

Shark and Shark Products Trade Channel and its Conservation Aspects in Bangladesh

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Abstract

This study was conducted in two major shark landing centers; BFDC fish harbor, Cox's Bazar and Fishery Ghat fish landing center, Chittagong from January–December, 2014. Semi-structured interview, case study, frequent visit to the informants found in and between the trade channels were done for data collection. As there is no forms of gear size limitation or seasonal restriction in the existing fish act, most landed sharks were found to be smaller in size. Big sharks were found to be processed and dried in some enclosed building in the form of cottage while smaller sharks in Nazirertek fish drying area. Dried salted and iced sliced meat of shark and its sun-dried bones are sold to local consumers for consumption. Dried shark fins, skins, teeth are exported to different countries like Myanmar, India, Singapore, Thailand, Hong Kong, China and USA. Bangladesh earned 0.09 crore taka by exporting 1 MT shark fin during 2012-2013. Although no shark products were exported from Bangladesh during 2010-11 to 2011-12 due to banning of shark catch and trade in several countries, different body parts of shark were smuggled to Myanmar from Cox's Bazar illegally. All the activities cause a serious threat to shark biodiversity in the Bay of Bengal. Steps should be taken to save and conserve shark in our ecosystem through the inclusion of shark in the fish act restricting indiscriminate killing, establishing shark sanctuary, smuggling of shark and its product and improving the trades of shark products.

Keywords: Shark products; Trade channel; Biodiversity; Conservation aspects; Bangladesh

Introduction

Shark, a major group of elasmobranch talked about globally as its population has been under serious threats due to over-exploitation mostly to meet the demand of shark fin soup especially in USA and China.

One of the most heavily fished regions in world's ocean for shark is Bay of Bengal. Catching sharks have increased in the recent years mainly by using hooks and lines during winter months in this region. A group of dry fish traders are allegedly patronizing the shark hunting, processing and trading. Shark harvesting is done by using different fish trawl, shark net (modified long mesh drift gill net), hooks and lines and sometimes by trammel nets. Coastal waters of Kuakata, Sonar Char, Ruper Char, Fatrar Char and Char Gongmoti in Patuakhali; Dublar Char in Khulna; Ashar Char, Patharghata, Barguna and the Sunderbans; Sandwip, in Chittagong; Kutubdia, Moheshkhali and Elephant Point in Teknaf, Cox's Bazar are major shark hunting grounds of Bangladesh [1].

Few small scale shark processing plants are there which are being operated seasonally for the irregular supply of sharks mostly by the fisher's communities and by different stakeholders. For the highly valued shark fins, sharks are targeted mainly although in the tribal area of the country shark meat has some demand. Few dried shark meats and the most valuable shark fins are exported to different Asian countries [2]. For consumption, dried and iced sliced meat of small shark and its sun-dried bones are sold to tribal people where dried shark fins, skins and teeth of big sharks are exported to different countries of the world like Myanmar, India, Singapore, Thailand, Hong Kong, China and USA (Figures 1 and 2).

Huge demand for shark fins in Asia caused a rapid increase in fin prices in the mid-1980s. Shark fin trade had increased dramatically in the 1980s although data on the fin trades are substantially incomplete

as many countries do not report fin exports [3,4]. In official statistics, shark landing data are reported while large proportion is estimated to be discarded and unreported. Significant mortality occurs through incidentally caught sharks and rays especially from trawl nets, gillnets, purse seines, and long lines which may exceed mortality from directed fisheries [5]. Elasmobranchs have always been important to people dependent on or interested in the sea. They have provided a vast number of products, ranging from food and pharmaceuticals to clothing and novelties. As a result of mankind's effects on the environment and multifaceted exploitation elasmobranch stocks are heavily impacted [6]. Some shark species are considered threatened or critically endangered worldwide while many elasmobranch populations are now depleted [7,8]. Decrease of large size sharks with the increased catch of small size or juvenile sharks and rays is reminding us that the stock may be undergoing overexploitation [9].

Illegal and unreported export of shark products trade have been expanding rapidly in the recent years, which causes serious threat to shark biodiversity in Bangladesh.

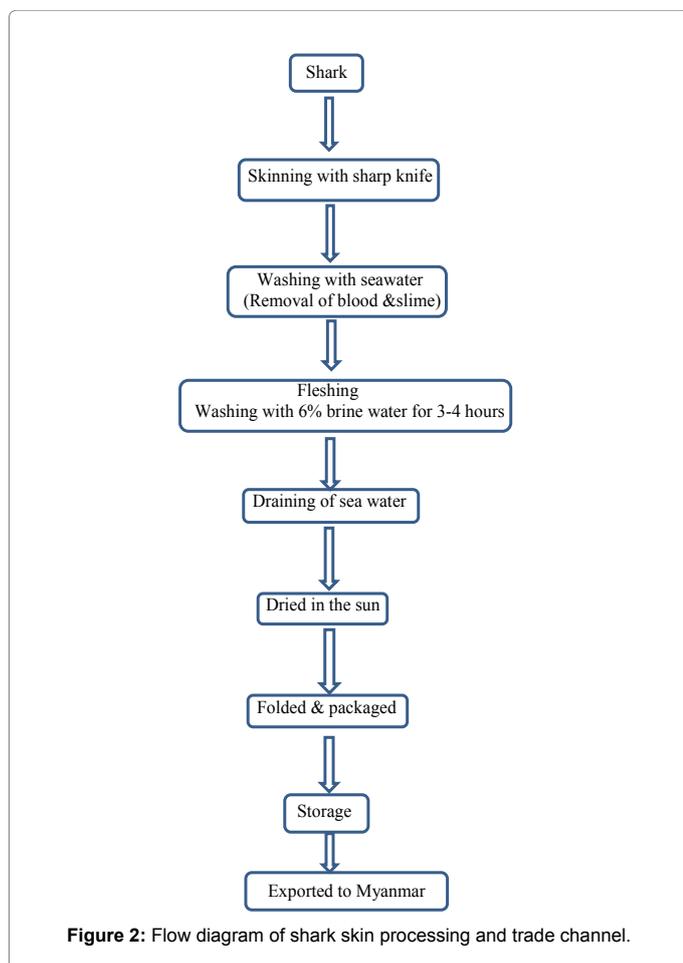
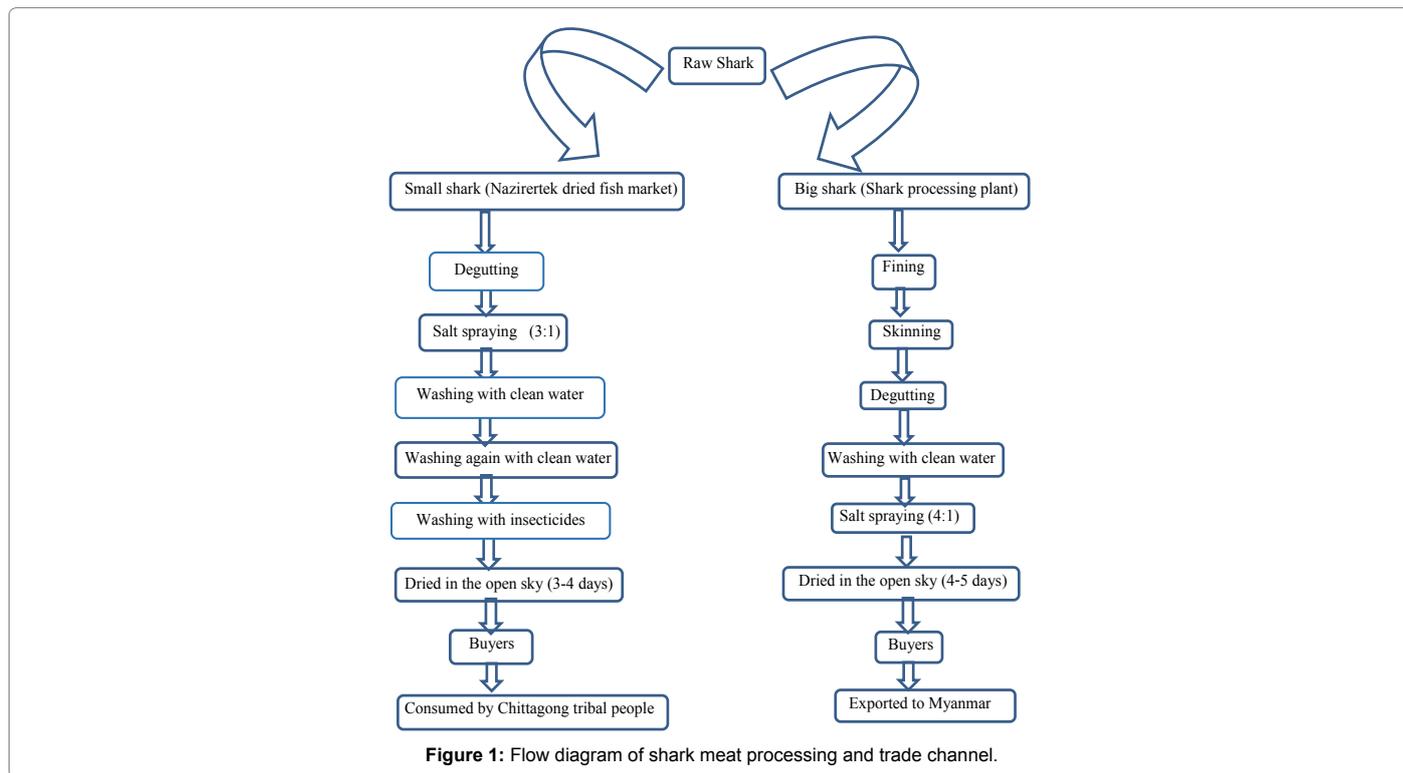
Specific objectives of this study are to: 1) describe the characteristics of shark and shark product trade in Bangladesh; 2) describe the processing and preservation of shark and shark product trade; and 3)

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assess the prospects for effective management and monitoring of this trade.

Materials and Methods

Sampling site and duration

A yearlong (January-December, 2014) field study was conducted in two selected shark landing centers: BFDC fish harbor, Cox's Bazar and Fishery Ghat fish landing center, Chittagong situated at the north-eastern part of the Bay of Bengal. These two study areas are the most important landing centers and related with the retail and wholesale markets of shark and its product from the Bay of Bengal, Bangladesh.

Data collection method

Through formal face to face interview of boat owners of commercial fishing vessels, fishermen, retailers and buyers information were collected from both landing stations regarding auction procedure, processing, preservation and trades of shark and its products. Verification of collected information was done by the key informants. A digital camera was used to capture photos.

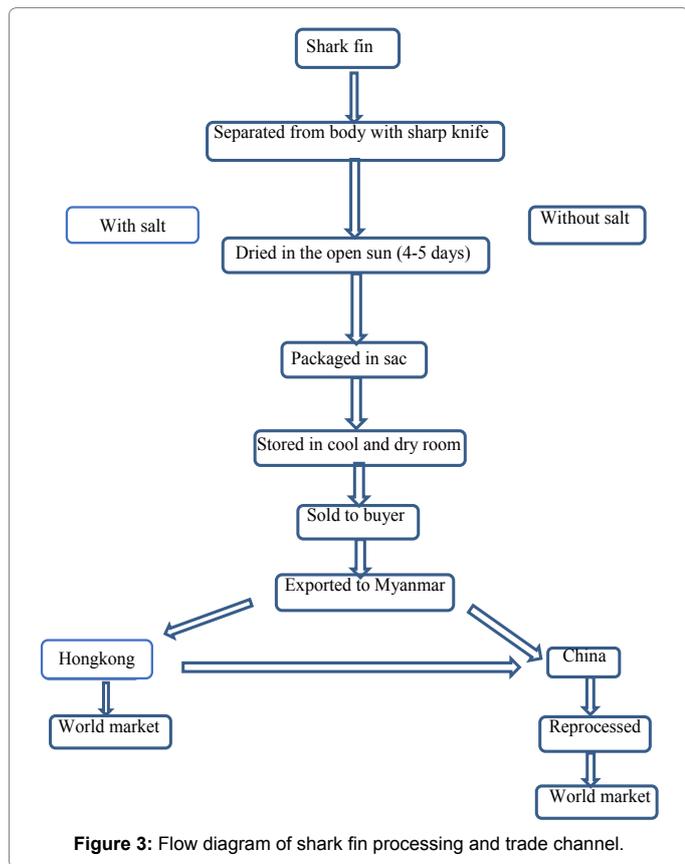
Statistical analysis

For data analyzing statistical software MS Excel 2013 was used.

Results

Trades of shark and shark products

Although catching shark is banned under the Forest Act [10], it is being hunted indiscriminately in the southwestern and southeastern coasts of Bangladesh threatening marine ecosystem. Shark catching is now a lucrative business for a large number of fishermen as shark skin, meat, fin, teeth and bone is sold at high prices abroad. Lots of fishermen are getting involved in shark fishing as it often brings more profit than catching fish (Figures 3 and 4).



Shark at wholesale market

At the landing center sharks are sold through an open bidding system. Before selling, the fishes are graded species-wise and sometimes lengthwise. Price of different shark species varies with the season. It has been found to be the highest in December to March and lowest in August to November. Price also varies with the shark species. Big size Bull shark was found to be sold at higher prices where the prices of Dog shark were found to be the lowest (Table 1 and Figure 5).

Icing of shark

Big sized sharks are iced when the catches are big and are not sold to the shark traders. Sometimes Dog shark are iced for selling to the local tribal people. Freezing boxes made of stainless steel with a lower capacity of 400-700 kg (with ice) are used for icing (Figures 6a and 6b).

Species	Average price (tk/kg)	Remarks	Tax/royalty
Bull shark	240	Highest- December, January, February, March	40 taka/drum (100 kg)
Silky shark	160		
Black tip reef shark	135		
Soft tail shark	115	Good- April, May, June, July	
Hammerhead shark	110		
Milk shark	100		
Tiger shark	100	Lowest- August, September, October, November	
Dog shark	70		
Ridge back cat shark	50		

Table 1: Prices of different Shark species observed in 2014.

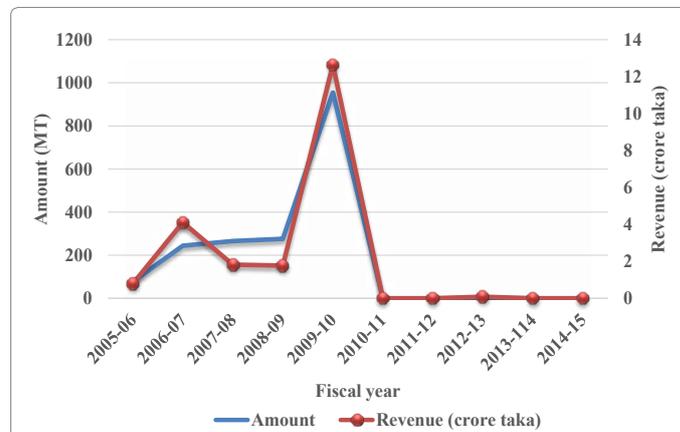
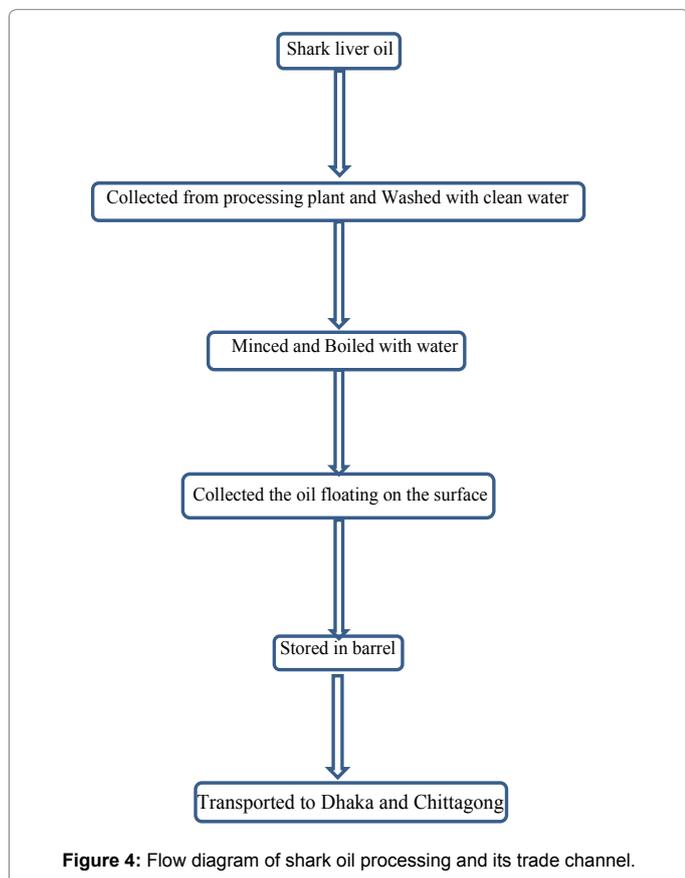


Figure 5: Shark product export and foreign exchange earnings during last 10 years.





Figure 6b: Freezing box.



Figure 7: Shark processing.

Processing and drying of shark and its product

Small-scale processing plants are used for shark processing at Cox's Bazar, established in the form of cottage industries of fisherman families, operated mostly by fisher folks and stakeholders. These are tin shed buildings with sidewall. Generally, big sized sharks such as Bull shark, Black shark, Silky shark, Milk shark, Hammerhead shark are processed in those buildings. Sharks are brought through trolleys and weight is taken. Then skins are taken off, fins are cut, degutted, flesh are sliced into small pieces. Fins and flesh are either salted or not according to customers demand. Three to four people are engaged in these processes. The smaller Dog shark is processed at Nazirtek fish-drying market, which is the biggest in the country. Sharks are cut in the middle portion and degutted. Then salt is sprayed at 1: 4 ratio. The fish are then washed two times with water and washed again with insecticides and finally placed in a rack under the sun for drying, which usually take 3-4 days (Figure 7).

Shark meat

Shark meat is white or slightly pinkish. It is used as food and livestock feed. In our country small shark species such as Dog shark are dried as a whole but the others are sliced into small pieces. Tribal people especially *Mugs* and *Rakhains* are known to be the common customer of shark meat in Bangladesh. Sliced shark meats are exported to India, Myanmar, Sri Lanka and Maldives (Figure 8).

Shark bone

Cartilaginous shark bones are not utilized in our country rather it is exported to China and other foreign countries. Only small portion is used by Nomads for making amulet (Figure 9).

Shark skin

Shark skin is a valuable product, which is totally exported to foreign countries. It is converted into leather that can be utilized as shoes, wallets, purses etc (Figure 10).

Shark fin and tail

Shark fin is the most valuable product of shark. Fins of variable sizes of different species are dried and exported to China, Hong Kong, USA. It is very popular in USA and China used for shark fin soup. Shark tail is also exported with shark fin (Figures 11 and 12).



Figure 8: Dried shark meat.



Figure 9: Dried shark bone.



Figure 10: Dried shark skin.



Figure 11: Dried shark fin.



Figure 14: Shark liver oil.



Figure 12: Dried shark tail.



Figure 13: Dried shark skull with teeth.

Shark skull and teeth

Shark skull and teeth are dried and exported to the foreign countries. These are used for making exclusive ornaments (Figure 13).

Shark liver oil

Shark liver oil is extracted from shark liver after fermenting and boiling with water in metal containers. It contains vitamin A and has high medicinal value. It is also used in tanning and textile industries and in some extent exported to foreign countries (Figure 14).

Shark Byproducts

Shark gills and viscera are the byproducts of shark. Dried shark viscera are known to be used in formulating fish feed by the local people in Cox's Bazar. Sometimes these are also used as fertilizer (Table 2).

Export Earnings from Shark Products

Dried shark products are packaged in sacks and stored in a confined dry room. Shark products are mainly exported to Myanmar

Shark product	Size (inch)	Price (tk/kg)		Remarks
		Dried	Dried salted	
Fin	02-04	1500	1000	Higher prices in case of sun dried without salt than salted as customer's preference.
	04-06	2000	1500	
	06-08	2500	2000	
	08-10	3500	3000	
	10-12	4500	4000	
	12-14	6000	5000	
	14-16	8000	6000	
	16-18	10000	7000	
	18-20	12000	8000	
Skin	Small	700	-	Generally species which fin size is >6-8 inch. Exported to Myanmar.
	Big	1200	-	
Tooth	-	20000	-	Separated from skull. Exported to Myanmar.
Backbones	-	450	-	Nomads buy those for making amulet.
Skull and other bones	-	400	-	China and other foreign countries like Hong Kong, Singapore.
Meat	Whole fish (Dog shark)	-	300	In country and Myanmar. 4:1. 250 gram salt/10 kg fish, 2-4 days for drying.
	Sliced flesh	-	500	In country and Myanmar. All salted. 3:1, salt 250gm/kg fish, 4-5 days for drying.
Liver	Crude liver oil extracted after fermentation and boiling	Drums of	22000-25000/	Sold to wholesalers at Dhaka and Chittagong.
		250 kg	Drum depending on the purity	Usually 120 kg of oil can be extracted from 200 kg of liver.
Guts	-	150	-	7:1. Usually tribal people buy.

Table 2: Market price of different shark products traded in Cox's Bazar and Chittagong.

directly from Cox's Bazar through border. In other cases, these are sold to buyers in Chittagong from where also exported to foreign countries including Myanmar. From Myanmar, other foreign countries buy those products. However, export statistics does not reveal export of other shark products but fins. During 2012-13, shark product exports from

Bangladesh was around 1 MT and earned a value of 0.09 crore taka [11]. Due to banning of shark catch and trade in different countries no shark products were exported from Bangladesh during 2010-11 to 2011-12 (Figure 5).

Discussion

In Bangladesh sharks are being harvested mostly as by catch; traded and exported to foreign countries. There is no in-depth research work on the status of the shark fishery in Bangladesh. Sharks are caught, sold, processed and dried before trading locally or internationally. There are a few small-scale shark processing plants in the form of cottage operated mostly by the fisher's community and different stakeholders in Bangladesh; only low priced Dog shark is locally consumed as a table food. Shark meat and fins has great demand and good market price. In general tribal people are the common customer of sharks and not eaten by the other people in this country. Roy et al. [1] found that sharks fins, dorsal view of ray's skin, teeth, jaws, meat (as dried form) and liver oil are exported every year from Bangladesh which was also observed in the present study. In Bangladesh each year about four to five thousand tons of sharks are caught by fishermen [12]. Roy et al [1] stated that through the legal channels only ten to twenty per cent of shark body parts are exported and the rest are smuggled to Myanmar, India, Singapore, Thailand, Hong Kong, China, USA and other countries. Shark fins and fin rays, meat, liver oil, liver and fishmeal, cartilage, skin and jaws are the major shark products for trade [13]. If markets of human consumption are not available smaller size sharks are used to produce fish meal and fertilizer [14] which was found similar with the present investigation. Fresh, chilled or frozen, unspecified shark meat are shark products which shares major quantity of international trade [15].

For shark meat, fins, skin, cartilage, and liver, sharks are harvested primarily [16]. Due to rapid spoiling of shark meat without refrigeration, consumption of shark meat was mostly local [16]. As primary mode of osmoregulation sharks retain urea in their blood and tissues which spread a belligerent taste and smell to the meat and is toxic in higher concentrations [17]. To solve this problem freshly captured animals can be bled. Hammerhead sharks have the highest concentrations of urea whereas spiny dogfish have the lowest concentrations meaning that urea concentrations vary from species to species [18]. Shark meat may be salted, dried, smoked or processed into surimi which is a popular shark product in addition to fresh consumption [16]. Haroon [19] observed that the shark meat is packed either fresh or frozen or salted dry according to the requirements of the customer which supports the present study. Haldar [9] reported present market price of raw shark meat varies between Tk. 70 and 100/kg in Bangladesh whereas Roy [20] recorded the price of fresh whole shark was Tk. 40-70/kg. However, in the present study it was found Tk. 50 to 240/kg meaning the price of fresh/raw shark meat has been increased a lot than previous years. Bahadur [21] recorded the price of dried meat Tk. 250/kg which was quite less than the recorded price Tk. 300 to 500/kg in the present study.

The most valuable shark products are shark fins used to make traditional shark fin soup which is a delicacy in Chinese culture [22]. In most shark species, the first dorsal, pectorals and lower lobe of the caudal are the largest and most valuable fins that are usually sold as a set which was also figured in the present findings. The smaller second dorsal, anal, and pelvic fins from several sharks are mixed and sold. To make the soup, only the fine cartilaginous ceratotrichia's (needles) upper part of the fin are used [16]. To avoid the fleshy lower part of the fin shark fins are removed from the body neatly. For marketing they are then dried and packed. Most fins are sold to national and international traders after processing in China, Hong Kong SAR or in mainland

China [22]. There has been a considerable increase in demand recently for shark fin soup which is a highly priced shark product [23]. Roy et al. [24] stated that shark fin, fin rays and dorsal skin are exported in Singapore, Hong Kong, China and USA which is also described in the present study. In the BFDC fish landing center, Cox's Bazar, it has been observed that the fins of all shark species, be small or large, are collected for export reported by Haroon [19] which was also found in the present study. Roy [20] found in his study that shark fins' (as dried form) prices ranges from US\$ 20-35/kg (fin lengths 5-40 cm). Bahadur [21] found slightly salted fin price Tk. 1,200 to 8,500/kg depending on the size of fins where Tk. 1,000 to 10,000/kg revealed from the present research.

Shark skin is eaten after it has been boiled and the denticles removed in several countries in Asia and Oceania. Shark skin has been utilized mostly to make leather which is attractive and very durable. For tanning industry skins from larger sharks are preferred. In Mexico most shark leather is currently tanned [16]. Haroon [19] observed shark skins were dried and sold at Tk. 2,500 to 3,000/kg in Bangladesh which was 2-3 times more than the present study as Tk. 700 to 1200/kg. Bahadur [21] showed shark skin price of Tk. 350/kg only.

Except the highly valuable ceratotrichia shark cartilage is used for food in China and Japan. Pharmaceutical industry is by far the largest market for shark cartilage which uses the dried and milled cartilage powder to make pills and capsules. As a medication for cancer shark cartilage pills were promoted [25]. In treating arthritis shark cartilage is used effectively which contain high chondroitin and glucosamine sulphate compounds. Certain biologically active compounds extracted from cartilage have shown promise in retarding tumor growth which may provide another potential pharmaceutical market [16].

Shark liver extract has been used heavily in pharmaceutical industry as squalene which is used in lubricants and skin creams [26] and has antibiotic properties [27]. Haldar [9] showed present market price of crude shark oil varies between Tk. 45 and 55/kg in Bangladesh. Bahadur [21] showed price of liver was Tk. 15,000 to 17,000/drum (drums of 250 kg) depending on the purity which was found to be slightly increased in present study where it was recorded Tk. 22,000 to 25,000/drum. In Bangladesh, the Fisheries Technology Laboratory of the then Freshwater Fisheries Research Station at Chandpur was quite successful in producing bottled cod-liver oil back in 1976-78s but it stopped due to unknown reason [19].

In the present study shark tooth price was found Tk. 20,000/kg which was four times more than the study of Bahadur HI [21] who showed tooth price was Tk. 5,000/kg.

Although 125 countries are now involved in shark fishing and international trades still there is no management for sharks fished on the high seas. Because of that many shark populations are now depleted and some are considered threatened. Without new conservation and management initiatives shark fishing and trades cannot be managed sustainably. The international shark trades are almost completely unrecorded and origin of shark products remains unknown [7]. Shark fisheries have often been undervalued and ignored, but have boomed in recent decades as international demand has risen for shark products. For processing and preparation of fin soup, shark fins are exported to East and Southeast Asia. China, the biggest shark consumer market imports shark fins from the European Union. Since 1985 shark meat, a low value product, is becoming increasingly popular. In 2005, 56% of global shark meat (particularly Spain and Italy) were imported by EU countries. Since most shark product trade is under-recorded, it is difficult to estimate the relationship between trade and shark catches, and the total volume of shark fisheries globally. It is observed that the

volume of traded shark products trade has increased considerably over the past 15 years [28].

Rahman and Uddin [29] observed that no parts of sharks, skates and rays remain unutilized which was also observed in the present study. He also indicated that most of the procedures of the traditional methods have got the potentials for further improvement considering hygiene, efficacy and refinement which is much needed in our country for the welfare of shark trade and export earnings. Similar results were also observed in the study, where he stated that significant amount of shark products are straddled through the trans-boundary movement from Bangladesh to neighboring countries [19]. This figure excludes all undocumented exports of shark products (hide, fins, crude oil, meat, etc.) to the neighboring India, Myanmar, Singapore and Thailand. Haroon [19] observed that there is a big volume of export for consecutive 3-4 years and then a drop for 1-2 years since 1992-93 which was also seen from the recent year's graphical representation of export values.

High demands for shark fin in Asia raise a concern about shark populations. However, most sharks were obtained by by-catch and all parts of sharks have been fully utilized in the region. Due to the fast multiplication of shark products trade in Bangladesh and worldwide it is much needed to adopt strategies for shark fisheries catch and trade management in Bangladesh.

Conclusion

Shark catching is increasing day by day in our Bay of Bengal region due to the increase in demand of different dried shark products which are valuable in terms of pricing. Shark meat, guts and oil mainly utilized in local market and only dried shark teeth, jaws, fins, skins and in some cases meats are exported to the international market. There is good scope of earning huge foreign exchange from exporting shark products through proper export channel of our country. It's also true that, the stocks are becoming endangered and following management are recommended to conserve the shark biodiversity in the Bay of Bengal, Bangladesh:

- i) Shark fisheries management action plan should be formulated
- ii) Inclusion of shark fisheries management in the existing Fish Act
- iii) Establishing shark sanctuary in the Bay of Bengal region
- iv) Gear size should be limited
- v) Maximum allowable limit of shark catch should be included in shark fisheries action plan
- vi) Harvesting season should be restricted
- vii) Banning indiscriminate killing and trades of shark juveniles
- viii) Identify the list of threatened shark species
- ix) Establishing shark processing plant
- x) Monitoring hygienic condition during shark processing
- xi) Ensure safety and quality of shark product during preservation
- xii) Regular documentation of shark product trade in country and from country to outside
- xiii) Banning illegal shark product export to foreign countries
- xiv) Raising awareness among the people.

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