

SOCIO-ECONOMIC STUDY OF SHARKS AND RAYS FISHERIES INDUSTRY IN SABAH



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1.0 INTRODUCTION

Fisheries is an important source of food, nutrition and income for many people around the globe (FAO, 2016). The fisheries industry worldwide employs over 58 million people who are engaged in capture fisheries and aquaculture. In relation to this, there are approximately 37% who are engaged full time, 23% part time, and the rest are occasional fishers or of unspecified status (International Labour Organisation, 2018).

The fisheries sector in Malaysia contributes to economic growth, employment and food supply for protein. In 2016, the country's marine fish landings amounted to 1,574,447 tonnes which was valued at RM10.17 billion and contributed to about 0.9% of the Gross Domestic Product (GDP). The fisheries sector also provides employment to 136,514 fishers (Department of Statistics Malaysia, 2018). The Malaysian capture fisheries is divided into coastal and deep-sea; which contributed 1,136,182 tonnes (77.2%) and 336,057 tonnes (22.8%) respectively to the total marine landings in 2014 (Department of Fisheries Malaysia).

Malaysia is rich in shark biodiversity. In total, there are 56 species of sharks, 52 species of rays and 2 species of chimaeras that were recorded in a study by Yano *et al.* (2005). The same study also revealed that there were only 7 species of sharks and 5 species of batoids that were commonly distributed in Malaysia. Another study by Ahmad and Annie (2012) indicated that there are at least 63 species of sharks from eight orders and 18 families which inhabited the Malaysian waters and freshwater habitat. As for freshwater habitat, there are two species of sharks, namely *Glyphis sp.* which inhabits the Mukah river in Sarawak and *Glyphis fowlerae* which is found along the Kinabatangan river in Sabah (Department of Fisheries Malaysia, 2014).

Malaysia is also rich in rays biodiversity. Yano *et al.* (2005) in their study recorded 52 species of rays in Malaysian waters. Ahmad *et al.* (2014) recorded at least 84 species of rays from five orders and 14 families inhabit in Malaysian waters that included freshwater habitat. According to the latter, Pahang river is inhabited by freshwater ray or known as *Himantura signifer* while Kinabatangan River is populated by the giant freshwater whipray which is also known as *Himantura polylepis*.

In terms of marine landings in Malaysia, sharks and rays contributed between 2.0% and 2.2% of the value of the total marine fish landed (Department of Fisheries Malaysia, 2006; Abd. Haris, *et al.* 2017). Although sharks are not a major target by fishers they are still caught as by-catch and this activity is still considered as an income supplement for traditional fishers. Sharks and rays, which are mostly landed whole, are sold at reasonable prices at landing ports (Ahmad, *et al.* 2015).

Sharks have been caught and consumed for many hundreds of years, but only in recent decades has that demand increased quite significantly. The introduction of anti-finning regulations was intended to encourage the full utilisation of carcasses had contributed to the global expansion of the market for shark meat (Dent & Clarke, 2015). According to the Food and Agriculture Organization of the United Nations (FAO) the total world shark fin imports was valued at USD377.9 million per year from 2000 to 2011, with an average annual volume imports of 16,815 tonnes. Meanwhile the corresponding 2000-2011 annual average figures for shark meat were 107,145 tonnes imported, worth USD239.9 million (Dent & Clarke, 2015). Countries such as China, Hong Kong SAR, Taiwan, Singapore, Malaysia and Vietnam consumed the vast majority of shark fins, while the world's largest importers of shark meat are Italy, Brazil, Uruguay, Spain and the Republic of Korea (Dent & Clarke, 2015).

2.0 OBJECTIVES OF RESEARCH

The objectives of this research are as follows:

- i. To present an overview of the sharks and rays fisheries industry in Malaysia and specifically Sabah in terms of trends, socio-economic dimensions and management issues.
- ii. To assess the relationship between sharks and rays capture at the landing ports in Sabah and the livelihood of traditional fishers.
- iii. To evaluate the effectiveness of related government policies and management strategies in achieving local 'buy in' without compromising their traditional way of life and cultural beliefs.
- iv. To recommend policy implications towards the creation of an alternative source of livelihood that could enhance the local community's role as joint custodians of the marine resources and foster responsible fisheries practices.

3.0 RESEARCH METHODOLOGY

The research was conducted in three stages and the research framework and instruments are described below.

3.1 Literature Review

A comprehensive literature review of the sharks and rays fisheries industry in Malaysia, and in particular Sabah, was carried out to develop a big picture of the main issues, challenges and prospects. This exercise provided a situational analysis that was derived from the recent and illuminating reports published by the Southeast Asian Fisheries Development Centre (SEAFDEC), Department of Fisheries Malaysia to fill in the data gaps that had plagued previous attempts in presenting a quantitative, fair and objective investigation. Against the backdrop of the literature review, the research framework and instruments were designed to focus on data collection at the main landing ports in Sabah so as to obtain the perspective of the local fishers and stakeholders.

3.2 Data Collection

Data collection was conducted at 4 major landing ports, namely Kota Kinabalu, Semporna, Sandakan and Tawau. This entailed a site inspection as the fish market and stalls selling shark-related products (especially dried fins). Together with local contact, the researchers carried out face to face interviews and also Focus Group Discussions (FGDs) involving the *Persatuan Nelayan* leadership and fish traders, etc. In addition interviews with seafood restaurant operators were carried out to determine the demand and supply for shark fin dishes in their menu.

An innovative but somewhat risky approach was also included during which the researchers posed as agents for seafood restaurants in Johor Bahru where the demand for shark fin soup from Singaporean patrons are high. Through the local contacts, the researchers approached middle men at 'targeted' sites in the 4 study areas to ascertain whether a regular and quantifiable supply of shark fins could be sourced and at what price. This novel attempt was applied to penetrate the black market business (if any) and it proved to be effective in verifying the information shared by the government officials during the interviews.

3.3 Local Community Survey at Pulau Mabul

A research assistant (RA) was mobilised to stay at Pulau Mabul (Mabul Island) between 29 January to 21 February 2018 to better understand the relationship between two groups of distinct communities, the Sulu and semi-nomadic Bajau Laut (Sea Gypsies) and their marine resources from both a socio-cultural and socio-economic perspective. Pulau Mabul was selected as a case study given that the local communities have a long tradition of including sharks and rays as part of their diet and capturing their narrative is imperative.



Research Assistant Emil Kurihara with Pulau Mabul Village Head. Photo Credit: Emil Kurihara

Additionally the field survey at Pulau Mabul intended to investigate the extent to which fishing for sharks and rays is important as a source of livelihood, and the success and/or shortcomings of tourism in creating an alternative source of income. By coincidence, the incident on 19 February 2018 during which several ray carcasses were being butchered into smaller pieces by the local fishers was witnessed by the RA who was staying in the adjacent guest house. The incident provided the RA with the opportunity of presenting an insightful first hand account of the different reactions to the incident in the part of the local communities.



Local fishers butchering manta rays on 19 February 2018 to be sold in Semporna. Photo Credit: Emil Kurihara

3.3 Verification Exercise

A verification exercise was also carried out to elicit the feedback and response by the related government agencies and industry players on the views given by the local fishers and local communities. This ranged from interviews with national, State and local government officers who have been working with the local fishers to the pioneer of the dive tourism industry in Pulau Sipadan/Pulau Mabul. The data verification exercise is also a two way process to verify the views of the authorities from the perspective of the local fishers and traders at the landing ports.

3.4 Analysis and Synthesis

The findings from the analysis were synthesised to determine the effectiveness of government policies and regulations in the management of sharks and rays fisheries as well the socio-economic implications on the local communities especially local fishers.

3.5 Policy Implications and Conclusions

Finally the research suggested several policy implications and interventions that could be taken up by the relevant authorities in their effort to enhance the 'buy in' from the local fishers. This is essential towards incorporating a soft but equally effective approach in the management of sharks and rays fisheries to complement regulations and enforcement.

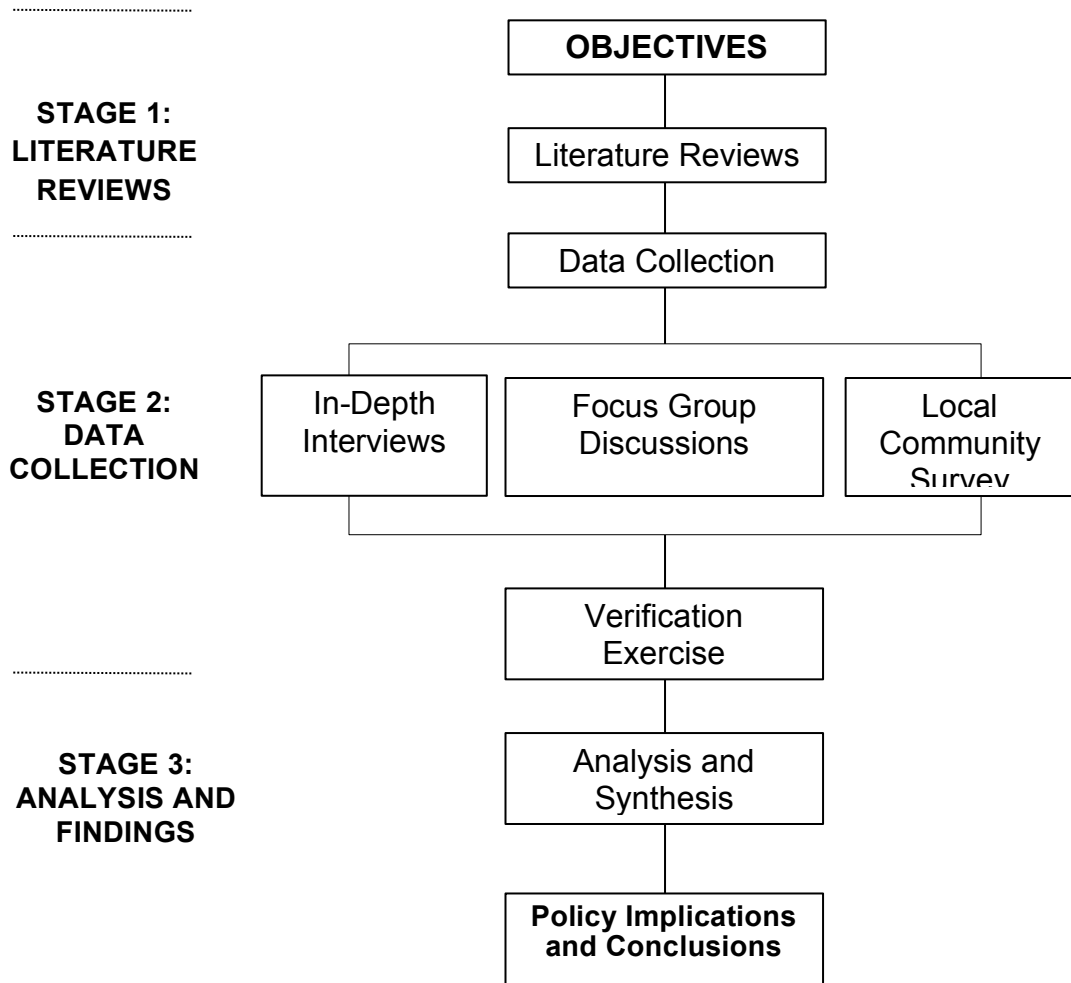


Figure 1: Research Flow Chart

This report consists of three parts. **Part I** presents the overall picture of the sharks and rays fisheries sector in Malaysia, and Sabah in particular, based on secondary data recently published by the relevant authorities. The aim is to understand the relationship between the local fishers in Sabah and sharks and rays capture especially to what extent it contributes to their socio-economic well-being. Baseline data extracted from secondary sources will be highlighted to give a quantitative perspective of the sharks and rays trade in Sabah that involves the local fishers. **Part II** presents the analysis and findings from the interviews that were carried out to understand the socio-economic perspective of the trade involving the local fishers in Sabah. It focuses on the traditional relationship between sharks/rays and the local livelihood/cultural practices, and the effectiveness of government policies and outreach in reducing possible overexploitation of sharks and rays by the local fishers. **Part III** sets out a number of conclusions and implications on policy planning.



Local children watching the processing of one of the ray carcasses brought to Pulau Mabul on 19 February 2018. Photo Credit: Emil Kurihara

PART I

4.1 OVERVIEW OF TRADE IN SHARK AND RAYS

4.1.1 The Global Perspective

It can be seen in Table 1 that ASEAN and Malaysian's share of the world's export of shark and rays products remained small but showing a gradual upward trend. Overall the total export quantity had increased gradually from 40,999 m.t. in 1990 to 131,921 m.t. in 2011, although Malaysia's overall contribution was still relatively small in 2011 (0.32%).

Table 1: World Export Quantity of Shark and Rays Products (m.t.), 1990-2011.

Commodity - Shark and Rays Products	1990	2000	2010	2011
World	40,999	79,780	130,087	131,921
ASEAN / World (%)	4.16	4.56	14.04	13.94
Malaysia / ASEAN (%)	0.94	0.30	1.64	2.30
Malaysia / World (%)	0.04	0.01	0.23	0.32

Source: Adapted from Fatimah *et al.* (2017).

Table 2 shows the world import of shark and rays products for the years 1990-2011. The total import of shark and rays products globally had also increased quite substantially from 50,581 m.t. in 1990 to 140,945 m.t. in 2011. Although both ASEAN and Malaysia are small players in the global import of shark and rays products, Malaysia is one of the active importers of shark and rays products within the ASEAN region (31.28%).

Table 2: World Import of Shark and Rays Products (m.t.), 1990-2011.

Commodity - Shark and Rays Products	1990	2000	2010	2011
World	50,581	103,392	123,844	140,945
ASEAN / World (%)	3.70	2.58	4.95	8.45
Malaysia / ASEAN (%)	6.95	2.93	14.62	31.28
Malaysia / World (%)	0.26	0.08	0.72	2.64

Source: Adapted from Fatimah *et al.* (2017).

Table 3 focuses specifically on the export of shark fins globally. It can be seen that the export of shark fins globally had increased significantly from 3,196 m.t. in 1990 to 14,528 m.t. in 2011. In relation to this, the export value of shark fins in 2011 was estimated

around USD 289,091,000. Significantly, the ASEAN region accounted for an alarming 78.71% of the global export in 2011. After showing a substantial dip in terms of exports from 51.6% in 1990 to 28.87% in 2000, the ASEAN region became the world's largest exporter of shark fins by 2010 (almost 80%). The main exporters for shark fins were Thailand (43.15%), Hong Kong (18.8%) and Indonesia (9%) while Malaysia's share was relatively low at 2.87%.

Table 3: World Export of Shark Fin (m.t.), 1990-2011.

Commodity - Shark and Rays Products	1990	2000	2010	2011
World	3,196	7,488	14,086	14,528
ASEAN / World (%)	51.6	28.87	78.94	78.71
Malaysia / ASEAN (%)	1.09	0.55	2.52	4.08
Malaysia / World (%)	0.5	0.13	1.85	2.87

Source: Adapted from Fatimah *et al.* (2017).

In essence, the ASEAN region imports about one-third of the world's supply of shark fins (see Table 4). Of this, however, Malaysia accounted for almost two-thirds (71.5%) of the total ASEAN import and 20.3% of the global import of shark fin in 2011. This suggests that Malaysia is one of the main consumers of shark fins (Fatimah *et al.* 2017).

Table 4: World Import of Shark Fin (m.t.), 1990-2011.

Commodity - Shark and Rays Products	1990	2000	2010	2011
World	5,342	17,682	17,124	17,154
ASEAN / World (%)	23.77	5.00	31.85	28.88
Malaysia / ASEAN (%)	9.33	6.48	68.30	71.47
Malaysia / World (%)	2.13	0.32	21.47	20.34

Source: Adapted from Fatimah *et al.* (2017).

4.1.2 The ASEAN Region

In the ASEAN market, the export of shark and rays products is dominated by Thailand as the main exporter, followed by Singapore, Indonesia, Vietnam and Malaysia for the year 2011 (Fatimah, *et al.*, 2017). Meanwhile the import of shark and rays products in the ASEAN region is monopolised by Singapore as the lead importer, followed by Malaysia, Vietnam, Thailand, Myanmar, Indonesia and the Philippines (Fatimah, *et al.* 2017).

Shark fins is a popular food delicacy in most of the ASEAN economies especially among the ethnic Chinese. Coupled with the high demand from China and Hong Kong, it is not surprising that ASEAN countries are heavily involved in the shark fin trade. As highlighted earlier, ASEAN contributes around two-thirds of the global export of shark fins, in which Thailand, Indonesia, Malaysia, Singapore and Vietnam are the main players (Fatimah, *et al.*, 2017). During the same period, ASEAN's import of shark fin had quadrupled from 1,222 m.t. in 1990 to 4,882 m.t. in 2011. In 2011, Malaysia emerged as the largest importer of shark fins among the ASEAN countries with an enormous share of about 72% of the region's total. Despite the relatively large volume, Malaysia's trade primarily consisted of low-valued processed fins (Dent & Clarke, 2015). Myanmar, Singapore, Indonesia and Thailand were the other important players in importing shark fins in the ASEAN region.

4.1.3 Malaysia

For the Malaysian market (see Table 5), the average export volume of sharks and rays was 11.2 m.t. in the 1980s, which grew to 63.1 m.t. in the 1990s and had significantly increased to 257 m.t. between 2000-2011. On the other hand, Malaysia's import on average had grown from 287 m.t. in the 1980s, to 205.9 m.t. in the 1990s, to reach 1,225 m.t. (2000-2011). This clearly marks a trade deficit, and by 2011, the trade deficit swelled to 3,085 m.t. (Fatimah, *et al.*, 2017). The substantial increase in import was partly due to the increase in local demand and the fact that the imported commodity was being re-exported. In 2011, Malaysia was ranked 11th in terms of the world's importers of sharks and rays. More importantly, Malaysia's import of shark fins that is classified as "*Shark's fins prepared and ready for use, other than in airtight containers*" substantially rose from about 10% of the total global import in 2004 to over 88% in 2013. However, this dropped substantially in 2014 mainly attributed to the Malaysian government's ban on shark finning and trading of such products (Fatimah, *et al.* 2017).

Table 5: Malaysia's Export and Import of Shark and Rays Products (m.t.), 1980-2011.

Commodity - Shark and Rays Products	1980s	1990s	2000-2011
Export (average)	11.2	63.1	257
Import (average)	287	205.9	1,225
Difference	-275.8	-142.8	-968

Source: Adapted from Fatimah *et al.* (2017).

Table 6: Malaysia's Import of Shark and Rays Products (m.t.), 2004-2014.

Commodity	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Dogfish and other sharks, excluding livers and roes, fresh or chilled	-	-	-	1	0	-	-	-	-	41	3
Dogfish and other sharks, excluding livers and roes, frozen	36	33	52	130	29	94	52	19	67	-	53
Shark fins	164	82	121	142	43	49	44	161	71	67	57
Shark's fins prepared and ready for use other than in airtight containers	99	169	121	-	-	-	-	-	-	15,097	77
Shark's fins, prepared or preserved, in airtight containers	-	-	0	1	3	9	31	2	21	237	0
Shark's fins prepared and ready for use and in airtight containers	586	593	760	1054	1150	1273	1270	1270	1802	1540	1444
Total	984	876	1053	1328	1226	1452	1397	1453	1962	16982	1634

Source: Adapted from Fatimah et al. (2017).

Note: An accurate analysis of Malaysia's shark fin trade records is difficult given the unclear descriptions in commodity categories, multiple disaggregating and re-aggregating code changes over time, and inconsistencies in the published figures that suggest shark fins have previously been recorded under other categories and not reported explicitly as shark fins. More specifically, from 2000 to 2011, trade statistics for shark fins were recorded by Malaysian customs under 9 different commodity codes, only 2 of which were not discontinued at some point in this period (Dent & Clarke, 2015:53).

4.2 BASELINE DATA ON SHARKS AND RAYS: KOTA KINABALU AND SANDAKAN

Landing data of shark and rays in Malaysia were scanty, fragmented and poorly recorded (Department of Fisheries Malaysia, 2006) until a recent study conducted in Perak and

Sabah by Abd. Haris, *et.al.* in 2017 which provided a new baseline landing data on sharks and rays in Malaysia hence augurs well for a more data driven approach to the management of sharks and rays fisheries in the country. Based on the availability of baseline data in the latest reports published by the Department of Fisheries it is possible to provide an overview of the situation at Kota Kinabalu and Sandakan but not Tawau and Semporna, which are presented below.

4.2.1 Fishing Vessels and Fishers

Overall there are 224 trawlers and 41 purse seines registered in Kota Kinabalu. These fishing vessels utilise the SAFMA jetty (Sabah Fisheries Marketing Authority) to load their catch. Kota Kinabalu recorded the highest fish landings in 2015 (61,800 m.t.), followed by Kudat (24, 600 m.t.) and Sandakan (18,700 m.t.) despite the fact that Sandakan has the highest number of fishing trawlers in Sabah (Abd. Haris, et al., 2017). Table 6 and table 7 present the details of fishing vessels in Kota Kinabalu and Sandakan respectively.

Table 6: Number of Licensed Fishing Vessels by Gears and Number of Fishery in Kota Kinabalu.

Gear Type	Fishing Zone	Fishing Operation (from Coastline) (Nautical Mile)	No. of Vessels	No. of Fishers
Trawlers				
<10 GRT	West Coast	> 3 nm	9	27
10 – 24.9 GRT	West Coast	> 3 nm	51	180
25 - 39.9 GRT	West Coast	> 3 nm	124	496
40 – 69.9 GRT	West Coast	> 3 nm	27	123
>70 GRT	West Coast	> 30 nm	13	79
Total			224	905
Purse Seiners				
25 - 39.9 GRT	West Coast	> 3 nm	17	222
40 – 69.9 GRT	West Coast	> 3 nm	21	308
> 70 GRT	West Coast	> 30 nm	3	54
Total			41	584
Grand Total			265	1,489

Source: Abd. Haris, *et al.* (2017)
GRT – Gross Registered Tonnage

Table 7: Number of Licensed Fishing Vessels by Gears and Number of Fishers in Sandakan.

Gear Type	Fishing Zone	Fishing Operation	No. of Vessels	No. of Fishers
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		(from Coastline) (Nautical Mile)		
Trawlers				
<10 GRT	East Coast	> 3 nm	7	19
10 – 24.9 GRT	East Coast	> 3 nm	172	520
25 - 39.9 GRT	East Coast	> 3 nm	209	820
40 – 69.9 GRT	East Coast	> 3 nm	69	380
>70 GRT	East Coast	> 30 nm	0	0
Total			457	1,739
Purse Seiners				
40 – 69.9 GRT	East Coast	> 3 nm	6	57
> 70 GRT	East Coast	> 30 nm	6	114
Total			12	171
Grand Total			469	1,910

Source: Abd. Haris, et al., (2017)

GRT – Gross Registered Tonnage

4.2.2 Landing of Sharks and Rays

In Kota Kinabalu, the study by Abd. Haris, *et al.*, (2017) indicated that the landings of sharks and rays only made up 4,487 kg (0.2%) and 7,243 kg (0.4%) respectively of the total landings sampled (1,856,510 kg). Their study was conducted from August 2015 to July 2016. This corresponds with an earlier national study that surmised that sharks and rays landings contributed to less than 2.2% of the value of the total marine fish landed (Department of Fisheries Malaysia, 2006). The estimated average landings by month for sharks and rays were 374 kg. and 604 kg. respectively. The most common and abundant rays species were *Neotrygon kuhlii* followed by *Himantura gerrardi* and *Dasyatis zugei*, and most of the rays were juveniles. Meanwhile, the most abundant shark species were *Chiloscyllium punctatum* and *C. plagiosum*, and contrary to the view given by the stakeholders interviewed on-site, most of the sharks landed were mature.

The study by Abd. Haris, *et al.* (2017) also showed that landings of sharks and rays in Sandakan only made up 2,969 kg and 10,170 kg (0.5% and 1.8%) of the total landings sampled (581,358 kg) and that the average landings per month for sharks and rays were 247 kg. and 848 kg. respectively. The most common and abundant rays species were *Neotrygon kuhlii* followed by *Himantura gerrardi* and *Taeniura lymma*. Meanwhile, the most abundant shark species were *Chiloscyllium punctatum* followed by *Carcharhinus sorrah* and

Chiloscyllium plagiosum. In general, both mature and juvenile sharks and rays were sampled in Sankadan.

4.2.3 Usage and Marketing of Sharks and Rays

Sharks and rays are mainly consumed locally as well as to cater demand from Peninsular Malaysia (e.g. ray's skin). Apart from the fin and meat, shark teeth and jaws are used as souvenirs, and there has been an emergence of a new delicacy in the form of shark head's skin. The wholesale price of rays and sharks (without the fins) at Kota Kinabalu jetty are between RM1-RM4/kg and RM2.50/kg respectively depending on the specie. However, the prices are doubled when they are sold at the fish market (Abd. Haris, *et al.* (2017)).

In terms of usage and marketing for sharks and rays in Sandakan, the situation is more or less similar to Kota Kinabalu. They are mainly consumed locally as well as to cater for demand from Peninsular Malaysia (e.g. ray's skin). The wholesale price of rays and sharks (without the fins) at Sandakan fish market jetty are between RM0.80-RM4/kg and RM0.80-2.50/kg respectively depending on the specie. Similarly, the prices are doubled or increased when the rays are sold at the fish market (Abd. Haris, *et. al.* 2017)

4.3 POLICIES ON SHARKS AND RAYS

Malaysia has taken serious efforts in strengthening the policies and regulations on sharks and rays. One of the legal frameworks is the Fisheries Act 1985 which is governed by the Minister of Agriculture and Agro-based Industry (Department of Fisheries Malaysia, 2014). Under the Fisheries Act, the Minister is empowered to make regulations (i.e. Fisheries [Control of Endangered Species of Fish] Regulations 1999) to ensure marine fisheries resources are managed sustainably. In line with this, in 2017, the state government of Sabah, through its Fisheries Department, has proposed four species of sharks (the great hammerhead shark, smooth hammerhead shark, winghead shark and oceanic whitetip shark) and two species of rays (oceanic manta ray and reef manta ray) to be included under the the Fisheries (Control of Endangered Species of Fish) Regulations 1999 (Muguntan Vanar, 2018).

In addition, there are other specific measures taken by the Ministry to ensure effective conservation and management of sharks and rays that are in line to their sustainable uses namely the Malaysia National Plan of Action: For the Conservation and Management of Shark, 2006 (NPOA-Sharks Plan 1) and Malaysia National Plan of Action: For the Conservation and Management of Shark, 2014 (NPOA-Sharks Plan 2). These instruments (e.g. action plans on shark) were derived when the United Nations of Food and Agriculture

Organisations (UN FAO) Committee on Fisheries adopted the International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks) in 1999.

Overall, the NPOA-Sharks aims to:

- ensure sustainable catches for sharks and rays;
- threats assessment of shark and ray population, determine and regulate unsafe habitats, and implement harvesting approaches that are in line with the biological sustainability ethics and long-term economic use;
- arrange for serious attention to the stocks of shark and ray which are in danger;
- develop a framework to manage effective consultation which implicates stakeholders in terms of research, management and educational initiatives within and between States;
- maximize utilised catches related with the of shark and ray;
- contribute to the protection of biodiversity and ecosystem structure
- reduce waste and discards from shark and ray catches;
- encourage full use of dead sharks and rays;
- aid enhanced species-specific catch and landing data and monitoring of shark and ray catches; and
- aid in documentation and reporting of species-specific biological and trade data.

In order to achieve these regulated objectives and policies, government agencies such as the Ministry of Agriculture and Agro-based Industry is responsible to actively set up management policies with regards to agriculture and fishery. Under this Ministry, the Department of Fisheries Malaysia (DoFM) and the Fisheries Development Authority of Malaysia (FDAM) have the most important roles in all aspects of fisheries (resource management, research and development, legislation etc.). At the same time, Malaysia had been committed to the maintenance of coastal fisheries to provide the bulk of marine fish landings and create employment to the local people (Department of Fisheries Malaysia, 2006).

In Sabah, the Sabah Aquaculture and Inland Fisheries Enactment 2003 also stipulates rules and regulation to manage its resources in a sustainable manner. The enactment was implemented in 2005 and aimed at conserving any threatened, protected, controlled and rare freshwater sharks and rays. The freshwater sharks namely the Borneo river shark (*Glyphis fowlerae*) and Bullsharks (*Carcharhinus leucas*) and the giant freshwater whipray (*Himantura chaophraya*) are listed under IUCN Red List. Suffice to say that the Federal government and the State of Sabah have showed real commitment in the management of sharks and rays

aspects of marine fisheries through regulations and enforcement. However, the scope of this study is not to examine their overall effectiveness in a quantifiable manner but to focus on the socio-economic implications and 'buy in' from the traditional fishers and local communities as an element of their source of livelihood.

For a more detailed articulation of the law relating to sharks and rays, see 'Sharks and Rays: Volume 12 of Environmental Law and Policy in Sabah, from Ridge to Reef' (in peer review and available upon request from Forever Sabah).

PART II

5.0 SOCIO-ECONOMIC PERSPECTIVE OF SHARKS AND RAYS INDUSTRY IN SABAH

The following section will present the socio-economic perspective of the sharks and rays industry in Sabah. It is based on primary data collected on-site to provide a better understanding of the socio-economic issues from the perspective of the local fishers. Semi-structured interviews and focus group discussions (FGDs) were carried out, as the research instruments, between the months of October 2017 to February 2018 involving the fishing communities and local traders at Tawau, Kota Kinabalu, Sandadan and Semporna.

5.1 Tawau

In Tawau a FGD was carried out on 28 October 2017 involving key stakeholders representing the local fishers. This was complemented by interviews with operators selling fish based products and restaurant operators in the Tawau market. The main finding of the FGD was that the targeted fishing of rays and sharks by the local fishers at Tawau has ceased in response to the government's directive and effective enforcement. However, sharks and rays are still caught as by-catch and sold as a whole at the market by one of two fish traders, who are known to the authorities. Most of the sharks that were sold in the market were juvenile. The FGD also revealed that most of the dried fins that were sold in the market and seafood restaurants originated from Indonesia due to the proximity of Tawau to Indonesian Kalimantan.



Sharks-related products being sold at the Tawau market originating from Indonesia. Photo Credit: Rosli Nooruddin.

This view was confirmed by the interviews with the stall operators in the Tawau market and seafood restaurants who also revealed that most of their dried fins stock were bought years ago, implying that it is presently difficult to get a fresh supply of fins due to the lack of active suppliers in Tawau.

The researchers also 'went underground' by posing as seafood restaurant owners from Johor, where there is a significant demand for shark fins from the seafood restaurants serving the predominantly Singaporean market. This unorthodox research method revealed that the middlemen based in Tawau could arrange for shark fins to be supplied in large quantity, albeit from Indonesian suppliers.

5.2 Kota Kinabalu

A site inspection and field interviews were carried out at Kinabalu fish market on 16 November 2017. During the site inspection only one stall was selling juvenile sharks openly. The sharks were sold as a whole and the asking price was between RM5-RM14 per kg. When asked whether a regular supply of whole sharks could be made available for bulk buying to extract fins to cater for the researcher's 'make believe' seafood restaurant in Johor Bahru, the trader could not guarantee this because his supply was intermittent and very dependent on 'luck'. The site inspection also revealed that there is only a single trader who dared to openly sell sharks and rays at the market and his operation is well known and being monitored by the Sabah Fisheries Department. The subsequent interview with the trader revealed that he was only dealing in sharks as by-catch and that "the species that I sell are not endangered and prohibited by the authorities" (pers. comm. 16 November 2018). Interviews with the other traders revealed that they neither sold sharks openly nor in the black market and were not aware if there was any illegal slaughtering house for sharks and rays in the vicinity simply because there was not enough supply to justify the need for this.

5.3 Semporna

The fieldwork in Semporna was conducted on 8 January 2018. The situation in Semporna is different from the other landing sites due to the presence of Pulau Mabul and the smaller islands. The researchers visited the fish market in the town centre but there was no visual evidence of sharks being openly sold by the fish stalls. Since most of the traders were immigrants they were careful to abide by the law so as to minimise their exposure to non-compliance that might risk offending the authorities and invite unwarranted actions. The site inspection also could not identify a 'kingpin' among the traders who were adamant that they did not deal in sharks because of 'their low price and lack of demand'. Despite this, a few of the traders hinted that the fishers at Pulau Mabul were active in fishing for sharks and rays,

and that the island was being used as a transit point for sharks and rays that were caught in Indonesian waters. In addition they hinted that there could be buyers in Semporna in the black market but would not reveal who they were.

Following this lead, the researchers dispatched a Research Assistant (RA) to Pulau Mabul to be stationed there for a three week period between 29 January to 21 February 2018. Despite their growing acceptance of tourism as an alternative source of livelihood, there is still a sizable number of local fishers on the island who are still dependent on traditional fishing as their main source of income. The brief given to the RA was to further examine this phenomenon from the perspective of the local Suluk and Bajau Laut communities. Given the extensive fieldwork in Pulau Mabul, its findings warrant a more detailed discussion, which will be presented in the following section.

5.4 Sandakan

The field survey at Sandakan was conducted on 17 December 2017 at the wet market. From as early as 4 a.m. mostly juvenile sharks were seen both on the fish stalls outside the wet market and in the fish section of the market proper. The juvenile sharks were sold as a whole and the asking price was between RM 5 to RM 20. According to interviews with the stall owners, fishers were able to maintain an almost everyday supply of sharks apparently from their by-catch. There were at least 5 stalls that were selling juveniles and according to the traders, the buyers were mainly locals. In addition the traders confirmed that there was no specific demand for shark fins from buyers.

When asked whether they could obtain a regular supply of shark fins to cater for the demand from 'seafood restaurants' in Johor Bahru, all the traders that were selling sharks were not in the position to oblige given the lack of supply. In addition they did not know if middlemen could perform this task because of the limited quantity of sharks that were supplied by fishers. A few of the fishers suggested that it could be possible for supply to be sourced from the neighbouring Philippines islands but they would have to contend with the ESSCOM patrols.

5.4 Data Verification Exercise

In between the fieldwork in Tawau and other landing jetties in Sabah, interviews were carried out with officers representing the relevant agencies to verify the information that was gathered on-site. The first interview was with Dr. Ahmad Ali who is the Head of Fishery Oceanography and Resources Enhancement Section at the Southeast Asian Fisheries Development Centre, Department of Fisheries Malaysia. Dr. Ahmad Ali is an authority and

international expert on sharks and rays, having spent many years conducting research in Sabah and is a member of the IUCN Sharks Species Survival Commission, and the interview was held on 5 November 2017. The interview confirmed the initial finding that the local fishers in Sabah were mostly fishing for sharks and rays as by-catch and that this segment is relatively small. Under Dr. Ahmad's leadership, the Southeast Asian Fisheries Development Centre (SEAFDEC) has recently published three comprehensive reports on the sharks and rays fisheries industry in Sabah and will soon be releasing a specific report on the socio-economic aspect of the industry. These reports were generously shared by Dr. Ahmad and there are referred to in the literature review.

A subsequent phone interview with Dr. Ahmad on 20 March 2018 revealed that the local fishers at Pulau Mabul are targeting mainly tuna which is more lucrative but sharks and rays continue to be included in their by-catch. On a typical fishing trip of between 4 to 5 days, around 3 to 4 sharks could be caught on a single day. Dr. Ahmad revealed that round 15 to 20 sharks could be caught on a single fishing trip especially during the 'shark season' but almost none during the 'non-shark season'. When asked whether poverty is the main reason why sharks and rays are still being caught by the local fishers even as by-catch, Dr. Ahmad agreed.

The data verification exercise was continued at the State level in the form of an interview with Mr. Lawrence Kissol, the Senior Assistant Director, Marine Aquaculture Department, Sabah Fisheries Department on 8 November 2017. Based on the interview, a similar pattern emerged in terms of the involvement of the local fishers in the sharks and rays business. Mr. Kissol suggested that the involvement of the local fishers has been effectively regulated by the policy interventions described earlier and complemented by the outreach programmes conducted by the Sabah Fisheries Department (SFD). Mr. Kissol confirmed that the earlier finding that fishing for sharks and rays among the local fishers has been relegated to by-catch, and that sharks landed in Kota Kinabalu are sold as a whole part.

More importantly, Mr. Kissol revealed that having a close rapport with the local fishers and fish stall operators near the landing jetties in Sabah is essential as a form of policing and surveillance. By instructing SFD's enumerators to mingle with the fish traders, he stated that SFD could isolate those dealing with sharks and rays and ensure that they are carrying out their business according to the law. In this way, the traders have extended their cooperation to allow the enumerators to collect baseline data, which have been effective in the process of gathering market intelligence on the sharks and rays business. Mr. Kissol explained that this innovative approach has been instrumental in the gathering accurate data that were used in the three recent publications reviewed earlier. He concluded by saying that winning

the hearts and minds of the local fishers and traders have been equally effective as enforcement, especially given the shrinking budget for the latter.

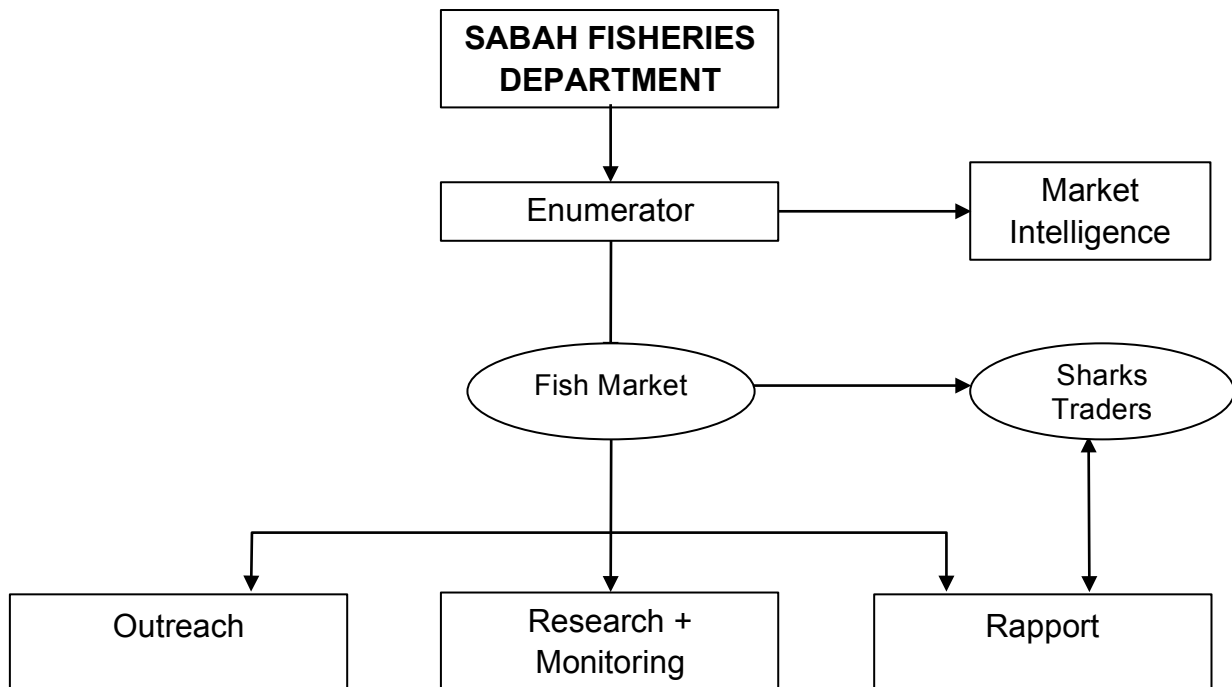


Figure 2: Innovative Approach in Managing Low Level Trade in Sharks and Rays by Sabah Fisheries Department

Another interview was carried out, this time at the district level, with Mr. Rizal Socradji who is the Chief Superintendent at the Semporna Fisheries Department, on 8 January 2018. Semporna covers numerous islands inhabited by mainly the Sea Gypsies including Pulau Mabul which is the most populated island where traditional fisheries and tourism exist side by side. Enforcement is a huge challenge in this geo-politically sensitive area where the threat to sharks and rays is greater from the foreign syndicates and their trawlers rather than the local fishers. While acknowledging the enforcement challenges, Mr. Rizal was of the opinion that the Eastern Sabah Security Command (ESSCOM), a predominantly marine security zone that was set up in 2013 to combat piracy and cross border kidnappings, has been effective in minimising large scale sharks and rays fishing by foreign syndicates. To ensure 'buy in' from the local fishers at Pulau Mabul, Mr. Rizal has focused on outreach programmes to educate them on a continuous basis. This soft approach is deemed to be more effective although from time to time, poverty induced non-compliance would surface

and attract the negative attention of tourists staying on Pulau Mabul. Mr. Rizal has also used the soft approach of deploying his enumerators to mingle with the fish traders as a form of outreach, assist in gathering market intelligence and isolating potential traders in sharks and rays for policing and surveillance purposes.

5.5 Fieldwork at Pulau Mabul

Being the most populated and 'visible' island (due to tourism) in Semporna, Pulau Mabul is both famous and infamous, the latter due to the occasional media coverage on the local fishers butchering sharks and rays (the Star, 19 February 2018 – among other incidents). Pulau Mabul has a population of 3,318 persons of which 2,467 (74%) belong to the Suluk community and the 651 (20%) are the Bajau Laut (Sea Gypsies). Ever since the forced relocation of resorts from Pulau Sipadan to Pulau Mabul by the government in 2004, there are now 5 formal resorts located in an enclave and 14 budget accommodation that are built within the water villages, although 2 chalets have since closed down. However all the accommodation facilities are owned and operated by outsiders and only one of the budget operations is partially owned by a local individual. Notwithstanding this, many of the youngsters on the island are employed by the resorts and chalet operators as boat men, on the front desks, in housekeeping and relating to food and beverage duties. It is interesting to note that many of the youngsters look up to dive masters/instructors as their role models. Despite this, traditional fisheries is still important as a source of livelihood, especially tuna fishing. To better understand the relationship between the local residents and their marine surrounding, a Research Assistant (RA) was dispatched to spend three weeks at Pulau Mabul from 29 January to 21 February. Besides being primarily tasked to investigate the prevalence of sharks and rays capture by the local fishers, the RA was also directed to probe whether shark meat and/or ray meat has been part of the traditional diet of the two distinct local communities because of cultural reasons. Additionally the RA was also to assess whether tourism has provided an alternative source of income that could compensate for the potential loss of income for not being able to catch and sell sharks and rays.

Participant observation was used and the semi-structured interviews revealed the particular traits of the local communities and their attitude towards fishing for sharks and rays. These respondents included leaders of the two local community groups, resort/chalets managers, small time traders and youth leaders. The main findings are summarised below:

- Traditionally, both the Suluk community and the Bajau Laut were actively involved in catching sharks and rays but this activity has been relegated to by-catch ever since the strict enforcement by the related agencies.

- Although this research could not establish the frequency of enforcement patrols, the perception of the local fishers was that it is risky to carry out shark fishing because it is a visible activity given that boats had to be equipped with many floating buoys to support the fishing lines (*rawai*) which made them easily spotted by enforcement patrol boats.
- Traditionally the Suluk community used to catch sharks only to sell their fins and the rest of the carcass were thrown away but the Bajau Laut (Sea Gypsies) would dry shark meat and turn them into salted fish for their own consumption.
- Rays have been traditionally part of the Suluk community's diet by processing ray meat into *tiulak itum* or black soup so in this regard the community was adamant that they should be allowed to fish for rays and will continue to do so as a way of life.
- In the days before strict enforcement shark fins could be sold for between RM 300 to RM 400 but the current price is not fixed, and are determined through negotiation once there is a sizeable capture as part of the by-catch, although a local fisher divulged that a 20in. shark fin could currently fetch up to RM600.
- One local fisher revealed that some of the fishers at Pulau Mabul have started to sell shark meat in the Philippines which could be sold at RM12 per kg. compared to between RM4 and RM5 per kg.
- The local fishers claimed that they are aware of the species of sharks and rays that are legally protected, based on the photographs shown to them during the outreach programmes, but whether this awareness is translated into practice is doubtful given that the local fishers do not have control over the types of by-catch on their fishing trips.
- Despite mainly targeting tuna due to its higher price, there are days when large numbers of sharks and rays are caught as by-catch, which the local fishers kept and sold to supplement their income.
- Pulau Mabul is becoming infamous, mainly through word of mouth among the local fishers, as the transit point for the processing of sharks and rays caught in Indonesian waters which the incident on 19 February 2018 demonstrated.
- There were conflicting narratives of the 19 February incident which ranged from denial by the authorities to apathy in the part of the local communities but the most likely explanation is that the rays were captured in Indonesian waters and then brought to Pulau Mabul as the most convenient site for processing before being sold to middlemen in Semporna.
- The infamous 19 February incident, as recorded by the RA, involved around 6 local fishers from Semporna who brought in between 15 and 20 rays on 2 boats together

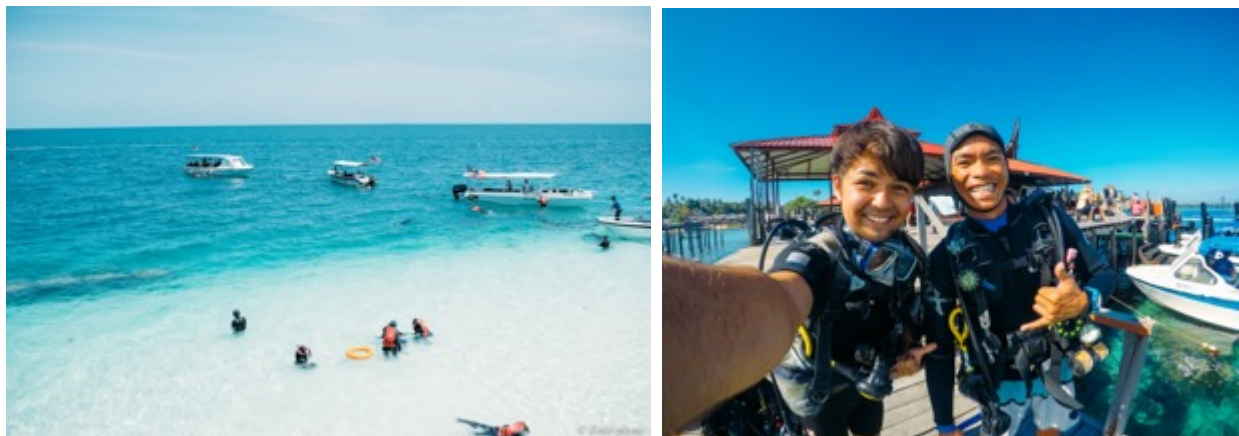
with 2 sharks to be butchered on the island before being sold to buyers in the black market in Semporna.

- Around 5 of the larger manta rays were taken onshore to be butchered into smaller pieces while the remaining smaller rays and juvenile sharks were left on the boats.
- The fishers were working for an 'agency' in Semporna and most of the rays were manta rays which have recently been included as a protected specie in the Fisheries Act but yet to be enforced (pers. comm. Sabah Fisheries Department, 20 February 2018).
- The overwhelming reaction to the incident by the local communities was mixed but most of the villagers showed apathy as it was considered as an on-off spectacle (in terms of scale and magnitude) and that those involved were not committing any crime as it was part of their way of life and right to make a decent living.
- Many of the villagers were aware that sharks and rays have been brought onshore in the past but in limited quantity, and it was the media coverage rather than the incident per se that alerted them, and despite this, the majority thought that only 1 manta ray was butchered (instead of 5).
- The incident on 19 February was witnessed by many foreign tourists and coupled with the media outrage, gave the impression of lawlessness on Pulau Mabul, and despite the fact that it was a one-off incident, the probability that it could be repeated in the future could not be ruled out.
- Most of the younger population who are directly or indirectly involved in tourism felt that the incident was bad for the image of Pulau Mabul but at the same time sympathised with the 'perpetrators' because they felt that the incident was just one of the occupational hazards of life as traditional fishers.
- Further investigation revealed that there were at least 4 and 6 local fishers who regularly fish for rays in the Indonesian waters and would bring in rays and sharks on a monthly basis, albeit in smaller numbers, to be butchered at Pulau Mabul but increasingly away from the public gaze.
- In conclusion the younger generation agreed that the lack of formal education and lack of local capacity have marginalised the Sea Gypsies and even the older Suluk community hence their only source of livelihood is still traditional fisheries in which fishing for sharks and rays during the so-called sharks season is part of the income stream.

5.6 Tourism As An Alternative Source of Livelihood

Tourism has provided a stable source of livelihood for both communities although the Bajau Laut (Sea Gypsies) youngsters are handicapped by their lack of formal education. The willingness and readiness of the local community to be involved in tourism has significantly changed since the advent of tourism on Pulau Mabul around the year 2000. An interview with Mr. Clement Lee was conducted on 21 March to elicit his views on the impact on tourism on the local communities. Mr. Lee was the former owner of Borneo Divers which was the pioneer resort to be relocated from Pulau Sipadan to Pulau Mabul in 2004. During his early engagement with the local communities to develop rapport, Mr. Lee revealed that the village headman at that time was not optimistic that tourism would provide a stable income, and that fisheries (including sharks and rays) would forever be the main source of livelihood as it was a lucrative business.

However, the attitude towards tourism has gradually changed over the years, and the fieldwork in Pulau Mabul also revealed that securing a job in the industry brings pride to the local communities. Despite this, the involvement of the local communities is restricted to menial work at the resorts, as stated above. Many of the Bajau Laut children are prevented from attending the primary school on the island because they do not have a Malaysian identity card. This has restricted their entry into the tourism industry and might create a 'social time bomb' in the future (Liew and Hamzah, 2016). As mentioned earlier, dive masters/instructors are the role models for the local youth and becoming a dive master is regarded as being the pinnacle in the career path of every youngster in the village.



Tourists using Pulau Mabul as a base to dive at the world class scuba diving spots at Sipadan Island. Photo Credit: Emil Kurihara.

Enabling factors, however, are lacking among the youth and the lack of capital and business acumen have restricted their involvement as accommodation providers. The fact that only 1 of the 14 chalets that have been developed in the water villages is partially owned by a local is a reflection of the marginalisation of the local communities. In this light Mr. Lee suggested

that a tourism cooperative should be established to empower the local youth and create entrepreneurs among them. In tandem with the soft approach used by the Sabah Fisheries Department to educate the local fishers, increasing the income of the local communities through sustainable tourism could elevate their role as joint custodians.



Children without Malaysian identity cards are prohibited from attending the primary school on Pulau Mabul. Photo Credit: Emil Kurihara.

PART III

6.0 CONCLUSIONS AND POLICY IMPLICATIONS

This research has revealed that the market share of sharks and rays fisheries in Sabah is within the two percent national average in terms of total annual marine landings. By focusing on the socio-economic perspective of the sharks and rays trade in Sabah involving the local fishers it can be surmised that the strict enforcement of regulations as well as the soft approach using outreach might significantly reduce the direct involvement of local fishers in sharks and rays capture. Most importantly the soft approach of befriending and engaging the local traders and 'kingpins' at the landing ports have managed to isolate the them, which in turn, has facilitated the monitoring of trading in sharks and rays as well as improved market intelligence. It has to be highlighted that the research did not investigate the frequency of the enforcing patrols, the number of persecutions for non-compliance and the other aspects of the regulatory system as they lie outside the scope of study. However the qualitative approach using the participant observation technique was successful in providing an insightful and intimate understanding on how the local communities have reacted to changes brought about by regulations and enforcement within a wider geopolitical setting. In this light the Pulau Mabul case study gives a fair reflection of the challenges that are being faced by the local communities in adapting to economic forces and opportunities which are mostly in the hands of powerful outsiders, and where local rights are seldom accommodated.

Credit should be given to the relevant agencies for limiting the capture and sale of sharks and rays as by-catch. However, poverty and the increasing demand for shark fins from selected markets as well as the indiscriminate capture of protected species of sharks and rays as by-catch are constantly challenging the effectiveness of existing management strategies. The case of Pulau Mabul shows how poverty and the lack of access to alternative livelihoods have forced the local fishers to be increasingly dependent of the by-catch of sharks and rays to supplement their income. Although the infamous butchering of rays at Pulau Mabul could be regarded as a one-off incident that was sensationalised by the media, the growing reputation of this tourism island as some sort of transit point for the processing of sharks and rays, protected or otherwise, clearly demonstrated how the poor economic condition of local communities had forced them to the edge of non-compliance.

On the other hand, the case of Pulau Mabul has also shown how tourism could empower the local communities and strengthen their potential role as joint custodians. However, ensuring economic sustainability is crucial in securing the 'buy in' from the local communities. For as long as local communities are being marginalised due to their lack of capacity, the journey to

transform them into effective joint custodians of the marine resources will face tough challenges.

Demand for shark and ray products (excluding shark fins) are expected to increase steadily over the years due to growing demand by consumers from certain markets. This is an important point to consider, as it implies that even where anti-finning campaigns from environmental groups are successful in terms of decreasing consumption of shark fins and/or reducing the prevalence of the practice among fishers of shark, the pressing need to maintain and develop monitoring and regulatory systems remains (Dent & Clarke, 2015). To complement regulations and enforcement policy interventions based on a softer approach is equally essential.

In the case of Sabah, the policy implications and required interventions should centre around the elevation of the role of responsible tourism not only as a alternative source of income for the local communities but also to educate and convince them that the protection of the marine resources is crucial to the tourist experience and their livelihood. In Pulau Mabul, the setting up of a tourism cooperative among the local communities is essential in enhancing their capacity to develop, manage and benefit from community based tourism. By enhancing local capacity and providing easy access to micro credit (for the tourism cooperative) the local communities could be empowered to operate their own accommodation facilities and scuba diving services that is likely to increase their income. In the proces, the local communities should be educated to value the marine resources around them as being valuable tourism assets that should be protected to ensure a high quality tourist experience for which tourists would not mind paying a premium.

Towards this end incorporating rights-based approaches is crucial, for instance by ensuring that every child on Pulau Mabul has the right to attend primary school, regardless of his or her citizenship status which will help prepare them to be a part of the local economy in the future, that should be based on non-consumptive wildlife tourism and responsible marine tourism.



Staring at the future – a Suluk girl in a typical Suluk water village on Pulau Mabul. *Photo Credit: Emil Kurihara.*

List of Respondents

	DATE	ACTIVITY	OFFICER/CONTACT PERSON
1.	28 Oct 2017	<ul style="list-style-type: none"> ▪ Interview with Tawau Fishermen and Community 	<p>En. Mursalin Hanas Former Member of Tawau Fisherman Association</p> <p>En. Grudon Fish trader at Pasar Ikan, Tawau</p> <p>En. Kassmani Local goods trader (Tawau-Tarakan trade)</p>
2.	5 Nov. 2017	<ul style="list-style-type: none"> ▪ Interview with Southeast Asian Fisheries Development Centre, Department of Fisheries Malaysia 	<p>Dr. Ahmad Ali Head of Fishery Oceanography and Resources Enhancement Section</p>
3.	8 Nov. 2017	<ul style="list-style-type: none"> ▪ Interview with Sabah Fisheries Department 	<p>En. Lawrence Kissol Senior Assistant Director,</p>

			Marine Aquaculture Department, Sabah Fisheries Department
4.	8 Jan. 2018	<ul style="list-style-type: none"> ▪ Interview with <i>Penguasa Perikanan</i> 	En. Rizal Socradji Ketua Penguasa Perikanan, Semporna Fisheries Department, Sabah
5.	29Jan-21 Feb 2018	<ul style="list-style-type: none"> ▪ Interview with local community in Mabul Island 	En. Mat Mabul Village Head <i>And</i> Local communities

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