

BYCATCH MANAGEMENT AND DISCARD REDUCTION STRATEGIES NATIONAL REPORT - PHILIPPINES

Rafael V. Ramiscal
Supervising Aquaculturist
National Marine Fisheries Development Center
Bureau of Fisheries and Aquatic Resources

Jonathan O. Dickson
Chief, Capture Fisheries Division
Bureau of Fisheries and Aquatic Resources
And Project National Coordinator

I. OVERVIEW AND SCOPE OF PROJECT

A. MARINE CAPTURE FISHERIES

1. Administrative Classification

Capture fisheries in the Philippines is administratively divided into commercial and municipal sectors on the basis of vessel gross tonnage. As defined in the Philippine Fisheries Code of 1998, commercial fisheries include fishing operations that use vessels of over 3 gross tons (GT). Municipal fisheries, on the other hand, involve the use of vessels of 3 GT or less, including operations that do not involve the use of fishing boats. Municipal fisheries roughly translate to traditional, artisanal or small-scale fisheries, while the commercial fisheries correspond to the industrial or large-scale type fisheries.

2. Production

Total fish production in 2007 reached 4.7 million metric tons, 47% (2.2 million) of which was from aquaculture. The entire marine capture fisheries production was 2.3 million tons, 49% was from municipal fisheries and 51% from commercial fisheries. Inland (freshwater) capture fisheries only amounted to 168,000 mt. (BAS 2007).

While the total fish production has expanded by an average of 7% annually since 2000 largely due to increases in the aquaculture, production from marine capture fisheries has leveled off at about 2 million metric tons. (Figure 1).

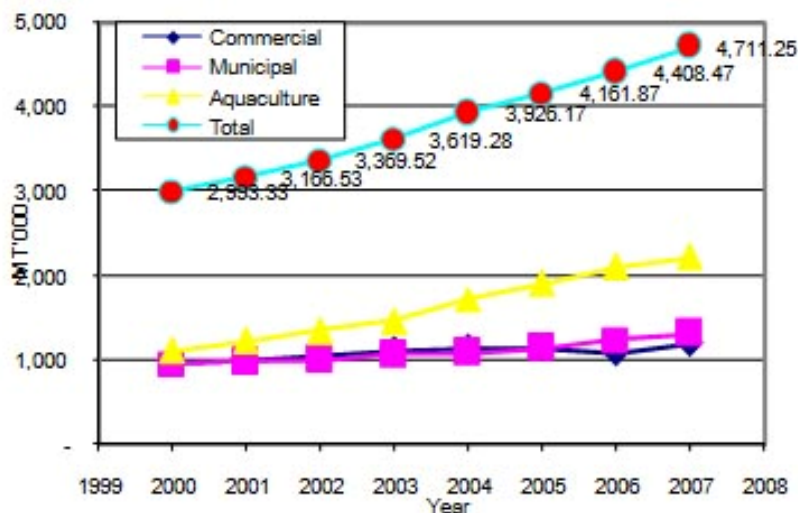


Figure 1. Philippines fisheries production 2000-2007

3. Fishes caught and status of stocks

Major fish species landed are roundscads, Indian sardine, frigate tuna, skipjack tuna, yellowfin tuna, bigeyescad, fimbriated sardines, slipmouths, squids, anchovies, eastern little tuna and Indian mackerel. Small pelagics (scads, sardines, herrings, mackerels, small tunas) and demersal fish (stocks are considered overfished and exploited beyond MSY levels (Dalzell et al. 1987; Zaragoza et al. 2004; Barut et al 2004; Armada 2004).

Overfishing brought about by increased number of fishers and the general open access to fisheries is common to both from the municipal and commercial fisheries. Commercial fishing boats continued operations in municipal waters and the use of destructive fishing methods (i.e., dynamite, cyanide fishing and the use of fine mesh net fishing gear) have also contributed in the rapid decline of fish stocks and habitat degradation.

4. Fishing fleet

The commercial fishing fleet is comprised of 3,874 catcher vessels that are licensed by BFAR in 2007. However, it is noticeable that many vessels remain unregistered. Important fishing gears used are ringnet, handline, modified Danish seine, bagnet, purse seine and trawl. Trawl is about 10% of the total number of registered commercial fishing vessels (Table 1).

Table 1. Registered commercial fishing boats (BFAR-RFQD, 2007)

Region	Ring net	Hand line	Modified Danish Seine	Purse Seine	Bag net	Trawl	Drift Long line	Gill net	Drive in Net	Round Haul Seine	Beach Seine	Push Net	TOTAL
1	0	0	38	0	0	36	0	0	0	0	0	0	74
2	33	0	18	0	0	0	1	0	0	18	1	0	71
3	8	2	8	26	3	6	11	0	0	0	0	9	73
4	115	153	41	83	160	19	0	42	15	1	0	0	629
5	86	2	71	23	94	52	0	0	0	0	1	0	329
6	99	42	74	60	5	153	0	0	0	0	0	0	433
7	224	91	157	4	3	0	0	1	1	4	0	0	485
8	141	3	109	1	14	57	3	1	0	0	5	0	334
9	12	16	39	63	40	3	4	0	0	0	0	0	177
10	88	1	0	0	31	0	0	1	0	0	0	0	121
11	73	18	0	0	39	0	0	0	0	0	0	0	130
12	64	441	0	89	5	0	14	5	0	0	0	0	618
13	5	1	28	0	5	0	0	1	0	0	0	0	40
ARMM	1	0	0	5	3	0	0	0	0	0	0	7	16
CAR	0	0	1	0	0	5	0	0	0	0	0	0	6
NCR	4	5	88	114	1	67	28	4	16	0	0	11	338
TOTAL	953	775	672	468	403	398	61	55	32	23	7	27	3874

Municipal fishing boats numbered 469,807 in 2000; 177,627 of which were motorized and 292,182 non-motorized (BFAR 2007). The most common fishing gears used in municipal fisheries are hook-and-line, gillnets, cast nets, traps/pots, beach seine and fish corral.

5. Employment

The fisheries sector provide employment to 1,614,368 fishing operators nationwide, 85% (1,371,676) of which are from the municipal fisheries and 1% (16,497) from the commercial sector. The aquaculture sector employed 14% (226,195 operators) (NSO 2002 Census for Fisheries)

B. THE TRAWL FISHERIES INDUSTRY

Following the general administrative classification of fishing boats based on the size of the vessel, trawling boats in the Philippines are correspondingly classified as municipal and commercial.

1. Municipal trawlers

Municipal trawlers are boats that are 3 gross tons or less and are made of wooden dugout. Popularly called as "*banca*," they commonly measure about 5 to 12 meters long, powered by inboard gasoline engines and fishing is manually operated.

The smallest trawler is referred to as *mini-trawl* and is a simple dugout powered by 10hp or smaller engine and is usually used to catch

sergestedshrimps (acetes) and anchovy. It is operated by 1 to 2 fishermen. On the other hand, *baby trawl* is outriggered banca propelled by 10-16 horse power gasoline or diesel engine and operation also requires 1 to 2 crew. These boats are small and categorized as municipal fishing boats. Operation is limited in shallow and nearby areas with short fishing trips, normally leaving late in the afternoon and returning the following morning.

Many trawlers considered as municipal are however under-measured or inaccurately classified with actual size exceeding 3 gross tons thus qualify them as small commercial trawlers. These boats are those that are more than 12 meters powered by 80-130 horsepower truck (diesel) engines and operated by 2-5 fishermen. Short daily trips are also usually done; however, trips lasting more than one day are also common as they are able to reach more distant fishing grounds.

Based on the latest census, there are about 469,807 municipal fishing boats; however information on gear types is not available. Many LGUs still have to undertake their mandates under Executive Order 305 to register municipal fishing boats. The present number of municipal trawlers is unavailable, however they are obviously in significant numbers considering their prevalence in many coastal areas. Notwithstanding the prohibition of active fishing gears including trawls in municipal waters, their continued operation in the coastal areas are largely attributed to laxity in the enforcement regulations and the lack of alternative livelihoods and opportunities.



Figure 2. Municipal trawlers

2. Commercial

Trawling with the use of more than 3 gross tons boats are classified as commercial and is further classified as 1) small-commercial (3.1 to 20 GT); 2) medium-commercial (20.1 to 150 GT; and, 3) large-commercial type (150.1 and beyond). The over-all length usually exceeds 12-meters and driven by 80-500 horsepower engines. In general, the boats are mechanized where winches and pulleys are rigged for hauling. Fishing trips lasting 2-4 days are common but shorter trips are also done in areas when target fishing grounds are close to fish ports or fish landing centers. Fish finders are common on medium-commercial boats and take on 5-7 days fishing trips.



Figure 3. Small scale commercial trawlers



Figure 4. Medium scale commercial trawlers

3. Gear designs

Two basic trawl net designs are employed depending on the target catch. The V-type net is a low-opening trawl that is intended to catch relatively higher catch of shrimps. The German two-seam type (Herman Engel) trawl is widely used to catch squid, sergested shrimp and anchovy and high opening fish trawl to catch not only demersal but also small-pelagic fishes. Boats commonly change gear types depending on the area of operation and target species.

The size of net used is according to size or power of the boat. For example for a baby trawler using 10 hp gasoline engine, the typical head rope (HR) of the V-type net measures 4-6 m head rope (HR) and 7-10m foot rope (FR) while for boats powered by 80hp engine, 11-18 m HR and 16-25 m FR. High-opening net used by medium commercial trawler measures 30-32m HR and 35-39FR.

The different gear designs according to boat size/engine power are illustrated in Appendix 1-11..

4. The trawl fleet

Trawling has been in use in the Philippines since the early part of 20th century and popularized after the Second World War when American surplus marine engines were readily available (Umali 1950; Thomas 1998). Exploratory surveys in the 1950s demonstrated the potential of trawling in the country and become widespread by 1960's (Thomas 1998). In 1967, 600 commercial trawling units were reported to be in operation (Encina 1976) and by early 80s, the number increased to about 700 to 900 units that peaked in 1983 when the total registered vessel was 932 boats (BFAR Fisheries Statistics 1981-1988).

Meanwhile, the expansion of commercial trawlers subsequently effected adoption in smaller boats. Locally called as "baby trawl" outriggered boats powered 10-16 horsepower engines use small nets that are dragged in shallow coastal area to catch shrimps and evolvement of the larger outriggered trawler boats fitted with surplus diesel (truck) engines to fish in the deeper portions of the bays and gulfs. Because of the size of the boats, baby trawls are classified as municipal while larger version of outriggered bancas are also commonly classified as municipal, however, the size of the boats are in fact more than 3 gross tons making them as small commercial vessels. While these municipal trawls are evidently widespread in bays, gulfs and coastal areas, their number has generally been indeterminate, much less registered or licensed.

Declining catch at the same time increasing cost of operations mainly by the increase in the price of fuel oil, conflicts with other users and restrictions may well resulted in the decline of the commercial fleet (Armada 2004; Thomas 1999; de Jesus 1988; Dickson 2004). By 1997, the registered

trawlers numbered 445 units and reduced to 398 units a decade later (2007). It was however noticeable in major trawl fishing grounds that many commercial trawlers continue to operate but remain unregistered and unlicensed.

The decrease in the number of trawlers was replaced with the gear that similarly catches demersal species. The local Danish seine is a modified version of the original Danish seine in the northern regions of Europe by using of heavy “tom” weight to close the drag or scare lines. Registered commercial modified Danish seine in 1988 was only 59 units that increased to 672 vessels in 2007. Similar situation is also apparent in municipal boats in many coastal areas.

The commercial trawl fleet in 2007 consisted of 56% small-commercial (3.1 to 20 GT), 44 % medium-commercial (20.1 to 150 GT). Further, 92% of the vessels are less than 50 GT, or 99% less than 75 GT.

5. Trawl fishing Grounds

Trawl fishing is conducted in relatively flat, muddy/sandy bottom and in shallow to moderate depths usually not exceeding 100-150 meters along coastal areas, bays, gulfs and inlets. The major trawl fishing grounds in the Philippines are Samar Sea, Visayan Sea, San Miguel Bay, Lingayen Gulf, Ragay Gulf, Carigara Bay, Guimaras Strait and Manila Bay (Fig. 2).

Despite the consequent closure of the greater parts of these major trawl fishing areas due to the expansion of municipal waters (to 15 km), trawlers have persisted and remained their uncontrolled operations in these areas. While there have been a decline in the officially registered & licensed commercial trawlers in recent years, the actual number of operating vessels is perhaps higher considering that many have remained unregistered/unlicensed. This same situation is more apparent in municipal fisheries sector.

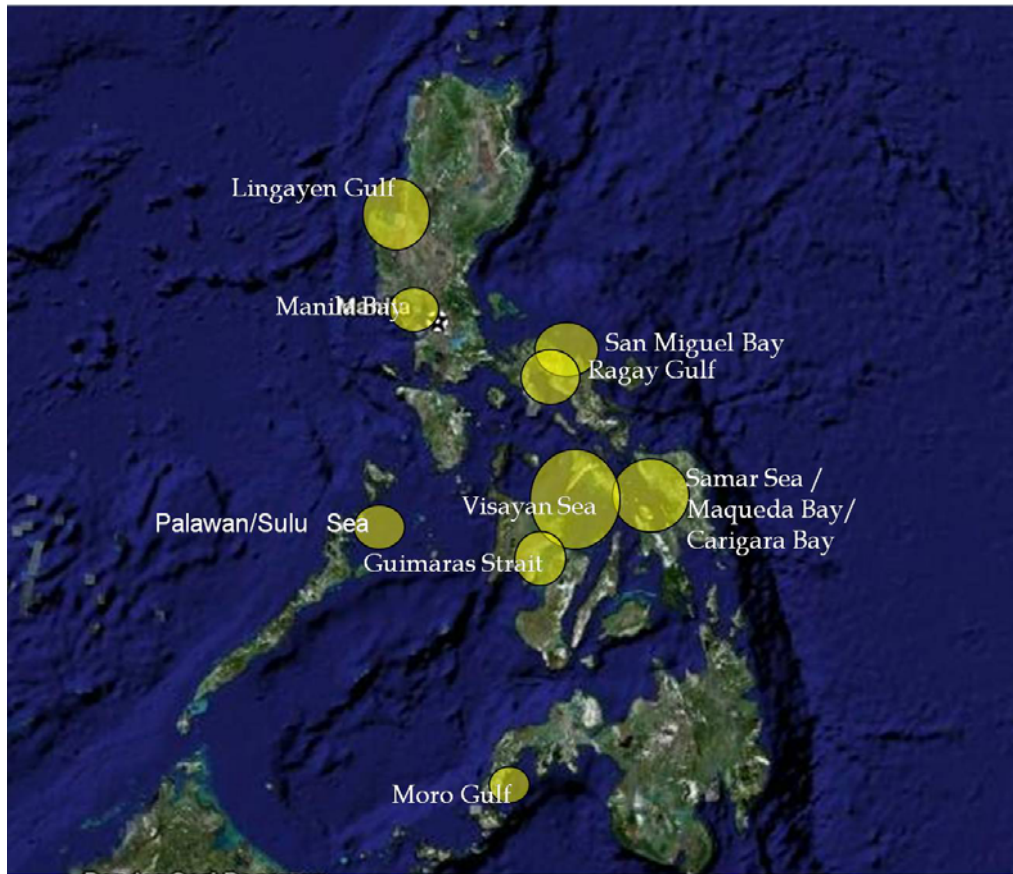


Figure 5. Trawl fishing grounds in the Philippines

6. Production

For the 10-year period from 1979 to 1988, trawl then ranked 2nd to purse seine as the most productive commercial fishing gear, supplying an average of about 145,000 metric tons per year or 27% of the commercial fish production.

In 1992-1995, commercial trawl production was reduced to an average of 83,000 metric tons or 11% of the commercial fisheries production and 3rd rank to purse seine and ringnet, gears that are designed for pelagic species. Municipal or baby trawls averaged 32,000 mt or 4% of the production of that sector. Commercial Danish seine then averaged about 73,000 metric tons or 6% (BFAR Statistics 1987).

While present statistics do not take account production by fishing gear, trawl fisheries continue to contribute significantly to the country's marine fish production.

7. Employment

Given the inadequate statistics, the importance of trawl fisheries as a source of livelihood can be only gleaned from the size of crew according to boat size and the magnitude of the current fleets. For a medium commercial trawl, the number of crew can be 12-17 fishermen while the small scale

commercial trawlers require 5-7 fishermen per boat. A baby trawler can be operated by 1-2 fishermen while the larger municipal trawlers by 2-5 fishermen.

In general, fishermen and their families are very much dependent on fishing with little opportunities from alternative or available part-time jobs. When forced due to insufficient catch or otherwise, fishermen take on any job like those in farming, construction, tricycle/pedicab driver, trading/retailing, coconut wine making and others.

On top of direct employment onboard fishing vessels, dependence on the fishery is well observed with the participation of practically all members of the family in fishing related activities. In municipal fisheries, husbands are usually complemented by able son/s or relative/s in fishing activities while wives and women assist in mending nets and take charge of catch disposal/marketing or processing (usually drying). Unpaid children are often involved in fishing activities especially in smaller boats.

Trawl caught fish are likewise extensively used as raw materials for locally processed fishery products such as dried fish, fish paste and fish sauce. Ancillary livelihoods are similarly significant. For example in Sto Tomas, La Union where commercial trawlers land their catch, 75 groups are dependent on drying fish as livelihood. Likewise, 71 specialty stalls or retailers of these fishery products (dried fish, fish sauce/paste) are established in the locality.

8. Status of demersal stocks

The state of the demersal fish stocks in the Philippines is generally considered overfished fisheries (Barut et al 2004; Armada & Campus 2004; Stobutzki et al). Various trawls surveys indicated declining biomass primarily due to excessive fishing (Table 2). Declining catch rates and major changes in species composition, particularly increase in squids, shrimps, anchovies and herrings and declines of large commercially valuable species like snappers, sea catfish and Spanish mackerels are also indicative of overfishing in major trawl fishing grounds like San Miguel Bay, Lingayen Gulf, Visayan Sea and Manila Bay (Barut et al 2004; Armada et al 2004; Green et al. 2004).

Table 2. Estimated biomass of demersal stocks in trawl fishing grounds

Fishing Ground	Year	Biomass	Authors
Lingayen Gulf	1978-79	1.33	Villoso and Aprieto 1983
Lingayen Gulf	1987-88	0.57	Ochavillo et al 1989
San Miguel Bay	1979-80	2.13	Vakily, 1982
San Miguel Bay	1992-93	1.96	Cinco et al 1995
Ragay Gulf	1981-83	1.58	Federizon 1993
Manila Bay	1949-52	4.61	Silvestre et al 1987
Manila Bay	1968-72	1.71	Silvestre et al 1987
Manila Bay	1992-93	0.47	Armada et al 1994
Samar Sea	1979-80	1.88	Armada et al 1983
San Pedro Bay	1994-95	1.73	Armada et al 1996

II. BASELINE DATA: MAJOR TRAWL FISHERIES

Major trawl fisheries are located in inland seas, bays and gulfs that are generally characterized by shallow to moderate depths with flat muddy to sandy bottoms. Significant commercial fleets are located in Regions 1, 5, 6, 8 and NCR (Table 3). Besides, a large but indeterminate number of municipal and small commercial trawl boats are located in the various localities bordering these trawling grounds.

Table 3. Distribution of registered commercial trawlers by region/fishing ground (BFAR-FRQD, 2007)

Region (Fishing Ground)	Total	%
1 (Lingayen Gulf)	41	10.3
3 (Manila Bay)	6	1.51
4 (Manila Bay/Palawan)	19	4.77
5 (San Miguel Bay/ Ragay Gulf/Visayan Sea)	52	13.07
6 (Visayan Sea/Guimaras Strait)	153	38.44
8 (Samar Sea/Maqueda/ Leyte Gulf/ Carigara Bay)	57	14.32
9 (Moro Gulf/Sulu Sea)	3	0.75
NCR (Manila Bay/Palawan/SCS)	67	16.83
TOTAL	398	100

A. SAMAR SEA / MAQUEDA BAY

Samar Sea and the Maqueda Bay are located in the province of Samar (Region 8-Eastern Visayas region) (Figure 6). The province is divided into two (2) congressional districts that comprised of two (2) cities and twenty four (24)

municipalities of which 24 are considered coastal cities/municipalities. Samar Sea is about 198 km² and Maqueda Bay is 92 km². These fishing grounds are muddy to sandy bottom and relatively shallow with prevailing depth of less than 50 meters. Deeper areas of less than 100 meter are located towards the northern portion.

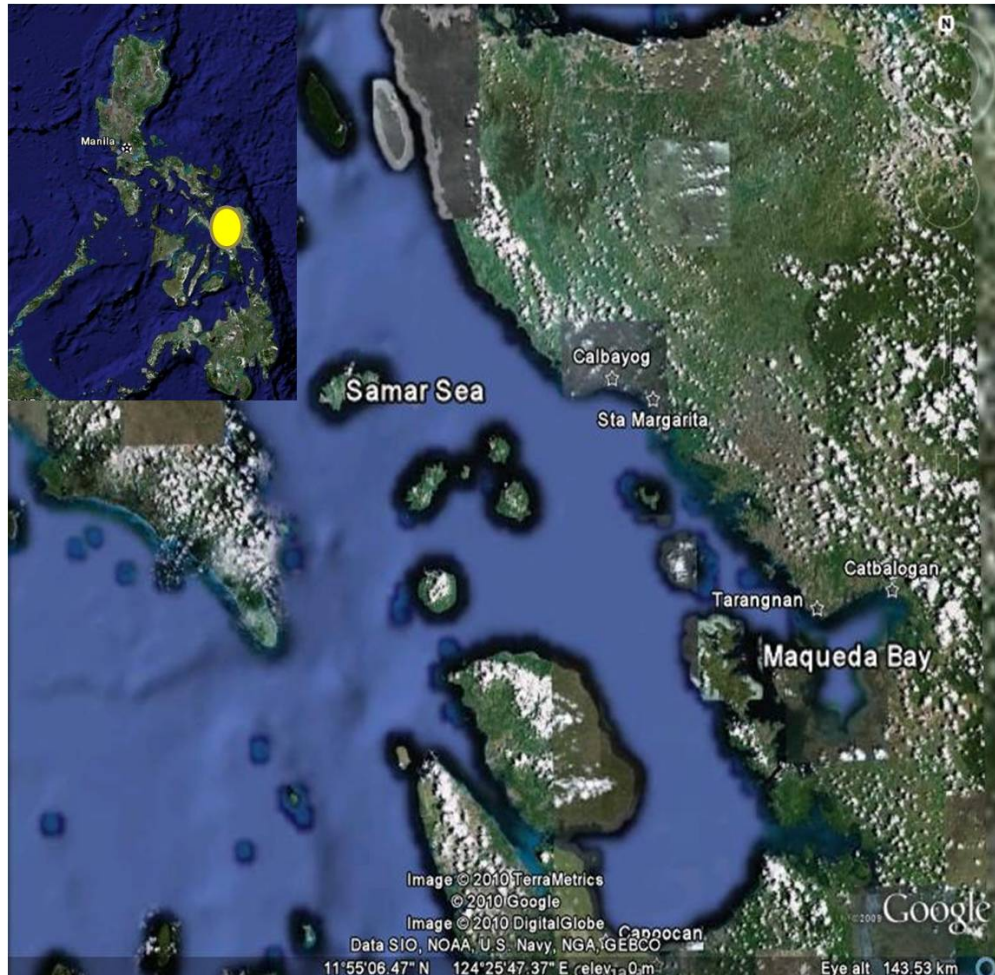


Figure 6. Samar Sea and Maqueda Bay

1. The trawl fleet

Samar Sea and Maqueda Bay are important fishing grounds for both municipal and commercial trawls. There were 73 small commercial trawlers, 66 large municipal and 266 baby trawlers in selected areas during the rapid survey conducted in connection with the preparation of this paper (Table 4).

In 2007, baby trawl was the 3rd most dominant among municipal gears (23%) after bottom set gillnet and shrimp tangle net. It was also the second in terms of catch rate after ringnet. Other important municipal gears are the modified Danish Seine and ringnets (Diocton, 2009).

Table 4. Number of trawlers in selected areas, Samar Sea / Maqueda Bay, 2010

City/Municipality	Commercial	Municipal (large)	Municipal (baby)	Total
Calbayog	12		7	19
Catbalogan	61		15	76
Sta. Margarita		60	16	76
Tarangnan		6	228	234
Total	73	66	266	405

2. Major ports and landing sites

Major fishing ports for commercial trawlers are located in Calbayog and Catbalogan. Landing sites for municipal boats are done in their respective villages/communities

3. Trawl catch and composition

The Pilot implementation of the Juvenile and Trashfish Excluder Device (JTED) in Calbayog City provided most recent information on the catch of trawlers operating in Samar Sea (Dickson et al 2008). For the period September 2005 to December 2006, the local fleet of 18 trawlers based in the City landed a total catch of 1,289 tons of fish from 991 fishing trips.

The average catch per-unit effort (CPUE) for shrimp trawl (panghipon) was just below 1 ton (0.94 tons) per 2 days-3 nights fishing trip while CPUE for fish trawl (palupad) was 2.4 tons per fishing trip. For shrimp trawl, peak months were indicated in the months of October and lean in July-August. For fish trawl, lowest mean catch was observed in September and highest in June (Fig.7).

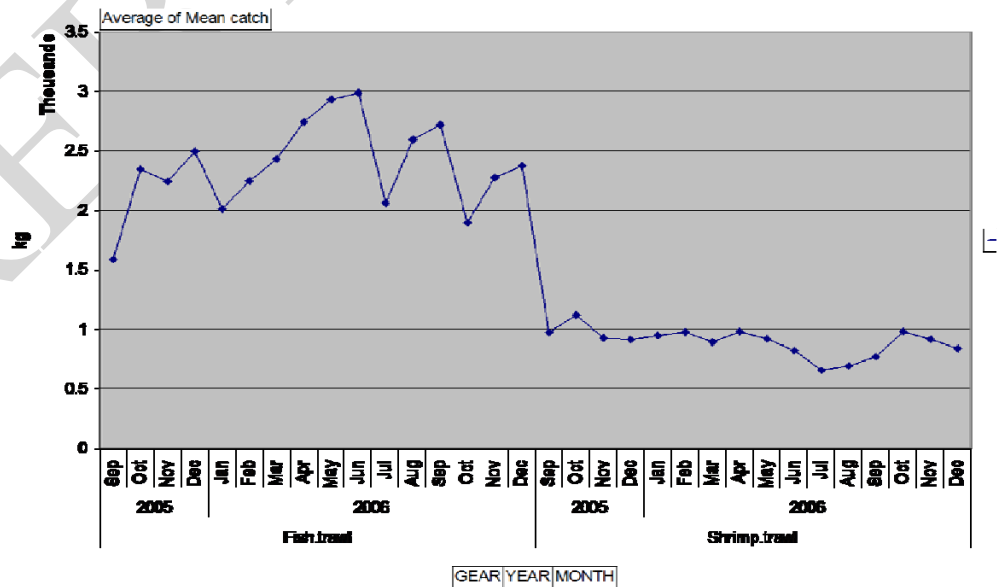


Figure 7. Catch rate of small commercial shrimp trawl, Samar Sea, Sep 2005- Dec 2006 (Dickson et al 2008)

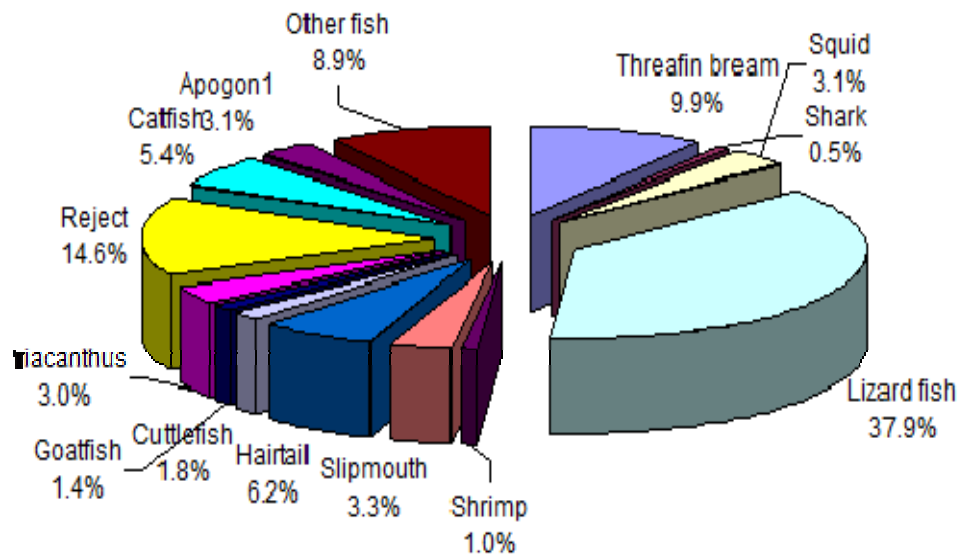


Figure 8 . Catch composition of shrimp trawls, Samar Sea (Dickson et al 2008)

More than one third (37.9%) of the catch of shrimp trawls were lizard fish (*Sauridaspp*), followed by threadfin bream (*Nemipterus spp.* 9.9%). Shrimps which were considered as the target species were just about 1% of the total catch. The rejects which comprised of small-sized fish of low or no commercial value as well as the juveniles of commercially important species was 14.6% of the total landings (Figure 8).

The composition of rejects in shrimp trawl indicated high incidence of juveniles of commercially important species, among which were the lizard fish 8.1% (*Saurida spp.*), purple spotted bigeye 5.4% (Dilat, *Priacanthustayenus*), cardinalfish 9.2% (Muong, *Apogon sp.*, hairtail 1% (espada, *Trichiurus sp.*) Fig. 9).

For fish trawl, the catch was dominated by small pelagic species e.g. roundscad 47.8% (*GG, D. maruadsi*), sardines 10.8% (*tamban, Sardinellalongiceps*) and mackerel 7.8% (*agumaa, R. faughni*). Demersal fish which are the dominant catch for fish trawl constitute a small portion of the catch like lizardfish (kalaso) 0.4% and threadfin bream 0.3%. The reject portion of the catch was also comparatively lower, with only 4.2% of the total catch (Fig 10).

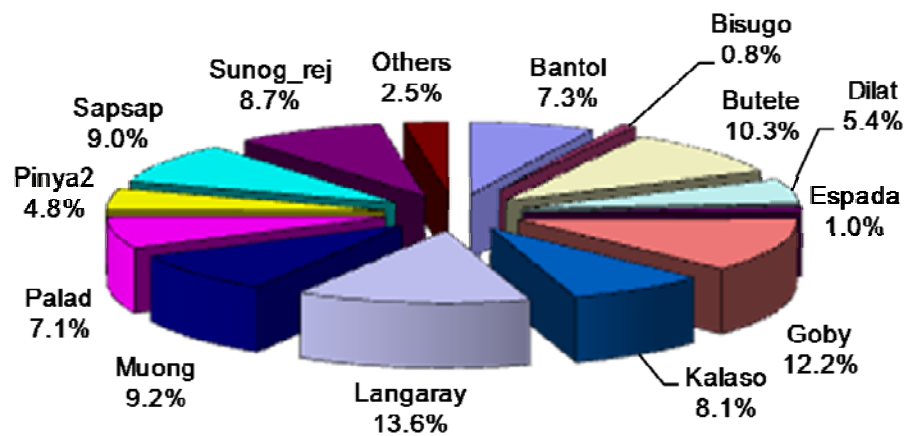


Figure 9. Composition of rejects (trashfish), shrimp trawl (Dickson et al 2008)

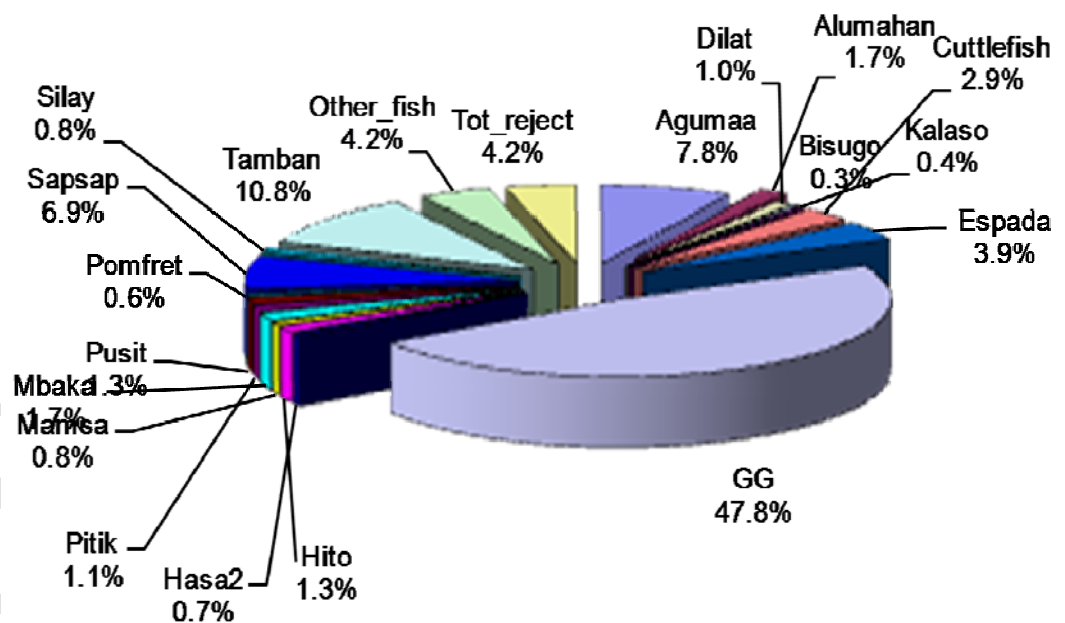


Figure 10. Catch composition of fish trawl, Samar Sea (Dickson et al 2008)

B. LINGAYEN GULF

Lingayen Gulf is an important fishing ground in the northwestern part of Luzon island facing the South China Sea (Region 1 – Ilocos Region) (Figure11). It has an area of 2,100 km² and the primary fishing ground to 18 municipalities and cities. The gulf is generally shallow with depths of less than 50 meters. The central

southern portion of the gulf from Sual (Pangasinan) to Sto Tomas (La Union) is characterized by soft, silt and mud. The northeastern portion from Agoo to San Fernando (La Union) is generally with sandy, rocky and scattered coralline bottom, while the western side of the bay is dotted with islands and generally characterized by hard and coralline substrate.

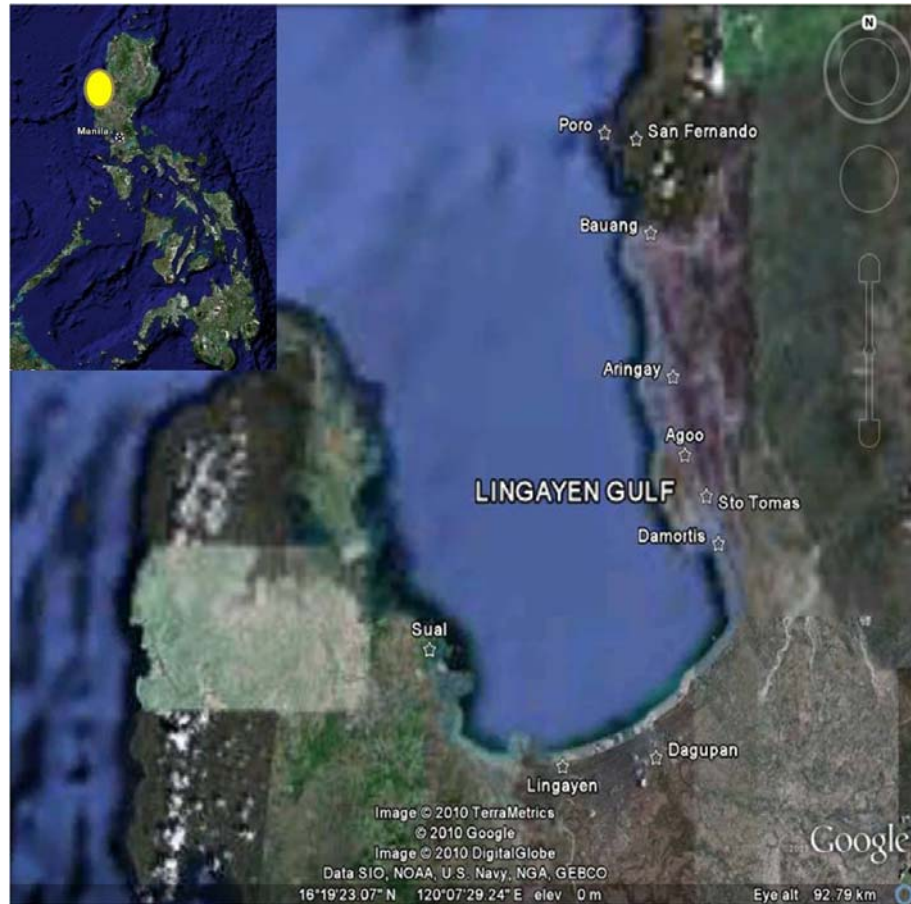


Figure 11. Lingayen Gulf

1. The trawl fleet

There are currently 55 registered commercial fishing boats operating in Lingayen Gulf that include 24 trawls and 31 Danish seines. The major landing centers for commercial fishing boats are in Damortis&Tubod, Sto Tomas, La Union;Pantal, Dagupan City and Sual, Pangasinan (Table 5). Baby (municipal) trawlers are common in municipalities of La Union province.

Table 5. Number of trawlers in selected areas, Lingayen Gulf

Municipality/ City	Small/ medium commercial	Large _municipal *	Baby trawl**	Total
Ago			195	195
Aringay			58	58
Bauang			44	44
Dagupan		61	1	62
Sto Tomas	18		11	29
Sual	6			6
Total	24	61	309	394

(* / ** based on 2009 BFAR-RFO1 inventory)

2. Major ports and landing sites

Major fishing ports for trawl operating in Lingayen Gulf are Damortis Fish Port (province of La Union) mainly by small scale commercial trawlers while landings at Sual Fish Port (province of Pangasinan) are from relatively bigger boats including medium scale commercial trawlers. Trawlers based in Dagupan (Pangasinan) land their catch at Pantal (Dagupan) Fish Port. Landing sites for municipal (baby) trawlers are done in their respective villages/communities.

3. Catch and composition

Trawl and modified Danish seine are the main commercial fisheries in the Gulf. For the period 2003-2007, the landed catch of these fisheries average 627 metric tons, 30% of which are caught by trawls (Fig. 12). The mean catch rate for small commercial trawls based in Sto Tomas, La Union was about 120 kg/boat/day while the medium commercial boats was 590 kg/day/day. Peak fishing season occurs in October-November (Fig. 13).

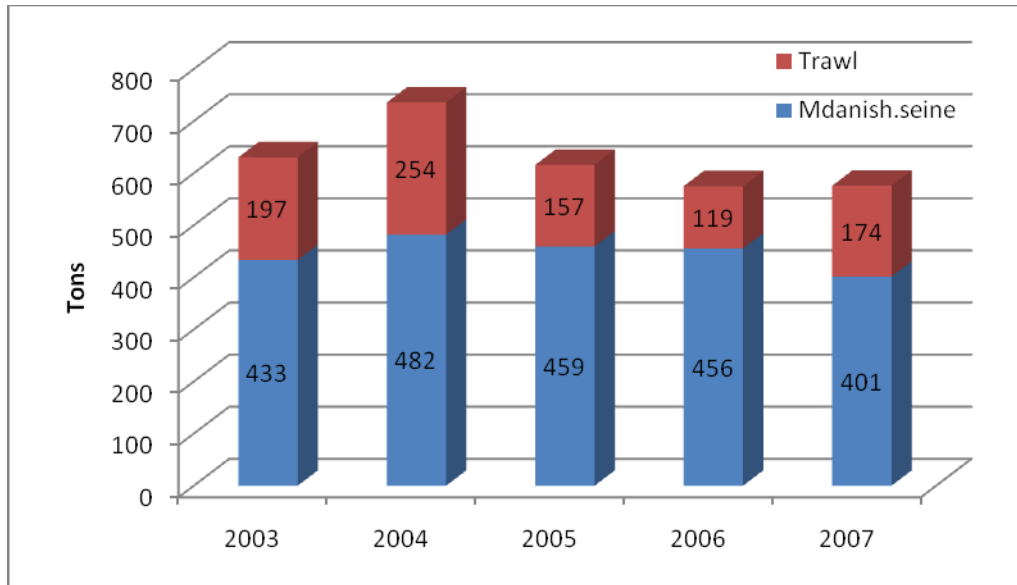


Figure 12. Commercial fisheries production, Lingayen Gif (RSAP, BFAR-RFO1)

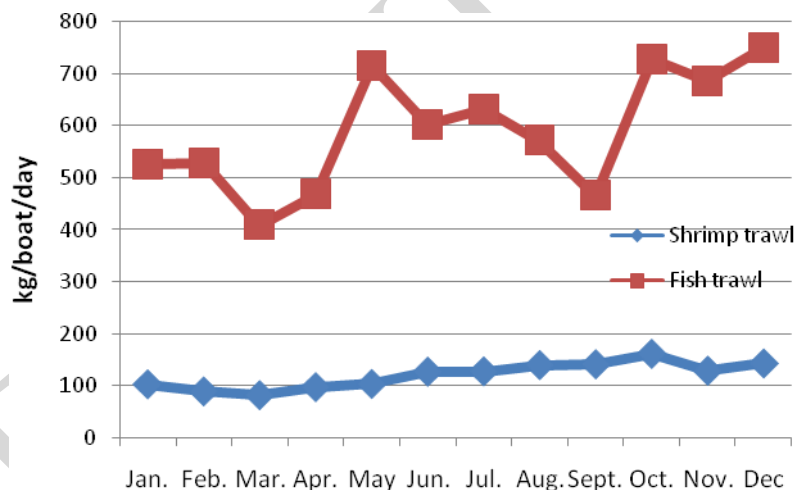


Figure 13. CPUE of trawls, 2007 (RSAP, BFAR-RFO1)

The dominant fish caught were hairtails, lizardfish, threadfin bream, bigeyescaud, ponyfish, and squid. The majority of lizardfish, threadfin bream and moontailbullseye were juveniles and only few were reaching length at first maturity. Rejects which comprised of very small fish that are usually too small and of low value/quality was 1.3 to 9.4% of the landings in Damortis/Tubod. Small goby, ponyfish, greasyback shrimp, stickfish, flatfish, crab, capiz shell, octopus, *apogon sp.* and sea mantis were the main rejects (RSAP, BFAR-RFO1).

Onboard observations, on the other hand, indicated that trashfish was 23% of the total catch and the discarded fish during sorting onboard was estimated to be minimal at 2% of the total catch which is composed of flathead, eels, puffer fish, butterfly fishes (Hilario&Lamarca 2009).

C. SAN MIGUEL BAY

San Miguel Bay is situated in the Southern Luzon (Bicol Region) and is along the eastern coast facing the Pacific Ocean (Fig. 14). It is bounded by seven (7) municipalities of Siruma, Tinambac, Calabanga, Cabusao (all in the province of Camarines Sur) and Siruma and Mercedes (Camarines Norte) (Figure 11). Sipocot, Basud and Mercedes are located on the western side which is generally hilly to mountainous. The southern base of the bay is large alluvial plain formed by Bicol river between the municipalities of Calabanga and Cabusao and where the majority of trawlers are located. The eastern part of the bay is the municipalities of Tinambac and Siruma (Lanzuela, 2010).

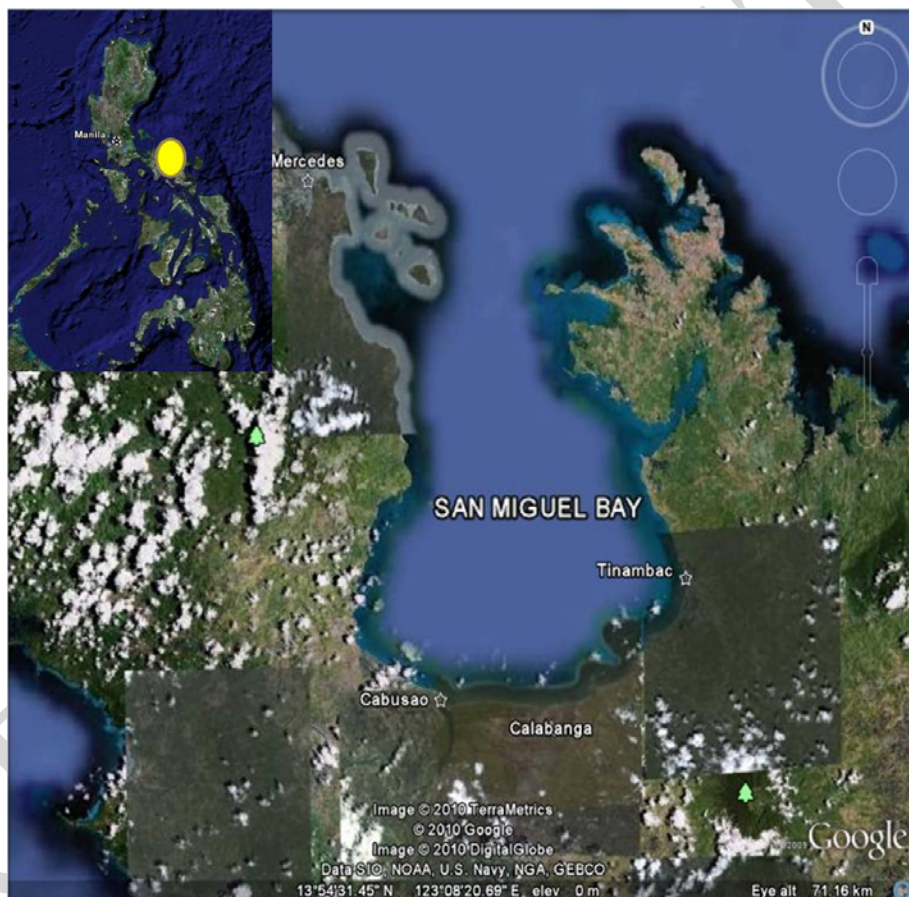


Figure 14. San Miguel Bay

The bay and the adjacent waters are the only sheltered areas in the Pacific coast that make year-round fishing possible. The other areas in the Pacific seaboard are exposed to strong winds and high seas during the Northeast Monsoon (November-February). The southwest monsoon (May-July) has no impact on the fisheries of the bay (Mines et al, 1982; Lim et al.).

The bay is about 1,115 km² area with a coastline of approximately 240 km. It is generally very shallow, with depths of 2-10 m at the inner and central portion that gradually deepens (> 30 m) leading to the Pacific Ocean. Sea bottom is essentially

soft muddy/sandy that is favorable for trawl fishing with small patches of hard/coralline substrate in western entrance of the bay. The shoreline is vegetated with mangroves and patches of seagrasses.

There are more than 7,000 fishers in the Bay, about 67% are from the municipalities of Calabanga, Mercedes and Siruma, and 27% from Cabusao and Tinambac. A variety of fishing gears are employed that are mainly gillnets (for crab, shrimp, fish), hook & line, mini-trawl, push net, long line, spear gun and filter nets that constitutes 80% of the total numbers of gears in the bay (Lanzuela, 2010).

Under current regulations, the entire San Miguel Bay is enclosed by the 15 km jurisdictions of the adjoining LGUs and in effect prohibits the operations of commercial fishing boats including trawls and other active fishing gears regardless of their size. However, non-compliance with these regulations is common over the years as evidenced by persistence of trawlers in the bay (Table 6)

Table 6. Number of trawlers in selected areas, San Miguel Bay, 2010

Municipality	Commercial	Municipal	Grand Total
Cabusao		286	286
Calabanga	18	200	218
Mercedes	15	100	115
Tinambak		50	50
Grand Total	33	636	669

Table 7. Record on the number of trawls, San Miguel Bay

Trawl type	Engine (hp)	(Vakily 1982)	REA (1992)	DA-BFAR (1992)	Rapid Assessment (1999)	Rapid Assessment (2010)*
Medium_ commercial	250-500	30	1	35	-	33
Small_ commercial	150-220	17	4	38	20	
Baby_ municipal	60-90	72	50	-	33	669
Mini_ municipal	10-16	188	260	-	569	

*Selected areas only

1. Major ports and landing sites

The major fish landing areas for municipal trawls are in Barangay Sabang, Calabanga and Castillo, Cabusao and Tinambac, all in the province of Camarines Sur. The major commercial fish ports are in Camaligan and Calabanga (Camarines Sur) and Mercedes (Camarines Norte).

2. Catch and composition

Survey conducted from September 1992 to July 1993 showed mean catch rate of 32.3 kg per hour for a 10-m 65 hp trawler, highest in October 1992 (73.9 kg/hr) and lowest in April 1993 (13.4 kg/hr). Slipmouths (*Leiognathidae*) was the most dominant species caught with over a third (37.6%) of the catch. Other major species are croakers (*Sciaenidae*), anchovies (*Engraulidae*) and hairtails (*Trichiuridae*) and shrimps (*Penaeidae*). The results of the trawl survey indicated heavy fishing pressure on the resources of San Miguel Bay. Symptoms of all forms of biological overfishing were also reported (BFAR-FSP 1996)

Observations onboard municipal trawlers in San Miguel Bay in 1999 reported a catch per unit effort of 4 kg/hr. Crabs were the most dominant catch at 40% while commercially important species was 20% and shrimps 15%. Trashfish which was composed of small-sized invertebrates, seamantis, crabs and young/small fish measuring 10-cm and below accounted 25% of the total catch (Chiuco & Santiago 1999).

D. VISAYAN SEA / GUIMARAS STRAIT

Visayan Sea is located in the central Philippines with an area of about 10,000 km². It is bordered by four provinces in three different regions: Masbate (Region 5-Southern Luzon), Iloilo, Capiz, Negros Occidental (Region 6-Western Visayas), Cebu (Region 7-Central Visayas). It is relatively shallow, with prevalent depths of 40 m or less (Armada 2004) (Fig 15).

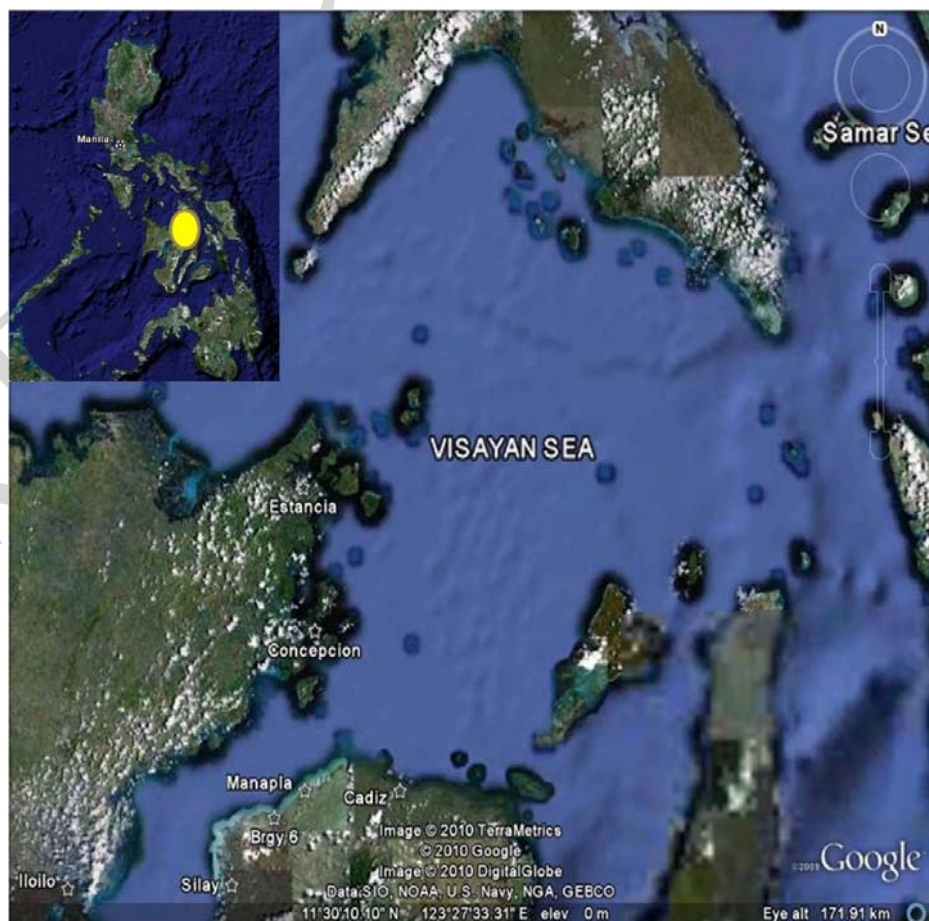


Figure 15. Visayan Sea

The Visayan Sea has always been among the top three fishing grounds in the country (NSO 2001 ; Hermes et al. 2004). While about two-thirds of the total fisheries production in the area comes from commercial fishing, the Visayan Sea is identified as the most productive municipal fishing ground in the country (NSO 2001 cited in Ferrer 2009).

In 2003 and 2007, a trawl survey in the Visayan Sea was conducted using MV DA-BFAR. The standing stock biomass of trawlable fisheries resources was determined at 2.23 mt/km² and low trophic level of demersal catch and increasing abundance of small pelagic species were observed. There was also large percentage of squid, cuttlefish, jellyfish, and crabs in the total catch and a reduction in abundance of carnivores (Armada and Campos 2004).

Vakily (2005) likewise concluded that the Visayan Sea is “definitely not underexploited, most probably fully exploited, and very likely overexploited”. Hermes et al. (2004) also directly links the decreasing trend in the volume of catch from the Visayan Sea during years 1992 to 1995 to overfishing, destruction of habitat, overcapitalization, and non-limitation of fishing effort within the fishing ground.

1. Trawl fleet

In selected areas of Negros Occidental and Iloilo, the three types of trawlers are common. Baby or small trawls are powered by 1-3 piston engines like Kubota, Briggs & Stratton and Lombardini, while small commercial (commonly classified as municipal) trawl are powered with Mitsubishi 4DR5/4D30/4D32 and Isuzu 6D14. Medium-commercial trawlers use Caterpillar, V10/12 and 8DC9 engines (Table 8).

Table 8. Number of trawlers in selected areas in Negros Occidental (Visayan Sea / Guimaras Strait)

City/Municipality	Commercial	Large_municipal	Small_municipal	Grand Total
Cadiz	32	40	43	115
Conception		18		18
Estancia		50		50
Hinigaran		10	14	24
Manapla			58	58
San Dionisio			50	50
Silay			30	30
Victorias		30	40	70
Grand Total	32	148	235	415

2. Catch and Composition

Based on the landings from medium trawlers based in Cadiz City, about 188 species were identified dominated by lizardfish (*Sauridaspp*, 24%), slipmouth (*Leiognathus spp.*, 14%), apogon (*Apogonspp*, 8%), goatfish (*Upeneusspp*, 5%) and hairtail (*Trichiuruspp*, 5%). Shrimps only constituted about 2% of the total catch (RSAP, RFO6).

Rapid assessment conducted in March 2010 on the same fleet indicated that the amount trashfish is significant. Observations showed that 64% of the total catch was comprised of commercial fish, 34% trashfish and 2.4% shrimps. Mean catch per boat was 8.8 tons per 6-7 days operation in the Visayan Sea, roughly translating to 3 tons of trashfish per medium-size commercial trawler per landing. For a small commercial trawl powered by 4D30 engine using shrimp net, the catch from one-day operation was 129 kg, 62% of which was comprised of trashfish.

E. CATCH COMPOSITION BY FISHING GROUND

High percentage of bycatch is high in all trawl fishing grounds. During the JTED demonstrations/trial fishing conducted in these areas, the proportion of bycatch (trashfish / rejects) was observed to be high, ranging from 16% to 31% in shrimp trawls. High percentages were also observed on juveniles of commercial species at 5-38%. Lower trashfish percentages were observed in high-opening fishing trawls (Table 9).

Table 9. Relative composition of fish-groups caught by trawls by fishing ground

FGround	Juveniles	Reject/ Trashfish	Shrimp	Commercial fish	Gear	
Manila Bay (2003)	19.02	29.63	1.5	49.85	shrimp trawl	Dickson et al 2003
Maqueda Bay (2003)	5.1	32	12.4	50.5	shrimp trawl	Dickson et al 2003
Lingayen Gulf (2004)	16.13	31.25	0.2	52.42	shrimp trawl	Dickson et al 2004
San Miguel Bay (2004)	1.9	26.6	0	71.5	fish trawl	Dickson et al 2004
Samar Sea (2004)	16.2	29.4	3.8	50.6	shrimp trawl	Dickson et al, 2004
Visayan Sea (2005)	38	29	4	29	shrimp trawl	Dickson et al 2005
Samar Sea (2005- 2006)	7.2	16.2	1	75.6	shrimp trawl	Dickson et al 2008
Samar Sea (2005- 2006)	3	8.1	nil	88.9	fish trawl	Dickson et al 2008



Figure 16. Catch of municipal (baby) shrimp trawl



Figure 17. Catch of municipal trawler for sergested shrimp / anchovies



Figure 18. Catch of small commercial shrimp trawl

REBYC-II



Figure 19. Catch of medium scale commercial trawl

F. EMPLOYMENT AND REMUNERATION SYSTEM

Direct employment in the trawl fisheries can be estimated based on the average number of crew per vessel. A small scale commercial trawler requires 5-7 fishermen and 15-17 for medium commercial trawlers. A mini or baby trawler is manned by 1 to 2 fishermen while a larger trawler boat (80-135 hp engine) is complemented by 2-5 fishermen.

Sharing system is generally practiced in most fisheries especially in municipal boats and small scale commercial boats. The net sales or net income (gross sales minus all operating expenses (usually including maintenance cost), is equally divided (50:50) between the boat/owner and fishermen/crew. Equal sharing among the crew of municipal trawls is commonly practiced. For small commercial trawl operations, the boat skipper/masterfisherman gets 3 parts, the engineman 2 parts and four fishermen/crew gets 1 part each.

It is also a common practice that only the proceeds from valuable fish and shrimps species are considered in this sharing system. Utilization or whatever income generated from trash fish or reject is given to the crew and this may translate into about 10-20% of their income.

For the larger medium commercial vessels, fixed nominal basic salary and incentive system is practiced as exemplified in the following (Table 10).

Table 10. Remuneration of crew, medium commercial trawlers (Cadiz City)

Number	Position	Salary (PhP/day)	Incentive/P5000 of net income	% share
1	Capt/MF	P150-180	200	14
1	2nd Officer	P140	170	12
1	3rd Officer	P120	130	9
1	C/Engineer	P140	130	9
1	2nd Engr	P120	110	8
1	3rd Engr	P110	100	7
3	Bodegero	P90	210	15
1	Cook	P80	70	5
5	Fishermen	P80	300	21
15			1420	100

Filipino fishermen are highly dependent on fishing and regard fishing as their only established source of income given their experience and education and the very limited alternative employment opportunities in many of their communities. Besides, fishing communities are generally deficient of arable/favorable agricultural. When compelled due to unfavorable weather and insufficient catch, fishers turn to other means of livelihood mainly menial jobs like pedicab (bicycle cab), coconut wine gathering and similar agricultural activities. Other alternative livelihood but of limited availability are also found in construction/building sectors.

A study conducted in San Miguel Bay also depicted that fisher earnings from non-fishery-related activities included remittances sent by relatives working in other areas. The distribution of fishermen's income also showed that the lowest 20% of the fishermen received 4.6% of the total income while the highest 20% received 52.8% (Lim et al)



Figure 20. Involvement of the family in the fishery

G. CATCH UTILIZATION

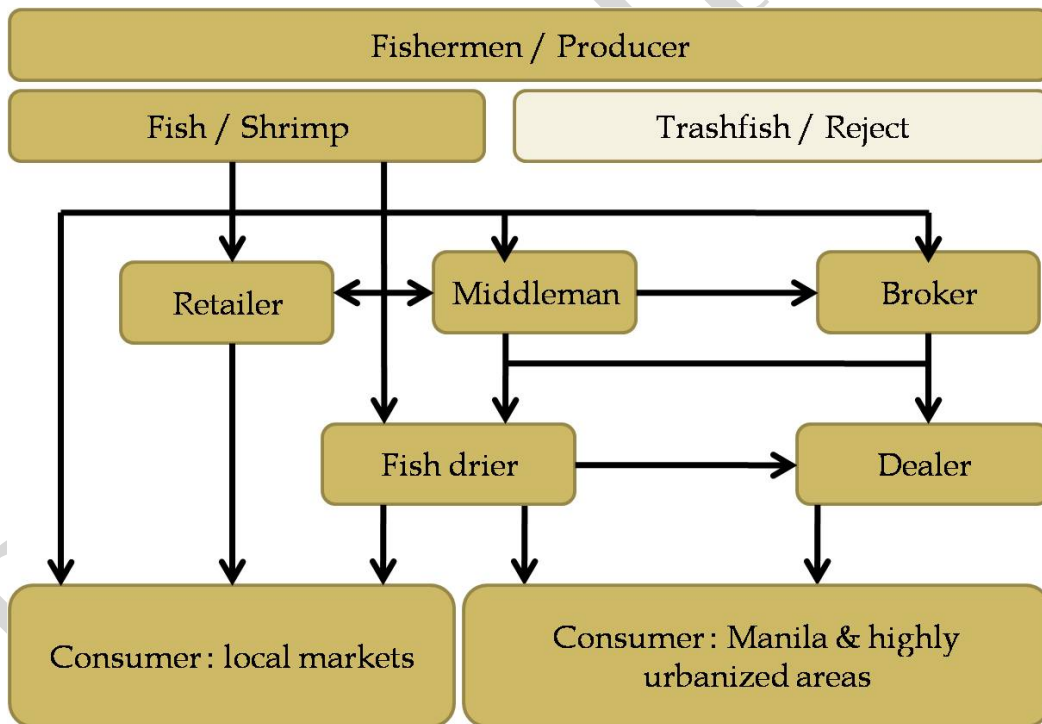


Figure 21. Market channel of fish and shrimp caught by trawl

The distribution of the catch of trawlers follows various channels. The commercially important fish and shrimp catch are usually marketed through the channel of fish driers, retailers, middlemen or brokers. Direct selling in markets is also practiced particularly by female members of family of small trawlers (Figure22)

In established fish ports and landing centers, a very common method of marketing is the *bulungan* or silent (whispered) auction.

The catch are sold in local markets although significant portion of the catch especially shrimps are shipped to Manila or other urban centers. The bulk of the catch is consumed fresh. Fish drying is the most common form of processing particularly the smaller size commercial trawl caught species. Smoked and salted fish are also to a lesser extent and limited value-added processing in various forms for selected species like anchovies are also undertaken.

H. BYCATCH UTILIZATION

The utilization of the bycatch could be summarized as: (1) for human consumption; (2) for processing dried, salted, fish sauce.); (3) for direct feed for aquaculture; (4) and, for production of fishmeal. The proportion utilized in each segment is difficult to quantify considering the lack of information. Legaspi (1999) assessed that around 50-60% of bycatch and trash fish were for fresh utilization

An important portion of the bycatch, particularly small-size juveniles of commercially important and low-value species are consumed fresh or dried. Relatively inexpensive fresh small-fish of commercially important species are widely acceptable and bought from wet markets especially by poor households. Dried fish is a traditional food consumed both high and low income families, with prices depending on species and size.. Fish drying is an important livelihood in many trawl landing centers.

Trashfish from trawl is an important component in the culture of high value species like grouper, seabass and mud crab fattening. Bycatch are given fresh whole or chopped form. Trash fish are also raw materials used in the preparation of local fish meal. Mixed species are commonly used by small-scale feed millers generated from demersal fisheries. Medium and large-scale feed producers utilized imported fishmeal.

The prevailing price of trashfish is in the range of P5-15 per kg, depending on the landed volume and available buyers. When trashfish are scarce, even small-size commercial fish are bought as feed for aquaculture, with price reaching up to P30/kg.

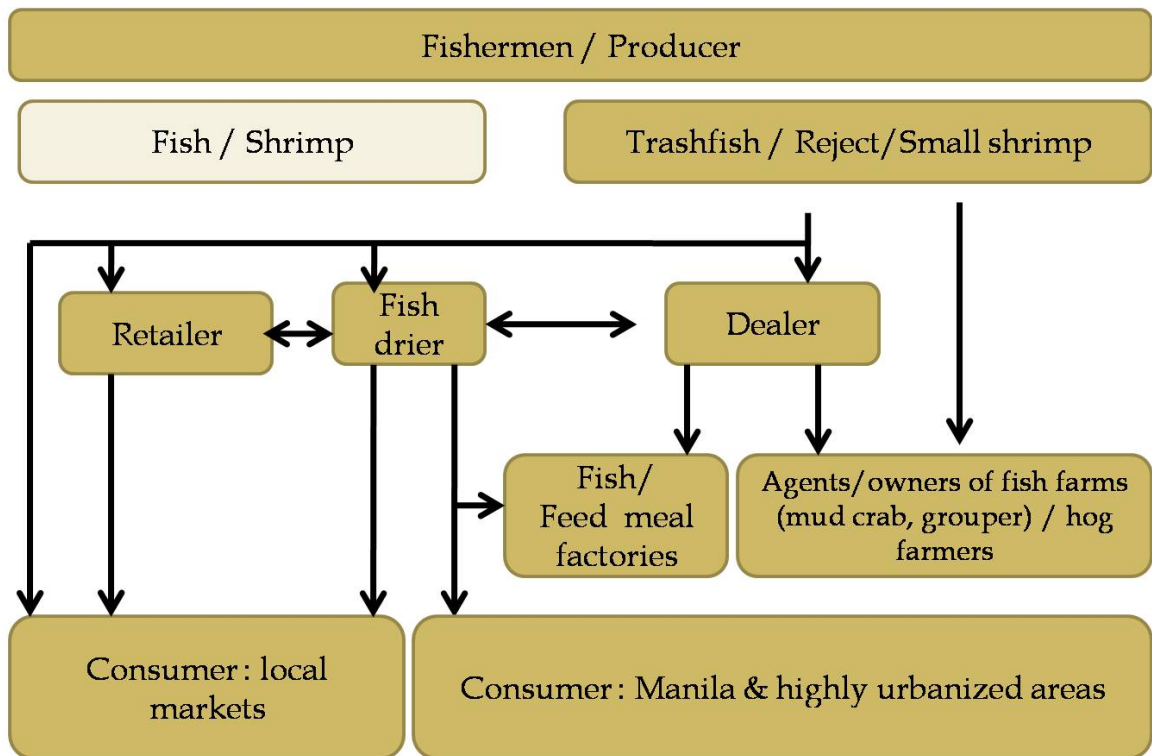


Figure 22. Bycatch utilization channel

The trade of trash fish caught by trawlers is carried out in various schemes: (1) directly sold to markets/consumers (2) retailers (3) fish driers (4) dealer (5) fish/hog farmers (Fig. 23).

Trashfish are most of the time handled onboard without any preservation or icing. Those that are caught by boats on short trips (usually overnight) are often of better quality trashfish and are commonly used for human consumption (fresh or dried). Trashfish caught from longer fishing trips are normally sold fresh or dried and used as direct feeds for aquaculture, swine and fish/feed meal plants.

Fishermen land their catch mainly in fish ports and landing places. Good quality trashfish are sold directly in markets by family members or to retailers or driers. The portions of the trashfish that can be consumed as fresh are usually sold directly to fish markets or fish driers. Trashfish that are not intended or fit for human consumption are sold in fresh or dried forms to dealers/wholesales or agents & owners of aquaculture or hog farmers. In some places buying stations are established by dealers of trashfish and consign feed/fish meal/processing plants in volumes. In some areas trashfish are bought at sea by agent-buyers on small boats and dispatch them to fish traders and fish farmers on commission basis.

Fresh small shrimps particularly the brown rough shrimps are usually sold directly to market or retailers (consumed fresh) or sold to drier/processors to produce *hibe*, a very popular dried small shrimps used as mixing ingredient in many local dishes.



Figure 23. Dried fish caught by trawls

I. IMPORTANCE OF BYCATCH TO FOOD SECURITY

Trashfish are partly consumed fresh or dried for human consumption. Relatively inexpensive fresh small-fish of commercially important species has become widely acceptable and bought from wet markets by poor households in the country. Retail price in Metro Manila ranges from P40 – P50. On the other hand, consumption of dried fish has been a long tradition in the country. These are consumed by both high- and low income families. Price of dried trash fish, depending on species and size ranges at about P 80 – P100 per kilo (Ramiscal&Chiuco, 2004).

J. POLICY AND REGULATORY FRAMEWORK

Fisheries policy and regulatory framework are primarily founded on three important legislations - the Fisheries Code of 1998 (Republic Act 8550), the Local Government Code of 1991 (RA 7160) and the Agriculture and Fisheries Modernization Act of 1997 (RA 8435).

The Fisheries Code of 1998 sets out the general framework for managing the country's fisheries sector with the BFAR as leading government agency responsible for conservation and management of fishery resources beyond municipal waters. The Local Government Code of 1991 provides the local government units (municipal and city governments) the jurisdiction and responsibility to manage the fisheries within their jurisdiction (municipal waters -15 km from the shoreline). It also grants preferential use of municipal waters to municipal or small-scale fisherfolks. The Agriculture and Fisheries Modernization Act of 1997 sets out measures to modernize the fisheries sector particularly on credits and extension.

Among others, RA 8550 prescribes that the number of licenses and permits for the conduct of fishery activities subject to the limits of the MSY or Total Allowable

Catch (TAC) and catch ceiling limitations of the resource as determined by scientific studies or best available evidence (Sec 2, 7,8).

In addition Executive Orders that provide rules for marinecoastal environment protection include :

- E.O. 305 (2004) devolving the municipal and city governments the registration of fishing vessels 3 gross tons or below
- E.O. 247 (1995) prescribing guidelines for the prospecting of biological and genetic resources
- E.O. 240 (1995) creating the FARMCs in barangays, cities and municipalities and their composition

1. Decentralized fisheries management / co-management

The Local Government Code of 1991 and as reiterated in the Fisheries Code of 1998, fisheries management and regulation of municipal waters are devolved to the Local Government Units (LGUs). The LGUs are the municipal/city governments which are under the Department of Interior and Local Government (DILG). The LGUs in consultation with the FARMC, enact ordinances in accordance with the national fisheries policy sets out by the Fisheries Code. Such ordinances are reviewed by the Sanggunian Panlalawigan (Provincial level) pursuant to Republic Act No. 7160. The LGUs also enforce all fishery laws, rules and regulations as well as valid fishery ordinances enacted by the municipality/city council.

The LGUs however, through its local chief executive and appropriate ordinance, may authorize or permit small and medium commercial fishing vessels to operate within the ten point one (10.1) to fifteen (15) kilometer area from the shoreline in municipal waters with certain conditions.

The Fisheries and Aquatic Resources Management Councils (FARMCs) are established at the national and local (municipalities/cities). The organization and formulation of FARMCs undergo the process of consultation among LGUs, NGOs, fisherfolk, and other concerned POs. The National Fisheries and Aquatic Resources management Council (NFARMC) comprising of representatives of stakeholders is the advisory/recommendatory body at the national level.

In contiguous fishery resources such as bays and gulfs which straddle several municipalities, cities or provinces, the Integrated Fisheries and Aquatic Resources Management Councils (IFARMCs) are also created to recommend the enactment of integrated fishery ordinances and assist in the preparation of the Integrated Fishery Development Plan and enforcement of fishery laws, rules and regulation. The LGUs which share or border such resources may group themselves and coordinate with each other to achieve the objectives of integrated fishery resource management.

Besides, BFAR and other government agencies that are mandated to implement relevant management/conservation of aquatic resources are the Department of Environment and Natural Resources (DENR) which has jurisdiction on habitats, protected areas, endangered species and biodiversity, the Department of trade and industry that regulates fisheries business and the Maritime Authority (MARINA) on the regulation of fishing vessels.

2. Fish refuge and Sanctuaries

Under Sec 81 of RA 8550, the Department may establish fish refuge and sanctuaries at least twenty-five percent (25%) but not more than forty percent (40%) of bays foreshore lands, continental shelf or any fishing ground for fish refuge and sanctuaries within which no commercial fishing is allowed. The LGUs in consultation with the FARMCs may also designate/establish fishery refuge and sanctuaries which is 15% where applicable of the total coastal areas in each municipality.

3. Local ordinances / regulations

Within the structure of RA 8550 and RA 7160, local fisheries ordinances for the management of municipal water in accordance with the National Fisheries Policy mainly providing rules and regulations on licensing, issuance of permits and other fisheries related activities. Common among these ordinances that affects trawl fisheries is the prohibition of trawl and other active fishing gears in their respective jurisdictional waters.

4. Policies and strategies on poverty reduction and food security

Under R.A 8550, the following policies are specified :

- Achieving food security is the overriding consideration in the utilization, management, development, conservation and protection of fishery resources (Sec 2)
- Objectives in fisheries in poverty alleviation and the provision of supplementary livelihood among municipal fisherfolk (Sec 2)
- Regulation of export fishery products affects domestic food security and production (Sec 61)

5. International and regional commitments on bycatch management

The Philippines as party to existing international and regional commitments/arrangements supports measures relevant to bycatch management and discards reduction set out by such arrangements including the regulations RFMO RFBs like the Western and Central Pacific Fisheries Commission.

6. Government Institutional Structure

The Department of Agriculture (DA) Secretary through the Undersecretary for Fisheries exercises overall supervision on the functions and activities of all offices and instruments and other offices related to fisheries including its officers. He also chairs the National Fisheries and Aquatic Resources Management Council that is the advisory/recommendatory body on matters relating national fisheries policies.

The Bureau of Fisheries and Aquatic Resources (BFAR), is the agency under the DA that is primarily responsible for the development, conservation, management and utilization of fisheries and aquatic resources. Among its major functions are to prepare and implement a Comprehensive National Fisheries Industry Development Plan, to issue licenses for the operation of commercial fishing vessels, to formulate and implement a Comprehensive Fishery Research and Development Program, to provide extensive development support services in all aspect of fisheries production, processing and marketing and to coordinate efforts relating to fishery production undertaken by the primary fishery producers, LGUs, FARMCs, fishery and organizations/cooperatives. It formulates and enforces all rules and regulations governing the conservation and management of fishery resources except in municipal waters which is the jurisdiction of the local government units (municipal or city governments).

The BFAR is headed by a National Bureau Director with the support of two (2) Assistant Directors (for Technical and Administrative Services). There are 5 divisions under Technical Services including the Capture Fisheries Division and Fisheries Resources Management Division and 5 Administrative Services that include the Fisheries Regulatory and Quarantine Division.

The Bureau operates nine (9) national technology centers, among which is the National Marine Fisheries Development Center, the only national center responsible for capture fisheries and fishing technology. The Center currently implements the National MCS/CMS, Fisheries Observer Program and operates the only multi-purpose vessel, the 1,100 GT MV DA-BFAR.

The implementation of BFAR programs and services in the field are the main responsibility of 15 BFAR-Regional Field Offices headed by Regional Directors. There are also seven Regional Fisheries Technology Centers that primarily conduct livelihood trainings in the regions.

7. Legal definitions of terms related to bycatch / discards

.There are no specific legal definitions that specifically relate to bycatch and discards. RA 8550 (Sec 11) however provides for the protection of rare, threatened and endangered species that include some varieties of corals and sea shells in danger of extinction as provided for existing fishery laws, rules and regulations or in the Protected Areas and Wildlife Bureau of the Department of Environment and Natural Resources (DENR) and in the

Convention of the International Trade of Endangered Species of Flora and Fauna (CITES). The measures considered in this provision include closed seasons and ban the fishing and/or taking of rare, threatened and/or endangered species, including their eggs/offspring.

In the draft Fisheries Administrative Order (FAO) requiring all commercial trawlers to use the Juvenile and Trashfish Excluder Device (JTED), *bycatch* was defined as the part of the catch taken incidentally with the target species toward which fishing effort is directed. It includes all non-target animals and non-living material, including those that escape from the fishing gear during fishing operation and or not landed onboard. *Juvenile fish* was also defined as small-size and sexually immature fish (or within maturity stages I&II or GSI < 4) and *trashfish* are usually small-sized fish with little or no commercial value that are either used as food-fish in aquaculture or thrown away or discarded aboard.

8. Current and proposed legislations & regulations related to trawl and bycatch management

Regulations are mostly in the form of areal closures (FAO 130; 131; 132; 134; 136; 137 and 142; (i.e., closing of certain areas for 5 years and prohibition within 7-km distance from shore (LOI 1296; PD 281) and within 7-fathoms deep (Republic Act 3048). In 1983, Letter of Instruction No. 1328 was promulgated to close commercial trawl fishing within 7 km from the shoreline and within 7 fathoms deep on a nationwide basis

More recently under RA 8550, commercial fishing including trawl is only permitted beyond 15 km from shoreline. However, the local chief executive acting pursuant to an appropriate ordinance and consultation with the fisheries and aquatic resources management councils (FARMC) may authorize small and medium commercial fishing vessels to operate within 10.1-15 kilometer area. In addition, no commercial fishing in municipal waters is allowed with depth less than seven (7) fathoms and fishing activities that are consistent with national policies. Likewise, FAO 201 prohibits active fishing gears including trawls to operate in municipal waters, in effect also exclude small municipal trawlers from municipal waters.

The increased areal restriction greatly affected operations of commercial boats and active gears like trawls. Since trawling is principally done in relatively flat bottom areas in bays, gulfs and other coastal waters, suitable fishing grounds for trawl practically within municipal waters. Small commercial fishing boats are allowed beyond 10 km when permit is granted by concerned LGUs, however, even such arrangement is difficult to implement considering the process and conditions for granting such access. The continued operation of municipal trawlers and incursion of commercial trawlers (& other commercial fishing boats) in municipal waters has become a major issue and many of commercial trawl operators have stopped securing licenses. A number have stopped operations but many persist to operate illegally.

9. Licensing Schemes

a) *Commercial fishing Boat Registration and Licensing*

The Maritime Industry Authority (MARINA) is the government Agency mandated to ensure safety and manage the local shipping industry. This includes the responsibility to register commercial fishing boats and to make sure that safety, manning and other requirement are complied with.

BFAR on the other hand is responsible for granting “authority to fish” through the Commercial Fishing Boat and Gear License (CFVGL) including licenses of commercial fishing boats to operate in international waters or waters under the jurisdiction of other countries (under fishing agreements). In many instances, the MARINA registration is wrongly interpreted by fishers as the fishing license.

The MARINA Certificates (Certificate of Vessel Registry (CVR), Certificate of Ownership (CO) and Current Certificate of Inspection (CI) are requirements for CFVGL applications. Conversely, approval/clearance of the BFAR is also required prior to importation of fishing vessels and the construction of new fishing vessels. The standards and documentary requirements for these certificates occasionally discourage enlistments, especially among the traditionally built small commercial boats.

Fisheries Administrative Order (FAO) 198 defines the Rules and Regulations on Commercial Fishing in the Philippines that essentially proscribe unlicensed commercial fishing vessel in Philippine waters. The Order likewise sets out the procedures, fees and other requirements such record book on board on fish catch, fishing area, spoilage, landing points, transshipment and/or other means of disposal. Enforcement and compliance to this regulation however have been somewhat inadequate.

All commercial fishing boats are required to secure Certificate of Clearance from Regional/Provincial Officer prior to departure to the fishing ground and fishworkers or fishermen on commercial boats are required to secure identification cards/permits.

Approval of new CFVGL is issued at the BFAR Central Office (HQ) while renewal is delegated to the BFAR-Regional Fisheries Office that has jurisdiction over the homeport of the vessel. A CFVGL has a validity of 3 years.

b) ***Moratorium on New Commercial fishing Vessel and Gear License***

In 2004-2005, the moratorium of the issuance of new CFVGL was promulgated to maintain the current level of fishing effort in Philippine waters while an inventory was being undertaken. The intention of the Order was to make full inventory of operational commercial fishing boats (both licensed and unlicensed), establish a computerized commercial fishing vessel and gear register and subsequently penalized non-participation in the inventory process by the cancellation of existing licenses and exclusion from the fishery in new access rules. This regulation excluded many units in particular small commercial fishing boats that did not participate due various reasons including their being at the time classified as municipal (because they are undermeasured).

c) ***Municipal fishing boat registration***

Executive Order 305 transferred the registration of municipal fishing boats of 3 gross tons or below from the Philippines Coast Guard (PCG) to the municipal and city local government units. The PCG however retained visitorial functions and are authorized to inspect, check measurements and ensure compliance to safety measures. MARINA and PCG provide training and accredit/authorize inspectors of the municipality/city for admeasurements.

The implementation of EO 305 however required improvement of capacities and manpower, and many of the LGUs still have to implement the order.

10. Effort Control

Limited access policy is now being arranged in critical fisheries. For instance, progressive reduction scheme for commercial fishing is being prepared for Manila Bay where a Fisheries Administrative Order providing for a moratorium of new licenses in the 1st year will be applied and vessels renewing their licenses will be required with ALCs for tracking in the 2nd year. The order will include requirements to strengthen law enforcement and patrol activities.

Likewise, one of the recent projects of BFAR is Vessel Monitoring System which was facilitated due to the requirements of the Western Central Pacific Fisheries commission (WCPFC). It became operational early this year initially to cover the tuna fisheries (purse seine & ring nets) in the WCPFC area. Other critical areas and fisheries like those in the major trawl fishing grounds are also being considered of immediate concern for the project.

11. Gear / areal and temporal restrictions

Management measures include: (1) technological controls or limitations, e.g. gear restrictions, including mesh regulations, hook size control and trawl bans; (2) spatial restrictions, e.g. marine sanctuaries and area closures; and (3) temporal restrictions, e.g. seasonal closures.

Among these that affect trawlers are areal closures (FAO 130; 131; 132; 134; 136; 137 and 142; (i.e., closing of certain areas for 5 years and prohibition within 7-km distance from shore (LOI 1296; PD 281) and within 7-fathoms deep (Republic Act 3048). In 1983, Letter of Instruction (LOI) 1328 closed commercial trawl fishing within 7 km from the shoreline and within 7 fathoms deep on a nationwide basis

More recently the following are the various prohibitions under the Fisheries Code

- Commercial fishing within municipal waters (Sec 18, FAO 198)
- Commercial fishing in bays and fishery management areas declared as over-exploited (Sec 86)
- Use of active gear in municipal waters, bays and other fishery management areas (Sec 90, FAO 201)
- Fishing in overfished areas during closed season (Sec 95)
- Fishing in fishery reserves, refuge and sanctuaries (Sec 96)
- Use of fine mesh net (FAO 155-; FAO 155-1)

Size selectivity in fishing gears is implemented by mesh size regulation which is 3 cm minimum for trawl under FAO 155.

12. Problems on bycatch and discards

While discarding is not much of a local issue, the high proportion of trashfish or rejects in practically the entire trawl fleet which include not only the low-value as well as the juveniles of commercial important species is considered threat in maintaining biodiversity and sustaining the fisheries. The incidence of large species like sea turtles in specific vulnerable areas also needs to be addressed.

While good quality trashfish are occasionally taken in for human consumption, their handling is not a priority and usually left unpreserved during longer fishing trips rendering their being utilized only as animal food. In some areas where there are no trashfish buyers and this part of their catch is also left unutilized or at times discarded.

13. Conflicts with other resources users

Competition and non-compliance to the restriction in the extended municipal waters (within 15 km) have caused increased conflict among the small scale and the commercial fishing sector. The continued operations of

commercial fishing like trawl in municipal waters is taken as unfair competition that affect/reduce the catch of legitimate municipal gears. Trawl operations also occasionally result to damage to other gears (Vakily 1982, Lim 1990, ICLARM 1993; Ahmed et al 2006).

The prevailing contraventions are attributed to the weak law enforcement and capacity of local authorities to implement existing regulations. In addition, the lack of better understanding/awareness and lack positive reception of fishers on the importance of these regulations are also considered as drawback in enforcement.

The problem is being addressed mainly through improved law enforcement and awareness building among fisherfolk. Some LGUs implement measures like the introduction of artificial reefs as obstruction in restricted areas. Others designate informal delineation of fishing areas for specific gears like trawl and commercial fishing.. Several measures like giving loans and assistance for alternative livelihood for voluntary withdrawal from trawl fishing have also been attempted by some LGUs.

In a study in the Visayan Sea among commercial fishers, the competition for the best spot for fishing was the foremost cause of conflict while among municipal fishers, overcrowding which also result to competition for best location of fishing was the leading cause of conflict. But the most common conflicts are between the municipal and commercial fishers where gears (nets, stationary gears, fish aggregating device) and sometimes boats are damaged. In addition, the perceived decreased catch brought about by the more efficient commercial fishing gears intensifies the disagreements between the two user-groups (Ahmed et al 2006).

14. Demand from aquaculture

Bycatch from trawl is an important component in the culture of high-value species like grouper, snapper, sea bass and mud crab including catfish, species that are of high value and widely accepted and popular in local diet. While there are no records as to the quantity of trashfish utilized in this sector, the requirement is expected to remain high due to continued and increasing demand of these products.

The demand for trashfish in aquaculture is projected to continue if current practices are not reversed. The high average growth in aquaculture sector is expected to be sustained as government thrusts have been focused on this sector to supplant anticipated limited improvement in the marine capture fisheries. Some high-value and other trashfish eating species are promoted as alternative livelihood and export commodities including government programs. The demand for trashfish from local suppliers is also expected to continue, noting the current undercapacity of plants and the rising cost of imported fish meals (Ramiscal&Chiuco 2004).

15. Role of trashfish / low value fish to food fish consumption

An important portion of the bycatch, particularly small-size fish including bycatch of juvenile commercially important and low-value species are consumed fresh or dried. Relatively inexpensive fresh small-fish of commercially important species are widely acceptable and bought from wet markets especially by poor households. Dried fish is a traditional food consumed both high and low income families, with prices depending on species and size. Fish drying is an important livelihood in many trawl landing centers.

III. KEY ACTIVITIES, STRUCTURE AND PERCEPTION

A. CURRENT AND PLANNED GOVERNMENT PROGRAMS / ACTIVITIES

1. GMA Fisheries Program

The GMA Program for Fisheries is the flagship government program for fisheries in the Philippines with BFAR as the lead Agency in its implementation. Components of the program include programs on the promotion of responsible fishing and the maximum utilization/development of fishery products (value-adding and fish processing).

2. Comprehensive National Fisheries Industry Development Plan (CNFIDP)

Recently, the BFAR and Fisheries Improved for Sustainable Harvest (FISH) Project prepared the 20-year (2008-2027) Comprehensive National Fisheries Industry Development Plan (CNFIDP) with a vision of “A sustainable and competitive fisheries industry that contributes to food security and provides optimum socioeconomic benefits to Filipinos” and a long-term goal “to optimize and sustain the socioeconomic benefits from fisheries without jeopardizing the fishery resources and the associated habitats in the most administratively efficient and cost-effective manner.”

Among the objectives are 1) to rationalize utilization of fishery resources 2) protect fishery habitats 3) reduce resource use competition and conflict and 4) develop full potential of aquaculture and commercial fishing

For municipal fisheries, the plan aims reduce poverty among municipal fisherfolks. Among the projects are 1) *Comprehensive Education Program for Fisheries and Aquatic Resource Management Council [FARMC] and Fisherfolk Organizations*) to enhance the capabilities of local government units (LGUs) and local communities in fisheries management 2) *Validation of Priority Use Rights through Municipal Registration and Licensing* to minimize resource use 3) *Sustainable Fisheries Livelihoods Support* to help resolve the livelihood-related concerns 4) *Enhancement of Fishery Law Enforcement*) shall mitigate the concern

for weak law enforcement 4) (*Rationalization of Municipal Fishing Effort*) addresses the overfishing concern

Under the commercial fisheries, project interventions are geared towards the rational exploitation, sustainable development and conservation of fisheries and aquatic resources in Philippine commercial waters, including EEZ and the adjacent high seas. The priority projects are 1) *Rationalization of Fishing Effort in Overfished Commercial Fishing Areas* to address excessive fishing effort in major traditional fishing grounds 2) *Development and Implementation of a Monitoring, Control and Surveillance [MCS] System for Commercial Fisheries* to deal with the continued poaching/intrusion in prohibited fishing areas and the absence of monitoring system. 3) *Development, Adaptation and Promotion of Selective, Environment-friendly and Cost-effective Fishing Gear and Practices* to deal with degraded/critical fishery habitats 4) *Exploratory Fishing in the Exclusive Economic Zone [EEZ] and Beyond, and in Underexploited Commercial Fishing Grounds* addresses the concern for limited access to regional/international resources/grounds, as well as the issue of underexploited resources in nontraditional commercial fishing grounds 5) *Information, Education and Communication [IEC] for Commercial Fishers/Fishing Vessel Operators* shall help resolve the issue of lack of information system on commercial fisheries subsector requirements. 6) *Legitimization and Implementation of the National Plan of Action [NPOA] to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated [IUU]Fishing*) is an initiative to address weak law enforcement.

3. National Fisheries Research and Development Institute

The National Fisheries Research and Development Institute (NFRDI) serves as the primary research arm of BFAR. One of the major projects of the Institute is the National Stock Assessment Project that is designed to institutionalize generation of reliable time series data that can be used in fisheries management and development strategies in capture fisheries. While trawl fisheries are covered in very few areas, studies have been mainly focused on the commercially important fishes, with little attention or emphasis on bycatch or trashfish.

The Fishing Technology Research and Development of the Institute also implements a R&D program on responsible fishing technology relating to gear selectivity and economics of fishing gears.

4. Academe

State universities, such as the University of the Philippines in the Visayas (UPV) and other State Universities and Colleges are likewise active research programs on fisheries and marine sciences.

B. FOREIGN/DONOR FUNDED PROJECTS /ACTIVITIES

1. Fisheries Improved for Sustainable Harvest (FISH) Project

Fisheries Improved for Sustainable Harvest (FISH) Project is a seven-year (2003–2010) technical assistance project funded by USAID and implemented in partnership with BFAR, other national government agencies,

LGUs and non-governmental organizations (NGO) and other assisting organizations. It builds upon the foundation and lessons learned from the preceding USAID-funded Coastal Resource Management Project (CRMP) and other related projects. It is intended to improve the capacity for managing fisheries and coastal resources and promotes integrated fisheries management by supporting stakeholders at national and local levels.

The Project activities focus on four areas: Calamianes Islands (Palawan); Danajon Bank (Bohol, Southern Leyte, Leyte, Cebu); Surigao del Sur; and Tawi-tawi.

FISH is expected to result in a 10% increase in fish stocks by 2010 in the four areas. To achieve this, the project build capacity, both at local and national level, improve the national policy framework and create an informed constituency for fisheries management.

2. Sustainable Management of Coastal Resources (SUMACORE)

Another foreign assisted project is the Sustainable Management of Coastal Resources (SUMACORE), a three-year project (2007-2010) being implemented by BFAR and the Spanish Agencia Espanola de Cooperacion International (AECI) in two regions (Bicol and CARAGA). The project aims to alleviate poverty through improved management of coastal resources and strengthening capacities of local managements. capacity

3. CTI Initiative

WWF-Philippines play a leading role in crafting program on fisheries under the Coral Triangle Initiative (CTI). The CTI aims to achieve the following:

- Designation and effective management of “Priority Seascape” (large-scale geographies prioritized for investments and action, where best practices are demonstrated and expanded)
- Application of ecosystem approach to management of fisheries and other marine resources
- Establishment and Management of Marine Protected Areas (MPAs) including community-based resource utilization and management
- Implement climate change adaptation measures
- Improve threatened species status

OTHER GOVERNMENT AGENCIES.

1. the Department of Environment and Natural Resources (DENR) through its coastal environment programs for the protection, rehabilitation and enhancement of coastal habitats;
2. the Philippine Council for Aquatic and Marine Research and Development (PCAMRD) under the Department of Science and Technology (DOST), for fisheries research coordination,;

3. the Bureau of Agricultural Research, for fisheries research coordination;
4. the Department of Agriculture, of which BFAR is part, through the Agriculture and Fisheries Modernization Act of 1997 (R.A. 8435), which includes fisheries management and coastal development;
5. NAMRIA, the mapping agency, responsible for establishing the limit of the

C. PLANNING & IMPLEMENTATION PROCESS

Stakeholders' consultation and participation are strongly enshrined in the process of formulation of policies and projects and their implementation in the Philippines. These involve the Local Government Units (municipal, City, provincial), Fisheries and Aquatic Resources Management Council (FARMC), Non-Governmental Organization (NGOs) / Peoples Organizations (POs), BFAR Field Units/Offices & related got field units, Fisherfolks Organizations and Fishers.

D. RESEARCH CONDUCTED TO MINIMIZE IMPACT OF FISHING

1. Experiments on Turtle Excluder Device (TEDs)

Several studies have been undertaken to address issues on the impact of fishing. Among these are the experiments on the Turtle Excluder Devices TEDS by BFAR in response to the US ban on the import of trawl caught shrimps by countries that do not use the device. The study identified the most appropriate design, the Thai Turtle Free Device (TTFD) (Dickson et al 1998).

2. Selective shrimp trawling

Based on the design/concept of the Devismes System of Ets Le Drezenof France, a separator panel fitted to a shrimp trawl was tested to determine its efficiency in separating shrimp from fish and the rest of the catch. The experiment showed little significance on the separating efficiency of the panel, however, it indicated the potential application of other similar devices that could improve selectivity in multi-stock shrimp trawl fishery (Dickson et al 1997).

3. Juvenile and Trashfish Excluder Device (JTEDs)

The most recent initiative to reduce the impact of trawl was the project on the Juvenile and trashfish excluder device (JTEDs) to address problem of incidence of juveniles and trashfish in trawl fisheries. The project was implemented under the FAO/GEF REBYC I (Dickson et al 2008).

Various JTED designs were the subject of practical demonstrations in the major fishing grounds in the country to demonstrate to stakeholders the available technologies that deal with bycatch and discards and thereby increasing their awareness on the relevant issues.

The project led to the implementation of the JTED Pilot Project in Calbayog City (Samar Sea) which conducted a limited industry adoption of the device. The pilot implementation also intended to conclude identification of the most appropriate designs and learn from the experience in its implementation. It was carried out as a technical component of the Coastal Zoning Project of the LGU-Calbayog City.

The project resulted to the formulation of a Fisheries Administrative Order requiring all commercial trawlers in the Philippines to use the V12 or H15 JTEDs. The Order has undergone the process of approval including series of stakeholders' consultations at various local and national levels. It is now in the course of approval of the Secretary of the Department of Agriculture.

Useful and practical experiences were learned. It generated a pioneering approach in reducing conflict among resources users/stakeholders by delineating fishing grounds, prescribing technical measures to reduce the impact of their fishing, continuous dialogue/consultation among stakeholders, strengthening law enforcement and the importance of an operational/acceptable implementation/management plan.

IV. PROJECT FORMULATION

A. CONSULTATION/WORKSHOPS

Local consultation/workshops on bycatch management and reduction of discards were conducted in the major trawl fishing grounds of Samar Sea, Lingayen Gulf and San Miguel Bay in addition to a concluding National Workshop also in Samar Sea. In attendance were multi-sector representatives including the local government units (LGUs) including local fisheries law enforcements units, fishing boat owners & fishermen, Academe, FARMCs & NGOs and BFAR Field Offices and Training Centers

These Consultation/Workshops were aimed at informing the participants of the proposed REBYC II Project and provided the opportunity to present their views on relevant local issues as well as the solutions and activities that can be undertaken under the project and well as possible roles/contributions to project.

The projects/activities identified were generally measures to reduce fishing effort and impact of trawl operations and other fisheries (Table 11). It was also pretty obvious that stakeholders recognized the need for a workable arrangement or plan to manage trawl fisheries under the current circumstances. The need to undertake integrated/multi-disciplinary approach in managing the fishery was also well recognized including the need to enhance the awareness and transforming attitudes of stakeholders and political will to implement achievable measures.



Figure 24. Regional and National Consultation/Workshops

B. PROJECT OBJECTIVES AND ACTIVITIES

The proposed project activities as outcomes of stakeholders workshop/consultations on bycatch management and discards reduction were in consonance with the general logframe prepared during the workshop at SEAFDEC, Thailand on May 4-7, 2010 (Table 12).

Based on the logframe and indicative overall project budget, the activities in the Philippines proposed to cover Samar Sea and Lingayen Gulf, the selection of which considers preceding experience that can provide better level of success in project implementation. In addition, the national commercial trawl fleet is also covered through the implementation of the forthcoming implementation of the Fisheries Administrative Order (FAO) on the use of Juvenile and Trashfish Excluder Device (JTED).

C. MONITORING AND EVALUATION – suggested SMART indicators

- Number of relevant policies / regulations (including technical measures) developed and implemented
- Catch (target & bycatch) and income of trawl fishers
- Number of legitimate (registered/licensed) & IUU vessels
- Number of fishers who adopted alternative livelihood
- Number of fisher/families/individuals engaged in fish processing; value-adding

D. IMPLEMENTATION AND MANAGEMENT ARRANGEMENTS

The implementation of REBYC II Project in the Philippines will involve the established/institutionalized networks and processes in the country. A National Project Coordination Unit for the overall project coordination and supervision will be located at the Bureau of Fisheries and Aquatic Resources-Central Office in Quezon City with the Project National Coordinator as the overall Responsible Person.

Stakeholders participation and consultation are also strongly enshrined in the formulation of policies and implementation of projects in the Philippines. REBYC II implementation in the Philippines will follow these institutionalized processes and activities will be carried out in collaboration with the following in the identified localities :

- Local Government Units
- Fisheries and Aquatic Resources Management
- Non-Governmental Organization (NGOs) and Peoples Organizations (POs)
- (National) Government Field Units/Offices
- Fisherfolks Organizations
- Fishers

Table 11. Consolidated key issues/problems, causes, solutions, projects/activities that were identified during regional and national workshops on bycatch management and discard reduction

Problems / Issues	Causes	Solutions	Projects / Activities	Partners / Institutions	
Low/Poor/Declining catch; Loss of biodiversity	Open access fisheries; Overfishing/ overharvesting	Limit/regulate the number of fishing vessels	Inventory, registration & licensing registration of vessels in both commercial & municipal fisheries	BFAR, MARINA, LGU, FARMC, NGOs, Academe	
			Implement a gradual reduction in the issuance of fishing boat & gear licenses in municipal and commercial fisheries		
			Monitoring of compliance on boat registration and reduction of boat construction		
			Registering of boat building by LGU		
			Information dissemination		
		Implement Catch Ceiling	Policy to enforce catch ceiling based on the results/recommendations of research	NFRDI, BFAR, LGUs NGO; Academe, FARMC, PO, Media	
			Massive information drive/advocacy		
			Strengthening of fisherfolk organizations to support the policy		
		Establish closures (areal/seasonal); Fish refugias/ MPAs		Conduct stock assessment and biological studies particularly spawning	NFRDI, Academe, BFAR, LGUs, FARMC

			Studies before, during and after establishment ,MPAs)	
			Implement relevant provision of RA 8550	
			Deployment of large scale ARs	
		Zoning of fishing grounds	LGU mechanism to designate areas for fishing gear type	LGU, FARMC, BFAR, Boat Owners, Fishermen
	Poor selectivity / highly efficient gears / lost fishing gears	Improve gear selectivity / reduce negative impact of trawl (Promote/Introduce bycatch reduction gears/devices to reduce unwanted catches of non-targeted species)	Adopt JTEDs / Implement Fisheries Administrative Order (FAO) upon its approval (Adopt JTEDS to baby trawl for shrimps and selected fleets with supplementary effort reduction schemes)	BFAR, LGU, Academe, Boat owners, Fishermen, LGU, FARMC
			By-catch & discard assessment	
			Survival studies on escape fish	
			Modification of design of the gear	
			Adoption on flexible otter board technology)	

			Strict implementation of mesh size regulations	
			Develop BRDs for other gear; implement FAO on JTED upon its approval	
			Assessment of catch, composition, size	
		Reduce negative impact of trawl& other fishing gears	Conduct studies to reduce other negative impact of fishing gears	Academe, NFRDI, BFAR, Boat Owners, Fishermen NGO, FARMC, PO
			Conduct of fora/dialogues/conferences on responsible fisheries management to fishers/workers/ operators	
			Design & implement an effective IEC materials; use of tri-media	
			Conduct studies and reporting system on ghost fishing	
		Protect the juveniles and spawners	Adopt JTEDs	Academe, NFRDI, BFAR, Boat Owners, Fishermen NGO, FARMC, PO
			Establish closed seasons /fish refugia	
			Determination of spawning areas and seasonality)	
			Discourage the use of trash fish	
	Illegal Fishing	Provide alternative/ supplemental livelihood	Financial assistance (grant / no interest)/Access to credit and	Financial Institutions, Foreign Assistance/

			financial institutions	Donors, LGUs, BFAR
		Establish incentive/ recognition mechanisms to responsible fishers	Establish fisherfolk registry and grant licenses only to responsible fisheries	LGU, BFAR, FARMC, NGOs, FLET, Fisherfolk
			Tap the support of the Fisherfolk Organizational & FARMCs	
		Regulate issuance of fishing license	Use NSAP results and Implement rational policies in issuance of license	NFRDI, Academe, BFAR, MARINA
		Strengthen enforcement of existing policies & regulations	Implement Vessel Monitoring System especially for commercial trawl	BFAR, LGU, PNP, Maritime, PCG, PO, NGOs
			Provide clear delineation of fishing grounds	
			Provide incentives to volunteers/fish wardens & enact enabling ordinance	
			Capacity building and support to FLET, FARMC, Bantay Dagat	
			Policy advocacy	
		Reconsider trawlers to fish in designated areas but not less than 7 fathoms deep	Consultation/ signature campaign of stakeholders; Resolve policy issues	B/C/M FARMCs, LGUs, FWs, Congress, BFAR
			Implement fishery ordinances	
Lack of effective/ practicable management for trawl fisheries	Inadequate statistics on effort, catch by gear by species by grounds, cpue, etc collection system	Strengthen and improve fisheries statistics and data collection system	Database improvement for both commercial and municipal fisheries	BAS, NFRDI, BFAR, FARMC, LGU, FO
			Use NSAP data to generate study on catch composition; assessment on per gear basis	

		Strengthen coordination with fishers on data collection through surveys & interviews	Inventory of fishing boats/gears and fisherfolks	
		Implementation of EO 305 on the registration of municipal fishing boats	Support LGUs in EO implementation	MARINA, BFAR, LGU
Lack of alternative livelihood & technologies	Provide alternative livelihood, technologies & capital		Formulate / seek funding assistance to implement alternative livelihood & technology program for trawl fishermen affected by the reduction of fishing effort	LGU, Fincancial Institutions, BFAR
			Conduct fishing trials/evaluation of alternative shrimp fishing gear s like suripera & pontoon traps	Academe, BFAR, Boat owners, Fishermen, LGU
			Gear substitution of fishing by LGU mechanism	LGU, BFAR, Boat owners, Fishermen
Lack of understanding on socio-economics aspects of trawl fishing operations	Conduct socio-economic studies		Economic studies of small, medium, large trawl fishing operations	Academe, NFRDI, BFAR
Insufficient understanding on biological/environmental/ impact of fishing gears	Generate database that can be used for management		Conduct studies on resources, environment & impact of fishing/gears (Experiments on low impact fishing technology)	
Lack of awareness on fisheries management	Strengthen awareness building on fisheries		Conduct IEC and training programs	

	& understanding of trawl fish among fishers in coastal areas;	management		
		Baywide / seawide implementation of Coastal Resource Management		

E. PROJECT ACTIVITIES, OUTCOMES, IMPACTSS AND INDICATED BUDGET

Table 12. Logframe and indicated budget

Component	Outcomes	Outputs	Activities	Indicated budget (PhP)	Indicated budget (PhP)
1. Policy, legal and institutional frameworks	Effective policies, legislation, regulations and institutional arrangements for responsible trawl fisheries	1. Regional guidelines and regional strategy for bycatch management. Regional coordination of monitoring, control and surveillance (MCS)	1a. Regional expert meeting for developing regional guidelines and strategy	14,400,000	300,000
			1b. Regional training on MCS, including vessel monitoring systems (VMS) and vessel positioning systems (VPS).		300,000
		2. National or area specific Bycatch Management Plans for trawl fisheries adopted and enforced in project areas.	2a. Review existing management plans and measures. PY1		200,000
			2b. Conduct stakeholder consultations. PY1,2,3,4		1,600,000

			2c. Develop management plans for trawl fishing, including bycatch. Y1,2		1,000,000
			2d. Set up appropriate fishing zones, refugias, MPAs. PY2,3		2,400,000
			2f. Set up advisory bodies (stakeholder forums). PY2,3		400,000
		3. Tools for effective monitoring, control and surveillance (MCS).	3a. Establish (VMS) and (VPS) . PY1,2,3		1,800,000
			3b. Set up observer and sampling programs. PY,1,2,3		3,600,000
		4. Institutions in place that have the capacity to implement national trawl management plans in project areas.	4a. Establish Advisory Groups, including all major stakeholders (Councils) PY1,2		800,000
			4b. Implement training programs, meetings, and consultations. PY1,2,3,4		1,600,000
		5. Legislation / regulations to support implementation of effective bycatch and trawl management.	5. Review existing legislation and amend where necessary . PY1		400,000
2.Resource management and fisheries operations	Management measures put in place which reduce bycatch and discards and improve fisheries resources and the resulting economic benefits	1. Regional sharing of management measures and lessons learnt	1. Develop information exchange systems to facilitate sharing.	23,700,000	600,000
			1b. Regional exchange programs for facilitating development of incentives for fishermen to adopt more selective gears. P1,2,3,4		1,200,000
			2a. Conduct studies on selective fishing gears, bycatch reduction devices (BRDs) and alternative gears in collaboration with fishing sector. PY1,2,3		3,600,000

		2b. Conduct studies on BRD impact and survival of juveniles fish. PY1,2 (SEAFDEC acitivity)	
		Participation in SEAFDEC activities / experiments	400,000
		2c. Demonstration of appropriate selective trawl gears and best practices. Py1,2,3	1,800,000
		2d. Implementation of the Fisheries Administrative order (FAO) on JTEDs. PY1,2,3,4,	4,800,000
	3. Demarcated fishing zones in project areas	3a. Conduct biological and habitat studies for developing effective fishing area management. PY2	1,500,000
	4. Incentive packages to promote selective trawl gears and practices	4a. Provide evidence on economic benefit of reducing bycatch and discards, PY1,2	1,600,000
		4b. Examine and develop incentives that promote more responsible fishing practices. PY1,2	800,000
		4c. Examine market-based measure (eco-labelling, etc) for better fisheries practices. PY2	400,000
	5. Effective measures for controlling fishing capacity and effort measures in project areas.	5a. Inventory of trawl fishing fleets in the project areas PY1,2,3	3,000,000
		5b. Introduce fishing effort limits in project areas (number of boats, days at sea). PY1,2,3,4	4,000,000

3. Information Management	Robust information systems that collect and disseminate data to inform trawl fisheries management decisions and implementation	1.Regional data and information sharing system for vessels, gears, bycatch, discards and key indicator species in project areas.	1. Develop a regional data and information sharing system	20,760,000	600,000
		2. Improved data collection, analysis and dissemination systems on bycatch and discards in place	2a. Data collection at landing sites and on vessels (observers, logbooks).PY1,2,3,4		5,760,000
			2b. Data analysis and annual reports.PY1,2,3,4		1,600,000
			2c. Workshop to disseminate data to policy makers/fisheries managers PY1,2,3,4		1,600,000
		3. Stock assessment on selected commercial species where juveniles are caught as bycatch	3a. Modelling on selected species (regional distribution). PY2, PY4		1,200,000
		4. Maps of project areas showing fishing activities, resource distribution and seabed habitats for zonation (refugia/closed areas and seasons).	4a. Consultations with fishermen on mapping (fishing activities, resource distribution and seabed habitats). PY1		400,000
			4b.Biological survey for closed areas/seasons and fish refugia. PY1		1,200,000
			4c. Global Information System (GIS) development for project areas. PY2,3		1,000,000
		5.Improved vessel registration systems and database, and fishing capacity analysis in project areas.	5a. Inventory and database of vessels in project areas. PY1		1,000,000
			5b. Install VMS/VPS on selected fleets in project areas and integrated into existing national systems. PY2,3		2,000,000

		6. Monitoring system for ensuring that income is maintained or improved for trawl fishermen and market chain beneficiaries.	6a. Identify indicators and generate data to monitor these indicators to measure socioeconomic impact. PY1,2,3,4		2,400,000
			6b. Conflict analysis (trawl fleet, other fleets and resource owners) and development of conflict resolution mechanisms. PY2,3		1,000,000
			6c. Analysis of income and incentives for fishermen to adopt more responsible fishing practices and management. PY1,2		1,000,000
4. Communication	Better understanding of responsible fishing leads to improved fishing practices and policies, which are communicated within regional frameworks, including ASEAN and Coral Triangle Initiative	1. Regional capacity building program and materials for project countries	1. Training the trainer courses on BRDs, fish handling	11,200,000	800,000
		2. Changed behaviour and perceptions of fishermen and fishing communities through increased awareness on responsible trawl fisheries and management	2/3a. Stakeholder consultations, training and capacity development on best practices/responsible fisheries for specific area fisheries co-management arrangements. PY1,2		800,000
		3. Increased understanding by policy makers, fisheries managers and officials, extension officers and NGOs on responsible trawl fisheries and management	2b/3b. Training on fish handling and on board preservation including processing for value-adding of trawl catches. PY2,3,4		1,800,000
			2c/3c. Training and workshops on appropriate BRDs for SSF and LSF. PY3,4		1,200,000
			2d/3d. Produce publications and technical guidelines. PY3,4		1,200,000

			2e/3e. Workshops on existing and new policies, management measures and regulations. PY1,4		800,000	
		4. Increased awareness by general public, especially children, on responsible trawl fisheries and management	4a. Development and production of media material (radio, newspaper, posters, cartoons, videos) and promotion material (t-shirts etc). PY1,2,3,4		2,400,000	
			2f/3f/4b. Development of website and web based information and communication material. PY1,2,3,4,		600,000	
			4c. School education material and programme		1,600,000	
National Project Coordinating Unit (NPCU)	Institutional capacity established to coordinate, implement and monitor the CTI – REBYC-2 project in the Philippines	1. National Project Coordinating Unit (PCU) established with National Coordinator as Unit Head	1. Set up & operationalize NPCU. PY1,2,3,4	6,800,000	1,600,000	
		2. National coordination promoted through a National Working Groups/Task Force	2a. Form & operationalize Working Groups (WGs)/Task Forces (TFs), PY1, 2,3,4,		2,400,000	
		3. National Project monitoring and evaluation (M&E) program established and implemented	3. Develop and implement M & E plan. PY1,2,3,4		2,400,000	
		4. Project financial management and reporting system	4. Agree on & implement financial systems PY1		400,000	
				PhP	76,860,000	76,860,000
				USD	1,670,870	1,670,870

РЕВУС-ІІ СТИ

V. REFERENCES

- Abad, P. 1999. Field report on Shrimp Trawl in Sorsogon Bay (unpublished), BFAR, Philippines, May – August, 1999.
- Ahmed, M., N.D.Salayo, K.K.Viswanthan, L.R.Garces and M.D.Pido. 2006. Management of fishing capacity and resources use conflicts in Southeast Asia: A Policy Brief. *The WorldFishCenter (Malaysia)*. www.worldfishcenter.
- Almonte, R. and E. Taborada. 1999. Field report on Shrimp Trawl Observations in Ragay Gulf (unpublished) BFAR, Philippines, February – August, 1999.
- Armada, N.B. 2004. State of the demersal fisheries. pp. 42–46. In: DA-BFAR, 2004. Turbulent seas: The status of Philippine marine fisheries.Coastal Resource Management Project, Cebu City, the Philippines. 378 p.
- Armada, N. and W. Campos. 2004. A Hydrobiological Survey of the Visayan Sea (Trawl, Plankton, and Oceanography): Status of demersal resources. Unpublished Research Report, University of the Philippines in the Visayas.
- Bureau of Agricultural Statistics. 1996. Fisheries Statistics of the Philippines for 1992 to 1995. Quezon Avenue, Quezon City, Philippines.
- Barut, N.C., Santos, M.D. &Garces, L.R. 2004. Overview of Philippine marine fisheries. pp. 22–31. In: DA-BFAR, 2004, q.v.
- BAS [Bureau of Agricultural Statistics]. 2007. Fisheries Statistics of the Philippines, 2005–2007.
- BFAR[Bureau of Fisheries and Aquatic Resources]. 2007. Philippine Fisheries Profile, 2007.
- BFAR Regulatory and Quarantine Division. 2007 Licensed Commercial Fishing Fleets. Bureau of Fisheries and Aquatic Resources, Quezon Avenue, Quezon City.
- Bureau of Fisheries and Aquatic Resources (BFAR). 2007. Philippine Fisheries Profile, 2007. Quezon City, Philippines
- BFAR/FISH/OIDCI. 2008. Comprehensive National Fisheries Industry Development Plan (CNFIDP). 273p.
- BFAR-RFO1. 2007. Regional Stock Assessment Program (landing data). BFAR-RFO1, San Fernando, La Union.

- BFAR. Fisheries Statistics, 1981-1988.
- BFAR-Fishery Sector Project. 1996. Resource and Ecological Assessment of San Miguel Bay. ICLARM.
- Congress of the Philippines. 1992. Local Government Code. Quezon City, Philippines.
- Congress of the Philippines 1998. Fisheries Code. Quezon City, Philippines.
- FAO Website (<http://www.fao.org>)
- Chiuco, M. and A. Santiago. 1999. Field report on Shrimp Trawling in San Miguel Bay (unpublished) BFAR, Philippines, August 1999.
- DA-BFAR. 2007. Brochure on Sustainable Management of Coastal Resources in Bicol and CARAGA Regions.
- DA-BFAR [Department of Agriculture – Bureau of Fisheries and Aquatic Resources]. 2004. In turbulent seas: The status of Philippine marine fisheries. Coastal Resource Management Project, Cebu City, the Philippines. 378 p
- Dickson, J. , R. Ramiscal, M. Chiuco, B. Magno and A. Santiago. 1997. Selective shrimp trawling in Manila Bay. Paper presented to the Cooperative Research Network Workshop in the Asia and the Indian Region on Selective Tropical Shrimp Trawling. Darwin, Australia, July 1997.
- Dickson, J.O. R.V.Ramiscal, B.D.Magno, N.Lamarca, M.B.Chiuco and A.Q.Santiago. 1998. Experiments of Turtle Excluder Devices (TEDs) in Manila Bay. Project Terminal Report. BFAR 860 Quezon Avenue, Quezon City.
- Dickson, J.O. R. Ramiscal, N. Lamarca, E.Hilario, R. Ramirez, B. Magno and R. Romero. 2003-2005. Study on the Juvenile and Trashfish Excluder Devices (JTEDs). Reports submitted to FAO-REBYC1 Project.
- Dickson, J.O., A.T.Realino, N.T.Berida, R.V.Ramiscal, N.J.Lamarca, E.V.Hilario, R.O.Romero, E.B.Alba and M.B.Ramos. 2008. Juvenile and trashfish excluder device (JTED) Pilot Project in Sama Sea. Report submitted to FAO-REBYC1 Project.
- Ferrer, A.J.G. 2009. Evaluation of Fisheries Management Options for the Visayan Sea, Philippines: The Case of Northern Iloilo. Economy and Environment Program for Southeast Asia (EEPSEA) Tanglin PO Box 101, Singapore 912404 (www.eepsea.org)

- Green, S.J., White, A.T., Flores, J.O., Carreon, M.F. III & Sia, A.E. 2003. Philippine fisheries in crisis: A framework for management. Coastal Resource Management Project of the Department of Environment and Natural Resources, Cebu City, Philippines. 77 p.
- Green, S.J., Flores, J.O., Dizon-Corrales, J.Q., Martinez, R.T., Nunal, D.R.M., Armada, N.B. & White, A.T. 2004. The fisheries of Central Visayas, Philippines: Status and trend. Coastal Resource Management Project of the Department of Environment and Natural Resources and the Bureau of Fisheries and Aquatic Resources of the Department of Agriculture, Cebu City, Philippines. 159 p.
- Hermes, R., N.B. Armada, R.A. Aparri, E.C. Zaragoza, and U. Lohmeyer. 2004. Overexploitation in the Visayan Sea: Designing a project solution. *In* DA-BFAR (Department of Agriculture-Bureau of Fisheries and Aquatic Resources). *In turbulent seas: The status of Philippine marine fisheries*. Coastal Resource Management Project, Cebu City, Philippines. 378 p.
- ICLARM (International Center for Living Aquatic Resources Management). 1993. The San Miguel Bay integrated coastal fisheries management plan. ICLARM, Manila, Philippines.
- Hilario, E. & N. Lamarca. 2009. Travel report on the survey/onboard observations of trawls in Lingayen Gulf (unpubl. Report)
- Legaspi, A. S. 1999. Bycatch utilization in the Philippines. *In* Report and Proceedings of FAO/DFID Expert Consultation on Bycatch Utilisation in Tropical fisheries, Beijing, China, 21-28 September 1998. Publ. Nat. Res Inst (NRI), Chatham (UK), pp.105-113.
- Lim, Cristina. 1990. Population pressure, migration and fishing in Camarines Sur. *Kinaadman* 12:153-162.
- Lim, Cristina P. Matsuda, Yoshiaki and Yukio Shigemi. Problems and Constraints in Philippine Municipal Fisheries: The Case of San Miguel Bay, Camarines Sur. *Environmental Management* Vol. 19, No.6. <http://www.adnu.edu.ph/Centers/SSRC/articles/art02.htm>
- Mines, A. N., D. Pauly, N. A. Navaluna, and J. M. Vakily. 1982. The physical environment. Pages 5-14 in D. Pauly and A. M. Mines (eds.), Small-scale fisheries of SMB, Philippines: Biology and stock assessment. ICLARM Technical Report 7, 124 pp.
- NSO (National Statistics Office). 2001. Philippine Statistical Yearbook.
- Smith, I. R., D. Pauly, and A. N. Mines. 1983. Small-scale fisheries of San Miguel Bay, Philippines: Options for management and research. ICLARM Technical Report

11, 80 pp. Institute of Fisheries Development and Research; College of Fisheries, University of the Philippines in the Visayas, Quezon City, Philippines; ICLARM, Manila, Philippines.

Vakily, J. M. 1982. Catch and effort in the trawl fishery. Pages 57-65 in D. Pualy and A.N. Mines (eds.), Small-scale fisheries of SMB, Philippines: Biology and stock assessment. ICLARM Technical Report 7, 124 pp. Institute of Fisheries Development and Research; Colleges of Fisheries, University of the Philippines in the Visayas, Quezon City, Philippines; ICLARM, Manila, Philippines.

Ordonez, J.A. 1985. A study of trash fish caught by otter trawl in the Visayan Sea. A thesis submitted in partial fulfillment of the requirements in M.S. Fisheries. University of the Philippines, Diliman, Quezon City.

Ramiscal R.V. and M.B. Chiuco. 2004. Overview of the status and trend of trash fish from marine capture fisheries and their utilization with special reference to aquaculture. Report submitted to FAO-RAP. 27p.

Ramiscal, R.V., M. Chiuco, B. Magno, N. Lamarca. 2003. Field reports on Manila Bay Trawl fishing observations (unpubl) BFAR, Philippines, December, 2003.

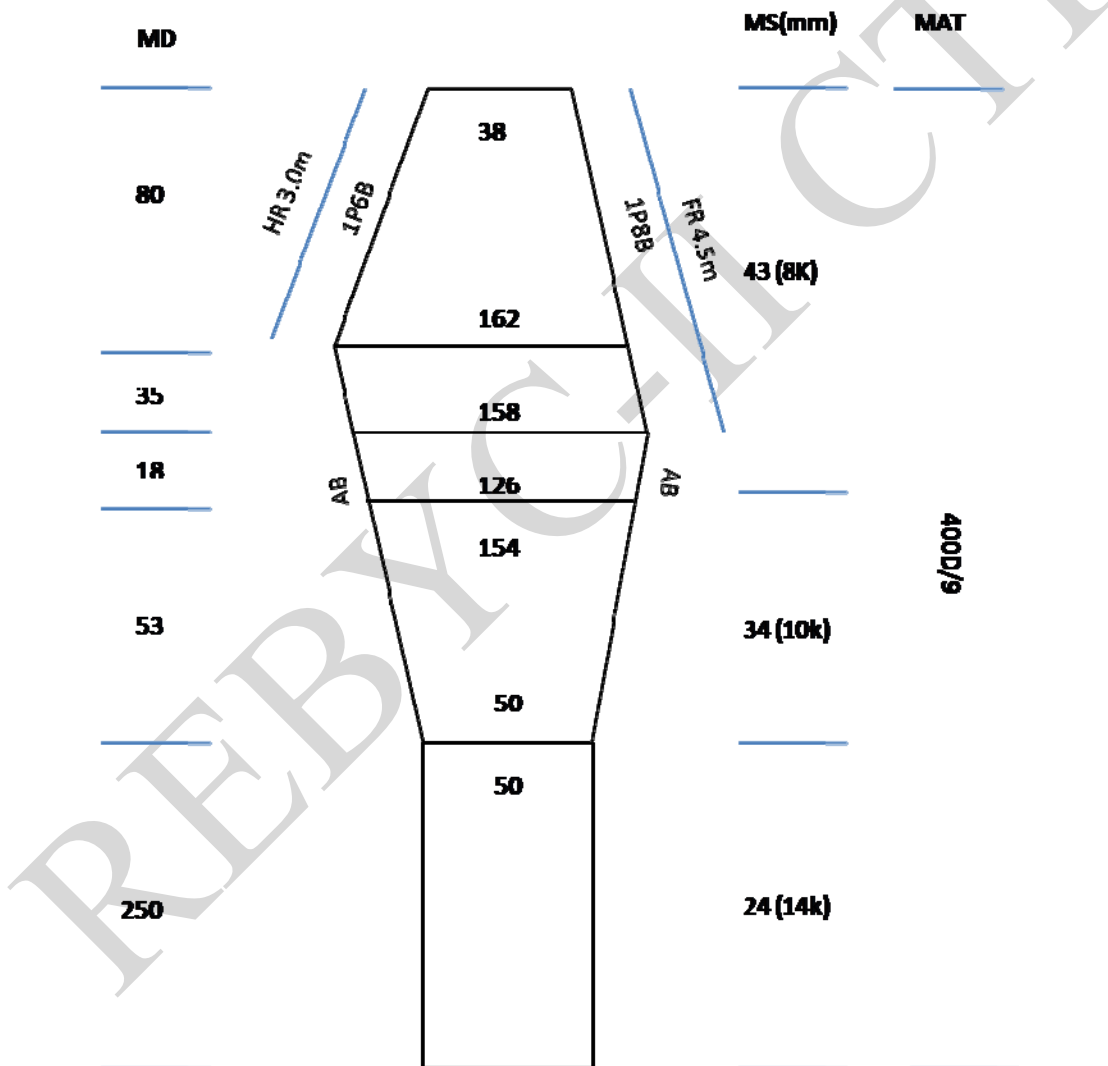
Realino, A.T. and M.A. Sabido. 2009. Status of trawl fishing in Calabayog City. Powerpoint presentation during the REBYC II Seminar WS. Catbalogan City, Dec. 2009.

NSO (National Statistics Office), 2005

VI. APPENDIXES

Appendix 1. Baby shrimp trawl (municipal)

Fishing Gear : Shrimp Trawl
Fishing Boat : 10.2m x 0.90m x 0.90m
Engine Type : Gasoline Lombardini
Fishing Ground : Visayan Sea
Location : Brgy. 6A, Victorias, Negros Occidental



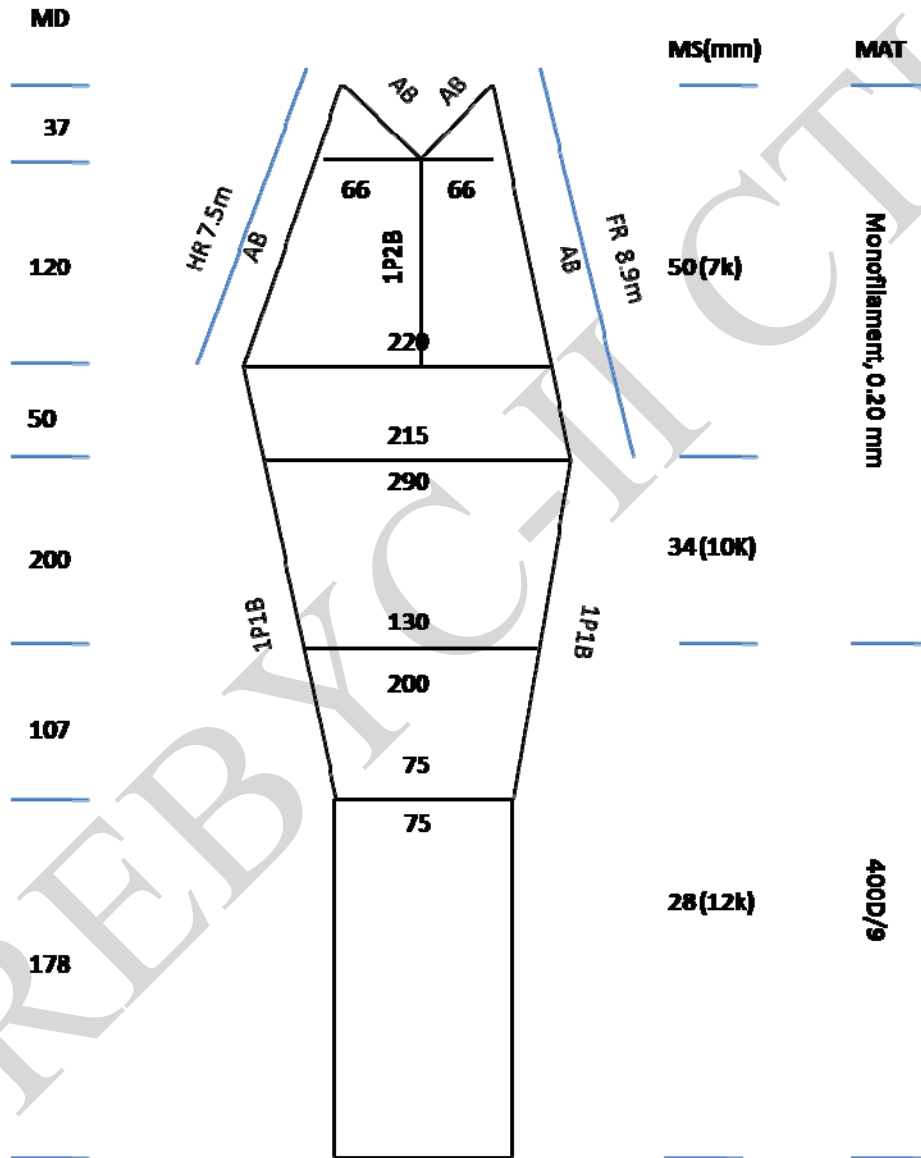
Appendix 2. Squid trawl (small scale commercial)

Fishing Gear : Trawl (Squid)

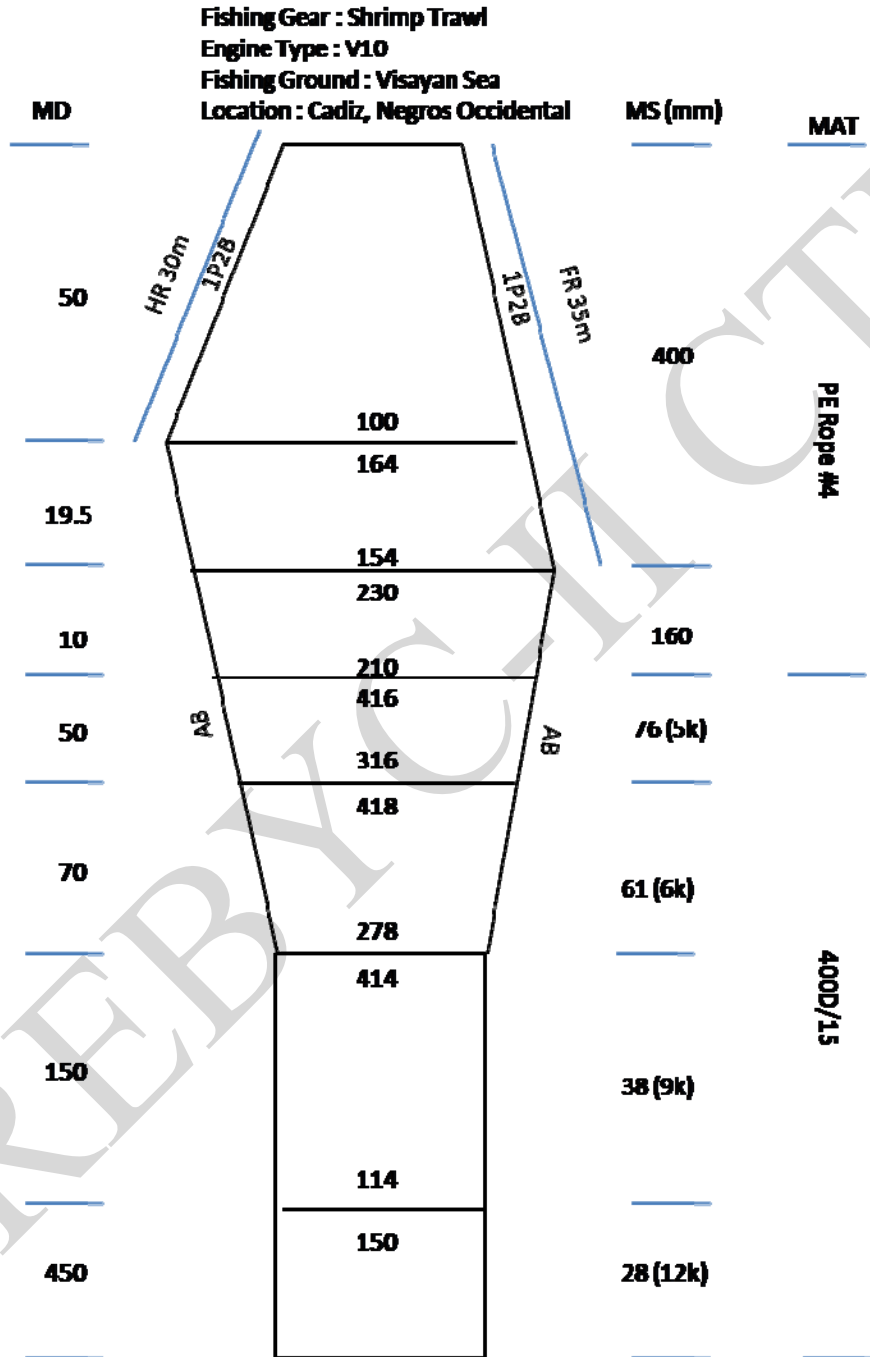
Engine : 4DR5

Fishing Ground : Guimaras Strait

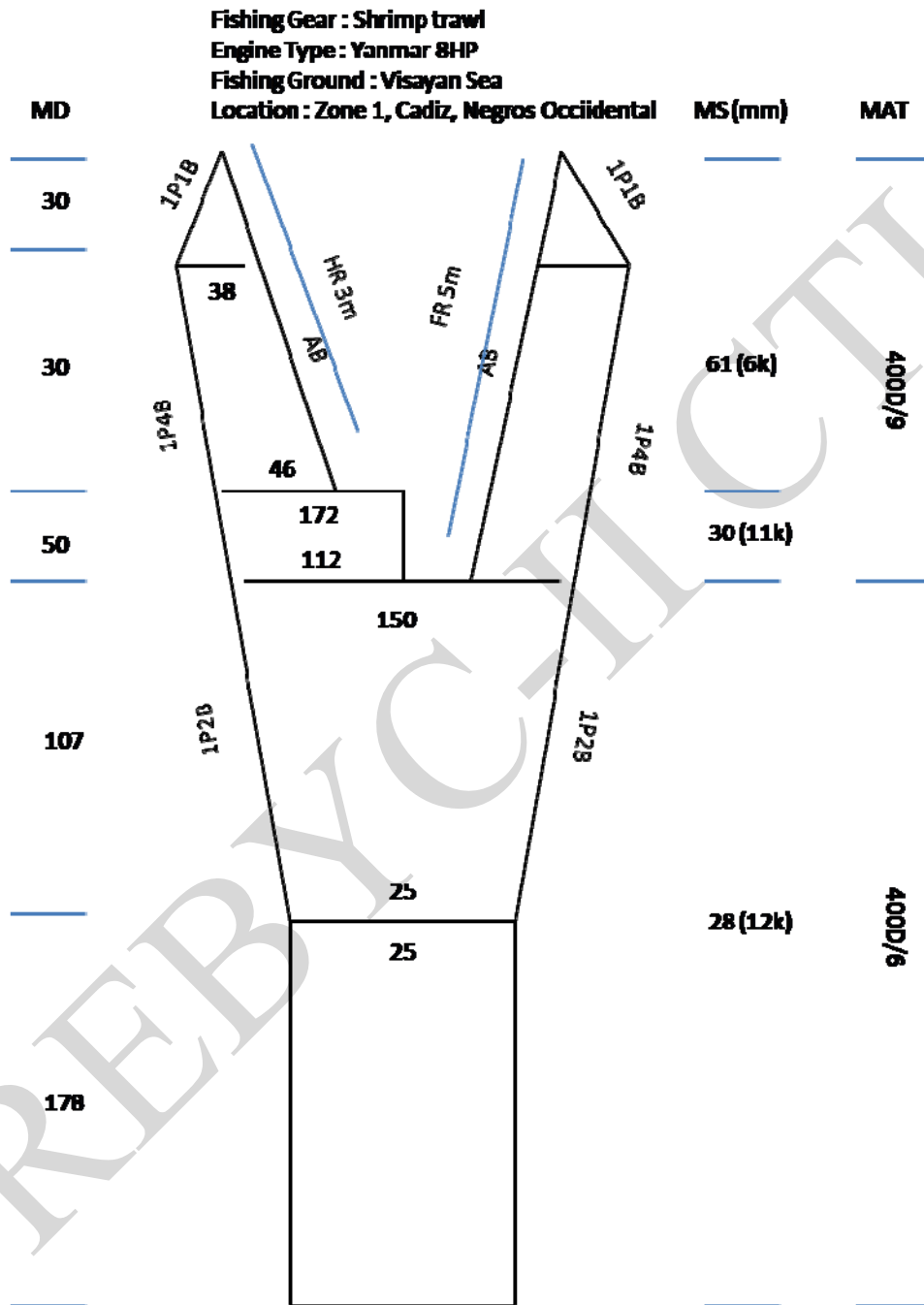
Location : Tugbungan Brgy. 2, Hinigaran, Negros Occidental



Appendix 3. Shrimp trawl (medium scale commercial)

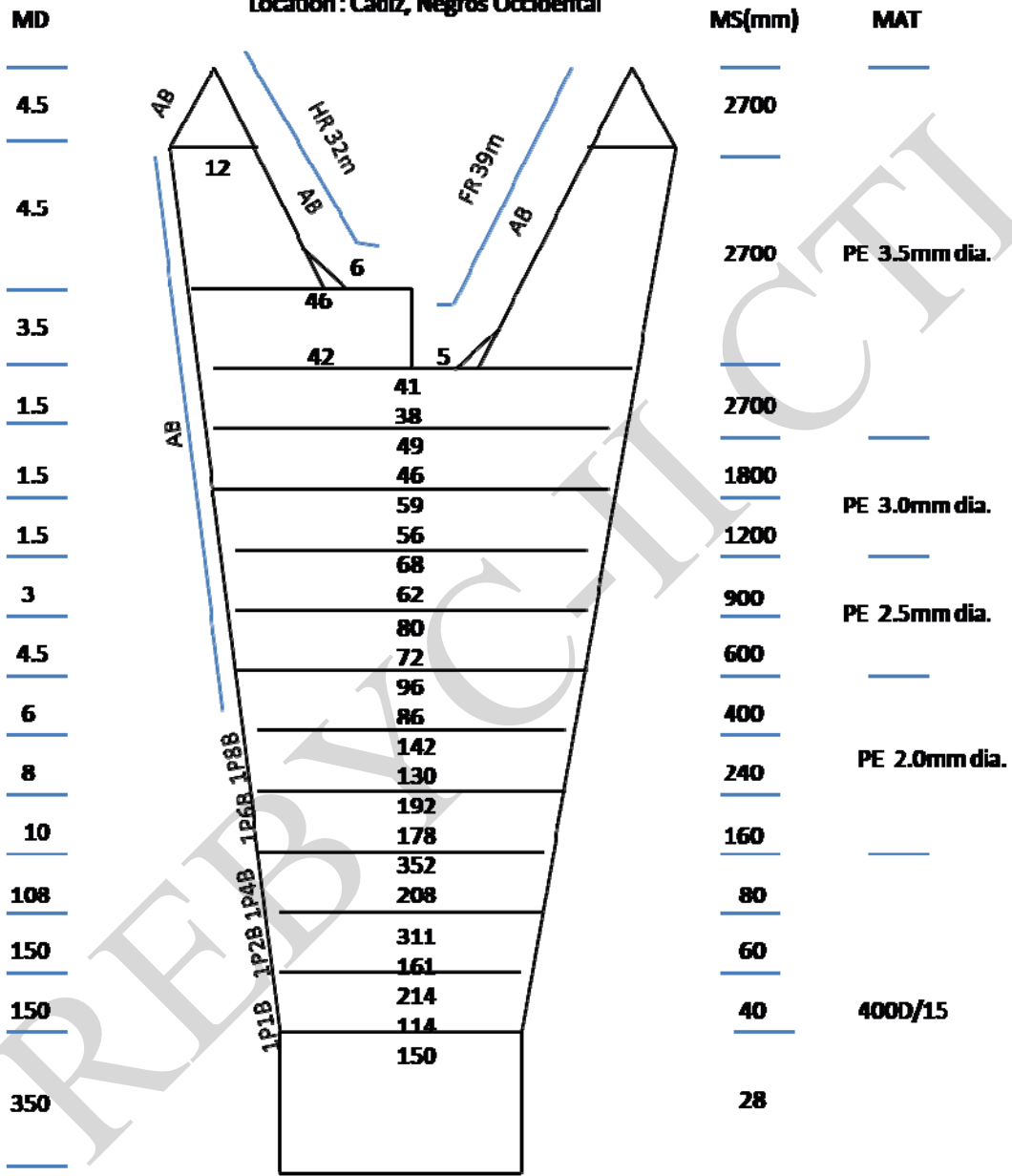


Appendix 4. 2-seam baby shrimp trawl (municipal)



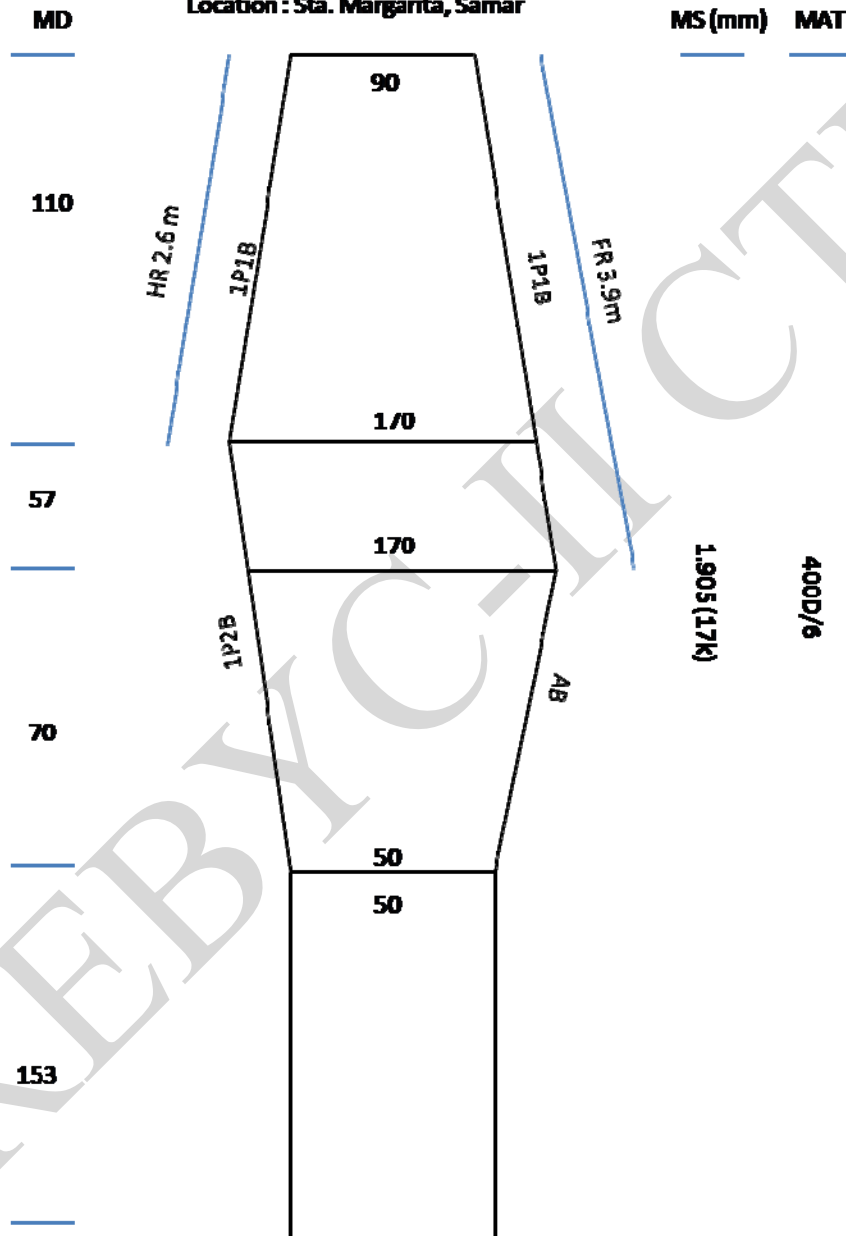
Appendix 5. High opening trawl (medium scale commercial)

Fishing Gear : Fish Trawl (Palupad)
 Engine Type : V10
 Fishing Ground : Visayan Sea
 Location : Cadiz, Negros Occidental



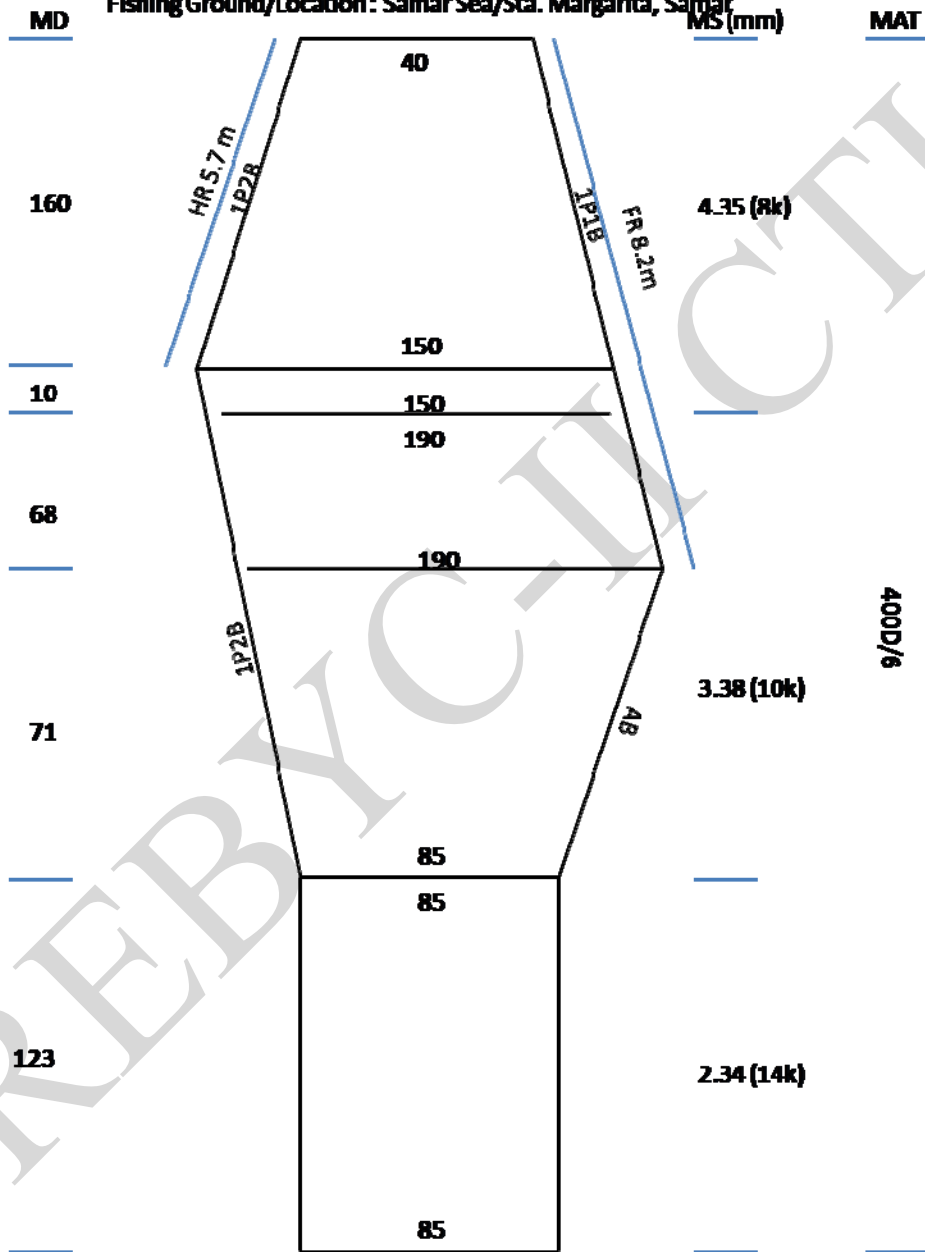
Appendix 6. Shrimp trawl (municipal)

Type of Fishing Gear : Shrimp Trawl
 Boat Type : 8.5m x 0.70m x 0.70 m
 Engine Type : Briggs and Stratton 10HP
 Fishing Ground : Samar Sea
 Location : Sta. Margarita, Samar



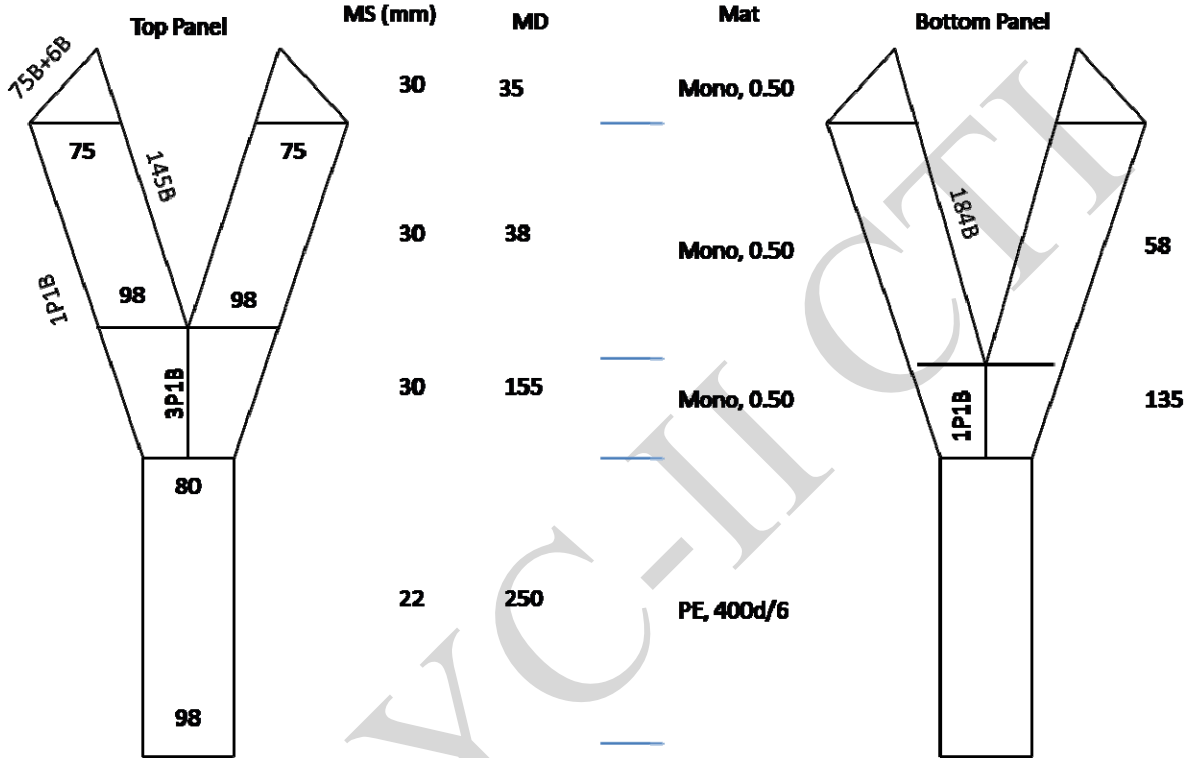
Appendix 7. Shrimp trawl (large municipal/small scale commercial)

Type of Fishing Gear : Shrimp Trawl
 Type of Fishing Boat : 14m x 1.0m x 0.90m
 Type of Engine : Fuzo Canter (4DR5) 80 HP
 Fishing Ground/Location : Samar Sea/Sta. Margarita, Samar



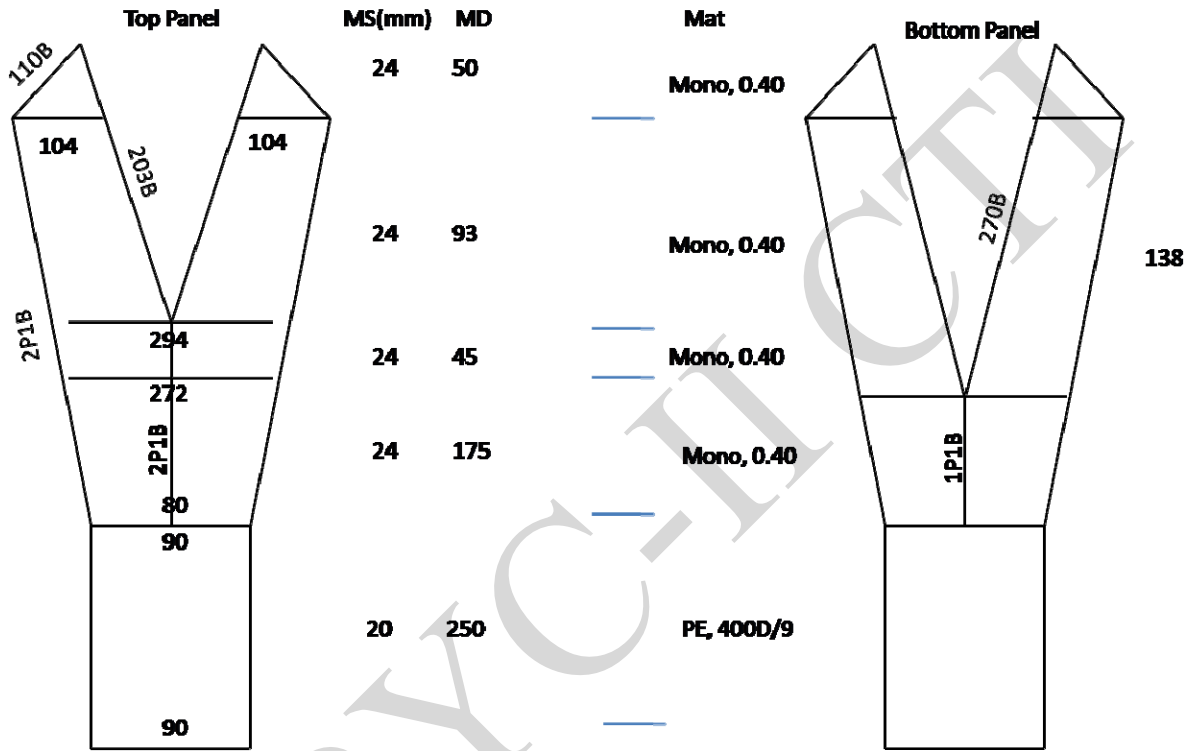
Appendix 8. Shrimp trawl (mini-trawler)

Fishing Ground : San Miguel Bay (Tinambac, Cam. Sur)
 Fishing Gear : Shrimp Trawl
 Fishing Boat : 7.2 x 0.9 x 0.7 meter
 Engine Type : Kubota D850, 8HP



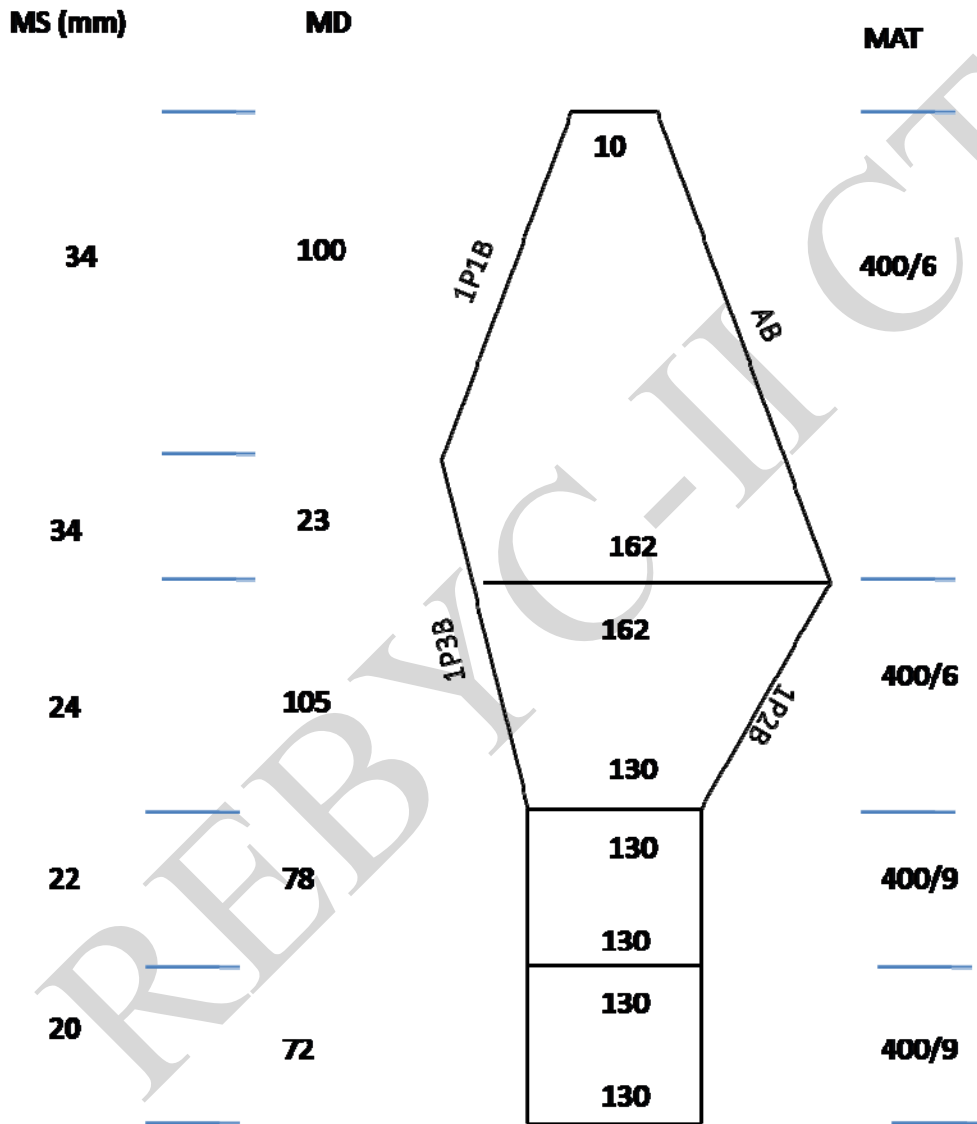
Appendix 9. 2-seam baby shrimp trawl (municipal)

Fishing Ground : San Miguel Bay (Cabusao, Cam. Sur)
 Fishing Gear : Shrimp Trawl
 Fishing Boat : 12 x 1 x 0.5 m
 Engine Type : Yanmar NS130, 13HP



Appendix 10. V-type baby shrimp trawl (municipal)

Fishing Ground : Bauang, La Union
Type of Fishing Boat : Shrimp Trawl (Karkar)
Boat Specifications : 7.8 m x 0.65 m x 0.65 m
Engine model : 16 HP Briggs and Stratton



Appendix 11. 2-seam high opening fish trawl (commercial)

Fishing Ground : Abuyog, Leyte
 Type of Fishing Boat : Fish Trawl
 Boat Specifications :
 Engine Model :

