

REVIEW OF SHARK FISHERIES IN THE ASEAN REGION

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1. INTRODUCTION

Shark fisheries have historically represented only a minor and relatively low-value contribution to the overall fisheries production of all SEAFDEC member countries. However, there has been an apparent rise in the trade of shark fins in the last decade which focusing more on a substantial fishery and little is known about this fishery. Shark species are currently in demand for their fins, cartilage, skin, meat, oil and livers.

Due to lack of management and research on sharks, little is known about its sustainable level. Consequently, very little is known about the biology and ecology of the most sharks' species. Despite the global pressure on this resource, only few nations include sharks fishery in their management regimes.

This report compiles available fisheries information on sharks through published reports on statistics, shark trade and conservation conventions, seminars, meetings, workshops and visual market survey in all the major fish markets and fishing port of Peninsular Malaysia, Sabah, Sarawak and Brunei Darussalam.

2. BIODIVERSITY AND TAXONOMY

The elasmobranch biodiversity of this region is among the richest in the world with at least 136 species of sharks (Compagno, 1997). The "Region" as define here includes the tropical waters of the South China Sea and adjacent waters) with those countries fronting the South China Sea (including freshwater habitats): Thailand (Gulf of Thailand), Malaysia (Peninsular Malaysia, Sarawak and Sabah) Singapore, Kampuchea (Cambodia), Vietnam, China, Taiwan, Philippines, Indonesia (Kalimantan and Brunei). However, information relating to the shark fauna of the region is still poorly known. Many new species are continually being discovered and recorded, and numerous taxonomic problems still need to be resolved before a complete biodiversity baseline can be established. More complete studies are however hampered by general lack of research and reference collection, lack of access to the regional data management and information systems, the near absence of a comprehensive regional identification guide to the shark species found here and a clear shortage of taxonomists in the region.

2.1 Indonesia

Indonesia has richest chondrychthian in the world. Only relatively small number of research and publications on chondrychthian has been carried out in Indonesian waters. However, the elasmobranch fauna in the Indonesian shallow water is as rich as the Australian waters and little is known about its habitats in the deeper water. It has been estimated that Indonesia has at least 350 chondrychthian species.

Among the major shark species caught in Indonesia are blacktip reef shark (*Carcharhinus melanopterus*), spot-tail shark (*Carcharhinus sorrah*), whitetip reef shark (*Triaenodon obesus*), scalloped hammerhead (*Sphyrna lewini*), blue sharks (*Prionacea glauca*) and gulper shark (*Centrophorus squamosus*).

2.2 Malaysia

Information regarding the sharks and rays in Malaysia is still scanty and inadequate. More than 116 species of elasmobranch are reported to inhabit within the Economic Exclusive Zone of Malaysia, comprising more than 62 species of sharks from 15 families, more than 54 species of rays from 12 families and 2 species of *Chimaera* (Ahmad *et al.*, 1998, Ahmad, 2002-unpublished report). In Sabah, a total of 32 species of sharks and 41 species of rays has been recorded during the 18 months elasmobranch biodiversity project in 1997 (Manjaji, 1997).

2.3 Philippines

In the Philippine waters, 52 species of sharks were reported to be found in the survey conducted by Fish and Wildlife Service, U.S Department of Interior in the early 1950s but at present, only 20 species were confirmed to occur. But, this does not mean that other species are no longer found in the Philippines waters (Barut & Zartiga, 1997).

2.4 Thailand

In Thailand, at least 145 species of elasmobranch from 34 families and 13 orders may probably occur in the Thai and adjacent waters. These consist of one species of chimaera, 74 species of shark and 70 species of batoids. The dominant groups are ground sharks (Carcharhiniformes), comprising 49 species from 5 families and stingrays (Myliobatiformes), constituting 45 species from 6 families. Eighteen species of this elasmobranch are known to inhabit in deeper waters. A total of 15 species are oceanic, 108 species are coastal species and 10 species inhabit freshwaters or penetrate in euryhaline waters (Chavalit, 1997).

2.5 Brunei Darussalam

Information regarding the sharks and rays in Brunei Darussalam is still scanty and inadequate. Fifteen species of sharks from 5 families and 2 orders were recorded during research team from MFRDMD and JICA expert visited Brunei from 4 to 7 November 2000.

2.6 Vietnam, Singapore, Cambodia and Myanmar

Information from the above countries was not available during this report writing

3. SHARK RESOURCES

Figure 1 show the landings (in metric tons) of sharks for 5 SEAFDEC member countries (Malaysia, Thailand, Philippines, Singapore and Indonesia) from 1975 to 1997. Data from other countries such as Myanmar, Cambodia, Vietnam and Brunei are not available during this report preparation. Indonesia is the top harvester and the trend is increasing with a total

landing of about 854,681 metric tons and an average of 37,160 metric tons/year (1975-1997). Philippines is the second with the total landing of 125,287 metric tons with an average of 5,966 metric tons/year (1977-1997). Malaysia is the third with a total landing of 121,411 metric tons and an average of 5,571 metric tons/year (1977-1997) Thailand is the fourth with a total landing about 86,564 metric tons and an average of 4,122 metric tons/year (1977-1997). Singapore is the least country with a total contribution of 6,471 metric tons and average of 308 metric tons/year (1977-1997).

Figure 2 show the landings of sharks in value (US\$) for 4 SEAFDEC member countries (Malaysia, Thailand, Philippines, Singapore) from 1975 to 1997. Data from other countries such as Indonesia, Myanmar, Cambodia, Vietnam and Brunei are not available during this report preparation. Malaysia is the top and the trend is increasing with an average of US\$ 3,015/year. Philippines is the second with an average of US\$ 2,970/year followed by Thailand at an average of US\$1,496/year. Singapore is the least country with an average of US\$ 215/year.

4. DISTRIBUTION OF FISHERY AND THE HARVESTING PROCESS

4.1 Indonesia

4.1.1 Landings

Fisheries statistics indicate that sharks and rays are caught throughout Indonesia. Between 1987 and 1991, sharks and rays accounted for only 2.4% of total fisheries production. Indonesia has considerably increased its elasmobranch catch from 1,000 metric tons in 1950 to 95,600 metric tons in 1997, which represents 12.1 % of the total world chondrychthian catches. This amount represents only 2.6% of the total Indonesia catches. This growth has been particularly significant since the mid 1970s. Indonesia does not report chondrychthian catches by species but only provided at the level of "sharks and rays" which were at 59,450 metric tons and 36,100 metric tons, respectively in 1997.

The targeting of carcharhinid sharks such as the white and black tip reef shark appears to have a long history in Indonesia. This is because that specialist shark fisherman from southeast Sulawesi has targeted sharks for centuries. During long annual voyages they fished for shark using handlines (Wallner & McLoughlin, 1995).

Much of Indonesia shark fisheries are small-scale fisheries using relatively small canoes and simple gear. Most of these activities occur in shallow water of coral reef and coastal environments. However, the increase in the price of shark fins has resulted in greater fishing effort being directed towards these species. Sharks are also captured as by-catch by industrial fisheries. When using set gillnets, set longlines and handlines, sharks and rays are caught along with other species. Longlines are often used to target demersal species such as snappers and groupers. Baits used include skipjack, dolphin, dugong, cow and cat and these baits are attractive to shark. Target fishing for shark is now focused on area such as Nusa Tenggara, Timor Sea, North Sulawesi, northern Maluku and northern Irian Jaya.

During the late 1970s, landing of sharks were concentrated around the central and western provinces, in the Java Sea, Strait of Malacca and Indian Ocean. However during the next five years, landings increased uniformly although proportionally large amount of catches were observed in South Sulawesi, north and south coast of West Java (Chen, 1996).

By 1990, most of the region with historically larger landings had experienced significant decreases in landings. These include the west coast of North Sumatra; the north and south coasts of West Java and East Java; the north coast of Central Java and South Kalimantan. Landings in some of these regions, particularly those that experienced declines around the mid 1980s have increased tremendously especially in areas such as south coast of West Java, north coast of Central Java and South Kalimantan. However, landings in other regions such as the north coast of East Java and South Kalimantan have continued on a decreasing trend.

Landings in the other western provinces, such as West Sumatra, the west coast of Lampung, Bengkulu and the Strait of Malacca coasts of Aceh and North Sumatra have continued to increase but not reaching 2,000 metric tons. The provinces of South Sumatra, the east coast of Lampung and Central Kalimantan are all in the Java Sea. Unlike neighboring regions, the landings from north coast of Java were initially low but continuously increase at an increasing trend.

Most of the western and central provinces have experienced greatest expansion in the landings during the early 1980s. Since then, catches have generally decreased or remained relatively stable. In the eastern provinces, particularly Maluku, North Sulawesi, West Nusa Tenggara and Irian Jaya, there were large increased in landings during the late 1980s. Apart from Irian Jaya, there was no consistent decrease in landings in any of these provinces from 1985 to 1992. However, in East Nusa Tenggara, Maluku and North Sulawesi had decreased in landings between 18 and 42% in 1993.

There are a number of locations where demersal elasmobranchs such as white-spotted guitarfish are being targeted specially for their fins. Their fins are worth more than 1.5 times from other species. This species have been heavily targeted in the Java Sea, Maluku and Irian Jaya.

4.1.2 Exploitation of shark by foreign vessel

Evidence from Indonesia fishers suggest that there are large numbers of foreign vessels targeting for shark in the deeper offshore waters of eastern Indonesia (Banda Sea between East Timura and the island of Seram). Majority of these vessels is of Taiwanese origin and some were Korean boats. These boats are based in Bitung, North Sulawesi. The target species was probably blue sharks (*Prionace glauca*). In early 1970s, Taiwanese vessels began fishing in the Arafura Sea for sharks. They used drifting gillnets to catch Australian black tip shark (*Carcharhinus tilstoni*), spot tail shark (*C. sorrah*) and tunas. McLoughlin *et al.*, (1994) have reported that 55 Taiwanese gillnetting vessels were licensed to fish in the Indonesia waters.

4.2 Malaysia

Shark caught in Malaysia are normally as by-catch. On both east and west coasts of the Peninsular Malaysia and Sabah, trawls accounted for 60 to 70% of the local shark catches and 72 to 93% of rays. Purse seines contributed less than 1% of the total shark landings in Peninsular Malaysia. In Sarawak, large-scale otter trawls were estimated to land 70% of the rays annually but only 30% of the shark. In general, shark landings by trawl have decreased since 1990 from as high as 80% (of the total shark landing) in 1991, to only 46% in 1994, despite a threefold increase in total landings for the same period. The increase in shark landings is mostly due to an increase use of drift/gill nets and hooks and line methods. Other gears that caught sharks are portable traps, other seines and stationary traps.

Sharks are caught throughout Malaysian waters with Sarawak and Sabah contributing higher catch as compared to west and east coasts of Peninsular Malaysia. The average total landing of sharks from Peninsular Malaysia and Sabah/Sarawak from 1988-1995 are 2,280 metric tons/year to 3,672 metric tons/ year, respectively.

Some of the important ports that land a large quantity of shark are LKIM Kuantan, LKIM Batu Maung (Peninsular Malaysia), Kota Kinabalu and Sandakan in Sabah and Tg. Manis in Sarawak.

4.3 Thailand

Thai elasmobranch fisheries are mainly from large-scale activity. The Fisheries Statistics of Thailand indicates that the catch of shark since the 1960's varied from 9 to 12 metric tons. Since the late 1980s, the landings of shark were on the average of 11.8 metric tons. The shark landings have not been restricted to its coastal waters as the fishery was also caught in waters of other nations, including Indonesia, Vietnam and Malaysia, Myanmar and Bangladesh. Most of the fishermen within the Thai waters do not directly target for shark.

The important fishing ground for the sharks in Thailand is the Gulf of Thailand and Andaman Sea. Most of the catch on both coasts were taken by trawlers followed by gill nets, purse seines and hook and line/longlines.

From 1989 to 1995 (not including 1991), the catch of sharks from the gulf was on average at 2,415 metric tons/year while the contribution from the Andaman Sea, only 911 metric tons/year (Chen, 1996). Some of the more important fishing ports are located around Songkla Lake and its coastal areas of Chumporn Province, Aung Thong National Park (Surat Thani Province) and Prachuap kirikhan.

4.4 Philippines

In the Philippines, the most productive commercial fishing grounds for sharks, in order importance, are the West Sulu Sea, the Lamon Bay and the Visayas Sea. The data statistics from SEAFDEC from 1977 to 1995 showed that Mindanao is the main harvesting area for shark and rays, followed by Luzon and Visayas. The whale shark is highly exploited in the southern island of Pamilacan, Bohol and Camiguin at the Bohol Sea. The hunting season for this type of shark is normally from November to May with March and April considered as the peak months in the hunting.

Shark is not the primary target species with trawl as the main gear employed in the harvesting of shark. Other gears used in catching sharks are hook and line and handline. The sharks were also caught as by-catch in gears that are used to catch the large and small pelagic. In Luzon, the large-scale trawlers are the main gear but in Visayas, the main gear is large-scale purse seines. The harvest of shark from small-scale fisheries in Luzon, Visayas and Mindanao are mainly by hook and lines and gillnets. The hook and lines method was more effective in catching shark from Visayas and Mindanao. The catches from gill nets were normally smaller than that for hook and lines. Whale sharks hunting are carried out using traditional methods of metal spears or hooks. The catches are then towed to the village, and at its shallowest points, they were left to flounder.

The ports involved in the shark fisheries in Philippines included Pamilacan, Bohol, Turtle Island, Lubang, Mindoro, Calauit Island, Palawan, San Fernando and Pampanga. The main fishing grounds around Zamboanga were in Batorampon Point, near Batangway Labuan (west coast), and the Sta. Cruz Island, near Basilan at Sambay Island, Pilas Island, Jolo, Tawi-Tawi, Cotabato and Siasi.

4.5 Brunei Darussalam

Shark caught in Brunei Darussalam are normally as by-catch. Shark is not the primary target species with trawl as the main gear employed in the harvesting of shark. Other gears used in catching sharks are hook and line and handline. The important ports that land a large quantity of shark is Muara and Jerudung.

5. THE TRADE OF SHARKS AND SHARKS PRODUCTS IN ASEAN REGION

Production and trade data are useful in highlighting important markets and uses for shark products. But it was difficult to obtain both catch and trade data that hampers and limit the correctness of reported volumes and values of shark products in the trade. They are often inadequate and not precise enough to state the species and areas of interest in this trade. Knowledge regarding utilization of sharks is often limited, as national fisheries statistics frequently do not record production and trade of the various shark products.

Asian countries sustain the leading chondrychthian fisheries. In 1996 their catches represented 55.4% of total world landings for these species. Consumption and trade of chondrychthian meat is rather limited. Shark meat is usually dried and salted, used in the production of fish balls, tempura, surimi, fish sausage, fish ham, fish cake and fish paste. According to FAO statistics, production of chondrychthian by Asian countries amounted to nearly 33,000 metric tons in 1997, with Pakistan being the main producer with 19,000 metric tons.

Hong Kong is the world's leading trading center for shark fins and significant consumer of shark fins. The consumption of shark meat is not very high. Shark meat is involved in the production of fish balls, which are used in the preparation of certain Chinese dishes and often exported to other neighboring countries. About 20-40% of shark meat was normally added to the cheaper varieties of fish balls. It was used in filling vegetable and soya bean products called *yeong tau fu*. However, with the increase in the price of shark meat it became uneconomical and shark meat has not been used for making fish balls in Hong Kong since 1997. Traditionally the consumption of shark and ray meat in Hong Kong was not widespread and only the poor and persons who lived near the coastline eat them.

5.1 Singapore

Figures 3, 4, 5 and 6 show the trend of import and export for shark fins of Malaysia, Thailand, Philippines and Singapore from 1977-1995 in metric tons and US\$. Singapore is the second largest shark fin trading nation after Hong Kong. Although Singapore's fishing fleets is not large, nevertheless, she is able to imports, process and export a wide variety of fish products that including sharks' meat and fins. Singapore has a number of traders dealing with import, export and wholesale markets in sharks' fin, although not all are specialized in one commodity. Most have a retail outlet supplying pre-packed shark products and a wholesale market supplying to hotels and restaurants.

Of the many species of fins imported into Singapore, two are most popular with the local restaurant trade. These are the fin of brown shark and blue shark. Species such as hammerhead shark, tiger shark, white sandbar shark are also common. However, by comparison, they are used in very small quantities.

Singapore exported dried or salted shark fin to more than 15 countries. The quantity was relatively small compared with regular export. It varied from as low of 1 ton valued at S\$ 51,000 in 1988 to as high of 254 tons, valued at S\$ 15,266 million in 1994. Singapore also exported prepared shark fin to more than 17 countries of which Hong Kong, Japan, Taiwan Province of China and the USA are the main buyer of the product.

In 1996, estimated quantity of fins consumed in Singapore is about 500 tons annually as compared to 400 tons in 1991. The highest demand for this product comes from the Chinese banquets held at major restaurants and hotels. By custom, shark is a powerful animal and by eating its meat, it was considered to engender strength and vitality to its consumer.

There was an increased in the opening up of the Chinese market and they are in demand for the fins of whale sharks. These fins were not usually popular products as their fin needles are inclined to be coarse in texture and ashy in taste. The Chinese demand for these fin were not for food, but mainly for display in the restaurants. The sheer size of these fins was enough to impress customers.

Singapore's shark export has only been reported to FAO since 1995. In 1997 they amounted to nearly 1,600 metric tons, worth US\$5.7 million. In the same year 1,400 metric tons were imported, valued at US\$ 4.7 million. Singapore exports shark meat to other Asian countries and to the EU. According to EUROSTAT statistics, in 1997 Singapore exported nearly 1,500 metric tons, valued at US\$ 4.3 million to the EU. Italy was by far the main outlet, taking 790 metric tons, followed by the Netherlands (310 metric tons), Germany (195 metric tons) and Greece (180 metric tons).

In Singapore, locally made processed and canned sharks' fin may be found on sale at most of the major market. Health food shops in the country also stock some of the shark products, the most frequent being in the form of squalene. Shark's cartilage manufactured in the USA, is sold here in small packages. The imports for both squalene and cartilage products come from Japan, New Zealand and the USA. To satisfy the modern consumer, instant "sharks' fins soup", conveniently packed for use in the microwave oven, are also provided at some local Chinese medicinal hall.

5.2 Malaysia

In Malaysia, the Annual Fisheries Statistics does not differentiate the different species of sharks that are caught and processed. Data concerning these products are only available under the general heading of:

- i Frozen dogfish and other sharks
- ii Sharks' fin salted but not dried or smoked in brine
- iii Shark's fin dried weather or not salted but not smoked
- iv Shark's fin

The Malaysian trade in shark fin is on smaller scale and only about 2% of that of Singapore. Malaysia imports shark fins from more than 25 countries and exports to around 15 countries. Statistics on exports of shark meat have been reported since 1991 when they stood at 34 metric tons worth US\$ 42,000. Export has not been very regular and in 1997 they amounted to only 35 metric tons, worth US\$15,000. Before 1993 the Malaysian import tax on shark fin was 50%. In 1993 this was reduced to 30% and in the following year fell again to 20% but importers were then required to pay another 5% sales tax.

Some of the main markets for the Malaysian shark's fin (salted but not dried or smoked and in brine) are Singapore and Hong Kong. Malaysia also imports similar products from Singapore, Indonesia, Hong Kong and Thailand. Australia, Singapore, China and Hong Kong have been the major countries that provide raw shark's fins to Malaysia, while Malaysia in turn has provided export of the same products to Korea, Hong Kong, Brunei and Singapore.

Processing of sharks' fins in Malaysia is usually carried out as cottage industry by fishermen or middlemen. The meat is sold fresh, or dried, at almost all major markets in Malaysia. A small number of shark's jaws, and even teeth, are sold as rare souvenir items to enthusiasts. Cartilage, and some other discarded parts of the fish, is used as baits, for fish and crab traps. Small sharks, as well as those that are non-edible or unsuitable for baits, are sold to the fishmeal factories for fertilizers.

Most of the shark fin processors did not want their activities to be known by anyone outside the trade. The task was made more difficult by the fact that most traders do not advertise their activities in trade the directories, chamber of commerce or the dried seafood association. Except for the sale of popular products such as sashimi and sushi in local supermarkets, Malaysia shark fin processors have not ventured into processing of ready-to-eat products. However, attempts were made to produce canned shark fin soups. One established Malaysian company distributes pouched shark fin soups and dishes under its own label, but the product was processed and packed in Thailand.

The most well known and highly priced shark fin in Malaysia is the shovel-nose ray. The price of 4 piece set pectoral fin (36-48 inches) range between US\$ 195-220. Others often mention by traders is blue shark. It is believed that only 3% of the restaurants in Malaysia have knowledge to use different species and type of fins to their best advantage. Only 5 shark species are locally accepted as food table. Both meat and fins from species like *Carcharhinus falciformes*, *C. limbatus*, *C. macloiti*, *C. sorrah* and *Scoliodon laticaudus* are greatly in demand, and price of these items is on the increase. Some other species are preferred locally for their fins, especially among Chinese, and these included *C. melanopterus*, *C. sealei*, *Chiloscyllium indicum*, *Chiloscyllium punctatum*, *Squalus japonicus*, *Stegostoma fasciatum*, *Sphyrna lewini*, *Sphyrna mokarran*, and *Sphyrna zygaena*. Fins were normally extracted from very small sharks of less than 1 m. in size. Fresh fins and their processed items may be easily found at almost all main wet market especially in Kota Kinabalu and Sandakan in Sabah.

Health food shops here also stocked processing shark's fin and a variety of differently labeled imported shark products that include shark's cartilage and squalene. The shark's cartilage has been claimed to have some anti-vascularization or anti-angiogenesis properties, and has the potential to provide some cure for the following pathological conditions; cancer (prostate, breast, colon and central nervous system cancers), arthritis (rheumatoid disease,

progressive systemic sclerosis, osteoarthritis and mixed connective tissue diseases), skin conditions (burns, wound healing, psoriasis, eczema, hemangiomas, angiofibroma, kaposi's sarcoma), eye diseases (diabetic retinopathy, retrolental fibroplasia, macular degeneration, corneal vascularization, neovascular glaucoma) and inflammatory (bowel diseases).

5.3 Thailand

In the fishery statistics of Thailand, some information on sharks may be obtained under the category 'dogfish and other sharks excluding liver, in roes and/or frozen' and sharks' fin salted and whether or not salted. Base on the import and export of dogfish and other sharks from 1990, Canada has consistently been the biggest exporter of the product into the country. Between 1990 and 1992, the Netherlands, Norway and United Kingdom are also exported shark products to Thailand. The export of dogfish and other sharks from Thailand to other nations appeared inconsistent with only six receiving countries from 1990-1994. In 1994, the two countries that imported dogfish and other sharks from Thailand were PR China and Singapore. The export of 'shark fins dried, whether or not salted' during 1990-1994 was mainly to Hong Kong, Japan and Singapore. In 1997 exports were less than 500 kg, while in 1996 Thailand exported 200 metric tons, valued at US\$ 503,000, of frozen sharks of which 94.4% went to Singapore and the rest to Hong Kong. In the same year 415 metric tons of frozen sharks were imported. Canada was by far the main supplier with 180 metric tons, followed by Denmark, Germany, the USA and Australia. In 1997 imports of shark meat were 300 metric tons, worth US\$ 342,000.

There is no shark processing plants in Thailand. The presently well-established fish processing plants do not engage in shark processing due to the irregular supply. Therefore, all sharks processing is carried out as a cottage industry mostly by the families of the fishermen located in the provinces where the fishing fleets reside. The shark's meat is preserved as salted meat and as sweetened meat and mainly consumed by less wealthy people. Part of the meat is prepared in the form of fillets (fresh or frozen). Shark's fin of large shark is sold in dried or salted form to make the delicacy shark's fin soup. A small number of shark's jaws and teeth are sold as souvenirs to the tourist trade. Cartilage and other discarded parts together with small sharks are sold to fishmeal factories.

5.4 Philippines

In the Philippines, the different areas of the country employed a number of ways to affect the sale of shark's meat. In Luzon, the meat is sold fresh in the market, while in the Visayas and Mindanao, the meat is sold fresh or dried. The shark fins are dried first before being sold to particular buyers. Data collected from 1990-1994 showed the largest and most consistent importer of 'dried sharks' fins' from the Philippines is Hong Kong, followed by Singapore. Due to lack of data, the overall trend in this trade remains unclear. The National Statistics Office provided data for 'shark liver oil and fractions not 'chemically modified''. The Fisheries Statistics provided export figures for squalene oil. The primary importer for this former item is Japan, followed by Korea.

Shark meat is used to prepare fish balls and tempura in Zamboaga, before being sent to Manila for sale or export to the USA. However, since 1996, the preparation of fish balls from shark's meat has stopped due to the instability in the market price, and also from stiff competition for their limited supplies in the market.

The whale shark's fins are sold fresh or dried. A set of 8 fins may be obtained from a single fish. These fins are the most expensive part of the shark. Meat and skin belonging to the shark are also taken, but this (the taking of parts other than fins) has been reported to be a recent action. The innards (i.e. the stomach, intestines and heart) of the shark are now cooked as viand, a local favorite dish. Whale shark liver oil is used effectively as pesticide in the rice fields and coffee plantations at Talisayan. The shark's head also has some value for its meat and skin, but the rest of the body parts are thrown back into the sea. The whale shark fishery has now been reported by some fishers to be on the decline. In Visayas, fishermen reported its catch to be decreasing from 100 whale sharks in 1994, to 80 in 1995 and down to 30 in 1996.

5.5 Indonesia

The shark fishery in Indonesia is primarily driven by the export market for fin. The targeting of carcharhinids sharks such as the white and black tip reef shark appears to have a long history in Indonesia. Recently there has been an increase in the capture of deep-sea sharks for liver oil and squalene. The most valuable fin is white-spotted guitarfish. Shark carcasses are dumped after their fins have been removed. This appears to be particularly true in more remote areas where less demand for the large amounts of flesh caught. Shark carcasses do appear in markets, although they generally sell for low prices. Shark meat is not particularly appreciated for domestic consumption but it is eaten, mainly dried, by the ordinary people. Shark meat is usually processed into dry-salted or boiled-salted commodities. The research Institute for Fish Technology in Jakarta explored different methods of shark utilization, such as processing it into commodities including *abon* (shredded, spiced and dried), *dendeng* (spiced-dried satay), fish balls and sausage.

Indonesia has different trading systems for various elasmobranch products. This reflects their different values and end markets. The shark fins are the most valuable product and they are destined for overseas market. Some fins are consumed domestically, particularly in Chinese restaurants, but this is likely to be insignificant relative to the large amounts exported. Trade data show that three cities, Jakarta, Surabaya and Ujung Pandang, dominated in the fin exports. There is a hierarchy of buyers ranging from local villagers up to ethnic Chinese, who dominated the export business.

Export statistics show that almost all frozen and fresh shark exported from Indonesia in 1993 were originated from Bitong. Furthermore almost all of these products were export to Taiwan Province of China. Exports of shark meat have only been reported since 1990 when they amounted to only 240 metric tons, valued at US\$108,000. These exports increased substantially to peak at 9,300 metric tons (valued at US\$ 5.6 million) in 1993. Indonesia exports dropped to about 800 metric tons worth US\$ 240,000 in 1996 but in 1997, an increase of 204% was observed with exports of 2,370 metric tons and valued at US\$ 740,000. The export of shark meat are mainly directed to other Asian countries, with the great bulk exported to Taiwan Province of China and People Republic of China and small quantities to Japan, Singapore and Europe (mainly UK). Exports of fresh sharks are mainly directed to Taiwan Province of China and dried shark meat is exported to Hong Kong, Singapore, Malaysia and Japan, while Singapore is the main market for exported of brine shark meat.

Dried shark fin have been exported from Indonesia in large quantities for the last two decades. By the 1980s exports were over 200 tons and rising steadily to a peak of 547 tons

in 1987. In 1993 most dried fins were exported to Hong Kong and Singapore although a far greater price was obtained for those sending to Japan. Many sharks are now being sold to Malaysia and Singapore because they are offering higher prices than Hong Kong.

The price of fin can vary greatly depending upon the degree of processing, species and size. Fully processed fins are sold dried and packaged in supermarkets for US\$ 330/kg (Wibowo & Susanto, 1995). First and second dorsal fins and upper lobe of the caudal fin from the white-spotted guitarfish is the most valuable and sold at around US\$ 88-132/kg. Small blacktip reef shark, grey carpet shark, zebra shark, thresher sharks, angel shark (shark ray) and hammerhead shark fins are less valuable. Prices as low as US\$ 6.00/kg were quoted for blacktip reef shark, and US\$ 31-40/kg for hammerhead fins. Fins from blue, mako, and tiger sharks are also valuable. Sawfish fins are also said to be very expensive. Fins from species such as the nurse shark (*Nebrius ferrugineus*) are worthless. There was a rapid increase in the shark fin prices since the late 1980s.

Only very small amounts of shark products are imported into Indonesia. These include dried fins and fins in brine. No fresh or frozen shark was imported.

6. LEGISLATION

Sharks are not specially protected by any specific legislation in the countries of the region, but in the Philippines and Malaysia, some form of protection does exist. In the Philippines, the whale shark is now a protected species under the Fishery Administration (Order 193) since 1998. In Malaysia, six species of sharks have also been listed as protected species under the Marine Recreational Fishing Regulation. Under this regulation, only catch and release fishing is allowed for these species. The Department of Fisheries is preparing to implement the regulation, promulgate under the Fisheries Act 1985, once it is gazetted. The six shark species mentioned are given below.

Scientific name	English name
<i>Chiloscyllium punctatum</i> (Muller & Henle)	Brownhanded bambooshark
<i>Chiloscyllium griseum</i> (Muller & Henle)	Grey bamboo shark
<i>Stegostoma fasciatum</i> (Hermann)	Cat shark, Zebra shark
<i>Atelomycterus marmoratus</i> (Bennett)	Coral catshark, Marble catshark
<i>Heterodontus zebra</i> (Grey)	Zebra bullhead shark
<i>Rhincodon typus</i> (Smith)	Whale shark

Some reasons for their selection are because of their unpopularity as food table and also relative abundance in the inshore waters with exception of whale shark and zebra bullhead shark. These two sharks are great attractive items for the diver and angler, especially the whale shark, which is regarded by many divers as a flagship species among the group. The whale shark, being entirely a filter feeder, eating plankton and very small fish, is especially put on the list due to its docility. The angler fortunate enough to meet this animal might cause unwitting injury because of its harmlessness. The whale shark may be seen in Malaysia coastal waters during the shrimp bloom season (*Acetes sp.*) from November to April.

In 1990, the Government of Malaysia has prohibited the use of 'pukat pari', a type of drift net with mesh size exceeding 25.4 cm, and used for catching sharks and rays to protect marine turtles. The nationwide ban for this large-mesh gillnets partly helps to conserve the breeding stocks of shark, by allowing the larger and more productive females to escape.

Base on the IUCN Red List of Threatened Animals 1996, three shark species reported to occur in Malaysia are classified as endangered. These are black tip shark (*Carcharhinus limbatus*), sandbar shark (*Carcharhinus plumbeus*) and whale shark (*Rhincodon typus*).

In Thailand, 4 pristid sawfishes are now considered to be locally endangered species, followed by 43 threatened species, which especially include two freshwater stingrays, *Himantura chaophraya* and Mekong river endemic *Dasyatis laoensis*. Some of the main threats to the Thai elasmobranchs are due to degradation in the marine environment and overexploitation of some of the fishery resources.

7. CONCLUSION

The status of shark populations of this region is still largely unknown. This has been due to low economic emphasis especially placed on this group of fish, which has, up to recent years, occurred mostly as by catch, resulting in their catch and effort data being notably absent or infrequently recorded in most of the fisheries. Over-exploitation of the juveniles and young's of several shark species that utilize the inshore nursery waters in most areas is perhaps a common phenomenon. Specific nursery grounds of nearly all of the shark species found in the region have not been fully identified.

Better data relating to the population status of elasmobranchs and their fisheries, covering the potentially rare or threatened species, need to be obtained through appropriate studies, in order to improve the level of knowledge required for the formulation of fisheries and conservation management objectives and strategies.

The shark fisheries and its markets of many countries in this region are expanding rapidly, even in the absence of management directed specially at these animals. New fisheries are actively being developed, and there is a growing interest in the trade of shark products. Some species, which were previously considered to be common, now no longer appear to be available in some areas such as sawfishes and sawsharks. Shark fisheries if not properly managed can easily collapse, and the shark populations can enter a long-term decline. Without the introduction and implementation of an effective management regime, directed specifically towards their sustainable exploitation, sharks stocks may be depleted, and it would take a considerably longer period to rebuild. If this occurs, the end result would be a long-term loss of an economically precious resource.

Improved data collection on their landing is essential so as to provide more accurate information needed for their management. There is a strong need to improve shark identification amongst the data collectors especially at the taxonomic level. Data on the specific landings of particular species would be the best data, while their collection at the genus level may still be considered as good if effected, and would be a vast improvement over the current situation on the data collection.

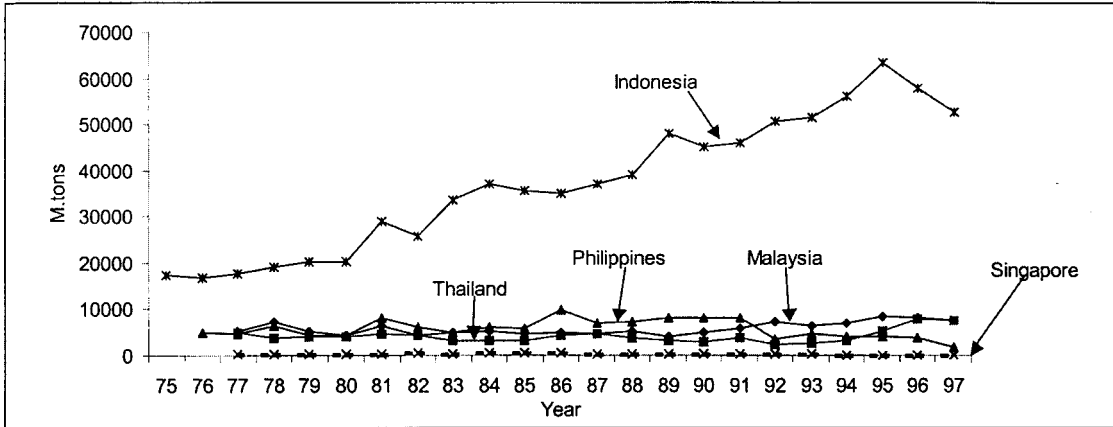


Figure 1. Landings of Sharks in Metric Tons of Indonesia, Philippines, Malaysia, Thailand and Singapore (1975-1997)

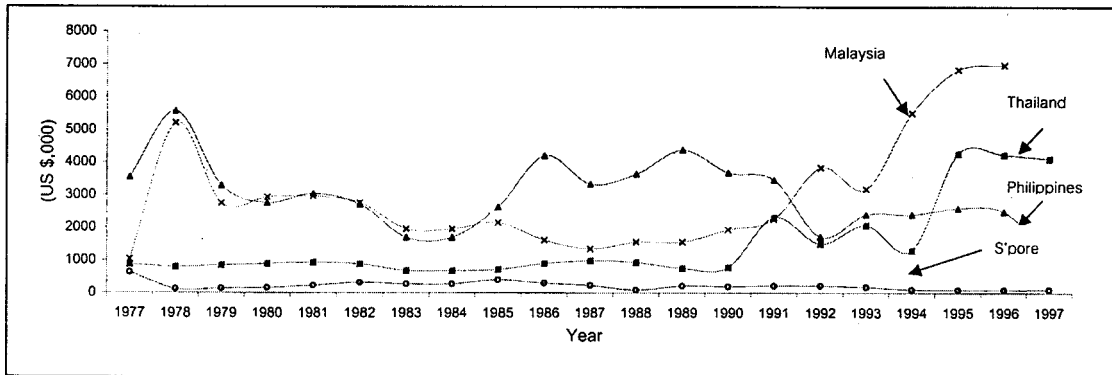


Figure 2. Landings of Sharks in Value (US\$) of Malaysia, Thailand, Philippines and Singapore 1977-1997

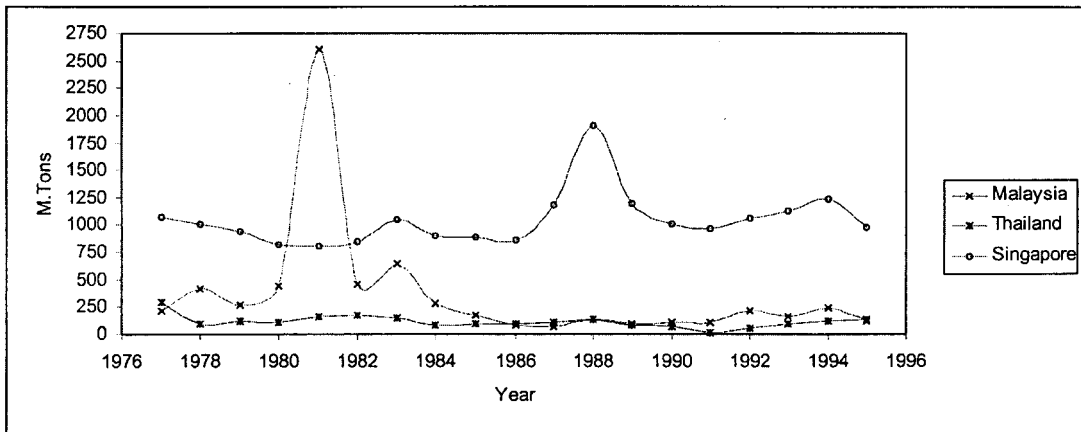


Figure 3. Import of Shark's fin of Malaysia, Thailand and Singapore in Weight (metric tons) from 1977-1995

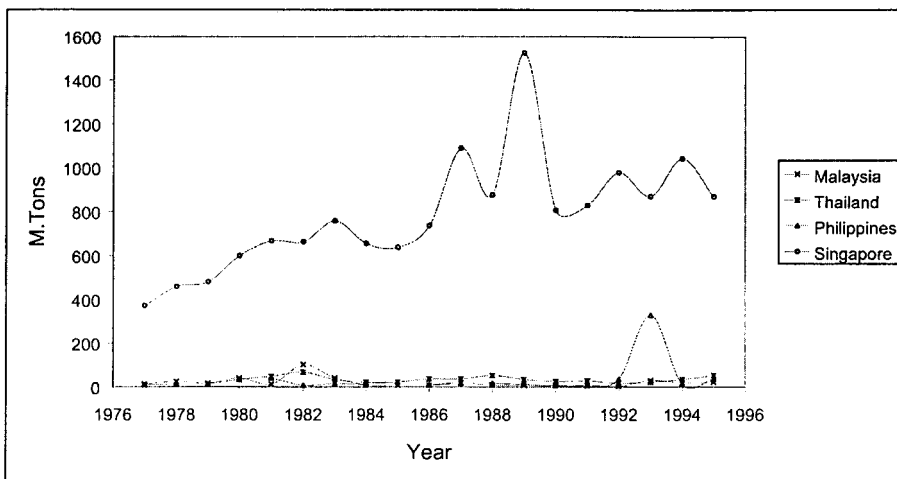


Figure 4. Export of Shark's fin of Malaysia, Thailand, Philippines and Singapore from 1977-1995 in weight (metric tons)

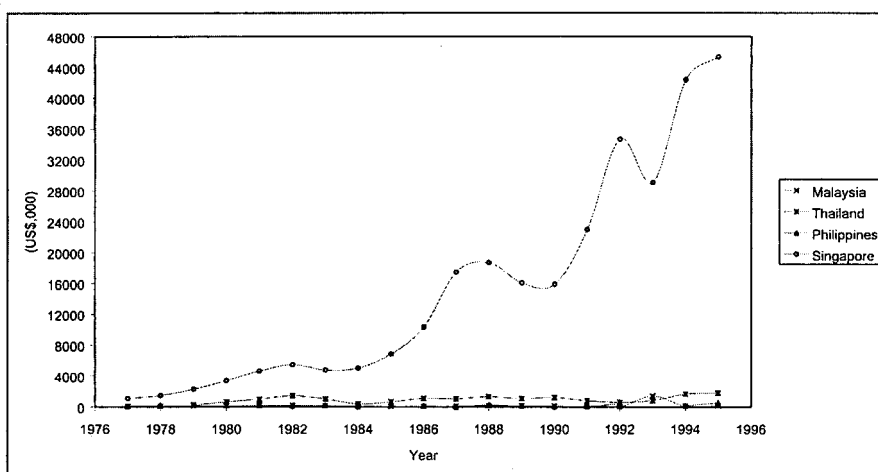


Figure 5. Export of Shark's fin of Malaysia, Thailand, Philippines and Singapore in Value (US\$) from 1977-1995

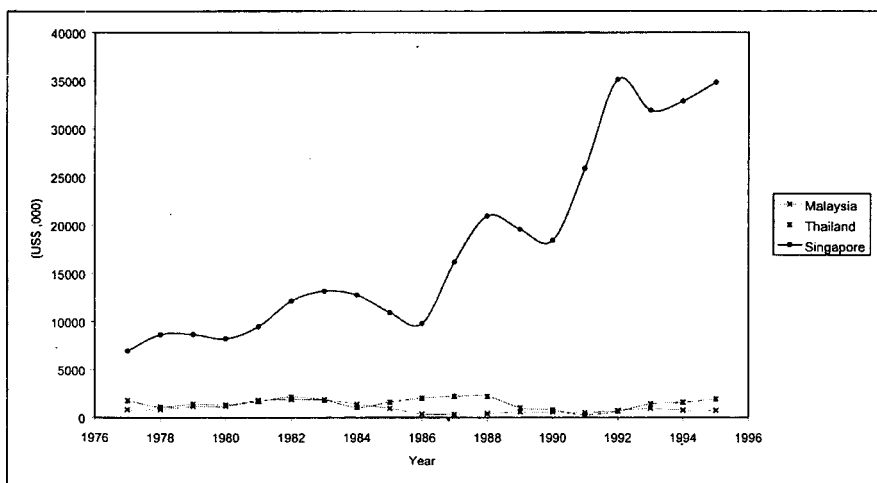


Figure 6. Import of shark's fin of Malaysia, Thailand and Singapore in value (US\$) from 1977-1995

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