

STUDY ON DATA AND INFORMATION COLLECTION ON SHARK FISHERIES IN CAMBODIA

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1. GENERAL OVERVIEW

Marine fisheries are very important both for the national economy and for improving local livelihoods in the coastal areas. Further, marine fisheries resources play a very important role to contribute to national food security after the production of inland fisheries. Even though, this such richness was constantly declined from day to day due to lack of proper national data and information collection system, poor management and research activities. Therefore, as the Department of Fisheries has no qualitative and quantitative data and scientific information, it cannot set up any action plan for protecting marine aquatic resources such as sharks, rays and skates, and their habitat.

Prior to 2004, many species, typically sharks, the Department of Fisheries (DoF), Cambodia has been considering sharks as non-target species and usually caught by accident with several gears such long-line fishing, gill nets (fish and crab net), and trawlers. In general, the sizes of the sharks caught are small, but in big amount in the wet season and they occur in various habitats from open oceans to brackish water such as inshore estuaries and sometime some were also found in freshwater (SEADEC, 2004).

Although, landing and national catch data have not been recorded on sharks, but fins and fresh shark meat have been formally consumed as food in coastal areas as well as in the city. In addition, there are about 3-5 sharks, including rays exported to Thailand as either fins or whole body. However it is known that dried shark fins are imported to Cambodia from neighboring countries such as China, Vietnam, Taiwan, etc. They are used in Cambodian restaurants for important ceremonies and parties. Further more, small sharks (juveniles) was mixed with other low value fisheries product (waste or trash) and used for aquaculture and animal purpose either in locally, or areas far from coastal area (Try *et al.*, 2004). However, the figure of Rays were recorded in the national statistic data by the Department of Fisheries, but its number collected seemed not to cover all effort. So far, there have no study in detail related to Sharks and Rays, but there were some report by Tana (1996, 1999) and then by Jensen & Try (2002) which reported that there were approximately 23 species of sharks and 22 species of rays found in Cambodia waters. Of 23, some are become rare in the nature and some are endangered species. Due to lack of research activities it has caused Cambodia under an adequate situation in management and conservation its marine aquatic resources, especially any species of sharks and rays species that become rare and endanger, and as well as other marine mammals.

Even though, Cambodia tries its best either in collaboration with conservation organization or convention of fauna and flora. In fact, Cambodia today is both one of signatory parties of CITES and one of a members of FAO.

Other appropriate effort, the fisheries law of the Kingdom of Cambodia mentioned that any fishing activities relating to endangered species as listed in the endangered species list were strictly banned. Of those one shark species, namely whale shark (*Rhincodon typus*), is included and also appeared on the poster named Marine Endangered Species in Cambodia (see in figure 1).

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More importantly, the DoF has made efforts to designate to select landing sites and set up team works (provincial fisheries officers and researchers) for shark fisheries study, to collect catch data and information and biological observation. Through sharing cost of both parties, in which SEAFDEC, technical and financial support was provided for Cambodia to enable to run its one-year study program on data and information collection on shark fisheries in Cambodia. This study plays a role as a collaborative study program between the Department of Fisheries of the Ministry of Agriculture, Forestry and Fisheries Cambodia and the South East Asia Fisheries Development Center. All information and catch are the result of overall interviews of enumerators with landing site owners and fishermen, including existing data and information in each provincial fisheries office.

2. STUDY AREAS

Three selected landing sites from three coastal areas, in which one namely Kampong Bay in Kampot province, one named Tomnob Rolork in Sihanoukville and one called Koh Sdach in Koh Kong province were chosen as targeted sites and they were used to collect catch and biological data and information, consumption and its marketing status in Cambodia as well as other countries involved in shark fisheries. These three sites were designated for conducting this research and data collection were described in following details and shown in reference map in figure 2.

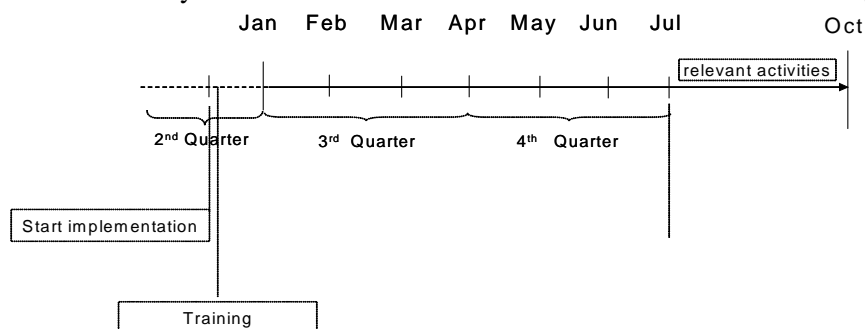
Kampong Bay, located in Kampot province has 340 fishing boats ranging from small to middle scale gear. Shark landings in this area are mainly as by-catch, caught with trawls from 33 hp boats, gillnets and hook and line. These sharks are kept for family consumption, or to be dried. Large sharks are sold to fish merchants for extra income. The survey found that there is one specific gear designed for taking sharks, shark gillnet. This implies that there is a sustenance or commercial shark fishery, however no further information was found on this.

Tomnob Rolork, is the largest landing port in coastal areas which located in Sihanoukville municipality. 80 % of families who are living in this area are fishermen and it has about 957 fishing boats, with trawl, purse seine, gillnet, long-line and traps operating either in Sihanoukville water or other location nearby. Sharks are usually caught in this area as accidental by-catch as well, by trawls, gillnets, and hooklines.

Koh Sdach, Koh Kong Province has 300 local fishing boats. With fishing gear ranging from small scale hook and line, gillnet, and traps. To commercial scale trawl nets. Sharks are caught in this area by trawl, gillnet and hookline. There are about 45 fishing vessels applying trawl nets in this area. Sharks are generally not a target species, caught accidentally by 4-5 fishing gears, longline, gillnets, traps and trawlers. There are two kinds of boats, long-tailed with engine capacity of 11-13 Hp and trawling boats with an engine capacity of 33-200Hp.

3. TIMEFRAME OF THE STUDY

The time frame of study on shark fisheries in Cambodia is shown on the following diagram:



Activities of the study were completely ended and the finding of this study has been sent to SEAFDEC secretariat. Other study, however, activities regarding sharks fisheries hopefully will continue based on the finding of first-year study and four years study plan.

4. DESCRIPTION OF BOATS AND GEARS FOR CATCHING SHARK

Sharks, generally, are not targeted specie, which mostly caught by accident by several fishing gears. In facts, there are main four to five fishing gears, namely long line fishing, gillnets (fish and crab net), Grouper traps, and trawlers. Two kinds of boats are the majorities, namely long-tailed boats with engine capacity of 11-13Hp and trawling boats with engine capacity of 33 to 200 Hp, which allow operating in fishing ground with water dept from 20 m to up).

A. Long-tailed boat:

The length of boat is generally from 11 to 15 m, width is about 3 m, its loading capacity is about one ton, and engine power is usually 13Hp. It is one of small scale fishing boat in Cambodia. Formally, two types of fishing gears have applied on the boat per month for fishing, Mackerel gill net, crab gill net and shrimp gill net. In general, a period of one month, the duration of applying Mackerel gill net on boat is about 15 days and shrimp gill net 15 days, in case of fishermen who are skill at using of these two gears, while fishermen who are skill at using of crab net and shrimp gill net they spent 15 days for crab net and 15 days for shrimp net. In habit, one trip of fishing, they took time about 12 hours and there are at least two or three people on boat for operating their fishing. Among of these gears, only crab net caught in big amount of sharks and rays by accident.

B. Crab gill net (called in Khmer Mong Kdam):

Normally, the length of one line of crab net (so-called Mouy PHÉ in Khmer) is approximately at least 1,000 m and one boat from five to six PHÉ have applied on for one-trip operation. Formally, one trip of their fishing is four to five days and sometime depends on weather condition. From fishermen experience, generally, during a period of one month they crab net can use from ten to 15 days and other 15 days they use shrimp gill net. The crab net is one kind of gears that can catch by accident in a big amount of sharks and rays per time if compared to shrimp gill net, hook long and line, small trawling and grouper trap. Big amount of sharks and rays, which mostly accidentally caught by this gear is in the rainy season and vice versa in the dry season. However, in average, they can monthly catch about 30 kg of sharks and 20 to 30 kg of rays.

C. Shrimp gill net (called in Khmer Mong Bang Kea):

This gear particularly designed for catching shrimp and applied on long-tailed boat. The length of one line of shrimp gill net (one PHÉ) is nearly to 1,000 m. Generally, they use from five to six lines of shrimp gill nets per boat per trip. Target species of this gear is shrimp, but it also accidentally caught in small amount of sharks with small size. The operation of this gear spent about 15 hour per trip per day, which caught one to two kg of shrimp and about ten kg of other fishes (excluded sharks) per trip in the dry season and from 10 to 20 kg of shrimp and 6 to 10 kg of multi-fish species (excluded sharks) in the rainy season.

D. Mackerel gill net (called in Khmer Mong Trey Kamong):

It is used to catch mackerel species. In Cambodia, usually this gill net can catch one kind of mackerel and round scads species, namely short mackerel and which comprises more than 80-90 % of the total catch. Mackerel fishing is prohibited every year from 15 January to 31 March because this is the spawning period for mackerel. In Cambodia, one fisherman has at

least two fishing gears, so they can change to another fishery during the closed season. Scomberomorus boat/gill net (called in Khmer Touk Beka or Mong Trey Beka). This gill net is widely distributed in Sihanoukville and Koh Kong province. One fishing boat has from 1 to 10 km of net depending on the size of the boat. For boats with engines from 10 to 90 HP, gill nets with a height of 9 m are used, whereas boats with engines bigger than 90 HP, use nets with a height of 18 m. On the bottom the gill nets are anchored or weighted and they are used to catch various pelagic fish species. The main fish species caught by this gill net are Scomberomorus, scads and shark.

E. Hook and line:

One line of hook and line there are about 3,000 hooks, this gear was operated only during in a period of moon, it is mean that it operated 6 month a year. Totally, Sharks caught by this hook and line was 30 to 50 kg per day.

F. Single trawling boat: were issued a license

According to interviewing with captain and worker of joint venture vessel (only single trawling boat), there are at least big five-transferred vessels (may be call landing vessel in Khmer called Touk Sang and in Thai, Chhut) have been loading marine product on ocean. These five Chhut, after loading will go back to Thailand, where is good price for them. In general, Chhut's Owner, somebody who is Owner of single trawling boat was licensed to do exploitation in Cambodia water by (mixed-commission) under Koh Kong provincial authorities.

5. OBJECTIVE OF THE STUDY

Based on an one-year study initiative on Shark Fisheries, done with the support of SEAFDEC, Cambodia has been studying relevant issues relating to sharks-catch, consumption, and biological data collection. This regional support was aimed for Cambodia to run the first one-year study program on sharks, which started in January last year, which will provide a basis for longer term activities in the future. Along line with this project, importance was given to the management and conservation together with awareness building, notably through the production of some awareness materials such the poster and some descriptive documentation.

In order to have an access to the initiative, the Department of Fisheries of Cambodia sets up 6 objectives to enable to support this one-year study program on shark fisheries in Cambodia as well as in the region. Those objectives are:

1. Collect data and information related to sharks, typically on catch and biological data of sharks captured in Cambodian waters.
2. List and rank the types of fishing gear used in shark fisheries.
3. Identify sharks and rays species.
4. Collect information on consumption and marketing of sharks
5. Collect information from authorities concerning import and export of sharks and sharks products.
6. Develop the National Plan of Action of Sharks Conservation and Management (NPOA-SHARKS).

6. METHODS OF THE STUDY

Three enumerators of which one for each landing site was selected for collecting catch data and information from fishermen and landing site owner and also gather relevant information around landing site. On the other hand, in order to push this study to receive a good result, three researchers which nominated by the Department of Fisheries, have an obligation to assist

enumerators in part of technical support and their biological study on maturity development stage of some species of sharks.

Tools for data and information collection are followed the format sheet and technical guidance designed by SEAFDEC and FAO for supporting this study program. For data catch and information collection were conducted in each selected landing site in every month of the quarter based on the real situation. In this case, enumerators conducted their work for 15 days per month on data catch collection from landing sites and fishermen, while biological data was conducted sampling by researchers about 2 to 3 days a month.

7. FINDING OF THE STUDY

7.1 Encountered Evidences

In 1973, one whale shark with 600-800 weight was fired by soldier in the Koh Kapi, Koh Kong Province, and then on 12 October 1998, another whale shark with 800-1000kg weight was accidentally caught by Scomberomorus gillnet (Beka gillnet in Khmer) in Koh Kong province water (see in figure 3)

While, in 1999, a rare giant freshwater stingray named (*Himantura chaophraya*) with a total weight of about 18 kg was caught by fishermen in Prey Veng province. While in December 2002, the fishermen in Prey Veng province again caught another freshwater stingray of the same species at Peam Chhor by bottom trawl (Khmer name: Yang Kav). This fish had a total length of 4.2 m, diameter 2.1 m and weight 180 kg (see in figure 4).

7.2 Shark's Landing Data

The catch indicated here is only a part of effort that has been collected by enumerators in each selected landing sites with targeted fishermen, the owners of landing sites and fish merchant. The way was collected is relied on the real situation and factors in individual sites. It, therefore, is clear that this figure was not taken from the annual national statistic record. On the other hand, the details of number of boats, families living around landing sites, and catch collection shown from table1 to table5 of Appendix i.

7.3 Sharks and Ray species found

Through the study period, 9 species of sharks and 8 species of rays found in the Cambodia water (see in table6 of Appendix i). Of 9 sharks, several species were abundantly appeared in the production and preferably consumed in the whole country, particularly in the local market, while several rays species were also similar case like sharks as well. However, the number of those recently seems to be declined this because of increasing fishing effort with improper methods while the trends of resources are critically declining. Table below preliminarily shown sharks and rays species encountered in Cambodia.

7.4 Sharks Consumption and its Market

So far, not many people known about the taste of sharks, shark soup and steamed shark, but recently market demand for Sharks and rays in Cambodia is the one of popular marine products from users, due to last several years this preference have been occurred in the coastline areas and this preference is dominating to non-coastal areas, especially in the city and tourist sites (see in figure 5 & 6). Currently, due to high demand caused the price of fresh sharks goes increasingly which is varying from 8,000 to 16,000 riels per kilogram, while its fin is more expensive is about 40,000 to 60,000 riels.

Generally, Sharks were used in both fresh (for shark soup) and processed product. Locally, Sharks and rays were processed to be dried product for only country supply, and the dried sharks were only processed while the numbers of sharks were abundant with cheaper price. The cost of such processing product was about 15,000 Riels, was about US\$3.80.

Furthermore, dried-meat sharks and dried fins were imported from Viet Nam, China, Thailand and other countries. Dried-shark meat (about 2.5-3 \$US per kilogram) and small-dried fin were flown from Viet Nam into Cambodia, but its price was cheaper than the price of processed sharks in the country, and whereas, a big-dried shark fin was imported from the other countries (see in figure 7, 8 & 9). However, the exact number and price of shark products have imported into the country were neither recorded nor clearly known.

The fish sellers or middle man separately collect sharks and rays from the fishermen for selling at the local market, restaurants or bring to other areas in the country (Fig. 3). The shark fin is more expensive than the other parts; usually they cut the fins off before they sell them in the local markets (see in figure 10 & 11).

7.5 Biological Study

Few shark species, namely grey bamboo shark (*Chiloscyllium griseum*), Blacktip reef shark (*Carchrhinus melanopterus*), Brownded bambooshark (*Chiloscyllium punctatum*) and Coral catshark (*Atelomycterus marmoratus*) were conducted a sampling, but only female was identified their maturity stage development, while male was not did so, because from starting point of the study and now there has been no clear guideline was informed yet even few consultations were done.

Resulting from biological study found that the gonad development of Grey bamboo shark, Brownded bamboo shark, and Coral catch shark were round-year, but development of their maturity stage is different, according to location.

Grey bamboo sharks: it was plenty in Sihanoukville and Koh Kong water and fewer amounts in Kampot water. However, based on quarterly sampling in each site, it was identified that among 100 % of female sampled 70 % was in expecting stage, 20 % was in mature stage and 10 % was in juveniles.

Coral catch shark: This species basically appeared in big amount in Kampot water that mostly caught in rocky areas, but it was also rarely found in Sihanoukville water and never in Koh Kong. From the biological view indicated that in Sihanoukville among 100 % of female sampled 80 % was in expecting stage and 20 % was in mature stage, while in Kampot among 100 % of female sampled about 30 % was in expecting stage and around 70 % was in mature stage. Table 8 & 9 in appendix ii below indicated the input and result of biological field study.

Blacktip reef shark was found in big amount in Sihanoukville water, less in Koh Kong water and never found in Kampot water. Generally, its numerous numbers appeared in Sihanoukville water, but mostly in small size (juvenile). From the point of biological study, only one big female was found and through checking for her gonad development indicated there had 6 babies inside her belly, it is mean that she was in stage 6.

8. PUBLICATION PREPARATION

A Poster, namely Sharks and rays species found in Cambodia was finalized in drafting. Before printing out it was edited by Mr. Ing Try², Prof. Katch R. Jensen³ and Mr. Ahmad Ali⁴. On the

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poster, there were nine species of sharks and eight species of rays included (see in figure 12). However, these species were just a finding of a one-year study program on shark fisheries in Cambodia. Respectively, more species will be appeared if the continuation of such activities will be also considered to be extended.

9. ESTABLISHMENT OF NPOA-SHARKS

Regarding this duties, some clarifications related to formulation of National Plan of Action on Sharks Fisheries used to inform to SEAFDEC via quarter report. Event that the going-on process of NPOA-SHARKS development is underway, but it is only forming within the DoF itself there has no any involvement from outsider.

In order to get a good NPOA-SHARKS and avoid any conflict in the future, DoF tried to seek fund to support this activity trough conducting consultative workshops among its skill institution, line agencies and other stakeholders. Even though, this effort has not come up with yet and due to this caused the step of finalization of NPOA-SHARKS seem not to be developed award.

10. CONCLUSION AND SUGGESTION

In order to get more qualitative and quantitative sources relating to shark fisheries in Cambodia as well as in the region, more researches need to be carried out to be able to identify status of shark fisheries and their habitats (feeding ground and spawning) in Cambodia that might be provided a completed information to enable to formulate a proper NPOA-Shark or guideline, in terms of good Management and Conservation of Sharks in Cambodia as well as regionally.

With this context, the Department of Fisheries of Cambodia suggest to SEAFDEC to continue its Collaborative Study Program, namely Data and Information Collection on Shark Fisheries, which would be an indicator to other purpose in terms of management manner in regional level.

Apart from this, Cambodia also suggest to SEAFDEC to support to finalize a formulating a National Plan of Action on Shark Management and Conservation. If do so, this will provide more useful to Cambodia to enable to complete the NPOA-SHARKS with considerable accountability and transparency consensus among its skill institutions, line agencies and other stakeholders.

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⁴ SEAFDEC Marine Fisheries Resources Development and Management Department, Terengganue, Malaysia

Table 1. Number of boats and families in three selected landing sites

Landing Site	Number of Boats	Number of Families	Number of person	Fishermen Families	
				Family member	Fishing Labor
Tomnob Rolork	1129	2150	9376	???	???
				389	
Kampong Bay	340	934	8080	1145	1131
				80% are fishermen families	
Koh Sdach	196	800	3873	80% of	

Table 2. Catch in Kg (boats), Kampong Bay, Kampot Province

Quarter	Gear	Catch in kg			Number of Boat Operation per quarter
		Average catch in Kampong Bay			
		Shark	Ray	Non-shark	
1st (January)	Trawl net	560	1400	105000	70
	Fish net	0	0	0	0
	Shrimp net	80	40	2200	20
	Hook line	50	90	360	2
	Crab Net	1200	3000	15000	60
	other	187	561	56100	187
Sub-total		2077	5091	178660	
2nd	Trawl net	7161	22596	4373386.5	70
	Fish net	45	5215.5	1670587.5	10-60
	Shrimp net	379.5	1883.4	317201.55	20
	Hook line	90	292.5	990	3
	Crab Net	2322	900	260280	60
	Beka net	121.5	266.4	53049.9	2
Sub-total		10119	31153.8	6675495.45	
3rd	Trawl net	3254.25	15737.9	187054.2	70
	Fish net	1498.2	7308.9	72077.1	58-72
	Shrimp net	0	0	0	0
	Hook line	0	0	0	0
	Crab Net	1377	9297	64305	60
Sub-total		6129.45	32343.8	323436.3	
4th	Trawl net	5130	20520	202464	70-80
	Fish net	1410	8460	63732	60-70
	Shrimp net	0	0	0	0
	Hook line	0	0	0	0
	Crab Net	682.5	18375	152565	60
Sub-total		7222.5	47355	418761	
Total Catch		25548	115944	7596352.75	

Table 3. Catch in Kg (boats), Tomnob Rolork, Sihanoukville

Quarter	Gear	Catch in kg			Number of Boat Operation per quarter
		Average catch in Tom Nob Rolork			
		Shark	Ray	Non-shark	
1st (January)	Trawl net	2940	26460	205800	147
	Fish net	150	200	3000	10
	Shrimp net	0	0	0	0
	Hook line	720	1440	7200	24
	Crab Net	4040	6060	35350	101
	Beka Net	900	1260	1080	18
	other	4050	5670	891000	810
Sub-total		12800	41090	1143430	

2nd	Trawl net	6480	37440	4568400	180
	Fish net	1702	0	110078	23
	Shrimp net	0	0	0	0
	Hook line	1080	288	23076	18
	Crab Net	747	3780	17856	18
	Beka Net	864	1488	14424	24
	Trap	500	0	5000	25
Sub-total		11373	42996	4738834	
3rd	Trawl net	3744	18810	1487646	180
	Fish net	3570	220.5	49659	23
	Shrimp net	0	0	0	0
	Hook line	2160	0	139770	24
	Crab Net	2152.8	11250	59022	18
	Beka Net	11109	0	446667.13	23
	other	0	0	0	0
Sub-total		22735.8	30280.5	2182764.13	
4th	Trawl net	2880	17100	1207620	180
	Fish net	2160	300	21240	23
	Shrimp net	0	0	0	0
	Hook line	0	0	0	0
	Crab Net	6210	15210	68490	18
	other	0	0		0
Sub-total		11250	32610	1297350	
Total Catch		58158.8	146977	9362378.13	

Table 4. Catch in Kg (boats), Koh Sdach, Koh Kong Province

Quarter	Gear	Catch in kg			Number of Boat Operation per month
		Average catch in Koh Sdach			
		Shark	Ray	Non-shark	
1st	Trawl net	150	1400	15000	10
	Fish net	0	0	0	0
	Shrimp net	250	150	6000	50
	Hook line	1650	1320	385000	110
	Crab Net	12600	5600	9800	70
	other	600	1000	90000	200
Sub-total		15250	9470	505800	
2nd	Trawl net	850	960	256000	5
	Fish net	0	0	0	0
	Shrimp net	0	0	0	0
	Hook line	2100	2350	7100	15-20
	Crab Net	0	0	0	0
	Joint venture	20250	71550	4320000	45
Sub-total		23200	74860	4583100	
3rd	Trawl net	393	673.2	30198.8	5
	Fish net	2538	4164	36921	30
	Shrimp net	852	2068	25668	40-50
	Hook line	100	640	0	4
	Crab Net	5388	8958	47208	60
	Joint venture	5100	33000	1200000	20
Sub-total		14371	49503.2	1339995.8	
4th	Trawl net	110	552.5	5542.5	5
	Fish net	4425	2662.5	377175	30
	Shrimp net	440	1920	19066.66	40-50
	Hook line	0	2490	0	4
	Crab Net	3200	7620	46600	60
	Joint venture	5100	33000	1200000	20
Sub-total		13275	48245	1648384.16	
Total Catch		66096	182078	8077279.96	

Table 5. Catch in Kg in three selected landing site

Catch in Kg				
Landing Site	Quarter	Shark	Ray	Non-Shark
Tom Nob Rolork	1st	957	0	92428
	2nd	1812	1555	147579
	3rd	149.9	324.7	49044.4
	4th	888	2519	111796
Sub-total		3806.9	4398.7	400847.4
Kampong Bay	1st	93	0	2994.5
	2nd	254.6	732.4	145112
	3rd	964	3388	92617.5
	4th	164.2	338.4	53054.3
Sub-total		1475.8	4458.8	293778.3
Koh Sdach	1st	1330	0	311500
	2nd	11066.6	11462.4	324001
	3rd	1342.4	5732.7	178601.9
	4th	240	2408	26646
Sub-total		13979	19603.1	840748.9
Total Catch 3rd Quarter		19261.7	28460.6	1535374.6

Table 6. Sharks and Rays species found in the period of study

	Scientific Name	English Name	Khmer Name
Sharks			
1	<i>Stegostoma fasciatum</i>	Zebra shark	Kla
2	<i>Chiloscyllium punctatum</i>	Brownded bambooshark	Chhout
3	<i>Chiloscyllium griseum</i>	Grey bamboo shark	Chhout or king kork
4	<i>Atelomycterus marmoratus</i>	Coral catshark	Tok Kae
5	<i>Sphyrna mokarran</i>	Great hammerhead shark	EK
6	<i>Carchrhinus leucas</i>	bull shark	Ka Mab
7	<i>Carchrhinus dussumieri</i>	Whitecheek shark	Sor
8	<i>Carchrhinus melanopterus</i>	Blacktip reef shark	Pruy Khmao
9	<i>Rhiconodon typus</i>	Whale shark	Trey Banun Kingkork
Rays			
1	<i>Rhynchobatus sp.</i>	Unknown	Trouch
2	<i>Taeniura lymma</i>	Blue-spotted fantail ray	Khean
3	<i>Dasyatis kullii</i>	Bluespotted maskray	Kror Loat
4	<i>Himantura gerrardi</i>	Whitespotted whipray	Sach Ouch
5	<i>Himantura imbricata</i>	Sealy whipray	Moann
6	<i>Himantura sp.</i>	Unknown	Spoann
7	<i>Mobula japanica</i>	Spinetail mobula	Leak or Ses
8	<i>Aetobatus narinari</i>	Eagle ray	Ork or Chroeuung

Table 7. Summary for consumption and marketing of sharks

Species	Part	Shark Source		Abundance at landing site ¹	Locally consumed (C), Discarded (D), Traded (T), Processed (type of processing)	Local price per kg ² (Riel)	Market destination
		Type of fishing boat	Type of fishing gear				
SHARKS							
1. <i>Stegostoma fasciatum</i>	NA	1	d	+	c	NA	NA
2. <i>Chiloscyllium punctatum</i>	wh & fin	1 & 2	a, c & d	+++	c	6-1000 4-50000	local & city
3. <i>Chiloscyllium griseum</i>	wh & fin	1 & 2	a, b, c, & d	+++	c	6-1000 4-50000	local & city
4. <i>Atelomycterus marmoratus</i>	wh	1	a & c	++	c	2-4000	local & city
5. <i>Sphyrna mokarran</i>	wh	2	l	+	c	NA	NA
6. <i>Carcharhinus leucas</i>	wh	1 & 2	a, d & e	++	c & T	5000- 12000	local, city & out
7. <i>Carcharhinus dussumieri</i>	wh	1 & 2	l	+	c	NA	
8. <i>Carcharhinus melanopterus</i>	wh & fin	1, 2 & 3	a, d & e	+++	c & T	5000- 12000	local, city & out
9. <i>Rhiconodon typus</i>	wh	NA	f	+	NA	NA	NA
RAYS							
1. <i>Rhynchobatus sp.</i>	Meat & fin	1	d	+	c & T	- 1- 20000 - NA	local & out
2. <i>Taeniura lymma</i>	wh	1 & 2	d & e	+++*	c	8-15000	local & city
3. <i>Dasyatis kulii</i>	wh	1 & 2	a, d & e	+++*	c & T	8-15000	local & out
4. <i>Himantura gerrardi</i>	meat & wh	1 & 2	d & e	+++**	c & T	8-15000	local & out
5. <i>Himantura imbricata</i>	wh	1 & 2	a, c, & d	+++*	c	2-3000	local & city
6. <i>Himantura sp.</i>	wh	1 & 2	d & e	+++*	c	3-5000	local & city
7. <i>Mobula japanica</i>	wh	1 & 2	f	+	NA	NA	local & city
8. <i>Aetobatus narinari</i>	meat	1 & 2	f	+	c	NA	local & city

Remarks:

Abundance: rarely (+), relatively common (++) , abundant to plentiful (+++)

Abundance +++: * in Sihanoukville and Koh Kong waters; ** only in Kampot water

Currency is in Riel (exchange rate is 1USD = 4000 R)

Boats: 1 = Trawling Boat; 2 = long-tailed boat; 3 = Beka Boat

Gears: a = Crab net; b = trap; c = Shrimp net; d = trawl net; e = hook & f= gill net

Part: wh= whole body

Table 8. Sharks species composition for biological observe

Quarter	species	SHV			KAM			KK		
		Total sampled	Sp. Observed (2days)	% of total sampled catch	Total sampled	Sp. Observed (2days)	% of total sampled catch	Total sampled	Sp. Observed (2days)	% of total sampled catch
1st	<i>Carchrhinus melanopterus</i> *	30	1	50	NA	0	NA	6.3	1	100
	<i>Chiloscyllium griseum</i>	3.8	1	30	NA	0	NA	NA	0	NA
2nd	<i>Carchrhinus melanopterus</i> *	20.8	2	50	NA	0	NA	3.35	1	20
	<i>Chiloscyllium griseum</i>	6.5	2	10	4.92	2	30	2.9	2	20
	<i>Aetomyceterus marmoratus</i> *	NA	0	NA	2.04	2	5	NA	0	NA
3rd	<i>Chiloscyllium griseum</i>	15.6	2	30	NA	0	NA	14.1	2	50
4th	<i>Chiloscyllium griseum</i>	23.5	1	40	14.3	1	NA	17	1	NA
	<i>Aetomyceterus marmoratus</i> *	3.5	1	3.5	5	1	4.16	0	1	NA

NA - Total catch was not known due to these sharks bought from fish merchant and they already iced one day before conducting biological sampling

Table 9. Sampled species for biological observe

Landing Site	Quarter	Species	Mean length (cm)	Sex		Maturity (% in each category of maturity)	
				% Male	% Female		
Tomob Rolork	1st	<i>Carchhinus melanopterus</i> *	120	0	100	100 in st.6	
		<i>Chiloscyllium griseum</i>	40.35	50	50	100 in st.3 (F)	
	2nd	<i>Carchrinus melanopterus</i> *	78.66	0	100	**	
		<i>Chiloscyllium griseum</i>	85.5	30	70	100M in st.1, 70F in st.2 & 30F in st.3	
	3rd	<i>Chiloscyllium griseum</i>	66.91	0	100	80 expecting & 20 mature	
	4th	<i>Chiloscyllium griseum</i>	51.17	0	100	70 expecting, 20 mature & 10 Juvenile	
		<i>Aetomyceterus marmoratus</i> *	52.62	0	100	80 expecting & 20 mature	
	Kampong Bay	1st	<i>Carchrinus melanopterus</i> *				NA
			<i>Chiloscyllium griseum</i>				
			<i>Aetomyceterus marmoratus</i> *				
		2nd	<i>Chiloscyllium griseum</i>	67.83	20	80	100M in st.4 & 100F in st.5
			<i>Aetomyceterus marmoratus</i> *	47.25	50	50	**
3rd		<i>Chiloscyllium griseum</i>				NA	
		<i>Aetomyceterus marmoratus</i> *					
4th		<i>Chiloscyllium griseum</i>	55.65	0	100	80 expecting & 20 mature	
		<i>Aetomyceterus marmoratus</i> *	50.43	0	100	70 expecting & 30 mature	
Koh Sdach		1st	<i>Chiloscyllium griseum</i>	50.35	0	100	30 in st.3 & 70 in st.3
		2nd	<i>Chiloscyllium griseum</i>	67.5	0	100	100F in st.4*
			<i>Carchrinus melanopterus</i> *	56.22	0	100	**
	3rd	<i>Chiloscyllium griseum</i>	72.33	30**	70	100F expecting	
4th	<i>Chiloscyllium griseum</i>	74.53	0	100	80 expecting & 20 mature		

** Not for Male shark

NA-No sample for Analyse

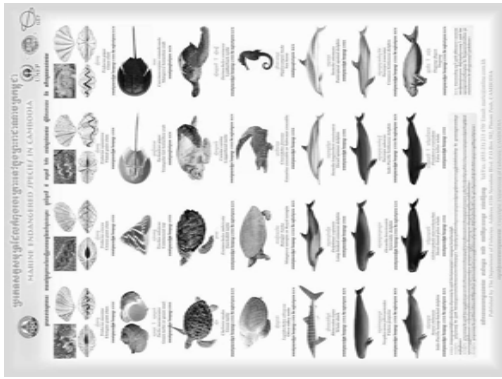


Figure 1. Marine Endangered species in Cambodia

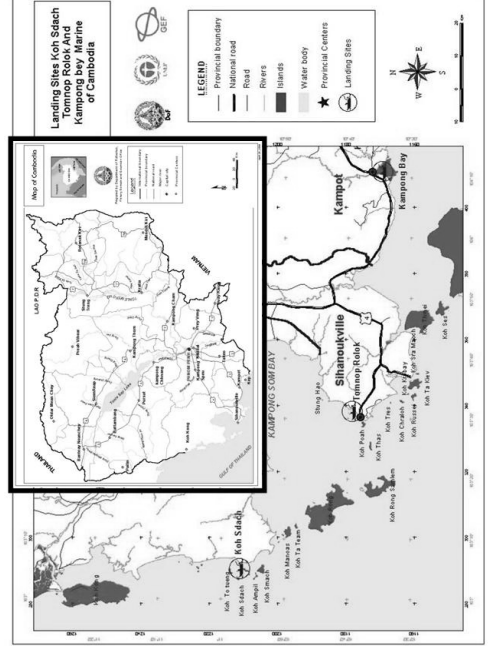


Figure 2. Map showing Map of Cambodia and selected landing site



Figure 3. Whale shark caught in a *Scomberomorus* gill net (Khmer name *Mong Trey Beka*) about 4 km from the beach on the outer side of Koh Kong island in 1973 (Photo: Koh Kong Fisheries Office).



Figure 4. Freshwater stingray (*Himantura chaophraya*) caught by bottom trawl (Khmer name: *Yang Kav*) at Peam Chhor, Prey Veng Province, in late 2002 (Photo: Nicolaas van Zalinge)



Figure 6. Restaurants with shark promotion



Figure 8. Dried Shark meat imported from Viet Nam (left) and dried ray meat processed in local (right)

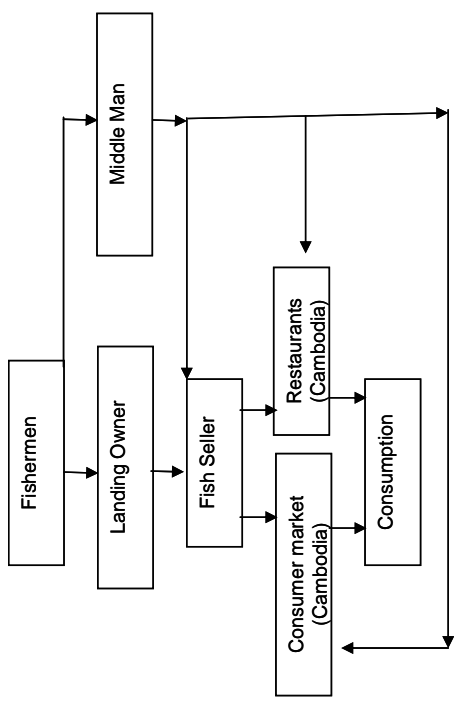


Figure 5. Market Circulation of Sharks Product



Figure 7. Shark soup made from fresh shark meat and fins served in the restaurant in Sihanoukville and restaurant in Siem Rap province.



Figure 9. Imported dried-shark Fin, in restaurant in Phnom Penh



Figure 10. Shark Fins solve in local market, Sihanoukville



Figure 11. Finless shark solved in Sihanoukville Market

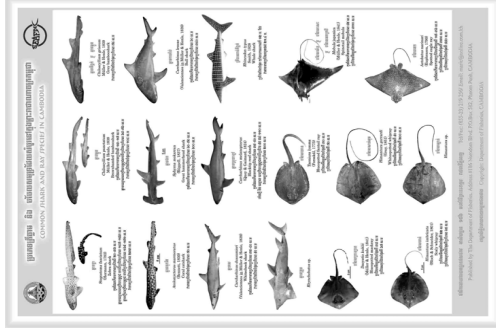


Figure 12. Poster showing Sharks and Rays species found during study period