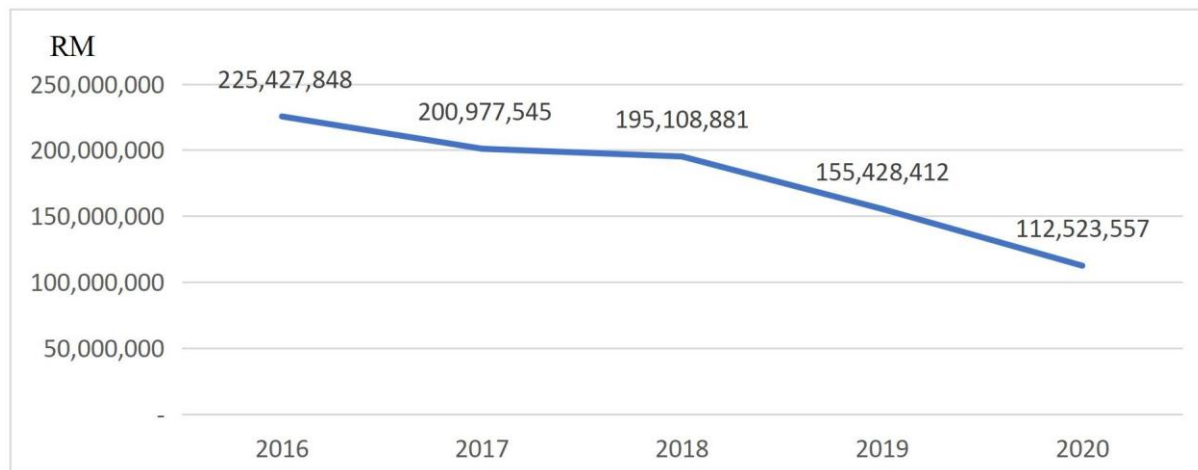


Figure 4: SFD's forest revenue, RM, 2015-2020

Source: SFD

4.2 Limitations in the current GDP measurement

The Food and Agriculture Organization of the United Nations (FAO) acknowledges that the existing Standard National Accounts (SNA) system does not cover all forest-based economic activities, commercial activities that are dependent on the production of wood fibre, commercial production and processing of non-wood forest products, subsistence use of forest products and economic activities related to production of forest services, in the measurement of the forest sector's contribution to GDP (FAO, 2014). The same issues are found in the measurements of the sector's exports and investments since both are based on the same SNA standards. Though desirable, in practice, it is extremely difficult to apply such a broad and inclusive definition and scope due to the unavailability of published statistics. Furthermore, some forest products and services are typically reported in other economic sectors. For example, the value of forest-based tourism is often reported in the tourism sector and the value of water-related ecosystem services of forests is partially reflected in the revenues of the Department of Water Supply. An Input-Output Analysis was conducted to provide a more complete picture of the sector in terms of its GDP contribution. This will provide a baseline for determining which industries or sub-industries should be included in the calculation of the forest sector's contribution to the state's GDP. One of the limitations in this study is that there are no official input-output data for Sabah (DOSM, 2018). The only available data are the input-output data for Malaysia and the latest is for the year 2015 (published in 2018). Despite this limitation, the results of the analysis can still provide a clear picture of which industries or sub-industries in the economy are more closely linked to the forest sector (i.e., industries/sub-industries that are forest-dependent or forest-based) and also provide an indication of the structure of the forest sector in Sabah. This study maps out the upstream and downstream industries of the forest sector based on the input-output data published by the Department of Statistics of Malaysia. Malaysia's forestry and logging industry sourced 43.1% of its input (in value terms) from within the industry itself. Other major intermediate input items included Coke and Refined Petroleum Products (18.4%), Wholesale and Retail Trade, Repair of Motor Vehicles and Motorcycles (14%), Motor Vehicles, Trailers and Semi-Trailers (5.2%), Specialised Construction Activities (4.7%), and others. Table 2 depicts the upstream industries of the forestry and logging industry and the extent to which the latter is dependent on the former for intermediate inputs.

Table 2: Upstream industries of the forest sector, Malaysia, 2015

Inputs	RM '000	% share of total input
Forestry and Logging	1,120,504	43.09
Coke and Refined Petroleum Products	477,410	18.36
Wholesale & Retail Trade, Repair of Motor Vehicles & Motorcycles	363,582	13.98
Motor Vehicles, Trailers and Semi-Trailers	136,222	5.24
Specialised Construction Activities	121,728	4.68
Basic Chemicals	48,948	1.88
Monetary Intermediation	40,246	1.55
Professional	35,957	1.38
Other Financial Service	29,119	1.12
Land Transport	29,094	1.12
Weapons, Ammunition and Special Purpose Machinery	25,960	1.00
Food and Beverage	25,404	0.98
Other Chemicals Products	23,912	0.92
Insurance/ Takaful and Pension Funding	22,929	0.88
Repair & Installation of Machinery and Equipment	20,052	0.77
Water Transport	18,703	0.72
Real Estate	11,127	0.43
Air Transport	9,114	0.35
Fertilizers and Nitrogen Compounds	8,127	0.31
Warehousing and Support Activities for Transportation	7,048	0.27
Telecommunications	4,135	0.16
Rental and Leasing	3,651	0.14
Electricity and Gas	3,152	0.12
Other Private Services	3,125	0.12
Sawmilling and Planning of Wood	2,707	0.10
Business Services	1,987	0.08
Other Manufacturing	1,771	0.07
Paints and Varnishes	1,201	0.05
Accommodation	1,093	0.04
Water	546	0.02
Postal and Courier Activities	447	0.02
Sewerage, Waste Management and Remediation Activities	434	0.02
Quarrying of Stone, Sand and Clay	397	0.02
Activities Auxiliary to Financial Service and Insurance/ Takaful	310	0.01
Plastic Products	136	0.01
Computer and Information Services	81	0.00
Wearing Apparel	10	0.00
Total	2,600,368	100

Source: Computed from Department of Statistics Malaysia (DOSM) Input-Output Tables Malaysia 2015 (published in 2018)

Table 3 shows the downstream industries of the forestry and logging industry. The top five downstream industries are Veneer Sheets and Wood-based Panels in which 19.2% the total output of the forestry and logging industry were included, Paper and Paper Products(18.7%), Sawmilling and Planning of Wood (17.5%), Forestry and Logging (12.1%), Wholesale & Retail Trade, Repair of Motor Vehicles and Motorcycles (8.6%) and 19.7% of the output went to export markets.

Table 3: Downstream industries of the forest sector, Malaysia, 2015

Industry	RM '000	% Share
Veneer Sheets and Wood-based Panels	1,785,308	19.2
Paper and Paper Products	1,733,327	18.7
Sawmilling and Planning of Wood	1,622,782	17.5
Forestry and Logging	1,120,504	12.1
Wholesale & Retail Trade, Repair of Motor Vehicles and Motorcycles	798,958	8.6
Oil Palm	267,581	2.9
Rubber	184,555	2.0
Furniture	83,509	0.9
Flower Plants	27,906	0.3
Wooden Containers and Other Wood Products	11,463	0.1
Builders' Carpentry and Joinery	11,433	0.1
Processing and Preserving of Fruits & Vegetables	1,575	0.0
Other Agriculture	1,532	0.0
Private Consumption	105,396	1.1
Changes in Inventories	304,135	-3.3
Exports	1,828,408	19.7
Total Use	9,280,101	100.0

Source: Computed from Department of Statistics Malaysia (DOSM) Input-Output Tables Malaysia 2015 (published in 2018)

The above analysis has clearly shown that the coverage of the forest sector is more than just “Forestry and logging”, “Wood manufacture”; and “Paper manufacture” as commonly defined in the Standard National Accounts. There are many other sub-sectors in the economy that are linked to the forest sector at both its upstream and downstream segments. It is worth noting that despite its usefulness, the input-output data are constructed based on the conventional national income accounting procedures in which only activities and assets that have commercial value are included in their computation. Many assets in the PFE are however non-commercial and lack market exchange values since they are strictly protected. These assets include, among others, Class 1 Protection Forest, Class VI Virgin Jungle Reserve and Class VII Wildlife Reserve of the Sabah Forestry Department and state parks under the management of Sabah Parks (e.g., Crocker Range, Tawau Hills Park) and wildlife sanctuaries under the management of Sabah Wildlife Department (e.g., Kinabatangan Wildlife Sanctuary). Though they are classified as “non-commercial”, these assets do provide many important services such as recreational use opportunities, watershed protection, fish and wildlife habitat protection, carbon storage, and others (FAO, 1998).

4.3 Socio-economic Contribution of the PFE

4.31 Forest Based Tourism

The assessment of the contribution of forest-based tourism to Sabah's economy is done within a supply chain framework. A supply chain is defined as the sequence of processes involved in the production and distribution of a commodity. Under this approach, the revenues of each of the key players along the supply chain are identified and measured. Figure 5 shows the various key players along the forest-based tourism supply chain. This framework is developed based on the key elements outlined in the Tourism Satellite Account of the Department of Statistics Malaysia.

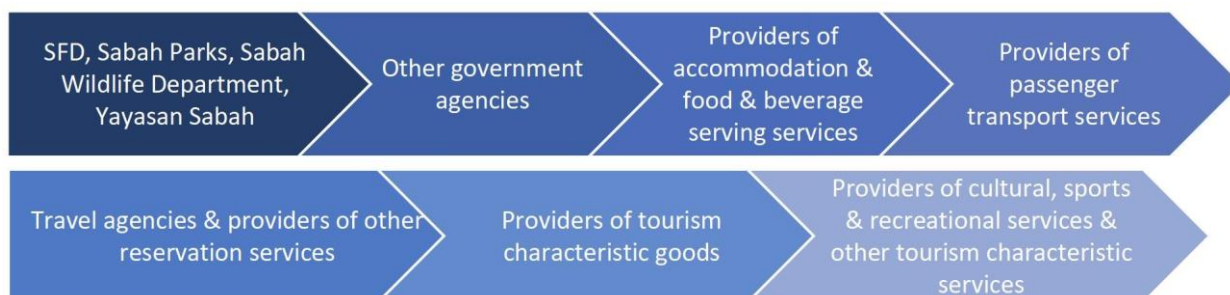


Figure 5: Key players along the forest-based tourism supply chain
Source: Author's construction and DOSM, Tourism Satellite Account

Out of the RM155.4 million forest revenue collected by SFD in 2019, RM1.6 million was forest-based tourism revenue originated from the 32 SFD-managed nature centres. Though this revenue item was on a steady increase during the 2015-2019 period (Figure 6), it represents only one percent of the total forest revenue collected by SFD.

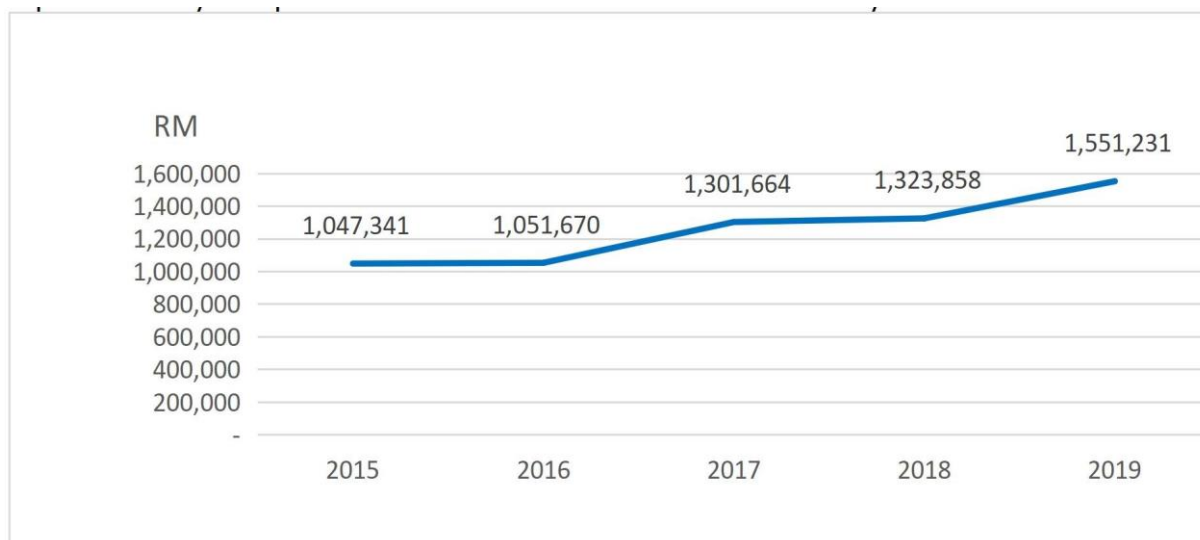


Figure 6: SFD's forest-based tourism revenue, RM, 2015-2019
Source: SFD 2019 Annual Report

However, the actual contribution of the 32 SFD-managed nature centres to Sabah's economy would be larger, estimated to be close to RM280 million in 2019, if revenues collected by other players along the tourism supply chain are also considered. It is worth noting that this amount is 180 times higher than the RM1.6 million collected by SFD. This is significant as it shows that the economic contribution of the 32 SFD-managed nature centres is far greater than what is usually perceived or reported. Table 4 shows that SFD, Sabah Parks, Sabah Wildlife Department, Yayasan Sabah and KiTA together with other players along the forest-based tourism supply chain contributed an estimated RM2.7 billion to Sabah's economy in 2019.

Table 4: Forest-based tourism - estimated revenue generated, 2019

	No. of visitors	Average tourist spending (RM)	Estimated revenue generated (RM)
Sabah Forestry Department's nature centres	130,215	2,150	279,962,250
Sabah Parks	865,492	2,150	1,860,807,800
Sabah Wildlife Department	167,336	2,150	359,772,400
Yayasan Sabah	15,255	2,150	32,798,250
Kinabatangan – Corridor of Life Tourism Operators Association (KITA)	65,978	2,150	141,852,700
Total			2,675,193,400

Source: Compiled and calculated from data provided by SFD data, Sabah Parks, Sabah Wildlife Department, and KITA as well as Sabah Tourism Board data

4.32 Construction

Wood-based products are among the popular natural resources utilised in the construction industry in Sabah. The popularity is because wood-based products have wide application and coverage in terms of functionality and aesthetic appearance. The manufacturing of the wood-based products is reported in the Principal Statistics of Manufacturing Industries published by DOSM. However, the installation of wood-based products such as doors, windows, window frames, fitted kitchens, staircases, shop fittings and furniture (including installation of self-manufactured carpentry or joinery of wood) is reported as Special Carpentry Construction Activities in the Principal Statistics of Construction Industries published by DOSM. The Special Carpentry Construction Activities contributed RM 610 million to the Sabah's economy in 2019, increasing steadily from RM 313 million in 2015 (MSIC, 2008). In 2019, within the construction industry itself, 20% of the total economic value of the industry stemmed from the Special Carpentry Construction Activities. The economic value of Special Carpentry Construction Activities is substantial, at RM503.9 million in 2017 (in value added terms; in current prices). However, such figure is rarely mentioned in any official reports or research papers. This may be partly because DOSM does not compile and report such data on an annual basis. The latest available data on the item for Sabah is 2017 (DOSM, 2019). Another reason for the under-reporting is because there is no direct way of obtaining the current value (current prices) of Special Carpentry Construction Activities for Sabah. DOSM publishes the data in two different prices under two different reporting systems: The contribution of the Special Carpentry Construction Activities to the whole construction industry in Sabah is reported in constant prices (under the GDP for Sabah by Kind of Economic Activity at Constant 2015 Prices table) and the value of the construction industry in Sabah (in value-added) is reported in current prices (found in the Principal Statistics of Construction Industries). To obtain the estimated value of the item at current prices, a two-stage process is required. In short, the value is usually not reported in official publications because of data paucity and the lack of a straightforward method to determine it.

4.33 Fisheries

Mangrove ecosystem plays a significant role in aquaculture. FAO observed a linear relationship exists between shrimp production and the size of the mangrove forest area. It also observed that the fishery potential of mangrove areas is tremendous, providing

livelihood to most of the coastal population (FAO, 1992). Sabah has the largest mangrove area in Malaysia with 231,778.27 ha protected as Class V Mangrove Forest Reserves, mainly along Sabah's east and southeast coasts, which are among the most productive fishing grounds in Malaysia. The Sabah Forestry Department has conserved almost all the mangrove forest reserves for marine life conservation and as a natural means of protection against sea erosions (SFD, 2019). The importance of the mangrove forests to the state's fisheries industry cannot be over-emphasised. Fishing activities in Zone A and Zone B are especially dependent on the health of the mangrove ecosystem (Figure 9). As fisheries statistics by fishing zone are unavailable, it is difficult to estimate the total fisheries output from the two zones. However, there are data available to estimate the production of brackishwater fish culture in Sabah. In terms of wholesale value, this sub-industry of the fisheries contributed RM749 million to the state's economy in 2019, up steadily from RM549 million in 2015. This rise in the total wholesale value took place despite no significant increase in the production volume, reflecting perhaps the increasing scarcity (limited supply capacity) of the brackishwater fish culture sub-industry. Given that the mangrove forest reserves are an integral part of the PFE and their importance to the well-being of the brackishwater fish culture industry, it is fair to attribute the RM749 million as part of the annual contribution of PFE to the state's economy. The actual contribution might be higher if the retail value (instead of wholesale value) of the brackishwater fish culture outputs are used and some parts of the Zone A and Zone B's output values are considered. Without the mangrove forest reserves, the brackishwater fish culture industry is likely to collapse.

4.34 Bird's Nest

The bird's nest industry is a forest-dependent industry. It is a rapidly growing industry with the number of premises and number of operators increasing by more than two times over the period 2016-2019. In 2019, there were 8,985 swiftlet houses in Sabah, of which 65% were licensed. The total production of edible bird's nest was 215,640 kg valued at RM862.56million (SEDIA, 2021). Sandakan District and Kudat District are the two most important production centres of edible bird's nest in Sabah (Table 5).

Table 5: Number of swiftlet houses and estimated production by district, 2019

District	Number of swiftlet houses	Estimated production (kg)
Beaufort	1,027	24,648
Kota Kinabalu	612	14,688
Kudat	2,808	67,392
Keningau	515	12,360
Sandakan	2,846	68,064
Tawau	1,187	28,488
Total	8,985	215,640

Source: Department of Veterinary Services
<https://vet.sabah.gov.my/content/industri-ternakan>

4.35 Water Supply

Forests plays a critical role in providing clean water through: (a) acting as a filter to keep pollution out of water and anchor soil against erosion; and (b) helping to control the water cycle by regulating precipitation, evaporation and flows. By acting as a natural water filter, forests reduce the need for costly concrete and steel water filtration infrastructure. In Sabah, the main river basins include, among others, Kinabatangan, Segama, Labuk, Sugut, Padas, Papar, Tuaran and Moyog. All these river basins rely heavily on the PFE to ensure clean and adequate water supply. The monetary value of the water-related ecosystem services of the

PFE is yet to be systematically and comprehensively established. Data on the expected annual revenue of Sabah Water Department can only provide a very crude indication of such value. In 2019, the expected annual revenue of the department stood at RM330.2 million, a steady increase from RM160 million in 2015. In other words, owing to the ecosystem services provided by the PFE, the Sabah Government was able to collect an estimated RM330.2 million revenue in 2019. Without the PFE, the whole state is likely to suffer from severe water shortages and high costs of water production and management.

4.36 Hydro Power

Hydropower energy generation is highly dependent on forests. The PFE in Sabah plays a critical role in generating the streams and rivers that ultimately drive the hydro turbines. SFD collects revenues through the issuance of occupation permits to small hydropower plants located in the forest reserves. To date, SFD is entitled to receive an annual revenue of RM 868,806 from two hydropower plants (Table 6).

Table 6: Small hydropower projects - annual occupation permit fee received by SFD

Location of small hydropower plants	Annual occupation permit fee
Lingkabau Forest Reserve, Kota Marudu	RM 300,000
Sipitang Forest Reserve and Kuala Tomani Forest Reserve, Tenom	RM 568, 806
Sipitang Forest Reserve, Sipitang	Under discussion
Total	RM 868,806

Source: SFD

However, the amount represents only a fraction of the value of the PFE in terms of its contribution to the state's hydropower generation. Sabah generated 343.9 million kwh of hydroelectricity in 2019. At an average unit price of RM0.34 per kwh, this translates to RM117.7 million.

4.37 Funding from Non-Governmental Organisations and Research Organisations

The PFE in Sabah can draw funds from various sources, including from domestic and international non-governmental organisations (NGOs)/research organisations. Close to RM30million are being invested in the PFE annually by NGOs/research organisations alone. Many of these organisations have in fact a long history of investing in and conducting tropical forest-related conservation projects and scientific research projects in Sabah and are likely to stay committed to conserve and enhance the quality of the PFE over the long-run. Besides attracting investment from the NGOs and research organisations, the PFE also draws funds through the various SFD forest research trust funds. For the period 2015-2020, the trust funds received an average annual allocation of RM410,439.

4.38 Revenues from PFE Managers

Despite the COVID-19 pandemic, the four main PFE managers, namely Sabah Forestry Department, Sabah Parks, Sabah Wildlife Department and Yayasan Sabah were able to collect a combined revenue of RM141.2 million in 2020. Prior to the pandemic, the figure was even higher, amounting to RM268 million in 2018 and RM238.1 million in 2019 (Figure 7).

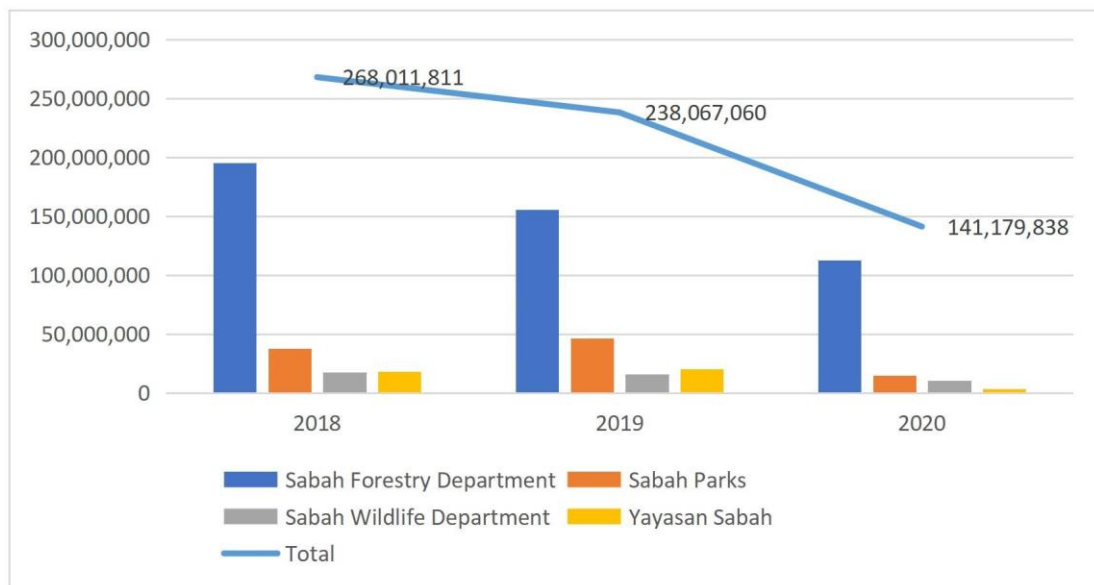


Figure 7: Combined revenues of the PFE Managers in RM

4.39 PFE Contribution to employment

The PFE provides many job opportunities to the locals and foreigners. In 2020, 16,462 people were directly involved in PFE-related jobs (Table 7). The upstream segment of the forestry industry employed 4,384 people in 2020, up from 2,751 people in 2019. From the total number of the people hired in 2020, 610 (or 14 percent) held managerial/professional positions and 7,774 (86 percent) were support workers. On average, based on the available data, it is estimated that around 43 percent of the workers in the upstream segment are foreigners. Most of them are support workers.

Table 7: Number of workers involved in PFE-related jobs, 2020

No.	Type of establishments	Number workers
1	FMU/SFMLA (upstream)	4,384
2	Mills (downstream)	8,624
3	State agencies/state-owned organisations	3,107
4	NGOs, research organisations	347
	Total	16,462

The downstream segment of the forestry industry employs more workers than the upstream segment, totalling 8,624 people in 2020. Over 53 percent of the workers were employed by veneer, plywood, polyply, blockboard and laminated board (V/P/PPY/BB/LB) mills/plants. However, the number of people employed by the downstream segment is on a decline, dropping from 22,328 in 2015 to 8,624 in 2020 (Table 8).

Table 8: Employment in the Wood-Based Industry in Sabah, 2015-2020

Type of Mill	2015	2016	2017	2018	2019	2020
Sawmill	4,299	3,078	3,043	2,521	2,502	1,645
V/P/PPY/BB/LB	10,385	10,047	7,788	7,377	6,452	4,629
Moulding	2,377	2,474	1,943	2,458	1,639	1,226
Particle Board	108	22	20	0	0	0
Pulp & Paper	911	846	869	632	616	595
Chips	102	93	114	83	55	111

Wood Preservative Plant	852	969	944	1,189	726	45
Kiln Dried Plant	3,189	2,740	2,145	2,748	1,985	284
MDF	0	0	0	0	0	0
Briquettes (Carbon Rod)/Sawdust Charcoal	54	56	70	124	209	65
Bamboo Furniture	0	0	0	0	0	0
Wood Pellets	51	77	72	124	73	24
Densified Wood	0	0	0	27	26	0
Total	22,328	20,401	17,008	17,283	14,283	8,624

Source: SFD

Together, state agencies/state-owned organisations that are directly associated with the management of the PEF, namely the Sabah Forestry Department, Sabah Wildlife Department, Sabah Parks and Yayasan Sabah, employed a total of 3,107 people in 2019 (Table 9).

Table 9: Government agencies directly associated with the management of the PFE, 2020

No	Organisation	Permanent/temporary		Contract		Part-time/daily	Total Employee
		Managerial/professional	Supporting	Managerial/professional	Supporting		
1	SFD	110	1209	21	193	0	1533
2	SWD	19	162	11	27	0	219
3	SP	25	350	13	135	238	761
4	YS	91	294	13	7	189	594
	Total	245	2015	58	362	427	3107

Source: Sabah Forestry Department (SFD), Sabah Wildlife Department (SWD), Sabah Parks (SP) and Yayasan Sabah (YS) (unpublished data)

5.0 CONCLUSION

The PFE in Sabah provides a wide range of economic and social benefits. However, it is evident that the economic contribution of the traditional forestry activities has been undergoing a long-term decline, both as a proportion of the state's GDP and in absolute value. Fresh strategies to arrest the decline and discover new sources of growth and revenue need to be found. It is also critical to strengthen the role and relevance of the PFE to a rapidly changing economic and social landscape. To arrest the decline and to stay competitive is to transform the forest industry from the production of traditional forest products to higher value and innovative new materials. This calls for going beyond the current emphasis on furniture products to the production of feedstock for the emerging bioeconomy. To take pressure off the natural forest and to ensure sustainable value creation, the ongoing effort to promote industrial tree plantation (ITP) should be intensified for greater economies of scale. To improve the economic contributions from the forest sector will require good forest governance measures that aims at addressing gaps in efficient economic utilization of forest values, promoting the long-term sustainability of both economic and other values from forests. This study shows that the socioeconomic contribution of the forest sector/PFE is undervalued because the existing GDP method measures only a narrow range of forest-based activities, focusing mainly on logging and production and processing of timber. The actual contribution of the sector should be significantly higher as many forest-based economic activities are not included in the GDP

calculation. The results highlight the multi-functional nature of forests. They also underscore the importance of adopting a fresh approach towards managing the PFE, focusing on developing new revenue streams across a wider range of forest-based products and services and at the same time optimising its social and economic benefits in a sustainable way. There is great value for SFD to collaborate with other PFE managers such as Sabah Parks, Sabah Wildlife Department and Yayasan Sabah in collecting the relevant data for determining a more complete picture of the values of the goods and services provided by the PFE. Research on valuing forest ecosystem services and non-market activities that conform to national accounting principles should also be further encouraged.

6.0 LIST OF REFERENCES

Department of Fisheries Malaysia (2015). National Plan of Action for the Management of Fishing Capacity in Malaysia (Plan 2)

Department of Statistics Malaysia (2008). Malaysia Standard Industrial Classification (MSIC)

Department of Statistics Malaysia (2008). System of National Accounts

Department of Statistics Malaysia (2016-2020). External Trade Stats, Sabah

Department of Statistics Malaysia (2018). Input-Output Tables Malaysia 2015

Department of Statistics Malaysia (2018 and 2019). Statistical Year Book Malaysia

Department of Statistics Malaysia (2019). My Local Stats Kota Kinabalu

Department of Statistics Malaysia (2019). Sabah Statistics Yearbook

Department of Statistics Malaysia (2019). Tourism Satellite Account

Food and Agriculture Organization of the United Nations (1998). Economic and Environmental Accounting for Forestry: Status and Current Efforts

Food and Agriculture Organization of the United Nations (2019). Forest Sector Workforce in the UNECE Region. Timber and Forest Discussion Paper 76, Geneva

Food and Agriculture Organization of the United Nations (2020). Global Forest Resources Assessment

Kodoh J., Mojiol A.R., Lintangah W. (2009). Some Common Non-Timber Forest Products Traded by Indigenous Community in Sabah, Malaysia, *Journal of Sustainable Development*. Vol. 2, No. 2, July.

Ministry of Finance Sabah, State Budget Speech, various years

Sabah Economic Development and Investment Authority (2021). Unpublished internal report

Sabah Forestry Department Annual Report, various years

Sabah Forestry Department, Sabah Wildlife Department, Sabah Parks and Yayasan Sabah (unpublished data)

Department of Irrigation and Drainage, Malaysia
<https://www.water.gov.my/index.php/pages/view/501?mid=246>

Department of Statistics Malaysia
https://www.dosm.gov.my/v1/index.php?r=column/cone&menu_id=S1NBdWhtajUxWFBIMFBUa3N5M2hRdz09

Department of Veterinary Services <https://vet.sabah.gov.my/content/industri-ternakan>

New Straits Times <https://www.nst.com.my/news/nation/2021/01/661872/sabah-swiftlet-board-add-value-states-birds-nest-industry>

Oxford Languages <https://languages.oup.com/google-dictionary-en/Sabah>

Tourism Board <https://www.sabahtourism.com/statistics/> United Nations

Statistics Division. <https://seea.un.org/>

Wafar. S.(1992) - FAO (1992). Role of mangroves in brackish water fish culture
<https://agris.fao.org/agris-search/search.do?recordID=AV20120139853>

World Bank <https://datahelpdesk.worldbank.org/knowledgebase/articles/114942-what-is-the-difference-between-current-and-constan>

World Resources Institute <https://www.wri.org/insights/3-surprising-ways-water-depends-healthy-forests>