Supporting Sustainability of Snapper Fisheries in Arafura and Timor Sea Through Supply Chain

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I. Background

Indonesia has been the biggest snapper producing country, contributing almost 48% to total snapper global capture production in 2008, followed by Philippines (7.3%), Brazil (6.9%), Mexico (5.4%), and Thailand (4.7%). Almost 78% of total Indonesian snappers were caught in Western Central Pacific Ocean waters of Indonesia and the remaining 22% were from Eastern Indian Ocean waters of Indonesia (FISHSTAT Plus – FAO).

Snapper is a highly sought-after species that is caught and sold for consumption on the local and international markets. Snapper is part of the family Lutjanidae, with 9 genera. Three species of snapper, *Lutjanus malabaricus* (Malabar blood snapper), *L. erythropterus* (crimson or scarlet snapper) and *Pristipomoides multidens* (goldband snapper), are the most economically important fish for export from Indonesia. These three species were also the most studied species under the research collaboration between Indonesia and Australia from 1999 to 2003.

The total landing of snapper in Indonesia was 116,994 metric tonnes in 2007, with Eastern Timor Sea, Aru Bay and the Arafura Seas being the major fishing grounds for this species, contributing to more than 30% of the total catch, with 35,112 metric tonnes being landed (MMAF 2009). Other important fishing grounds for snapper in Indonesia are in Karimata Strait, Natuna Sea, and South Cina Sea (13.9%), Tolo Bay and Banda Sea (11.8%), Java Sea (10.5%) and the Makassar Strait, Bone Bay, Flores Sea and Bali Sea (8.1%).

Export volume of snapper from Indonesia was estimated around 1.5 to 2.7 thousands metric tonnes per year with United States, EU countries, Japan, Hong Kong, Taiwan, Singapore, Malaysia, South Korea, Australia, Thailand and Middle East as main markets (WPI 2009, MMAF 2009). The precise volume and value of exported snapper to each destination country is not known. However, data from Foreign Trade Data Base shows that US snapper import from Indonesia ranged from 1 to 2 thousands metric tonnes per year in the last five years, mostly in the form of frozen boneless fillet. This means that most of frozen snapper from Indonesia goes to US market.

Snapper fisheries in Indonesia have been facing various challenges. One of them is that there have been complaints from many snapper processors and exporters that while the export demand from Europe, China, Korea, and the U.S. are actually on the rise, the companies could not meet all of the requests due to limited raw material. As result of lack of supply from fishermen, the company's production capacity has dropped by 40 percent. The companies admit that they are now only operating between 40 % and 50 % of their capacities (SFP 2009).

There are also some indication that red snapper has been overfished in most of Indonesia waters. Red snapper stocks (*Lutjanus erythropertus* and *Lutjanus malabaricus*) in the neighboring seawaters of eastern Indonesia and northern Australia had declined to 10–20 per cent of their 1971 level by the early 2000s (Badrudin and Blaber 2003). If current levels of fishing activity continued, it was predicted that red snapper stocks would collapse in both the Indonesian and Australian fisheries (Blaber et al 2005). The study in the Arafura and Timor Seas also suggested

fisheries management approaches such as spatial closures or restrictions on fishing efforts. To date, these recommendations have not been implemented.

Illegal Unreported and Unregulated (IUU) fishing has been perceived as the major issues in Timor-Arafura Sea. ATSEA noted that in Timor-Arafura Seas various fishing operations from Indonesia and countries to the north (e.g. Thailand, Taiwan, South Korea, China and the Philippines) illegally target various species of high commercial value in Australian and Indonesian waters, including snapper, *teripang* and shark fin. It is estimated that more than 80% of demersal fish, mostly red snapper *(Lutjanus sp)* harvested from the Arafura Sea using bottom longline between 1980 and 2005 was defined unreported (Wagey et al 2009 in UNDP 2010). With regard to illegal fishing activity particularly in the fishnet fishery, fish are transshipped from the fishing vessels to foreign carrier vessels for transport to country of origin. Thus a major problem is the clear gap in official fisheries statistics for the Arafura Sea and actual real catch and efforts (UNDP 2010).

Most illegal foreign fishing vessels operating in the Arafura Sea have bases in Indonesian ports, such as Surabaya (East Java), Manado and Bitung (North Sulawesi), Kendari (Southeast Sulawesi), Benjina and Tual (Maluku), Sorong (West Papua) and Kimaam and Merauke (Papua) (*Kompas*, 17 March 2005 in Resosudarmo 2008). However, there are also some fishing vessels that ship most of fish harvested directly to China, since they do not own any land based processing plants in Indonesia (Resosudarmo 2008).

In addition to that, there is rising concern that US market will request for MSC certification, tight specification (including health and safety issues) and traceability for all snapper they purchase. As for other fisheries in Indonesia, lack of specific management on the ground regulated by the government on this fishery has been a challenge in this fishery to proceed to full MSC assessment. At the same time, Indonesia's snapper export to US market showed downward trend, from 2,015 tonnes in 2005, valued at USD 7.9 million (when it reached the highest volume) to just 952 tonnes in 2010, valued at USD 5 million or dropped by more than 52% in five years (US Foreign Trade Data).

The aim of this set of studies is *to deliver a thorough analysis to understand the snapper fisheries from Arafura Timor Seas: where the market, where the pressure, what the threats to the fisheries and what the recommendation to use the market based approach/pressure to improve the fisheries in this area and to identify the factors – current and potential – affecting sustainable management of the fishery and to identify strategies for addressing these challenges via private sector alliances and market based incentives.*

The results of the studies will contribute into the TDA (Transboundary Diagnostic Analysis) process and be presented at a group discussion, after having been made available for comment and input. It is intended that the findings of the studies will assist the project in identifying priorities in targeting the investment and also identifying feasible market intervention, including feasible joint actions between the Indonesian industry and potential international buyers and retailers.

II. Fishery Profile

II.1. About the Species

Tropical demersal lutjanids are a major component of catches in the many coastal fisheries within the Indo-Pacific region (Hai, et al. 2005). Red snapper is a group of species with highly valued and heavily fished worldwide.

In Indonesia statistical system, 'red snappers' or *kakap merah* are included under one group. Prisantono et al (2010) suggested that there are about 15 species included in red snappers group – Table II.1.

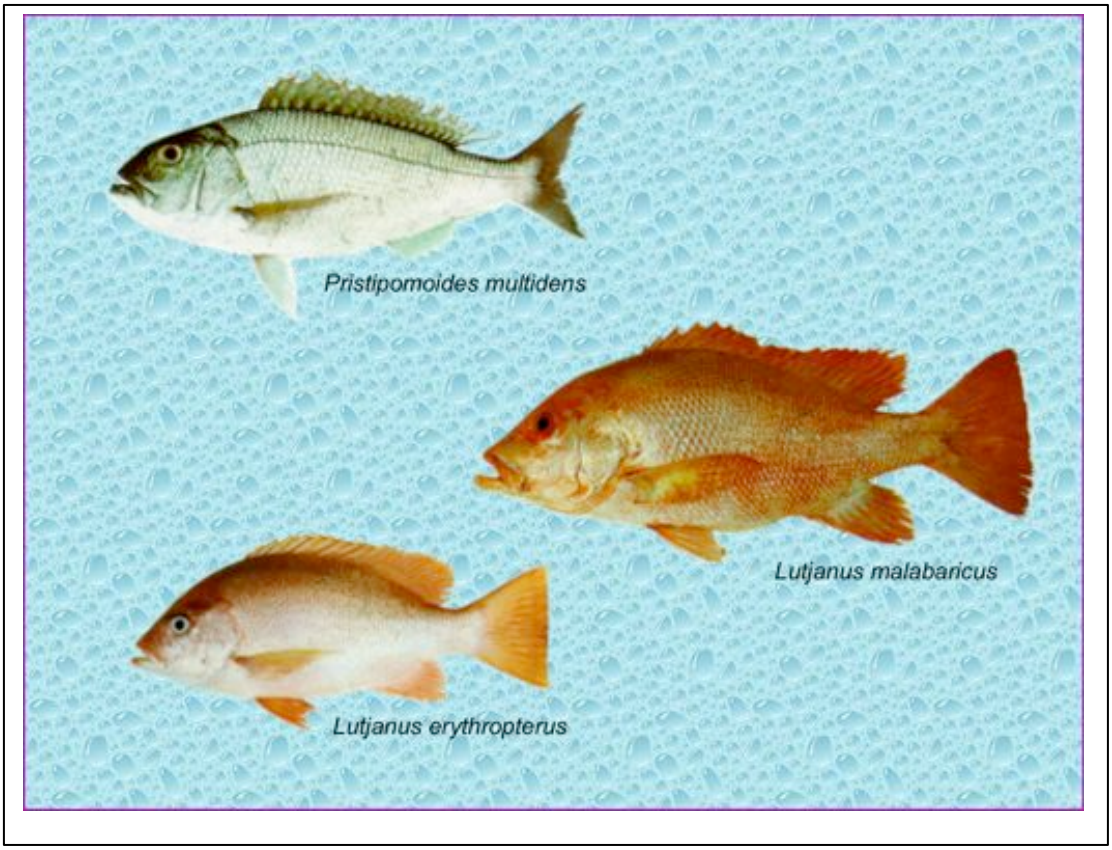
Table II.1. List of species categories as snapper

No	Scientific name	English name	Local name
1	*Lutjanus malabaricus*	Malabar blood snapper	Kakap asli
2	*Lutjanus gibbus*	Humpback red snapper	Dapa
3	*Lutjanus erythropterus*	Crimson snapper	Bambangan
4	*Lutjanus bohar*	Two spot red snapper	Njalu
5	*Lutjanus sebae*	Emperor red snapper	Kemonca
6	*Lutjanus argentimaculatus*	Mangrove red snapper	Jarang gigi
7	*Lutjanus johnii*	John's snapper	Jenaha
8	*Lutjanus bitaeniatus*	Indoensian snapper	Kakap merah
9	*Lutjanus timorensis*	Timor snapper	Kakap merah
10	*Lutjanus monostigma*	One spot snapper	Kakap merah
11	*Pinjalo pinjalo*	Pinjalo	Kakap merah
12	*Pristipomoides multidens*	Goldband snapper	Anggoli, Kurisi Bali
13	*Pritipomoides typus*	Sharptooth jobfish	Kurisi Bali
14	*Pristipomoides filamentos*	Randall snapper	Kurisi Bali
15	*Etelis carbunculus*	Ruby snapper	Guntur

Source: Prisantono et al (2010)

Based on recent information, species belong to family Lutjanidae mostly commercially caught in Arafura and Timor Seas consisted of Malabar blood snapper *(Lutjanus malabaricus)*, crimson or scarlet snapper *(L. erythropterus)*, and goldband snapper *(Pristipomoides multidens)* (ACIAR 2003; Badrudin et al. 2005) – Figure II.1.

Figure II.1. Snapper species commonly caught in Arafura and Timor Sea



Source: ACIAR (2003)

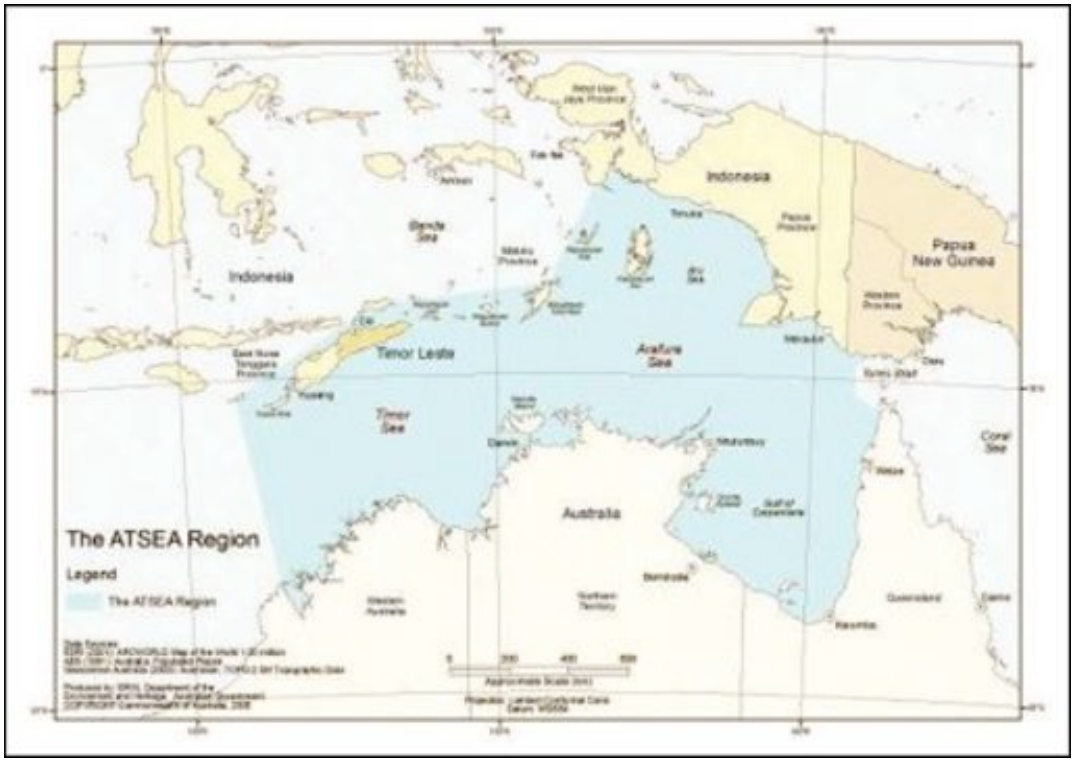
The species inhabits both coastal and offshore reefs with depth range from about 12 to 100 m. Large aggregations are often observed around coral reefs, rocky areas, estuaries, and mangrove habitats but also in the steep slope waters. Adults show little movement once they have settled in a location, but do exhibit daily activity patterns such as nocturnal feeding and diurnal schooling. Young snapper live in soft and sandy bottom inshore areas. They feed mainly on fishes and benthic crustaceans (Allen 1985).

II.2 About the Area

The Arafura and Timor Seas (Figure II.2) is covering the Timor Sea, spanning the Island of Timor (comprising Timor Leste and West Timor – which is part of the Indonesian Province of East Nusa Tenggara) and the north coast of Australia, and the Arafura Sea spanning the Indonesian Provinces of Maluku and Papua, the north coast of Australia, bordered by the Torres Strait and the western coast of PNG. The Arafura and Timor Sea region exhibits high productivity that sustains both small- and large-scale fisheries, including several high-value, shared, and transboundary fish stocks (Stacey 2009).

Arafura Sea is one of the vast and productive areas of demersal fish resource in Indonesia since this area is regularly enriched by the nutrient rich upwelling from Banda Sea and nutrients carried by rivers flowing from mangrove forested terrestrial of Papua (Prisantoso et al 2010). Therefore, this fertile condition has stimulated the rapid growth of demersal species in this area. The area is one of the most important fishing areas for demersal and shrimp resources in Indonesia. The area were relatively shallow water with the depth of less than 200 m, relatively flat with muddy and sandy bottom. The estimate fishing ground for the demersal is approximately 481,511 km^2 (Anon, 2005 in Nugroho 2011).

Figure II.2 The Arafura and Timor Sea Region (Areas in Blue)



Source: Stacey (2009)

Due to long distance from the local communities, only industrial scale fisheries that could exploit the fish resources in Arafura Sea commercially. Exploitation of demersal/shrimp resources in the Arafura Sea started in 1969. As the selectivity of the shrimp trawl is low, many different fish species with various sizes are caught for decades. Shrimp (Penaeid) was the target species of shrimp trawls operating in the Arafura Sea. Lately, since 1980, other substantial fish species that were considered as bycatch of shrimp trawls became a target species. The red snappers group is one among the demersal species that caught not only in the shallow waters but also in the slope waters with the depth of more than 200 m (Nugroho 2011).

The estimate total landings from this area in 2009, which were recorded in several landing places in Maluku and Papua provinces, reached 822,000 tonnes. The catch consisted of a number of

small and large sized species. Among of them, the red snappers contribute 37,800 tonnes or around 5% of the total catch. The estimated value of red snappers in the entire waters were approximately USD 183 million, where Arafura Sea contributed to USD 49 million of it (DGCF, 2010).

One of the major issues facing the Timor and Arafura Seas is the depletion of shared transboundary fisheries stocks - in particular sharks, rays, snappers, and prawns/shrimp. This is caused through unsustainable artisanal and industrial fishing practices and management and relates to issues of overexploitation, overcapacity, destructive methods, and includes IUU fishing activities. In the Timor - Arafura Seas region various fishing operations from Indonesia and countries to the north (e.g. Thailand, Taiwan, South Korea, China, the Philippines) illegally target various species of high commercial value in Australian and Indonesian waters (e.g. snapper, *trepang*, shark fin) (Fox, et al 2009, Stacey 2007, Resosedarmo 2009 in Stacey 2009).

II.2.1 Number of Fishers, Fishing Boats and Gears in Arafura and Timor Sea Region

Administratively, Arafura and Timor Sea in Indonesian waters cover four provinces: East Nusa Tenggara, Maluku, West Papua and Papua. In 2010, total number of fishers in these four provinces reached 239,516 people. From this population, only less than 40% work as full time fishers, where the remaining are working as part time fishers – Table II.2.

Table II.2 Number and type of fishers in Arafura and Timor Seas

Type of Fishers	Provinces					
	East Nusa Tenggara	Maluku	West Papua	Papua	TOTAL	%
Full time fishers	22,070	31,543	12,802	18,782	85,197	36
Part time (major) fishers	33,426	14,356	18,049	26,480	92,311	39
Part time (minor) fishers	11,763	32,212	7,309	10,724	62,008	26
TOTAL number of fishers	**67,259**	**78,111**	**38,160**	**55,986**	**239,516**	**100**

Source: MMAF 2011

Small-scale fishers operating on a daily basis make the vast majority of fishing activities in the region. Within the region, Maluku Province has the largest number of fishing boats, with 41,900 units (80% of them are non-motorized). In Papua, West Papua and East Nusa Tenggara about 75%, 55% and 49% respectively are non-motorized boats. East Nusa Tenggara has the largest number of inboard motors, with 5,626 vessels, followed by Maluku, Papua and West Papua – Table II.3.

Table II.3 Number and type of fishing boats in Arafura and Timor Seas

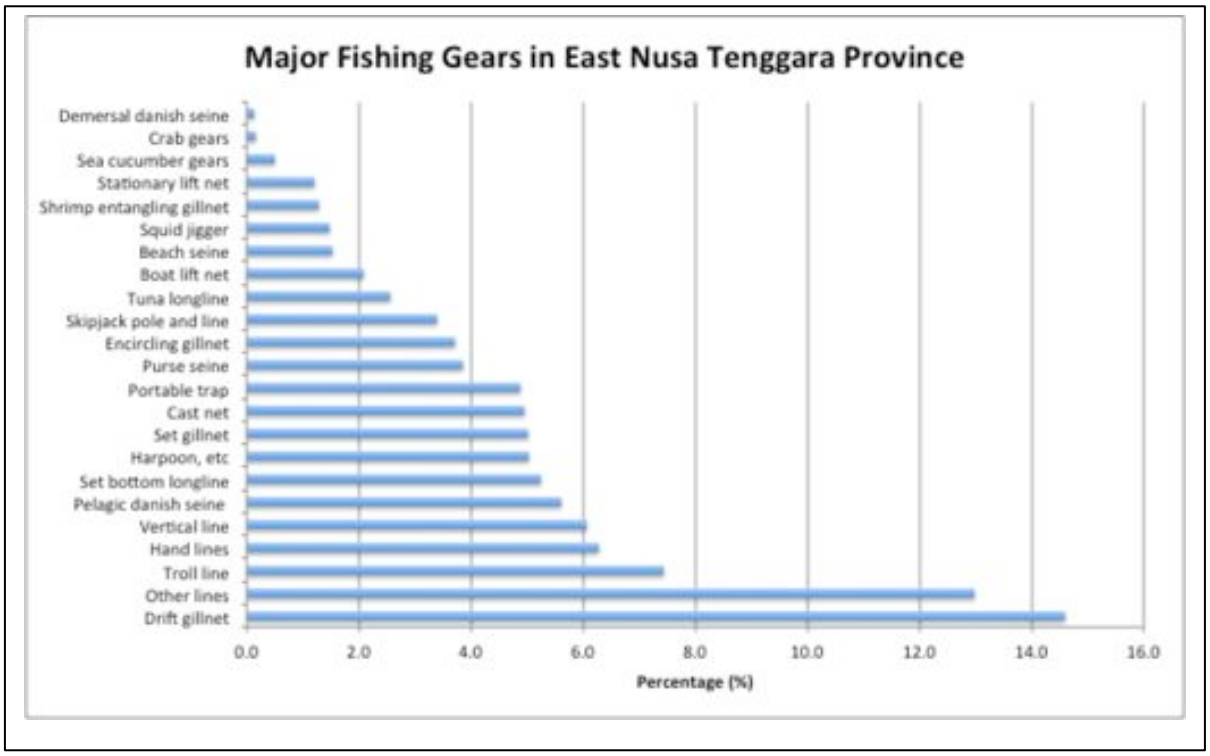
Type of boat	Provinces			
	East Nusa Tenggara (boats)	Maluku (boats)	West Papua (boats)	Papua (boats)
Non-powered boat				
Dug-out boat	4,462	21,736	2,506	14,359
Small plank built boat	2,387	8,131	1,716	4,225
Medium plank build boat	1,456	2,649	1,237	1,456
Large plank built boat	209	1,447	720	274
Total non-powered boat	**8,514**	**33,963**	**6,179**	**20,314**
Outboard motor	**3,297**	**6,180**	**4,042**	**5,298**
Inboard motor				
< 5 GT	3,784	717	188	562
5 - 10 GT	1,140	446	168	337
10-20 GT	482	276	199	152
20-30 GT	213	92	75	83
30-50 GT	4	37	33	136
50-100 GT	0	26	347	88
100-200 GT	0	131	34	4
200-300 GT	0	27	15	0
500-1000 GT	0	5	1	6
Total inboard motor	**5,623**	**1,757**	**1,060**	**1,368**
TOTAL	**17,434**	**41,900**	**11,281**	**26,980**

The numbers of fishing trips made by large scale/industrial fishing operations are much fewer than small-scale fishers. However, they account to the larger share of fisheries production. Larger vessels usually land their catches in the major fishing ports of Makassar, Kendari, Sorong, and Probolinggo that are located outside the Arafura and Timor Sea area, but other catches were also landed in Merauke, Tual, Benjina, and Ambon that are within the region.

Industrial scale fisheries have started exploiting fish resources in the Arafura Sea for years. In the last twenty-five years, the shrimp trawlers, fish trawlers (fish net) and bottom longliner provide the most active fisheries in these waters. Except for bottom longline fisheries that have different fishing ground, the shrimp trawl and the fish trawl have almost operated in the same fishing ground. The fishing gear recorded in the area by provinces is showed in Figure II.3 to Figure II.6.

Major fishing gears used in East Nusa Tenggara Province are: drift gillnet (14.6%), other line (13%), troll line (7.4%), hand line (6.3%), vertical line (6.1%), pelagic danish seine (5.6%), set bottom long line (5.2%), harpoon, etc. (5%), set gillnet (5%), cast net (5%), portable trap (4.9%), purse seine (3.9%), encircling gillnet (3.7%), and skipjack pole and line (3.4%) – Figure II.3.

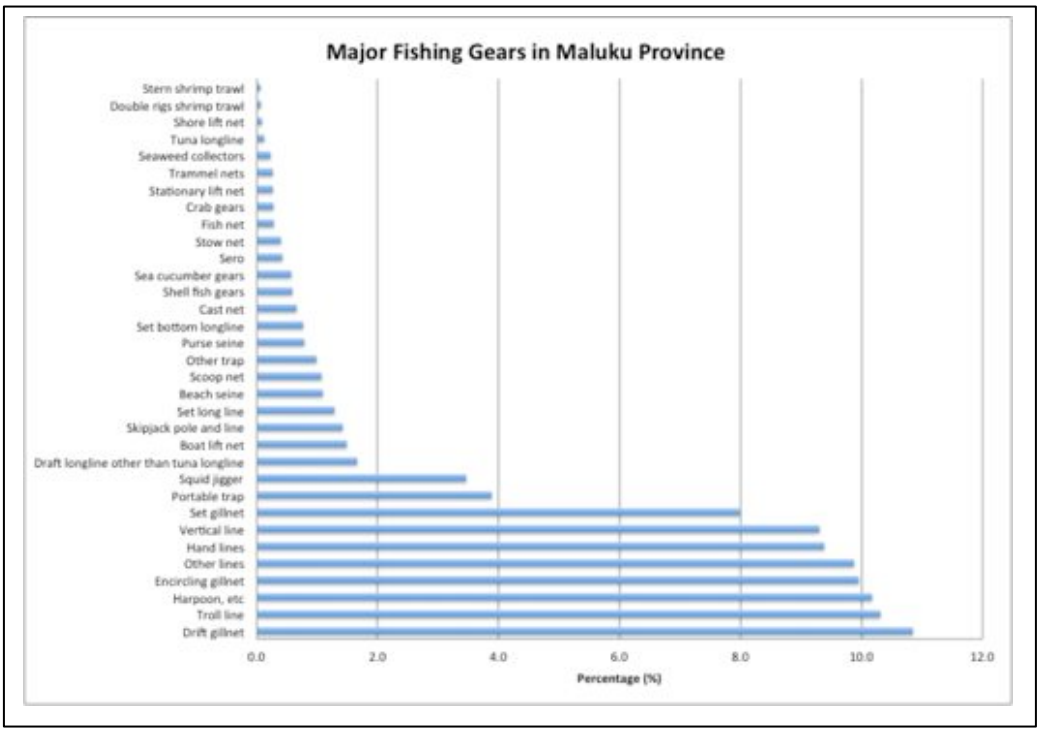
Figure II.3. Major Fishing Gears in East Nusa Tenggara Province



Source: MMAF (2011)

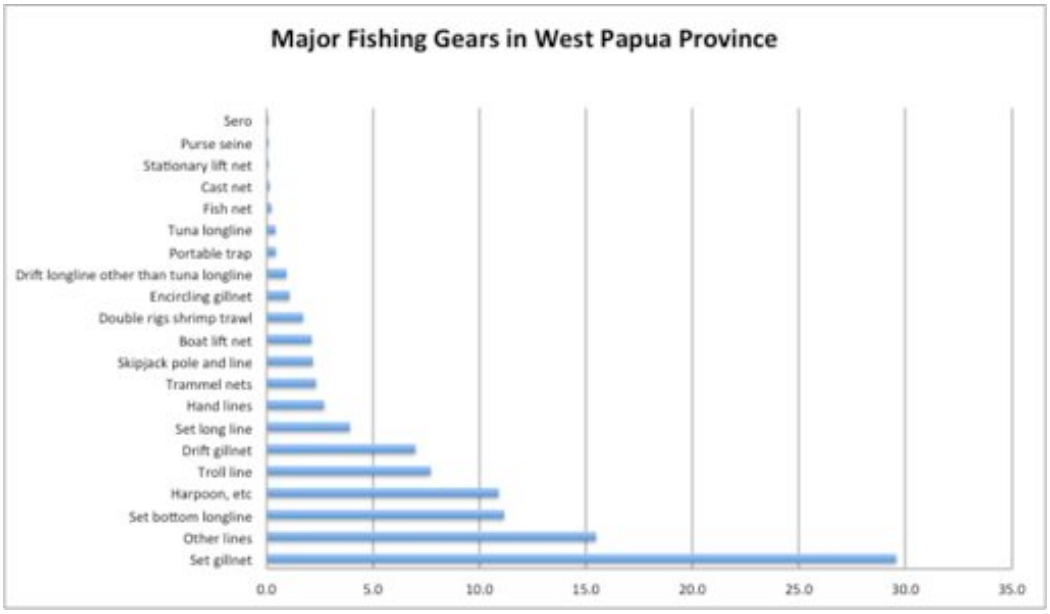
Major fishing gears used in Maluku Province are: drift gillnet (10.8%), troll line (10.3%), harpoon, etc (10.2%), encircling gillnet (10%), other lines (9.9%), hand lines (9.4%), vertical line (9.3%), set gillnet (8%), portable trap (3.9%), and squid jigger (3.5%) – Figure II.4. In West Papua, the major fishing gears are set gillnet (29.6%), other lines (15.5%), set bottom long line (11.1%), harpoon, etc (10.9%), troll line (7.7%), drift gillnet (7%), set long line (3.9%), hand lines (2.7%), trammel nets (2.3%) and skipjack pole and line (2.2%) – Figure II.5. Meanwhile, in Papua, fishing gears commonly used by fishers are much simpler. "Other lines" contribute almost 43% of fishing gears commonly used in Papua, followed by set gillnet (18.7%), drift gillnet (13.5%), harpoon, etc (11.4%), troll line (7%), set long line (2.8%) and beach seine (2.8%) – Figure II.6.

Figure II.4. Major Fishing Gears in Maluku Province



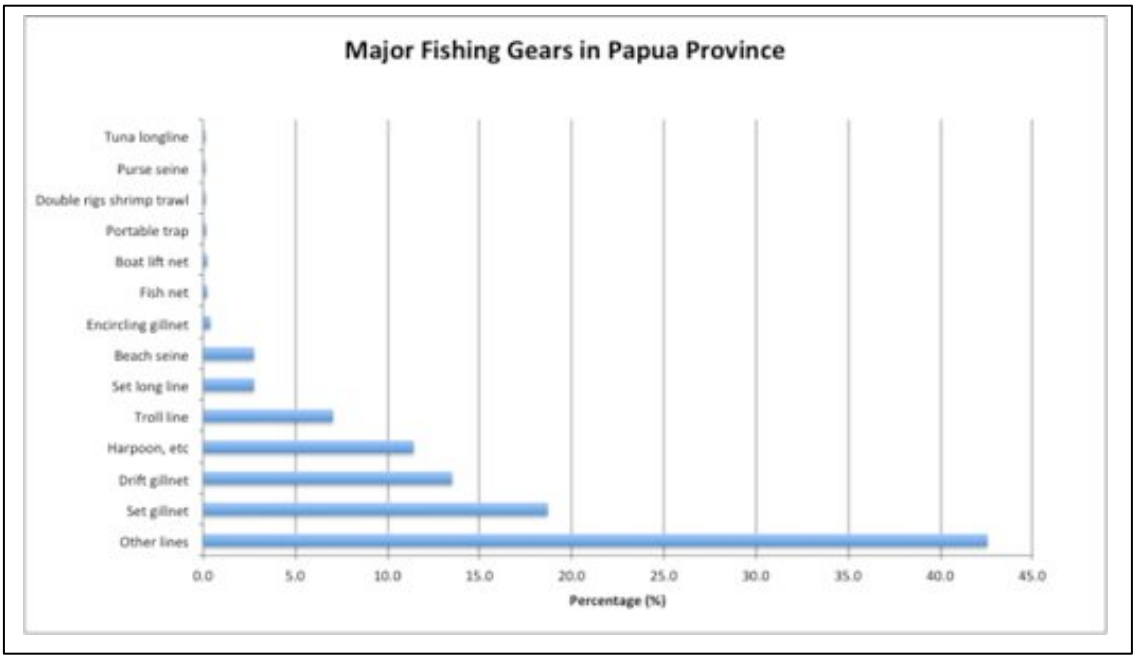
Source: MMAF (2011)

Figure II.5. Major Fishing Gears in West Papua Province



Source: MMAF (2011)

Figure II.6. Major Fishing Gears in Papua Province



Source: MMAF (2011)

II.2.2 Fishery Production

Within the Arafura and Timor region, Maluku Province has the highest production with 559,000 tonnes in 2010, valued at IDR 2.9 trillion or about USD 322 million. Papua Province follows with 263,528 tonnes. However, in terms of the value, Papua Province has the highest production value with IDR 5.9 trillion or about USD 655 million (Table II.4).

Table II.4 Fishery Production in Each Province in Arafura and Timor Seas

Province	Volume (tonnes)	Value (1000 IDR)	Unit Value (IDR/Kilo)	Value (USD)*
East Nusa Tenggara	90,185	422,023,313	4,680	46,891
Maluku	559,000	2,899,093,816	5,186	322,122
West Papua	116,593	1,259,314,240	10.810	139,924
Papua	263,528	5,902,567,250	22,398	655,841

Note: * = 1 USD = IDR 9000
Source: MMAF (2011)

Total fishery production in East Nusa Tenggara reached 90,185 tonnes in 2010, valued at USD 46.89 million. Major species caught are frigate tuna (12.3%), goldstripe sardinella (11.1%), trevallies (6.1%), scad (6%) and short-bodied mackerel (5.7%). Red snappers contribute to 3.8% of total fishery production from East Nusa Tenggara, amounted to 3.423 tonnes in 2010 - Table II.5.

Table II.5 Top 20 species caught in East Nusa Tenggara Province in 2010

No	Species	Volume (tonnes)	%
1	Frigate tuna	11,051	12.3
2	Fringescale/goldstrip sardinella	10,048	11.1
3	Trevallies	5,497	6.1
4	Scad	5,428	6.0
5	Short-bodied mackerel	5,142	5.7
6	Garfish and Halfbeaks	4,837	5.4
7	Skipjack tuna	3,562	3.9
8	Red snappers	3,423	3.8
9	Blue lined seabass	2,822	3.1
10	Other fishes	2,565	2.8
11	Narrow barred spanish mackerel	2,363	2.6
12	Needle fish	2,097	2.3
13	Red belly yellowtail fusilier	2,038	2.3
14	Bigeye tuna	1,974	2.2
15	Pony fishes	1,912	2.1
16	Anchovies	1,690	1.9
17	Hairtails	1,689	1.9
18	Emperors	1,488	1.6
19	Blue and gold fusilier	1,285	1.4
20	Ornate threadfin bream	1,263	1.4

Source: NTT Fishery Office (2011)

Figure II.7 Local fishers and traders at Oeba Fishing Port, Kupang

Figure II.8 Some fishes commonly found in the local market in Kupang (East Nusa Tenggara Province)

Total fishery production in Maluku Province reached 559,000 tonnes in 2010, valued at US$ 322 million. Red snappers contributed to 3.4%, amounted to 19,010 tonnes in 2010. Other important species are scad (7.1%), skipjack tuna (6%), short-bodied mackerel (5.1%), eastern little tuna (4.6%), ornate threadfin bream (3.4%), and torpedo scad (3%) – Table II.6.

Table II.6 Top 20 species caught in Maluku Province in 2010

No	Species	Volume (tonnes)	%
1	Other fishes	141,924	25.4
2	Scad	39,463	7.1
3	Skipjack tuna	33,764	6.0
4	Short-bodied mackerel	28,234	5.1
5	Kawa kawa/eastern little tuna	25,491	4.6
6	Red snappers	19,101	3.4
7	Ornate threadfin bream	18,854	3.4
8	Torpedo scad	16,894	3.0
9	Giant sea perch	15,977	2.9
10	Fringescale/goldstripe sardinella	12,648	2.3
11	Black pomfret	12,031	2.2
12	Croakers	10,702	1.9
13	Common squids	9,434	1.7
14	Trevallies	9,242	1.7
15	Jack trevallies	9,069	1.6
16	Silver pomfret	8,644	1.5
17	Redbelly yellowtail fusilier	8,343	1.5
18	Giant catfish	8,179	1.5
19	Anchovies	7,101	1.3
20	Emperors	7,012	1.3

Source: MMAF (2011)

Figure II.9 Some fishes commonly found in Ambon and Dobo, Maluku Province

Total fishery production from West Papua Province reached 116,595 tonnes in 2010, valued at US$ 140 million. Major species caught are skipjack tuna (10.9%), yellowfin tuna (6.6%), narrow barred spanish mackerel (6.1%), other shrimps (3.2%), short-bodied mackerel (3.2%), anchovies (3.2%) and giant sea perch (2.3%). Red snappers only contributed about 1.8% of total fishery production, with 2,045 tonnes in 2010 – Table II.7.

Table II.7 Top 20 species caught in West Papua Province in 2010

No	Species	Volume (tonnes)	%
1	Other fishes	35,834	30.7
2	Skipjack tuna	12,706	10.9
3	Yellowfin tuna	7,653	6.6
4	Narrow barred spanish mackerel	7,069	6.1
5	Other shrimps	3,758	3.2
6	Short-bodied mackerel	3,750	3.2
7	Anchovies	3,699	3.2
8	Giant sea perch	2,683	2.3
9	Jumbo/giant/tiger prawn	2,626	2.3
10	Kawa kawa/eastern little tuna	2,444	2.1
11	Giant catfish	2,293	2.0
12	Red snappers	2,045	1.8

13	Banana shrimp	1,789	1.5
14	Scad	1,778	1.5
15	Octopuses	1,738	1.5
16	Endeavour shrimp	1,718	1.5
17	Spiny lobster	1,406	1.2
18	Cuttle fish	1,270	1.1
19	Ornate threadfin bream	1,198	1.0
20	Pony fishes	1,121	1.0

Source: MMAF (2011)

Total fishery production from Papua Province reached 263,528 tonnes in 2010, valued at US$ 655 million. Major species caught are red snappers (11.2% or about 29,459 tonnes), giant sea perch (10.5%), short-bodied mackerel (9.4%), hair tails (6.5%), threadfin (4.5%), giant catfish (4.3%) and skipjack tuna (4.3%) – Table II. 8. However, during the field visit to Merauke Regency, Papua Province, red snappers were rarely found in landing sites in this regency - Figure II.10.

Table II.8 Top 20 species caught in Papua Province in 2010

No	Species	Volume (tonnes)	%
1	Other fishes	42,163	16.0
2	Red snappers	29,459	11.2
3	Giant sea perch	27,683	10.5
4	Short-bodied mackerel	24,686	9.4
5	Hair tails	17,028	6.5
6	Threadfins	11,986	4.5
7	Giant catfish	11,417	4.3
8	Skipjack tuna	11,206	4.3
9	Croackers	10,893	4.1
10	Narrow barred spanish mackerel	10,127	3.8
11	Yellowfin tuna	7,526	2.9
12	Redbelly yellowtail fusilier	5,445	2.1
13	Kawa kawa/eastern little tuna	5,081	1.9
14	Black pomfret	4,848	1.8
15	Silver pomfret	4,233	1.6
16	Trevallies	4,135	1.6
17	Jack trevallies	3,861	1.5
18	Scad	3,839	1.5
19	Fringescale/goldstripe sardinella	3,109	1.2
20	Requiem sharks	3,028	1.1

Source: MMAF (2011)

Figure II.10 Some fishes commonly found in local markets in Merauke, Papua Province

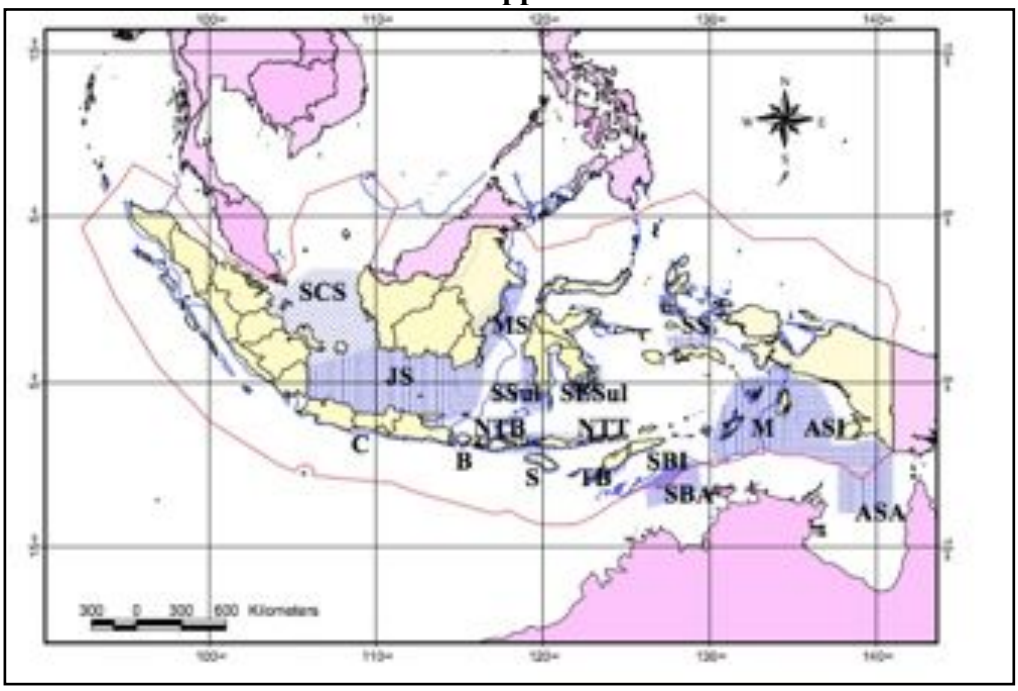
II.3 Snapper Fishery

II.3.1 Fishing Gears

Trawlers coming from Taiwan and Thailand who got licenses in Darwin, Australia started exploitation of demersal species in Arafura and Timor Sea in 1970s. Until 1990s, the demersal fishes in Australian shelf have been intensively exploited by the trawlers from Thailand, Japan and Taiwan, targeted species of red snappers (Lutjanidae), emperors (Lethrinidae), trevallies (Carangidae), and threadfin bream (Nemipteridae) [Prisantoso et al 2010].

Until now, several scientific observation indicated that snappers were caught by several type of fishing gears, namely shrimp and fish trawls, gillnet, hand line and bottom longline. Using map from ACIAR (2003) on the location of the major sectors of the Australia and Indonesian fisheries for snapper, the areas that are included in the ATSEA (Arafura and Timor Sea Ecosystem Action) are: Arafura Sea (Indonesia and Australia), Southeast Maluku, Sahul Banks (Australia and Indonesia), and Timor Barat – Figure II.11.

Figure II.11 Location of the major sectors of the Australian and Indonesian fisheries for snapper



Source: ACIAR (2003)

Based on data from ACIAR (2003), six fishery sectors had been identified within the study area of the project (Table II.9):

Table II.9 Fishing Areas, Fishing Gears and Species in Arafura and Timor Sea

Area	Fishing Gears	Species
Arafura (Australia) - ASA	trawl (equivalent to the fish net) fishery	*Lutjanus*
Arafura (Indonesia) – ASI	fish net fishery	*Lutjanus*
Southeast Maluku – M	bottom longline fishery	*Lutjanus*
Sahul Banks (Australia) – SBA	dropline and trap fisheries	*Pristipomoides* and *Lutjanus*
Sahul Banks (Indonesia) – SBI	dropline and bottom longline fisheries	*Pristipomoides*
Timor Barat - TB	bottom longline and dropline fisheries	*Lutjanus*

Source: ACIAR (2003)

Previous report based on data in 2002, snapper fisheries in Arafura Sea comprised:

1. Small-scale, artisanal fishery that uses bottom longline, dropline and handline in waters to 100–150 m depth within the 12 mile limit from the coastline;

2. A semi-industrial or industrial-scale fishery of about 500–600 boats that fish using bottom longline, drop line and handline in waters of 100–200 m depth or in areas with untrawlable bottom near the coastline; and

3. A much larger industrial-scale trawl net (fish net) fishery of around 700 boats that operate in the Arafura Sea and transfer frozen catches directly to export carrier ships. These vessels are often reflagged Thai trawlers, with Thai crews. Vessels transfer catches directly to carrier vessels, and product is shipped directly overseas without landing in Indonesia (Blaber, et al 2005).

More up to date data and information in 2007 showed that the type fishing gears are still the same as in 2002. The major fishing gears to catch red snappers were fish trawl and bottom longline with size of more than 50 GT (Badrudin et al., 2004; 2004a; 2005; Blabber et al., 2005; Nugroho and Badrudin 2008). The catches from these boats are mostly to get exported. Fleets originate from various ports, including Kupang Kei, and Aru Island chains, Merauke, and Probolinggo (East Java). The small fishing boats mainly operated in a daily basis and deal with their daily consumptions.

Table II.10 Number of demersal licensed fishing vessel operated in the Arafura Sea (May 22, 2007)

No	Fishing Gear	Range GT					Total
		< 50	51-100	101-200	201-400	> 400	
1	Traps	8	3	-	-	-	11
2	Bottom Gillnet	2	1	-	-	-	3
3	Bottom Longline	117	30	6	4		157
4	Fish net		3	167	359	119	648
5	Shrimp net	2	123	165	20	9	319
Total		129	160	338	383	128	1138
Percentage		**11**	**14**	**30**	**34**	**11**	**100**

Source: Anonymous (2007) in Nuraini (2009)

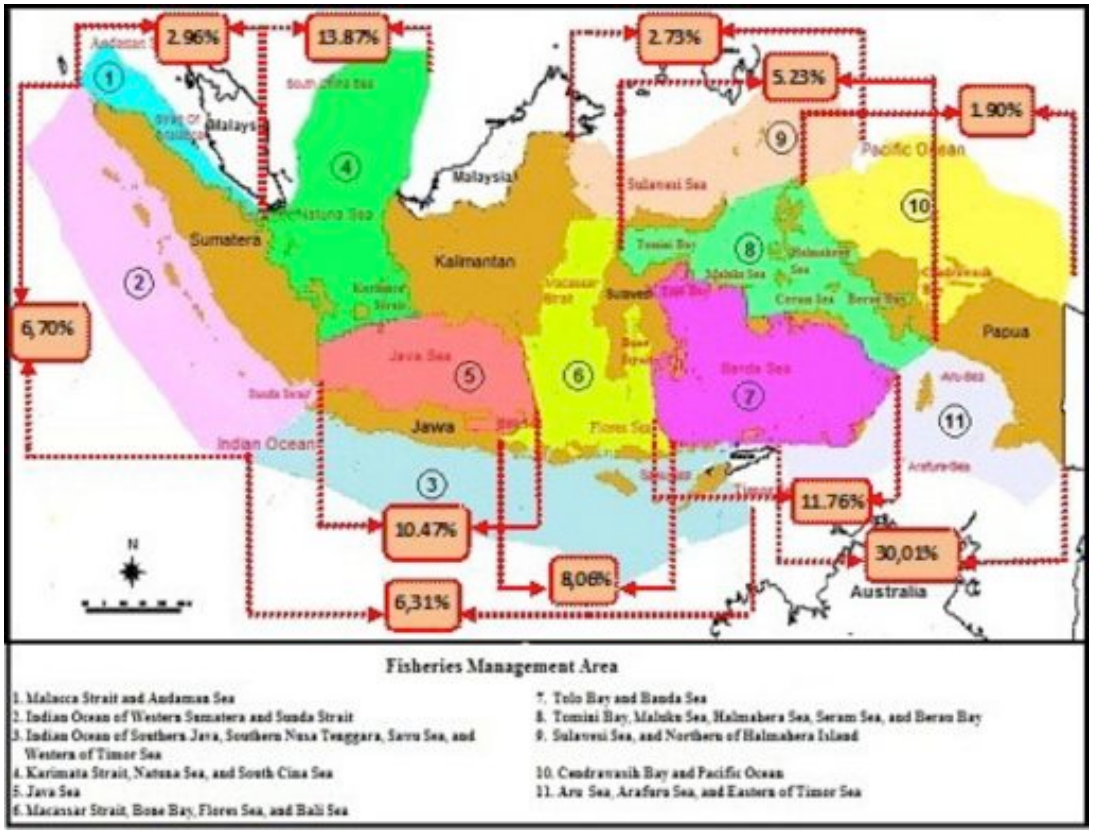
The total number of demersal licensed fishing vessel in Arafura Sea up to 2007 was 1,138 fishing boats. This number is considered very high compare to licensed fishing vessel operated in the Australian sector of the Arafura Sea. Apart from the licensed fishing vessel, it is concerned that until the end of 2007 or probably until the present time there were some illegal fishing vessel operated in the Arafura Sea (Nuraini 2009).

II.3.2 Total Catch and Fishing Ground

According to data from MMAF (2010), total production of red snapper in 2009 reached 115,523 tonnes, valued at IDR 1.8 trillion (or about US$ 183 million). Data from Indonesia Capture Fisheries Statistics shows that in 2008, Arafura Sea, Aru Sea and Eastern Timor Sea contributed to 30% of total catch of snapper in Indonesia with 27,012 t landing. Java Sea is still one of important snapper fishing grounds in Indonesia, contributed to 17% of total landing in 2004, followed by Makassar Strait and Flores Sea (16%), Indian Ocean (9%), South China Sea (8%), Moluccas Sea,

Tomini Bay and Seram Sea (7%), Banda Sea (6%) and Sulawesi Sea and the Pacific Ocean (3%) – Figure II.12.

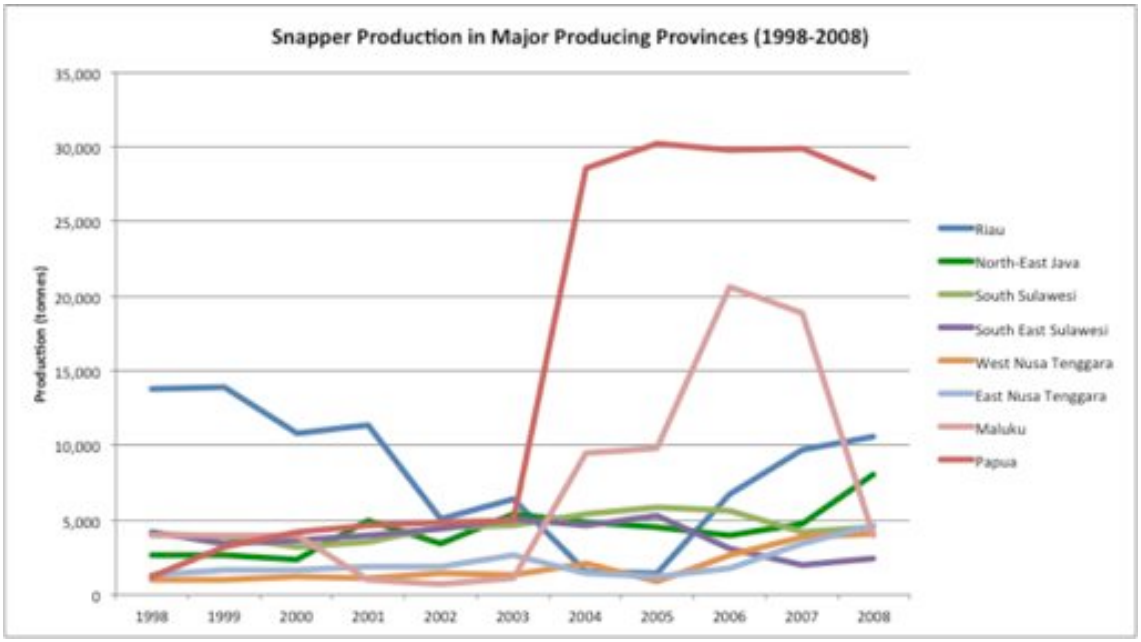
Figure II.12 Contribution of Each Fishery Management Region to Total Landing of 'Red Snapper' (*Lutjanus sp.*) in Indonesia (2008)



Source: Processed from Capture Fisheries Statistics of Indonesia in MMAF

Snapper landings by provinces shows fluctuated trend in the last 10 years period – Figure II.13 and Table II.11. In 2008, the highest landings occurred in Papua (Merauke) with total catch of 28,000 tonnes, followed by Riau-Tanjung Balai Karimun (11,000 tonnes), North East Java (8,100 tonnes), East Nusa Tenggara (4,600 tonnes), South Sulawesi (4,500 tonnes) and West Nusa Tenggara (4,100 tonnes).

Figure II.13 Snapper Production in Major Producing Provinces



Source: Capture Fishery Statistics (2010)

Table II.11 Annual Catch of Snapper per region (tonnes)

Province	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Riau	13,794	13,942	10,814	11,396	5,091	6,386	1,560	1,421	6,703	9,722	10,659
North-East Java	2,660	2,697	2,370	4,969	3,432	5,450	4,845	4,502	3,995	4,787	8,122
South Sulawesi	4,144	3,835	3,186	3,535	4,487	4,652	5,420	5,876	5,659	4,200	4,495
South East Sulawesi	4,211	3,404	3,634	4,012	4,381	5,065	4,608	5,262	3,050	1,994	2,477
Bali	415	245	139	46	31	2,629	137	55	86	203	159
West Nusa Tenggara	989	1,058	1,284	1,166	1,443	1,344	2,149	891	2,640	3,899	4,108
East Nusa Tenggara	1,368	1,699	1,619	1,847	1,866	2,638	1,505	1,205	1,792	3,417	4,668
Maluku	3,977	3,977	3,977	1,016	726	1,110	9,456	9,886	20,644	18,890	3,946
Papua	1,196	3,223	4,218	4,626	4,818	4,973	28,559	30,239	29,813	29,959	27,966
West Papua								1,611	1,611	1,628	1,931

Source: http://www.bps.go.id

II.3.3 Fishing Ports

None of the three industrial scale fisheries of fish trawlers, shrimp trawler and bottom longline that have been operating for years have changed their fishing base:

- The bottom longline and and trap fleets of the Tanjung Balai Karimun landed in Kupang and Probolinggo – Figure II.14 and Figure 15.

- The fish trawler or fish net fishing base are Tual, Wanam, Sorong, Merauke and Ambon. (Tual fishing port has long been used by some fishing companies. Some large fishing companies have their own fishing base/port).

Based on the information from Fishery Office in Problinggo, it is noted that fishing boats operated by their head quarters in Tanjung Balai Karimun (TBK), known as *'Kapal Balai'* can only transit or unload their catches in these designated ports:

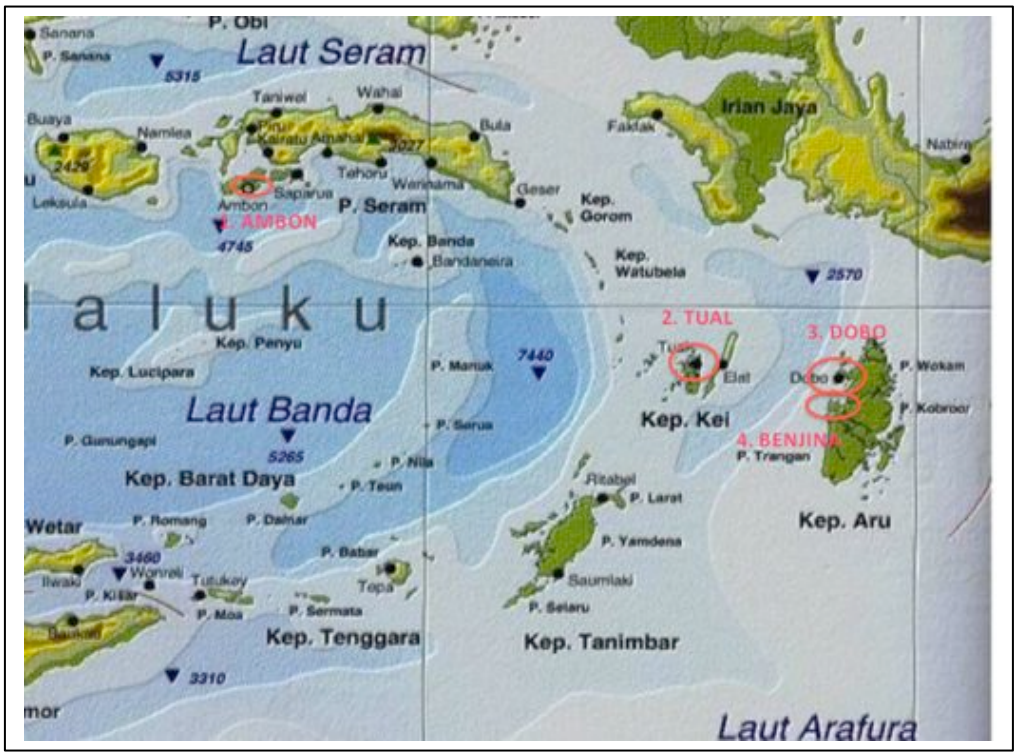
1. Main fishing base ports *(Pelabuhan Pangkalan)*: Kupang, Dobo, Kimaan and Probolinggo;
2. Loading and transit ports *(Pelabuhan Muat dan Singgah):* Ambon, Kupang, Merauke, Sorong, Tual, Avona, Banggai, Benjina, Dobo, Kaimana, Kimaan, Problinggo, Timika, Waisai and Wanam.

The bottom longline fishing boats stop over in Tenau Coastal Fishing Port for collecting provisions for and from fishing operation in the Timor Sea and Arafura Sea. Some BLL fishing boats back from the Arafura Sea usually unloaded part of their catch especially fish that having lower market prices. Some first quality fish of scarlet snapper, *L. malabaricus* and goldband snapper, *P. multidens*, are usually transported to Probolinggo, and directly exported (Nuraini 2010).

Figure II.14 Location of Probolinggo Fishing Port

Figure II.15 Location of Kupang Fishing Port

Figure II.16 Location of Major Fishing Ports in Maluku Islands



II.3.4 Processing Facilities

According to information from major snapper processors/exporters in Indonesia, processing facilities are mostly located in Jakarta, Pasuruan, Gresik, Surabaya, Bali, Makassar and Kendari – Figure II.17.

Figure II.17 Main Location of Snapper Processing Plants in Indonesia

According to major processors, most of processing plants in these areas purchased red snapper from Indonesian bottom longliners operating in off the Maluku Islands and Timor Barat.

II.3.5 Sustainability and Environmental Issues

Stock Status

Research in Kupang and Probolinggo showed that from a total of 1,619 samples identified and measured from fish net and bottom long line catches during observation by the ACIAR-Indonesian research project in 2001-2002 (ACIAR, 2003), the biological status of red snappers in Arafura and Timor Sea were concluded to be relatively at **moderate exploitation level**. This was indicated by wide range of catch at length of *Lutjanus malabaricus* between 22.5-96.0 cm TL, while *Pristipomoides multidens* (10-78 cm TL), *Lutjanus erythropterus* (10-84 cm TL), and *Lutjanus sebae* (36-90 cm TL).

Blaber et al (2005) suggested that there were some indications that red snapper has been overfished in most of Indonesia waters. Red snapper stocks (*Lutjanus erythropertus* and *Lutjanus malabaricus*) in the neighboring seawaters of eastern Indonesia and northern Australia had declined to 10–20 per cent of their 1971 level by the early 2000s (Badrudin and Blaber 2003 in

Blabber et al 2005). The study suggested if current levels of fishing activity continued, it was predicted that red snapper stocks would collapse in both the Indonesian and Australian fisheries in 2006/2007 (Blaber et al 2005). The study in the Arafura and Timor Seas also suggested fisheries management approaches such as spatial closures or restrictions on fishing efforts. To date, these recommendations have not been implemented.

However, more recent data shows that the prediction that the collapse is underway is too premature. This is proven by the catch data from Tanjung Balai Karimun-based bottom longliners that recorded in Kupang Fishing Port, where the total catch of red snappers reached 1,673.5 tonnes (Badrudin and Aisyah 2009 in Prisantoso et al 2010). This has not included the catch of snappers caught by fish net and landed in Merauke, Tual, and Ambon or transshipped from catcher vessels to carrier vessels.

Based on those facts, Prisantoso et al (2010) argued that the collapse of the snapper stock as predicted by Australia has not happened yet. The assumption that suggested the snapper stock in Arafura Sea as one unit stock is not true. This can be seen from the spawning grounds that distributed in two countries and the different population parameters that related to fertilities in the waters of Australia and Indonesia.

Changes in catch composition

Based on catch data from 1977 fleets from 2005 to 2007, the mean catch of BLL showed steadily increased in the last three years. The mean catch accounted for 2,760.3 kilo, 4,735.9 kilo and 6,827.8 kilo per trip per boat in each year (Nuraini 2010).

Changes in catch composition of red snapper and deep-sea snapper in term of biomass in the last decade was detected (Table II.12). The red snapper *(Lutjanus malabaricus)* catches declined from 58% in 1995 (Usaha Mina report) to 42.1% in 2005 and to 24.7% in 2007. Catches of goldband, *P. multidense* in BLL catches in 1995 is the same as in 2005, at level of 16%. By 2007 catches increase to 36% of the total catch.

Table II.12 Development on red snapper and deep sea snapper composition based on landing data in PPI Probolinggo of the fish cooperation record

Local name	Scientific name	% Catch Composition			
		1995*	2005	2006	2007
Red Snapper	***Lutjanidae***				
Kakap merah	*Lutjanus malabaricus*	58	42.1	30.8	24.7
Kakap seto	*L. erythropterus*		0.4	0.8	4.84
Kakap sawo	*L. sebae*			0.3	0.74
Tungku	*Lutjanus sp.*		0.2	0.8	0.8
Deep Sea Snapper					
Anggoli	*P. multidense*	16	16	25.1	36

Anggoli merah	*Pristipomoides sp.*		0.3	0.1	1.4

Source: Nuraini (2010)

Badrudin and Blaber (2003) in Blaber (2005) reported red snapper contributed to 21.3% and *P. multidens* to 1.1 – 5.1% of total catch in Aru Sea. Changes in red snapper composition in BLL catches might be affected by variability in the fish abundance, habitat structure of fishing ground, environmental condition, seasonal and technical interaction in the red snapper fishery. Shift in catch composition can be used as one index of the extend exploitation in reef fisheries. In light fishing intensity catches consist of large predator fishes i.e. grouper and snapper in lining catches. As the fishing pressure increases, catches of predator fish decline replace by small emperors (Jennings and Lock, 1996 in Nuraini 2010).

Lack of raw materials

There have been complaints from many snapper processors and exporters that while the export demand from Europe, China, Korea, and the U.S. are actually on the rise, the companies could not meet all of the requests due to limited raw material. As result of lack of supply from fishermen, the company's production capacity has dropped by 40 percent. The companies admit that they are now only operating at 40 % - 50 % of their capacities (SFP 2009).

Illegal unreported and unregulated fishing

Illegal Unreported and Unregulated (IUU) fishing has been perceived as the major issues in Timor-Arafura Sea. ATSEA noted that in Timor-Arafura Seas various fishing operations from Indonesia and countries to the north (e.g. Thailand, Taiwan, South Korea, China and the Philippines) illegally target various species of high commercial value in Australian and Indonesian waters, including snapper, trepang and shark fin. It is estimated that more than 80% of demersal fish, mostly red snapper *(Lutjanus sp)* harvested from the Arafura Sea using bottom longline between 1980 and 2005 was defined unreported (Wagey et al 2009 in UNDP 2010). With regard to illegal fishing activity particularly in the fishnet fishery, fish are transshipped from the fishing vessels to foreign carrier vessels for transport to country of origin. Thus a major problem is the clear gap in official fisheries statistics for the Arafura Sea and actual real catch and efforts (UNDP 2010).

Most illegal foreign fishing vessels operating in the Arafura Sea have bases in Indonesian ports, such as Surabaya (East Java), Manado and Bitung (North Sulawesi), Kendari (Southeast Sulawesi), Benjina and Tual (Maluku), Sorong (West Papua) and Kimaam and Merauke (Papua) (*Kompas*, 17 March 2005 in Resosudarmo 2008). However, there are also some fishing vessels that ship most of fish harvested directly to China, since they do not own any land based processing plants in Indonesia (Resosudarmo 2008).

The use of destructive fishing gears

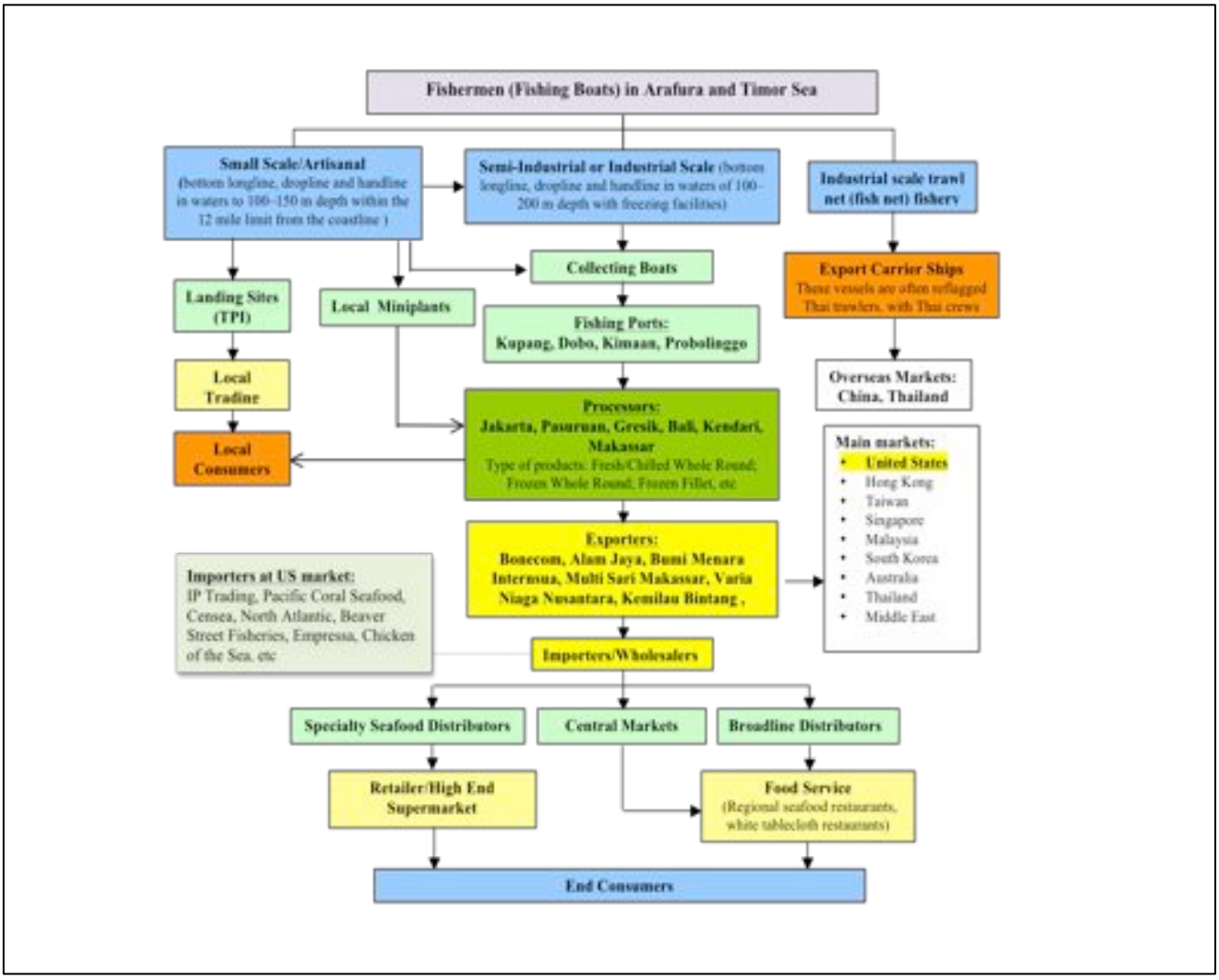
Other concern on this fishery is habitat destruction due to the use of bottom trawl, which also pull in bycatch that often exceeding the intended catch. Due to Presidential Decree No. 12/1982 and Decree of the Indonesian Supreme Court No 8/1988, the use of trawls has been concentrated in the wide shallow shelf of the Arafura Sea running west from the Southern Coast of Papua. Fegan (2003) believed that the trawlers in Arafura Sea are so numerous that whole populations of fish can quickly disappear from the sea. The threats of further depletion of the snapper fisheries are also caused by the use of gillnets, where juvenile snappers are also caught.

III. Supply Chain Analysis

III.1 Overview of Supply Chain

Generally, there are four main components involved in the supply chain of snapper fishery, which are fishers/catchers (consist of small scale, semi-industrial or industrial and industrial scale trawl net), traders/middleman, processors/exporters and importers. Figure III.1 shows the supply chain of snappers from fishers (catchers) to end consumers.

Figure III.1 Supply Chain Diagram of Snappers from Arafura and Timor Sea



There are two ways of processing plants (processors) getting their raw materials (snappers), which are:

1) From the trader (middle men), who buy the snappers from fishermen in landing areas and then sell them to the processors nearby; and

2) From their own vessels. Sometimes, these vessels also buy fishes from other fishing boats to fulfill the shortage of raw material.

In the processing plants, snappers are processed into fillet and/or whole round products for export. Meat yield of snapper is 0.5, so to produce 1 kilo of processed snapper, one needs approximately 2 kilo green weight of snapper.

Processed snappers with high quality (Quality A) will be then exported to the United States. Meanwhile, processed snappers that do not meet the standard and quality requested by the buyers/importers (Quality B) will be marketed locally. In addition to that, the company will also sell residuals (e.g. head, stomach, etc.) of snappers to local buyers. Snappers with minimum weight of 450 gram per individual are regularly exported by agents – who directly pick up them from fishermen - to Singapore and Malaysia.

Figure III.2 shows the market distribution of snappers caught from Arafura and Timor Sea:

Small scale/artisanal fishers:

Small scale/artisanal fishers who fish in the in waters to 100–150 m depth within the 12 mile limit from the coastline, using hand line and gillnet usually sell the snappers to the collectors/middle-man who will then supply the snappers to local miniplants where the snappers will be processed into fillet or whole gilled and gutted and transferred to the processing companies located in Makassar (South Sulawesi), Surabaya and Probolinggo (East Java) or Jakarta. The price at fishers level is around IDR 10,000 to 13,000 per kilo (depending on the size). There are some local miniplants located in the region, such as in Merauke (Papua) and Aru Islands (Dobo and Benjina). These local miniplants are mostly supplied by small scale/artisanal fishers. Sometimes, the small fishers also sell their catches to the collecting boats or to the bigger vessels.

Small scale/artisanal fishers based in Kupang (East Nusa Tenggara) that fish around West Timor and Rote (and occasionally to Sahul Banks in between monsoons) using mostly gillnet, bottom longline and *'pancing ulur'* (hand line) will land their fishes in various villages in West Timor to be sold locally at local market or aggregated for export market and send it to Bali, Surabaya, Probolinggo and Jakarta by air or sea. There is no processing plant in Kupang. About 80% of the snapper and grouper (live and fresh/chilled) are sent to other islands, and only 20% consumed locally.

Semi industrial and industrial scale vessels:

Semi industrial and industrial scale vessels, which usually using bottom longline, drop line and handline in waters of 100–200 m depth or in areas, will land their catches in the major fishing

ports of Makassar, Kendari, Sorong, and Probolinggo that are located outside the Arafura and Timor Sea area, but other catches were also landed in Merauke, Tual, Benjina and Ambon that are within the region. Bottom longliners from Probolinggo will move their catches from previous trip to the collecting boats that are waiting for them in Tenau Fishing Port (Kupang). These fishing vessels have the freezing facilities. After these snappers landed in Probolinggo, then they will be transferred to the processors in Gresik, Pasuruan, Surabaya and Jakarta that will process the snappers into fillet with the United States as main market. Small portions of snappers landed in Probolinggo get exported directly to Singapore or Malaysia.

Large-scale industrial scale trawlers or fishnet:

Most of large-scale industrial scale trawlers or fishnet belong to foreign companies, such as China and Thailand. These vessels usually landed in the region, such as in Benjina, Ambon and Merauke to transfer their catches directly to carrier vessels. Snappers will be packed as frozen fish and get exported directly to China and Thailand together with other frozen fish products. Since the snappers caught by trawlers or fishnet, so the quality of snappers are not as good as the ones caught by bottom longline.

Figure III.2 Snappers Distribution from Arafura and Timor Sea

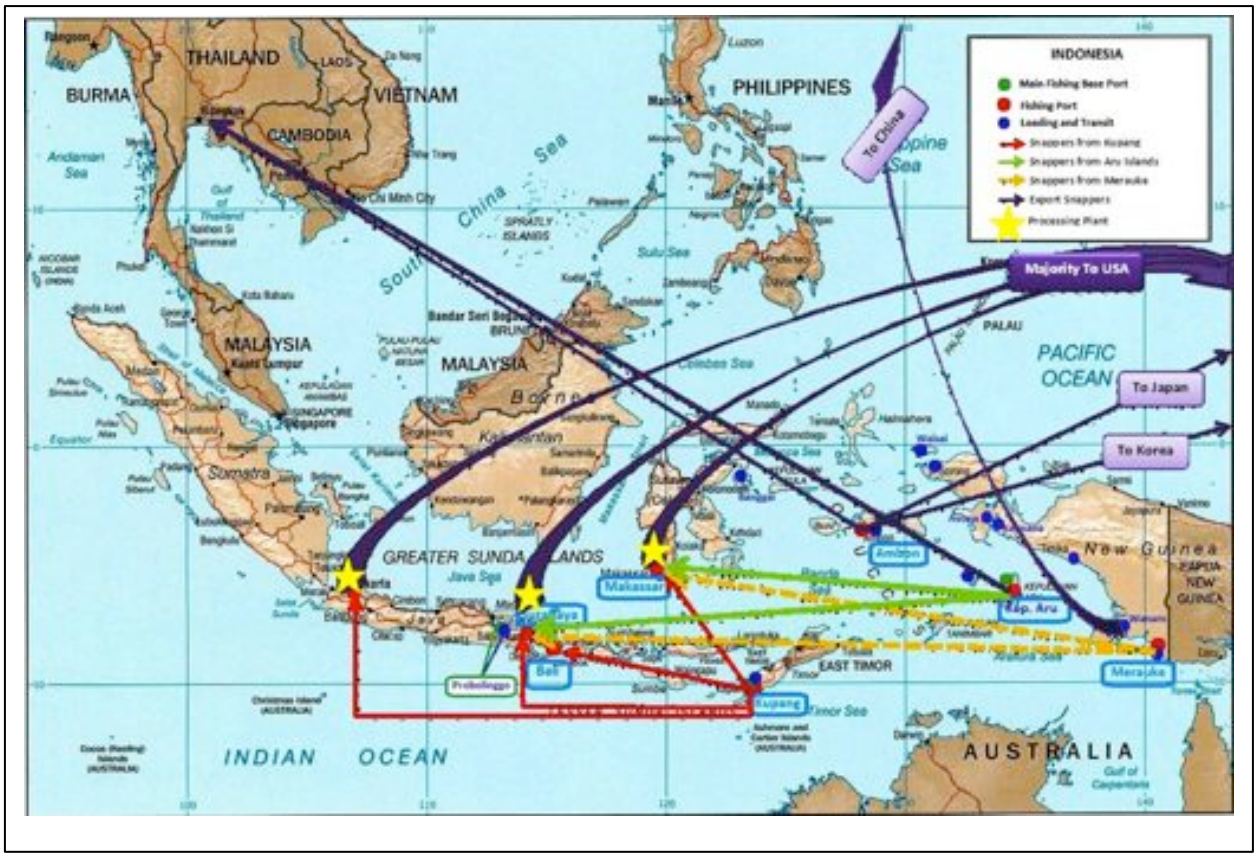


Table III.1 shows distribution of snappers caught in Arafura and Timor Sea and landed in some major landing sites.

Table III.1. Distribution of snappers landed in major landing sites (2011)

No	Fishing Ports	Local name	Landings (kilo)	Main Fishing Gears	Distribution
1	Probolinggo	Red snapper	2,008,410	Bottom Longline	Transferred to the processors in Jakarta, Surabaya, Probolinggo, etc.
		Anggoli	1,546,594		
2	Kupang	Red snapper	933,239	Gillnet, Bottom Longline, Hand Line	Sold locally and aggregated for export and send it to Bali
		Anggoli	1,003,232		
3	Ambon	Red snapper	1,754,845	Fishnet	Export directly to Thailand
4	Aru	Red snapper	2,475,520	Fishnet	Export directly to Thailand
		Red snapper	?	Gillnet, Bottom longline	Transfer to Makassar (South Sulawesi), Surabaya (East Java)
5	Merauke	Barramundi	669,057		Transfer to Surabaya and Probolinggo (East Java)
		Mixed demersal (red snappers most likely included in it)	?	Fishnet	Export directly to China

Source: processed from field data collection

III.2 Description of Activities and Stakeholders Involved Along Supply Chain

III.2.1 Probolinggo (East Java)

Probolinggo provide a 'transit' fishing base of bottom long line (BLL) fisheries operated by their headquarters in Tanjung Balai Karimun. The BLL fishing boats stop in Mayangan Coastal Fishing Port, Probolinggo for unloading the fishes caught from Timor Sea and Arafura Sea. Data from Fishery Office at Probolinggo Regency suggested that at least there are 8 fishing companies registered in Probolinggo Fishing Port, consisting of 160 fishing vessels – see Table III.2.

Table III.2 Fishing companies and vessels registered in Probolinggo Port (2011)

No	Name of Companies	Number of Fishing Vessels (units)	Fishing Gears	Fishing Ports	Fishing Grounds
1	UD Karya Samudra	39	Longline (35 units), Trap (3 units), Carrier (1 unit)	Probolinggo, Dobo, Kupang	Arafura, Aru, and Timor Sea
2	PT. Erasprima Pratama	5	-	-	-
3	CV. Lautan Berlian	21	-	-	-
4	UD. Lautan Jaya	5	Trap (3 units) Longline (2 units)	Kendari, Kupang, Probolinggo	East Java, Arafura, Seram, and Timor Sea
5	UD. Utara Jaya	12	Longline (12 units)	-	Timor Sea
6	CV. Karya Utama	25	Longline (15 units), Net (2 Units), Gillnet (2 units), Carrier (2 units)	Kupang, Avona, Dobo, Probolinggo, Benjina, Kimaan, Kaimana, Kendari, Wanam, Tanjung Balai Karimun, PP. Timika, Merauke, Fak-Fak, Balikpapan, Bitung, Derawan, Kota Baru, Luwuk, Tarakan, Gorontalo, Pemangkat, Ambon.	Arafura, Aru, Timor, Seram, and Halmahera Sea
7	CV. Jala Karya Mandiri	33	Longline (25 units), Gillnet (6 units), Carrier (2 units)	Probolinggo, Kupang, Avona, Dobo, Kaimana, Benjina, Tanjung Balai Karimun, Merauke, Timika, Kendari, Wanam.	Arafura, Aru, Timor, Seram, and Natuna Sea, Makasar Strait
8	CV. Pesona Mandiri	20	Longline (18 units), Carrier (2 units)	Kendari, Sorong, Fak-Fak, Ambon, Probolinggo, Gresik, Jakarta, Kupang, Dobo, Wanam, Avona, Belerang (Batam), Nizam Zachman (Jakarta), Tanjung Balai Karimun, Telaga Bungar (Batam), Biak, Benjina, Bintuni	Halmahera, Seram, Pasifik Sea, Kaimana, Kimaan, Merauke, Timika, Arafura, Aru, and Timor Sea

Source: Processed from Fishery Office of Probolinggo Regency (2011)

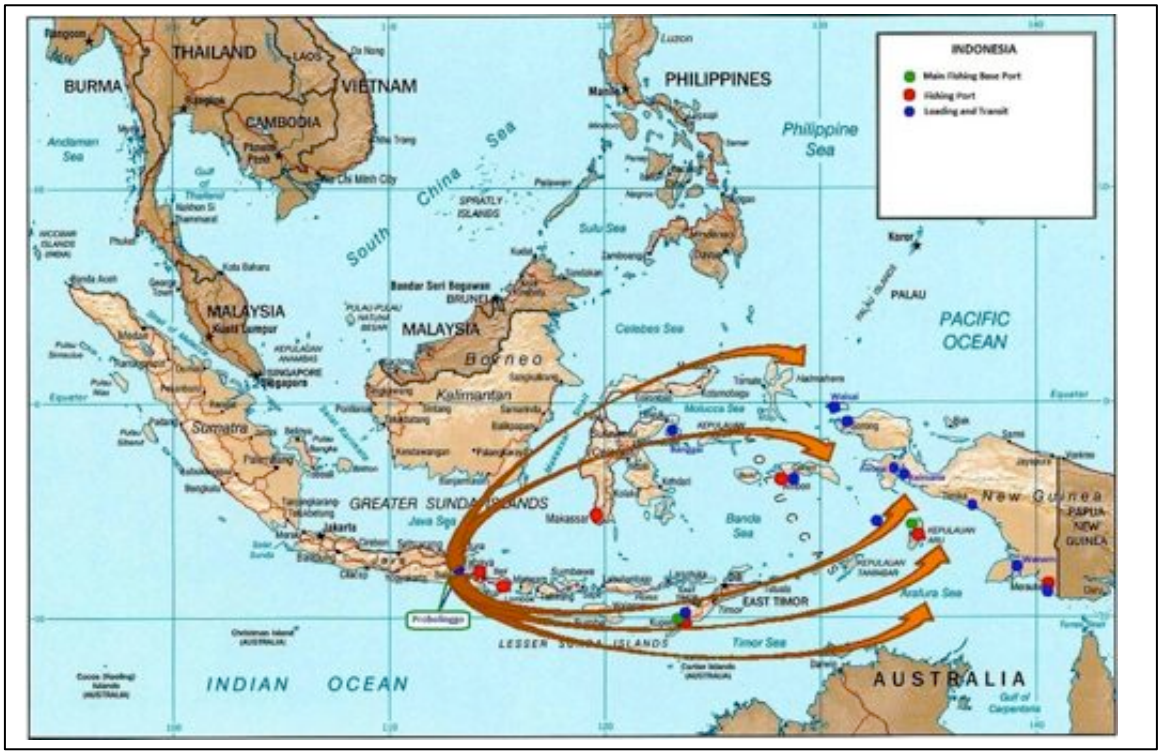
Based on the licenses, the size of BLL fishing vessels range from 28 to 40 GT. The fishing grounds of these vessels covered the waters of the Arafura Sea, Aru Sea, Seram Sea, Halmahera Sea, Kaimana, and Timor Sea (Figure III.4). They usually covered three or four fishing grounds in one trip in coral reef flat or slope with a relatively larger size demersal finfish as the target species group. Fishing trips in the Arafura Sea usually carry out in December to April, while in the Timor Sea from April to November (Nuraini 2009).

Based on the interview with captains of the boats, the average number of trips of BLL is about 4 to 6 trips per year. Minimum length of trip is 1.5 months and the average length of trip is about 4 to 6 months. Most of the catches are then chilled and transferred to the collecting boats (carrier vessels), which will then deliver them to Probolinggo.

There are at least about 7 carrier vessels registered in Probolinggo, who collect the fishes caught in Arafura, Aru and Timor Sea. The vessel is equipped with freezer facilities and filled with lots of ice. One carrier vessel normally consists of about 7 to 9 crews and one captain. In average, one carrier vessel can take about 60 to 125 tonnes of fishes, mostly goldband or locally known as *anggoli (P. multidense)* and red snapper *(L. malabaricus)*, and some small portions of other species. A carrier vessel will spend about 14 days in one trip (7 days to reach the fishing ground, where they collect the fish and other 7 days to go back to the landing port). One-carrier vessels normally carry fishes belong to more than one company. Each fish is wrapped with a plastic bag and put in the ice.

Figure III.3 Picture of *'Kapal Balai'* landed in Probolinggo Fishing Port

Figure III.4 Fishing Grounds of Probolinggo-base Bottom Long Line



Data collected from the fishing port in Probolinggo (East Java) shows that the snapper landings started to increase from March to April, where it reached the highest landing. The landings will then start to decline although they remained high until June. In August to September the landings will increase again. The landings showed the lowest volume in February each year – Figure III.5.

Figure III.5 Monthly Snapper Production (2009 and 2010) in Probolinggo Port (East Java)

Source: Processed from Probolinggo Fishery Office

When the carrier vessels land in the fishing port, the local workers will unwrapped the chilled fishes from the cold storage and sort them out based on the species and the sizes – Figure III.6 and III.7.

Figure III.6 The workers at Probolinggo Fishing Ports unwrapping the fishes on the boat

Figure III.7 The workers are sorting out the fished based on species and size

The prices of snapper fluctuate over years, depending on the season. The average price is about IDR 35,000 per kilo. In general, snapper is divided into three size categories: 1) Up (about 2.5 to 5 kilos per individual); 2) Regular (1 to 2.5 kilos per individual); 3) Small (less than 1 kilo).

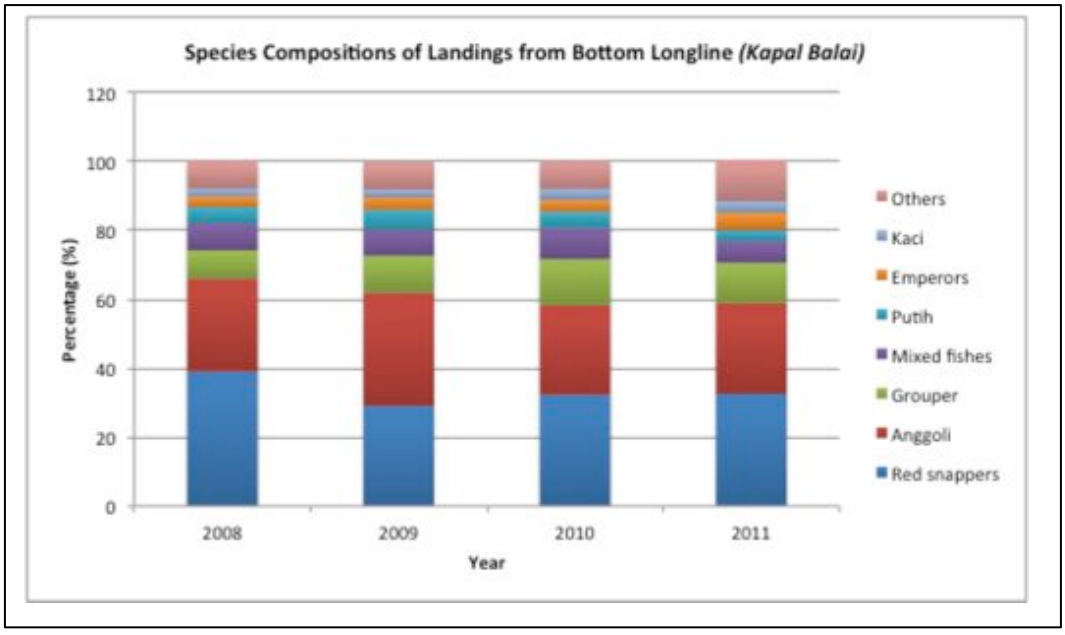
The fishes will then be weighed and recorded by the field representatives from fishing companies and enumerators from the Fishery Offices – Figure III.8. The fishes then loaded into the trucks that have been waiting and transported to the processing plants which then process the fishes into frozen fillet – Figure III.9.

Figure III.8 The representatives from fishing companies and enumerator from Fishery Office are weighing the fishes

According to data from Mayangan Fishing Port Office, Probolinggo, total landings from all BLL vessels reached 6,602 tonnes in 2010. From this amount, red snappers (Lutjanidae) and anggoli (*P. multidense)* contribute to about 60% of it. There are at least 70 species listed as the type of fishes caught by BLL vessels. Other demersal species groups landed are grouper (12%), mixed fishes (6%), and emperors (5%). Data shows that percentage of red snappers (Lutjanidae) in the total landings have been declining, from 39% in 2008 to just 33% in 2011 – Figure III.10

Figure III.9 Fishes are loaded into the truck and ready to send to processing plans or directly exported

Figure III.10 Species compositions of landings from Bottom Longline *(Kapal Balai)*



Source: processed from data from Mayangan Fishing Port Office (2011)

Figure III.11 Other species that commonly caught aside from red snappers

III.2.2 Kupang (East Nusa Tenggara)

Kupang provide a 'transit' fishing base of bottom long line (BLL) fisheries operated by their headquarters in Tanjung Balai Karimun. The BLL fishing boats stop over in Tenau Coastal Fishing Port for collecting provisions for and from fishing operation in the Timor Sea and Arafura Sea. Some BLL fishing boats back from the Arafura Sea usually unloaded part their catch especially fish that having lower market prices. Some first quality fish of scarlet snapper, *L. malabaricus* and goldband snapper, *P. multidens*, are usually transported to Probolinggo, and directly exported.

The bottom longline (BLL) fishing boats stop over in Tenau Coastal Fishing Port for loading fuel, ice and provisions for and from fishing operation in the Timor Sea and Arafura Sea. Some BLL

fishing boats coming back from the Arafura Sea usually unloaded part their catch especially fish that having lower market prices. Some first quality fish of scarlet snapper, *L. malabaricus* and goldband snapper, *P. multidens*, are usually transported to Probolinggo, and directly exported.

Figure III.12 Tenau, Kupang Fishing Port (East Nusa Tenggara)

In Kupang, fishing gears used to catch snappers and other demersal fishes are *"pancing ulur"*, bottom long line, drift gillnet and others. The fishing grounds are in Kupang Bay, Sawu Sea, Flores Sea and Timor Sea. Fishes commonly caught include snappers, grouper, *kurisi*/ *angoli*, *lencam* (emperors)*, layang* (scad)*, kuwe* (jack trevallies), and *manyung* (giant catfish).

Goldband snapper or deep-water snapper, *Pristipomoides* with its popular name as *kurisi bali or anggoli* contributed the biggest portion of landings in Kupang Fishing Port with 23%, followed by snappers (Lutjanidae) with 21.5% - Table III.3.

Table III.3 Species landed in Kupang Fishing Port (Tenau) in 2011

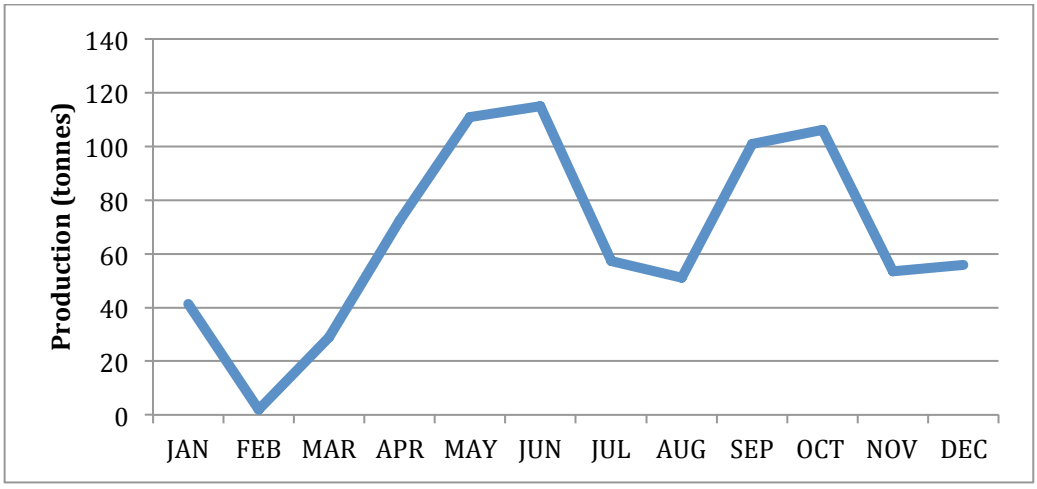
No	Species	Kilo 2011	%
1	Kurisi/Angoli	1,003,232	23.1
2	Snappers	933,239	21.5
3	Skipjack	676,347	15.6
4	Groupers	512,093	11.8
5	Tuna	415,620	9.6
6	Emperors	260,642	6.0
7	Others	180,501	4.2
8	Jack trevallies	92,920	2.1

9	Frigate tuna	43,615	1.0
10	Scad	43,156	1.0
11	Giant catfish	41,438	1.0
12	Trevallies	34,786	0.8
13	Goldstripe sardinella	28,330	0.7
14	Anchovies	19,079	0.4
15	Short bodied mackerel	17,831	0.4
	Total top 15	4,302,829	99.3
	Total landings	4,333,659	

Source: Kupang Fishing Port (2011)

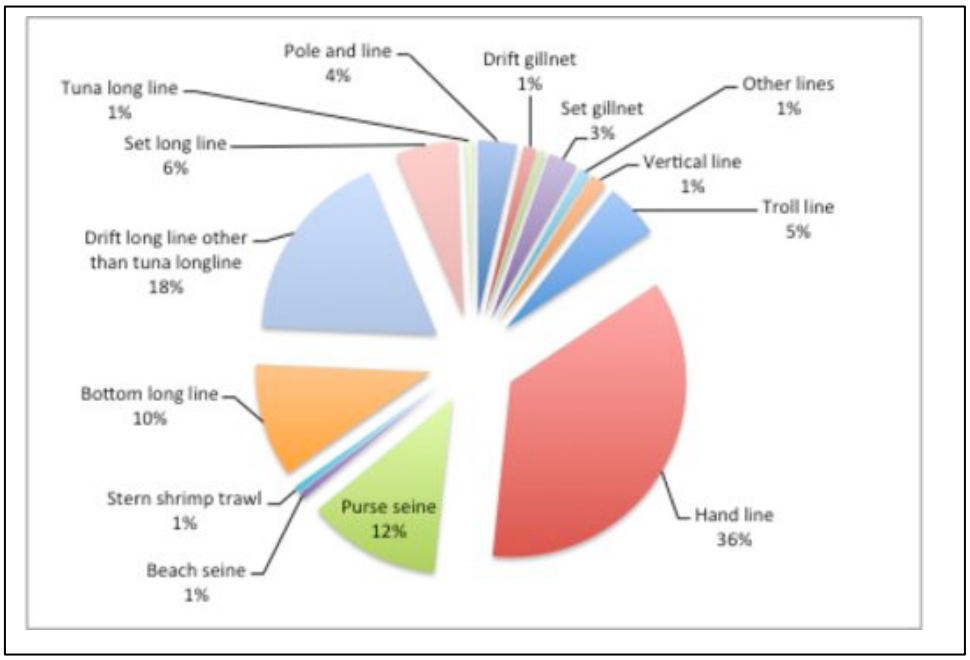
Data from Kupang Fishing Port (East Nusa Tenggara) also shows the upward trend of snapper landings during March to June, as in Probolinggo (East Java). The catch shows the lowest point in February – Figure III.13.

Figure III.13 Monthly Snapper Production (2009) in Kupang Port (East Nusa Tenggara)



Source: Quarantine Office Kupang (2009)

Figure III.14 Fishing gears composition of the fishing boats registered and located in Tenau Fishing Port (2011)



Source: Tenau Fishing Port Office (2011)

Data from Kupang Fishery Fishing Port, there are about 333 fishing vessels registered and landed in Kupang Fishing Port in 2011. Out of this, *'pancing ulur'* (hand line) contribute to 36% (120 units) and bottom longline contribute to 10% (with 35 units) with the capacity range from 3 GT to around 30 GT.

The average of catches of these *'pancing ulur'* or hand line vessels is around 7 tonnes per vessels/trip. Taking examples from some *'pancing ulur'* it is found that the catch mostly consists of *kurisi/anggoli* (44%), snappers (32%), groupers (19%), and emperors (5%) – Figure III.15.

About 80% of the snapper and grouper (live and fresh/chilled) from these vessels are sent to other islands, and only 20% consumed locally. Most of the catches are sent directly to Denpasar (Bali) by air or by Sea. Some also goes directly to Surabaya, Probolinggo and Jakarta.

Figure III.15 *"Pancing ulur"* (hand line) fishing boat in Tenau Fishing Port

The average of catch of bottom long line vessels is around 9 tonnes per vessels per trip, mostly consists of snappers (40%), *kurisi/anggoli* (29%), groupers (18%), and emperors (12%). The collecting vessels will take all these target fish to the companies in Java.

There are also snappers on the local market and auction in Kupang, such as in Oesapa and Oeba – Figure III.16.

Figure III.16 Snapper in local market in Kupang, East Nusa Tenggara

The major snapper producing districts within East Nusa Tenggara Province are Kupang Municipality (36%), Lembata (10%), Ende (9%), West Sumba (7.8%), East Flores (6.6%), Kupang (5.9%), Sikka (4.9%), and Alor (4.8%) [East Nusa Tenggara Fishery Office 2011] – Table III.4 and Figure III.16.

Table III.4 Production of red snapper in each district in East Nusa Tenggara (2009)

District	Red snapper production (tonnes)	%
Kota Kupang	1,697,375.00	35.7
Lembata	498,051.08	10.5
Ende	429,511.39	9.0
West Sumba	369,099.77	7.8
East Flores	311,529.91	6.6
Kupang	279,181.08	5.9
Sikka	235,224.57	4.9
Alor	228,492.54	4.8
East Sumba	177,057.43	3.7
West Manggarai	152,480.61	3.2
Rote Ndao	76,204.50	1.6
Ngada	74,345.40	1.6
Nagekeo	71,687.00	1.5
North Central Timor	69,461.22	1.5
Belu	40,164.90	0.8
South Central Timor	32,069.13	0.7
Northwest Sumba	13,641.28	0.3
TOTAL	**4,755,576.81**	**100**

Source: East Nusa Tenggara Fishery Office (2010)

Figure III.17 Map of Main Landing Sites of Snapper in East Nusa Tenggara Province

III.2.3 Ambon (Maluku)

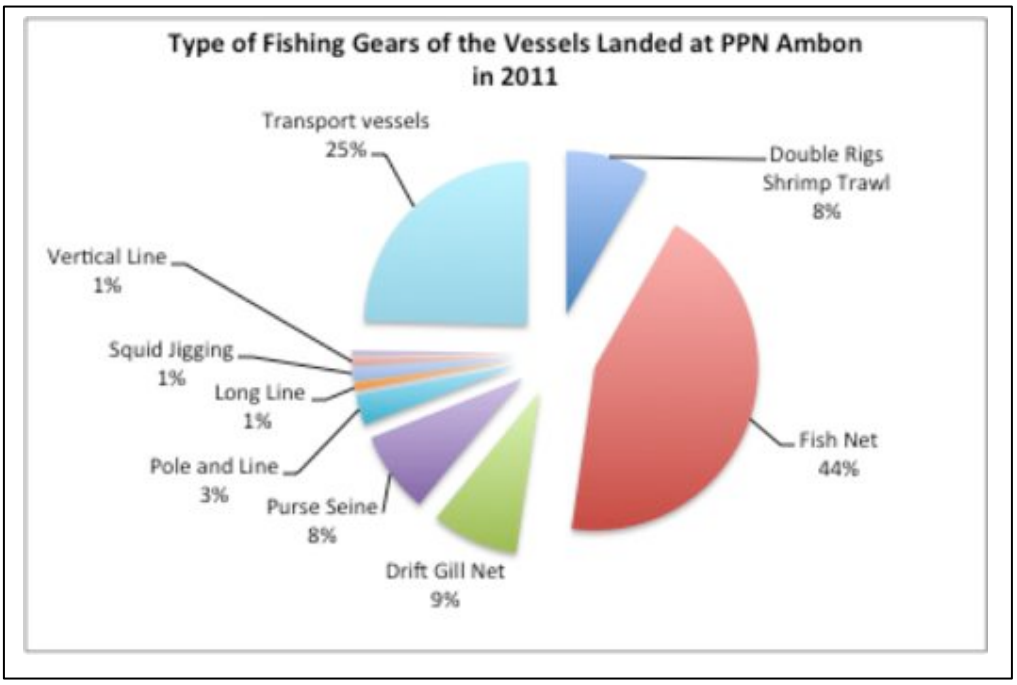
Pelabuhan Perikanan Nusantara (PPN) Ambon located in Tantui, Sirimau, Maluku. Total export from this fishing port reached 72,104 tonnes, valued at IDR 804 billion in 2011 (PPN Ambon, 2011). Number of fishing vessels landed in Ambon Fishing Port reached 1,121 units in 2011.

Large fishing vessels dominated the fishing ports with 40% (453 vessels) was more than 200 GT, capacity > 200 GT, 33% (371 vessels) between 100 to 200 GT, 14% (157 vessels) was between 50 to 100 GT and the remaining 13% was less than 50GT.

Fish net contributed to 44% of total vessels landed in the fishing port or about 494 units, followed by transport vessels (25%), drift gillnet (9%) and double rigs shrimp trawl (8%). Fish net has the capacity from 100 GT to 500 GT.

From total fish production recorded in PPN Ambon in 2011, fish net contribute almost 85% of it or about 61 thousands tonnes, followed by drift gillnet (10%), purse seine (3%) and double rigs shrimp trawls (2%).

Figure III.18 Type of Fishing Gears of the Vessels Landed at PPN Ambon in 2011

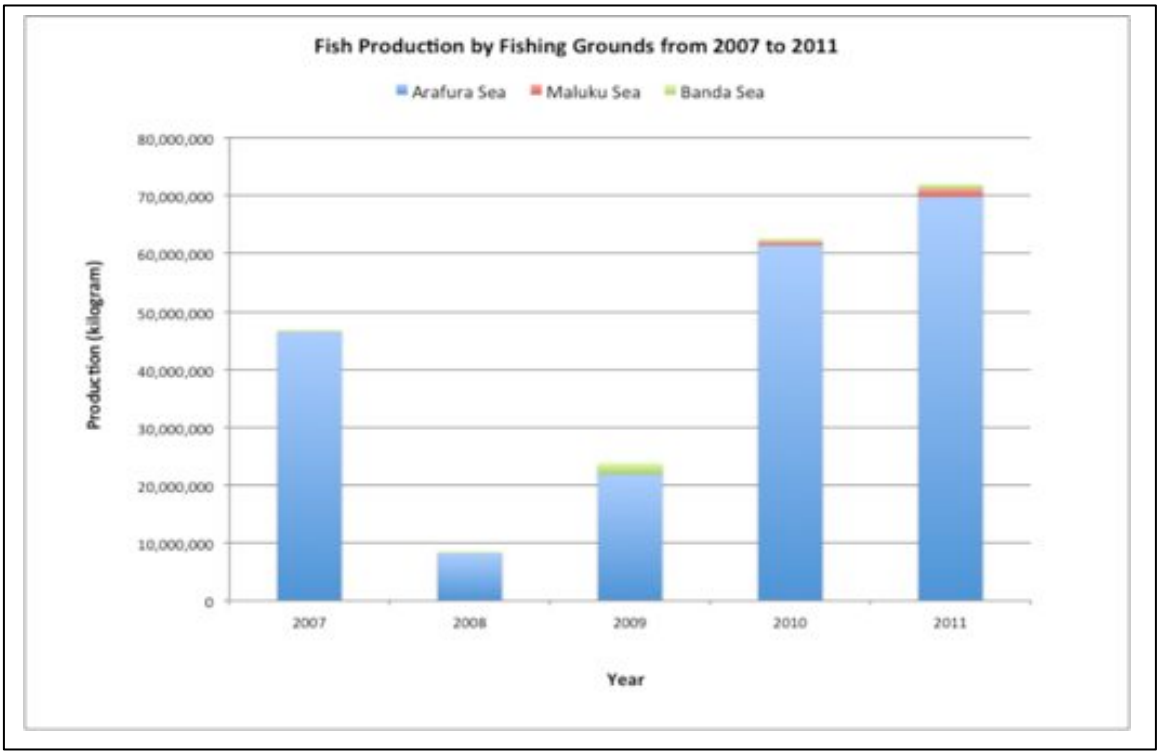


Source: PPN Ambon (2011)

Figure III.19 Ambon Fishing Port

In terms of fishing grounds, Arafura and Timor Sea contribute almost 97% of the total fish production recorded in PPN Ambon. Other fishing grounds include Maluku Sea and Banda Sea. Landings from Arafura and Timor Sea show upward trend from 2009 to recently – Figure III.20.

Figure III.20 Fish Production Recorded in Ambon Fishing Port in Each Fishing Grounds (2007-2011)

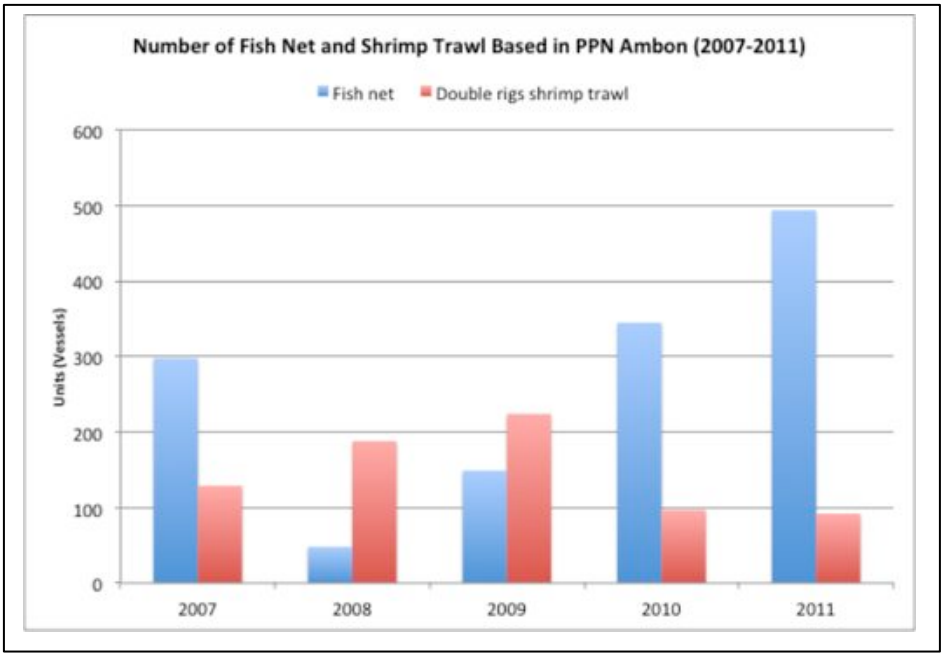


Source: PPN Ambon (2011)

Fish net has been the major fishing gears used in PPN Ambon, contributing to 44% of fishing vessels in this area. Number of fish net also keeps increasing, from 48 vessels in 2008 to 494 vessels in 2011, while the number of shrimp trawls tends to decline, from 188 vessels in 2008 to just 92 vessels in 2011 – Figure III.21.

Most of fishnets belong to foreign companies (mostly from Thailand), where the fishes are not landed in Ambon, but directly shipped to Thailand in the form of frozen fish by the transport vessels. There are about 21 fishing companies registered in Ambon Fishing Port. Some major companies include PT. Tanggul Mina Nusantara (with 156 fishing vessels), PT. S&T Mitra Mina Industri (with 61 fishing vessels), PT. Kristalin Eka Lsestari (with 29 fishing vessels), PT. Jaring Mas (with 27 fishing vessels) and PT. Hadigdo (with 25 fishing vessels) – Table III.5.

Figure III.21 Number of fish net and shrimp trawls based in Ambon (2007 to 2011)



Source: PPN Ambon (2011)

Figure III.22 A fish net landed in Ambon Fishing Port

Table III.5 List of fishing companies registered in Ambon Fishing Port in 2011

No.	Name of Fishing Companies	Number of Visits
1	PT. Alsum Kampar Semesta	6
2	PT. Arabika Khatulistiwa	10
3	PT. Argado Bahari	1
4	PT. Artha Mina Haiyu	1
5	PT. Bersama Mitra Sejahtera	13
6	PT. Biota Indo Persada	2
7	PT. Cahaya Fisheries Abadi	2
8	PT. Dech Alsum Nusantara	5
9	PT. Era Sistem Informasido	9
10	PT. Hadigdo	25
11	PT. Jaring Mas	27
12	PT. Jaya Sejahtera	1
13	PT. Kristalin Eka Lestari	29
14	PT. Laut Arafura Indah	1
15	PT. Maju Bersama Jaya	4
16	PT. Pelayaran Beta Putra Daerah	1
17	PT. S&T Mitra Mina Industri	61
18	PT. Sinar Abadi Cemerlang	1
19	PT. Sumber Laut Utama	14
20	PT. Tanggul Mina Nusantara	156
21	PT. Thalindo Arumina Jaya	3
	Total	372

Source: PPN Ambon (2011)

In one trip, a fish net can spend about two month at the sea. Number of crews is about 30 people (normally, 5 people are Indonesian, coming from Ambon, Sulawesi and Java) and another 25 people are from Thailand. The fishing grounds range from the boundary of Australia-Indonesia to the south of Merauke. Average catch per trip is about 100 to 300 tonnes, dominated by fish.

At least there are 60 fish species caught by fishnet. Major species caught by fish net recorded in Ambon Fishing Port are croakers (11%), red belly yellowtail fusilier (8.5%), short-bodied mackerel (8%), hairtails (7.9%), ornate threadfin breams (6.6%), greater lizard fish (5.5%), slander scad (4.8%), common squids (3.8%), Bluefin trevally (3.5%), giant cath fish (3.1%), stingrays (3.0%), red snapper (2.8%), requiem shark (2.5%) and black pomfret (2%) – Table III.6.

Table III.6 List of species caught by fishnet in Ambon Fishing Port in 2011

No	Species	Production (kilo)	%
1	Gulamah/Tigawaja - *Croackers*	6,692,405	11.1
2	Ekor kuning - *Redbelly yellowtail fusilier*	5,177,277	8.6
3	Kembung - *Short-bodied mackerel*	4,879,013	8.1
4	Layur - *Hairtails*	4,809,500	8.0
5	Kurisi - *Ornate treadfin breams*	4,048,488	6.7
6	Beloso - *Greater lizardfish*	3,331,555	5.5
7	Ikan lainnya - *Other fishes*	3,021,499	5.0
8	Layang - *Slander scad*	2,925,168	4.8
9	Cumi-cumi - *Common squids*	2,293,230	3.8
10	Kwee - *Bluefin trevally*	2,161,719	3.6
11	Manyung - *Giant catfish*	1,885,412	3.1
12	Pari kembang - *Stingrays*	1,829,298	3.0
13	Kakap merah - *Red snappers*	1,702,838	2.8
14	Cucut lanyam - *Reguiem sharks*	1,507,239	2.5
15	Bawal hitam - *Black pomfret*	1,221,736	2.0
16	Tetengkek - *Torpedo scad*	903,998	1.5
17	Cucut martil - *Hammerhead sharks*	845,628	1.4
18	Sotong - *Cuttle-fish*	832,812	1.4
19	Lencam - *Emperors*	825,929	1.4
20	Biji nangka - *Yellow-strip goatfish*	789,344	1.3
21	Ikan Sebelah - *Indian halibut*	729,748	1.2
22	Selar kuning - *Yellowstripe scad*	657,457	1.1
23	Swanggi - *Purple-spotted bigeye*	648,312	1.1
24	Bawal putih - *Silver pomfret*	586,362	1.0
25	Others	6,701,623	11.1
	TOTAL	61,007,590	100

Source: PPN Ambon (2011)

This fish net is equipped by freezer facilities, so the fishes caught could be frozen on boat. The fishes are packed per species per pan (one pan is about 14 to 16 kilogram) – Figure III.23.

Figure III.23 Packing the fish

Figure III.24 Mixed frozen fishes in a Fishnet Vessel in Ambon Fishing Port

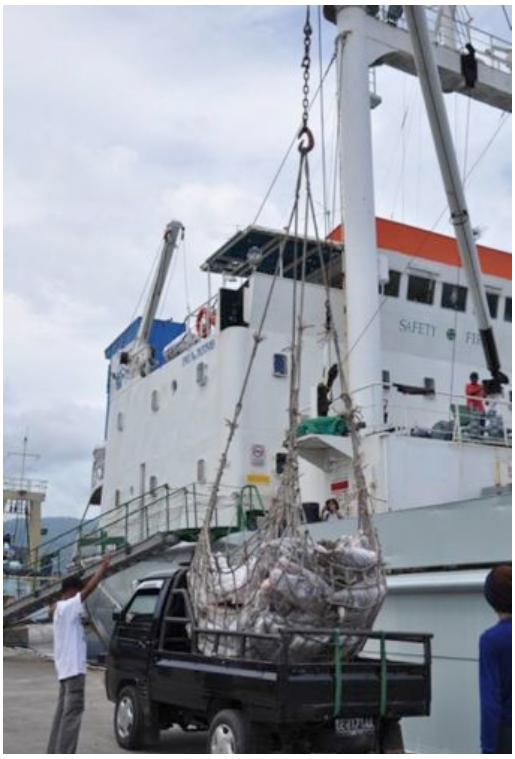
Red snappers only contribute less than 3% of total catch by fishnet landed in Ambon Fishing Port. In 2011, total red snapper catch was about 1,700 tonnes by fishnet – Table III.6.

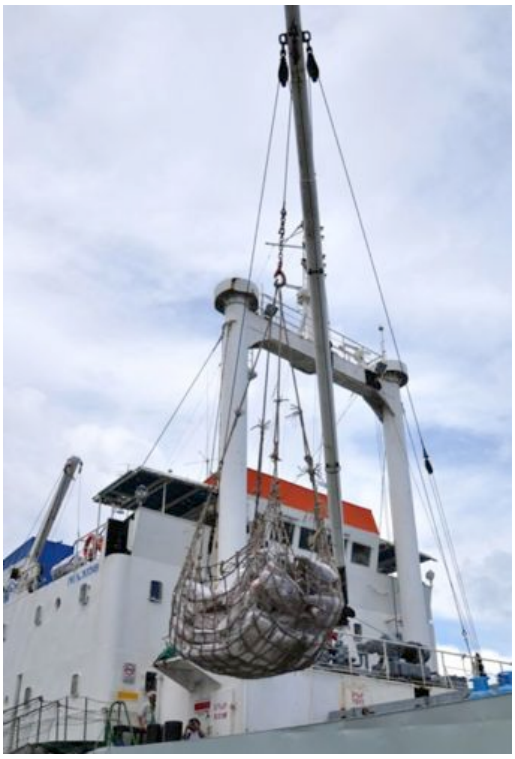
Figure III.24 Frozen Snapper Caught by Fishnet in Ambon Fishing Port

The frozen fish from the fishing boats (fishnet) will be unloaded from the boat to the small trucks waiting on the fishing port. To unload a fishing boat, normally one can take about three to four days, depending on the catch volume. These small trucks will then transport the frozen fish to the transport boat that has been waiting at the fishing port too.

Figure III.25 Unloading frozen fish from fishing boat

Figure III.26 Unloading frozen fish from fishing boat





About 96% of total products landed in Ambon Fishing Port get exported. The remaining 3% is to be shipped to other islands and less than 1% consumed locally. In 2011, total products traded reached 72.5 thousand tonnes, valued at IDR 1.6 billion or about USD 189 million, increase by 24% from the previous year (PPN Ambon 2011).

Most of the products are frozen fish, with China, Hong Kong, Japan, Sough Korea, Thailand and Vietnam as the major destination. However, Japan dominated the shrimp export from Ambon Fishing Port, with 85% goes to their market. Thailand dominated frozen fish export from Ambon Fishing Port, by 96% - Table III.7.

Table III.7 Type of products exported from Ambon Fishing Port in 2011

Type of Products	Kilogram	Yen	USD
Frozen shrimps			
- Japan	458,682	311,933,760	60,285
- Hong Kong	17,550	6,199,830	41,011
- China	16,938	0	98,937
- Vietnam	44,187	0	274,699
- Thailand	0	0	0
Total frozen shrimp	537,357	318,133,590	474,931

Frozen fish			
- Japan	100,000	0	110,000
- Vietnam	0	0	0
- Korea	1,762,000	0	161,810
- Thailand	50,482,961	0	15,131,806
Total frozen fish	52,344,961	0	15,403,616
Total Export	**52,882,318**	**318,133,590**	**15,878,548**

Source: PPN Ambon (2011)

III.2.4 Dobo and Benjina, Aru Islands (Maluku Province)

Figure III.27 Location of Aru Islands

There are seven fishing companies get involved in snapper fisheries in Aru Islands, namely:

1. CV. Sinar Terang in Aru Islands District (Dobo)
2. CV. Sinar Graha in Aru Islands District (Dobo)
3. CV. Bahari Aru Permai in Aru Islands District (Dobo)
4. CV. Karya Anugerah in in Aru Islands District (Dobo)
5. CV. Bahari Aru Pratama in Central Aru District
6. CV. Arabikatama Khatulistiwa Fishing Industry in Central East Aru District
7. PT. Pusaka Benjina Resources in Central Aru District

CV Sinar Graha process demersal fishes include *ikan ketamba/lencam* (emperors), grouper, snapper, *tenggiri* (mackerel) and *sunu* (leopard grouper) into fillet and the whole round. The company was established in 2000, but more actively in 2008, with the capacity of 30 to 40 tonnes. This plant produces 10 to 12 tonnes of fillets per month and sent it to Makassar and Surabaya for export. The company also sends the residuals (bones, head) to Makassar and Surabaya. To produce 4 to 5 tonnes of fillet, they will need 12 to 15 tonnes of raw materials. The plant is getting raw materials from the fishermen surrounding. The low season (no supply) is in December to January. The company buys from the fishermen at average price of IDR 10,000 to 13,000 per kilo (depending on the size). The processing cost is about IDR 4,000 per kilo. There are about 14 workers in this plant, coming from the surrounding areas and also from Makassar. Each month this plant sends a container with the capacity of 10 tonnes to Surabaya or Makassar. The transportation cost is IDR 22 million per trip per container.

CV Sinar Terang started operating in 2006 and also processing fishes (mainly demersal fishes) into fillet. They produce about 1 to 2 tonnes per day, working at 8 AM to 8 PM. There are more than 20 workers in this company. The minimum size of snapper is 300 gram to 500 gram, to be able to process as fillet. This company sends the frozen fillet at least 10 tonnes/month to Makassar (Multi Sari Makassar) to get exported (to Australia and other countries). This company gets the fishes from small fishing boats with less than 16 PK normally use hand line and gillnet to catch the demersal fishes. This company normally provides capital logistics (fuel, ice, etc.) to the fishermen so they can go fishing. In addition to that, the company also owns four fishing boats (26 PK) using bottom longline. They spend about one to two weeks in one trip, and can get about 5 tonnes maximum at one trip.

Figure III.28 A miniplant in Dobo, Aru Islands and a fishing boat supplying to miniplant

There are about 6 ice factories in Dobo. One was established by KKP with the capacity of 3 tonnes. The price of ice is IDR 500,000 per tonnes. One ton is divided into 3 to 4 fishing boats.

Figure III.29 Cold storage in Dobo, Aru Islands

Major fishing gears used in Aru Islands are shrimp net, fish net, gill net, lift net and others – Table III.8

Table III.8 Major fishing gears used in Aru Islands in 2011

Fishing Gears	Total
Pukat Udang - *Shrimp Net*	179
Pukat Ikan - *Fish Net*	116
Jaring Insang - *Gill Net*	3,193
Jaring Angkat - *Lift Net*	1,608
Pancing Lainnya - *Other Fishing Net*	6,583
Alat Pengumpul Kerang (Rake) - *Shellfish Collectors*	6,038
Sero - *Sero*	513
Alat Pengumpul Rumput Laut - *Seaweed Collectors*	81
Bubu - *Fish Trap*	2,057
Lain-lain - *Others*	4,881
Total Gears	**25,249**

Source: Fishery Office of Aru Islands

Aside from supplied to miniplants, fishes are also sold at local market, such as in Pasar Timur and Jakaria. The main fishing villages in Aru Islands are: Karangguling, Jabulena and Tungu.

In Pasar Timur, small fishing boats (less than 1 GT) spend about 10 liter of fuel for one-day trip and bring icebox when they go fishing. Commonly caught fishes are: *kurisi* (ornate threadfin bream), *kembung* (short bodied mackerel), *tenggiri* (narrow-barred Spanish mackerel), red snapper, grouper, *ikan kue* (jack trevallies), sharks, etc. They mostly use gillnet and *sero*. The small fishing boats also sell their catches to the collecting boats in the sea. The high season for fishing is in "West Monsoon", which is on October, November, December, January, February and March.

In one-day trip they will get about one box of fishes. The fishermen sell the fishes in a string. One string is IDR 30,000 to IDR 50,000. One boat can get about 20 strings. One string is about 2 to 3 kilo. About fifty percent of fishermen in Aru Islands own their own boats. The government provided 600 units of boats (including the machine) to the fishermen. This helps the local fishermen to approach the illegal fishing (using shrimp net) in East coast. These shrimp nets are not supposed to fish in isobaths less than 10 meters. It has to be far from the seashore. In South of Aru, there are bigger fishing boats (5 to 6 GT), send the fishes to Ambon, and then from Ambon to Jakarta. The boats are using bottom longline.

Based on the data from Aru Islands Regency Fishery Office, total fishery production from Aru Islands in 2011 reached 74,395 tonnes, with jack trevallies, sharks, short body mackerel, groupers and skipjack as major species. Red snappers contribute about 3.33% amounted to 2,476 tonnes – Table III.9.

Table III.9 List of major species caught in Aru Islands in 2011

No	Jenis	Production (tonnes)	%
1	Jack trevallies (kuwe)	5,969.0	8.02
2	Sharks (cucut)	5,159.0	6.93
3	Short body mackerel (kembung)	4,419.0	5.94
4	Groupers (kerapu)	4,409.0	5.93
5	Skipjack (cakalang)	3,756.0	5.05
6	Narrow barred spanish mackerel (tenggiri)	3,142.0	4.22
7	Tuna	3,118.0	4.19
8	Red fish	2,794.0	3.76
9	Red snapper (Lutjanidae)	2,476.0	3.33
10	Lobster	2,203.0	2.96
11	Mud Crab	2,193.0	2.95
12	Siganus sp (baronang)	2,171.0	2.92
13	Banana prawn	2,023.0	2.72
14	Frigate tuna (tongkol)	1,983.0	2.67
15	Pearl oyster (kerang muatiara)	1,812.0	2.44
16	Sea cucumber (teripang)	1,713.0	2.30

17	Black tiger prawn	1,701.0	2.29
18	Blue swimming crab (rajungan)	1,685.0	2.26
19	Emperor (lencam)	1,561.0	2.10
20	Mangrove mullets (belanak)	1,529.0	2.06
21	Blood cockles (kerang darah)	1,473.0	1.98
22	Goldstripe sardinella (tembang)	1,378.0	1.85
23	Squid (cumi)	1,360.0	1.83
24	Greater lizardfish (beloso)	1,342.0	1.80
25	Others	13,026.0	17.51
	TOTAL	74,395.0	100.00

Source: Fishery Office of Aru Islands

Table III.10 shows main commodities produced in Dobo (Aru Islands) and shipped to other islands in Indonesia.

Table III.10 Fishery products for intercellular market

No	Commodity	Volume (kilo)	Value (IDR)
1.0	Shark fin tip	22,796.0	3,452,225.0
2.0	Shark fin	202,234.1	68,918,552.0
3.0	*Kepel*	3,472.5	3,142,500.0
4.0	Shark bones	21,857.0	1,444,378.0
5.0	Shark head	2,879.0	179,938.0
6.0	Shark skin	41,536.0	4,425,100.0
7.0	Shark meat	503,115.0	25,158,613.0
8.0	Shark oil	2,445.0	1,158,750.0
9.0	Sea cucumber	62,077.0	29,523,756.0
10.0	Fish maw (gelembung ikan)	10,292.0	2,588,450.0
11.0	Lobster	27,944.5	19,098,013.0
12.0	Shrimp	290,806.0	79,166,690.0
13.0	Crab	287,244.0	53,745,252.0
14.0	Fishes	5,471,211.8	507,653,664.0
	Major species		
	Kakap merah – Red snapper	235,156.0	33,826,600.0
	Katamba	369,823.0	32,442,915.0
	Kerapu – grouper	69,902.3	13,980,460.0
	Tenggiri – Narrow barred Spanish mackerel	767,000.5	124,673,587.0
	Tongkol - Frigate tuna	117,284.0	11,723,900.0
	Kuwe – Jack trevallies	133,561.0	8,347,252.0
	Anggoli	149,100.0	11,247,500.0
	Layang - scad	411,942.0	17,897,100.0
	Lencam/Katamba – emperors	40,700.0	3,536,250.0
	Kembung/Lema – short body mackerel	1,224,010.0	61,200,500.0
	Kurisi – Ornate threadfin bream	56,590.0	3,536,875.0

	Mixed species	628,712.5	64,024,125.0
	Shark	526,924.0	26,458,300.0
	Kaci-kaci	107,440.0	10,724,000.0
	Cakalang - Skipjack	258,050.0	38,707,500.0
15.0	Fish head	43,140.0	2,921,189.0
16.0	Fish eggs	152,915.7	76,457,850.0
17.0	Squids	104,595.0	19,524,065.0
18.0	Seaweed	2,397,168.0	179,782,600.0
19.0	Biji Mutiara/Chessy pearl	520,911.5	293,044,875.0
20.0	Snails	66,414.0	6,145,913.0
21.0	Snail juveniles	6,850.0	4,084,375.0

Source: Fishery Office of Aru Islands Regency

Figure III.30 Some species caught and landed in Dobo, Aru Islands

Red snappers landed and processed in Dobo (Aru Islands) are mostly shipped to Tual, Surabaya, Makassar and Jakarta. Dobo is also used as a transit port for the *"Kapal Balai"* from Probolinggo. There is no official fishing port yet in Dobo. There is a commercial port, which is called as Sudarso or PELNI.

There are two companies based in Benjina, namely: CV. Bahari Aru Pratama (a miniplant) and PT. Pusaka Benjina Resources (previously PT Jayanti Group). CV Bahari Aru Pratama is a small processing plant, with the cold storage capacity of 15 to 25 tonnes. The company ships the frozen fillet to Surabaya.

PT. Pusaka Benjina Resource started to operate in 2006-2007 and has cold storage with capacity of 500 tonnes. There are about 260 people working in this company (both in the sea and in land). They process frozen gutted and gilled fishes, including *kurisi* (ornate threadfin bream), *mayung*, *layang* (scad), *belusik*, *lencam* (emperor), snapper, *kembung* (mackerel), *layur* (ponyfish), and shark. All the products get exported to Thailand (about three shipment in a month, one shipment is about 2000 tonnes). They started to ship fish (especially kembung or mackerel) to Jakarta (Muara Baru) last year.

Figure III.31 Fishing Port at PT. Pusaka Benjina Resource

The company owns more than 70 units of fish nets, with most of the crews are from Thailand (the manager informed that out of 25 crews, there are only five Indonesian). Fish net spends about 2 to 3 months in one trip. The fishing grounds are around Arafura and Aru Sea. Average catch rate per trip per vessel is about 200 to 300 tonnes (depend on the size of the vessel).

Figure III.32 Fish nets landed in Benjina

The frozen fishes stored in the cold storage in Benjina then loaded to carrier vessels to be directly exported to Thailand.

Figure III.33 Frozen fishes stored in the cold storage in Benjina

Figure III.34 Red snappers included in the mixed frozen fishes exported to Thailand

Figure III.35 Loading process to the Thai carrier vessels in Benjina

Based on the observation in the field, there is no officer from Fishery Office to make record of the fishery products get exported to Thailand. So the export data is gained from the company.

Table III.11 Fishery commodities exported to Thailand from PT. Pusaka Benjina Resource

No	Commodities	Export Volume (in Kilos)			
		2008	2009	2010	2011
1	Frozen Mixed Fishes	28,553,822	17,049,870	47,909,091	58,205,052
2	Frozen Squid	349,590	255,166	596,558	891,994
3	Frozen Mixed Shrimp		8,885	100,457	129,090
	TOTAL	**28,903,411**	**17,313,921**	**48,606,106**	**59,226,136**

Source: Aru Islands Fishery Office

The data shows that the export volumes have been increasing in the last 4 years. In 2011, total export for frozen mixed fishes reached 58 thousands tonnes.

III.2.5 Merauke, Papua

There are at least four fishing companies operating in Merauke, namely:

1. PT. Sino (a Chinese company).
   This company has 9 units of fish trawls. It is based in Kolam Bandar, Merauke. All fishes and other marine products are shipped directly to China.

Figure III.36 PT Sino located in Kolam Bandar, Merauke

2. PT. Dwi Karya (previously known as Jayanti Group), based in Wanam.
   The company has hundreds of fishing vessels (> 100 GT) and has private fishing port. This company also buys and collects fishes from the local fishermen, including the ones in Mapi

and Asmat District (mostly *kakap rawa*). All the fishes get exported directly to China. In this trip, we did not go to Wanam due to transportation problem (only three times flight per week).

3. PT. Modern Mitra Sejati (cold storage).
   This cold storage (with capacity of 20 tonnes) was established by KKP and rented to this company. The company started to operate in 2008, and has been sending frozen gutted and gilled whole fishes to the processing companies in Surabaya (about 15 tonnes per shipment). The average price of this frozen fish in Surabaya is about IDR 22,000 to 25,000 per kilo. About 90% of the products are *kakap putih* or barramundi. This company owns 4 collecting boats (< 6GT) that collect fishes from the gillnet fishermen in estuaries along the coast in Darmande. The average price at fishermen level is about IDR 5000 to 8000 per kilo. These collecting boats spend 14 to 18 days in the sea to collect the fishes.

Figure III.37 A miniplant in Merauke, Papua

4. CV. Cipta Jaya (processing plant)
   The facilities, with capacity of 20 tonnes also belong to the local government (KKP), and rented to the company. Fishes processed into fillet here are mainly *kakap putih* or barramundi, *kuru* or *senangin* (threadfins). The plant manager confirmed that there are no red snappers come into this plant. These frozen fillet fish will then be sent to Probolinggo. In the first year (2008), the company did five shipments to Probolinggo (frozen fillet). One shipment is about 10 to 15 tonnes. The plant has stopped operating due to lack of raw material in the last two months. This company does not have their own boats, so they really depend on the small-scale fishermen (< 5GT) or middlemen to supply them with the fishes.

Merauke Regency processed and sent some fishery products to the other islands in Indonesia, mainly to Jakarta, Makassar, Surabaya, Sorong and Jayapura. These products include shark fin, fish maw *(gelembung ikan)*, shark skin, ray skin, fish bones, shrimp paste, dried shrimp, fillet, etc – Table III.12.

Table III.12 Processed fishery products sent to other islands from Merauke Regency

No	Processed Fishery Products	Volume/Year (Kilo)		
		2009	2010	2011
1	Shark fin	20,140	7,994	9,819
2	Fish maw	50,363	32,395	32,041
3	Shark skin	41,115	18,805	31,561
4	Rays skin	250	1,200	17
5	Fish bone	21,425	8,915	18,734
6	Shrimp paste	126,316	6,760	-
7	Dried shrimp	7,377	8,000	1,040
8	Salted fish	-	-	172,760
9	Rays	-	-	1,703
10	Fish fillet	-	-	60,000
11	Snapper skin	-	-	624
12	Crocodile skin	-	-	949
13	Frozen shrimp	-	-	200
	TOTAL	**266.986**	**84,069**	**328,930**

Source: Fishery Office of Merauke Regency

Fishing companies in Merauke Regency, Papua export frozen shrimps, frozen fish, frozen squids, etc to Hong Kong, Vietnam, China, Japan, Korea, etc. – Table III.13.

Table III.13 Total export volume from Merauke Regency (2009)

No	Company	Type of Products	Volume (kilo)	Value (USD)	Destination
1	PT. Tri Kusuma Graha	Frozen shrimps	932,015	4,732,269	Hong Kong, Vietnam, China, Japan, Korea, Lebanon, Spain, Thailand and Australia.
2	PT. Dwi Karya Reksa Abadi	Frozen fishes	31,955,573	5,574,580	
3	PT. Tamajaya Fisherindo	Frozen fishes	14,596,860	2,431,587	
4	PT. Sino Ind Shunlinda Fishing	Frozen fishes	4,838,100	843,766	
5	PT. Mina Jaya Bahari	Frozen fishes	774,160	100,348	
		Frozen shrimps	3,700	480	
		Frozen squids	34,000	4,407	
6	PT. Marina Bahtera Buana	Frozen fishes	861,240	111,636	
		Frozen shrimps	3,340	433	
		Frozen squids	37,480	4,858	
7	PT. Bahtera Buana Mandiri	Frozen fishes	321,880	41,723	
		Frozen shrimps	2,160	280	
		Frozen squids	27,040	3,505	
8	PT. Megatama Adhijaya	Frozen fishes	543,420	70,439	
		Frozen shrimps	4,860	630	
		Frozen squids	40,000	5,185	
9	PT. MAP Mandiri	Fish fillet	3,400	19,720	
		Total	54,979,228	13,945,846	

IV. Market Analysis and Key Stakeholders Involved

IV.1 Market Analysis of Snappers from Arafura and Timor Sea

It is not easy to obtain data on total export of snapper from Indonesia and how much of it goes to which countries. There is lack of information on the production and market distribution of Indonesian snapper. Until late 90s and even in early 2000, snapper is not considered as the main focus of export management by Indonesia government. In the government publication of fishery products export statistics; snapper is not listed as individually separated items as other commercially important species, such as tuna, skipjack, trout, sardines, etc.

Instead, snapper is included under 'others' in each category of Indonesian fishery products export, namely: fresh/chilled fish - whole round, frozen fish - whole round, fresh/chilled fish - fillet and frozen fish – fillet.

United States, EU countries, Japan, Hong Kong, Taiwan, Singapore, Malaysia, South Korea, Australia, Thailand and Middle East as main markets (WPI 2009, MMAF 2009). The precise volume and value of exported snapper to each destination country are not known. However, data from Foreign Trade Data Base shows that US snapper import from Indonesia ranged from 1 to 2 thousands metric tonnes per year in the last five years, mostly in the form of frozen boneless fillet. This means that most of snapper from Indonesia goes to US market, fluctuated from 50 to 85% of total snapper export per year.

As presented in Chapter III (Supply Chain Analysis), there are three at least three major markets for snappers from Arafura and Timor Sea:

1. To domestic market: where snappers mostly caught by small scale, artisanal fisheries.
2. To the US market: where raw materials supplied from the bottom longline based in Probolinggo (East Java). The snappers caught by these vessels are considerably high quality snappers.
3. To China and Thailand market: where snappers came from the fish nets based in Ambon, Dobo and Benjina. The snappers caught by these vessels are considerably low quality snappers.

According to the data from some major processors/exporters, snappers from Indonesia are mostly exported in the forms of:

1. Frozen Whole round, which consist of:

    - Whole Gills Gutted Scaled (WGGS) – Gill off, Gut off and Scale off (Size: 0.5-1, 1-2 lbs)

- Whole Gilled Gutted (WGG) – Gill off, Gut of and Scale on (Size: 0.5-1, 1-2 lbs)

2. Frozen Fillet, which consists of:

- Fillet natural skinless/boneless
    - Size: 4/6, 6/8, 8/10, 10/12, 12 Oz UP
- Fillet natural skin-on/boneless
    - Size: 4/6, 6/8, 8/10, 10/12, 12 Oz UP
- Fillet portion cut skin-on/boneless,
    - Size: 4/6, 6/8, 8/10, 10/12, 12 Oz UP
- Fillet portion cut skinless/boneless
    - Size: 4/6, 6/8, 8/10, 10/12, 12 Oz UP
- Steak skin-on/bone-in
    - Size: 4/6, 6/8, 8/10, 10/12, 12 Oz UP

Figure IV.1 Types of Indonesian Snapper *(Lutjanus sp.)* Products for Export

1. Whole Gills Gutted Scaled (WGGS)
(Source: http://www.multisari.com)

2. Fillet natural skin-on/boneless
(Source: http://www.dharmasamudera.com)

3. Fillet portion cut skin-on/boneless
(Source: http://www.dharmasamudera.com)

4. Steak skin-on/bone-in
(Source: http://www.alamjayaseafood.com)

IV.2 Indonesia Snapper at US Market

Indonesia has been the second biggest frozen snapper supplier to US market, contributing to 18% of total frozen snapper import to US market, following Brazil (42%) – Table IV.1.

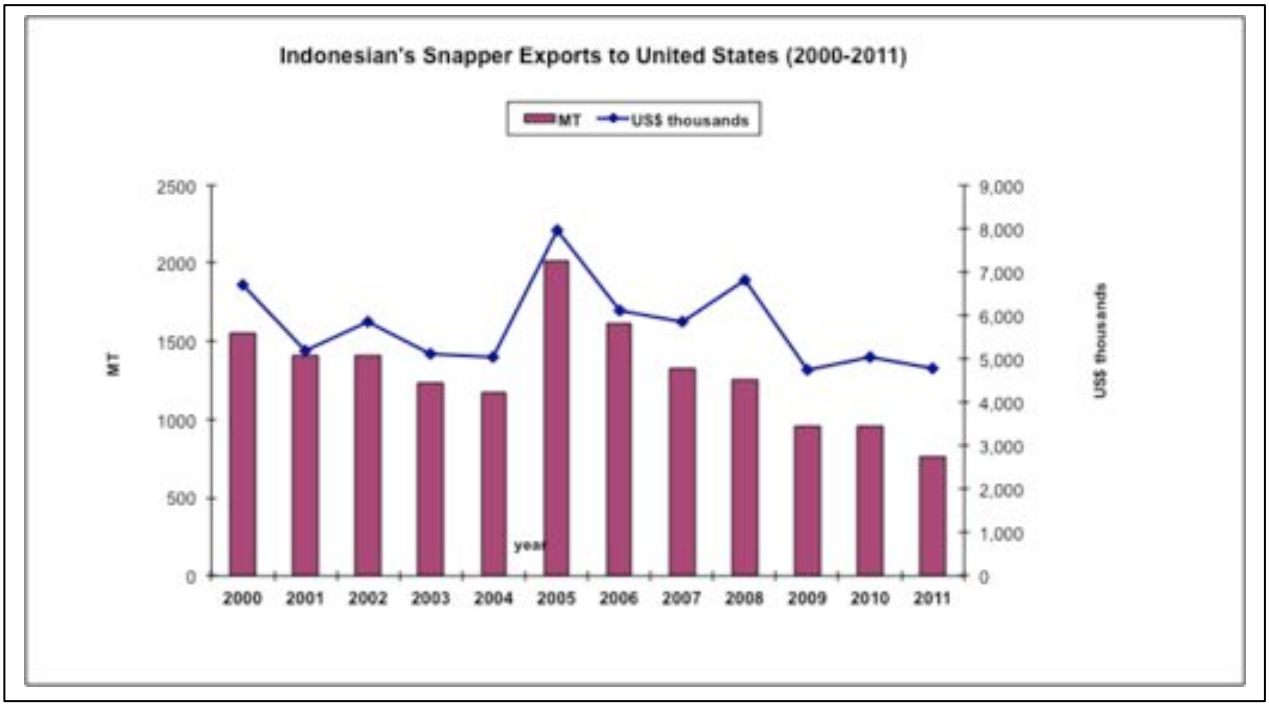
Table IV.1 Major frozen snapper supplying countries to US Market (2011)

Country	2011 Kilos	%
Brazil	1,624,359	42.1
Indonesia	691,308	17.9
Guyana	420,565	10.9
Mexico	392,270	10.2
Suriname	278,682	7.2
Nicaragua	165,443	4.3
Thailand	107,730	2.8
India	38,656	1.0
Viet Nam	37,139	1.0
New Zealand	31,095	0.8
Chile	22,769	0.6
Honduras	16,254	0.4
Costa Rica	6,989	0.2
Panama	6,817	0.2
United Emirates Arab	4,500	0.1
Belize	4,227	0.1
South Africa	3,910	0.1
El Salvador	2,268	0.1
Venezuela	2,176	0.1
Italy	794	0.0
Total	**3,857,951**	**100**

Source: processed from Foreign Trade Information (http://www.st.nmfs.noaa.gov)

Although Indonesia is still the second biggest frozen snapper suppliers to US market, the export volume has showed a downward trend since 2006 until now. Indonesia snapper export to US reached the highest point in 2005 with more than two thousands tonnes, valued at US$ 7.9 million. In 2011, Indonesia's snapper export to US market dropped to 759 kilos, valued at US$ 4.8 million.

Figure IV.2 Trends in U.S. Fresh and Frozen Snapper Import from Indonesia (2000-2011)



Source: processed from Foreign Trade Information (http://www.st.nmfs.noaa.gov)

IV.3 Major Snappers Players at US Market

According to foreign trade data base from Urner Barry, the major US importers of snappers from Indonesia are IP Trading, Popaco Enterprises, Beaver Street Fisheries, North Atlantic, South Fresh Aquaculture, etc) – Table IV.2

Table IV.2 List of Major US importers for Indonesian snapper (2010)

No	Importer
1	IP Trading
2	Popaco Enterprises
3	Beaver Street Fisheries
4	North Atlantic
5	Southfresh Aquaculture
6	National Fish and Seafood
7	Eastern Overseas Marketing
8	Top Cath Seafood
9	Censea
10	Twin Tails Seafood
11	Bank of Ireland
12	Fimbank PLC
13	Empresa Pesquera

14	Banco Santander of Puerto Rico
15	Sea to Sea

Source: Foreign Trade Data Base

Most of importers also play a role as wholesalers who sell and distribute snapper from Indonesia to retailers/supermarkets. For example, Beaver Street Fisheries sells their imported snapper from Indonesia under "Sea Best" and "Packer" brands, where Pacific Coral Seafood sells it under "Ocean Straits" brand. Hilo Fish sells snapper from Indonesia under "Krimson" brand. Retailers that selling Indonesia's snapper in US market are Publix, Kroger, Costco and Safeway.

IV.4 Processors (and Exporters)

Key processors/exporters of snapper in Indonesia are Alam Jaya, Bonecom, Kelola Mina Laut, Sukses Lautan Indonesia, Multi Sari Makassar, Varia Niaga Nusantara, Kemilau Bintang Timur, and Inti Luhur Fuja Abadi – Table IV.3. These companies contribute to more than 75 of total snapper export to US market.

Table IV.3 List of major snapper processors/exporters and their major buyers at US market

Rank	Exporter	Percent	US Importers/Buyers
1	Alam Jaya	14.33	Sea to Sea LLC, Vitin Auto Body Parts, Wells Fargo Bank, Twin Tails Seafood Corp, Nunez Foods Inc, Northwestern Selecta Inc, Censea, PNC Bank, Chicken of the Sea
2	Bonecom	12.07	IP Trading, Great Ocean
3	Sukses Lautan Indonesia	10.28	Pacific Coral Seafood, Eastern Overseas Marketing, Beaver Street Fisheries
4	Bumi Menara Internusa	8.61	Crystal Cove Seafood, A & D Foods, Vandergrift Forwarding Co, Pacific Coral Seafood
5	Graha Insan Sejahtera	7.48	Seafood Import, Netuno USA
6	Varia Niaga Nusantara	6.89	National Fish and Seafood, Tri Union Frozen Food
7	Multi Sari Makassar	5.98	Censea, Southfresh Aquaculture
8	Kemilau Bintang Timur	4.82	Crystal Cove Seafood, Top Catch Seafood
9	Indo Pratama Jaya	2.04	Great Ocean
10	Fresh on Time	1.87	Lawrence Whosale LLC, PNC Bank
11	Inti Luhur Fuja Abadi (ILUFA)	1.42	Eastern Overseas Marketing, Tri-Union Frozen Foods LLC

V. Market and Policy Tools for Sustainable Management of the Snapper Fishery

The purpose of this study is to understand precisely what tools exist to promote sustainable management of snapper fisheries – both market based and policy. It is expected that the primary outcome of this study will be a set of recommendations on which tools are most applicable in Indonesia.

V.1. Definition of seafood sustainability in the U.S. market

Many of retailers have stated their objective of sourcing only from certified fisheries, using Marine Stewardship Council (MSC), Best Aquaculture Practices (BAP) or other equivalent standards. Some of retailers already have an on-going initiative to track the progress of their supply chain in meeting this objective. For example, Walmart U.S. and Sam's Club U.S. require all fresh and frozen farmed and wild seafood products to become third party certified as sustainable using Marine Stewardship Council (MSC), Best Aquaculture Practice (BAP), or equivalent standard. To achieve this, they require currently uncertified fisheries and aquaculture suppliers to develop work plans to achieve certification and report progress biannually. Plans must be in development by May 2012 and finalized and underway no later than June 2012.

The Conservation Alliance (consist of Blue Ocean Institute, David Suzuki Foundation, Ecology Action Centre, Environmental Defense Fund, FishChoice, FishWise, Living Oceans Society, Monterey Bay Aquarium, Natural Resources Defense Council, New England Aquarium, Ocean Conservancy, Shedd Aquarium, Sierra Club British Columbia, Sustainable Fisheries Partnership, Vancouver Aquarium Ocean Wise, World Wildlife Fund – U.S) are often asked by the their partners their position on the specific strategy towards sustainability.

The members of Conservation Alliance have been discussing to ensure that fishery improvement projects that receive recognition in the marketplace are making measurable progress toward environmental sustainability. To be considered for recognition by members of the Conservation Alliance for moving toward sustainability, a fishery improvement project must take measureable steps within a defined timeframe to achieve a level of sustainability consistent with an unconditional pass of the Marine Stewardship Council standard.

V.2. Role of the market (buyers) in defining/supporting sustainability policy

The Sustainable Fisheries Partnership (SFP) is working with key buyers to help improve the sustainability of key fisheries in Indonesia, including snapper fishery.

Since October 2011, SFP has been in communication with PT Ilufa, one of the major Indonesian snapper processors and producers, to start the FIP process for their artisanal and larger vessels

together with their main buyer (North Atlantic). Both PT Ilufa and North Atlantic expressed interest in developing a fishery improvement project for the snapper fishery they are sourcing from. PT Ilufa's snappers come from various locations, including the Aru, Arafura, and Timor Seas. SFP has been assiting potential FIP members to develop a workplan and provide guidance and advice on the implementing activities.

The Sustainable Fisheries Partnership proposes to facilitate the formation of an Indonesian Snapper Producers Association. This association will play a key role in working with government regulators and fishermen to adopt programs that mitigate current stock and environmental challenges to sustainability. Formation of a producers association has worked well for SFP in other fisheries improvement initiatives including Indonesian blue swimming crab and Russian Pollock.

In the United States, Indonesian snapper buyers group should be established. The purpose of this group will be to assist SFP in communicating with Indonesian snapper producers and supporting efforts to improve the fishery.

V.3. Traceability

It is very important to implement seafood traceability as a measure for combating illegal, unreported and unregulated (IUU) fishing. Promote traceability by engaging supply chains to ensure that the origin and status of snapper products are well-known and all products source from legal fisheries.

European Union has stated that all seafood products imported to EU market has to be completed with *"catch certificate"* (European Council Regulation No. 1005/20008). Government of Indonesia has responded this regulation by appointing Directorate General of Capture Fisheries as competent authority to implement Sertifikasi Hasil Tangkap Ikan (SHTI) or Captured Fish Certificate. To implement this, the DG has appointed 21 Head of Fishing Ports as local competent authority to validate and release the catch certificate.

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