PART I
Status and Trends of Capture Fisheries and Aquaculture in Southeast Asia

I. GLOBAL PRODUCTION AND UTILIZATION OF FISH

Fish and fishery products are among the most important agricultural commodities providing significant contribution to the world's food security and economic development. Out of the total value of the global agricultural products reported at US$ 1,168.85 billion in 2009, fish or fishery products accounted for US$ 90.73 billion or about 8% of the total value (WTO, 2010). Aside from its contribution to the world's economies, fish and fishery products are also important source of protein for people worldwide and represent a significant part of the diets of peoples in many countries. From 2000 to 2009, the global fishery production had continuously increased from about 131.0 million MT to 145.1 million MT (**Table 1**) while the percentage of the production for human consumption also gradually rose from almost 74% to 81% (**Fig. 1**). It should however be noted that the increasing trend in total fishery production is mainly due to the increasing contribution from aquaculture sector, while the production from capture fisheries has gradually been declining. With the world's population increasing from 6.1 billion to 6.8 billion over the same period, the per capita fish consumption has also escalated (**Fig. 2**) and is expected to continue to rise particularly in the developing countries where the population and demand for food are continuously growing because of increased income and purchasing power for high value and quality food including food fish. In addition, the fishery sector with its ancillary activities which has expanded with increased numbers of people employed, significantly contributes to improved livelihoods and employment opportunities, as well as to the enhanced well-being of millions of peoples including those in the Southeast Asian region.

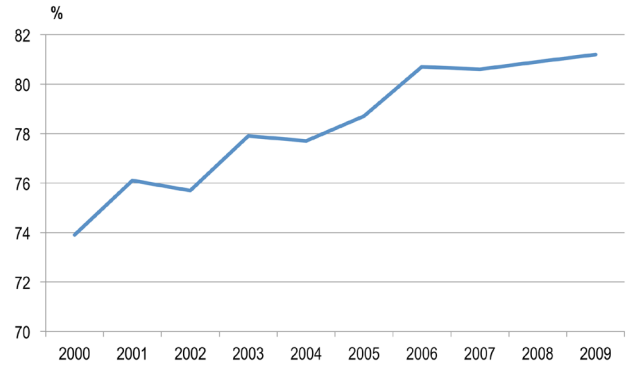

Figure 1. Percentage of fishery production used for human consumption from 2000 to 2009

Sources of data: *FAO State of World Fisheries and Aquaculture 2004 and 2010*

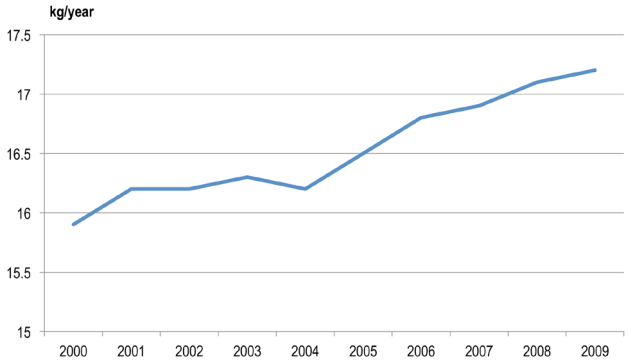

Figure 2. Global per capita fish consumption (kg/year) from 2000 to 2009

Sources of data: *FAO State of World Fisheries and Aquaculture 2004 and 2010*

The global fishery production by continent (**Table 2**) indicates that production from both capture fisheries and aquaculture during the period from 2000 to 2009 had been increasing at the rate of approximately 1.41 million MT per year. In the like manner, production from the Asian Continent (including Southeast Asia) also increased by

Table 1. World's fishery production and utilization from 2000 to 2009

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Production (million MT)										
Capture	95.5	92.9	93.2	90.3	92.4	92.1	89.7	89.9	89.7	90.0
Aquaculture	35.5	37.8	39.8	41.9	41.9	44.3	47.4	49.9	52.5	55.1
Total	**131.0**	**130.7**	**133.0**	**132.2**	**134.3**	**136.4**	**137.1**	**139.8**	**142.3**	**145.1**
Utilization (million MT)										
Human consumption	96.8	99.5	100.7	103	104.4	107.3	110.7	112.7	115.1	117.8
Non-food uses	34.2	31.1	32.2	29.2	29.8	29.7	26.3	27.1	27.2	27.3
Population (billions)	6.1	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.8
% of production for human consumption (%)	73.9	76.1	75.7	77.9	77.7	78.7	80.7	80.6	80.9	81.2
Per capita fish consumption (kg)	**15.9**	**16.2**	**16.2**	**16.3**	**16.2**	**16.5**	**16.8**	**16.9**	**17.1**	**17.2**

Sources: *FAO State of World Fisheries and Aquaculture 2004 and 2010*

about 1.96 million MT per year. Specifically in 2009, the Asian Continent remained the world's largest fish producer contributing about 66% to the world's total fishery production.

Moreover, the contribution of the Southeast Asian region to the total fishery production in 2009 was about 30% with respect to the Asian Continent's total production and 20% to the global fishery production. While the ten-year global fishery production seems to follow an increasing trend, some of the world's continents such as the Americas and Europe had been providing stable or gradually declining inputs but the contribution from Asia and the Southeast Asian region has continued to be steadily increasing and providing significant contribution to the rising fishery production of the world.

II. FISHERY PRODUCTION OF SOUTHEAST ASIA

The Southeast Asian region (**Fig. 3**) is bordered by the Andaman Sea and the Indian Ocean on the west, and the western part of the Pacific Ocean on the east. Although the region comprises 11 countries, namely Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Timor-Leste, Thailand and Vietnam; but, due to the inavailability of fishery statistics and information from Timor-Leste, the scope of this publication would focus mainly on the ten ASEAN Member Countries.

In terms of fishery statistics for both capture fisheries and aquaculture, fishery production of the countries in the Southeast Asian region is reported under FAO Fishing Area 57 (Indian Ocean, Eastern), 71 (Pacific, Western Central), 61 (Pacific, Northwest), and 04 (Asia, Inland Water). Based on such arrangement, the total fishery production of the Southeast Asian region from 2000 to 2009 is compiled by SEAFDEC from inputs of the countries and published in the Fishery Statistical Bulletin for the South China Sea Area 2000-2007 and the Fishery Statistical Bulletin of Southeast Asia 2008-2009, as summarized in **Table 3**.

The fisheries of the region are by nature tropical, multi-species and multi-gears, and involve large numbers of fishers and farmers mostly engaged in small-scale fishing operations and aquaculture practices. Indonesia consistently remains the highest producer of fish and fishery products from 2000 to 2009 with an average annual production increase of almost one-half of a million MT (**Fig. 4**). Vietnam which also recorded an increasing production trend of about 280,000 MT per year ranked the

Table 2. Fishery production by continent from 2000 to 2009 (million MT)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
World	**131.0**	**130.7**	**133.0**	**132.2**	**134.3**	**136.4**	**137.1**	**139.8**	**142.3**	**145.1**
Africa	7.3	7.7	7.6	8.0	8.2	8.4	7.9	8.1	8.4	8.3
Americas	27.6	25.2	26.4	23.2	27.9	26.5	25.1	24.6	24.5	23.6
Asia*	59.4	60.5	61.2	62.3	59.0	60.6	62.1	64.3	65.4	67.0
Southeast Asia**	**16.9**	**17.6**	**18.9**	**20.3**	**21.2**	**23.0**	**24.5**	**25.3**	**27.2**	**28.9**
Europe	18.6	18.4	17.6	17.0	16.4	16.2	15.9	15.9	15.4	15.9
Oceania	1.2	1.3	1.3	1.4	1.6	1.7	1.6	1.6	1.4	1.4

* *Excludes Southeast Asia*
** ***Sources:*** *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010, 2011)*
Source of other data: *FAO Fisheries and Aquaculture Information and Statistics Service*

Table 3. Total fishery production of the Southeast Asian countries from 2000 to 2009 (MT)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Brunei Darussalam	2,577	1,575	2,152	2,160	3,133	3,103	3,100	3,227	2,747	2,418
Cambodia	298,798	441,200	424,432	390,657	343,492	546,000	661,542	525,100	536,320	515,000
Indonesia	5,120,490	5,409,504	5,515,648	5,915,989	6,005,622	6,646,965	7,183,586	7,510,767	9,054,873	10,064,140
Lao PDR	71,000	81,000	93,000	95,000	95,000	107,800	107,800	91,660	93,500	105,000
Malaysia	*1,457,139**	1,411,740	1,467,486	1,483,957	*1,537,988**	*1,421,403**	*1,644,527**	1,654,221	*1,753,310**	*1,870,000**
Myanmar	1,309,830	1,474,460	1,606,240	1,987,020	2,148,580	2,581,780	2,817,990	2,808,037	3,147,605	3,491,103
Philippines	*2,993,332***	*3,166,528***	3,369,524	3,619,282	3,926,173	*4,161,870***	*4,408,472***	*4,711,252***	*4,966,889***	*4,079,977***
Singapore	9,984	7,784	7,795	7,109	7,579	7,837	11,675	8,026	5,141	5,687
Thailand	3,713,248	3,648,429	3,797,014	3,914,025	4,137,066	4,132,826	4,051,824	3,675,382	3,204,200	3,137,672
Vietnam	1,961,145	2,009,623	2,647,407	2,859,200	2,944,030	3,397,200	3,656,152	4,315,500	4,559,720	4,782,400
Total	**16,937,296**	**17,621,843**	**18,930,761**	**20,274,399**	**21,147,665**	**22,987,784**	**24,501,878**	**25,302,872**	**27,207,826**	**28,917,096**

Sources: *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010, 2011)*
* *Updated figures provided by Fisheries Management Information Division, DoF Malaysia; but not used for the calculation of total production.*
** *Updated figures provided by the Philippine Bureau of Agricultural Statistics,Department of Agriculture; but not used for the calculation of total production.*

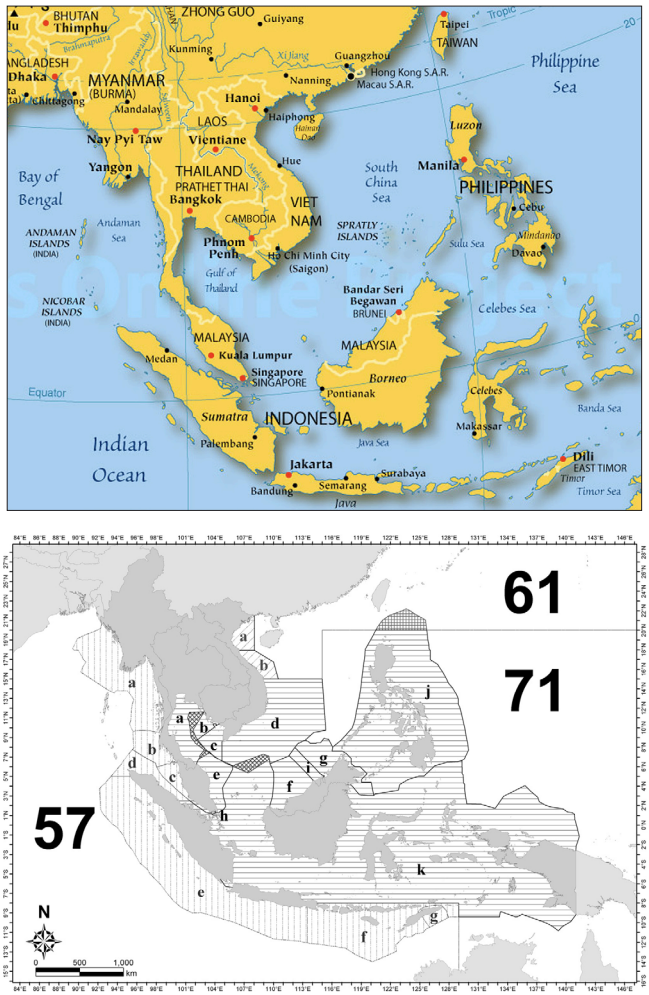

Figure 3. Map of Southeast Asia (above) with corresponding FAO Fishing Areas (below)

second with Myanmar and Philippines having production growth of about 200,000 MT per year placing third and fourth, respectively. Although Thailand's production was second after Indonesia in 2000, its production went through a see-saw pattern during the ten-year period until 2009 that landed the country into the fifth place in terms of total fishery production. From an increasing production growth of about 85,000 MT per year from 2000 to 2004, the fishery production of Thailand decreased from 2005 until 2009 at an average rate of about 200,000 MT per year.

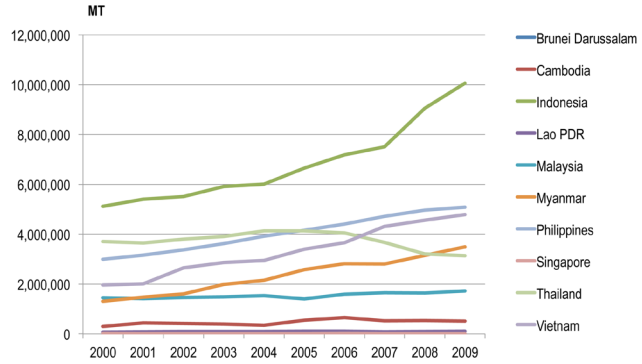

Figure 4. Fishery production of Southeast Asia by country

Table 4. Fishery production (quantity and value) of Southeast Asia by sub-sector in 2009

Sub-sector	Quantity (MT)	Value (US$ 1000)	Value (US$/MT)
Marine Capture Fisheries	14,140,387	10,416,661	737.00
Inland Capture Fisheries	2,397,273	2,834,477	1,182.00
Aquaculture	12,379,436	15,964,173	1,290.00
Total	**28,917,096**	**29,215,311**	

Source: *Fishery Statistical Bulletin of Southeast Asia (SEAFDEC, 2011)*

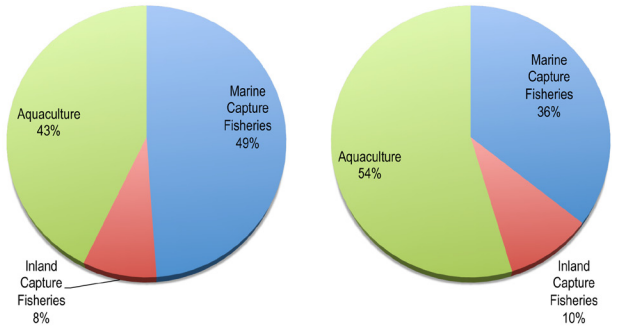

Figure 5. Percentage of Southeast Asia's fishery production by sub-sector in 2009 (left: by quantity; right: by value)

The fishery production of Malaysia also encountered ups and downs during the same ten-year period.

Fishery production of the Southeast Asian region comes from three sub-sectors, namely marine capture fisheries, inland capture fisheries, and aquaculture. **Table 4** which shows the total fishery production of the region by sub-sector in 2009 indicates that the largest portion of the production is derived from marine capture fisheries accounting for approximately 49% followed by aquaculture of about 43%, and inland fisheries 8% (**Fig. 5**). While marine fisheries contribute the largest volume of production, its production value which accounts for 36% of the total production value only comes next to aquaculture which contributes approximately 54% and that of inland capture fisheries was about 10%. While the value per metric ton of aquaculture production was about US$ 1,290/MT that of marine capture fishery production was only about US$ 740/MT.

III. MARINE CAPTURE FISHERIES PRODUCTION OF SOUTHEST ASIA

While the trend of the global marine capture fishery production seems to have slightly declined from 2000 to 2009 (**Fig. 6**), the production trend of the Southeast Asian region had been increasing at the rate of approximately 251,100 MT per year. In 2009, the Southeast Asian region contributed about 18% to the world's global production from marine capture fisheries.

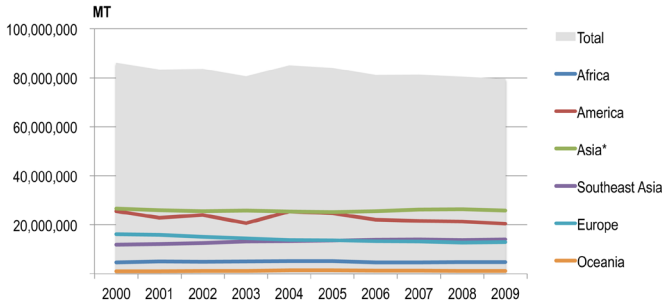

Figure 6. Global trend in marine capture fisheries production (* Asia excludes Southeast Asia)

The marine capture fishery production of the Southeast Asian countries in 2000-2009 (**Table 5**) indicated that Indonesia which is the largest producer accounting for 34% of the total production of the region in 2009. The Philippines which emerged as the second largest producer of the region contributed 17% to the total production of the region. After Indonesia and Philippines come Vietnam accounting for about 15% of the total production, Myanmar at 13%, Thailand at about 11%, and Malaysia at about 9% of the total production. Moreover, the volumes of the marine capture fishery production of Cambodia, Singapore and Brunei Darussalam represent less than 1.0% of the region's total production while Lao PDR does not produce any marine aquatic products being a landlocked country.

As mentioned earlier, the trend of marine capture fisheries production in the Southeast Asian region has been increasing from 2000 to 2009 at an average increase of about 251,000 MT per year. The countries that contribute to the increasing production trend include Indonesia, Myanmar, Vietnam, Philippines, Malaysia and Cambodia while in the case of Thailand although its production in 2000 was 2,773,665 MT it had some traces of ups and downs in certain years and finally decreased to 1,496,162 MT in 2009. Only small amount of production from capture marine fisheries had been reported by Singapore and Brunei Darussalam.

Specifically, Indonesia's increased production of 14 major groups of marine species that include marine fishes nei

Table 5. Production volume from marine capture fisheries in Southeast Asia by country from 2000 to 2009 (MT)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Brunei Darussalam	2,464	1,476	2,044	1,985	2,425	2,709	2,279	2,551	2,357	1,958
Cambodia	3,600	4,200	45,882	55,607	55,817	60,000	60,500	54,900	66,000	75,000
Indonesia	3,807,191	3,966,480	4,073,506	4,383,103	4,320,241	4,408,499	4,512,191	4,734,280	4,701,933	4,789,410
Lao PDR	...	...	...	...	...	...	...	...	...	...
Malaysia	*1,285,696**	1,231,275	1,272,078	1,283,256	1,331,645	1,209,601	*1,371,733**	1,381,424	1,394,531	*1,393,226**
Myanmar	949,670	1,026,460	1,060,250	1,132,340	1,220,030	1,375,670	1,525,000	1,485,740	1,679,010	1,867,510
Philippines	*1,740,309***	1,809,727	1,899,487	2,031,487	2,067,128	2,122,216	2,154,802	*2,328,149***	2,377,514	*2,413,863***
Singapore	5,371	3,342	2,769	2,085	2,173	1,920	3,103	3,522	1,623	2,121
Thailand	2,773,665	2,631,702	2,643,711	2,651,223	2,635,969	2,615,565	2,484,803	2,079,351	1,644,800	1,496,162
Vietnam	1,280,590	1,481,175	1,575,640	1,647,482	1,745,413	1,791,100	1,816,100	1,987,400	1,946,600	2,098,300
Total	**11,880,478**	**12,196,637**	**12,575,367**	**13,188,568**	**13,380,841**	**13,586,961**	**13,938,748**	**14,056,985**	**13,814,368**	**14,140,387**

Sources: *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010, 2011)*
* *Updated figures provided by Fisheries Management Information Division, DoF Malaysia; but not used for the calculation of total production.*
** *Updated figures provided by the Philippine Bureau of Agricultural Statistics,Department of Agriculture; but not used for the calculation of total production.*

Table 6. Production value from marine capture fisheries in Southeast Asia by country from 2000 to 2009 (US$ Million)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Brunei Darussalam	...	...	...	...	...	...	...	8	7	5
Cambodia	...	...	...	...	...	...	...	...	...	111
Indonesia	1,810	2,225	2,896	2,927	3,164	3,726	4,106	4,868	4,957	1,687
Lao PDR	...	...	...	...	...	...	...	...	...	...
Malaysia	*1,158**	*1,096**	*1,107**	1,056	*1,103**	*1,087**	*1,343**	*1,464**	*1,667**	*1,833**
Myanmar	...	...	...	...	...	...	...	...	1,585	3,081
Philippines	1,445	1,322	1,444	1,459	1,597	1,681	1,997	2,452	2,811	*2,650***
Singapore	11	7	6	6	6	6	111.5	14.3	8.6	10.4
Thailand	1,230	1,197	1,346	1,545	1,535	1,533	1,629	1,586	1,276	1,244
Vietnam	...	924	875	964	...	...	...	...	...	...
Total	**5,723**	**6,771**	**7,676**	**7,958**	**7,405**	**8,094**	**9,091**	**10,421**	**12,336**	**10,417**

Sources: *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010, 2011)*
* *Updated figures provided by Fisheries Management Information Division, DoF Malaysia; but not used for the calculation of total production.*
** *Updated figure provided by the Philippine Bureau of Agricultural Statistics,Department of Agriculture; but not used for the calculation of total production.*

(*Osteichthyes*), scad nei (*Decapterus* spp.), skipjack tuna (*Katsuwonus pelamis*), short mackerel (*Rastelliger brachysoma*), stelophorus anchovies (*Stelophorus* spp.), kawakawa (*Euthynnus affinis*), goldstripe sardinella (*Sardinella gibbosa*), yellowstripe scad (*Selaroides leptolepis*), Bali sardinella (*Sardinella lemuru*), and frigate tuna (*Auxis thazard*) among others, had contributed to the country's overall increasing production trend. On the other hand, although production from marine capture fisheries of Myanmar and Vietnam had not been classified by species, both countries recorded escalating production trend of marine fishes nei (*Osteichthyes*). In the case of Myanmar, its production is mainly from Area 57 in the Eastern Indian Ocean, while for Vietnam its production comes from Area 71 in the Western Central Pacific Ocean. For the Philippines, increased production of six major groups of marine species that include sardinellas nei (*Sardinella* spp.), skipjack tuna (*Katsuwonus pelamis*), scad nei (*Decapterus* spp.), yellowfin tuna (*Thunnus albacares*), frigate tuna (*Auxis thazard*), and bigeye scad (*Selar crumenophthalmus*) among others, contributed to the country's rising production from marine capture fisheries.

Although some Southeast Asian countries did not report the value of their production from marine capture fisheries, the total value of the region's marine capture fishery production from 2000 to 2008 seemed to have increased corresponding to the increasing trend of the volume of production, but eventually dropped in 2009 (**Table 6**). This could have been due to the drastic drop of the production values of Indonesia and Philippines during the same year. Although Myanmar reported the value of its production only in 2008 and 2009, such value increased by almost 200% between these two years.

While production from marine capture fisheries of Indonesia especially from 2008 to 2009 appears to have been increasing, the value of its production during the same period decreased by about 60%, which could be due to the decreasing values of the production of major species that ranged from 86% for marine species nei, 83% for barramundi (*Lates calcarifer*) and scad nei (*Decapterus* spp.), 81% for skipjack tuna, 80% for narrow-barred Spanish mackerel (*Scomberomorus commerson*), 78% for snappers nei (*Lutjanus* spp.), 77% for longtail tuna

Table 7. Production from marine capture fisheries of the Southeast Asian countries by species groups in 2009

Major species groups	Quantity (MT)										Value (US$ 1000)
	Brunei Darussalam	Cambodia	Indonesia	Malaysia	Myanmar	Philippines	Singapore	Thailand	Vietnam	Total	
Shads, milkfish, barramudi, etc.	2	...	87,520	16,773	...	3,553	25	54	...	107,927	42,075
Flounders, halibuts, soles, etc.	9	...	28,930	6,891	...	920	...	6,537	...	43,287	39,906
Red fishes, basses, congers, etc.	1	...	127,980	47,878	...	13,619	96	31,685	...	221,259	108,611
Jack, mullets, sauries, etc.	156	...	791,190	176,736	...	346,167	501	124,756	...	1,439,506	924,786
Herrings, sardines, anchovies, etc.	291	...	569,570	26,024	...	560,739	43	101,608	...	1,258,275	587,971
Tunas	182	...	925,660	56,012	...	612,008	2	47,490	...	1,641,354	1,218,040
Mackerels	578	...	1,258,490	409,517	...	699,498	243	401,564	...	2,769,890	1,990,401
Sharks and rays	87	...	98,750	26,278	...	14,354	278	18,105	...	157,852	174,101
Misc. fishes	493	55,460	401,607	412,878	1,867,510	16,920	460	543,077	1,572,100	4,870,505	3,548,806
Crabs	2	...	69,320	...	...	31,241	32	25,270	...	125,865	156,171
Lobsters	0.3	...	11,500	805	...	293	11	1,006	...	13,615	20,367
Shrimps, prawns, etc.	103	...	139,750	29,264	...	41,511		52,084	...	262,712	508,306
Misc. crustaceans	0.3	5,013	96,160	73,137	...	5,982	332	5,170	127,300	313,094	5,679
Oysters	...	...	333	...	...	...	...	...	...	333	712
Mussels	...	...	520	...	...	29	...	...	...	549	1,570
Cockles, clams, etc.	...	...	71,790	23,746	...	361	...	16,295	...	112,192	141,301
Cuttlefish, squids, etc.	51	...	100,680	81,136	...	70,361	97	112,815	...	365,140	929,808
Mollusks	...	14,527	3,060	...	...	...	...	4,681	...	22,268	3,902
Invertebrates	0.1	...	6,600	4,013	...	1,282		3,965	398,900	414,760	14,148
Total	**1,958**	**75,000**	**4,789,410**	***1,393,226****	**1,867,510**	**2,418,838**	**2,121**	**1,496,162**	**2,098,300**	**14,140,387**	**10,416,661**

Source: *Fishery Statistical Bulletin of Southeast Asia (SEAFDEC, 2011)*
* *Updated figure provided by Fisheries Management Information Division, DoF Malaysia.*

(*Thunnus tonggol*), and 73% for yellowfin tuna (*Thunnus albacares*) among others.

In the case of the Philippines, while its production from marine capture fisheries also increased from 2008 to 2009, the corresponding values decreased by about US$ 500 million in 2009. This could have been brought about by a notable decrease in value of about 89% in marine fishes nei followed by slight decreases by 11 to 17% of the values of Indian mackerel (*Rastrelliger kanagurta*), skipjack tuna, yellowfin tuna, and scad nei (*Decapterus* spp.).

Specifically for 2009, production from marine capture fisheries of the Southeast Asian countries classified into species groups and reported in terms of quantity and value (**Table 7**), indicated that about 34% of the volume of the total marine capture production are from "Miscellaneous Fishes" although such volume was not recorded at more detailed species level. However, for some species that have been classified into major groups, the largest volume was provided by "Mackerels" followed by "Tunas", "Jack, mullets, sauries", and "Herrings, sardines, anchovies". For the non-fish groups, the largest volume was derived from "Cuttlefishes, squids" followed by "Miscellaneous crustaceans" and "Shrimp, prawns".

However, the highest value of the production per metric ton was that of the mussels at US$ 2,850/MT which were mainly produced by Indonesia and small quantity by the Philippines. This was followed by "Cuttlefishes, squids" at US$ 2,545/MT produced mainly by Indonesia and Thailand; oysters at US$ 2,140/MT from Indonesia; "Shrimp, prawns" at US$ 1,935/MT from Indonesia, Thailand, Philippines and Malaysia; lobsters at US$ 1,495/MT mainly from Indonesia and Thailand; crabs at US$ 1,240/MT from Indonesia, Philippines and Thailand; and sharks and rays at US$ 1,100/MT from Indonesia, Malaysia, Philippines, and Thailand.

3.1 Tunas

Tuna species which are important commercial fishery resources in the exclusive economic zones (EEZs) of the countries in Southeast Asia are taxonomically grouped into the family Scrombridae comprising about 50 species. The important tuna species in the region, in terms of production quantity and value, that are caught include the skipjack tuna (*Katsuwonus pelamis*), yellowfin tuna (*Thunnus albacares*), bigeye tuna (*T. obesus*), albacore tuna (*T. alalunga*), bluefin tuna (*T. thynnus*, *T. orientalis*, and *T. macoyii*), and the tuna-like species such as the long-tail tuna (*T. tonggol*), frigate tuna (*Auxis thazard*), bullet tuna (*A. rochei*), and kawakawa (*Euthynnus affinis*).

As of 2009, only six countries, namely: Brunei Darussalam, Indonesia, Malaysia, Philippines, Singapore, and Thailand could provide their respective tuna production statistics by species and by gear type, while Cambodia, Myanmar and Vietnam, although generally known to be engaged to a certain extent in tuna fisheries, could not provide their respective current tuna statistics (**Table 8**).

Thus for the Southeast Asian region, the volume of tuna production in 2009 was about 6% of the region's total fishery production and in terms of value, it contributed about 4%. However, the region's tuna production accounts for about 12% in terms of volume of the region's production from marine capture fisheries and also about 12% in terms of value. Indonesia is the leading tuna producer contributing about 56% of the region's total tuna production with the Philippines coming next contributing about 37%, and then Malaysia and Thailand with more than 3%. Furthermore, although skipjack tuna (*Katsuwonus pelamis*) provided the highest production accounting for more than 34% of the total tuna production of the region, in terms of value bullet tuna (*Auxis rochei*) ranks first at US$ 1,245/MT (**Table 9**) followed by the southern bluefin tuna (*Thunnus*

Table 8. Tuna production of Southeast Asia by country and by species in 2009

Common name	Scientific name	Quantity (MT)						
		Brunei Darussalam	Indonesia	Malaysia	Philippines	Singapore	Thailand	All countries
Frigate tuna	*Auxis thazard*	0.03	135,200	*1,837**	152,338	...	...	**287,538.03**
Bullet tuna	*Auxis rochei*	...	5,310	...	...	...	...	**5,310.00**
Kawakawa	*Euthynnus affinis*	55	189,260	*19,123**	49,973	...	22,177	**282,424.60**
Skipjack tuna	*Katsuwonus pelamis*	80	300,740	4,460	251,524	2	7,532	**564,338.29**
Long-tail tuna	*Thunnus tonggol*	47	98,920	*27,569**	...	...	14,106	**140,634.31**
Albacore tuna	*Thunnus alalunga*	...	37,380	203	...	...	24	**37,607.00**
Southern bluefin tuna	*Thunnus maccoyii*	...	800	...	...	...	...	**800.00**
Yellowfin tuna	*Thunnus albacares*	...	103,390	1,403	152,437	...	1,189	**258,419.00**
Bigeye tuna	*Thunnus obesus*	...	54,660	*1,837**	5,736	...	2,462	**64,283.00**
Total		**182**	**925,660**	***56,432****	**612,008**	**2**	**47,490**	**1,641,354.23**

Source: *Fishery Statistical Bulletin of Southeast Asia (SEAFDEC, 2011)*
* *Updated figures provided by Fisheries Management Information Division, DoF Malaysia.*

Table 9. Total tuna production of Southeast Asia by FAO Fishing Area and by species in 2009

Common name	Scientific name	Quantity (MT)		Total (MT) All areas	Value (US$ 1000)	Ave Value (US$/MT)
		Fishing Area 57	Fishing Area 71			
Frigate tuna	*Auxis thazard*	55,170	232,368	287,538	237,449	825
Bullet tuna	*Auxis rochei*	4,460	850	5,310	6,599	1,245
Kawakawa	*Euthynnus affinis*	97,280	185,145	282,425	197,504	700
Skipjack tuna	*Katsuwonus pelamis*	63,782	500,556	564,338	336,390	600
Long-tail tuna	*Thunnus tonggol*	36,821	103,813	140,634	84,789	600
Albacore tuna	*Thunnus alalunga*	9,467	28,140	37,607	20,260	540
Southern bluefin tuna	*Thunnus maccoyii*	800	…	800	990	1,240
Yellowfin tuna	*Thunnus albacares*	26,183	232,236	258,419	293,437	1,135
Bigeye tuna	*Thunnus obesus*	20,217	44,066	64,283	40,622	630
Total		**314,180**	**1,327,174**	**1,641,354**	**1,218,040**	**740**

Source: *Fishery Statistical Bulletin of Southeast Asia (SEAFDEC, 2011)*

maccoyii) and yellowfin tuna (*Thunnus albacares*) which is mainly produced by the Philippines. Frigate tuna (*Auxis thazard*) which ranks second in terms of tuna production in the region contributed about 18% to the region's tuna production but in terms of average value this species ranks only fourth at US$ 825/MT.

In terms of FAO Fishing Area, the region's tuna production in 2009 mostly came from FAO Fishing Area 57 (Indian Ocean, Western) and Area 71 (Pacific, Western Central) although production figures are mostly based on landings but not on fishing areas. In 2009, the average value of the total tuna production from Fishing Area 71 was about US$ 984 million accounting for 81% of the region's total tuna production value while the average value of production from Fishing Area 57 was about US$ 234 million providing the remaining 19%.

The species coming from Area 71 providing the highest production value is skipjack tuna followed by yellowfin tuna, frigate tuna, and kawakawa, while for Area 57 the species that provided the highest production value is kawakawa followed by frigate tuna and skipjack.

3.2 Sharks and Rays

In contrast with the tuna species, sharks and rays may not be considered as among the major marine fishery commodities of the Southeast Asian region. The species have been considered as non-target species of artisanal small-scale capture fisheries. Generally, landings of sharks, rays and skates comprise only a small percentage of the production from marine fisheries in the Southeast Asian region. Based on available data, production of sharks and rays by type of fishing gears indicated substantial amounts of sharks and rays caught by purse seine, gill net, hook and line, and trawl (SEAFDEC, 2006). In addition, small amount of sharks and rays was also caught by other gears such as traps, seine net, lift-net and push/scoop net but their catches were not significant in terms of quantity. However, it is widely known that the region has the highest diversity of species of sharks and rays, and that several species had been proposed for listing in the Appendices of the CITES during the past decade. Therefore, the compilation of fishery statistics on sharks and rays has become necessary in order to come up with a real picture of the resources in the region, but considering the dearth of information and data on production of sharks and rays in the region, information derived from relevant technical reports especially those that emanate from various relevant R&D activities on sharks and rays should also be availed of.

Based on the data from 2000 to 2009 reported in the SEAFDEC Fishery Statistical Bulletin of Southeast Asia, production of sharks and rays could range from 122,000 to 184,000 MT/year while the total marine capture fishery

Table 10. Contribution of sharks and rays to the total marine capture fisheries production of the Southeast Asian region from 2000 to 2009 (MT)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Total marine capture fishery production	11,880,478	12,196,637	12,575,367	13,188,568	13,380,841	13,586,961	13,938,748	14,056,985	13,814,368	14,140,387
Production of sharks and rays	167,459	165,551	166,543	184,382	167,604	150,811	155,941	148,932	128,262	122,381
Contribution of sharks and rays (%)	**1.41**	**1.36**	**1.33**	**1.40**	**1.25**	**1.11**	**1.12**	**1.06**	**0.93**	**0.86**

Sources: *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010, 2011)*

Table 11. Production of sharks of the Southeast Asian countries from 2000 to 2009 (MT)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Brunei Darussalam	...	...	...	...	...	...	...	24	29	15
Cambodia	...	...	...	...	...	...	...	...	...	...
Indonesia	68,366	65,860	56,906	58,100	50,967	43,306	55,944	57,462	43,625	40,950
Lao PDR	...	...	...	...	...	...	...	...	...	...
Malaysia	7,948	8,663	8,226	8,696	8,299	9,165	*7,878**	7,684	*7,346**	*7,252**
Myanmar	...	...	...	...	...	...	...	...	...	...
Philippines	2,071	2,681	2,682	3,021	2,977	2,440	2,765	2,638	2,380	2,635
Singapore	43	32	30	17	31	23	38	42	17	20
Thailand	11,039	11,146	13,918	14,409	10,155	7,751	6,082	5,000	2,834	2,826
Vietnam	...	...	...	...	...	...	...	...	...	...
Total	**89,467**	**88,382**	**81,672**	**84,243**	**72,429**	**62,685**	**72,639**	**72,850**	**56,186**	**53,681**

Sources: *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010, 2011)*
* *Updated figures provided by Fisheries Management Information Division, DoF Malaysia; but not used for the calculation of total production.*

Table 12. Production of rays of the Southeast Asian countries from 2000 to 2009 (MT)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Brunei Darussalam	...	...	...	...	...	...	...	70	69	56
Cambodia	...	...	...	...	...	..	...	...	...	...
Indonesia	45,260	44,451	49,492	59,459	57,977	56,731	54,584	51,077	47,609	44,660
Lao PDR	...	...	...	...	...	...	...	...	...	...
Malaysia	16,573	16,532	15,941	19,253	16,754	15,929	*16,046**	14,079	*15,642**	*15,091**
Myanmar	...	...	...	...	...	...	...	...	...	...
Philippines	2,248	2,867	2,986	3,156	2,799	2,308	2,544	2,560	2,370	2,591
Singapore	261	187	162	140	154	164	195	180	117	143
Thailand	13,650	13,132	16,290	18,131	17,491	12,994	10,133	8,116	6,245	6,219
Vietnam	...	...	...	...	...	...	...	...	...	...
Total	**77,992**	**77,169**	**84,871**	**100,139**	**95,175**	**88,126**	**83,302**	**76,082**	**72,076**	**68,700**

Sources: *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010, 2011)*
* *Updated figures provided by Fisheries Management Information Division, DoF Malaysia; but not used for the calculation of total production.*

production of Southeast Asia in 2009 was 14,140,000 MT. This means that less than 1.0% of the total production in 2009 was contributed by sharks and rays (**Table 10**). Specifically, the landings contribute only 1.6% for Malaysia (Ahmad, 2011), 2.2% for Indonesia (Faizah, 2011), and 0.7% for Thailand (Ratanawalee, 2011).

For sharks, the highest producer is Indonesia followed by Malaysia. Although Thailand was also a top producer of sharks in the early 2000s, its production started to decline in 2004 (**Table 11**). Likewise for rays, the main producer is Indonesia followed by Malaysia with Thailand's production declining since 2004 (**Table 12**). Production of the Philippines for both species had also been considerably high. However, records have shown that the overall production of sharks and rays of the region had been slightly decreasing. Even if some countries in this region such as Indonesia, Thailand, Malaysia, and Philippines, have recorded considerable production volume of sharks and rays, only Indonesia was able to report the production of sharks and rays at genus, family and order level as shown in **Table 13**. The other countries reported only the production by major species groups, which could be mainly due to limited ability of local officers in identifying the species of sharks and rays.

In terms of value, Indonesia's production of sharks in 2009 was valued at US$ 12,979,000 or at an average value of about US$ 315/MT, while for rays the total value was US$ 11,030,000 or an average value of about US$ 250/MT. As for Malaysia, the value of its production of rays was US$ 23,164,000 or an average value of US$ 1,540/MT although the production value of sharks was not reported. Likewise for Thailand, the value of its production of rays was US$ 4,736,000 or at an average value of about US$ 760/MT.

Despite the small contribution from sharks and rays to the total fishery production of the region, these commodities provide significant incomes for traditional fishers and serve as cheap source of protein for poor people in remote areas as well as coastal communities. Many products for human consumption could be derived from sharks and rays such as meat (fresh, frozen, smoked, salted) and fins (for the famous fishery product such as the shark fins). Other valuable products include oil (for cosmetics, squalene, pharmaceuticals, lubricants), skin (for food, leather goods,

Table 13. Production of sharks and rays by species and by fishing area of some Southeast Asian countries in 2009 (MT)

English Name	Scientific Name	Fishing Area	Indonesia's Production (MT)	Malaysia's Production (MT)	Thailand's Production (MT)	Philippines's Production (MT)
Thresher shark	*Alopias* spp.	57	6,230			
Thresher shark	*Alopias* spp.	71	2,430			
Hammerhead sharks	*Sphyrna* spp.	57	1,410			
Hammerhead sharks	*Sphyrna* spp.	71	2,060			
Dogfish sharks	*Squalus* spp.	57	2,150			
Dogfish sharks	*Squalus* spp.	71	2,500			
Mackerel sharks	Laminidae	57	140			
Mackerel sharks	Laminidae	71	530			
Requiem sharks	Carcharhinidae	57	2,550			
Requiem sharks	Carcharhinidae	71	20,950			
Sawfishes	Pristidae	57	10			
Sharks nei	Sharks			*7,252**	2,826	2,635
Sting rays	*Dasyastis* spp.	57	11,600			
Sting rays	*Dasyastis* spp.	71	24,270			
Rays, mantas	Rajiformes	57	-	*4,663**	3,141	
Rays, mantas	Rajiformes	71	-	*10,427**	3,078	2,591
Eagle rays	*Myliobatis* spp.	57	1,100			
Eagle rays	*Myliobatis* spp.	71	2,500			
Manta rays	*Mobula* spp.	57	170			
Manta rays	*Mobula* spp.	71	5,110			

Source: *Fishery Statistical Bulletin of Southeast Asia (SEAFDEC, 2011)*
* *Updated figures provided by Fisheries Management Information Division, DoF Malaysia.*

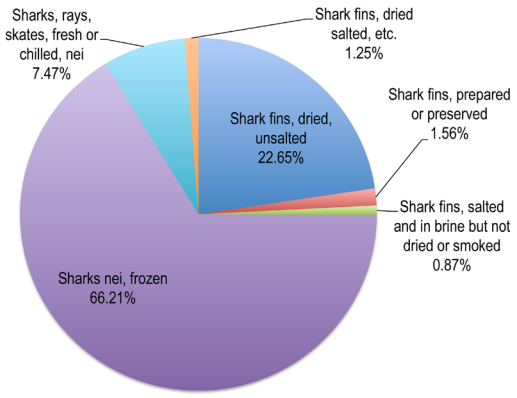

Figure 7. Export volume of sharks and rays by types of products from Southeast Asia in 2006

sand paper, etc.), cartilage (pharmaceuticals), teeth and jaw (souvenir items, accessories), and rostrum of sawfishes (for religious relics, traditional medicines, souvenirs, implements for cock fighting, etc.). Although the economic value of sharks and rays is also low compared with other marine aquatic species, but over the years, human exploitation of sharks and rays species has substantially increased worldwide, threatening the populations of the said species.

It should also be noted that, the products from sharks and rays in the region are mostly intended for export and are prepared in several forms such as shark fins, dried, salted, unsalted or preserved, salted and in brine but not dried or smoked; shark liver oil, fresh or chilled, and frozen. The total volume sharks and rays exported and the total value of the export from the Southeast Asian countries from 1986 to 2006 are shown in **Fig. 7**.

IV. PRODUCTION FROM INLAND CAPTURE FISHERIES OF SOUTHEAST ASIA

In the Southeast Asian region, inland fisheries are generally characterized as small-scale, multi-species and multi-gear, involving large numbers of small-scale and subsistence fishers with large portion of the catch utilized directly for household consumption. In 2009, the total production from inland fisheries in the region accounted for approximately 8% of the region's total fishery production. Based on the production statistics reported by the countries of the Southeast Asian region from 2000 to 2009 in terms of volume and values as shown **Table 14** and **Table 15**, respectively, seven countries, namely: Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, and Thailand were able to report the values of their respective production from inland capture fisheries. The remaining countries at this stage could not yet report their corresponding production values from inland capture fisheries.

Over the past ten years, the Southeast Asian production from inland capture fisheries has been slightly increasing,

Table 14. Production volume from inland capture fisheries of the Southeast Asian countries from 2000 to 2009 (MT)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Cambodia	245,600	360,000	360,300	308,750	250,00	444,000	559,642	420,000	430,600	390,000
Indonesia	318,334	310,240	304,989	308,693	330,880	297,370	293,921	310,457	497,740	494,630
Lao PDR	...	...	...	...	...	29,800	29,800	28,410	29,200	30,000
Malaysia	3,549	3,446	3,565	3,828	4,119	4,583	4,164	4,283	4,353	4,469
Myanmar	238,210	254,880	289,940	454,320	502,550	631,120	718,000	717,640	814,740	899,430
Philippines	*152,121**	136,347	131,644	133,292	142,019	143,806	*161,394**	*168,277**	*181,678**	*188,722**
Thailand	201,500	202,500	198,700	198,400	199,600	198,800	214,000	225,600	228,600	245,500
Vietnam	170,00	243,583	226,958	208,623	...	138,800	152,325	133,600	144,800	144,800
Total	**1,159,544**	**1,510,996**	**1,516,096**	**1,615,906**	**1,179,168**	**1,888,279**	**2,136,933**	**2,008,301**	**2,329,524**	**2,397,273**

Sources: *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010, 2011)*
** Updated figures provided by the Philippine Bureau of Agricultural Statistics,Department of Agriculture; but not used for the calculation of total production.*

Table 15. Production value from inland capture fisheries of the Southeast Asian countries from 2000 to 2009 (US$ 1000)

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Cambodia	...	...	...	...	...	...	...	...	255,500	334,845
Indonesia	155,472	189,590	237,888	257,779	268,990	323,827	264,372	368,247	521,019	616,640
Lao PDR	...	...	...	...	...	...	...	215,708	240,334	93,168
Malaysia	...	...	*6,316**	*6,316**	*7,632**	*8,446**	*8,470**	*9,855**	*11,556**	*11,014**
Myanmar	...	...	...	...	...	...	...	...	788,325	1,349,145
Philippines	59,285	57,022	64,518	66,029	80,442	84,077	101,477	125,464	145,912	*164,252***
Thailand	174,920	157,072	145,038	170,236	184,658	194,859	222,573	266,740	254,057	273,290
Total	**389,677**	**403,684**	**453,861**	**500,658**	**541,901**	**611,950**	**596,877**	**985,172**	**2,215,437**	**2,834,477**

Sources: F*ishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010, 2011)*
** Updated figures provided by Fisheries Management Information Division, DoF Malaysia; but not used for the calculation of total production.*
*** Updated figure provided by the Philippine Bureau of Agricultural Statistics,Department of Agriculture; but not used for the calculation of total production.*

which could have been brought about by many factors that include improvement in the national statistics collection systems and mechanisms. Nevertheless, it should be considered that large portions of the catch from inland capture fisheries are directly utilized for household consumption without proper recording and reporting. At this point in time, it is therefore difficult to estimate the actual trend of the production from inland capture fisheries in the region based only on the current available statistics. Thus, the contribution of inland capture fisheries to the total fisheries production of the Southeast Asian region could not be confirmed in view of the insufficient data from the countries. However, among the Southeast Asian countries, Myanmar, Indonesia, and Cambodia are the top producers from inland capture fisheries (**Table 16**).

Nonetheless, it should be noted that the contribution of Lao PDR to the region's total production from capture fisheries is significantly high considering that all its production from capture fisheries is derived from inland fisheries. The production of Cambodia from inland capture fisheries represents 84% of its total capture fishery production and 76% of the country's total fishery production. On the other hand, the production of Myanmar from inland capture fisheries represents 33% of its total capture fishery production and 26% of the country's total fishery production. Overall, the contribution of the Southeast Asian countries' inland capture fisheries production to the region's total capture fishery production is 15% and to the region's total fishery production at about 8%.

As for the inland capture fisheries production of Indonesia, about 38% is contributed by *Mystacoleucos padangensis* of the family Cyprinidae, about 13% by freshwater fishes nei, 6% by striped snakehead (*Chana striata*), 4% by Nile tilapia (*Oreochromis niloticus*), another 4% by snakeskin gourami (*Trichogaster pectoralis*), and the rest by the various species of freshwater fishes, crustaceans and mollusks. In terms of value, Indonesia's production of the giant freshwater prawn (*Macrobrachium rosenbergii*) is valued at US$ 5,745/MT although its volume of production was only 7,310 MT in 2009. The second highest valued species is the striped snakehead at US$ 2,100/MT followed by snakeskin gourami at US$ 1,365/MT, freshwater fishes nei at US$ 1,135/MT and Nile tilapia at US$ 1,075/MT. The value of its production of *Mystacoleucos padangensis* was US$ 430/MT.

In the case of Thailand, the main inland capture fishery species produced was classified as freshwater fishes nei contributing about 33% of the country's total production from inland fisheries followed by Nile tilapia at 20%, silver barb (*Barbonymus gonionotus*) at 18%, striped snakehead at 8%, and the rest by the other freshwater fishes, crustaceans and mollusks. While the average value of freshwater fishes nei was US$ 730/MT, striped

Table 16. Contribution of inland capture fisheries to the respective Southeast Asian country's total fishery production in 2009

Country	Production from inland capture fisheries (MT)	Total capture fishery production (MT)	% of inland capture fishery production to total capture fishery production (%)	Total fishery production (capture and aquaculture) (MT)	% of inland capture fishery production to total fishery production (%)
Brunei Darussalam	…	1,958	-	2,418	-
Cambodia	390,000	465,000	83.9	515,000	75.7
Indonesia	494,630	5,284,040	9.4	10,064,140	4.9
Lao PDR	30,000	30,000	100.0	105,000	28.6
Malaysia	4,469	1,395,557	0.3	1,729,002	0.3
Myanmar	899,430	2,766,940	32.5	3,491,103	25.8
Philippines	*188,722**	*2,602,585**	*7.25**	*5,079,977**	3.7
Singapore	…	2,121	-	5,687	-
Thailand	245,500	1,741,662	14.1	3,137,672	7.8
Vietnam	144,800	2,243,100	6.5	4,782,400	3.0
Total	**2,397,273**	**16,537,660**	**14.5**	**28,917,096**	**8.3**

Source: *Fishery Statistical Bulletin of Southeast Asia (SEAFDEC, 2011)*
* *Updated figures provided by the Philippine Bureau of Agricultural Statistics,Department of Agriculture; but not used for the calculation of total production.*

snakehead had the highest average value at US$ 2,025/MT followed by Nile tilapia at US$ 1,070/MT and silver barb at US$ 980/MT. No further analysis could be done on the values of the production from inland capture fisheries of Cambodia and Myanmar because the volumes and values of their respective production were not reported by species. Therefore, even if production from inland capture fisheries is not very high compared to the other fishery sub-sectors, but for some countries in Southeast Asia especially Cambodia, Lao PDR and Myanmar, the contribution of their respective inland capture fishery production to the region's total fishery production is considerably significant as indicated in **Table 16**. Thus, the importance of inland fisheries could not be undermined and its sustainable development should be appropriately addressed under the relevant national and regional fisheries-related mechanisms.

V. AQUACULTURE PRODUCTION OF SOUTHEAST ASIA

The over-exploitation of the fishery resources in the major fishing areas of the world coupled with the deterioration of the habitats resulted in the continuous decline of production from marine capture fisheries, while the demand for fish food remains high and increases to certain extent with the escalating world's population. Aquaculture has the potentials to fill the gap between supply and demand for fish products. The global supplies from aquaculture during the period from 2000 to 2009 had sprung at the rate of 1.46 million MT annually from 2000 to 2009. Asia is the largest producer, with its production (including that of Southeast Asia) accounting for about 91% of the global total aquaculture production, out of which production from the Southeast Asian counties accounted for 17% of the world's total aquaculture production (**Table 17**).

From 2000 to 2009, the total production from aquaculture in the Southeast Asian region grew at an average rate of about 868,330 MT/year, while its contribution to the total fishery production had steadily increased by almost double from 22% to 43% (**Table 18** and **Fig. 8**). Based on culture areas and species cultured, aquaculture is broadly classified into mariculture, brackishwater culture and freshwater culture. In 2009, mariculture contributed about 40% to the total aquaculture production of the region, while 22% and 38% came from brackishwater culture and freshwater culture, respectively.

Table 17. Aquaculture production by continent from 2000 to 2009 (MT)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
World	**35,527,690**	**37,871,216**	**39,827,801**	**41,927,958**	**41,932,297**	**44,302,706**	**47,380,956**	**49,919,261**	**52,537,253**	**55,125,167**
Africa	451,363	489,358	568,516	619,604	637,646	727,332	842,978	916,008	1,061,773	1,103,492
Americas	1,457,011	1,765,456	1,873,018	1,975,716	2,162,782	2,192,047	2,405,572	2,385,009	2,527,746	2,609,930
Asia*	27,728,412	29,138,351	30,403,415	31,601,474	30,506,286	31,589,971	33,347,606	34,853,630	35,392,453	36,371,354
Southeast Asia**	**3,696,068**	**4,257,005**	**4,806,000**	**5,439,809**	**6,308,557**	**7,512,534**	**8,426,187**	**9,237,586**	**11,063,934**	**12,379,436**
Europe	2,056,224	2,092,225	2,042,630	2,159,636	2,171,691	2,121,195	2,185,861	2,352,715	2,313,510	2,484,585
Oceania	138,612	128,821	134,222	131,719	145,335	159,627	172,752	174,313	177,837	176,370

* *Excludes Southeast Asia*
** ***Sources:*** *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010, 2011)*
Source of other data: *FAO Fisheries and Aquaculture Information and Statistics Service*

Table 18. Total fishery and aquaculture production by aquaculture sub-sector of the Southeast Asian countries from 2000 to 2009 (MT)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Total Fishery Production	**16,937,296**	**17,621,843**	**18,930,761**	**20,274,399**	**21,147,665**	**22,987,784**	**24,501,878**	**25,302,872**	**27,207,826**	**28,917,096**
Total Aquaculture Production	**3,696,068**	**4,257,005**	**4,806,000**	**5,439,809**	**6,308,557**	**7,512,534**	**8,426,187**	**9,237,586**	**11,063,934**	**12,379,436**
• *Mariculture*	*1,219,702*	*1,489,952*	*2,114,640*	*2,230,322*	*2,712,679*	*3,005,014*	*3,623,260*	*3,879,786*	*4,646,146*	*4,945,239*
• *Brackishwater culture*	*1,108,821*	*1,191,961*	*1,297,620*	*1,468,748*	*1,514,054*	*1,953,258*	*1,853,761*	*2,032,269*	*2,072,026*	*2,694,336*
• *Freshwater culture*	*1,367,545*	*1,575,092*	*1,393,740*	*1,740,739*	*2,081,824*	*2,554,262*	*2,949,166*	*3,325,531*	*4,345,762*	*4,739,861*

Sources: *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010, 2011)*

Table 19. Aquaculture production by aquaculture sub-sector of the Southeast Asian region in 2009 (MT)

Country	Quantity (MT)				Value (US$ 1000)	Ave. Value US$/MT
	Mariculture	Brackishwater culture	Freshwater culture	Total		
Brunei Darussalam	72	354	34	460	5,161	11,220
Cambodia	4,925	75	45,000	50,000	87,954	1,760
Indonesia	2,537,100	1,080,700	1,162,300	4,780,100	5,189,522	1,090
Lao PDR	...	...	75,000	75,000	111,801	1,490
Malaysia	*111,524**	*69,296**	*152,630**	*333,450**	700,910	2,100
Myanmar	50,464	2,926	670,773	724,163	853,165	1,180
Philippines	1,860,462	308,440	308,490	2,477,392	*1,710,608***	700
Singapore	3,286	...	280	3,566	8,793	2,500
Thailand	316,927	558,444	520,639	1,396,010	2,422,630	1,740
Vietnam	172,003	554,397	1,812,900	2,539,300	4,867,779	1,920
Total	**4,945,239**	**2,694,336**	**4,739,861**	**12,379,436**	**15,968,676**	**1,290**

Source: *Fishery Statistical Bulletin of Southeast Asia (SEAFDEC, 2011)*
* *Updated figures provided by Fisheries Management Information Division, DoF Malaysia; but not used for the calculation of total production.*
** *Updated figure provided by the Philippine Bureau of Agricultural Statistics,Department of Agriculture; but not used for the calculation of total production.*

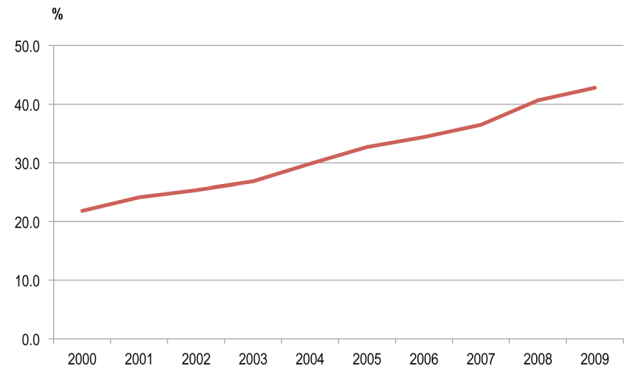

Figure 8. Contribution of aquaculture to the total fishery production of the Southeast Asian region

Sources: *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2010) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010, 2011)*

Among the Southeast Asian countries, Indonesia is the leading producer of aquaculture products in terms of volume and value (**Table 19**) followed by Vietnam. The Philippines comes third in terms of volume but Thailand ranks third in terms of value. Specifically for mariculture production, Indonesia is the top producer followed by the Philippines, but for production from brackishwater culture, Thailand and Vietnam come next to Indonesia as the highest producer. For the production from freshwater culture, Vietnam emerges next to Indonesia followed by Myanmar (**Fig. 9**).

Indonesia's production from aquaculture in 2009 comes mainly from aquatic plants nei which accounts for about 62% of the country's aquaculture production, followed by freshwater fishes nei (*Osteichthyes*) accounting for 20%, marine fishes nei (*Osteichthyes*) 8%, and marine crustaceans about 7% while other invertebrates and freshwater crustaceans comprise the remaining 3%. In the case of Vietnam, 41% of its aquaculture production comes from Pangas catfish nei (*Pangasius* spp.) followed by freshwater fishes nei (*Osteichthyes*) 36%, giant tiger shrimp (*Penaeus monodon*) 12%, marine mollusks nei 7% and the remaining 4% comprises other marine shrimps and freshwater crustaceans.

For the Philippines, its main aquaculture product is seaweeds mainly the Zanzibar weeds (*Eucheuma cottonii*) which accounts for 59% of the country's production

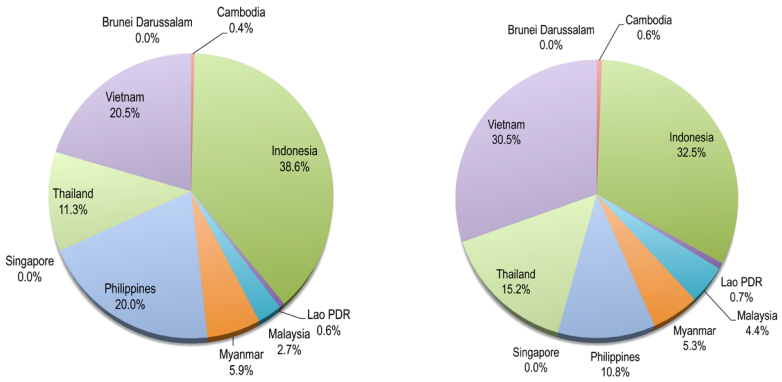

Figure 9. Percentage of aquaculture production of the Southeast Asian countries in 2009: quantity in MT (left) and value in US$ 1000 (right)

from aquaculture followed by milkfish (*Chanos chanos*) accounting for 14%, tilapia (mainly *Oreochromis* spp.) 11%, aquatic plants nei 6%, other seaweeds mainly *E. denticulatum* 5%, shrimps (*P. monodon*) and crabs (*Scylla serrata*) 3%, and oysters and giant mussels 2%. In the case of Thailand, its main production from aquaculture is the whiteleg shrimp (*Penaeus vannamei*) which contributes 38% to the country's aquaculture production followed by green mussels accounting for 17%, tilapia (*O. niloticus*) 15%, catfish hybrid (*Clarias gariepenus* x *C. macrocephalus*) 10%, gourami and silver barb 7%, blood cockle 5%, others including oysters comprising the remaining 8%. For Myanmar, its main aquaculture product is roho labeo (*Labeo rohita*) which accounts for 67% of the country's production from aquaculture. Other freshwater species also contribute 18% to the total aquaculture production while *P. monodon* accounts for 6%, tilapia 5%, *Pangasius* spp. 2%, and other species comprising the remaining 2% of the country's total aquaculture production.

As for the values of aquaculture production, Brunei Darussalam has the highest average value at US$ 11,220/MT, especially for the country's main aquaculture commodity which is the blue shrimp (*Penaeus stylirostris*) valued at US$ 11,430/MT. The county's other products include the giant tiger shrimp (*P. monodon*) valued at US$ 15,000/MT, *Caranx* spp. at US$14,000/MT, grouper (*Epinephelus* spp.) at US$ 17,000/MT, snapper (*Lutjanus* spp.) at US$ 13,500/MT, and the African catfish (*Clarias gariepinus*) at US$ 6,350/MT.

For the Philippines, its main aquaculture product which is the Zanzibar weed is valued at US$120/MT. Milkfish which is the second major product is valued at US$ 1,730/MT while tilapia is valued at US$ 1,370/MT and the other seaweeds are valued US$ 225/MT. The county's other products such as *P. monodon* is valued at US$8,200/MT, *Scylla serrata* at US$ 5,700/MT, oysters at US$ 200/MT, and giant mussels at US$ 145/MT.

In the case of Indonesia, its main production of aquatic plants nei is valued at US$ 275/MT while the other products such as freshwater fishes nei is valued at US$ 1,515/MT, marine fishes nei at US$ 1,300/MT, marine crustaceans at US$ 3,640/MT, and other invertebrates and freshwater crustaceans at US$ 740/MT. For Vietnam, its main product which is the Pangas catfish is valued at US$ 1,500/MT. The other products such as freshwater fishes nei is valued at US$ 1,500/MT, giant tiger shrimp (*P. monodon*) at US$ 4,000/MT, other marine shrimps also at US$ 4,000/MT, marine mollusks nei at US$ 1000/MT, and freshwater crustaceans at US$ 7,000/MT.

5.1 Mariculture

Worldwide, mariculture production had grown from 21.0 million MT in 2000 to 34.8 million MT in 2009, accounting for nearly one-half of the global production from aquaculture. In 2009, Asia (including the Southeast Asia) was the biggest producer of mariculture products at about 31.1 million MT or about 89% of global mariculture production, out of which the Southeast Asian countries contributed 14% of the global production. Indonesia has been the leading producer of mariculture products of which its production in 2009 contributed more than 51% to the region's total production from mariculture, followed by the Philippines at 38% and Thailand at 6%, and the other countries provided the remaining 5% (**Table 20**). In terms of value, Indonesia still led the countries with the value of its mariculture production contributing about 58%, followed by the Philippines (18%), Myanmar (9%), Vietnam (8%), and the remaining countries contributing about 7% to the region's total mariculture production value (**Table 21**).

The major species groups cultured in marine areas in the region are the aquatic plants which accounted for about 87% of the total production from mariculture in 2009 (**Table 22**), followed by marine mollusks (11%), and 2% from marine fish species and others (**Fig. 10**). Although aquatic plants accounted for 87% of the total mariculture

Table 20. Production volume from mariculture of the Southeast Asian countries from 2000 to 2009 (MT)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Brunei Darussalam	53	30	16	18	...	37	500	...	390	72
Cambodia	408	394	4,064	8,324	16,915	16,400	500	16,630	1,370	4,925
Indonesia	197,114	221,010	234,859	249,242	736,689	890,074	1,365,919	1,509,062	2,377,382	2,537,100
Lao PDR	...	...	...	...	...	...	...	...	...	...
Malaysia	*84,962**	*87,468**	*94,671**	*92,936**	*84,699**	*80,239**	*71,374**	*72,922**	*96,159**	*111,524**
Myanmar	23,038	68,854	134,784	25,709	...	804	...	...	48,303	50,464
Philippines	747,414	827,670	936,851	1,039,081	1,273,598	1,419,727	1,566,056	1,626,206	*1,793,395***	1,860,462
Singapore	4,398	3,700	4,303	4,786	4,786	5,280	8,113	4,159	3,235	3,286
Thailand	149,810	246,602	384,094	361,400	400,400	364,061	317,457	309,497	...	316,927
Vietnam	32,900	319,071	396,099	443,135	155,235	213,800	216,200	208,500	48,420	172,003
Total	**1,246,957**	**1,785,154**	**2,205,608**	**2,237,934**	**2,691,311**	**3,009,034**	**3,571,441**	**3,818,848**	**4,646,146**	**4,945,239**

Sources: *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010, 2011)*
* *Updated figures provided by Fisheries Management Information Division, DoF Malaysia; but not used for the calculation of total production.*
** *Updated figure provided by the Philippine Bureau of Agricultural Statistics,Department of Agriculture; but not used for the calculation of total production.*

Table 21. Production value from mariculture of the Southeast Asian countries from 2000 to 2009 (US$ 1000)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Brunei Darussalam	...	...	...	...	...	...	...	...	392	...
Cambodia	...	...	...	...	4,585	...	...	5,300	3,890	19,700
Indonesia	134,182	73,047	122,985	180,007	167,787	353,019	220,568	432,802	983,185	1,297,568
Lao PDR	...	...	...	...	...	...	...	...	...	...
Malaysia	*47,895**	*48,158**	*51,579**	*75,526**	*60,263**	*67,828**	*108,470**	*131,304**	*159,407**	*189,275**
Myanmar	...	...	...	...	...	...	...	...	...	208,905
Philippines	75,410	77,623	86,379	96,373	164,013	171,539	216,342	270,984	500,275	*383,899***
Singapore	5,952	5,382	4,079	5,258	6,187	7,147	7,381	7,980	8,082	7,551
Thailand	40,692	54,847	57,207	62,260	59,915	97,215	1,457,754	...	...	71,837
Vietnam	...	880,737	1,024,056	1,255,758	155,235	622,600	...	189,500	1,493,750	174,000
Total	**273,284**	**1,109,600**	**1,315,130**	**1,619,311**	**559,585**	**1,271,964**	**1,919,809**	**929,804**	**2,994,548**	**2,224,666**

Sources: *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010, 2011)*
* *Updated figures provided by Fisheries Management Information Division, DoF Malaysia; but not used for the calculation of total production.*
** *Updated figure provided by the Philippine Bureau of Agricultural Statistics,Department of Agriculture; but not used for the calculation of total production.*

Table 22. Mariculture production in the Southeast Asia by species group from 2000 to 2009 (MT)

Major groups	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Marine fishes	21,971	21,580	29,037	38,504	42,216	70,520	71,099	93,653	245,967	64,279
Marine mollusks	291,122	358,311	495,371	470,724	661,716	672,108	617,095	590,202	588,563	553,401
Aquatic plants	910,635	1,017,136	1,147,212	1,257,452	1,987,178	2,266,406	2,883,247	3,134,993	3,811,616	4,277,095
Others	23,229	388,127	533,988	471,254	201	-	-	-	-	50,464
Total	**1,246,957**	**1,435,154**	**2,205,608**	**2,237,934**	**2,691,311**	**3,009,034**	**3,571,441**	**3,818,848**	**4,646,146**	**4,945,239**

Sources: *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010, 2011)*

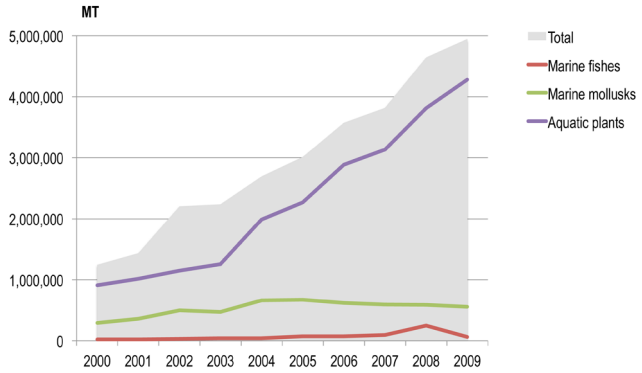

Figure 10. Production trend of aquatic plants, marine fishes and mollusks from mariculture in Southeast Asia

production in terms of value however, their contribution was only 45% to the total value of mariculture production. While marine fishes contributed only 2% to the total marine production in 2009, in terms of value this group contributed 34% to the total value of mariculture products. On the other hand, marine mollusks which contributed 11% to the total volume of mariculture production, its contribution in terms of value was about 12%, while the contribution of marine shrimps to the total value of mariculture production was about 9%.

Table 23. Mariculture production in Southeast Asia by country and by major species in 2009 (MT)

	Brunei Darussalam	Cambodia	Indonesia	Malaysia	Myanmar	Philippines	Singapore	Thailand	Vietnam	Total
Aquatic plants nei	...	...	2,537,100	...	...	165,570	...	...	...	**2,702,670**
Euchema cottonii	...	...	...	...	...	1,462,203	...	...	...	**1,462,203**
Euchema denticulatum	...	...	...	...	...	112,222	...	...	...	**112,222**
Marine mollusks nei	...	...	...	...		1,447	...	...	166,003	**167,450**
Perna viridis	...	...	...	...	...	19,936	...	230,678	...	**250,614**
Anadara granosa	...	...	...	...	...	...	...	67,854	...	**67,854**
Crassostrea spp.	...	...	...	...	...	19,931		18,395		**38,326**
Marine shrimps					50,464					**50,464**
Others	72	4,925	...	...	...	79,153	3,286		6,000	**93,436**
Total	**72**	**4,925**	**2,537,100**	...	**50,464**	**1,860,462**	**3,286**	**316,927**	**172,003**	**4,945,239**

Source: *Fishery Statistical Bulletin of Southeast Asia (SEAFDEC, 2011)*

The mariculture production by country and by species in 2009 (**Table 23**) indicated that Indonesia contributed the largest amount of aquatic plants production but this was not classified according to species. Only Philippines and Thailand reported their mariculture production at species level. Therefore, it appears that the species with highest production was the Zanzibar weeds (*Eucheuma cottonii*) reported only by the Philippines, followed by the green mussel (*Perna viridis*) reported by Philippines and Thailand, *Eucheuma denticulatum* reported by the Philippines, and blood cockle (*Anadara granosa*) reported by Thailand. It should be noted that Myanmar reported its production of marine shrimps at 50,464 MT comprising the giant tiger shrimp (*Penaeus monodon*) at 46,104 MT and Indian white shrimp (*P. indicus*) at 4,360 MT. The value of the country's production of marine shrimps was recorded at US$ 208,905,000 or at an average value of US$ 4,140/MT.

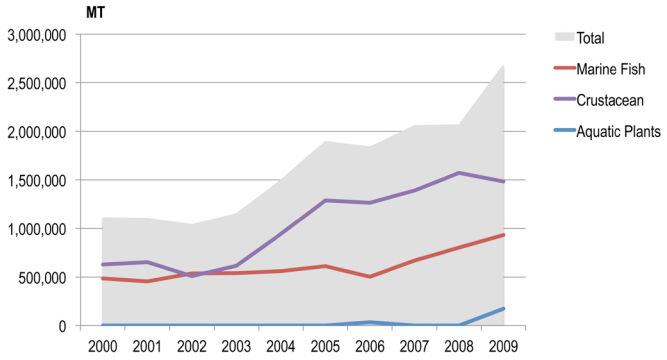

Figure 11. Production of aquatic plants, marine fishes and crustaceans from brackishwater aquaculture of Southeast Asia

5.2 Brackishwater Culture

The main brackishwater species cultured in the Southeast Asian region include the crustaceans such as the whiteleg shrimp (*Penaeus vannamei*) and giant tiger shrimp (*P. monodon*), fishes and aquatic plants. Production from brackishwater aquaculture had increased by about 141% during the period from 2000 to 2009 (**Table 24**). Although such production was rather stable from 2000 to 2003, a sharp increase occured during 2004 and 2005 (**Fig. 11**), which could be mainly due to the development of culture technologies and increased production of the whiteleg shrimp by Thailand and Vietnam.

In terms of average value of production from brackishwater aquaculture (**Table 25**), Brunei Darussalam posted the highest at US$ 14,580/MT followed by Cambodia at US$ 10,050/MT. For the other countries such as Vietnam the average value of its brackishwater aquaculture products was US$ 3,560/MT, Thailand at US$ 3,075/MT, Philippines at US$2,900/MT, Malaysia at US$ 2,170/MT, and Indonesia at US$ 2,000/MT. Myanmar and Singapore did not report the values of their respective brackishwater aquaculture production.

Crustaceans such as the whiteleg shrimp, giant tiger shrimp and other prawns including banana prawn provided the highest contribution to the total brackishwater aquaculture production in 2009, in terms of volume at 58% and value at also about 58%. While the whiteleg shrimp contributed 21% in volume its contribution in terms of value was 25%, likewise for the giant tiger shrimp which contributed 15% in volume and 25% in value. However, the other prawns including banana prawn contributed 22% in volume but only 8% in value. Milkfish (*Chanos chanos*) also contributed almost 10% in volume but only 9% in value. Although the region's production from brackishwater aquaculture in 2009 (**Table 26**) is dominated by marine fishes nei contributing about 15% of the total production, analysis could not be made on its production trend considering that the data had not been classified into species level. On the other hand, production of the whiteleg shrimp (*Penaeus vannamei*) which comes with the second highest production volume contributed more than 20% of the region's total brackishwater culture production, with

Table 24. Production volume from brackishwater aquaculture of the Southeast Asian countries from 2000 to 2009 (MT)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Brunei Darussalam	41	31	52	52	598	537	60	611	...	354
Cambodia	20	143	53	90	590	100	130	...	...	75
Indonesia	430,020	510,744	473,128	501,977	480,046	643,975	629,609	629,797	691,432	1,080,700
Lao PDR	...	...	...	...	...	...	...	...	...	
Malaysia	*16,119**	*27,232**	*25,143**	*26,382**	*31,011**	*33,547**	*35,547**	*35,258**	*51,119**	*69,296**
Myanmar	4,964	5,473	6,550	18,421		250,407	60,000	48,303	...	2,926
Philippines	241,455	268,120	254,167	254,744	262,554	277,230	281,316	294,495	*303,244***	308,440
Singapore	55	40	107	30	71	35	34	...	...	...
Thailand	317,263	287,928	276,008	341,878	377,388	414,926	508,150	535,834	805,300	558,444
Vietnam	96,433	...	...	...	339,555	287,200	309,000	500,500	501,600	554,397
Total	**1,115,635**	**1,109,219**	**1,044,967**	**1,157,485**	**1,503,783**	**1,901,773**	**1,841,978**	**2,063,196**	**2,072,026**	**2,694,336**

Sources: *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010, 2011)*
* *Updated figures provided by Fisheries Management Information Division, DoF Malaysia; but not used for the calculation of total production.*
** *Updated figure provided by the Philippine Bureau of Agricultural Statistics,Department of Agriculture; but not used for the calculation of total production.*

Table 25. Production value from brackishwater aquaculture of the Southeast Asian countries from 2000 to 2009 (US$ 1000)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Brunei Darussalam	...	...	...	...	2,695	...	...	3,212	...	5,161
Cambodia	...	...	...	...	767	...	...	...	375	754
Indonesia	731,798	902,128	1,118,924	1,139,019	1,529,358	1,483,289	1,736,275	1,672,408	1,840,902	2,156,102
Lao PDR	...	...	...	...	...	...	...	...	...	...
Malaysia	*125,236**	*201,579**	*167,105**	*165,789**	*173,158**	*172,341**	*162,295**	*165,797**	*209,481**	*271,014**
Myanmar	...	...	...	...	...	...	...	193,212	641,278	...
Philippines	534,739	534,699	485,225	457,412	490,853	535,451	611,344	714,106	831,073	*886,256***
Singapore	430	386	969	313	593	374	625	...	...	...
Thailand	2,206,325	1,875,872	1,248,738	1,081,912	1,175,007	897,455	...	1,523,423	1,602,685	1,717,645
Vietnam	...	...	...	...	1,146,005	1,463,200	...	1,692,500	467,450	1,974,429
Total	**3,631,332**	**3,547,229**	**3,055,403**	**2,904,025**	**4,566,961**	**4,616,652**	**2,602,799**	**6,038,269**	**5,717512**	**7,160,596**

Sources: *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010, 2011)*
* *Updated figures provided by Fisheries Management Information Division, DoF Malaysia; but not used for the calculation of total production.*
** *Updated figure provided by the Philippine Bureau of Agricultural Statistics,Department of Agriculture; but not used for the calculation of total production.*

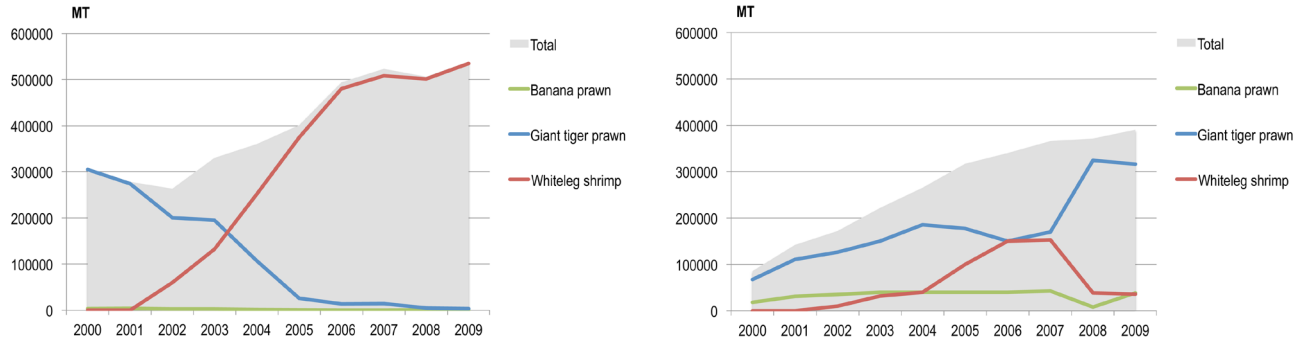

Figure 12. Changes in production trends of whiteleg shrimps and giant tiger shrimps in Thailand (left) and Vietnam (right)

Thailand as the largest producer accounting for about 94% of the species group's total production (**Fig. 12**). Coming next after the whiteleg shrimp is the giant tiger shrimp (*Penaeus monodon*) providing 15% to the region's total with Vietnam as the highest producer providing about 74% of the species production. Milkfish (*Chanos chanos*) is also an important commodity although it contributed only about 10% to the region's total brackishwater culture production with the Philippines as the leading producer of such species (**Table 27**).

5.3 Freshwater Aquaculture

The deterioration of inland fishery habitats had resulted in degrading inland fishery resources despite reports by many Southeast Asian countries that inland capture fishery production had been increasing. In order to increase fish

Table 26. Brackishwater culture production by major groups of species from 2000 to 2009 (MT)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Marine fishes nei	76,385	34,467	110,147	109,570	111,743	139,447	64,790	172,224	174,413	672,371
Whiteleg shrimp	...	...	...	132,365				...	745,948	571,000
Tiger prawn	511,867	450,522	439,532	406,519	478,865	604,511	427,467	429,295	522,326	383,696
Milkfish	408,827	421,119	425,892	430,903	448,910	473,924	439,706	498,437	...	260,610
Banana prawn	...	...	...	...	320,429	399,816		...	78,087	64,534
Other prawns	118,392	203,111	69,396	76,145	143,165	284,075	837,503	963,106	224,545	462,671
Aquatic plants	...	...	...	...	...	...	33,321	...	...	171,868
Others	164	...	...	1,984	671		39,191	134	326,707	107,586
Total	**1,115,635**	**1,109,219**	**1,044,967**	**1,157,485**	**1,503,783**	**1,901,773**	**1,841,978**	**2,063,196**	**2,072,026**	**2,694,336**

Sources: *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010, 2011)*

Table 27. Brackishwater aquaculture production in Southeast Asia by country and by major species in 2009 (MT)

	Brunei Darussalam	Cambodia	Indonesia	Malaysia	Myanmar	Philippines	Singapore	Thailand	Vietnam	Total
Penaeus vannamei	...	...	...	...	...	...	...	535,000	36,000	571,000
Penaeus monodon	15	...	...	16,351	...	47,830	...	3,500	316,000	383,696
Chanos chanos	...	...	...	...	...	260,610	...	...	...	260,610
Aquatic Plants nei	...	...	171,868	...	...	...	...	...	...	171,868
Penaeus spp.	275	75	402,043	*52,927**	2,204	...	...	453	59,700	527,205
Anadara granosa	...	..	...	64,938	...	...	...	...	...	64,938
Perna viridis	...	...	...	10,596	...	...	...	...	...	10,596
Lates calcarifer	39	...	...	14,229	...	...	...	15,656	...	29,924
Crassostrea spp.	...	...	...	2,128	...	...	...	...	...	2,128
Marine fishes nei	25	...	506,789	*19,650**	722	...	...	3,835	142,697	672,371
Total	**354**	**75**	**1,080,700**	***180,819****	**2,926**	**308,440**	**-**	**558,444**	**554,397**	**2,694,336**

Source: *Fishery Statistical Bulletin of Southeast Asia (SEAFDEC, 2011)*
* *Updated figures provided by Fisheries Management Information Division, DoF Malaysia.*

supply from inland areas, freshwater aquaculture has been widely promoted and practiced in many countries in Southeast Asia. As a result, production from freshwater aquaculture in the region has demonstrated a steady growth over the past decade of approximately 411,000 MT annually from 2000 to 2009 (**Table 28**).

Specifically in 2009, the volume of the region's production from freshwater culture accounted for about 38% of the region's total aquaculture production. In terms of value, this sub-sector accounts for 41% of the region's total aquaculture production value (**Table 29**), making freshwater aquaculture a very important fishery sub-sector. Vietnam contributed the highest production in terms of volume and value followed by Indonesia, Myanmar, and Thailand.

More than 30 major freshwater fish species are being cultured in the Southeast Asian region, about one-half of which are indigenous in the region while the rest are either imported or domesticated for an extended period (*e.g.* tilapia, roho labeo, African (including hybrid) catfish). For this reason, many countries reported on their production by major species groups such as freshwater fishes without providing the details at species level (**Table 30**). Nevertheless, the information provided by the countries in 2009 indicated that freshwater fishes nei accounted for 42% of the region's total production from freshwater aquaculture followed by the Pangas catfish (23%), tilapia nei (12%), roho labeo (10%), catfishes (5%), cyprinidae (4%), and others (4%). In terms of value, freshwater fishes nei provided 47% followed by Pangas catfish (25%), tilapia nei (10%), roho labeo (7%), catfishes (4%), cyprinidae (4%), and others (4%).

Notwithstanding the information provided by the countries on miscellaneous freshwater fishes which are mostly not classified into species level, Pangas catfish (*Pangasius* spp.) contributed the highest production in 2009 accounting for about 23% of total freshwater culture production in the region with Vietnam producing 95%. It is notable that the production of catfish of the region had increased by more than 5 times over the ten-year period from 2000 to 2009. Tilapia comes next providing 11% of the region's freshwater aquaculture production from the Philippines and Thailand, and roho labeo (*Labeo rohita*) at 10% of the region's freshwater production contributed mostly by Myanmar (**Table 31**).

Table 28. Production volume from freshwater aquaculture of the Southeast Asian countries from 2000 to 2009 (MT)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Brunei Darussalam	19	38	90	89	110	129	...	63	...	34
Cambodia	14,002	13,463	17,886	14,133	20,170	25,500	...	33,570	38,350	45,000
Indonesia	367,831	401,030	472,974	429,166	137,766	407,047	384,658	327,171	786,386	1,162,300
Lao PDR	...	...	...	...	...	...	...	...	64,300	75,000
Malaysia	50,689	43,456	*46,403**	*49,947**	55,557	62,006	*61,653**	70,064	*95,846**	*152,631**
Myanmar	93,948	115,793	356,230	114,716	426,000	323,779	...	556,354	605,552	670,773
Philippines	112,033	*123,666***	*147,375***	*160,678***	180,875	198,890	257,325	*244,903***	311,059	*308,294***
Singapore	160	702	602	616	549	602	1,471	345	283	280
Thailand	271,010	279,697	361,124	183,311	523,709	539,474	532,252	525,100	525,500	520,639
Vietnam	381,222	390,820	559,960	448,710	703,827	966,300	...	1,485,500	1,918,300	1,812,900
Total	**1,290,914**	**1,368,663**	**1,979,491**	**1,679,020**	**2,048,563**	**2,523,727**	**1,255,362**	**3,292,292**	**4,345,762**	**4,739,861**

Sources: *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010, 2011)*
* *Updated figures provided by Fisheries Management Information Division, DoF Malaysia; but not used for the calculation of total production.*
** *Updated figure provided by the Philippine Bureau of Agricultural Statistics,Department of Agriculture; but not used for the calculation of total production.*

Table 29. Production value from freshwater aquaculture of the Southeast Asian countries from 2000 to 2009 (US$ 1000)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Brunei Darussalam	...	...	...	...	398	...	...	...	...	...
Cambodia	...	...	...	...	36,813	...	...	52,738	57,525	67,500
Indonesia	217,067	347,392	440,725	443,349	269,851	332,412	384,658	342,329	1,398,411	1,735,852
Lao PDR	..	...	...	...	...	...	...	...	91,141	111,801
Malaysia	*80,263**	*65,263**	*62,368**	*63,421**	*67,105**	*77,329**	*79,781**	*101,159**	*139,556**	*204,058**
Myanmar	...	...	...	...	...	...	...	1,669,191	141,288	644,260
Philippines	118,147	106,139	114,794	132,546	162,960	185,546	257,325	349,629	387,286	418,956
Singapore	3,564	2,522	1,799	1,861	1,744	2,450	1,471	1,072	1,180	1,242
Thailand	209,990	206,769	.253,349	317,492	479,587	358,509	532,252	611,169	462,616	633,148
Vietnam	...	280,191	316,039	379,767	1,055,741	859,850	...	2,662,750	2,656,500	2,719,350
Total	**629,028**	**1,008,429**	**935,923**	**1,338,492**	**2,075,298**	**1,822,566**	**1,255,362**	**5,779,567**	**4,716,200**	**6,583,413**

Sources: *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010, 2011)*
* *Updated figures provided by Fisheries Management Information Division, DoF Malaysia; but not used for the calculation of total production.*

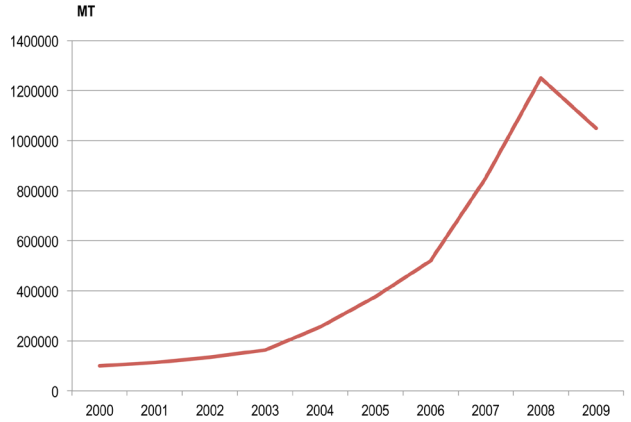

Figure 13. Vietnam's production of Pangas catfish

In 2009, Vietnam reported the highest quantity and value of inland culture production, more than one half of which was derived from the culture of *Pangasius* spp. accounting for about 58% of the country's inland culture production. The production from *Pangasius* spp. in Vietnam had drastically grown from approximately 100,000 MT in 2000 to about 1,250,000 MT in 2008 but dropped to 1,050,000 MT in 2009 (**Fig. 13**).

VI. FISH TRADE

Fish is the most heavily traded food commodity and the fastest growing agricultural commodity in international markets. In addition to its contribution to national economy and capability in generating income, trade in fish and fishery products also plays an important role in improving food security and ensuring the distribution of products to meet the nutritional demands and requirements for food fish worldwide. In 2008, the total export quantity of fish and fishery products was about 23% of world's fishery production while the total import accounted for about 24% of the total fishery production (**Table 32**). While the export of fish and fishery products of the Southeast Asian countries in 2008 represented 17% of the region's fishery production, the region posted a positive trade balance of 1,541,402 MT.

Table 30. Freshwater aquaculture production of the Southeast Asian region by species groups from 2000 to 2009 (MT)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Carps, barbels and other cyprinids	342,185	409,066	447,496	629,864	551,173	300,195	495,534	428,692	680,758	210,735
Tilapia and other cichilds	244,664	281,880	367,489	373,653	380,584	504,195	530,852	575,560	615,705	540,508
Catfishes	235,689	148,962	171,717	252,733	278,865	667,154	756,841	1,160,620	1,674,598	1,334,894
Gouramis	...	43,350	49,661	67,373		44,418	44,971	32,233	37,883	37,438
Misc. freshwater fishes	125,393	200,486	122,278	38,387	96,465	921,116	1,006,699	922,542	620,456	1,994,409
Fresh. crustaceans	19,949	14,140	16,696	29,024	37,648	46,141	32,294	113,873	37,378	35,637

Sources: *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010, 2011)*

Table 31. Freshwater aquaculture production in Southeast Asia by country and by major species in 2009 (MT)

	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Vietnam	**Total**
Pangasius spp.	...	...	...	...	18,810	13,944	...	...	22,243	1,050,000	**1,104,997**
Oreochromis (=Tilapia) spp.	...	...	...	...	35,588	34,860	260,911	...	209,141	...	**540,500**
Labeo rohita	...	...	...	...	...	488,046	...	...	2,375	...	**490,421**
Clarias spp.	...	...	...	...	83,727	6,972	2,892	...	136,306	...	**229,897**
Barbonymus gonionotus	...	...	...	...	723	13,944	...	...	57,600	...	**72,267**
Catla catla	...	...	...	...	...	41,832	...	...	...	...	**41,832**
Cyprinus carpio	...	...	...	...	994	20,916	15,691	...	4,026	...	**41,627**
Trichogaster spp.	...	...	...	...	...	...	175	...	36,047	...	**36,222**
Cyprinidae	...	...	...	...	3,688	50,199	...	...	1,122	...	**55,009**
Misc. freshwater fishes	34	45,000	1,162,300	75,000	915	60	28,821	280	51,779	762,900	**2,127,089**
Total	**34**	**45,000**	**1,162,300**	**75,000**	**144,445**	**670,773**	**308,490**	**280**	**520,639**	**1,812,900**	**4,739,861**

Source: *Fishery Statistical Bulletin of Southeast Asia (SEAFDEC, 2011)*

Table 32. World's fishery production and trade by continent in 2008 (MT)

	Total Fishery Production	Total Export of Fish and Fishery products	Total Import of Fish and Fishery products	Trade Balance (Export-Import)
World	**142,326,046**	**32,338,756**	**33,536,329**	**-1,197,573**
Africa	8,424,970	1,618,807	3,248,505	-1,629,698
Americas	24,470,938	7,720,061	4,210,689	3,509,372
Asia*	65,340,506	5,924,837	9,139,516	-3,214,679
Southeast Asia**	**27,260,013**	**4,651,467**	**3,110,065**	**1,541,402**
Europe	15,415,869	11,867,828	13,430,337	-1,562,509
Oceania	1,413,750	555,756	397,217	158,539

* *Excludes Southeast Asia*
** ***Sources:*** *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010, 2011)*
Source of other data: *FAO Fisheries and Aquaculture Information and Statistics Service*

6.1 Global Trading of Fish and Fishery Products

From 2000 to 2008, the world exports of fish and fishery products increased in terms of volume by about 646,300 MT/year (**Table 33**) and in terms of value by about US$ 5,205 million annually (**Table 34**). In 2008, Europe exported the largest amount of fish and fishery products accounting for about 37% in terms of volume and 38% in terms of value of the world's total export of fish and fishery products (**Fig. 14**). The Southeast Asian region on the other hand, exported more than 14% of global export volume with value that represents 16% of the world's export value (**Table 34**). From Asia, China is the largest exporter contributing about 10% to the global export value followed by Norway providing about 7%. From among the Southeast Asian countries, Thailand's export value contributes 6% to the world's total export value while Vietnam provides 4%.

In terms of import of fish and fishery products in 2008 (**Table 35**), Europe also imported the largest quantity representing 40% of the world's total import volume and 47% of the world's import value. Asia (excluding Southeast Asia) came next with the import volume equivalent to 27% and 26% in terms of value (**Table 36**), with Japan as the largest importing country with its import value accounting for 14% of the world's import value. The United States of America on the other hand, accounted for about 13% of the world's total import (**Table 37**).

Table 33. World's export volume of fish and fishery products by continent from 2000 to 2008 (MT)

	2000	2001	2002	2003	2004	2005	2006	2007	2008
World	**26,522,457**	**27,692,567**	**27,579,545**	**28,229,117**	**29,778,194**	**31,125,973**	**31,487,742**	**31,824,120**	**32,338,756**
Africa	1,429,938	1,448,437	1,495,826	1,443,456	1,362,495	1,438,138	1,577,060	1,569,254	1,618,807
Americas	7,439,299	7,575,941	6,719,867	6,796,415	7,573,772	8,271,059	7,676,682	7,477,837	7,720,061
Asia*	3,934,695	4,313,806	4,690,050	4,651,357	5,103,039	5,372,681	5,974,680	6,132,797	5,924,837
Southeast Asia**	**2,537,650**	**2,794,576**	**3,130,183**	**3,487,477**	**3,726,312**	**3,905,249**	**4,347,417**	**4,391,013**	**4,651,467**
Europe	10,666,929	11,053,966	10,979,693	11,268,697	11,384,394	11,504,192	11,301,402	11,657,352	11,867,828
Oceania	513,946	505,841	563,926	581,715	628,182	634,654	610,501	595,867	555,756

* *Excludes Southeast Asia*
** ***Sources:*** *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010, 2011)*
Source of other data: *FAO Fisheries and Aquaculture Information and Statistics Service*

Table 34. World's export value of fish and fishery products by continent from 2000 to 2008 (US$ 1000)

	2000	2001	2002	2003	2004	2005	2006	2007	2008
World	**55,845,773**	**56,632,610**	**58,712,141**	**64,309,755**	**71,866,509**	**79,098,102**	**86,548,454**	**94,109,569**	**102,676,390**
Africa	2,736,448	2,849,334	3,118,517	3,368,369	3,293,196	3,713,840	3,906,874	4,494,502	4,777,540
Americas	13,256,480	13,779,546	13,473,722	14,918,822	15,925,983	17,772,863	19,103,365	19,757,890	21,297,994
Asia*	10,369,245	10,342,455	10,916,377	11,585,136	14,075,457	15,390,484	16,672,254	17,675,673	19,000,022
Southeast Asia**	**8,812,594**	**8,728,057**	**8,707,277**	**9,120,338**	**10,052,738**	**11,035,117**	**12,512,487**	**13,682,576**	**16,115,145**
Europe	18,769,641	19,126,103	20,603,409	23,381,528	26,401,855	29,000,684	32,188,631	36,230,015	39,178,009
Oceania	1,901,365	1,807,115	1,892,839	1,935,562	2,117,280	2,185,114	2,164,843	2,268,913	2,307,680

* *Excludes Southeast Asia*
** ***Sources:*** *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010, 2011)*
Source of other data: *FAO Fisheries and Aquaculture Information and Statistics Service*

Table 35. World's import volume of fish and fishery products by continent from 2000 to 2008 (MT)

	2000	2001	2002	2003	2004	2005	2006	2007	2008
World	**26,514,155**	**27,946,942**	**28,088,132**	**28,574,573**	**30,289,223**	**31,925,268**	**33,379,144**	**34,045,034**	**33,536,329**
Africa	1,593,854	1,864,311	1,731,138	1,861,829	2,289,675	2,431,128	3,845,105	3,850,588	3,248,505
Americas	3,284,576	3,347,550	3,347,352	3,596,394	3,821,087	3,852,586	4,042,879	4,195,907	4,210,689
Asia*	8,115,616	8,339,821	8,664,947	8,110,971	9,006,740	9,492,860	9,127,798	9,051,252	9,139,516
Southeast Asia**	**1,857,630**	**2,020,229**	**2,237,657**	**2,180,413**	**2,446,107**	**2,866,375**	**2,972,007**	**2,961,865**	**3,110,065**
Europe	11,314,999	12,034,262	11,758,543	12,471,731	12,340,682	12,909,988	13,002,845	13,597,405	13,430,337
Oceania	347,480	340,769	348,495	353,235	384,932	372,331	388,510	388,017	397,217

* *Excludes Southeast Asia*
** ***Sources:*** *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010, 2011)*
Source of other data: *FAO Fisheries and Aquaculture Information and Statistics Service*

Table 36. World's import value of fish and fishery products by continent from 2000 to 2008 (US$ 1000)

	2000	2001	2002	2003	2004	2005	2006	2007	2008
World	**61,016,653**	**60,603,270**	**62,504,836**	**68,429,660**	**76,761,850**	**82,872,583**	**91,311,234**	**99,420,542**	**108,599,363**
Africa	957,275	1,261,522	1,230,671	1,459,686	1,671,522	2,013,573	2,410,767	2,842,462	3,036,319
Americas	13,091,323	12,885,820	12,544,833	14,302,537	15,053,196	15,405,417	17,262,495	18,319,122	19,627,040
Asia*	22,275,946	20,277,573	21,116,032	20,314,354	23,808,717	24,773,774	25,293,048	25,757,485	28,700,820
Southeast Asia**	**1,965,852**	**2,145,850**	**2,297,541**	**2,443,603**	**2,958,752**	**3,277,086**	**3,493,875**	**3,865,759**	**4,822,005**
Europe	22,050,883	23,352,325	24,593,131	29,082,728	32,363,763	36,351,038	41,709,655	47,307,259	51,018,055
Oceania	675,374	680,180	722,628	826,752	905,900	1,051,695	1,141,394	1,328,455	1,395,124

* *Excludes Southeast Asia*
** ***Sources:*** *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010, 2011)*
Source of other data: *FAO Fisheries and Aquaculture Information and Statistics Service*

Table 37. World's top ten exporters and importers of fish and fishery products in 2008

Exporters	Export Value (US$ millions)
1. China	10,114
2. Norway	6,937
3. Thailand	6,532
4. Denmark	4,601
5. Vietnam	4,550
6. United States of America	4,463
7. Chile	3,931
8. Canada	3,706
9. Spain	3,465
10. Netherlands	3,394
Importers	**Import Value (US$ millions)**
1. Japan	14,947
2. United States of America	14,135
3. Spain	7,101
4. France	5,836
5. Italy	5,453
6. China	5,143
7. Germany	4,502
8. United Kingdom	4,220
9. Denmark	3,111
10. Korea	2,928

Source: *The State of World Fisheries and Aquaculture 2010*

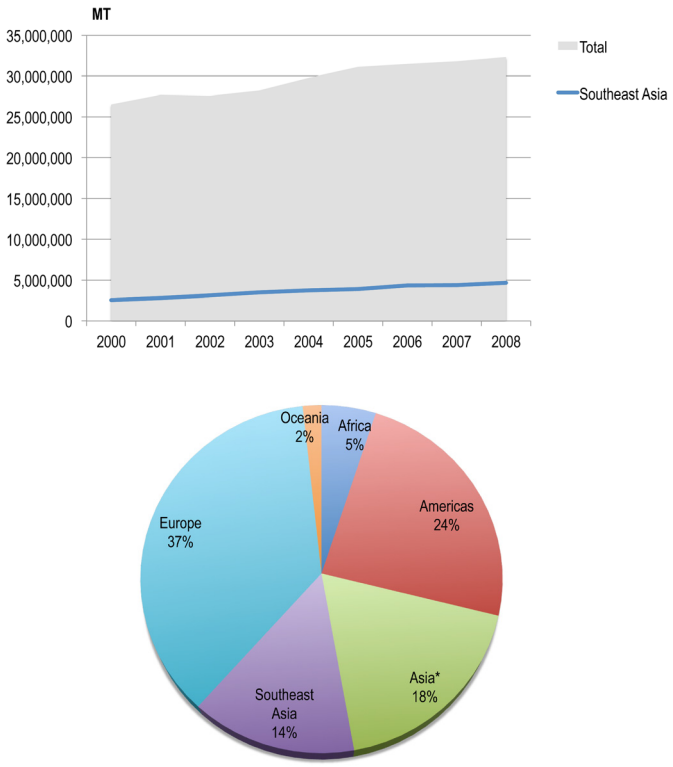

Figure 14. Export volume of fish and fishery products (top) and percentage of export quantity by continent in 2008 (above)

6.2 Southeast Asian Export-Import of Fish and Fishery Products

For the Southeast Asian region, Thailand is the largest exporter of fish and fishery products in 2008, which was about 55% of the country's total fishery production, followed by Vietnam the volume of which was about 23% of its fishery production (**Table 38** and **Table 39**). Although the region's export of fish and fishery products originates mainly from capture and culture fisheries, some products are imported and re-exported as well. As in the case of Singapore, although its import volume was minimal but the total export volume very much exceeded the country's fishery production, since the country imported most products that are meant for re-export.

In terms of export value (**Table 40**), Brunei Darussalam posted the highest average value per metric tons of exported products at US$ 10,900/MT followed by Singapore at US$ 5,415/MT, Vietnam at US$ 4,315/

Table 38. Trading of fish and fishery products by the Southeast Asian countries in 2008 (MT)

Country	Total Fishery Production	Total Export of Fish and Fishery products	Total Import of Fish and Fishery products	Trade Balance (Export-Import)
Brunei Darussalam	2,747	220	4,882	-4,662
Cambodia	536,320	42,610	2,176	40,434
Indonesia	9,054,873	868,442	198,980	669,462
Lao PDR	93,500	17	3,884	-3,867
Malaysia	1,639,017	*302,235**	*383,334**	*-81,099**
Myanmar	3,147,605	351,652	2,416	349,236
Philippines	4,964,703	228,075	210,215	17,860
Singapore	5,141	62,541	225,703	-163,162
Thailand	3,204,200	1,755,255	1,533,690	221,565
Vietnam	4,559,720	1,056,124	253,315	802,809
Total	**27,207,826**	**4,651,467**	**3,110,065**	**1,541,402**

Source: *Fishery Statistical Bulletin of Southeast Asia (SEAFDEC, 2010)*
* *Updated figures provided by Fisheries Management Information Division, DoF Malaysia.*

Table 39. Export volume of fish and fishery products by the Southeast Asian countries from 2000 to 2008 (MT)

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Brunei Darussalam	285	149	92	144	113	156	736	320	220
Cambodia	43,636	38,454	52,752	56,957	47,272	50,334	48,868	43,985	42,610
Indonesia	490,416	457,913	539,384	830,383	881,677	825,076	885,179	814,303	868,442
Lao PDR	4	30	7	24	11	-	1	33	17
Malaysia	*144,590**	*161,339**	*198,892**	*241,780**	*283,385**	*289,971**	*270,774**	*318,403**	*302,235**
Myanmar	116,609	144,623	201,667	212,999	205,463	278,675	271,071	259,054	351,652
Philippines	215,531	171,361	171,279	188,789	180,648	153,885	171,726	185,918	228,075
Singapore	110,693	91,932	74,428	72,465	78,590	83,229	81,308	69,889	62,541
Thailand	1,162,099	1,250,204	1,280,563	1,440,364	1,436,475	1,570,762	1,743,974	1,823,612	1,755,255
Vietnam	302,942	513,681	606,684	525,090	625,368	668,126	888,664	890,418	1,056,124
Total	**2,537,650**	**2,794,576**	**3,130,183**	**3,487,477**	**3,726,312**	**3,905,249**	**4,347,417**	**4,391,013**	**4,651,467**

Sources: *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010)*
* *Updated figures provided by Fisheries Management Information Division, DoF Malaysia; but not used for the calculation of total production.*

Table 40. Export value of fish and fishery products by the Southeast Asian countries from 2000 to 2008 (US$ 1000)

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Brunei Darussalam	296	334	459	706	683	1,053	5,305	3,238	2,398
Cambodia	37,691	31,308	32,071	34,744	40,304	51,207	43,995	31,970	31,937
Indonesia	1,610,291	1,560,078	1,516,537	1,579,783	1,736,184	1,845,883	2,019,803	2,170,876	2,600,968
Lao PDR	29	78	27	26	25	21	8	56	40
Malaysia	*355,136**	*358,931**	*384,878**	*442,643**	*592,787**	*641,350**	*646,426**	*756,515**	*769,846**
Myanmar	183,707	218,291	251,534	317,382	318,514	460,089	362,951	358,065	560,568
Philippines	455,984	420,184	453,030	464,463	454,384	384,766	418,364	498,069	671,194
Singapore	455,407	379,215	313,707	320,344	399,887	404,259	382,742	369,982	388,655
Thailand	4,384,437	4,075,341	3,713,299	3,943,194	4,079,407	4,502,821	5,275,349	5,721,525	6,547,742
Vietnam	1,484,283	1,823,102	2,044,630	2,203,499	2,450,112	2,765,365	3,379,955	3,790,167	4,559,252
Total	**8,812,594**	**8,728,057**	**8,707,277**	**9,120,338**	**10,052,738**	**11,035,117**	**12,512,487**	**13,682,576**	**16,115,145**

Sources: *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010)*
* *Updated figures provided by Fisheries Management Information Division, DoF Malaysia; but not used for the calculation of total production.*

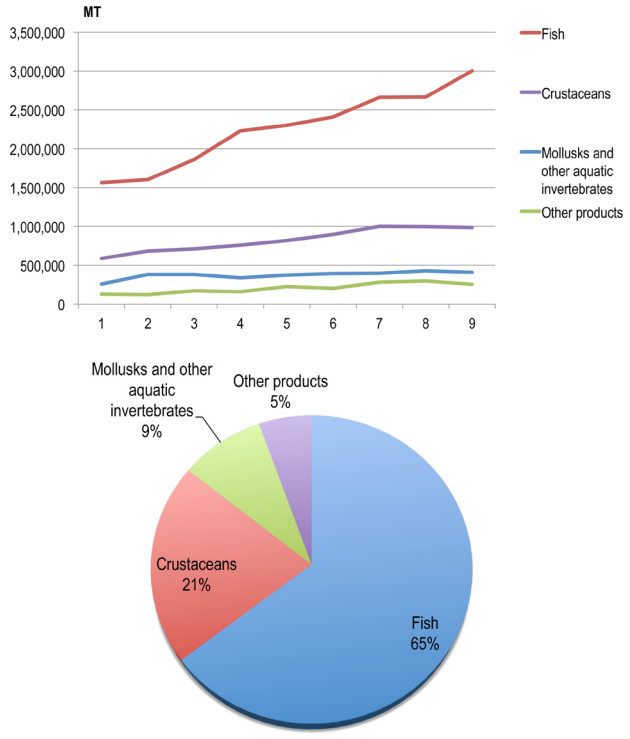

Figure 15. Major groups of commodities exported by the Southeast Asian countries in 2008

MT and Thailand at US$ 3,730/MT. On the other hand, Cambodia posted the lowest average value per metric ton of exported products at US$ 750/MT.

Moreover, from 2000 to 2008, the largest exported commodity is the "fishes" group which accounts for 65% of total export of the region, followed by crustaceans contributing 21% to the total export (**Table 41** and **Fig. 15**). Specifically in the case of Vietnam, its important export products are frozen shrimps, processed Pangas catfish which are mainly exported to Japan, Taiwan, South Korea, Hong Kong, the United States and the European Union. For Thailand, its major export fishery products included shrimps and canned seafood which are exported to the United States, Japan, Canada, and Singapore.

Furthermore, the import quantity of the Southeast Asian region which increased at the rate of about 139,160 MT annually (**Table 42**), posted a positive trade balance of about 1,541,400 MT in 2008. Although Thailand is the largest importing country, it still posted a positive trade balance of 221,565 MT (**Fig. 16**). On the other hand,

Table 41. Fish and fishery products exported by Southeast Asia (MT)

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Crustaceans	**588,337**	**684,492**	**711,793**	**758,504**	**818,594**	**899,674**	**1,000,908**	**995,896**	**983,362**
Frozen	417,571	460,098	489,987	512,425	561,982	603,595	666,398	672,100	643,444
Not Frozen	37,001	86,362	80,415	97,085	85,118	106,808	91,361	76,613	75,665
Prepared or preserved	133,765	138,032	141,391	148,994	171,494	189,271	243,149	247,183	264,253
Fish	**1,562,969**	**1,605,154**	**1,862,742**	**2,230,473**	**2,302,817**	**2,407,896**	**2,663,082**	**2,666,187**	**3,004,456**
Fillets, frozen	65,350	87,945	96,744	106,809	163,351	212,908	338,899	297,407	439,987
Meat and fillets fresh or chilled	5,307	7,745	11,833	14,755	5,417	8,037	8,529	31,468	22,213
Meat, whether or not minced, frozen	95,249	128,938	154,204	151,017	140,360	179,521	186,536	198,329	232,794
Prepared or preserved	492,547	567,552	623,194	730,870	732,202	835,383	890,473	905,002	995,289
Dried, salted and smoked	55,366	75,334	80,973	90,029	86,933	126,248	126,801	128,578	123,271
Fresh or chilled, excluding fillets and meat	308,179	310,920	321,933	323,722	321,483	303,516	312,636	335,363	308,280
Frozen, excluding fillets and meat	502,559	386,383	530,208	770,498	803,973	694,053	753,017	732,779	839,921
Live	38,412	40,337	43,653	42,773	49,098	48,230	46,191	37,261	42,701
Mollusks and other aquatic invertebrates	**257,980**	**382,804**	**384,252**	**338,164**	**376,146**	**392,684**	**400,131**	**431,767**	**408,510**
Live, fresh or chilled	17,319	80,811	61,582	71,834	52,703	48,770	23,151	24,841	31,848
Other than live, fresh or chilled	213,050	271,118	289,131	231,276	269,597	293,587	322,156	350,205	323,223
Prepared or preserved	27,611	30,875	33,539	35,054	53,846	50,327	54,824	56,721	53,439
Other products	**128,364**	**122,126**	**171,396**	**160,336**	**228,756**	**204,995**	**283,296**	**297,164**	**255,139**
Total	**2,537,650**	**2,794,576**	**3,130,183**	**3,487,477**	**3,726,313**	**3,905,249**	**4,347,417**	**4,391,014**	**4,651,467**

Sources: *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010)*

Malaysia which ranked second as the largest importing country posted a negative trade balance of about 388,270 MT (**Fig. 17**). Brunei Darussalam which had the least fishery production posted a negative balance of trade of 4,662 MT while Singapore which is the second country with the least fishery production also posted a high negative trade balance of 163,162 MT.

During the period from 2000 to 2008, the value of the products imported by the Southeast Asian countries increased by about US$ 317,350 annually (**Table 43**). In terms of average value per metric tons of imported products, Singapore had the highest value at US$ 4,060/MT followed by Brunei Darussalam at US$ 2,510/MT. As for Thailand which is the largest importer among the Southeast Asian countries, the value of its import was US$ 1,595/MT while the value of the Philippine import was the lowest at about US$ 840/MT.

VII. SUMMARY

Since the early 2000s, the Southeast Asian region has been responsible for the substantial and consistently increasing volume of the world's total fishery production, with the region contributing about 13% in 2000 to about 20% in 2009 or at an average of more than 16% annually. Among the Southeast Asian countries, Indonesia has maintained its position as the leading fish producer with its volume contributing an average of more than 30% annually to the region's total fishery production. The Philippines which ranked as the region's second highest producer contributed an average of about 18% while Vietnam's contribution to the region's total fishery production ranged from more than 11% in 2000 to about 17% in 2009 with an average of about 15% annually. This scenario reflects the important role that Indonesia's fishery sector has played in the region's economies.

On the other hand, the trend of the fishery production of Myanmar has been increasing fast especially starting in 2008. While the country has contributed only about 8% to the region's total fishery production in 2000, by 2009 it accounted for at least 12% with an average contribution of 10% to the region's fishery production from 2000 to 2009. Meanwhile, Thailand seems to be losing its grip on its fishery production as its contribution to the region's overall total had been decreasing from 22% in 2000 to only about 11% in 2009 decreasing at an average of more than 1% annually over the ten-year period. The region's fishery production comes from three major sources, namely: marine capture fisheries, inland capture fisheries and aquaculture. During the ten-year period from 2000 to 2009, marine capture fisheries had contributed substantially to the region's total fishery production followed by aquaculture and inland capture fisheries.

However, the contribution from marine capture fisheries has been decreasing from 70% in 2000 to only about 49%

Table 42. Import volume of fish and fishery products by the Southeast Asian countries from 2000 to 2008 (MT)

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Brunei Darussalam	6,624	8,335	6,573	7,201	6,812	6,385	7,697	5,382	4,882
Cambodia	3,174	1,074	1,267	2,218	3,071	3,094	3,084	3,862	2,176
Indonesia	171,349	151,957	110,035	92,649	126,826	128,431	165,195	126,003	198,980
Lao PDR	2,510	3,142	2,725	3,026	3,943	3,594	3,028	3,190	3,884
Malaysia	*323,199**	*349,265**	*353,794**	*375,870**	*423,092**	*399,379**	*435,616**	*438,898**	*383,334**
Myanmar	1,525	565	464	1,053	1,650	1,846	1,393	1,699	2,416
Philippines	248,407	180,992	217,069	152,389	134,375	182,765	179,640	202,163	210,215
Singapore	183,934	174,391	179,616	215,305	227,340	253,552	244,646	239,686	225,703
Thailand	813,789	977,656	1,006,347	1,078,966	1,240,567	1,445,348	1,470,636	1,407,414	1,533,690
Vietnam	7,960	42,488	46,062	80,758	105,712	165,588	200,663	228,718	253,315
Total	**1,857,630**	**2,020,229**	**2,237,657**	**2,180,413**	**2,446,107**	**2,866,375**	**2,972,007**	**2,961,865**	**3,110,065**

Sources: *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010)*
* *Updated figures provided by Fisheries Management Information Division, DoF Malaysia; but not used for the calculation of total production.*

Table 43. Import value of fish and fishery products by the Southeast Asian countries from 2000 to 2008 (US$ 1000)

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Brunei Darussalam	15,239	13,379	13,136	11,847	14,415	15,766	25,646	15,907	12,260
Cambodia	2,724	467	586	3,090	3,225	3,714	4,341	5,086	2,443
Indonesia	101,644	93,730	79,095	75,903	143,669	106,330	142,742	118,966	202,029
Lao PDR	2,069	2,170	1,727	2,333	3,331	3,310	3,084	3,675	4,409
Malaysia	*307,448**	*335,180**	*343,871**	*375,631**	*542,341**	*533,921**	*587,028**	*648,196**	*591,607**
Myanmar	1,894	605	642	1,704	2,791	3,213	2,598	2,931	5,231
Philippines	111,596	71,362	92,524	86,405	73,892	102,798	101,105	132,765	176,560
Singapore	560,405	494,362	513,415	598,724	705,335	776,580	757,639	818,064	916,118
Thailand	826,699	1,072,925	1,079,930	1,134,471	1,255,346	1,457,936	1,573,958	1,750,024	2,447,759
Vietnam	36,242	60,145	116,141	151,622	218,636	276,576	302,425	373,470	461,125
Total	**1,965,852**	**2,145,850**	**2,297,541**	**2,443,603**	**2,958,752**	**3,277,086**	**3,493,875**	**3,865,759**	**4,822,005**

Sources: *Fishery Statistical Bulletin for the South China Sea Area (SEAFDEC, 2000-2009) and Fishery Statistical Bulletin of Southeast Asia (SEAFDEC 2010)*
* *Updated figures provided by Fisheries Management Information Division, DoF Malaysia; but not used for the calculation of total production.*

in 2009 decreasing by an average of more than 2% every year. This situation would need special attention in order that marine capture fisheries could continue to provide a sizeable amount of fishery production to enhance the region's economies. On the other hand, the contribution from aquaculture to the region's total fishery production had been increasing from 22% in 2000 to 43% in 2009 or at an average rate of about 2.3% annually. Although the trend of aquaculture production is increasing with large volume being contributed to the region's total fishery production, there are still major concerns that need to be addressed in order that aquaculture would remain sustainable.

The region's inland capture fishery sub-sector appears to have potentials for further development especially if the sub-sector is given more attention. The sub-sector's contribution to the region's total fishery production from 2000 to 2009 indicated steady trend of about 8% annually even if the real trend could not be established due to lack of data from many countries. Following such situation, there is a need to improve data collection especially from inland capture fisheries in order that the actual contribution of inland capture fisheries to the region's economies could be established. It should be noted that Indonesia maintains its position as the highest producer of fish and fishery products not only from marine capture fisheries but also from aquaculture and inland capture fisheries as well.

Specifically in 2009, a big portion of Indonesia's production from marine capture fisheries comprised the mackerels which accounted for 26% of the country's total production from marine capture fisheries, especially the short mackerel (*Rastrelliger brachysoma*) followed by tunas providing 19% comprising mostly the skipjack tuna (*Katsuwonus pelamis*) and frigate tuna (*Auxis thazard*). For Vietnam, its main production comes from miscellaneous marine fishes which had not been classified by species. In the case of the Philippines, the main production also comes from mackerels especially the Indian mackerel (*Rastrelliger karnagurta*), accounting for 29% of the country's production from marine capture fisheries and tunas comprising mainly the skipjack and yellowfin tuna (*Thunnus albacares*), providing about 25%. From the current trend, it can be seen that the pelagic fishery resources are very important for the region's marine capture fisheries.

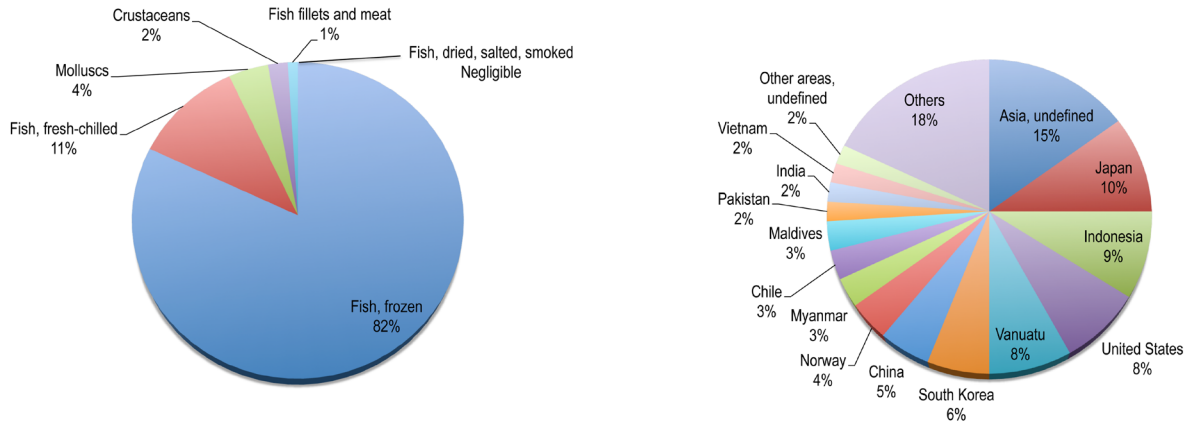

Figure 16. Thailand's import of fish and fish products in 2008 (left) and countries of origin (right)
Source: *Thailand's Trade Statistics for Imports (http://www.ats.agr.gc.ca/ase/5677-eng.htm)*

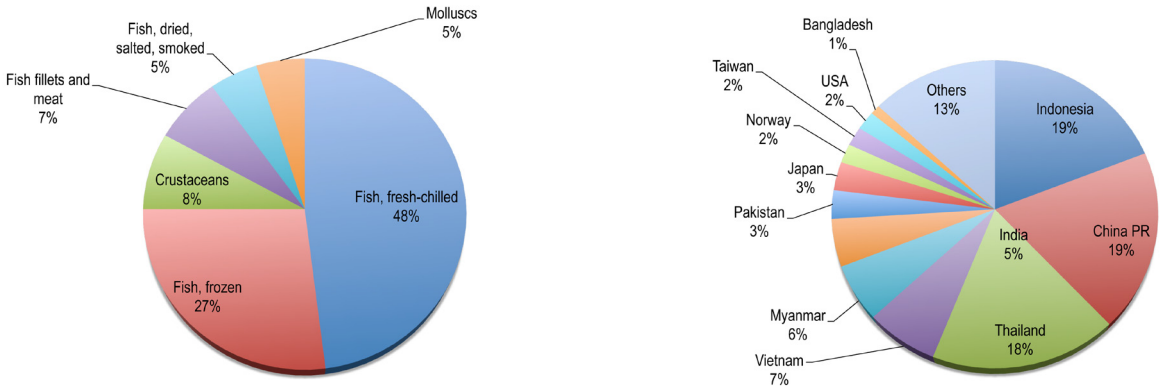

Figure 17. Malaysia's import of fish and fish products in 2008 (left) and countries of origin (right)
Source: *Malaysian External Trade Statistics (http://www.ats.agr.gc.ca/ase/5688-eng.htm)*

In the case of aquaculture, production comes from three main sources, namely: mariculture or marine culture, brackishwater culture, and freshwater culture. Indonesia's main products from mariculture are aquatic plants which had not been classified by species while that of the Philippines are the Zanzibar weeds (*Eucheuma cottonii*) accounting for 79% of the country's production from mariculture. This trend tends to suggest the importance of marine aquatic plants and seaweeds in the region's mariculture industry. For brackishwater culture, Indonesia's main products are miscellaneous marine fishes followed by *Penaeus* spp.although such species have not been specifically classified.

On the other hand, Thailand's production from brackishwater aquaculture comes mainly from *Penaeus vannamei* contributing 96% of the country's production from brackishwater aquaculture, while Vietnam's main production came from *Penaeus monodon* providing 57% to the country's production from brackishwater aquauculture. It should be noted that although the production from brackishwater aquaculture of Brunei Darussalam is minimal at 354 MT, this comprised mainly the Pacific blue shrimp (*Penaeus stylirostris*) accounting for 77% of the country's production from brackishwater aquaculture which is valued at about US$ 14,580/MT. This trend indicates the importance of *Penaeus* spp. to the region's brackishwater aquaculture industry.

In freshwater aquaculture, Vietnam's main production comes from *Pangasius* spp. accounting for 58% of the country's total production from freshwater aquaculture and the remaining 42% is provided by miscellaneous freshwater species which have not been classified by species. For Indonesia, its production indicates miscellaneous freshwater species which have not also been classified by species. Myanmar ranks third in terms of freshwater aquaculture production which comes mainly from roho labeo (*Labeo rohita*) accounting for 73% of the country's total production from freshwater aquaculture. Therefore, the economically important species for freshwater aquaculture in the Southeast Asian region seem to vary depending on the countries' technical capability.