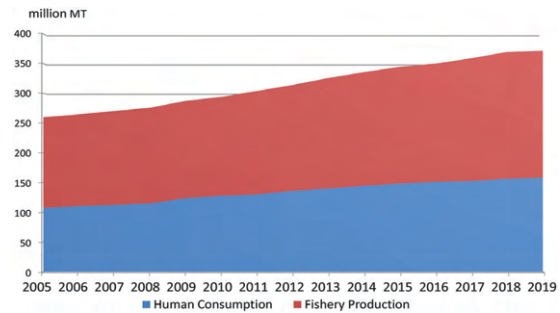


# PART I

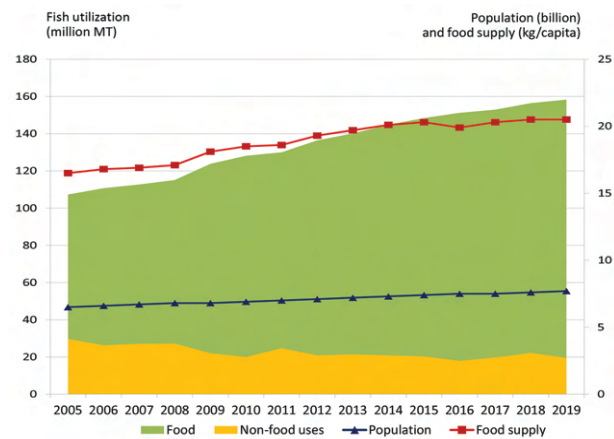
## Overview of the Status and Trends of Capture Fisheries and Aquaculture in Southeast Asia

### 1. Global Production and Utilization of Fish

The global fisheries production had continued to grow from 152.8 million metric tons (mt) in 2005 to 213.7 million mt in 2019, with the worldwide trend of fisheries production from both capture fisheries and aquaculture steadily increasing at an annual average rate of 4.35 million mt or about 2.43 % annually (**Table 1**). The utilization of fish for human consumption and non-food uses also increased from 137 million mt in 2005 to 177.8 million mt in 2019 or an increase of 1.89% annually (FAO, 2020a). During the period from 2005 to 2019, the percentage of fish produced for human consumption had increased from 70.2 % to approximately 77.1 %, although there was slight decrease during 2011–2015, but it had remained rather steadily at 76.0 % in 2016, and then slightly declined from 2017 to 2019 (**Table 1**; **Figure 1**). Meanwhile, the human population as major consumer of fish products also increased from approximately 6.5 billion in 2005 to 7.7 billion in 2019, while the per capita fish consumption also increased from an average of 16.5 kg in 2005 to 20.9 kg in 2019 (**Figure 2**). From the aforesaid data, it could be visualized that the increased supply of fish through enhanced fisheries production has contributed to the elevated consumption and other utilization, and as the human population grows the demand for fish and fishery products would surely



**Figure 1.** Quantity of fisheries production utilized for human consumption from 2005 to 2019



**Figure 2.** Global fish utilization, food supply and human population from 2005 to 2019

**Table 1.** World fisheries production and utilization from 2005 to 2019

Year	Production (million mt)*			Utilization**		Human population (billions)**	Percentage of production for human consumption (%)	Per capita fish consumption (kg)**
	Capture	Aquaculture	Total	Human consumption	Non-food uses			
2005	93.7	59.1	152.8	107.3	29.7	6.5	70.2	16.5
2006	91.2	62.9	154.1	110.7	26.3	6.6	71.8	16.8
2007	91.6	66.3	157.9	112.7	27.1	6.7	71.4	16.9
2008	90.7	70.2	160.9	115.1	27.2	6.8	71.5	17.1
2009	90.1	73.8	163.9	123.8	22.0	6.8	75.5	18.1
2010	88.2	78.0	166.2	128.1	20.0	6.9	77.1	18.5
2011	92.7	81.6	174.3	130.0	24.7	7.0	74.6	18.6
2012	89.8	88.2	178.0	136.4	20.9	7.1	76.6	19.3
2013	91.0	95.0	186.0	140.1	21.4	7.2	75.3	19.7
2014	91.6	99.6	191.2	144.8	20.9	7.3	75.7	20.1
2015	92.7	103.9	196.6	148.4	20.3	7.4	75.5	20.3
2016	90.8	108.2	199.0	151.2	17.9	7.5	76.0	19.9
2017	94.3	112.1	206.4	152.9	19.7	7.5	74.1	20.3
2018	97.6	115.8	213.4	156.4	22.2	7.6	73.3	20.5
2019	93.6	120.1	213.7	158.3*	19.5*	7.7	74.1	20.5*

Source: \* FAO Fisheries and Aquaculture Information and Statistics Service

\*\* State of World Fisheries and Aquaculture 2018 and 2020

rise. It is quite clear that for the developing countries, fish consumption trends depend on the availability of local and seasonal supply of fish and fishery products, which also influence the subsequent fish supply chain.

The rapid growth in human population is also likely to continue, and as predicted by the United Nation’s Population Division, world population will reach 8.5 billion by 2030 and 9.7 billion by 2050 (UN, 2019), increasing at 10.4 % and 26.0 %, respectively, compared with that in 2019. In 2019, fish consumption had accounted for 74.2 % of the global fisheries production, and is expected to increase in the coming years considering the health benefits that could be derived from fish and fishery products. The world food producing sectors must therefore secure food and nutrition for the growing human population through increased sustainable production. Although records might have shown that the Coronavirus 2019 pandemic has led to dramatic loss of human lives worldwide and presented an unprecedented challenge to public health and food system, the number of people in the world affected by hunger increased in 2020 under the shadow of the COVID-19 pandemic. In fact, after remaining virtually unchanged from 2014 to 2019, the prevalence of under nourishments (PoU) climbed to around 9.9 % in 2020 from 8.4 % a year earlier (FAO, 2021a).

The world fisheries production from 2005 to 2019 by continent (Table 2; Figure 3) indicated continuous annual increases at an average rate of 2.43 % or 4.35 million mt per year. The major fish producers on one hand, are the countries in Asia (excluding Southeast Asia), contributing 52.8 % to the total production in 2019. On the other hand, the Southeast Asian region, which contributes approximately

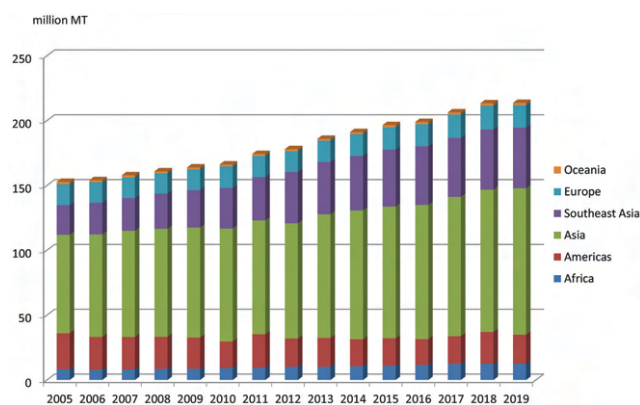


Figure 3. Trends of fisheries production of each continent from 2005 to 2019 by quantity (mt)  
(Note: Asia does not include the data of Southeast Asia)

21.9 % to the world’s total fisheries production, had maintained an increasing trend in production from 23.0 million mt in 2005 to 46.8 million mt in 2019 or at an annual average increase of 1.7 million mt or 5.3 % per year. Meanwhile, fisheries production from the Americas had been fluctuating with slight decrease from 27.7 million mt in 2005 to 22.4 million mt in 2019. For Europe, its fisheries production had slightly increased from 16.2 million mt in 2005 to 17.3 million mt in 2019 with highest production peak of 18.4 million mt in 2018.

## 2. Fisheries Production of Southeast Asia

The Southeast Asian region (Figure 4) is bordered to the north by East Asia, to the west by South Asia and the Bay of Bengal, to the east by Oceania and the Pacific Ocean, and to the south by Australia and the Indian Ocean. Southeast Asia

Table 2. Fisheries production of each continent from 2005 to 2019 by quantity (in million mt)

Year	World total* (million mt)	Continents					
		Africa*	Americas*	Asia*	Southeast Asia**	Europe*	Oceania*
2005	152.8	8.3	27.7	75.9	23.0	16.2	1.7
2006	154.1	7.9	25.4	78.9	24.5	15.9	1.5
2007	157.9	8.1	25.1	81.8	25.3	16.0	1.6
2008	160.9	8.4	24.9	83.3	27.2	15.7	1.4
2009	163.9	8.6	24.1	84.8	28.9	16.1	1.4
2010	166.2	9.2	20.5	87.1	31.4	16.6	1.4
2011	174.3	9.4	25.9	87.7	33.6	16.3	1.4
2012	178.0	10.2	21.8	88.8	36.1	16.2	1.5
2013	186.0	10.2	22.3	95.2	40.4	16.5	1.4
2014	191.2	10.6	20.8	99.3	42.1	16.9	1.5
2015	196.6	10.9	21.3	101.5	44.0	17.3	1.6
2016	199.0	11.5	20.0	103.5	45.3	17.0	1.7
2017	206.4	12.3	21.4	107.5	45.5	18.1	1.6
2018	213.4	12.5	24.5	109.7	46.5	18.4	1.8
2019	213.7	12.5	22.4	112.9	46.8	17.3	1.8

Note: Asia does not include data of Southeast Asia

\* Source: FAO Fisheries and Aquaculture Information and Statistics Service

\*\* Source: Fishery Statistical Bulletin for the South China Sea Area 2005-2007 (SEAFDEC, 2008a; 2009; 2010a) for data from 2005 to 2007, and Fishery Statistical Bulletin of Southeast Asia 2008-2019 (SEAFDEC, 2010b; 2011; 2012; 2013, 2014, 2015; 2016; 2017a; 2018; 2020a; 2020b; 2022) for data from 2008 to 2019



Figure 4. Map of Southeast Asia (Source: Google)

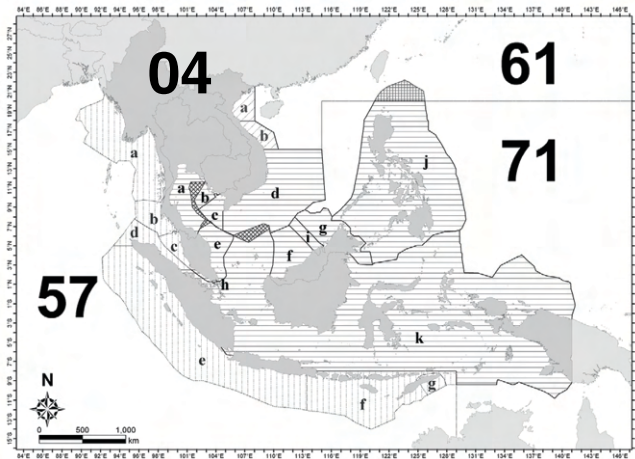


Figure 5. FAO Major Fishing Areas in Southeast Asia (Source: SEAFDEC, 2008b)

comprises eleven countries with impressive diversity in religion, culture, and history, namely: Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Timor-Leste, Thailand, and Viet Nam. Although Timor-Leste may have its own fisheries data, SEAFDEC has no mandate to include the country’s statistics in this publication as the scope of this publication focuses mainly on the ten ASEAN Member States (AMSs). In terms of fishery statistics for both capture fisheries and aquaculture, the total fisheries production of the Southeast Asian region is derived from the waters identified as FAO Major Fishing Area 57 (Indian Ocean, Eastern), 61 (Pacific, Northwest), 71 (Pacific, Western Central), and 04 (Asia, Inland Waters) as shown in **Figure 5**.

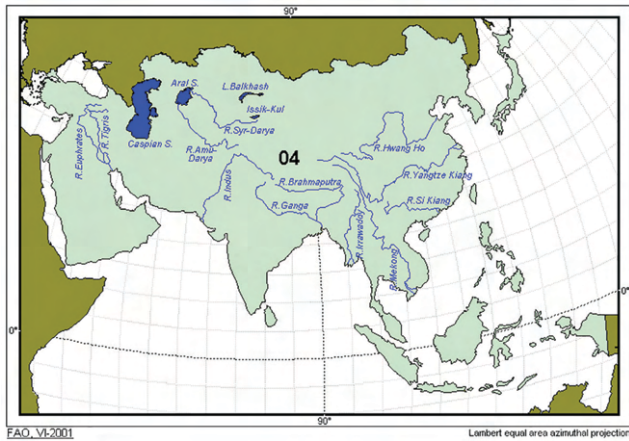
All inland waters of the Southeast Asian countries are included in the FAO Major Fishing Area 04 (Asia, Inland Waters) as shown in **Figure 6**. The data presented by Lao PDR, which is the sole landlocked country in the region, are therefore reported under Area 04 only (SEAFDEC, 2008b). There is no sub-area that has been recognized for the collection of catch effort data for the Southeast Asian region. The fisheries production of the Southeast Asian region from 2005 to 2019, summarized in **Table 3**, was compiled by SEAFDEC based on inputs from the AMSs, and published in the Fishery Statistical Bulletin for the South China Sea Area in 2005-2007 and henceforth, in the Fishery Statistical Bulletin of Southeast Asia in 2008–2019.

In compiling the data for the Fishery Statistical Bulletin of Southeast Asia, efforts are being made to come up with as much complete data as possible, by utilizing as additional inputs those data and information that are available from various sources, while utilization of regional inputs is always maximized. These include the data collected

Table 3. Fisheries production of the Southeast Asian countries from 2005 to 2019 by quantity (thousand mt)

Year	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam	Total
2005	3.42	546	6,646.96	107.8	1,402.40	2,581.78	4,161.87	7.84	4,132.83	3,397.20	22,988.10
2006	2.99	661.54	7,183.59	107.8	1,596.05	2,817.99	4,412.16	11.67	4,051.82	3,656.15	24,501.76
2007	3.22	525.1	7,510.77	91.66	1,654.22	2,808.04	4,710.95	8.03	3,675.38	4,315.50	25,302.87
2008	2.75	536.32	9,054.87	93.5	1,639.02	3,147.60	4,964.70	5.14	3,204.20	4,559.72	27,207.82
2009	2.42	515	10,064.14	105	1,729.00	3,491.10	5,084.67	5.69	3,137.67	4,782.40	28,917.09
2010	2.77	550	11,662.31	113	1,806.57	3,901.98	5,155.65	5.23	3,113.32	5,127.60	31,438.43
2011	2.45	631.69	13,626.14	129.6	1,665.84	4,149.80	4,973.59	5.95	3,036.53	5,432.90	33,654.49
2012	5.08	728	15,420.73	136	1,760.84	4,417.68	4,865.68	6.2	2,991.62	5,816.10	36,147.93
2013	3.43	728	19,245.63	164.23	2,018.74	4,715.84	4,695.37	7.21	2,822.08	6,019.70	40,420.23
2014	3.95	745.31	20,600.77	150.59	1,985.16	5,040.31	4,681.42	6.69	2,567.80	6,332.50	42,114.50
2015	4.35	731.89	22,154.42	158.6	1,998.25	5,316.95	4,645.87	8.16	2,429.86	6,549.70	43,998.05
2016	14.11	808.55	23,172.87	166.88	1,987.68	5,598.00	4,350.76	7.35	2,425.90	6,803.90	45,336.00
2017	15.43	857.02	22,850.63	180.78	1,897.30	5,675.46	4,312.66	6.99	2,386.92	7,313.40	45,496.59
2018	14.71	943.21	23,007.39	179.1	1,672.45	5,877.46	4,613.07	7.01	2,456.29	7,768.50	46,539.19
2019	14.66	969.1	22,614.59	183.9	1,872.80	5,931.81	4,413.13	7.25	2,488.83	8,270.20	46,766.27

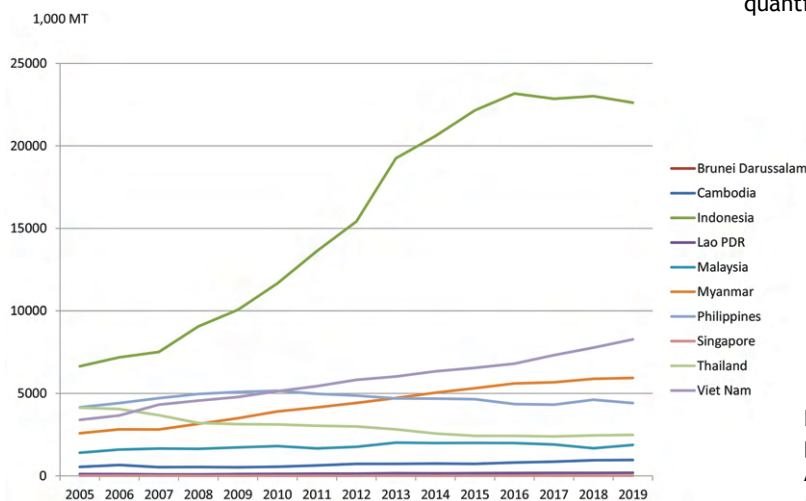
Source: Fishery Statistical Bulletin for the South China Sea Area 2005-2007 (SEAFDEC, 2008a; 2009; 2010a) for data from 2005 to 2007, and Fishery Statistical Bulletin of Southeast Asia 2008-2019 (SEAFDEC, 2010b; 2011; 2012; 2013; 2014; 2015; 2016; 2017a; 2018; 2020a; 2020b; 2022) for data from 2008 to 2019



**Figure 6. Asia-Inland Waters**  
(Source: SEAFDEC, 2008b)

through statistics surveys, as well as statistical records from government and semi-governmental organizations. In addition, data and information derived from recently-conducted statistical research, e.g. small-scale surveys are also being sourced to provide additional inputs to the Bulletin.

The total fisheries production of the Southeast Asian region in 2019 reached a record of 46.77 million mt, with an average increase of 6.08 % annually over the past 15 years. By country, Indonesia reported the highest fisheries production in 2019 in terms of volume at 22.6 million mt or nearly 48.3 % of the region’s total fisheries production, followed by Viet Nam, Myanmar, Philippines, and Thailand at 8.2 million mt (17.7 %), 5.9 million mt (12.7 %), 4.4 million mt (9.4 %), and 2.5 million mt (5.3 %), respectively. The increased fisheries production in Indonesia could have been due to a number of reasons that include increased abundance of fish in several locations of the country; good weather with waves and wind that support fishing activities; increase in the number of fishing vessels, as well as government support for fishing facilities, e.g. distribution of fishing gears in 2018 (KKP, 2019). In contrast, the fishery statistics of Thailand showed declining trends, particularly from 2006 until 2019 at an average rate of 3.4 % annually,



**Figure 7. Trends of fisheries production of the Southeast Asian countries by quantity (thousand mt)**

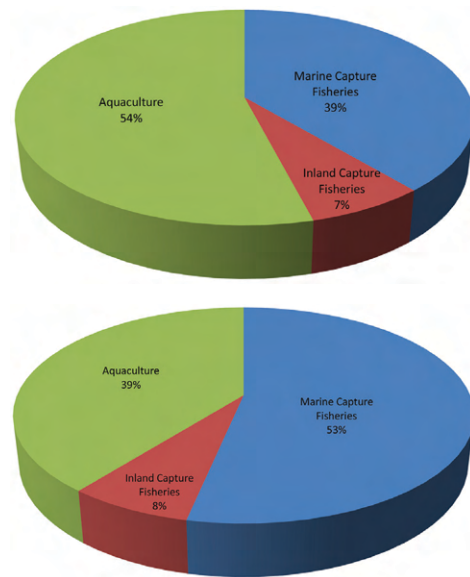
**Table 4. Production of the fisheries sub-sectors of Southeast Asia in 2019 by quantity (mt) and value (USD thousand)**

Sub-sectors	Quantity (mt)	Value (USD thousand)	Value/Quantity (USD/mt)*
Marine Capture Fisheries	18,167,839	29,343,867	2,031
Inland Capture Fisheries	3,316,808	4,056,224	1,605
Aquaculture	25,281,627	21,645,304	1,063
<b>Total</b>	<b>46,766,274</b>	<b>55,045,395</b>	

Source: Fishery Statistical Bulletin of Southeast Asia 2019 (SEAFDEC, 2022)  
\* Computation of value/quantity excludes the corresponding quantity of production from countries that did not report their production values

mainly because of the yearly decreases in the production from marine capture fisheries.

Fisheries production of the Southeast Asian region comes from three sub-sectors, namely: marine capture fisheries, inland capture fisheries, and aquaculture. By sub-sector, the total fisheries production of the region in 2019 (Table 4) indicated that the largest portion of the production volume



**Figure 8. Percentage contribution of the fisheries sub-sectors to the total fisheries production of Southeast Asia in 2019: by quantity in mt (above) and value in USD (below)**

**Table 5.** Production trends of the fisheries sub-sectors of Southeast Asia: 2005 to 2019 by quantity (million mt)

Year	Marine Capture Fisheries		Inland Capture Fisheries		Aquaculture		Total (million mt)
	Production (million mt)	Percentage (%)	Production (million mt)	Percentage (%)	Production (million mt)	Percentage (%)	
2005	13.59	59	1.89	8	7.51	33	22.99
2006	13.94	57	2.14	9	8.43	34	24.50
2007	14.06	56	2.01	8	9.24	37	25.31
2008	13.81	51	2.33	9	11.06	41	27.20
2009	14.14	49	2.40	8	12.38	43	28.92
2010	14.87	47	2.38	8	14.19	45	31.44
2011	15.07	45	2.64	8	15.94	47	33.65
2012	15.48	43	2.82	8	17.85	49	36.15
2013	16.14	40	2.87	7	21.41	53	40.42
2014	16.58	39	3.00	7	22.53	54	42.11
2015	16.76	38	3.06	7	24.18	55	44.00
2016	17.03	38	3.13	7	25.18	56	45.34
2017	17.33	38	3.23	7	24.94	55	45.50
2018	18.33	39	3.34	7	24.87	53	46.54
2019	18.17	39	3.32	7	25.28	54	46.77

*Source:* Fishery Statistical Bulletin for the South China Sea Area 2005-2007 (SEAFDEC, 2008a; 2009; 2010a) for data from 2005 to 2007, and Fishery Statistical Bulletin of Southeast Asia 2008-2019 (SEAFDEC, 2010b; 2011; 2012; 2013, 2014, 2015; 2016; 2017a; 2018; 2020a; 2020b; 2022) for data from 2008 to 2019

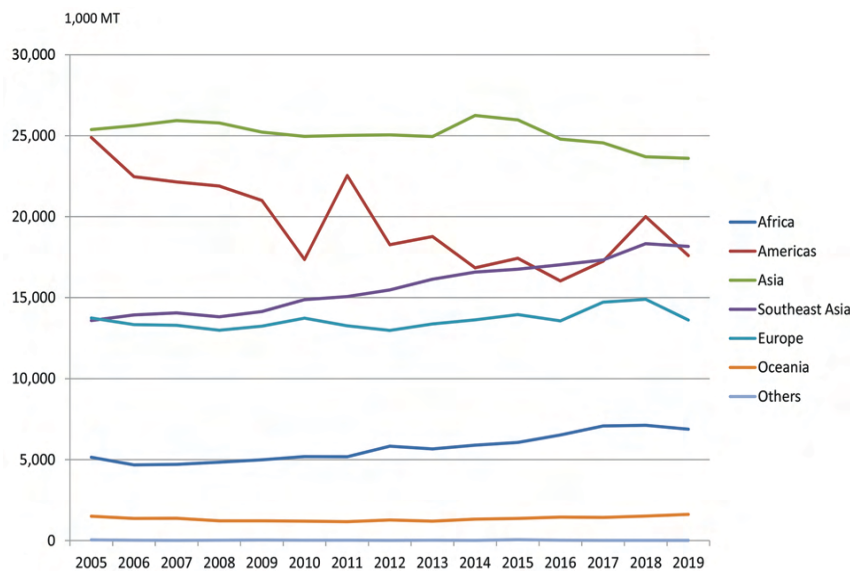
was derived from aquaculture accounting for approximately 54 % followed by marine capture fisheries at about 39 % and inland capture fisheries at 7 % (Figure 8). In terms of value, marine capture fisheries contributed the highest production value accounting for 53 % followed by aquaculture at approximately 39 % and inland capture fisheries at about 8 % (Figure 8). While the value per volume of marine capture fisheries in 2019 was about USD 2,031/mt, those of inland capture fisheries and aquaculture were about USD 1,605/mt and USD 1,063/mt, respectively (Table 4).

The production trends of the fisheries sub-sector of Southeast Asia from 2005 to 2019 signified declining contributions from marine capture fisheries, for although its contribution was about 59 % in 2005, henceforth, this had been constantly decreasing (Table 5). Nevertheless, such reduction was compensated by the contribution from

aquaculture which increased from 33 % in 2005 to 54 % in 2019. These trends indicated the increasing importance of aquaculture as a source of food fish to meet the increasing demand for fish and ensure food security in the region.

### 3. Marine Capture Fisheries Production of Southeast Asia

In 2019, the global marine capture fisheries production was reported to be 81.5 million mt, accounting for 38 % of the total fisheries production (213.7 million mt) with Asia (excluding Southeast Asia) and Southeast Asia as the top contributors followed by Americas and Europe (Table 6). The slight decrease of the marine capture fishery production from 2005 to 2019 was a result of the severe fluctuations in the production of America and the declining production trend of Asia over the years (Figure 9).



**Figure 9.** Trends in marine capture fisheries production of each continent by quantity (thousand mt) (Asia does not include data of Southeast Asia)

**Table 6.** Marine capture fisheries production of each continent from 2005 to 2019 by quantity (thousand mt)

Year	World total* (thousand mt)	Continents (thousand mt)						
		Africa*	Americas*	Asia*	Southeast Asia**	Europe*	Oceania*	Others*
2005	84,292	5,144	24,892	25,380	13,587	13,742	1,502	45
2006	81,435	4,676	22,466	25,622	13,939	13,341	1,368	23
2007	81,521	4,701	22,141	25,938	14,057	13,290	1,376	18
2008	80,572	4,842	21,891	25,782	13,814	12,990	1,224	29
2009	79,852	4,987	21,003	25,225	14,140	13,242	1,221	34
2010	77,342	5,187	17,360	24,962	14,874	13,736	1,204	19
2011	82,267	5,178	22,544	25,017	15,072	13,264	1,168	24
2012	78,891	5,830	18,271	25,048	15,479	12,977	1,270	16
2013	80,135	5,664	18,772	24,948	16,137	13,383	1,204	27
2014	80,532	5,897	16,839	26,246	16,584	13,628	1,326	12
2015	81,601	6,059	17,428	25,972	16,762	13,951	1,370	59
2016	79,410	6,527	16,031	24,787	17,027	13,567	1,449	22
2017	82,387	7,077	17,257	24,557	17,330	14,718	1,435	13
2018	85,578	7,124	20,006	23,698	18,330	14,895	1,511	14
2019	81,503	6,881	17,600	23,601	18,168	13,623	1,616	14

Note: Asia does not include data of Southeast Asia

\* Source: FAO Fisheries and Aquaculture Information and Statistics Service

\*\* Source: Fishery Statistical Bulletin for the South China Sea Area 2005-2007 (SEAFDEC, 2008a; 2009; 2010a) for data from 2005 to 2007, and Fishery Statistical Bulletin of Southeast Asia 2008-2019 (SEAFDEC, 2010b; 2011; 2012; 2013, 2014, 2015; 2016; 2017a; 2018; 2020a; 2020b; 2022) for data from 2008 to 2019

For the Southeast Asian region, the trend in marine capture fisheries production showed that it had been increasing from 2005 until 2018, but with slight decrease in 2019 to 18.17 mt from 18.33 mt in 2018 due to the decreased production of Indonesia and the Philippines in 2019 (Table 7). Nonetheless, such production in 2019 still accounted for 22 % of global marine capture fisheries production. Figure 10 shows the generally increasing trend in marine capture fisheries production of the Southeast Asian countries from 13.59 million mt in 2005 to 18.17 million mt in 2019 with an annual average increase of 0.31 million mt or 2.0 %

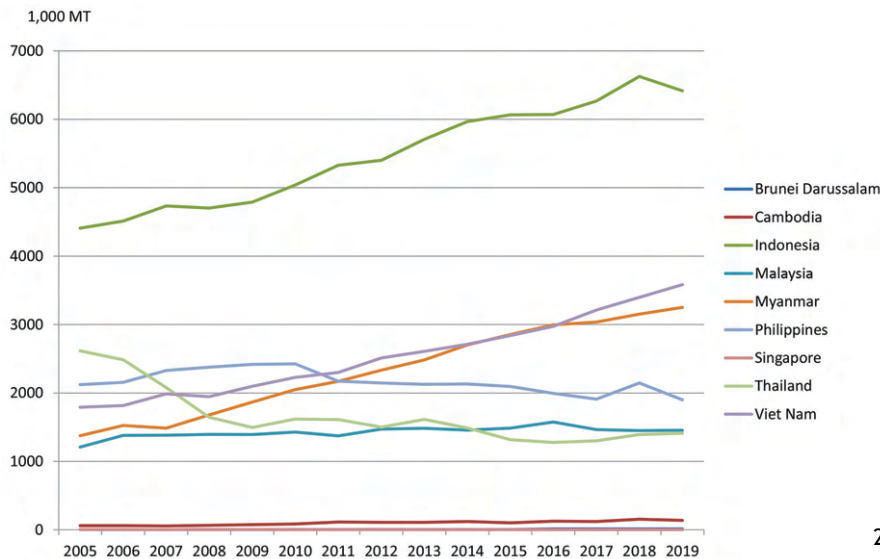
annually. Among the Southeast Asian countries, Indonesia consistently contributed the highest volume to the region's total marine capture fisheries production during 2005–2019 (Table 7). Specifically in 2019, Indonesia accounted for the highest production in terms of volume at 6.42 million mt accounting for about 35.3 % of the region's marine capture production, followed by Viet Nam contributing 3.58 million mt (19.72 %), Myanmar at 3.25 million mt (17.89 %), and Philippines at 1.90 million mt (10.46%). Malaysia ranked next contributing 1.45 million mt (8.01 %), and Thailand at 1.41 million mt (7.76 %).

**Table 7.** Marine capture fisheries production of the Southeast Asian countries in 2005-2019 by quantity (thousand mt)

Year	Brunei Darussalam	Cambodia	Indonesia	Lao PDR*	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam	Total
2005	2.71	60	4,408.50	-	1,209.60	1,375.67	2,122.22	1.92	2,615.56	1,791.10	13,587.28
2006	2.28	60.5	4,512.19	-	1,379.86	1,525.00	2,154.80	3.1	2,484.80	1,816.10	13,938.63
2007	2.55	54.9	4,734.28	-	1,381.42	1,485.74	2,327.82	3.52	2,079.35	1,987.40	14,056.98
2008	2.36	66	4,701.93	-	1,394.53	1,679.01	2,377.51	1.62	1,644.80	1,946.60	13,814.36
2009	1.96	75	4,789.41	-	1,391.09	1,867.51	2,418.84	2.12	1,496.16	2,098.30	14,140.39
2010	2.35	85	5,039.42	-	1,428.88	2,048.59	2,424.48	1.73	1,617.40	2,226.60	14,874.45
2011	2.15	114.69	5,328.64	-	1,373.11	2,169.82	2,171.77	1.62	1,610.42	2,300.00	15,072.22
2012	4.52	110	5,400.98	-	1,472.24	2,332.79	2,145.23	1.97	1,500.20	2,510.90	15,478.83
2013	2.82	110	5,707.02	-	1,482.90	2,483.87	2,127.37	1.64	1,614.54	2,607.00	16,137.16
2014	3.19	120.25	5,967.14	-	1,458.13	2,702.24	2,131.87	1.43	1,488.28	2,711.10	16,583.63
2015	3.37	100.98	6,065.06	-	1,486.05	2,854.20	2,094.35	1.26	1,317.22	2,839.90	16,762.39
2016	13.29	126.7	6,070.96	-	1,574.45	2,996.74	1,994.34	1.24	1,275.99	2,973.60	17,027.31
2017	13.8	121.02	6,268.11	-	1,465.11	3,036.41	1,911.01	1.1	1,300.42	3,213.30	17,330.28
2018	13.56	153.6	6,625.37	-	1,448.98	3,152.14	2,145.73	1.31	1,392.93	3,396.70	18,330.32
2019	13.72	137.23	6,416.45	-	1,455.45	3,249.70	1,900.21	1.42	1,410.66	3,583.00	18,167.84

\* - means magnitude is zero or not applicable. Being a landlocked country, Lao PDR has no marine capture fisheries

Source: Fishery Statistical Bulletin for the South China Sea Area 2005-2007 (SEAFDEC, 2008a; 2009; 2010a) for data from 2005 to 2007, and Fishery Statistical Bulletin of Southeast Asia 2008-2019 (SEAFDEC, 2010b; 2011; 2012; 2013, 2014, 2015; 2016; 2017a; 2018; 2020a; 2020b; 2022) for data from 2008 to 2019



**Figure 10.** Trends in marine capture fisheries production of Southeast Asian countries in 2005-2019 by quantity (thousand mt)

As shown in **Table 7** and **Figure 10**, Indonesia has been the largest fish producer in the Southeast Asian region from 2005 to 2019 in terms of quantity, which had been increasing from 4.41 million mt to 6.42 million mt or at an annual average rate of increase of 143.43 thousand mt or 2.75 % annually. The marine capture fisheries production of Viet Nam had also been steadily increasing from 1.79 million mt to 3.58 million mt or at an annual average rate of increase of 127.99 thousand mt or 5.12 % annually. Myanmar's marine capture production had increased from 1.37 million mt in 2005 to 3.25 million mt in 2019 with an annual average rate of increase of 133.86 thousand mt or 6.41 % annually. In contrast, the marine capture production of the Philippines showed declining trends from 2.12 million mt in 2005 to 1.90 million mt in 2019 with an annual average rate of decrease of 15.86 thousand mt or 0.60 % annually. Thailand also showed declining trends from 2.61

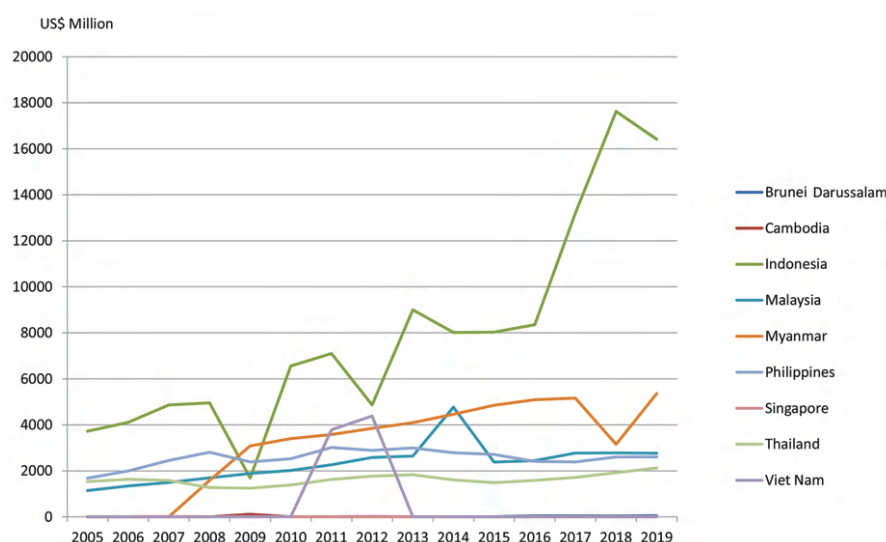
million mt in 2005 to 1.41 million mt in 2019 with an annual average rate of decrease of 86.06 thousand mt or 3.92 % annually. One of the possible reasons for the declining data on marine capture fisheries production of Thailand could have emanated from the decision of the European Union to declare Thailand in 2015 as having breached the illegal, unreported, and unregulated (IUU) fishing regulations by carrying out inappropriate fishing activities, and to issue a yellow card after giving warning to Thailand for being identified as a non-cooperating country in the fight against illegal, unreported and unregulated (IUU) fishing. Subsequently, Thailand had also been prohibited from exporting fishery products to the EU countries. Nonetheless, Thailand had adopted several measures to combat IUU fishing and controlled the fishing capacity at sustainable level. The yellow card issued to Thailand was finally lifted by the EU in January 2019.

**Table 8.** Marine capture fisheries production of the Southeast Asian countries in 2005-2019 by value (USD million)

Year	Brunei Darussalam	Cambodia	Indonesia	Lao PDR*	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam	Total
2005	10	...	3,726	-	1,147	...	1,681	6	1,534	...	8,104
2006	9	...	4,106	-	1,346	...	1,998	12	1,629	...	9,100
2007	10	...	4,868	-	1,493	...	2,452	14	1,586	...	10,423
2008	9	...	4,957	-	1,691	1,585	2,811	9	1,276	...	12,338
2009	5	111	1,687	-	1,888	3,081	2,390	11	1,244	...	10,417
2010	7	...	6,558	-	2,015	3,400	2,525	11	1,383	...	15,899
2011	8	...	7,100	-	2,268	3,580	3,017	10	1,627	3,784	21,394
2012	18	...	4,863	-	2,583	3,849	2,890	12	1,767	4,384	20,366
2013	8	...	8,997	-	2,646	4,098	2,997	11	1,829	...	20,586
2014	9	...	8,014	-	4,768	4,459	2,787	9	1,608	...	21,654
2015	9	...	8,032	-	2,383	4,852	2,710	9	1,486	...	19,481
2016	46	...	8,351	-	2,447	5,095	2,410	9	1,582	...	19,940
2017	44	...	13,199	-	2,774	5,162	2,389	8	1,716	...	25,292
2018	36	...	17,626	-	2,782	3,152	2,599	9	1,919	...	28,123
2019	53	...	16,413	-	2,770	5,362	2,607	9	2,130	...	29,344

\* - means magnitude is zero or not applicable. Being a landlocked country, Lao PDR has no marine capture fisheries

Source: Fishery Statistical Bulletin for the South China Sea Area 2005-2007 (SEAFDEC, 2008a; 2009; 2010a) for data from 2005 to 2007, and Fishery Statistical Bulletin of Southeast Asia 2008-2019 (SEAFDEC, 2010b; 2011; 2012; 2013, 2014, 2015; 2016; 2017a; 2018; 2020a; 2020b; 2022) for data from 2008 to 2019



**Figure 11.** Trends in value of marine capture fisheries production of the Southeast Asian countries in 2005-2019 (USD million)

In terms of value, the total production from marine capture fisheries of the Southeast Asian countries during 2005-2019 as shown in **Table 8**, indicated that the total value of the region’s marine capture fisheries production from 2005 to 2019 had increased corresponding to the increasing trend of the quantity of production, although some countries were not able to provide the data. Indonesia which led Southeast Asia’s top producing countries, accounted for about 55.9 % of the region’s marine capture fisheries production in 2019 in terms of value, with Myanmar emerging second contributing about 18.3 %. Meanwhile, Malaysia which came in the third contributed about 9.4 %, the Philippines came in fourth at 8.8 %, and Thailand at the fifth rank contributed about 7.3 % (**Figure 11**).

In terms of the species of Southeast Asia’s marine capture fisheries production, the countries reported a total of 184 aquatic species and/or species groups caught that comprise 143 finfishes, 17 crustaceans, 20 mollusks, and 4 aquatic invertebrates. **Table 9** shows the major groups of species from marine capture fisheries of Southeast Asian countries with the corresponding production in quantity and value in 2019. Nevertheless, it should be noted that the large portion of the production from the region was recorded as “Miscellaneous fishes (45.25 %), meaning that the catches had been recorded without being classified into species or species group. Moreover, the region’s production of major species of marine capture fisheries in 2019 indicated that jack, mullets, sauries, etc. contributed the second highest volume at 10.64 % followed by tunas at 10.23 %; herring, sardines, anchovies, etc. at 8.22 %; red fishes, basses, conger etc. at 7.95 %; mackerels at 4.19 %; cuttlefish, squids, etc. at 2.47 %; and miscellaneous crustaceans at 2.36 %.

As the consistent top producer, Indonesia contributed the largest volume of marine capture fisheries in 2019 which included the major groups of marine fishes *nei* at 26.87 %; tunas at 19.8 %; jack, mullets, sauries, etc. at 17.36 %; red fishes, basses, conger etc. at 11 %. The second highest

producer, Viet Nam reported production of major groups of species classified as marine fish *nei* at 66.10 %; others at 10.05 %; herring, sardines, anchovies, etc. at 9.34 %; mollusks at 8.65 %.

In terms of production value, it should be noted that although the production volume of Indonesia has been steadily increasing from 2005 to 2019 (**Figure 10**), the corresponding value had been highly fluctuating particularly from 2009 onwards (**Figure 11**) due to the decreasing production values of several major species. Since several Southeast Asian countries were not able provide their respective data on production value, *i.e.* Cambodia, Lao PDR, and Viet Nam although the latter was able to report for some years, the overall regional picture of the value of marine capture fisheries production could not be reported. In the case of Myanmar however, the country started to report the value of its production starting from 2008 to the present, and the trend showed increasing value at an average rate of USD 343 million per year or 16.3 % annually. Nevertheless, the general picture of the region’s marine capture fisheries production in terms of value, seemed to indicate a highly fluctuating trend over the years.

The data in **Table 9** also suggest that the production value of lobster as valued per volume is the highest among the major groups of species of marine capture fisheries at USD 5,683/mt, which was produced by Thailand and Indonesia as well as in smaller quantities by Malaysia, Philippines, and Singapore. This was followed by crabs at USD 2,551/mt produced mainly by Indonesia, Thailand, and Viet Nam; cuttlefish, squids, etc. at USD 1,905/mt from Indonesia, Thailand, Malaysia, Philippines, and in small quantities from Brunei Darussalam and Singapore; mackerels at USD 1,369/mt from Indonesia, Philippines, Malaysia, Thailand and in small quantities from Brunei Darussalam and Singapore; shrimps prawns, etc. at USD 1,328/mt from Indonesia, Thailand, Philippines, and Brunei Darussalam; cockles, clams, etc. at USD 1,322/mt from



**Table 9.** Major groups of species produced by marine capture fisheries of the Southeast Asian countries in 2019 by quantity (mt) and value (USD thousand)

Major groups of species	Quantity (mt) by country										Total value (USD thousand)*	Value/Quantity (USD/mt)*
	Brunei Darussalam	Cambodia	Indonesia	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam	Total		
Shads, milkfish, barramundi, etc.	26	...	52,220	35,740	...	2,828	46	827	...	91,687	78,486	856
Flounders halibuts, soles, etc.	7	...	8,177	9,221	...	699	...	4,266	...	22,370	28,215	1,261
Red fishes, basses, congers, etc.	262	...	705,590	299,459	...	304,176	466	134,962	...	1,444,915	1,475,075	1,021
Jack, mullets, sauries, etc.	410	...	1,113,680	216,141	...	415,270	241	186,763	...	1,932,504	1,526,192	790
Herring, sardines, anchovies, etc.	246	...	435,506	87,278	...	394,915	41	239,810	334,800	1,492,596	640,068	553
Tunas	2,217	...	1,275,534	90,751	...	419,243	1	46,397	25,109	1,859,252	1,272,396	694
Mackerels	187	...	300,050	161,255	...	203,430	46	96,309	...	761,277	1,042,279	1,369
Sharks and rays	37	...	20,271	17,379	...	3,969	107	2,562	...	44,325	42,189	952
Misc. fishes	...	104,765	1,724,157	318,837	3,249,700	12,615	151	442,696	2,368,291	8,221,212	5,708,407	993
Crabs	4	...	125,815	15,227	...	30,224	26	50,950	50,360	272,606	566,884	2,551
Lobsters	...	...	1,567	682	...	268	4	1,964	...	4,484	25,483	5,683
Shrimps, prawns, etc.	169	...	92,472	...	...	27,299	...	34,053	...	153,993	204,573	1,328
Misc. crustaceans	9	17,430	129,380	106,517	...	11,196	218	29,072	134,544	428,366	410,575	1,485
Oysters	...	...	334	...	...	7	...	...	...	341	147	432
Mussels	...	...	11,319.00	...	...	24.00	...	...	...	11,343	365	32
Cockles, clams, etc.	...	...	103,702	4,247	...	473	...	26,449	...	134,871	178,325	1,322
Cuttlefish, squids, etc.	91	...	225,657	70,603	...	53,772	72	98,375	...	448,570	854,608	1,905
Mollusks	...	15,030	13,885	...	...	...	...	6,577	309,844	345,336	10,489	513
Invertebrates	...	...	9,651	20,904	...	951	...	8,634	...	40,140	16,128	402
Seaweeds	...	...	67,483	...	...	365	...	...	...	67,848	...	...
Others	10,060	...	...	1,205.00	...	18,486.10	...	...	360,052	389,803	15,262,983	...
<b>Total</b>	<b>13,725</b>	<b>137,225</b>	<b>6,416,450</b>	<b>1,455,446</b>	<b>3,249,700</b>	<b>1,900,210</b>	<b>1,418</b>	<b>1,410,665</b>	<b>3,583,000</b>	<b>18,167,838</b>	<b>29,343,867</b>	...

Source: Fishery Statistical Bulletin of Southeast Asia 2019 (SEAFDEC, 2022)

\* Computation of prices excludes the corresponding production of country not reporting the production value

Indonesia, Thailand, Malaysia, and in small quantity from the Philippines.

### 3.1 Economically Important Marine Species

The economically important marine species that provided significant contributions to Southeast Asia's total fisheries production in 2019 include tuna and tuna-like species, small pelagic fishes (e.g. scads, mackerel, anchovies, sardines), demersal fish species, crustaceans, mollusks, and seaweeds. Being highly in demand not only within the Southeast Asian region but also in other regions of the world, these species dominate the fishery exports of the Southeast Asian countries.

#### 3.1.1 Tuna and Tuna-like Species

The tuna and tuna-like species include the most economically important species referred to as principal market because

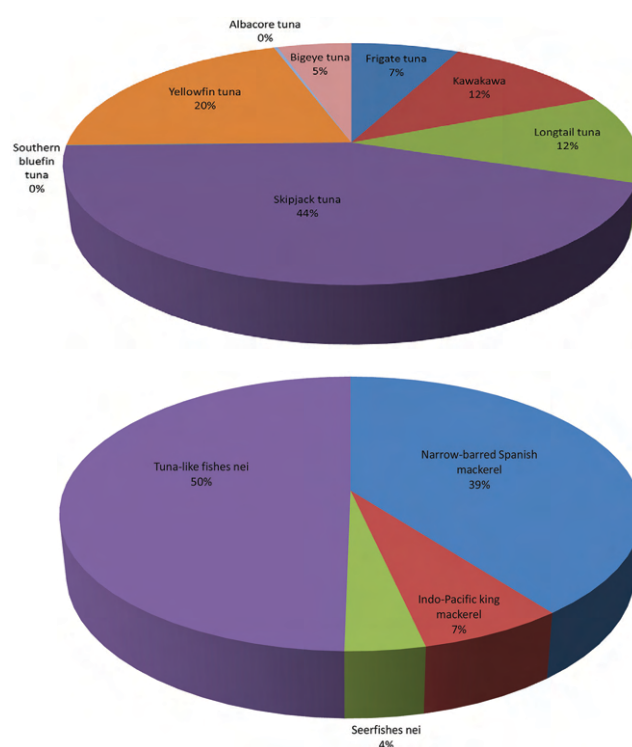
of their global economic importance and the intensive international trade generated for canning and sashimi production. Tuna and tuna-like species in Southeast Asian could be taxonomically classified under the family Scombridae, and broadly categorized into three groups, i.e. oceanic tunas which include skipjack tuna (*Katsuwonus pelamis*), yellowfin tuna (*Thunnus albacares*), bigeye tuna (*T. obesus*), albacore tuna (*T. alalunga*), and bluefin tuna (*T. thymus*, *T. orientalis*, and *T. macoyii*); neritic tunas including frigate tuna (*Auxis thazard*), bullet tuna (*A. rochei*), kawakawa (*Euthynnus affinis*), and longtail tuna (*T. tonggol*); and tuna-like species, i.e. narrow-barred Spanish mackerel (*Scomberomorus commerson*), Indo-Pacific king mackerel (*Scomberomorus guttatus*), seerfishes (*Scomberomorus* spp.), striped bonito (*Sarda orientalis*), and tuna-like fishes *nei* (Scombroidei). Tuna and tuna-like species are caught by commercial fishing gears, particularly trawl nets, purse seines, falling net, and gill net as well as several other traditional fishing gears.

**Table 10.** Tuna and tuna-like species production of the Southeast Asian countries in 2019 by quantity (mt)

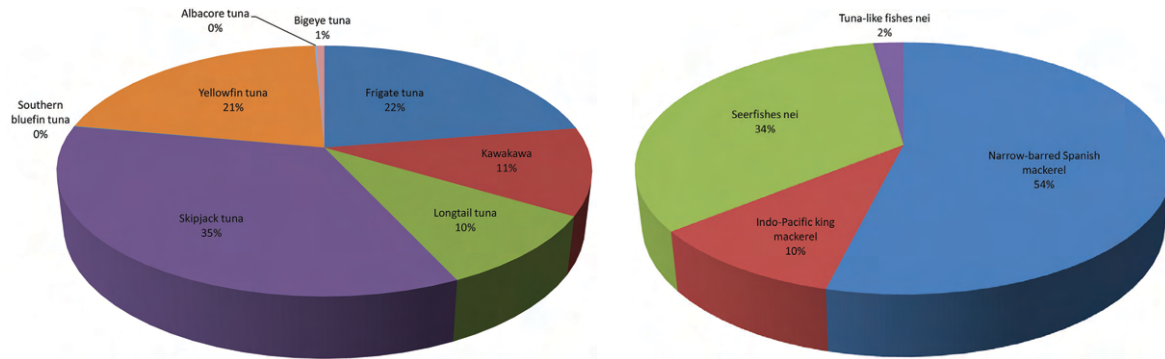
Species	Countries							Total
	Brunei Darussalam	Indonesia	Malaysia	Philippines	Singapore	Thailand	Viet Nam	
<b>Neritic tunas</b>	<b>135</b>	<b>409,978</b>	<b>71,297</b>	<b>35,759</b>	...	<b>46,397</b>	...	<b>563,566</b>
Frigate tuna ( <i>Auxis thazard</i> )	121	130,518	2,937	...	...	...	...	133,576
Bullet tuna ( <i>Auxis rochei</i> )	...	...	...	...	...	...	...	...
Kawakawa ( <i>Euthynnus affinis</i> )	4	119,930	25,515	35,759	...	29,383	...	210,591
Longtail tuna ( <i>Thunnus tonggol</i> )	11	159,530	42,845	...	...	17,014	...	219,400
<b>Oceanic tunas</b>	<b>2,081</b>	<b>865,556</b>	<b>19,454</b>	<b>383,484</b>	<b>1</b>	...	<b>25,109</b>	<b>1,295,685</b>
Skipjack tuna ( <i>Katsuwonus pelamis</i> )	1,417	527,237	16,107	266,376	1	...	12,000	823,138
Southern bluefin tuna ( <i>Thunnus maccoyii</i> )	...	1,607	...	...	...	...	...	1,607
Yellowfin tuna ( <i>Thunnus albacares</i> )	664	265,129	1,862	99,351	...	...	7,700	374,706
Albacore tuna ( <i>Thunnus alalunga</i> )	...	4,316	485	...	...	...	...	4,801
Bigeye tuna ( <i>Thunnus obesus</i> )	...	67,267	1,000	17,757	...	...	5,409	91,433
<b>Tuna-like species</b>	<b>15</b>	<b>222,727</b>	<b>16,934</b>	<b>111,511</b>	<b>39</b>	<b>9,430</b>	<b>334,800</b>	<b>695,456</b>
Narrow-barred Spanish mackerel ( <i>Scomberomorus commerson</i> )	14	163,855	...	111,511	...	...	...	275,380
Indo-Pacific king mackerel ( <i>Scomberomorus guttatus</i> )	1	47,910	...	...	...	...	...	47,911
Seerfishes <i>nei</i> ( <i>Scomberomorus</i> spp.)	...	...	16,934	...	39	9,430	...	26,403
Tuna-like fishes <i>nei</i> (Scombroidei)	...	10,962	...	...	...	...	334,800	345,762
<b>Total</b>	<b>2,232</b>	<b>1,498,261</b>	<b>107,865</b>	<b>530,754</b>	<b>40</b>	<b>55,827</b>	<b>359,909</b>	<b>2,554,708</b>

Source: Fishery Statistical Bulletin of Southeast Asia 2019 (SEAFDEC, 2022)

In 2019, only seven countries provide the statistics on tuna and tuna-like species production by species, namely: Brunei Darussalam, Indonesia, Malaysia, Philippines, Singapore, Thailand, and Viet Nam. Cambodia and Myanmar were unable to report their respective production volumes of tuna and tuna-like species. **Table 10** shows the tuna and tuna-like species production of Southeast Asia in 2019 accounting for approximately 14.06 % of the region’s total marine capture fisheries production. The total production volume of oceanic tunas accounted for approximately 50.7 % of the region’s total tuna and tuna-like species production, while tuna-like species accounted for approximately 27.2 % of the region’s total tuna and tuna-like species production. In 2019, Indonesia which is the top tuna producer in Southeast Asian region contributed to the region’s total tuna production by approximately 68.60 %, followed by the Philippines contributing about 22.55 %, Malaysia 4.88 %, Thailand 2.50 %, Viet Nam 1.35 %, and Brunei Darussalam 0.12 %. In terms of species, skipjack tuna (*Katsuwonus pelamis*) contributed the highest production volume accounting for 44.27 %, followed by yellowfin tuna (*Thunnus albacares*) at 20.15 %, and longtail tuna (*Thunnus tonggol*) at 11.80 % (**Figure 12**). In 2019, Viet Nam was the leading producer of tuna-like species in the Southeast Asian region contributing approximately 48.14 % followed by Indonesia at 32.03 %, Philippines at 16.03 %, and Thailand 1.36 %. Nearly half of the catch was reported not by species but only as tuna-like



**Figure 12.** Percentage of tuna species (*above*) and tuna-like species (*below*) production of Southeast Asia in 2019 by quantity



**Figure 13.** Percentage of tuna species (*left*) and tuna-like species (*right*) production of Southeast Asia in 2019 by value

fishes *nei* (Scombroidei) which accounted for 49.72 % of the region's production of total tuna-like species followed by the narrow-barred Spanish mackerel (*Scomberomorus commerson*) at 39.60 % (**Figure 12**).

In terms of the value of production in 2019, tuna and tuna-like species contributed approximately 2.93 % to the region's total fisheries production or 5.49 % to the region's total marine capture fisheries production. Skipjack tuna (*Katsuwonus pelamis*) provided the highest production value about 34.76 % of the region's total tuna production, followed by frigate tuna (*Auxis thazard*) contributing about 22.37 %, and yellowfin tuna (*Thunnus albacares*) about 21.35 % (**Figure 13**). For the value of production of tuna-like species in 2019, narrow-barred Spanish mackerel (*Scomberomorus commerson*) contributed the

highest production value to the region's total value tuna-like species production accounting for 53.87% followed by seerfishes *nei* (*Scomberomorus* spp.) contributing about 33.65 % (**Figure 13**). Data in **Table 11** suggest that seerfishes *nei* (*Scomberomorus* spp.) obtained the highest price among the tuna and tuna-like species group at USD 4,891/mt, followed by frigate tuna (*Auxis thazard*) at USD 2,055/mt, Indo-Pacific king mackerel (*Scomberomorus guttatus*) at USD 824/mt, narrow-barred Spanish mackerel (*Scomberomorus commerson*) at USD 751/mt, yellowfin tuna (*Thunnus albacares*) at USD 679/mt, and Kawakawa (*Euthynnus affinis*) at USD 654/mt.

The region's production of tuna and tuna-like species in 2019 (**Table 11**) was derived mostly from FAO Major Fishing Area 71 (Pacific, Western Central) and 57 (Indian

**Table 11.** Tuna and tuna-like species production of Southeast Asia in FAO Major Fishing Areas in 2019 by quantity (mt), and value (USD thousand)

Species	Quantity (mt)			Value (USD thousand)			Value/Quantity (USD/mt)*
	Fishing Area 57	Fishing Area 71	Total	Fishing Area 57	Fishing Area 71	Total	
<b>Neritic tuna</b>	<b>243,515</b>	<b>320,052</b>	<b>563,567</b>	<b>148,718</b>	<b>380,575</b>	<b>529,293</b>	
Frigate tuna ( <i>Auxis thazard</i> )	125,118	8,458	133,576	96,418	178,130	274,548	2,055
Bullet tuna ( <i>Auxis rochei</i> )	...	...	...	...	...	...	...
Kawakawa ( <i>Euthynnus affinis</i> )	57,270	153,321	210,591	36,791	100,983	137,774	654
Longtail tuna ( <i>Thunnus tonggol</i> )	61,127	158,273	219,400	15,509	101,462	116,971	533
<b>Oceanic tuna</b>	<b>205,677</b>	<b>1,090,008</b>	<b>1,295,685</b>	<b>11,496</b>	<b>686,607</b>	<b>698,103</b>	
Skipjack tuna ( <i>Katsuwonus pelamis</i> )	131,755	691,383	823,138	2,886	423,735	426,621	526
Southern bluefin tuna ( <i>Thunnus maccoyii</i> )	1,607	...	1,607	835	...	835	520
Yellowfin tuna ( <i>Thunnus albacares</i> )	51,896	322,810	374,706	4,270	257,791	262,061	714
Albacore tuna ( <i>Thunnus alalunga</i> )	4,796	5	4,801	1,924	10	1,934	403
Bigeye tuna ( <i>Thunnus obesus</i> )	15,623	75,810	91,433	1,581	5,071	6,652	77
<b>Tuna-like species</b>	<b>55,529</b>	<b>639,927</b>	<b>695,456</b>	<b>55,787</b>	<b>327,965</b>	<b>383,752</b>	
Narrow-barred Spanish mackerel ( <i>Scomberomorus commerson</i> )	31,417	243,963	275,380	497	206,226	206,723	751
Indo-Pacific king mackerel ( <i>Scomberomorus guttatus</i> )	12,440	35,471	47,911	13	39,476	39,489	824
Seerfishes <i>nei</i> ( <i>Scomberomorus</i> spp.)	8,266	18,137	26,403	49,413	79,727	129,140	4,891
Tuna-like fishes <i>nei</i> (Scombroidei)	3,406	342,356	345,762	5,864	2,536	8,400	766
<b>Total</b>	<b>504,721</b>	<b>2,049,987</b>	<b>2,554,708</b>	<b>216,001</b>	<b>1,395,147</b>	<b>1,611,148</b>	

\* Computation of prices excludes the corresponding production from countries that do not report their production values

Source: Fishery Statistical Bulletin of Southeast Asia 2019 (SEAFDEC, 2022)

Ocean, Western). However, most of the production figures were actually based on the areas where tunas were landed and not fished. In 2019, the total value of tuna and tuna-like species production value from Fishing Area 71 was about USD 1,395 million or 86.59 % of the region's total tuna production value, with an average price about USD 825/mt, while the total value of the production from Fishing Area 57 of about USD 428 million provided the remaining 13.41 % at an average price of USD 428/mt. For Fishing Area 71, the species that contributed the highest value to the total production value was skipjack tuna followed by yellowfin tuna, narrow-barred Spanish mackerel, and frigate tuna.

### 3.1.2 Small Pelagic Fish Species

Small pelagic fish species could be groups of scads, mackerels, sardines, and anchovies which are also main

contributors to the fisheries production. In 2019, production from small pelagic fish species contributed approximately 6.42 % to the region's total fisheries production or 16.52 % to the region's total marine capture fisheries production.

**Table 12** shows the region's production of small pelagic fish species in 2019 indicating that scads and sardines are the most economically important species contributing about 53.61 % and 23.50 %, respectively. Indonesia as the main producer, contributed 1,326 thousand mt accounting for 44.20 % of the region's total small pelagic production, followed by Philippines at 838 thousand mt (27.92 %), Thailand at 483 thousand mt (16.08 %), Malaysia at 353 thousand mt (11.76 %). Brunei Darussalam and Singapore reported at 753 and 105 mt, respectively.

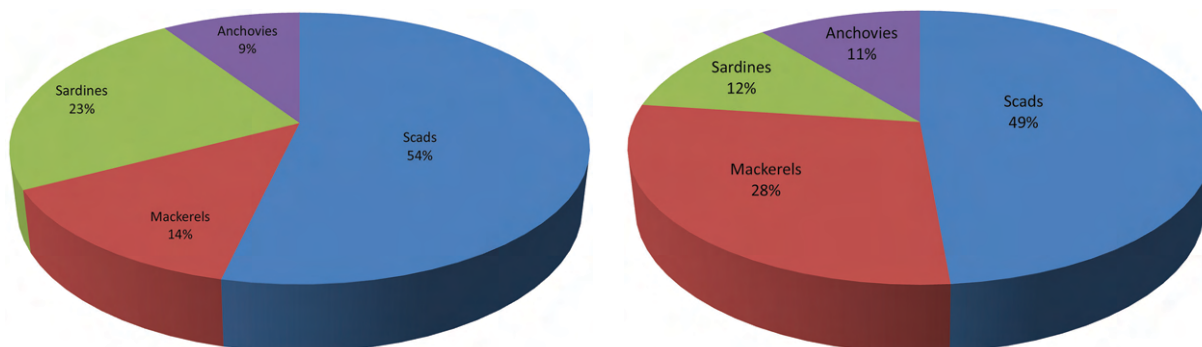
In 2019, seven species of scads accounted for approximately 53.61 % of the region's total small pelagic species

**Table 12.** Production of small pelagic fishes of the Southeast Asian countries in 2019 by quantity (mt) and value (USD thousand)

Major groups of species	Quantity (mt) by country						Total quantity (mt)	Total value (USD thousand)	Value/Quantity (USD/mt)*
	Brunei Darussalam	Indonesia	Malaysia	Philippines	Singapore	Thailand			
<b>Scads</b>	<b>352</b>	<b>902,439</b>	<b>176,253</b>	<b>369,129</b>	<b>98</b>	<b>160,476</b>	<b>1,608,747</b>	<b>1,135,507</b>	<b>706</b>
Indian scad ( <i>Decapterus russelli</i> )	...	513,733	69,746	...	...	50,952	634,431	154,147	
Scads <i>nei</i> ( <i>Decapterus</i> spp.)	262	...	...	194,826	60	...	195,148	278,081	
Bigeye scad ( <i>Selar crumenophthalmus</i> )	40	62,031	48,310	109,440	...	30,074	249,895	318,533	
Yellowstripe scad ( <i>Selaroides leptolepis</i> )	...	139,241	9,459	...	...	...	148,700	58,598	
Hardtail scad ( <i>Megalaspis cordyla</i> )	...	24,792	34,032	13,663	...	22,397	94,884	94,404	
Jacks, crevalles <i>nei</i> ( <i>Caranx</i> spp.)	51	162,642	...	...	22	...	162,715	15,087	
Carangids <i>nei</i> (Carangidae)	...	...	14,706	51,200	16	57,053	122,975	216,657	
<b>Mackerel</b>	<b>172</b>	<b>87,178</b>	<b>144,321</b>	<b>91,084</b>	<b>7</b>	<b>86,879</b>	<b>409,641</b>	<b>666,091</b>	<b>1,626</b>
Short mackerel ( <i>Rastrelliger brachysoma</i> )	74	23,603	...	30,003	...	...	53,680	194,497	
Indian mackerel ( <i>Rastrelliger kanagurta</i> )	...	63,575	...	61,081	...	62,505	187,161	203,275	
Indian mackerels <i>nei</i>	1,271	...	1,403	...	...	...	2,674	1,349	
( <i>Rastrelliger</i> spp.)	98	...	50,318	...	7	24,374	74,797	45,902	
<b>Sardines</b>	<b>228</b>	<b>278,318</b>	<b>...</b>	<b>334,696</b>	<b>...</b>	<b>91,989</b>	<b>705,231</b>	<b>281,267</b>	<b>399</b>
Goldstripe sardinella ( <i>Sardinella gibbosa</i> )	...	141,722	...	...	...	...	141,722	19,213	
Bali sardinella ( <i>Sardinella lemuru</i> )	...	90,411	...	247,503	...	...	337,914	135,997	
Sardinellas <i>nei</i> ( <i>Sardinella</i> spp.)	...	...	...	81,878	...	91,989	173,867	105,383	
Spotted sardinella ( <i>Amblygaster simm</i> )	82	26,752	...	...	...	...	26,834	10,362	
Rainbow sardinella ( <i>Dussumieria acuta</i> )	146	19,433	...	5,315	...	...	24,894	10,312	
<b>Anchovies</b>	<b>...</b>	<b>58,570</b>	<b>32,440</b>	<b>42,900</b>	<b>...</b>	<b>143,218</b>	<b>277,128</b>	<b>252,993</b>	<b>913</b>
Stolephorus anchovies ( <i>Stolephorus</i> spp.)	...	58,570	32,440	42,900	...	...	133,910	143,341	
Anchovies <i>nei</i> (Engraulidae)	...	...	...	...	...	143,218	143,218	109,652	
<b>Total</b>	<b>753</b>	<b>1,326,505</b>	<b>353,014</b>	<b>837,809</b>	<b>105</b>	<b>482,562</b>	<b>3,000,748</b>	<b>2,335,858</b>	

Source: Fishery Statistical Bulletin of Southeast Asia 2019 (SEAFDEC, 2022)

\* Computation of prices excludes corresponding production from countries not reporting their production values



**Figure 14.** Percentage production of major groups of species of small pelagic fish of Southeast Asia in 2019 by quantity (left) and value (right)

production (Figure 14). These are: the Indian scad (*Decapterus russelli*) which contributed the highest volume to the region’s total scads production at 39.44 %, followed by bigeye scad (*Selar crumenophthalmus*) at approximately 15.53 %, scads *nei* (*Decapterus* spp.) at 12.13 %, jacks, crevalles *nei* (*Caranx* spp.) at 10.11 %, yellowstriped scad (*Selaroides leptolepis*) at 9.24 %, carangids *nei* (*Carangidae*) at 7.64 %, and hardtail scad (*Megalaspis cordyla*) at 5.90 % (Table 12).

Sardines which contributed approximately 23.50 % to the total small pelagic species production in 2019 (Figure 14) comprise five species, namely: goldstriped sardinella (*Sardinella gibbosa*), Bali sardinella (*Sardinella lemuru*), sardinellas *nei* (*Sardinella* spp.), spotted sardinella (*Amblygaster sirm*), and rainbow sardinella (*Dussumieria acuta*). Bali sardinella (*Sardinella lemuru*) contributed nearly 47.91 % to the region’s total sardine production, with Philippines as the largest producer, providing 47.46 % to the region’s total sardine production (Table 12).

For mackerel, Malaysia, Philippines, Thailand, Brunei Darussalam, and Singapore reported catching four species, comprising short mackerel (*Rastrelliger brachysoma*), Indian mackerel (*Rastrelliger kanagurta*), Indian mackerels *nei* (*Rastrelliger* spp.), and mackerels *nei* (*Scombridae*) as shown in Table 12. The production of mackerels contributed about 13.65 % to the total small pelagic production of the region (Figure 14), with the Indian mackerel (*Rastrelliger kanagurta*) having the highest production that accounted for 45.69 % of the total mackerel production (Table 12).

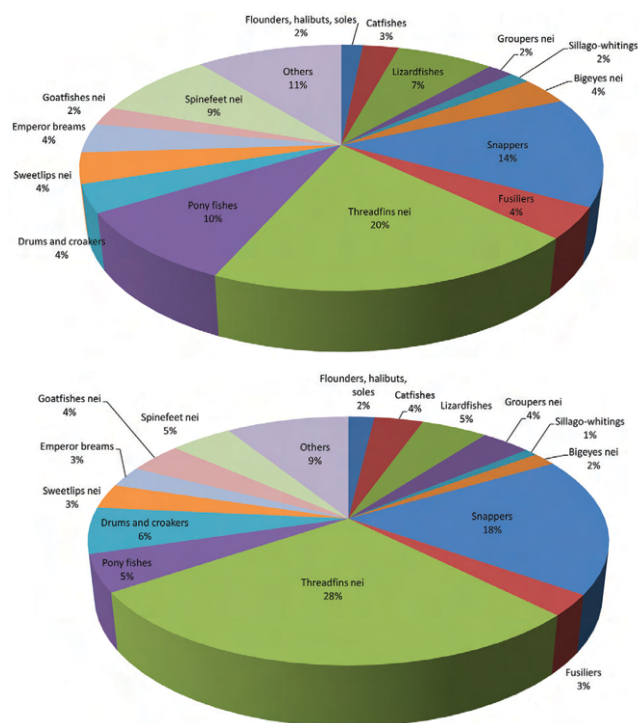
Another important small pelagic is anchovy with total production of 277,128 mt in 2019 (Table 12), contributing approximately 9.23 % to the region’s small pelagic production (Figure 13). Thailand was the main producer providing 51.68 % to the region’s total anchovy production (Table 12).

In terms of value, scads ranked first accounting for about 48.61 % of the total small pelagic production, followed by mackerels at about 28.52 % (Figure 14). The data showed in Table 12 also suggest that mackerels commanded the highest average value compared to the other small pelagic

species at about USD 1,626/mt, followed by anchovies at USD 913/mt, scads at USD 656/mt, and sardines at USD 399/mt.

### 3.1.3 Demersal Fish Species

Demersal fishes are one of the major components in the marine capture fisheries in Southeast Asian region which live and feed on or near the bottom of seas. The major species groups of demersal fishes found in the Southeast Asian waters include the flounders, halibuts, soles, lizardfishes, sea catfishes, threadfins *nei* (*Nemipterus* spp. and *Polynemus* spp.), snappers (*Lutjanus* spp.), groupers *nei* (*Epinephelus* spp.), sillago whittings, croakers and drums, fusilier (*Caesio* spp.), pony fishes (*Leiognathus* spp.), goatfishes, sweetlips, emperors, etc. Demersal fishes are usually caught by trawl nets, bottom gillnets, longlines, and handlines.



**Figure 15.** Percentage production of major groups of species of demersal fish of Southeast Asia in 2019 by quantity (above) and value (below)

**Table 13.** Major groups of species of demersal fishes produced by the Southeast Asian countries in 2019 by quantity (mt) and value (USD thousand)

Major groups of species	Quantity (mt) by country						Total quantity (mt)	Total value (USD thousand)	Value/Quantity (USD/mt)*
	Brunei Darussalam	Indonesia	Malaysia	Philippines	Singapore	Thailand			
Flounders, halibuts, soles	7	8,177	9,221	933	...	3,746	22,084	28,215	1,278
Catfishes	5	49	29,319	4,542	63	2,580	36,558	53,149	1,454
Lizardfishes	5	16,201	52,488	4,964	0	25,652	99,310	71,791	723
Groupers <i>nei</i>	28	17,158	9,319	...	35	...	26,540	53,590	2,019
Sillago-whittings	...	2,343	1,752	13,439	...	3,204	20,738	13,992	675
Bigeyes <i>nei</i>	22	21,841	12,341	...	...	16,348	50,552	25,155	498
Snappers	66	122,903	21,876	35,946	117	18,694	199,602	263,367	1,319
Fusiliers	2	37,282	945	18,661	16	...	56,906	40,478	711
Threadfins <i>nei</i>	61	113,128	61,087	44,235	70	52,387	270,968	415,486	1,533
Pony fishes	34	76,656	9,890	46,464	4	...	133,048	70,732	532
Drums and croakers	3	...	42,722	...	43	7,798	50,566	88,299	1,746
Sweetlips <i>nei</i>	10	49,580	6,020	...	36	...	55,646	47,096	846
Emperor breams	6	52,023	1,551	...	...	...	53,580	39,713	741
Goatfishes <i>nei</i>	0	17,711	16,269	13	...	...	33,993	58,516	1,721
Spinefeet <i>nei</i>	9	95,827	1,360	25,282	24	...	122,502	67,363	550
Others	10	80,122	26,781	34,223	24	8,298	149,458	133,268	892
<b>Total</b>	<b>267</b>	<b>711,001</b>	<b>302,941</b>	<b>228,702</b>	<b>432</b>	<b>138,707</b>	<b>1,382,050</b>	<b>1,470,210</b>	

Source: Fishery Statistical Bulletin of Southeast Asia 2019 (SEAFDEC, 2022)

\* Computation of prices excludes corresponding quantity from countries not reporting their production value

In 2019, the total demersal fish production in terms of quantity was approximately 1,382,050 mt contributing about 7.61 % to total marine capture fisheries production of the region (**Table 13**). Threadfins *nei* which provided the highest production that accounted for 19.61 % of the total demersal fish production in 2019 (**Figure 15**), snappers gave the second highest at 14.44 % followed by pony fishes at 9.63 %, and Spinefeet *nei* at 8.86 %. By country, Indonesia was the leading producer of demersal fish species, contributing approximately 51.44 % of the region's total demersal fish production, followed by Malaysia at 21.92 %, Philippines at 16.55 %, Thailand at 10.04 %; while Singapore and Brunei Darussalam reported a few volumes. For Indonesia, the main demersal fish species were snappers contributing 17.26 % to the country's total demersal fish production followed by threadfins *nei* at 15.91 %, and spinefeet *nei* at 13.48 %.

In terms of value, threadfin *nei* had the highest value at approximately at USD 415 million or 28.26% of the total demersal fish production value, followed by snappers at USD 263 million or 17.91%, (**Figure 15**). **Table 13** also show that groupers *nei* posted the highest value per volume at about USD 2,019/mt followed by drums and croakers at USD 1,746/mt, goatfishes *nei* at USD 1,721/mt, and threadfin *nei* at USD 1,533/mt.

### 3.1.4 Crustaceans

Crustacean fisheries have great economic importance in the Southeast Asian region. The commercial crustaceans

in the region could be classified into five groups that are crabs, lobsters, penaeid shrimps, metapenaeus shrimps, and marine crustaceans *nei* (species not classified). Brunei Darussalam, Indonesia, Philippines, Singapore, and Thailand reported on their respective production by species, but Cambodia, Malaysia, and Viet Nam had reported by group of crustaceans only for 2019. Thus, in 2019, the production of crustaceans contributed about 4.27 % to the region's marine capture fisheries production. Indonesia was the largest producer contributing 349,234 mt accounting for 44.99 % of the region's total crustaceans, followed by Viet Nam at 23.82 %, Thailand at 11.2 %, Malaysia at 10.33 %, Philippines at 7.36 %, Cambodia at 2.24 %; while Singapore and Brunei Darussalam reported only a few volumes (**Table 14**).

The main crustacean species in the Southeast Asian region include the blue swimming crab (*Portunus pelagicus*), Indo-pacific swamp crab (*Scylla serrata*), lobsters (*Panulirus* spp.), banana prawn (*Penaeus merguensis*), giant tiger prawn (*Penaeus monodon*), western king prawn (*Penaeus latisulcatus*), green tiger prawn (*Panaeus semisulcatus*), Penaeus shrimps (*Penaeus* spp.), and Metapenaeus shrimps *nei* (*Metapenaeus* spp.). Majority of the crustaceans harvested in the region were reported under marine crustaceans *nei* accounting for 44.55 % of the total crustacean production from marine capture fisheries in 2019 (**Table 14**). Production of blue swimming crab (*Portunus pelagicus*) was the second highest at 23.31 % followed by metapenaeus shrimps *nei* at 11.65 %, marine crabs *nei* at 9.68 %.

**Table 14.** Major groups of species of crustaceans produced by the Southeast Asian countries in 2019 by quantity (mt) and value (USD thousand)

Major groups of species	Quantity (mt) by country								Total quantity (mt)	Total value (USD thousand)	Value/Quantity (USD/mt)*
	Brunei Darussalam	Cambodia	Indonesia	Malaysia	Philippines	Singapore	Thailand	Viet Nam			
Blue swimming crab	3.94	...	111,922	...	29,020	...	40,027	...	180,973	432,024	2,387
Indo-pacific swamp crab	...	...	13,893	...	1,204	22	1,332	...	16,451	30,293	1,841
Marine crabs <i>nei</i>	...	...	...	15,227	...	3	9,591	50,360	75,181	104,567	4,213
Lobsters <i>nei</i>	0.01	...	1,567	682	268	3.88	1,964	...	4,485	25,483	5,682
Banana prawn	10.31	...	10,543	...	...	...	7,281	...	17,834	76,826	4,308
Giant tiger prawn	...	...	10,447	...	924	...	461	...	11,832	15,463	1,307
Western king prawn	...	...	...	...	...	...	799	...	799	3,333	4,171
Green tiger prawn	26.18	...	...	...	...	...	1,699	...	1,725	23,718	13,748
Penaeid shrimps <i>nei</i>	121.4	...	...	...	16,690	...	13,897	...	30,708	33,476	1,090
Metapenaeus shrimps <i>nei</i>	11.1	...	71,482	...	9,052	...	9,916	...	90,461	51,757	572
Marine crustaceans <i>nei</i>	8.85	17,430	129,380	64,251	...	218	...	134,544	345,832	410,575	2,118
<b>Total</b>	<b>182</b>	<b>17,430</b>	<b>349,234</b>	<b>80,160</b>	<b>57,158</b>	<b>247</b>	<b>86,967</b>	<b>184,904</b>	<b>776,282</b>	<b>1,207,515</b>	<b>.</b>

Source: Fishery Statistical Bulletin of Southeast Asia 2019 (SEAFDEC, 2022)

\* Computation of prices excludes corresponding production from countries not reporting their production values

The data in **Table 14** also suggest that the production value of blue swimming crab is the highest among the commodities harvested through crustacean capture fisheries at USD 432 million or 35.78 % of total crustacean value production, followed by marine crustaceans *nei* at USD 411 million or 34.00 %, marine crabs *nei* at USD 105 million or 8.66 %. In terms of value per volume, green tiger prawn (*Panaeus semisulcatus*) posted the highest at about USD 13,748/mt, followed by lobsters *nei* (*Panulirus* spp.) at USD 5,682/mt, banana prawn (*Panaeus merguensis*) at USD 4,308/mt, marine crabs *nei* at USD 4,213/mt, and western king prawn (*Panaeus latisulcatus*) at USD 4,171/mt.

### 3.1.5 Mollusks

Mollusks, which are of general importance within the food chains, include such familiar organisms as snails, octopuses, squid, clams, scallops, and oysters. In 2019, the production of mollusks in the Southeast Asian region contributed about 5.17 % to the region's total marine capture fisheries production by quantity, while its contribution in terms of value was nearly 3.56 %. The main mollusk species harvested in the Southeast Asian region include those in the groups of the oysters (*Crassostrea* spp.), green mussels (*Perna viridis*), blood cockle (*Anadara granosa*), clams, etc. *nei* (*Bivalvia*), common squids *nei* (*Loligo* spp.),

**Table 15.** Production of major groups of species of mollusks of the Southeast Asian countries in 2019 by quantity (mt) and value (USD thousand)

Major groups of species	Quantity (mt) by country								Total quantity (mt)	Total value (USD thousand)	Value/Quantity (USD/mt)*
	Brunei Darussalam	Cambodia	Indonesia	Malaysia	Philippines	Singapore	Thailand	Viet Nam			
Oysters	...	...	334	...	7	...	...	...	341	147	432
Green mussel	...	...	11,319	...	24	...	...	...	11,343	365	32
Blood cockle	...	...	100,614	...	...	...	19,122	...	119,736	149,210	1,246
Clams, etc. <i>nei</i>	...	...	2,388	4,247	472	...	7,326	...	14,433	28,871	2,000
Common squids <i>nei</i>	36.56	...	193,821	...	46,946	35	69,387	...	310,226	470,494	1,517
cuttlefish, bobtail squids <i>nei</i>	54.26	...	20,363	20,661	1,478	37	12,901	...	55,494	110,983	2,000
Squids <i>nei</i>	...	...	...	48,848	1,594	...	5,839	...	56,281	238,417	4,236
Octopuses <i>nei</i>	...	...	11,473	1,094	3,754	...	10,248	...	26,569	34,713	1,307
Marine mollusks <i>nei</i>	...	15,030	13,885	...	...	...	6,577	309,844	345,336	10,489	513
<b>Total</b>	<b>90.82</b>	<b>15,030</b>	<b>354,197</b>	<b>74,850</b>	<b>54,275</b>	<b>72</b>	<b>131,400</b>	<b>309,844</b>	<b>939,758</b>	<b>1,043,689</b>	<b>.</b>

Source: Fishery Statistical Bulletin of Southeast Asia 2019 (SEAFDEC, 2022)

\* Computation of prices excludes corresponding production from countries not reporting their production values

cuttlefish, bobtail squids *nei* (Sepiidae, Sepiolidae), various squids *nei* (Loliginidae, Ommastrephidae), octopuses *nei* (Octopodidae), marine mollusks *nei* (Molluska). Indonesia was the largest producer contributing 354,197 mt accounting for 37.69 % of the region's total mollusks production followed by Viet Nam at 32.97 %, Thailand at 13.98 %, and Malaysia at 7.96 % (Table 15).

The production of common squids *nei* (*Loligo* spp.) of Indonesia, as the largest producer of mollusks in 2019, contributed 54.72 % to the country's mollusks production. This was followed by blood cockle (*Anadara granosa*) accounting for 28.41 %, and cuttlefish, bobtail squids *nei* (Sepiidae, Sepiolidae) at 5.75 %. In the case of Viet Nam, as the second the highest producer of mollusks, their production was reported as marine mollusks *nei* (Molluska). For Thailand, as the third highest producer of mollusks, its main product is the common squids *nei* (*Loligo* spp.) contributing 52.81 % to the country's production of mollusks, followed by blood cockle (*Anadara granosa*) accounting for 14.55 %, cuttlefish, bobtail squids *nei* (Sepiidae, Sepiolidae) at 9.82 %, and octopuses *nei* (Octopodidae) at 7.80 %. For Malaysia, its main production from mollusks comprises various squids *nei* (Loliginidae, Ommastrephidae) which accounted for 65.26 % of the country's production of mollusks, followed by cuttlefish, bobtail squids *nei* (Sepiidae, Sepiolidae) accounting for 27.60 %.

For the production value, the common squids *nei* (*Loligo* spp.) contributed at 40.08 % to the region's total mollusks production value followed by various squids *nei* (Loliginidae, Ommastrephidae) which contributed about 22.84 %, blood cockle (*Anadara granosa*) at 14.30 %, and cuttlefish, bobtail squids *nei* (Sepiidae, Sepiolidae) at 10.63 %. In terms of value per volume of mollusk production in 2019 (Table 15), the group of squids *nei* (Loliginidae, Ommastrephidae) posted the highest at about USD 4,236/mt, followed by cuttlefish, bobtail squids *nei* and clams, etc. *nei* (Bivalvia) both at USD 2,000/mt, common squids *nei*

(*Loligo* spp.) at USD 1,517/mt, octopuses *nei* (Octopodidae) at USD 1,307/mt, and blood cockle (*Anadara granosa*) at USD 1,246/mt.

#### 4. Inland Capture Fisheries Production of Southeast Asia

Inland capture fisheries have been identified as the main source of livelihoods of peoples living in rural areas and improved incomes of rural households in Southeast Asia, and make use of natural inland waters that include vast river systems and lakes, floodplains, reservoirs, dams, and wetlands. Specifically in Southeast Asia, Indonesia has more than 256 million ha of inland water bodies, followed by Myanmar with more than 82 million ha, Thailand with more than 66 million ha, and the Philippines with more than 12 million ha. Cambodia has the Tonle Sap Great Lake which could expand from 250,000 ha during dry season to more than 1.6 million ha during the wet season (Pongsri *et al.*, 2015). Figure 16 shows the important rivers and lakes in the region that have been tapped by rural fisherfolks for many years for their subsistence.

From 2005 to 2019, the inland capture fisheries production at global level has continued to grow at an annual average of about 190 thousand mt or 1.81% annually (Table 16). Asia and Southeast Asia continued to be the leading inland capture fisheries producers, followed by Africa, Americas, Europe, and Oceania. In 2019, Asia (excluding Southeast Asia) which was the top producing region accounted for 37.64 % of the world's total inland capture fisheries production, followed by Southeast Asia at 27.44 %, Africa at 26.93 %, Americas at 4.60 %, Europe at 3.25 %, and Oceania at 0.14 %.

Table 17 and Figure 17 show the trend of inland capture fisheries production by quantity during 2005-2019, of which the region's production from inland capture fisheries had increased at about 102 thousand mt/year or 4.26 % annually.

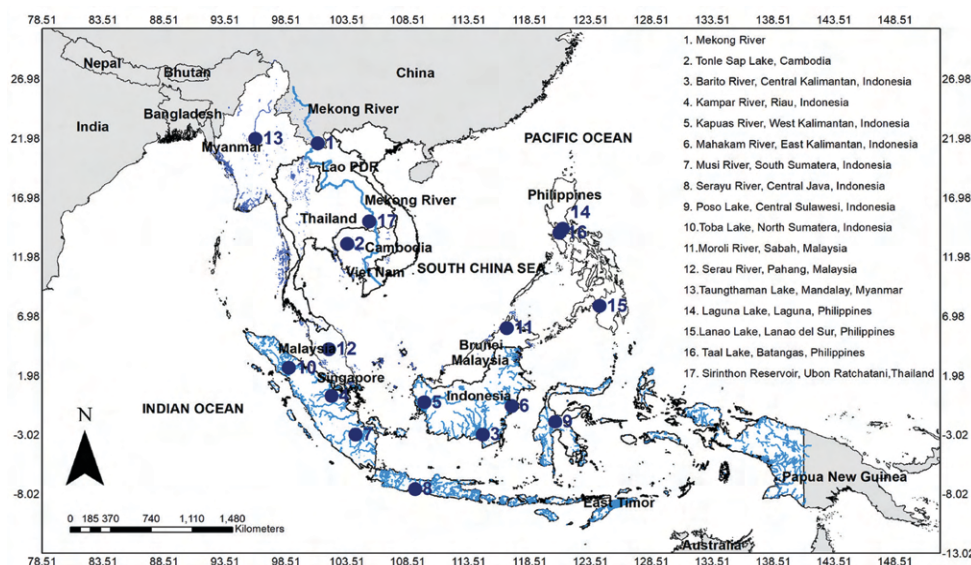


Figure 16. Important rivers and lakes in Southeast Asia (Muthmainnah D., et al. 2017a)



**Table 16.** Inland capture fisheries production of each continent from 2005 to 2019 by quantity (mt)

Year	World total* (mt)	Continents					
		Africa*	Americas*	Asia*	Southeast Asia**	Europe*	Oceania*
2005	9,431,089	2,449,224	579,892	4,145,770	1,888,279	350,055	17,869
2006	9,830,788	2,386,956	596,098	4,350,395	2,133,246	346,256	17,837
2007	10,074,554	2,522,207	575,089	4,561,756	2,008,267	389,433	17,802
2008	10,161,313	2,502,883	569,356	4,394,762	2,335,711	340,915	17,686
2009	10,328,235	2,548,141	566,903	4,427,429	2,397,773	370,462	17,527
2010	10,864,121	2,619,728	562,335	4,905,452	2,377,253	381,846	17,507
2011	10,503,064	2,711,655	542,180	4,222,323	2,637,300	371,292	18,314
2012	10,892,468	2,705,949	547,045	4,425,102	2,817,251	378,812	18,309
2013	10,939,910	2,829,389	551,576	4,260,577	2,869,785	409,956	18,627
2014	11,066,834	2,854,570	551,495	4,244,752	3,001,099	396,615	18,303
2015	11,175,063	2,850,599	574,966	4,242,969	3,058,821	429,678	18,030
2016	11,385,882	2,885,002	608,439	4,312,422	3,126,166	435,904	17,949
2017	11,954,018	3,021,294	583,379	4,691,932	3,226,154	413,121	18,138
2018	12,010,137	3,037,770	638,020	4,569,265	3,337,066	410,032	17,984
2019	12,088,723	3,255,405	556,161	4,549,949	3,316,808	392,911	17,489

Note: Asia does not include data of Southeast Asia

\* Source: FAO Fisheries and Aquaculture Information and Statistics Service

\*\* Source: Fishery Statistical Bulletin for the South China Sea Area 2005-2007 (SEAFDEC, 2008a; 2009; 2010a) for data from 2005 to 2007, and Fishery Statistical Bulletin of Southeast Asia 2008-2019 (SEAFDEC, 2010b; 2011; 2012; 2013, 2014, 2015; 2016; 2017a; 2018; 2020a; 2020b; 2022) for data from 2008 to 2019

**Table 17.** Inland capture fisheries production of the Southeast Asian countries in 2005-2019 by quantity (mt)

Year	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam	Total
2005	0	444,000	297,370	29,800	4,583	631,120	143,806	0	198,800	138,800	1,888,279
2006	0	559,642	293,921	29,800	4,164	718,000	165,081	0	214,000	152,325	2,136,933
2007	0	420,000	310,457	28,410	4,283	717,640	168,311	0	225,600	133,600	2,008,301
2008	0	430,600	497,740	29,200	4,353	814,740	179,491	0	228,600	144,800	2,329,524
2009	0	390,000	494,630	30,000	4,469	899,430	188,444	0	245,500	144,800	2,397,273
2010	0	405,000	344,972	30,900	4,545	1,002,430	185,406	0	209,800	194,200	2,377,253
2011	0	445,000	368,542	34,000	5,695	1,163,159	193,698	0	224,706	202,500	2,637,300
2012	0	528,000	393,552	34,105	5,042	1,246,460	195,804	0	219,428	194,500	2,816,891
2013	0	528,000	391,324	40,143	5,640	1,302,970	194,615	0	210,293	196,800	2,869,785
2014	0	505,005	446,509	60,237	6,520	1,381,030	211,941	0	181,757	208,100	3,001,099
2015	0	487,905	455,270	62,635	5,924	1,463,120	203,366	0	181,101	196,500	3,055,821
2016	0	509,350	426,874	70,915	5,848	1,580,670	155,509	0	187,300	189,700	3,126,166
2017	0	528,493	467,531	70,900	5,177	1,590,360	163,870	0	192,623	207,200	3,226,154
2018	0	535,555	612,753	70,900	6,089	1,594,970	162,974	0	143,825	210,000	3,337,066
2019	0	524,465	649,978	70,900	5,569	1,600,050	154,681	0	116,465	194,700	3,316,808

Source: Fishery Statistical Bulletin for the South China Sea Area 2005-2007 (SEAFDEC, 2008a; 2009; 2010a) for data from 2005 to 2007, and Fishery Statistical Bulletin of Southeast Asia 2008-2019 (SEAFDEC 2010b; 2011; 2012; 2013, 2014, 2015; 2016; 2017a; 2018; 2020a; 2020b; 2022) for data from 2008 to 2019

Myanmar had been the top producer from inland capture fisheries throughout 2005 to 2019, providing 48.24 % to the region's total inland capture fisheries production producing about 1,600,050 mt in 2019. The second highest producer, Indonesia reported production of 649,978 mt in 2019 representing 19.60 % of the region's total inland capture fisheries production, followed by Viet Nam contributing approximately 5.87 %.

In terms of production value, only five countries had reported their figures, namely: Indonesia, Malaysia, Myanmar (since 2008), Philippines, and Thailand.

Despite the efforts made by many agencies to improve the compilation of information on inland capture fisheries production in Southeast Asia, the information could still be under reported due to the inadequacy of information gathered, especially on production value of inland capture fisheries. As shown in **Table 18**, the region's total production value from inland capture fisheries in 2019 was USD 4,056 million accounting for 7.37 % of the region's total fisheries production value or 12.14 % of the region's total capture fisheries production value. Myanmar maintains a stable inland capture fisheries production value from 2008-2019 and its production value of USD 2,480 million

**Table 18.** Inland capture fisheries production of the Southeast Asian countries in 2005-2019 by value (USD thousand)

Year	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam	Total
2005	0	...	323,827	...	9,187	...	84,077	0	194,859	...	611,950
2006	0	...	264,372	...	8,455	...	101,477	0	222,273	...	596,877
2007	0	...	368,247	215,708	9,013	...	125,464	0	266,740	...	985,172
2008	0	255,500	521,019	240,334	10,290	788,325	145,912	0	254,057	...	2,215,437
2009	0	334,845	616,640	93,168	11,482	1,349,145	155,907	0	273,290	...	2,834,477
2010	0	...	546,937	...	13,138	1,503,645	174,479	0	288,277	...	2,526,476
2011	0	...	635,754	...	17,978	1,744,738	185,799	0	348,810	...	2,933,079
2012	0	...	793,238	...	18,376	1,869,690	196,239	0	359,075	...	3,236,618
2013	0	...	741,813	...	20,129	1,954,455	206,569	0	375,993	...	3,298,959
2014	0	...	721,042	313,232	19,441	2,071,545	220,480	0	312,798	...	3,658,538
2015	0	...	724,041	...	18,353	2,267,836	208,919	0	301,441	...	3,520,590
2016	0	...	774,384	...	21,570	2,450,038	152,387	0	298,804	...	3,697,183
2017	0	...	1,065,343	...	23,926	2,465,058	161,337	0	302,702	...	4,018,366
2018	0	...	1,170,570	...	30,578	2,472,203	167,742	0	272,883	...	4,113,976
2019	0	...	1,155,560	...	22,033	2,480,080	172,633	0	225,918	...	4,056,224

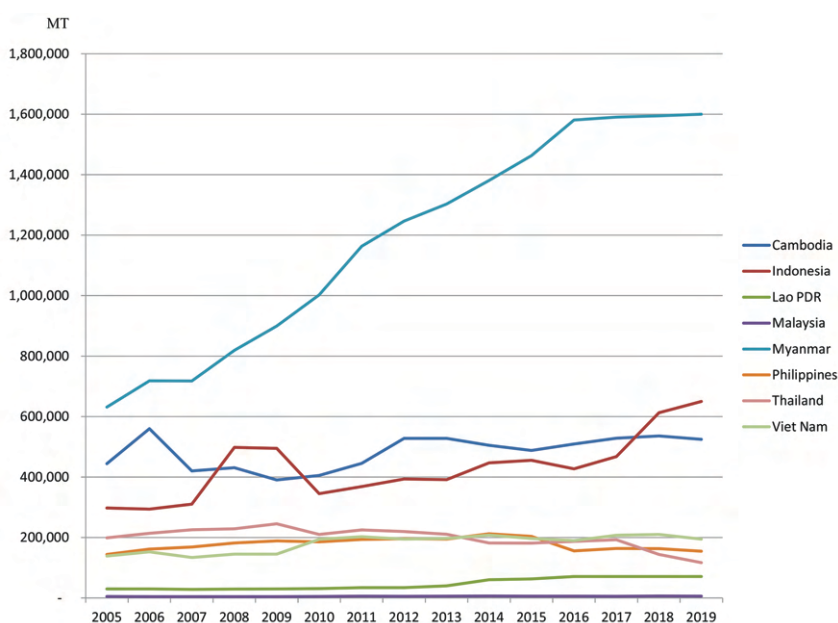
Source: Fishery Statistical Bulletin for the South China Sea Area 2005-2007 (SEAFDEC, 2008a; 2009; 2010a) for data from 2005 to 2007, and Fishery Statistical Bulletin of Southeast Asia 2008-2019 (SEAFDEC 2010b; 2011; 2012; 2013, 2014, 2015; 2016; 2017a; 2018; 2020a; 2020b; 2022) for data from 2008 to 2019

in 2019 accounted for 25.61 % of the country’s total fishery production value. Indonesia as the second highest in inland capture fisheries production value accounted for 3.71 % of the country’s total fishery production value followed by Thailand at 4.08 %, Philippines at 3.41 %, and Malaysia at 0.61 %.

Looking at the contribution from inland capture fisheries to the respective countries’ total fisheries productions in 2019, Cambodia ranked first with its production contributing 54.12 % to the country’s total fisheries production, followed by Lao PDR at 38.55 %, Myanmar at 26.97 %, Thailand at 4.68 %, and Philippines at 3.51 %. As for Indonesia, although the total inland capture was very high and ranked second after Myanmar, but the total production from

inland capture fisheries represented only 2.87 % of the country’s total fisheries production (Table 19). It should be noted however that such production volumes could not be confirmed as accurate and could be under-reported, considering that most of the countries still need to improve their systems of collecting and compiling their respective fishery statistics, especially with regards to their production form inland capture fisheries.

In terms of production of major species from inland capture fisheries (Table 20), only Indonesia, Philippines, and Thailand provided the figure at species levels. The group of freshwater fishes *nei* (Osteichthyes) with no species classification provided the highest production from inland capture fisheries accounting for 72.71 % of the region’s total



**Figure 17.** Trends of inland capture fisheries production of the Southeast Asian countries in 2005-2019 by quantity (mt)

**Table 19.** Contribution of inland capture fisheries production to the respective Southeast Asian country's capture fisheries production and total fisheries production in 2019 by quantity (mt)

Country	Inland capture fisheries production (mt)	Total Capture fisheries production (mt)	Percentage of inland capture fisheries production in total capture fisheries production (%)	Total fisheries production (mt)	Percentage of inland capture fisheries production in total fisheries production (%)
Brunei Darussalam	0	13,725	0	14,658	0
Cambodia	524,465	661,690	79.26	969,098	54.12
Indonesia	649,978	7,066,428	9.20	22,614,595	2.87
Lao PDR	70,900	70,900	100.00	183,900	38.55
Malaysia	5,569	1,461,015	0.38	1,872,797	0.30
Myanmar	1,600,050	4,849,750	32.99	5,931,815	26.97
Philippines	154,681	2,054,891	7.53	4,413,129	3.51
Singapore	0	1,418	0	7,249	0
Thailand	116,465	1,527,130	7.63	2,488,833	4.68
Viet Nam	194,700	3,777,700	5.15	8,270,200	2.35
<b>Total</b>	<b>3,316,808</b>	<b>21,484,647</b>	<b>Ave: 15.44</b>	<b>46,766,274</b>	<b>Ave: 7.09</b>

Source: Fishery Statistical Bulletin of Southeast Asia 2019 (SEAFDEC, 2022)

**Table 20.** Production of major species from inland capture fisheries in Southeast Asia in 2019

Common name	Quantity (mt)	Percentage total quantity of major inland species to total inland capture production (%)	Value (USD thousand)*	Percentage total value of major inland species to total inland capture production (%)	Value/Quantity (USD/mt)**
Nile tilapia	126,268	3.81	209,575	5.17	1,660
Striped snakehead	87,395	2.63	230,402	5.68	2,636
Torpedo-shaped catfishes <i>nei</i>	47,647	1.44	60,847	1.50	1,277
Freshwater mollusks <i>nei</i>	46,471	1.40	4,727	0.12	102
Snakeskin gourami	44,122	1.33	15,805	0.39	358
Tilapia <i>nei</i>	41,802	1.26	51,835	1.28	1,240
Silver barb	36,715	1.11	33,041	0.81	900
Climbing perch	35,452	1.07	87,830	2.17	2,477
Common carp	29,649	0.89	64,455	1.59	2,174
Asian redbtail catfish	29,140	0.88	77,285	1.91	2,652
<i>Pangasius djambal</i>	28,397	0.86	40,835	1.01	1,438

Source: Fishery Statistical Bulletin of Southeast Asia 2019 (SEAFDEC, 2022)

\* Data not available from Cambodia, Lao PDR, and Viet Nam

\*\* Computation of price excludes corresponding quantity from Cambodia, Lao PDR, and Viet Nam

inland capture fisheries production in 2019. As for the major species, production of Nile tilapia (*Oreochromis niloticus*) was the highest at 3.81 %, followed by striped snakehead (*Channa striata*) at 2.63 %, torpedo-shaped catfishes *nei* (*Clarias* spp.) at 1.44 %, freshwater mollusks *nei* (Molluska) at 1.40 %, and snakeskin gourami (*Trichogaster pectoralis*) at 1.33 %. As for the production value per volume, the group of freshwater fishes *nei* (Osteichthyes) was valued the highest among the commodities harvested through inland capture fisheries at USD 3,602/mt, followed by the Asian redbtail catfish (*Hemibagrus nemurus*) at USD 2,652/mt, striped snakehead (*Channa striata*) at USD 2,636/mt, climbing perch (*Anabas testudineus*) at USD 2,477/mt, and common carp (*Cyprinus carpio*) at USD 2,174/mt.

## 5. Aquaculture Production of Southeast Asia

Global aquaculture had grown dramatically during the period from 2005 to 2019 at an average rate of about 4.35 million mt per year or 5.21 % annually (Table 21). Of the total world's production from aquaculture in 2019, approximately 21.05 % was contributed by the Southeast Asian countries (Figure 18). The importance of aquaculture in the Southeast Asian region goes beyond its relatively high contribution to world aquaculture production as fish products are important in the diet in most of Southeast Asian countries' populace. While capture fisheries had grown only slightly over the same period, aquaculture production had increased rapidly. Aquaculture in Southeast Asia therefore plays important roles in providing source of protein, contributing to food security, enhancing people's

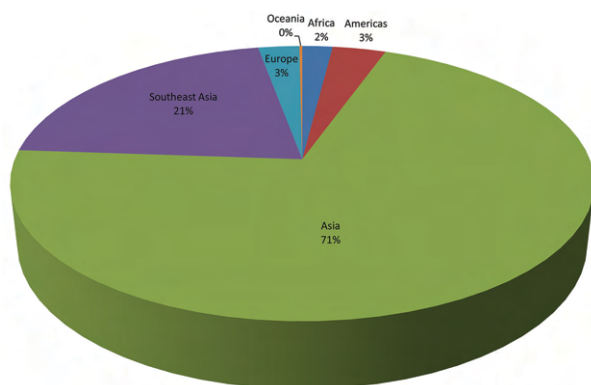
**Table 21.** Aquaculture production of each continent from 2005 to 2019 by quantity (mt)

Year	World total* (mt)	Continents					
		Africa*	Americas*	Asia*	Southeast Asia**	Europe*	Oceania*
2005	59,148,584	727,569	2,192,363	46,418,409	7,512,534	2,135,194	162,515
2006	62,933,396	843,195	2,406,779	48,888,916	8,426,187	2,193,747	174,572
2007	66,302,271	916,837	2,386,509	51,218,416	9,237,586	2,367,132	175,791
2008	70,203,575	1,061,743	2,497,835	53,072,022	11,063,934	2,327,891	180,150
2009	70,835,134	1,103,355	2,554,886	52,091,208	12,379,436	2,518,903	187,346
2010	77,981,746	1,424,308	2,527,550	57,115,459	14,186,737	2,524,939	202,753
2011	81,612,091	1,536,939	2,790,277	58,482,343	15,944,613	2,648,469	209,450
2012	88,171,509	1,651,800	2,995,568	62,637,316	17,852,212	2,831,536	203,077
2013	94,979,864	1,743,938	2,999,715	65,892,847	21,413,291	2,732,994	197,079
2014	99,619,014	1,867,108	3,362,408	68,743,967	22,529,781	2,906,952	208,798
2015	103,891,620	1,974,636	3,291,811	71,301,858	24,176,840	2,945,782	200,693
2016	108,178,787	2,115,854	3,333,753	74,357,172	25,182,532	2,964,175	225,301
2017	112,175,203	2,161,660	3,602,903	78,219,445	24,940,156	3,026,451	224,588
2018	115,949,295	2,530,742	3,834,670	81,416,800	24,871,804	3,074,713	220,566
2019	120,098,422	2,395,252	4,203,050	84,747,685	25,281,627	3,247,536	223,272

Note: Asia does not include data of Southeast Asia

\* Source: FAO Fisheries and Aquaculture Information and Statistics Service

\*\* Source: Fishery Statistical Bulletin for the South China Sea Area 2005-2007 (SEAFDEC, 2008a; 2009; 2010a) for data from 2005 to 2007, and Fishery Statistical Bulletin of Southeast Asia 2008-2019 (SEAFDEC, 2010b; 2011; 2012; 2013, 2014, 2015; 2016; 2017a; 2018; 2020a; 2020b; 2022) for data from 2008 to 2019

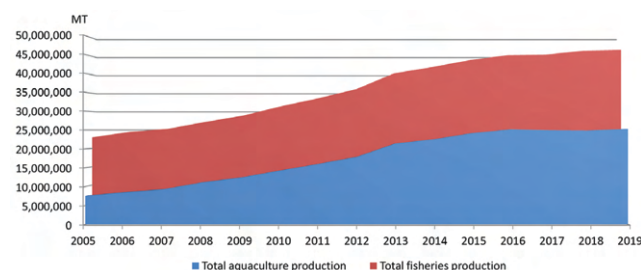


**Figure 18.** Percentage of continents' aquaculture production to world's production in 2019 by quantity

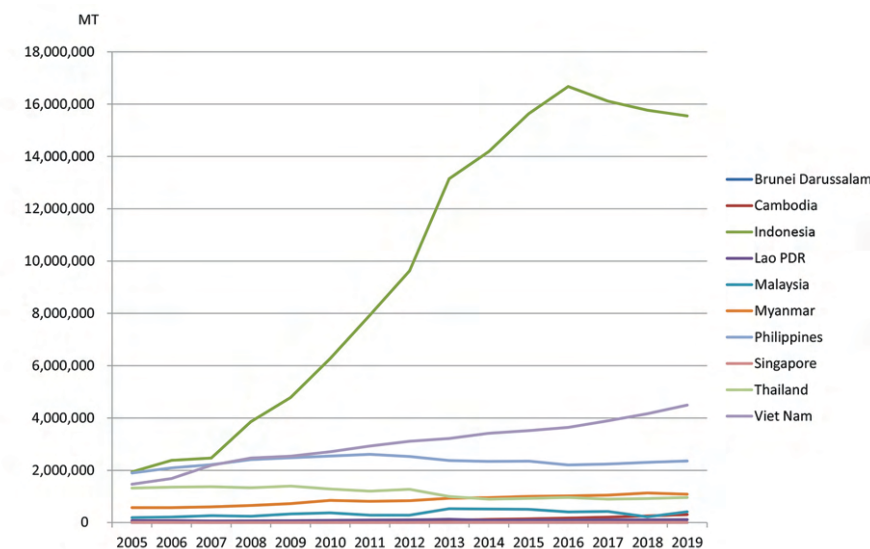
Note: Asia does not include data of Southeast Asia

livelihoods, providing income and employment, as well as improving economic growth.

From 2005 to 2019, the total production of aquaculture in the Southeast Asian region had continued to increase at an annual average rate about 1,269 thousand mt or 9.25 % per



**Figure 19.** Contribution of the region's aquaculture production to the total fisheries production of Southeast Asia from 2005 to 2019



**Figure 20.** Trends of aquaculture production of the Southeast Asian countries in 2005-2019 by quantity (mt)

**Table 22.** Aquaculture production of the Southeast Asian countries from 2005 to 2019 by quantity (mt)

Year	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam	Total (aquaculture production)	Total (fisheries production)
2005	703	42,000	1,941,096	78,000	188,220	574,990	1,895,847	5,917	1,318,461	1,467,300	7,512,534	22,988,103
2006	700	41,400	2,377,474	78,000	212,028	574,990	2,092,275	8,572	1,353,021	1,687,727	8,426,187	24,501,767
2007	674	50,200	2,466,030	63,250	268,514	604,657	2,214,826	4,504	1,370,431	2,194,500	9,237,586	25,302,872
2008	390	39,720	3,855,200	64,300	240,133	653,855	2,407,698	3,518	1,330,800	2,468,320	11,063,934	27,207,826
2009	460	50,000	4,780,100	75,000	333,445	724,163	2,477,392	3,566	1,396,010	2,539,300	12,379,436	28,917,098
2010	421	60,000	6,277,923	82,100	373,151	850,959	2,545,765	3,501	1,286,117	2,706,800	14,186,737	31,438,431
2011	293	72,000	7,928,962	95,600	287,042	816,820	2,608,120	3,974	1,201,402	2,930,400	15,944,613	33,654,492
2012	556	90,000	9,626,863	101,895	283,559	838,426	2,524,641	3,577	1,271,995	3,110,700	17,852,212	36,147,934
2013	606	90,000	13,147,288	124,085	530,205	929,000	2,373,386	5,566	997,255	3,215,900	21,413,291	40,420,239
2014	761	120,055	14,187,124	90,355	520,515	957,041	2,337,605	5,262	897,763	3,413,300	22,529,781	42,114,508
2015	983	143,000	15,634,093	95,965	506,276	999,630	2,348,159	6,896	928,538	3,513,300	24,176,840	43,998,054
2016	822	172,500	16,675,033	95,965	407,387	1,020,593	2,200,914	6,112	962,606	3,640,600	25,182,532	45,336,010
2017	1,632	207,500	16,114,990	109,877	427,015	1,048,692	2,237,787	5,891	893,872	3,892,900	24,940,156	45,496,587
2018	1,146	254,050	15,769,272	108,200	217,381	1,130,350	2,304,365	5,702	919,538	4,161,800	24,871,804	46,539,195
2019	933	307,408	15,548,167	113,000	411,782	1,082,065	2,358,238	5,831	961,703	4,492,500	25,281,627	46,766,274

Source: Fishery Statistical Bulletin for the South China Sea Area 2005-2007 (SEAFDEC, 2008a; 2009; 2010a) for data from 2005 to 2007, and Fishery Statistical Bulletin of Southeast Asia 2008-2019 (SEAFDEC, 2010b; 2011; 2012; 2013, 2014, 2015; 2016; 2017a; 2018; 2020a; 2020b; 2022) for data from 2008 to 2019

**Table 23.** Aquaculture production of the Southeast Asian countries from 2005 to 2019 by value (USD thousand)

Year	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam	Total
2005	...	...	2,168,720	...	341,126	...	892,536	9,971	1,353,179	2,945,650	7,711,182
2006	...	...	2,341,501	...	351,975	...	1,085,011	9,477	1,990,005	...	5,777,969
2007	3,212	58,038	2,447,539	...	352,981	1,862,403	1,334,719	9,052	2,134,592	4,544,750	12,747,286
2008	392	61,790	4,222,498	91,141	452,880	782,566	1,718,634	9,262	2,065,301	4,617,700	14,022,164
2009	658	87,954	5,189,522	111,801	700,910	853,165	1,720,961	8,793	2,422,630	4,867,779	15,964,173
2010	4,950	...	6,980,897	...	793,085	917,706	1,835,308	14,864	2,830,930	...	13,377,740
2011	1,671	126,850	7,219,307	...	757,320	740,655	1,984,554	15,039	3,360,317	6,281,507	20,487,220
2012	4,730	...	7,635,708	...	833,156	1,348,346	2,152,326	12,686	3,484,673	6,383,000	21,854,625
2013	3,495	...	10,348,414	...	768,026	1,714,315	2,186,360	32,215	2,955,291	...	18,008,116
2014	8,884	...	9,503,444	108,426	1,197,902	1,857,360	2,135,384	42,756	2,555,413	...	17,409,569
2015	6,165	...	8,775,201	...	804,915	1,643,071	2,135,384	30,511	2,331,558	...	15,726,805
2016	4,138	...	10,303,470	...	712,306	1,990,126	1,964,460	55,794	2,488,147	...	17,518,441
2017	10,985	...	13,965,299	...	788,655	1,749,584	2,000,639	33,689	2,704,988	...	21,253,839
2018	8,518	...	12,159,824	...	762,788	1,498,561	2,082,502	44,576	3,017,966	...	19,574,735
2019	6,818	...	13,492,992	...	820,430	1,841,443	2,274,650	35,204	3,173,767	...	21,645,304

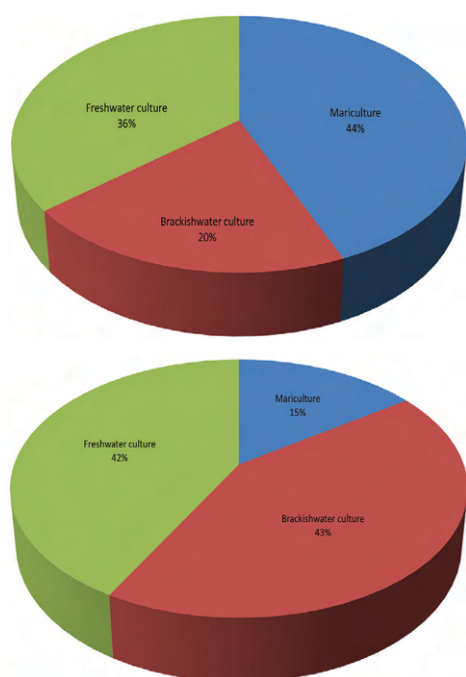
Source: Fishery Statistical Bulletin for the South China Sea Area 2005-2007 (SEAFDEC, 2008a; 2009; 2010a) for data from 2005 to 2007, and Fishery Statistical Bulletin of Southeast Asia 2008-2019 (SEAFDEC, 2010b; 2011; 2012; 2013, 2014, 2015; 2016; 2017a; 2018; 2020a; 2020b; 2022) for data from 2008 to 2019

year, while its contribution to the region's total fisheries had increased from 32.7 % to 54.1 % (Table 22). Figure 19 shows the constant increase in aquaculture production of the region which could be observed throughout a span of 15 years.

By country, Indonesia as a large aquaculture producer in 2019 contributed about 61.50 % to the region's total aquaculture production, followed by Viet Nam at 17.77 %, the Philippines at 9.33 %, Myanmar at 4.28 %, Thailand at 3.80 %, Malaysia at 1.63 %, and Cambodia at 1.22 % (Figure 20).

In terms of value of the region's aquaculture production, the actual trend could not be established as some countries were not able to report their data regularly (Table 23). For the available data in 2019, by value per volume, Brunei Darussalam attained the highest average value at USD 7,308/mt followed by Singapore at USD 6,037/mt, Thailand at USD 3,300/mt, Malaysia at USD 1,992/mt, Myanmar at USD 1,702/mt, the Philippines at USD 984/mt, and Indonesia at USD 868/mt (Table 22 and Table 23).

Aquaculture production comes from three culture environments, namely: mariculture, brackishwater culture,



**Figure 21.** Contribution of the culture environments to the aquaculture production of Southeast Asia in 2019 by quantity (above) and value (below)

and freshwater culture. In 2019, Indonesia as the top producer of aquaculture products of the Southeast Asian region had the highest production from mariculture, followed by Viet Nam from freshwater culture, Philippines from mariculture, Myanmar from freshwater culture, and Thailand from brackishwater culture (Table 24). In terms of volume, aquaculture in marine areas or mariculture provided 44.00 % to the region’s total aquaculture production in 2019 while brackishwater aquaculture contributed 20.00 %, and the remaining 36.00 % came from freshwater aquaculture. However, in terms of value, mariculture contributed 15.00 % while freshwater aquaculture production contributed 42.00 %, while brackishwater aquaculture production contributed the highest at 43.00 % (Figure 21).

The production of spiny eucheuma (*Eucheuma denticulatum*) of Indonesia as the largest producer of aquaculture product in 2019, contributed 54.50 % to the production volume and 14.30 % to the production value of the country’s aquaculture production. This was followed by Nile tilapia (*Oreochromis niloticus*) accounting for 9.00 %, Gracilaria seaweeds *nei* (*Gracilaria* spp.) at 7.90 %, and torpedo-shaped catfishes (*Clarias* spp.) at 6.50 %. In the case of Viet Nam, as the second highest producer from aquaculture, 35.60 % of its aquaculture production came from striped catfish (*Pangasianodon hypophthalmus*), followed by whiteleg shrimp (*Penaeus vannamei*) at 12.80 %, freshwater fishes *nei* (Osteichthyes) at 10.60 %, and cyprinids *nei* (Cyprinidae) at 9.80 % of the country’s aquaculture production.

For the Philippines as the third highest producer from aquaculture, its main aquaculture product was the elkhorn sea moss (*Kappaphycus alvarezii*) contributing 60.30 % to the country’s production from aquaculture, followed by milkfish (*Chanos chanos*) at 17.40 %, Nile tilapia (*Oreochromis niloticus*) at 7.40 %, Tilapia *nei* (*Oreochromis* (=Tilapia) spp.) at 4.50 %, and spiny eucheuma (*Eucheuma denticulatum*) at 3.20 %. For Myanmar, its main production from aquaculture was roho labeo (*Labeo rohita*) which accounted for 33.40 % of the country’s production from aquaculture, followed by common carp (*Cyprinus carpio*) at 28.10 %, and silver barb (*Barbonymus gonionotus*) at 24.00 %. Thailand’s main aquaculture product was the whiteleg shrimp (*Penaeus vannamei*) accounting for 39.40 % of the country’s production from aquaculture, followed by Nile tilapia (*Oreochromis niloticus*) at 23.80 %, hybrid catfishes (*C. gariepinus* x *C. macrophalus*) at 10.10 %, and barramundi (=giant seaperch) (*Lates calcarifer*) at 4.90 %. In terms of value per volume of production from aquaculture, Brunei Darussalam had the highest average value at about USD 7,308/mt (Table 24), followed by

**Table 24.** Production from aquaculture environments of the Southeast Asian countries in 2019 by quantity (mt) and value (USD thousand)

Country	Quantity (mt)				Value (USD thousand)	Value/Quantity (USD/mt)*
	Mariculture	Brackishwater culture	Freshwater culture	Total		
Brunei Darussalam	336	591	6	933	6,818	7,308
Cambodia	13,888	3,340	290,180	307,408	0	0
Indonesia	8,638,457	2,984,207	3,925,503	15,548,167	13,492,992	868
Lao PDR	0	0	113,000	113,000	0	0
Malaysia	204,839	91,658	115,285	411,782	820,430	1,992
Myanmar	52,849	69,472	959,744	1,082,065	1,841,443	1,702
Philippines	1,688,977	348,284	320,977	2,358,238	2,274,650	984
Singapore	4614	202	1,015	5,831	35,204	6,037
Thailand	88,973	445,781	426,949	961,703	3,173,767	3,300
Viet Nam	368,414	1,140,257	2,983,829	4,492,500	0	0
<b>Total</b>	<b>11,061,347</b>	<b>5,083,795</b>	<b>9,136,487</b>	<b>25,281,627</b>	<b>21,645,304</b>	

Source: Fishery Statistical Bulletin of Southeast Asia 2019 (SEAFDEC, 2022)

\* Computation of price excludes these corresponding quantities from Cambodia, Lao PDR, and Viet Nam

**Table 25.** Mariculture production of the Southeast Asian countries from 2005 to 2019 by quantity (mt)

Year	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam	Total
2005	37	16,400	890,074	0	98,851	804	1,419,727	5,280	364,061	213,800	<b>3,009,034</b>
2006	500	500	1,365,919	0	96,696	...	1,566,056	8,113	317,457	216,200	<b>3,571,441</b>
2007	33	16,630	1,509,062	0	144,794	0	1,626,206	4,159	309,497	208,500	<b>3,818,881</b>
2008	31	1,370	2,377,382	0	70,407	48,303	1,793,395	3,235	285,678	48,420	<b>4,628,221</b>
2009	72	4,925	2,537,100	0	77,476	50,464	1,860,462	3,286	316,927	172,003	<b>5,022,715</b>
2010	109	2,120	3,514,702	0	89,366	75,441	1,933,396	3,098	270,628	128,322	<b>6,017,182</b>
2011	121	2,620	4,605,825	0	60,975	3,158	1,992,953	3,448	186,676	318,300	<b>7,174,076</b>
2012	201	2,810	5,769,736	0	131,005	52,693	1,910,568	3,022	185,860	374,300	<b>8,430,195</b>
2013	134	4,633	8,372,817	0	332,236	4,775	1,727,165	4,159	216,577	202,633	<b>10,865,129</b>
2014	162	7,416	9,029,843	0	283,930	59,705	1,820,533	4,252	202,732	454,100	<b>11,862,673</b>
2015	182	2,500	10,275,181	0	278,890	55,524	1,965,099	5,598	194,405	360,100	<b>13,137,479</b>
2016	107	12,832	11,704,838	0	217,980	60,827	1,821,670	4,748	197,201	284,500	<b>12,946,303</b>
2017	371	10,500	9,550,781	0	219,173	59,015	1,457,474	4,868	98,256	306,600	<b>11,707,038</b>
2018	413	1,810	9,601,972	0	18,431	23,458	1,553,997	4,621	78,203	303,000	<b>11,585,905</b>
2019	336	13,888	8,638,457	0	204,839	52,849	1,688,977	4,614	88,973	368,414	<b>11,061,347</b>

Source: Fishery Statistical Bulletin for the South China Sea Area 2005-2007 (SEAFDEC, 2008a; 2009; 2010a) for data from 2005 to 2007, and Fishery Statistical Bulletin of Southeast Asia 2008-2019 (SEAFDEC, 2010b; 2011; 2012; 2013, 2014, 2015; 2016; 2017a; 2018; 2020a; 2020b; 2022) for data from 2008 to 2019

**Table 26.** Mariculture production of the Southeast Asian countries from 2005 to 2019 by value (USD thousand)

Year	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam	Total
2005	-	-	353,019	0	20,444	-	171,539	7,147	97,215	622,600	<b>1,271,964</b>
2006	-	-	220,568	0	17,764	-	216,342	7,381	1,457,754	-	<b>1,919,809</b>
2007	-	5,300	432,802	0	23,238	-	270,984	7,980	-	189,500	<b>929,804</b>
2008	392	3,890	983,185	0	4,974	641,278	500,275	8,082	-	1,493,750	<b>3,635,826</b>
2009	-	19,700	1,297,568	0	40,195	208,905	404,910	7,551	71,837	174,000	<b>2,224,666</b>
2010	-	-	1,437,044	0	34,369	193,568	934,081	13,204	110,379	-	<b>2,722,645</b>
2011	740	8,070	1,127,599	0	27,785	2,088	535,916	12,986	82,065	2,305,138	<b>4,102,387</b>
2012	4,716	-	1,349,055	0	500,888	213,465	649,976	10,028	107,746	2,191,542	<b>5,027,416</b>
2013	712	-	1,810,287	0	197,976	17,728	533,742	22,344	122,869	-	<b>2,705,658</b>
2014	1,710	-	1,668,006	0	234,956	260,538	665,468	28,724	181,418	-	<b>3,040,820</b>
2015	976	-	952,546	0	43,615	330,715	665,468	21,310	137,410	-	<b>2,152,040</b>
2016	786	-	2,389,389	0	42,220	548,777	984,226	36,822	138,661	-	<b>4,140,881</b>
2017	2,669	-	1,619,760	0	30,209	379,608	861,732	22,668	125,365	-	<b>3,042,011</b>
2018	3,453	-	1,418,891	0	24,899	185,917	1,100,797	34,356	162,659	-	<b>2,930,972</b>
2019	2,871	-	2,156,005	0	59,339	374,257	550,012	21,843	168,306	-	<b>3,332,634</b>

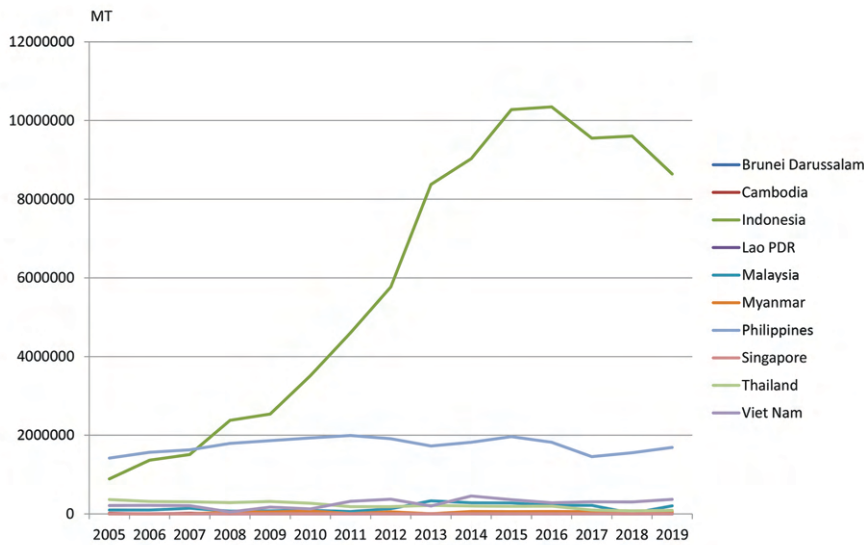
Source: Fishery Statistical Bulletin for the South China Sea Area 2005-2007 (SEAFDEC, 2008a; 2009; 2010a) for data from 2005 to 2007, and Fishery Statistical Bulletin of Southeast Asia 2008-2019 (SEAFDEC, 2010b; 2011; 2012; 2013, 2014, 2015; 2016; 2017a; 2018; 2020a; 2020b; 2022) for data from 2008 to 2019

Singapore at the average of USD 6,037/mt, and Thailand about USD 3,300/mt.

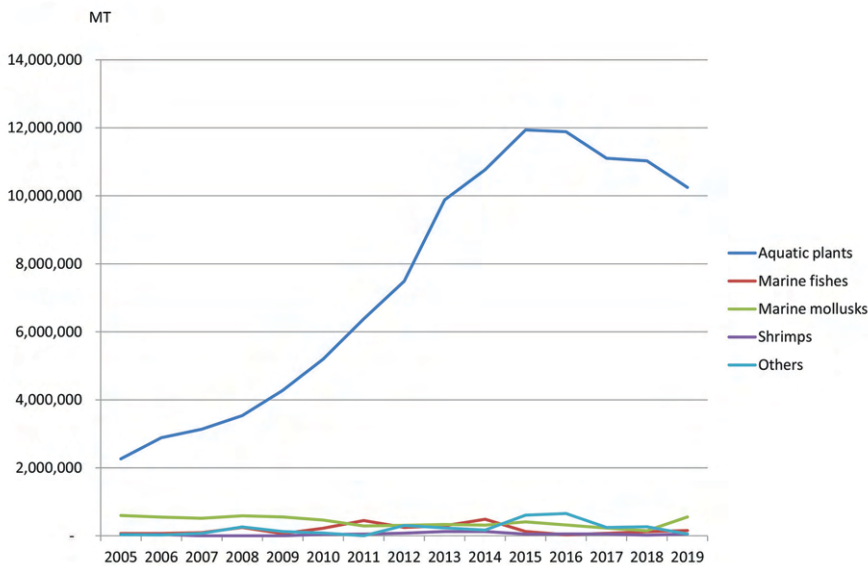
## 5.1 Mariculture

The growth of mariculture production in the region had been very strong for the past 15 years, resulting mainly from the increased fisheries production of Indonesia. From 2005 to 2019, the region's total mariculture products increased in terms of quantity by about 575 thousand mt per year (Table 25 and Figure 22) and valued at about USD 147 million/year (Table 26). In 2019, Indonesia contributed

the highest mariculture production in quantity, accounting for 78.10 % of the region's total mariculture production, followed by the Philippines for 15.30 %, Viet Nam for 3.30 %, Malaysia for 1.80 %, Thailand 0.80 %, and Myanmar for 0.50 %. Cambodia, Singapore, and Brunei Darussalam also reported minimal contributions to the region's total mariculture production. In terms of value, Indonesia also led the countries with the value of its mariculture production contributing about 64.70 % to the region's total mariculture production value, followed by Philippines for 16.50 %, Myanmar for 11.20 %, Thailand for 5.00 %, Malaysia for 1.80 %, and Singapore for 0.70 %, while Singapore and



**Figure 22.** Trends of the quantity (mt) of mariculture production of the Southeast Asian countries in 2005-2019

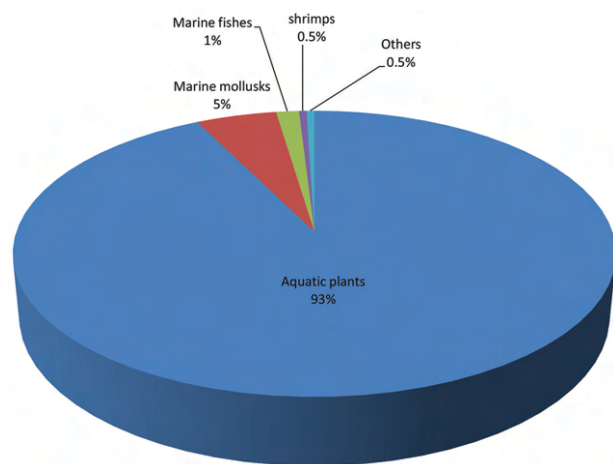


**Figure 23.** Trends of mariculture production by quantity (mt) of major groups of species of Southeast Asia in 2005-2019

Brunei Darussalam contributed less than 1.00 % to the region’s total mariculture production value.

By major groups of mariculture species, namely: aquatic plants, marine fishes, marine mollusks, shrimps, and others, the aquatic plants contributed the largest production to the region’s total mariculture production from 2005 to 2019. The total contribution from aquatic plants attained an average increase of at about 570,021 mt/year or 12.03 % annually (**Table 27** and **Figure 23**).

As shown in **Table 28**, by major groups of mariculture species, the aquatic plants contributed about 93.00 % to the region’s total mariculture production volume. Indonesia contributed the largest amount from production of aquatic plants, particularly *Eucheuma* spp. which accounted for about 76.60 % of the region’s total production volume from mariculture, followed by the elkhorn sea moss (*Kappaphycus alvarezii*) the main mariculture product of the Philippines which accounted for 12.90 %. Specifically for the marine mollusks group, this group contributed



**Figure 24.** Percentage of mariculture production of major groups of species of Southeast Asia in 2019 by quantity (mt)



**Table 27.** Mariculture production of major groups of species of Southeast Asia from 2005 to 2019 by quantity (mt)

Year	Major group of species					Total
	Aquatic plants	Marine fishes	Marine mollusks	Shrimps	Others	
2005	2,266,406	70,521	596,837	40,608	34,662	3,009,034
2006	2,883,247	69,314	551,143	40,630	27,107	3,571,441
2007	3,134,993	91,972	518,330	130	73,456	3,818,881
2008	3,534,124	245,967	588,563	...	259,567	4,628,221
2009	4,277,095	64,279	553,401	...	127,940	5,022,715
2010	5,198,944	224,993	462,158	46,105	84,982	6,017,182
2011	6,380,246	449,323	291,382	51,207	1,918	7,174,076
2012	7,488,620	244,770	311,560	79,099	306,146	8,430,195
2013	9,879,417	292,890	334,836	127,050	230,936	10,865,129
2014	10,767,935	485,559	312,452	126,200	170,527	11,862,673
2015	11,940,006	128,671	412,832	49,891	606,079	13,137,479
2016	11,882,824	29,332	321,493	54,179	658,475	12,946,303
2017	11,105,950	71,465	225,451	55,310	248,862	11,707,038
2018	11,027,739	120,127	151,920	19,042	267,077	11,585,905
2019	10,246,706	157,178	554,145	51,904	53,414	11,061,347

Source: FAO Fisheries and Aquaculture Information and Statistics Service  
 Fishery Statistical Bulletin for the South China Sea Area 2005-2007 (SEAFDEC, 2008a; 2009; 2010a) for data from 2005 to 2007, and Fishery Statistical Bulletin of Southeast Asia 2008-2019 (SEAFDEC, 2010b; 2011; 2012; 2013; 2014; 2015; 2016; 2017a; 2018; 2020a; 2020b; 2022) for data from 2008 to 2019

**Table 28.** Production of major groups of mariculture species of the Southeast Asian countries in 2019 by quantity (mt)

Major groups of species	Brunei Darussalam	Cambodia	Indonesia	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam	Total
<b>Aquatic plants</b>	...	...	<b>8,556,708</b>	<b>188,110</b>	<b>11</b>	<b>1,499,877</b>	...	...	...	<b>10,244,706</b>
<i>Euचेuma denticulatum</i>	...	...	...	...	...	75,619	...	...	...	75,619
<i>Euचेuma spp.</i>	...	...	8,476,045	...	...	...	...	...	...	8,476,045
<i>Caulerpa sertularioides</i>	...	...	45	...	...	...	...	...	...	45
<i>Caulerpa spp.</i>	...	...	...	...	...	1,090	...	...	...	1,090
<i>Kappaphycus alvarezii</i>	...	...	...	188,110	11	1,423,168	...	...	...	1,611,289
<i>Sargassum muticum</i>	...	...	80,618	...	...	...	...	...	...	80,618
<b>Marine mollusks</b>	...	<b>11,900</b>	<b>59,691</b>	<b>16,561</b>	<b>934</b>	<b>61,615</b>	<b>405</b>	<b>88,973</b>	<b>315,000</b>	<b>554,145</b>
Marine mollusks <i>nei</i>	...	11,900	10,864	...	...	...	...	...	315,000	337,764
<i>Perna viridis</i>	...	...	26,080	1,221	...	25,421	403	38,005	...	91,130
<i>Anadara granosa</i>	...	...	11,883	13,772	...	...	...	33,064	...	58,719
<i>Crassostrea gigas</i>	...	...	10,748	...	...	...	2	...	...	10,750
<i>Crassostrea iredalei</i>	...	...	...	...	...	36,194	...	...	...	36,194
<i>Crassostrea spp.</i>	...	...	...	1,568	...	...	...	17,904	...	19,472
<i>Pinctada radiata</i>	...	...	116	...	...	...	...	...	...	116
<b>Marine fishes</b>	<b>336</b>	<b>1,988</b>	<b>22,058</b>	<b>168</b>	<b>934</b>	<b>127,485</b>	<b>4,209</b>	...	...	<b>157,178</b>
<b>Marine crustaceans (shrimps)</b>	...	...	...	...	<b>51,904</b>	...	...	...	...	<b>51,904</b>
<b>Others</b>	...	...	...	...	...	...	...	...	<b>53,414</b>	<b>53,414</b>
<b>TOTAL</b>	<b>336</b>	<b>13,888</b>	<b>8,638,457</b>	<b>204,839</b>	<b>52,849</b>	<b>1,688,977</b>	<b>4,614</b>	<b>88,973</b>	<b>368,414</b>	<b>11,061,347</b>

Source: Fishery Statistical Bulletin of Southeast Asia 2019 (SEAFDEC, 2022)

about 5.00 % to the region's total production volume from mariculture, with Viet Nam providing the highest production of marine mollusks *nei* accounting for about 2.80 %, followed by Thailand whose production of the

green mussels (*Perna viridis*) and blood cockles (*Anadara granosa*) contributed about 0.30 % each (Figure 24).

In terms of value, the euचेuma seaweeds *nei* (*Euचेuma spp.*) contributed 58.10 % to the region's total mariculture

**Table 29.** Production of major species from inland capture fisheries in Southeast Asia in 2019

Scientific name (Common name)	Quantity (mt)	Percentage production of major commodities from mariculture to total mariculture production	Value (USD thousand)*	Percentage total value of major commodities production from mariculture to total mariculture value (%)	Value/ Quantity** (USD/mt)
<i>Eucheuma</i> spp. (Eucheuma seaweeds <i>nei</i> )	8,476,045	76.6	1,936,894	58.1	229
<i>Kappaphycus alvarezii</i> (Elkhorn sea moss)	1,611,289	14.6	116,154	3.5	72
Marine mollusks <i>nei</i>	337,764	3.1	15,927	0.5	700
<i>Chanos chanos</i> (Milkfish)	126,804	1.1	282,610	8.5	2,229
<i>Perna viridis</i> (Green mussel)	91,130	0.8	40,981	1.2	450
<i>Sargassum muticum</i> (Japanese Sargasso seaweed)	80,618	0.7	27,643	0.8	343
<i>Eucheuma denticulatum</i> (Spiny eucheuma)	75,619	0.7	8,587	0.3	114
<i>Crassostrea</i> spp. (Oysters)	66,416	0.6	60,464	1.8	910
<i>Anadara granosa</i> (Blood cockle)	58,719	0.5	176,167	5.3	3,000
Marine crustaceans (Shrimps)	51,904	0.5	362,575	10.9	6,985

Source: Fishery Statistical Bulletin of Southeast Asia 2019 (SEAFDEC, 2022)

\* Data not available from Cambodia and Viet Nam

\*\* Computation of price excludes corresponding quantity production from Cambodia and Viet Nam

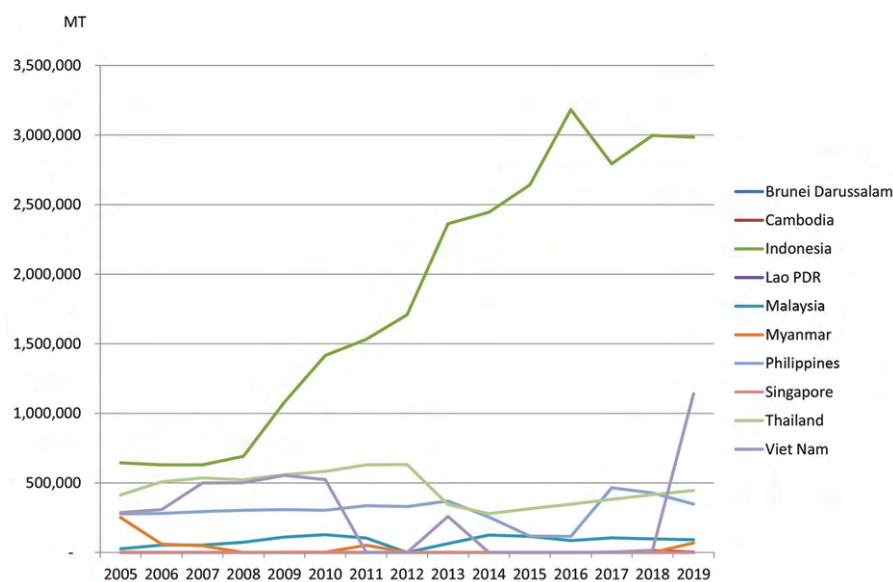
production followed by shrimps which contributed 10.90 %, milkfish (*Chanos chanos*) which contributed about 8.50 %, and blood cockle (*Anadara granosa*) that contributed 5.30 %. Moreover, shrimp commended the highest value per volume at USD 6,985/mt, followed by blood cockle at USD 3,000/mt, and milkfish at USD 2,229/mt. Meanwhile, the lowest value was obtained for the elkhorn sea moss at USD 72/mt (Table 29).

## 5.2 Brackishwater Aquaculture

The total brackishwater aquaculture production of the Southeast Asian region had increased from 1,901,173 mt in 2005 to 5,083,792 mt in 2019, accounting for an average increase of 227,287 mt/year or 7.96 % annually (Table 30). Throughout the 15-year period (Figure 25), Indonesia had been the region’s top producer with an average increase in production of 167,159 mt/year or 13.80 % annually,

followed by Viet Nam at 60,933 mt/year, Thailand at 2,204 mt/year, Philippines at 5,075 mt/years, and Malaysia at 4,593 mt/year.

The value of the brackishwater aquaculture production had increased during 2005–2019 at an average of USD 329 million per year or 12.68 % annually (Table 31). Indonesia reported the highest increasing average value of USD 263,157 per year, followed by Thailand at USD 90,844 per year, Philippines at USD 49,396 per year, and Malaysia at USD 22,934 per year. In 2019, Singapore recorded the highest average value of USD 28,267/mt, followed by Brunei Darussalam at USD 6,618/mt, Malaysia at USD 6,087/mt, Thailand at USD 4,866/mt, Philippines at USD 3,523/mt, Indonesia at USD 1,732/mt, and Myanmar at USD 1,300/mt. Cambodia and Viet Nam were not able to report the values of their respective brackishwater aquaculture production in 2019 (Table 31).



**Figure 25.** Trends of brackishwater culture production of the Southeast Asian countries in 2005-2019 by quantity (mt)

**Table 30.** Brackishwater aquaculture production of the Southeast Asian countries from 2005 to 2019 by quantity (mt)

Year	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam	Total
2005	537	100	643,975	0	27,363	250,407	277,230	35	414,926	287,200	1,901,773
2006	60	130	629,609	0	53,679	60,000	281,316	34	508,150	309,000	1,841,978
2007	629	-	629,797	0	53,656	48,303	294,495	-	535,834	500,500	2,063,214
2008	355	-	691,432	0	73,694	-	303,244	-	522,659	501,600	2,092,984
2009	-	75	1,080,700	0	11,524	2,926	308,440	-	558,444	554,397	2,616,506
2010	293	100	1,416,038	0	128,387	3,122	304,276	-	583,111	524,443	2,959,770
2011	159	-	1,531,456	0	103,578	51,965	336,159	-	630,375	-	2,653,692
2012	335	160	1,708,110	0	-	-	330,781	96	631,881	-	2,671,363
2013	456	91	2,362,480	0	64,577	1,969	369,591	389	344,913	258,867	3,403,333
2014	592	-	2,446,031	0	125,801	1,845	254,692	200	279,907	-	3,109,068
2015	789	870	2,641,429	0	115,352	-	118,648	237	314,288	-	3,191,613
2016	712	-	3,182,105	0	85,802	-	116,237	334	347,382	-	3,732,572
2017	1,242	2,720	2,793,437	0	105,195	-	465,274	204	382,353	2,200	3,752,625
2018	724	13,630	2,997,350	0	97,681	-	427,770	227	415,498	15,500	3,968,380
2019	591	3,340	2,984,207	0	91,658	69,472	348,284	202	445,781	1,140,257	5,083,792

Source: FAO Fisheries and Aquaculture Information and Statistics Service

Fishery Statistical Bulletin for the South China Sea Area 2005-2007 (SEAFDEC, 2008a; 2009; 2010a) for data from 2005 to 2007, and Fishery Statistical Bulletin of Southeast Asia 2008-2019 (SEAFDEC 2010b; 2011; 2012; 2013, 2014, 2015; 2016; 2017a; 2018; 2020a; 2020b; 2022) for data from 2008 to 2019

**Table 31.** Brackishwater aquaculture production of the Southeast Asian countries from 2005 to 2019 by value (USD thousand)

Year	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam	Total
2005	-	-	1,483,289	0	236,883	-	535,451	374	897,455	1,463,200	4,616,652
2006	-	-	1,736,275	0	254,555	-	611,344	625	-	-	2,602,799
2007	3,212	-	1,672,408	0	193,212	714,106	714,106	-	1,523,423	1,692,500	6,512,967
2008	-	375	1,840,902	0	323,749	-	831,073	-	1,602,685	467,450	5,066,234
2009	658	754	2,156,102	0	409,412	-	897,093	-	1,717,645	1,974,429	7,156,093
2010	4,800	-	3,409,438	0	506,555	-	481,441	-	2,066,328	-	6,468,562
2011	890	-	2,657,156	0	497,955	1,592	1,044,438	-	2,587,963	-	6,789,994
2012	-	-	2,643,864	0	-	-	1,040,218	717	2,570,171	-	6,254,970
2013	2,690	-	4,234,648	0	284,912	262,169	1,204,447	6,752	2,003,487	-	7,999,105
2014	7,130	-	3,526,200	0	737,340	1,600	1,040,667	5,299	1,610,425	-	6,928,661
2015	5,147	-	3,238,667	0	552,192	-	1,040,667	2,952	1,456,921	-	6,296,546
2016	3,340	-	2,597,458	0	464,783	-	592,548	6,696	1,615,768	-	5,280,593
2017	8,163	-	6,053,092	0	567,328	-	671,957	4,938	1,914,523	-	9,220,001
2018	5,014	-	5,496,728	0	520,505	-	509,164	2,044	2,044,098	-	8,577,553
2019	3,911	-	5,167,493	0	557,953	90,314	1,226,997	5,710	2,169,268	-	9,221,646

Source: Fishery Statistical Bulletin for the South China Sea Area 2005-2007 (SEAFDEC, 2008a; 2009; 2010a) for data from 2005 to 2007, and Fishery Statistical Bulletin of Southeast Asia 2008-2019 (SEAFDEC 2010b; 2011; 2012; 2013, 2014, 2015; 2016; 2017a; 2018; 2020a; 2020b; 2022) for data from 2008 to 2019

The major groups and species cultured in brackishwater include aquatic plants such as *Gracilaria* spp., crustaceans such as banana prawn (*Penaeus merguensis*), giant tiger shrimp (*P. monodon*), whiteleg shrimp (*P. vannamei*), and other shrimps, as well as fishes such as milkfish (*Chanos chanos*) and marine fishes, and others. **Table 32** showed that the production of *Gracilaria* spp., whiteleg shrimp (*P. vannamei*), giant tiger shrimp (*P. monodon*), and milkfish (*Chanos chanos*) had increased from 2005 to 2019, where *Gracilaria* spp. attained average increase in production of 84,242 mt/year, followed whiteleg shrimp at 78,567 mt/

year, giant tiger shrimp (*P. monodon*) at 4,615 mt/year, and milkfish at 37,019 mt/year. On the other hand, production of banana prawn (*Penaeus merguensis*) had decreased with an average decrease of 5,503 mt/years from 2005 to 2019. Malaysia was unable to report its production of banana prawn (*Penaeus merguensis*) since 2008. In 2019, the whiteleg shrimp (*P. vannamei*) provided the highest contribution to the total brackishwater aquaculture production for 33.00 % followed by at *Gracilaria* spp. at 24.10 %, milkfish (*Chanos chanos*) at 19.50 %, and giant tiger shrimp (*P. monodon*) at 9.00 %.

**Table 32.** Production of major group of species of brackishwater aquaculture of Southeast Asia from 2005 to 2019 by quantity (mt)

Year	Major group of species								Total
	Aquatic plants ( <i>Gracilaria</i> spp.)	Crustaceans				Fishes		Others	
		Banana prawn ( <i>P. merguensis</i> )	Tiger shrimp ( <i>P. monodon</i> )	Whiteleg shrimp ( <i>P. vannamei</i> )	Other shrimps	Milkfish ( <i>Chanos chanos</i> )	Miscellaneous fishes		
2005	44,253	80,613	393,720	578,361	185,271	473,924	139,447	6,184	1,901,773
2006	120,000	76,633	366,522	690,062	63,216	439,706	64,790	21,049	1,841,978
2007	242,821	86,186	429,295	580,091	72,424	498,437	153,826	134	2,063,214
2008	207,470	78,087	522,326	745,948	224,545	219,444	95,164	...	2,092,984
2009	171,868	64,534	383,696	571,000	462,671	260,610	552,667	149,460	2,616,506
2010	517,605	87,905	455,722	767,653	31,650	683,990	172,012	243,233	2,959,770
2011	630,788	73,404	234,053	762,045	17,291	735,667	108,657	91,787	2,653,692
2012	776,177	64,258	188,870	825,169	1,419	756,842	25,899	32,729	2,671,363
2013	977,635	65,285	297,468	695,665	129,224	977,970	260,086	...	3,403,333
2014	1,106,065	74,838	197,571	699,776	12,997	738,605	142,756	136,460	3,109,068
2015	1,157,561	1,883	65,931	338,696	548,701	1,009,876	68,965	...	3,191,613
2016	1,358,685	1,890	67,860	361,851	677,543	1,141,030	123,713	...	3,732,572
2017	1,059,204	3,005	197,231	1,153,741	30,258	1,114,731	152,827	41,628	3,752,625
2018	1,338,716	17,707	197,641	875,997	66,303	932,505	415,040	124,472	3,968,380
2019	1,223,648	3,565	458,325	1,678,302	95,645	992,195	343,606	288,507	5,083,792

Source: FAO Fisheries and Aquaculture Information and Statistics Service  
Fishery Statistical Bulletin for the South China Sea Area 2005-2007 (SEAFDEC, 2008a; 2009; 2010a) for data from 2005 to 2007, and Fishery Statistical Bulletin of Southeast Asia 2008-2019 (SEAFDEC 2010b; 2011; 2012; 2013, 2014, 2015; 2016; 2017a; 2018; 2020a; 2020b; 2022) for data from 2008 to 2019

**Table 33.** Production of major groups of species of brackishwater aquaculture of the Southeast Asian countries in 2019 by quantity (mt)

Major groups of species	Brunei Darussalam	Cambodia	Indonesia	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam	Total
<b>Aquatic plants</b>										
( <i>Gracilaria</i> spp.)	-	-	1,223,564	-	-	84	-	-	-	1,223,648
<b>Crustaceans</b>										
Banana prawn	-	-	2,229	-	-	1,176	-	160	-	3,565
Giant tiger shrimp	52.4	-	129,610	3,950	-	45,733	25.3	17,954	261,000	458,325
<b>Whiteleg shrimp</b>			<b>664,869</b>	<b>38,767</b>		<b>19,152</b>	<b>5.58</b>	<b>378,508</b>	<b>577,000</b>	<b>1,678,302</b>
Other shrimps	202.5	1336	49,399	-	-	498	58.39	151	45,000	96,645
<b>Fishes</b>										
Milkfish	3.9	-	748,167	2,235	-	241,789	-	-	-	992,195
Marine fishes	332	1988	153,803	45,860	69,472	8,530	113	49,008	14,500	343,606
<b>Others</b>		<b>16</b>	<b>12,566</b>	<b>846</b>		<b>31,322</b>			<b>242,757</b>	<b>287,507</b>
<b>Total</b>	<b>591</b>	<b>3,340</b>	<b>2,984,207</b>	<b>91,658</b>	<b>69,472</b>	<b>348,284</b>	<b>202</b>	<b>445,781</b>	<b>1,140,257</b>	<b>5,083,792</b>
<b>Total Value (USD thousand)</b>	<b>3,911</b>	...	<b>5,167,493</b>	<b>557,953</b>	<b>90,314</b>	<b>1,226,997</b>	<b>5,710</b>	<b>2,169,26</b>	...	<b>9,221,646</b>

Source: Fishery Statistical Bulletin of Southeast Asia 2019 (SEAFDEC, 2022)

In the production quantity of brackishwater aquaculture in 2019 by the Southeast Asian countries and by major groups and species, production of whiteleg shrimp (*P. vannamei*) was highest and mainly produced by Indonesia (39.60 %), Viet Nam (34.40 %), and Thailand (22.50 %). The second highest production was generated by aquatic plants or *Gracilaria* spp. mainly produced by Indonesia which contributed the highest to the region's total brackishwater aquaculture production of aquatic plants at 99.90 %, and the third highest was from milkfish (*Chanos chanos*) mainly produced by Indonesia (75.40 %) and Philippines (24.40

%), and followed by giant tiger shrimp (*P. monodon*) mainly produced by Viet Nam (56.90 %), Indonesia (28.30 %), Philippines (10.00 %), and Thailand (3.90 %) (Table 33). In terms of production value, the whiteleg shrimp (*P. vannamei*) contributed the highest value of about 54.80 % followed by milkfish (*Chanos chanos*) at 16.10 %, giant tiger shrimp (*P. monodon*) at 15.10 %, and marine fishes at 8.00 %. Although aquatic plants attained the second highest production volume (24.00 %), its contribution in terms of value was only 1.00 % (Figure 26).

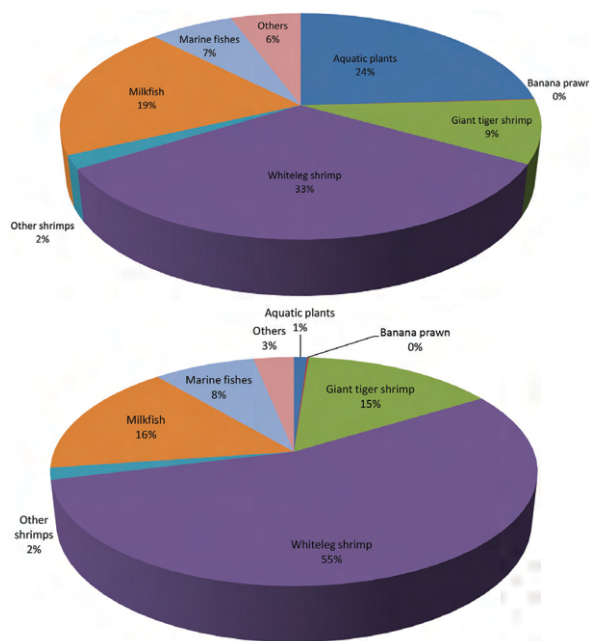
**Table 34.** Major brackishwater species cultured in the region (as of 2019)

Common name	Quantity (mt)	Percentage brackishwater culture production of major commodities to total brackishwater culture production	Value (USD thousand)*	Percentage total value of major commodities production from brackishwater culture to total brackishwater culture value (%)	Value/Quantity** (USD/mt)
Whiteleg shrimps	1,678,302	33.0	5,056,968	54.8	4,592
Gracilaria seaweeds	1,223,648	24.1	94,800	1.0	77
Milkfish	992,195	19.5	1,483,073	16.1	1,495
Giant tiger shrimp	458,325	9.0	1,392,428	15.1	7,057
Fishes	343,606	6.8	736,466	8.0	2,238
Shrimps	96,645	1.9	152,959	1.7	2,962

Source: Fishery Statistical Bulletin of Southeast Asia 2019 (SEAFDEC, 2022)

\* Data not available from Cambodia and Viet Nam

\*\* Computation of price excludes corresponding quantity production from Cambodia and Viet Nam



**Figures 26.** Production of major group of species from brackishwater aquaculture of Southeast Asia in 2019 by quantity (above) and value (below)

On the average value per volume of production from brackishwater aquaculture, considering only the countries that reported their respective production values, Singapore posted the highest at USD 28,267/mt followed by Brunei Darussalam at USD 6,618/mt, Malaysia at USD 6,087/mt, Thailand at USD 4,866/mt, Philippines at USD 3,523/mt, Indonesia at USD 1,732/mt, and Myanmar at USD 1,300/mt. Cambodia and Viet Nam did not report their respective production value from brackishwater aquaculture (Table 33). The highest value per volume of production was attained by the giant tiger shrimp (*P. monodon*) at USD 7,057/mt followed by whiteleg shrimp (*P. vannamei*) at USD 4,592/mt, other shrimps at USD 2,962/mt, group of fishes at USD 2,238/mt, milkfish (*Chanos chanos*) at USD 1,495/mt, and *Gracilaria* spp. at USD 77/mt (Table 34).

### 5.3 Freshwater Aquaculture

Freshwater aquaculture had continued to play an increasingly important role in food security in many countries in the Southeast Asian region, with policies evolving in several countries to address the anticipated short-fall in fishery products from capture fisheries. In less developed countries of the sub-region such as Viet Nam, Myanmar, Cambodia, and Lao PDR, recognition is given to fish production for food security and rural development, as the governments promoted aquaculture as means of alleviating poverty and ensuring food supply in many rural areas (FAO, 1997a). This is clearly reflected in the continued increases in production from freshwater aquaculture in the respective countries.

The region’s total production from freshwater aquaculture in 2019 was reported to be 9,136,488 mt accounting for about 36.00 % of the region’s total production from aquaculture. Indonesia had the highest production from freshwater aquaculture at 3,925,503 mt or 43.00 % to the region’s total freshwater aquaculture production, followed by Viet Nam at 2,983,829 mt or 32.70 %, Myanmar at 959,744 mt or 10.50 %, Thailand at 426,949 mt or 4.70 %, and Philippines at 320,977 mt or 3.50 % (Table 35).

The trend of freshwater aquaculture in the Southeast Asian countries from 2005 to 2019 as shown in Figure 27 indicates a large increase of approximately 466,769 mt per year or 9.70 % annually. In terms of value, production from freshwater aquaculture provided 42.00 % to the regions’ total aquaculture production value (Table 36). This information however, could be underestimated considering that the corresponding production value from Cambodia, Lao PDR, and Viet Nam have not yet been reported.

Table 35 and Table 36 showed that Singapore posted the highest average value at USD 7,538/mt in 2019 followed by Brunei Darussalam at USD 6,050/mt, Thailand at USD 1,959/mt, Malaysia at USD 1,762/mt, Indonesia at USD 1,572/mt, Philippines at USD 1,550/mt, and Myanmar at

**Table 35. Freshwater aquaculture production of the Southeast Asian countries from 2005 to 2019 by quantity (mt)**

Year	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam	Total
2005	129	25,500	407,047	78,000	62,006	323,779	198,890	602	539,474	966,300	2,601,727
2006	140	40,770	381,946	78,000	61,653	514,990	244,903	425	527,414	1,162,527	3,012,768
2007	12	33,570	327,171	63,250	70,064	556,354	294,125	345	525,100	1,485,500	3,355,491
2008	4	38,350	786,386	64,300	96,032	605,552	311,059	283	522,463	1,918,300	4,342,729
2009	34	45,000	1,162,300	75,000	144,445	670,773	308,490	280	520,639	1,812,900	4,739,861
2010	19	57,780	1,347,183	82,100	155,398	772,396	308,093	403	432,378	2,054,035	5,209,785
2011	13	69,380	1,791,681	95,600	122,489	761,697	279,008	526	384,351	2,612,100	6,116,845
2012	20	87,030	2,149,017	101,895	152,554	785,733	283,292	459	454,254	2,736,400	6,750,654
2013	16	85,276	2,411,991	124,085	133,392	922,256	276,630	1,018	435,765	2,754,400	7,144,829
2014	7	112,639	2,711,250	90,355	110,784	895,491	262,380	810	415,124	2,959,200	7,558,040
2015	12	139,630	2,717,483	95,965	112,034	944,106	264,412	1,061	419,845	3,153,200	7,847,748
2016	3	159,668	3,146,490	95,965	103,605	959,766	263,007	1,030	418,023	3,356,100	8,503,657
2017	19	194,280	3,770,772	109,877	102,647	989,677	315,039	819	413,263	3,584,100	9,480,493
2018	9	238,610	3,169,950	108,200	101,269	1,106,892	322,598	854	425,837	3,843,300	9,317,519
2019	6	290,180	3,925,503	113,000	115,285	959,744	320,977	1,015	426,949	2,983,829	9,136,488

Source: FAO Fisheries and Aquaculture Information and Statistics Service  
Fishery Statistical Bulletin for the South China Sea Area 2005-2007 (SEAFDEC, 2008a; 2009; 2010a) for data from 2005 to 2007, and Fishery Statistical Bulletin of Southeast Asia 2008-2019 (SEAFDEC, 2010b; 2011; 2012; 2013; 2014; 2015; 2016; 2017a; 2018; 2020a; 2020b; 2022) for data from 2008 to 2019

**Table 36. Freshwater aquaculture production of the Southeast Asian countries from 2005 to 2019 by value (USD thousand)**

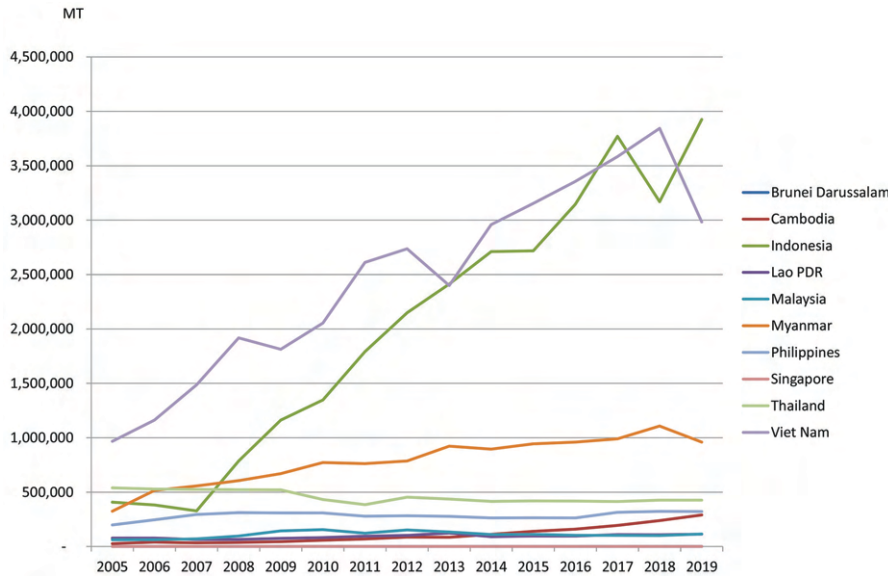
Year	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam	Total
2005	...	...	332,412	...	83,799	...	185,546	2,450	358,509	859,850	1,822,566
2006	...	...	384,658	...	79,656	...	257,325	1,471	532,251	...	1,255,361
2007	...	52,738	342,329	...	136,531	1,148,297	349,629	1,072	611,169	2,662,750	5,304,515
2008	...	57,525	1,398,411	91,141	124,157	141,288	387,286	1,180	462,616	2,656,500	5,320,104
2009	...	67,500	1,735,852	111,801	251,304	644,260	418,956	1,242	633,148	2,719,350	6,583,414
2010	150	...	2,134,415	...	252,161	724,138	419,786	1,660	654,223	...	4,186,533
2011	41	118,780	3,434,552	...	231,579	736,975	404,200	2,053	690,290	3,976,369	9,594,839
2012	14	...	3,642,789	...	332,268	1,134,881	462,132	1,941	806,756	4,191,458	10,572,239
2013	93	...	4,303,479	...	285,138	1,434,418	448,171	3,119	828,935	...	7,303,353
2014	44	...	4,309,238	108,426	225,606	1,595,222	429,249	8,733	763,570	...	7,440,088
2015	42	...	4,583,988	...	209,108	1,312,356	429,249	6,249	737,227	...	7,278,219
2016	12	...	5,316,623	...	205,303	1,441,349	387,686	12,276	733,718	...	8,096,967
2017	153	...	6,292,447	...	191,118	1,369,976	466,950	6,083	665,100	...	8,991,827
2018	51	...	5,244,205	...	217,384	1,312,644	472,541	8,176	811,209	...	8,066,210
2019	36	...	6,169,494	...	203,137	1,376,872	497,641	7,651	836,193	...	9,091,025

Source: Fishery Statistical Bulletin for the South China Sea Area 2005-2007 (SEAFDEC, 2008a; 2009; 2010a) for data from 2005 to 2007, and Fishery Statistical Bulletin of Southeast Asia 2008-2019 (SEAFDEC, 2010b; 2011; 2012; 2013; 2014; 2015; 2016; 2017a; 2018; 2020a; 2020b; 2022) for data from 2008 to 2019

USD 1,435/mt. Cambodia, Lao PDR, and Viet Nam were not able to report the values of their respective countries' freshwater aquaculture production in 2019.

In the Southeast Asian region, more than 40 major groups and species are being cultured in freshwater environment, about one-half of which are non-indigenous fish species such as common carp, tilapia, roho labeo, African catfish, mrigal carp, giant freshwater prawn, and so on. A portion of the alien fish species have established self-sustaining populations in the nature, while a few have become invasive. These successful fish invaders have posed serious threats not only to the freshwater aquaculture sector and

the native species, but also to the countries' economies. While Brunei Darussalam, Indonesia, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Viet Nam were able to report their production from freshwater aquaculture by species, the other countries reported production by major groups only, such as freshwater fish *nei*, without providing the details at species level. From 2005 to 2018, the freshwater aquaculture production of major groups of species indicated that tilapia and other cichlids groups posted the largest production followed by carps, barbells, and other cyprinids group, and the catfishes group. In 2019, the catfishes group accounted for 35.00 % of the region's total production from freshwater aquaculture, followed



**Figure 27.** Freshwater aquaculture production trend of Southeast Asia in 2005-2019 by quantity (mt)

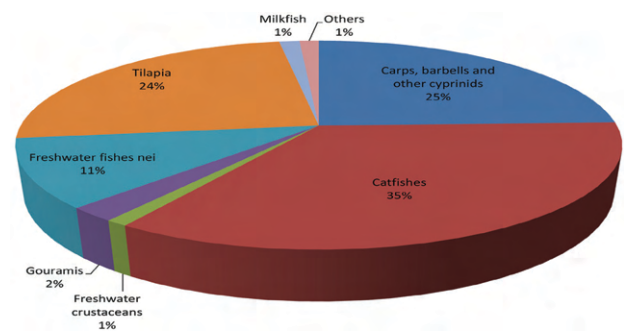
**Table 37.** Production of major groups of species of freshwater aquaculture of Southeast Asia from 2005-2019 by quantity (mt)

Year	Major group of species								Total
	Carp, barbells and other cyprinids	Catfishes	Freshwater crustaceans	Gouramis	Freshwater fishes <i>nei</i>	Tilapia and other cichlids	Milkfish	Others	
2005	300,195	667,154	46,141	44,418	1,014,347	504,195	25,277	0	2,601,727
2006	495,534	756,841	32,294	44,971	1,117,711	530,852	34,565	0	3,012,768
2007	428,692	1,001,873	113,873	32,333	1,161,877	575,560	41,283	0	3,355,491
2008	680,758	1,462,884	37,378	37,883	1,463,682	615,705	44,439	0	4,342,729
2009	636,003	1,334,894	42,159	37,438	1,994,409	540,508	43,115	111,335	4,739,861
2010	1,080,784	637,766	61,254	91,922	2,337,286	957,984	42,789	0	5,209,785
2011	1,147,753	792,513	51,631	97,505	2,901,796	1,083,395	42,252	0	6,116,845
2012	1,228,141	1,018,284	443,334	124,198	2,459,289	1,226,926	41,524	208,958	6,750,654
2013	1,336,381	1,215,705	510,616	137,358	2,457,258	1,385,695	42,426	59,389	7,144,829
2014	1,341,130	1,324,607	567,299	160,093	2,472,650	1,462,229	36,921	193,112	7,558,040
2015	1,337,999	1,315,651	645,644	132,193	2,720,464	1,600,711	85,753	9,333	7,847,748
2016	1,378,567	1,558,243	689,606	167,022	2,867,812	1,706,567	92,826	43,015	8,503,657
2017	1,300,333	1,686,016	796,028	246,384	3,410,935	1,803,775	114,357	122,666	9,480,493
2018	1,595,751	1,352,962	885,367	147,802	3,442,447	1,612,698	102,331	178,162	9,317,519
2019	2,237,568	3,174,256	91,431	202,405	969,794	2,230,460	118,226	112,348	9,136,488

**Source:** FAO Fisheries and Aquaculture Information and Statistics Service  
 Fishery Statistical Bulletin for the South China Sea Area 2005-2007 (SEAFDEC, 2008a; 2009; 2010a) for data from 2005 to 2007, and Fishery Statistical Bulletin of Southeast Asia 2008-2019 (SEAFDEC, 2010b; 2011; 2012; 2013, 2014, 2015; 2016; 2017a; 2018; 2020a; 2020b; 2022) for data from 2008 to 2019

by carps, barbells and other cyprinids group accounting for 25.00 %, tilapia and other cichlids group for 24.00 %, and freshwater fishes *nei* for 11.00 %. (Table 37 and Figure 28). It should however be noted that Indonesia had reported its milkfish aquaculture production under inland water environments since 2015.

In terms of production volume from freshwater aquaculture by species of the Southeast Asian countries (Table 38), pangas catfishes *nei* (*Pangasius* spp.) accounted for 21.90 % of the region’s total production from freshwater aquaculture, which was contributed mainly by Viet Nam. This was followed by Nile tilapia (*Oreochromis niloticus*) which accounted for 19.70 % and contributed mainly by



**Figure 28.** Percentage of production of major groups of species in freshwater aquaculture of Southeast Asia in 2019 by quantity (mt)

**Table 38.** Production of major groups of species from freshwater aquaculture of the Southeast Asian countries in 2019 by quantity (mt)

Major groups of species	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam	Total
Pangas catfishes <i>nei</i>	-	-	383,836	-	-	-	-	19	13,316	1,600,000	1,997,171
Nile tilapia	5	-	1,399,136	-	3715	-	169,594	75.5	228,601	-	1,801,127
Torpedo-shaped catfishes	-	-	1,011,083	-	28,464	-	4,874	-	12,500	-	1,056,921
Common carp	-	-	605,091	-	1,562	303,731	-	-	980	134,312	1,045,676
Tilapias <i>nei</i>	-	-	42,982	-	31,845	-	91,321	-	79	263,107	429,334
Cyprinids <i>nei</i>	-	-	-	-	-	-	12,819	-	-	400,000	412,819
Roho labeo	-	-	-	-	8908	361,345	-	-	1744	-	371,997
Silver barb	-	-	21,757	-	990	259,542	-	-	21,767	-	304,056
Giant gourami	-	-	181,960	-	-	-	87	-	11,150	-	193,197
Catfishes, hybrid	-	-	-	-	-	-	-	-	97,151	-	97,151
Misc. freshwater fishes	-	289,750	76,149	112,920	1,746	-	200	0.16	13,092	475,937	969,794
Milkfish	-	-	76,370	-	543	-	41,314	-	-	-	118,227
Giant river prawn	1.26	-	5,829	-	206	9509	1	0.1	31,984	20,129	67,659
Others*	-	430	121,310	80	37,306	25,617	767	920.47	7,085	77,844	271,359
<b>Total</b>	<b>6</b>	<b>290,180</b>	<b>3,925,503</b>	<b>113,000</b>	<b>115,285</b>	<b>959,744</b>	<b>320,977</b>	<b>1,015</b>	<b>426,949</b>	<b>2,983,829</b>	<b>9,136,488</b>

Source: Fishery Statistical Bulletin of Southeast Asia 2019 (SEAFDEC, 2022)

\*Others including other fishes, frogs, turtles, etc.

**Table 39.** Major brackishwater species cultured in the region (as of 2019)

Common name	Quantity (mt)	Percentage freshwater culture production of major commodities to total freshwater culture production	Value	Percentage total value of major commodities production from brackishwater culture to total brackishwater culture value (%)	Value/Quantity** (USD/mt)
Pangas catfish	1,997,171	21.9	548,074	6.0	1,380
Nile tilapia	1,801,127	19.7	2,956,238	32.5	1,641
Torpedo-shaped catfishes	1,056,921	11.6	1,258,394	13.8	1,191
Common carp	1,045,676	11.4	1,529,652	16.8	1,678
Tilapias <i>nei</i>	429,334	4.7	278,391	3.1	1,675
Cyprinid <i>nei</i>	412,819	4.5	6,160	0.1	481
Roho labeo	371,997	4.1	628,625	6.9	1,690
Silver barb	304,056	3.3	321,284	3.5	1,057
Giant gourami	193,197	2.1	446,744	4.9	2,312
Catfishes, hybrid	97,151	1.1	144,193	1.6	1,484
Misc. freshwater fishes	969,794	10.6	119,378	1.3	1,309
Milkfish	118,227	1.3	169,377	1.9	1,433
Giant river prawn	67,659	0.7	332,987	3.7	7,006

Source: Fishery Statistical Bulletin of Southeast Asia 2019 (SEAFDEC, 2022)

\* Data not available from Cambodia, Lao PDR, and Viet Nam

\*\* Computation of price excludes corresponding quantity production from Cambodia, Lao PDR, and Viet Nam

Indonesia, followed by torpedo-shaped catfishes (*Clarias* spp.) at 11.60 % contributed mainly by Indonesia, common carp (*Cyprinus carpio*) at 11.40 % contributed mainly by Indonesia, Myanmar, and Viet Nam, tilapias *nei* (*Oreochromis*(=Tilapia) spp.) for 4.70 % contributed mainly by Viet Nam, cyprinids *nei* for 4.50 % accounted mainly by Viet Nam, roho labeo (*Labeo rohita*) at 4.10 % contributed mainly by Myanmar, silver barb (*Barbonymus gonionotus*) at 3.30 % accounted mainly by Myanmar,

giant gourami (*Osphronemus goramy*) accounted for 2.10 % contributed mainly by Indonesia, and Africa-bighead catfish, hybrid (*Clarias gariepinus* x *C. macrocephalus*) at 1.10 % contributed mainly by Thailand.

On production value, the highest contributor to the region's total production value from freshwater aquaculture in 2019 was Nile tilapia (*Oreochromis niloticus*) which accounted for 32.50 % of the region's total production



from freshwater aquaculture, followed by common carp (*Cyprinus carpio*) at 16.80 %, torpedo-shaped catfishes (*Clarias* spp.) at 13.80 %, roho labeo (*Labeo rohita*) at 6.90 %, pangas catfishes *nei* (*Pangasius* spp.) at 6.00 %, giant gourami (*Osphronemus goramy*) at 4.90 %, giant river prawn (*Macrobrachium rosenbergii*) at 3.70 %, and tilapias *nei* (*Oreochromis*(=Tilapia) spp.) at 3.10 %. For the value per volume of major freshwater aquaculture species, the highest was earned by giant river prawn (*Macrobrachium rosenbergii*) at USD 7,006/mt followed by giant gourami (*Osphronemus goramy*) at USD 2,312/mt, roho labeo (*Labeo rohita*) at USD 1,690/mt, common carp (*Cyprinus carpio*) at USD 1,678/mt, tilapias *nei* (*Oreochromis*(=Tilapia) spp.) at USD 1,675/mt, Nile tilapia (*Oreochromis niloticus*) at USD 1,641/mt, Africa-bighead catfish, hybrid (*Clarias gariepinus* x *C. macrocephalus*) at USD 1,484/mt, milkfish (*Chanos chanos*) at USD 1,433/mt, pangas catfishes *nei* (*Pangasius* spp.) at USD 1,380/metric mt, miscellaneous freshwater fishes at USD 1,309/

mt, torpedo-shaped catfishes (*Clarias* spp.) at USD 1,191/mt, silver barb (*Barbonymus gonionotus*) at USD 1,057/mt, and cyprinids *nei* at USD 481/mt (**Table 39**).

## 6. Fishing Vessels

In the Southeast Asian countries, the number of fishing vessels reported is only for those vessels that had been registered, except for Cambodia and Lao PDR which did not report their respective number of registered fishing vessels in 2019. Based on the data available as of 2019, Indonesia had the highest number of vessels at 625,708, followed by Malaysia with 50,945 vessels of which 6,303 were non-powered while 44,642 were powered. The third highest number was reported by Viet Nam at 35,382, followed by Myanmar with 22,410 vessels of which 5,122 were non-powered while 17,288 were powered, Thailand with 10,530, Philippines with 7,646, Brunei Darussalam with 1,286, and Singapore with 34 vessels (**Table 40**).

**Table 40.** Number of fishing vessels in Southeast Asia in 2019

Country	Powered boats		Non-powered boats	Total
	Out-board	In-board		
Brunei Darussalam	1,158	44	84	1,286
Indonesia	...	...	...	625,708
Malaysia	29,227	15,415	6,303	50,945
Myanmar	14,077	3,211	5,122	22,410
Philippines	...	7,646	...	7,646
Singapore	26	8	...	34
Thailand	...	10,530	...	10,530
Viet Nam	...	...	...	35,382
<b>Total</b>	<b>44,488</b>	<b>36,854</b>	<b>11,509</b>	<b>753,941</b>

Source: Fishery Statistical Bulletin of Southeast Asia 2019 (SEAFDEC, 2022)

**Table 41.** Number of fishing vessels in the Southeast Asian countries from 2005 to 2019

Year	Brunei Darussalam	Cambodia	Indonesia	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam	Total
2005	...	40,600	311,110	36,136	16,375	...	146	13,627	20,537	438,531
2006	...	...	340,362	38,276	1,881	...	125	12,552	-	393,196
2007	...	...	348,425	39,221	...	...	...	13,056	21,552	422,254
2008	3,184	...	604,847	40,959	31,371	...	142	12,920	22,729	716,152
2009	2,750	108,145	596,230	48,745	30,428	...	133	16,891	24,990	828,312
2010	2,743	...	570,827	49,756	32,824	...	39	15,381	25,346	696,916
2011	2,607	...	581,845	53,002	30,848	...	39	17,203	28,424	713,968
2012	2,627	...	616,690	54,235	30,349	...	144	18,089	27,988	750,122
2013	46	...	603,318	57,095	27,638	...	155	16,548	30,132	734,932
2014	38	...	651,966	57,972	28,958	6,317	158	23,556	31,235	800,200
2015	36	98,693	625,708	56,211	29,455	6,371	30	25,002	28,719	870,225
2016	1,449	...	568,329	72,786	26,414	6,901	30	11,237	30,976	718,122
2017	1,415	...	543,845	52,648	29,884	1,025	32	10,913	32,878	672,640
2018	921	...	563,239	52,556	25,105	6,578	34	10,645	34,563	693,641
2019	1,286	...	625,708	50,945	22,410	7,646	34	10,530	35,382	753,941

Source: Fishery Statistical Bulletin for the South China Sea Area 2005-2007 (SEAFDEC, 2008a; 2009; 2010a) for data from 2005 to 2007, and Fishery Statistical Bulletin of Southeast Asia 2008-2019 (SEAFDEC, 2010b; 2011; 2012; 2013, 2014, 2015; 2016; 2017a; 2018; 2020a; 2020b; 2022) for data from 2008 to 2019

The Regional Classification of Fishing Vessels was developed to be able to compile the statistics on the fishing units considering the extent of existing fishing operations in Southeast Asia (SEAFDEC, 2008b). **Table 41** shows that Indonesia had the highest number of fishing vessels during 2005–2019 followed, by Malaysia, Viet Nam, Myanmar, and Thailand. The data on fishing vessels by Indonesia indicated some increases in terms of the numbers from 2005 to 2008, but with slight decreases in 2009–2011, slightly increasing again in 2012–2015, and slightly decreasing again in 2016–2017, after that the number slightly increased since 2018. The second highest number was reported by Malaysia, which indicated some increases from 2005 to 2014 with slight decrease in 2015 and an increase again in 2016, but decreased again in 2017 and afterwards. It should be noted that reductions in the number of fishing vessels could be due to several reasons, such as natural disasters, issues on vessel and gear licensing/registration, as well as the respective countries' policies toward the reduction of fishing vessels in commercial fishing operations, e.g. in the case of Thailand, to control the level of fishing capacity within sustainable level.

## 7. Fishers and Fish Farmers

From 2005 to 2019, the trend in the number of fishers and fish farmers in the Southeast Asian countries varied among countries. Indonesia had the highest number followed by Myanmar, Viet Nam, Philippines, Cambodia, Thailand, and Malaysia (**Table 42**). Although Brunei Darussalam and Singapore reported the minimal numbers of fish workers in their respective countries, but Lao PDR was not able to provide the information on the number of fishers and fish farmers during the past 15 years. Efforts had been made by the countries to improve the availability of relevant data and statistics, but support to the countries would still necessary to be able to compile the data and information. It has therefore become necessary that the countries' systems of collecting data and reporting of the statistics, especially for the number of fishers and farmers, should be improved, and in some instances, this could be achieved through the conduct of census and surveys using questionnaires. This approach would also enable the countries to compile the necessary data and information on fisheries not only on the number of fishers and fish farmers but also on the number of fishing vessels actively engaged in fishing operations.

**Table 42.** Number of fishers and fish farmers in the Southeast Asian countries from 2005 to 2019

Year	Brunei Darussalam	Cambodia	Indonesia	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam	Total
2005	4,124	765,124	5,120,414	115,100	2,991,000	2,201,000	...	452,300	2,100,730	13,749,792
2006	4,109	...	4,975,481	...	3,024,500	...	...	...	...	8,004,090
2007	5,541	...	5,099,977	...	3,080,600	...	...	...	...	8,186,118
2008	5,441	...	5,495,983	140,358	3,201,923	...	...	...	...	8,843,705
2009	4,078	...	5,135,160	152,014	3,261,199	...	460	...	...	8,552,911
2010	3,907	673,963	5,782,524	155,913	3,160,070	2,338,435	514	430,000	2,640,852	15,186,178
2011	3,910	657,269	6,099,112	162,709	3,164,627	...	500	...	...	10,088,127
2012	4,054	...	7,276,746	166,008	3,193,645	...	651	435,000	1,530,000	12,606,104
2013	4,393	578,468	6,473,657	170,821	3,196,289	...	699	435,000	2,565,525	13,424,852
2014	3,938	578,468	6,478,198	169,937	3,201,336	...	725	435,000	2,560,800	13,428,402
2015	3,126	...	6,443,192	210,399	3,216,300	...	643	456,960	2,602,340	12,932,960
2016	2,893	...	6,593,592	158,749	3,247,646	...	766	456,960	2,619,550	13,080,156
2017	2,678	...	6,761,204	153,517	3,205,805	...	811	456,960	2,619,550	13,200,525
2018	2,923	...	6,860,861	151,148	2,321,957	...	826	456,960	2,619,550	12,414,225
2019	402	...	5,508,642	149,269	...	...	756	...	...	5,659,069

**Source:** Fishery Statistical Bulletin for the South China Sea Area 2005-2007 (SEAFDEC, 2008a; 2009; 2010a) for data from 2005 to 2007, and Fishery Statistical Bulletin of Southeast Asia 2008-2019 (SEAFDEC, 2010b; 2011; 2012; 2013; 2014; 2015; 2016; 2017a; 2018; 2020a; 2020b; 2022) for data from 2008 to 2019  
FAO Yearbook 20016-2018

**Table 43.** Number of fishers and fish farmers in the fisheries sub-sectors of Southeast Asia in 2019 by working status

Country	Marine Capture Fisheries		Inland Capture Fisheries		Aquaculture		Total
	Full-time	Unspecified	Full-time	Unspecified	Full-time	Unspecified	
Brunei Darussalam	...	...	402	...	...	...	402
Indonesia	...	2,296,746	...	515,545	...	2,696,351	5,508,642
Malaysia	126,595	...	3,205	...	19,469	...	149,269
Singapore	64	...	...	...	692	...	756

**Source:** Fishery Statistical Bulletin of Southeast Asia 2019 (SEAFDEC, 2022)

In 2019, Indonesia had the highest number of fishers and fish farmers at 5,508,642 of which 48.90 % were involved in aquaculture, 41.70 % in marine capture fisheries, and 9.40 % in inland capture fisheries. Malaysia had the second highest number of fishers and fish farmers at 146,269 with 84.80 % in marine capture fisheries, 13.00 % in aquaculture, and 2.20 % in inland capture fisheries (Table 43 and Figure 29). Although minimal, Singapore and Brunei Darussalam also reported their respective number of fishers and fish farmers, however, Cambodia, Lao PDR, Myanmar, Philippines, Thailand, and Viet Nam were not able to provide the information on their respective numbers of fishers and fish farmers.

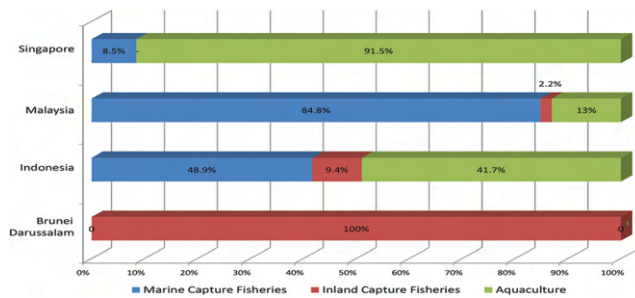


Figure 29. Percentage of fish workers in the fisheries sub-sectors of Southeast Asia in 2019

## 8. Fish Processing Industry

The fishing industry plays a vital role in the lives of millions of people in the world, and is the main source of food and livelihood for many. It accounts for a significant percentage in global trade of agriculture commodities. Although capture fisheries production from 2005 to 2019, had grown at a slow rate and which had a tendency to be stagnant, aquaculture production had grown dramatically to serve the demand of the world. Such a scenario had enabled the fishing industry to improve the fish supply for local consumption, which was decreasing because of increases in world population and the rising export growth. According to FAO (2020a), 87.60 % (156 million mt) of the global fish production in 2018 was used for human consumption. Of the portion not consumed by human, 12.40 % (22.1 million mt)

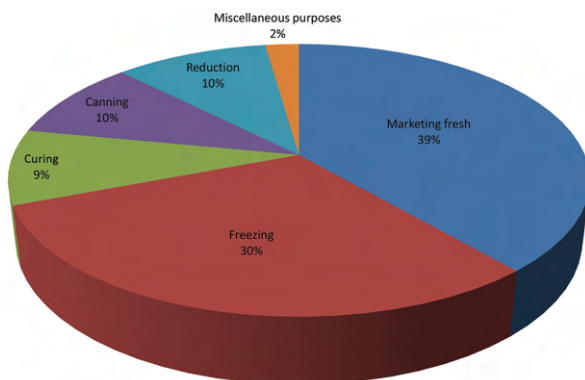


Figure 30. Percentage of disposition of the world fisheries production in 2018

was destined from non-food products. Figure 30 showed that about 39.00 % of the catch reached the market as live and fresh fish, 30.00 % as frozen fish, while 10.00 % is used as raw materials for canning and another 10.00 % for reduction, and 9.00 % for curing. The remaining fish supply (2.00 %) is used for miscellaneous purposes.

The fisheries and fish processing industry in Southeast Asia had shown tremendous growth over the past decades, because of the extension of cold chain distribution systems, diversification of fish processing techniques, and advances in quality control hygiene and sanitation management. However, the progress varied from country to country, with changes taking place rapidly in some and slowly in other countries (Miwa, 1991). The main species being processed are freshwater fishes, for example, in Viet Nam which is the largest exporter of catfish, in fillets and frozen forms running to 541,560 mt. On the other hand, skipjack tuna is prepared and preserved in Thailand, and comes as the second highest exported products of the country at 427,389 mt. FAO (2020b) indicated that in many developing countries, fish processing had evolved from traditional methods to more advanced value-adding processes, depending on the commodity and market value. Growth was observed in the share of production destined for human consumption in frozen form and in prepared or preserved forms. Fish commercialized in live form is principally appreciated in East and Southeast Asia, and in niche markets in other countries, mainly among the Asian communities. In some cases, fish is also used to produce traditional fish products of the Southeast Asian region, *i.e.* fermented fish and fish sauce. Nonetheless, information on the region’s data on disposition of its fisheries production, is not complete because only two countries provide the relevant information, namely: Brunei Darussalam and Indonesia, as shown in Table 44.

Table 44. Disposition of fisheries production of the Southeast Asian countries in 2019 by quantity (mt)

Disposition	Brunei Darussalam	Indonesia	Total
Marketing fresh	...	299,147	299,147
Freezing	3,433	1,389,022	1,392,455
Curing	7	3,615,115	3,615,122
Canning	...	285,486	285,486
Reduction	514	88,152	88,666
Misc. purposes	2	...	2
Unspecified	160	1,168,384	1,168,544
<b>Total</b>	<b>4,116</b>	<b>6,845,306</b>	<b>6,849,422</b>

Source: FAO Fishery and Aquaculture Information and Statistics Service

Moreover, several countries in Southeast Asia are exerting efforts not only on the improvement and development of fish processing but also in the development of new fishery products. This is meant to enhance the awareness of consumers on the importance of fish in human diet and also to promote the utilization of low cost and the so-called secondary species of fish into comminuted products.

## 9. Fish Trade

Seafood is one of the most traded food commodities in the world, and the trend of seafood trade keeps on growing. In 2019, fisheries production reached 213.7 million mt including about 93.6 million mt from capture fisheries and 120.1 million mt from aquaculture. While the export volume of fish and fishery products reached 41.6 million mt or 19.50 % of the world’s total fisheries production, the total import accounted for about 40.9 million mt or 19.10 % of world’s total fisheries production, posting a trade balance of 748,489 mt (Table 45). Therefore, fish is still fish available for fish for human consumption, which has reached an annual average of about 20.9 kg per capita.

Europe had been the top exporter and importer of fish and fishery products in 2019, accounting for 35.70 % of the total exports and 35.10 % of the total imports, followed by Asia which excludes Southeast Asian countries, at 21.50 % of the total exports and 31.60 % of the total imports. In the Southeast Asian region, the export of fish and fishery products in 2019 represented about 5,551,727 mt or 11.90 % of the regions’ total fisheries production, while import was 4,009,160 mt, posting a trade balance of 1,542,567 mt.

### 9.1 Global Trading of Fish and Fishery Products

From 2005 to 2019, the world’s export of fish and fishery products increased in terms of quantity by about 753,008 mt/year or 2.10 % annually (Table 46 and Figure 31), and in terms of value by about USD 6,005 million/year or 5.60 % annually (Table 47). Europe is the top exporter of fish and fishery products during the past 15 years, and in 2019, Europe’s export of fish and fishery products accounted for about 35.70 % in terms of quantity and 35.90 % in value of the world’s total export of fish and fishery products (Figure 32). Asia (excluding Southeast Asian countries) which ranked second, accounted for about 21.50 % in terms of quantity and 23.40 % in value, then the Americas with about 19.20 % in terms of quantity and 20.30 % in value. The next highest exporter of fish and fishery products is the Southeast Asian region which accounted for 13.30 % of global export quantity and 13.60 % of the global export value.

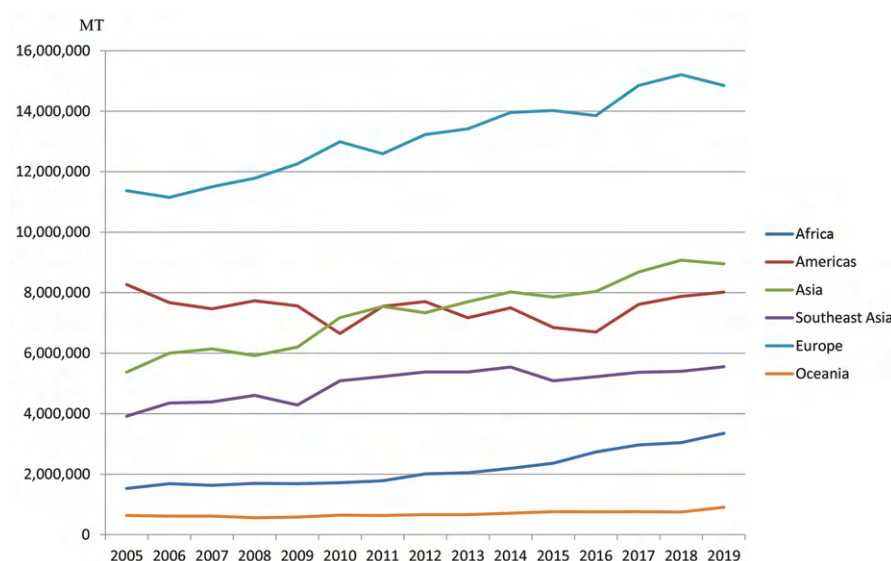
Table 48 shows that China was the largest exporter of fish and fishery products in 2019 contributing about 12.40 % to the global export value, followed by Norway providing about 7.40 %. Among the Southeast Asian countries, Viet Nam also exported very large amounts of fish and fishery

**Table 45.** World fisheries trade of fish and fishery products of each continent in 2019 by quantity (mt)

	Total fisheries production	Trade of fish and fishery products		Trade balance (export-import)
		Export	Import	
<b>World</b>	<b>213,690,416</b>	<b>41,633,173</b>	<b>40,884,684</b>	<b>748,489</b>
Africa	12,531,080	3,352,176	4,106,189	-754,013
Americas	22,359,201	8,017,771	5,078,807	2,938,964
Asia*	112,899,095	8,955,366	12,912,377	-3,957,011
Southeast Asia	46,766,274	5,551,727	4,009,160	1,542,567
Europe	17,263,623	14,849,258	14,355,274	493,984
Oceania	1,856,733	906,875	422,877	483,998
Others	14,410	...	...	...

Source: FAO Fishery and Aquaculture Information and Statistics Service

\*Asia does not include data of Southeast Asia



**Figure 31.** Trend of export of fish and fishery products of each continent from 2005 to 2019 by quantity (mt)

**Table 46.** Export of fish and fishery products of each continent from 2005 to 2019 by quantity (mt)

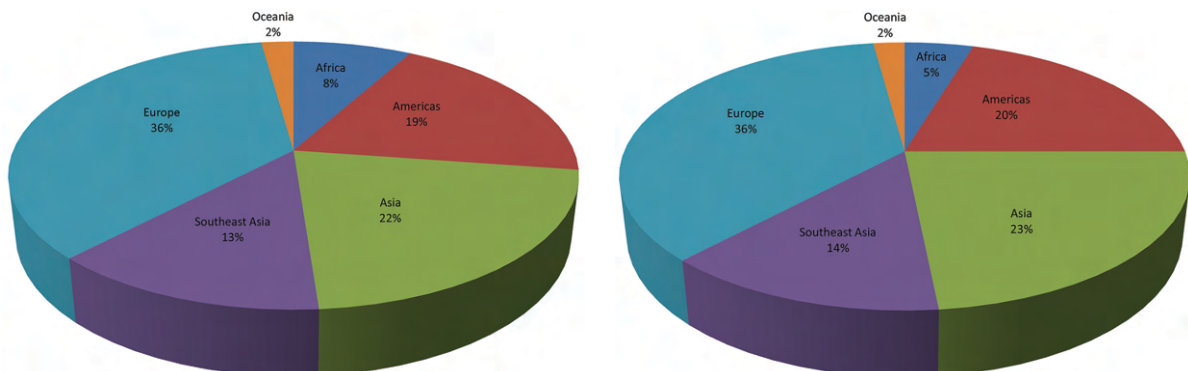
Year	World total	Continents					
		Africa	Americas	Asia*	Southeast Asia	Europe	Oceania
2005	31,091,064	1,524,564	8,266,534	5,371,442	3,919,407	11,375,261	633,856
2006	31,469,860	1,686,470	7,671,912	6,000,078	4,348,364	11,152,719	610,317
2007	31,744,010	1,630,255	7,467,034	6,144,031	4,388,903	11,500,230	613,557
2008	32,291,817	1,692,927	7,730,209	5,922,093	4,606,151	11,783,837	556,600
2009	32,573,026	1,682,669	7,565,847	6,198,749	4,285,608	12,257,814	582,339
2010	34,268,241	1,717,805	6,648,043	7,175,185	5,088,794	12,991,032	647,382
2011	35,326,566	1,781,927	7,549,158	7,540,460	5,225,911	12,596,873	632,237
2012	36,318,722	2,007,441	7,703,801	7,335,224	5,381,089	13,228,061	663,106
2013	36,368,650	2,044,822	7,168,953	7,697,828	5,376,674	13,417,913	662,460
2014	37,925,911	2,191,929	7,498,829	8,025,325	5,543,781	13,956,713	709,334
2015	36,936,193	2,359,614	6,850,987	7,855,104	5,086,043	14,026,383	758,062
2016	37,310,085	2,733,503	6,698,705	8,040,153	5,224,608	13,858,718	754,398
2017	40,238,424	2,964,765	7,612,109	8,686,568	5,365,920	14,850,528	758,534
2018	41,356,327	3,043,038	7,878,808	9,071,380	5,402,922	15,209,718	750,461
2019	41,633,173	3,352,176	8,017,771	8,955,366	5,551,727	14,849,258	906,875

Source: FAO Fishery and Aquaculture Information and Statistics Service  
 \* Southeast Asia data excluded from Asia data

**Table 47.** Export of fish and fishery products of each continent from 2005 to 2019 by value (USD thousand)

Year	World total	Continents					
		Africa	Americas	Asia*	Southeast Asia	Europe	Oceania
2005	79,228,696	3,828,723	17,785,236	15,420,204	11,045,661	28,961,282	2,187,590
2006	86,760,552	4,076,908	19,112,854	16,730,678	12,527,626	32,139,612	2,172,874
2007	94,214,013	4,589,519	19,762,842	17,700,239	13,707,701	36,150,048	2,303,664
2008	103,087,500	5,023,878	21,384,222	18,999,159	16,134,748	39,218,279	2,327,214
2009	97,105,931	4,841,328	19,287,161	19,290,164	14,989,838	36,480,871	2,216,569
2010	111,415,939	5,042,616	20,973,896	24,243,232	17,437,088	41,187,312	2,531,795
2011	130,508,288	5,319,936	25,423,670	30,067,489	20,441,521	46,450,822	2,804,850
2012	130,656,421	5,793,192	25,472,804	31,006,255	20,966,895	44,552,941	2,864,334
2013	139,299,827	6,028,941	27,082,621	33,357,869	21,040,188	48,930,350	2,859,858
2014	148,705,197	6,381,931	29,477,606	35,763,633	22,020,221	51,979,914	3,081,892
2015	133,431,817	5,953,576	26,479,127	32,993,255	18,686,790	46,401,253	2,917,816
2016	143,078,027	6,540,131	27,602,531	34,896,006	19,713,063	51,307,119	3,019,177
2017	157,729,008	7,282,520	31,643,157	38,326,430	21,739,500	55,445,374	3,292,027
2018	166,578,997	8,068,646	33,015,340	39,969,241	22,530,393	59,662,218	3,333,159
2019	163,304,921	7,638,817	33,180,024	38,239,304	22,163,504	58,624,265	3,459,007

Source: FAO Fishery and Aquaculture Information and Statistics Service  
 \* Southeast Asia data excluded from Asia data



**Figure 32.** Percent share of world's export of fish and fishery products by each continent in 2019, quantity (left) and value (right)

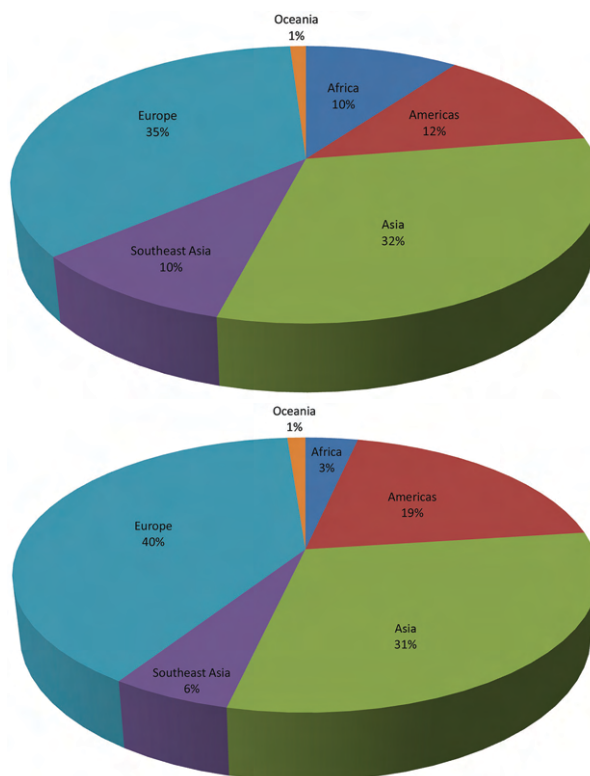
**Table 48.** World’s top ten exporters and importers of fish and fishery products in 2019 by value (USD thousand)

Exporter	Export value (USD thousand)	Importer	Import value (USD thousand)
1. China	20,256,429	1. USA	23,520,523
2. Norway	12,022,775	2. China	18,340,891
3. Viet Nam	8,694,596	3. Japan	15,492,562
4. India	6,857,128	4. Spain	8,139,488
5. Chile	6,675,177	5. France	6,733,949
6. Thailand	5,864,824	6. Italy	6,618,714
7. Netherlands	5,723,789	7. Germany	5,886,863
8. Canada	5,612,407	8. Republic of Korea	5,620,605
9. Ecuador	5,520,234	9. Sweden	5,270,508
10. Russia	5,490,671	10. United of Kingdom	4,600,952

Source: FAO Fishery and Aquaculture Information and Statistics Service

products the value of which contributed 5.30 % to the world’s total export value, while Thailand provided about 3.60 %.

Meanwhile, the world’s import of fish and fishery products during the past 15 years had increased in terms of quantity by about 637,604 mt/year or 1.80 % annually (Table 49) and in value by USD 5,604 million per year or 5.10 % annually (Table 50). In 2019, Europe imported the largest quantity representing 35.10 % of the world’s total import volume and 39.60 % of the world’s total import value. The second largest importer was Asia (excluding Southeast Asia) contributing about 31.60 % in terms of quantity and 30.60 % in value (Figure 33). The United States of America was the largest importing country, the value of which accounted for 14.50 % followed by China for about 11.30 %, and Japan for about 9.60 % of the world’s total import value (Table 48).



**Figure 33.** Percent share of the import of fish and fishery products by each continent in 2019, quantity (above) and value (below)

## 9.2 Trading of Fish and Fishery Products in Southeast Asia

The growth of international trade in fish and fishery products in Southeast Asian countries had been dramatic during 2005-2019 with significant export volumes contributing significantly to the foreign exchange earnings of the countries (Table 51 and Figure 34). Overall, the Southeast

**Table 49.** Import of fish and fishery products of each continent from 2005 to 2019 by quantity (mt)

Year	World total	Continents					
		Africa	Americas	Asia*	Southeast Asia	Europe	Oceania
2005	31,958,232	2,430,783	3,866,634	9,782,850	2,590,590	12,914,986	372,389
2006	32,647,088	3,085,191	4,047,547	9,407,415	2,705,785	13,012,584	388,566
2007	33,179,097	2,963,342	4,190,437	9,385,655	2,648,609	13,602,710	388,344
2008	33,300,170	2,973,777	4,208,994	9,474,597	2,811,534	13,432,910	398,358
2009	33,767,431	3,275,438	4,158,995	9,350,489	2,991,021	13,621,570	369,918
2010	34,956,139	3,484,414	4,464,453	9,884,535	3,056,568	13,675,899	390,270
2011	35,976,640	4,038,104	4,578,331	10,380,008	3,169,205	13,396,764	414,228
2012	35,695,339	3,456,636	4,563,853	10,434,844	3,192,797	13,587,945	459,264
2013	35,407,919	3,380,678	4,646,270	10,205,432	3,236,097	13,494,234	445,208
2014	37,526,567	4,141,080	4,903,681	10,657,469	3,303,514	13,999,120	521,703
2015	36,664,624	4,050,298	4,833,146	10,540,209	3,317,990	13,452,963	470,018
2016	36,997,760	3,744,071	4,938,597	10,423,050	3,630,381	13,811,826	449,835
2017	38,696,543	3,624,861	5,062,595	11,445,019	4,010,542	14,121,866	431,660
2018	39,720,822	3,830,130	5,171,941	11,749,913	4,096,609	14,445,813	426,416
2019	40,884,684	4,106,189	5,078,807	12,912,377	4,009,160	14,355,274	422,877

Source: FAO Fishery and Aquaculture Information and Statistics Service  
\* Southeast Asia data excluded from Asia data

**Table 50.** Import of fish and fishery products of each continent from 2005 to 2019 by value (USD thousand)

Year	World total	Continents					
		Africa	Americas	Asia*	Southeast Asia	Europe	Oceania
2005	83,718,314	2,008,310	16,212,435	24,784,946	3,283,879	36,375,305	1,053,439
2006	92,181,249	2,405,732	18,062,825	25,324,989	3,494,683	41,751,400	1,141,620
2007	100,364,239	2,887,837	19,160,452	25,782,122	3,868,229	47,337,018	1,328,581
2008	109,644,614	3,106,472	20,551,914	28,725,502	4,827,561	51,036,452	1,396,713
2009	101,292,165	3,399,002	19,189,832	26,824,946	4,439,163	46,124,358	1,314,864
2010	112,722,133	3,580,730	21,625,453	31,328,649	5,006,502	49,632,326	1,548,473
2011	131,903,507	5,432,114	24,714,400	37,164,443	6,334,802	56,383,254	1,874,494
2012	130,891,716	5,389,238	25,022,982	38,038,463	6,882,109	53,538,326	2,020,598
2013	135,594,983	5,301,345	27,102,139	36,365,910	7,036,958	57,737,167	2,051,464
2014	143,636,832	5,870,074	29,997,819	37,543,005	7,086,735	60,848,230	2,290,969
2015	129,791,833	5,335,018	27,393,206	35,898,900	6,719,576	52,565,495	1,879,638
2016	137,225,327	4,773,373	28,067,373	37,451,768	7,466,942	57,586,659	1,879,212
2017	148,606,749	5,020,911	29,857,962	41,257,570	8,608,805	61,791,403	2,070,098
2018	162,062,767	5,617,553	32,235,679	46,673,153	9,282,293	66,224,808	2,029,281
2019	162,176,791	5,603,490	31,616,170	49,687,029	9,101,078	64,234,605	1,934,419

Source: FAO Fishery and Aquaculture Information and Statistics Service

\* Southeast Asia data excluded from Asia data

Asian region has become large fish exporter, and from 2005 to 2019, fish export showed a gradually increasing surplus in quantity and value (**Table 51** and **Table 52**) as the total quantity of export from the Southeast Asian countries had grown at about 116,594 mt/year or 2.70 % annually. The export value of the region's fish and fishery products also increased from 2005 to 2019 at about USD 794,132 per year or 5.50 % annually.

In 2019, Viet Nam was the largest exporter of fish and fishery products among the Southeast Asian countries. Its export represented about 21.90 % of the country's total fisheries production by quantity. Following Viet Nam is

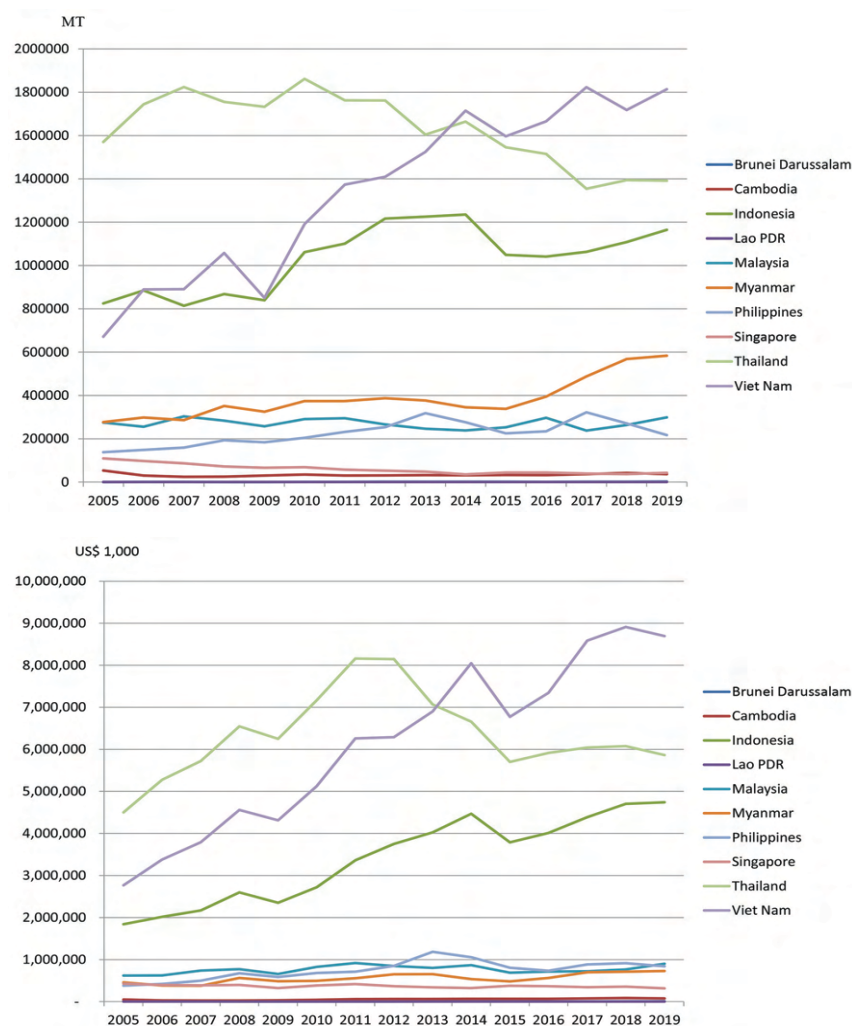
Thailand, its export quantity was about 55.90 % of its total fisheries production, and then Indonesia at about 5.10 % of its total fisheries production (**Figure 35**).

In 2019, Singapore reported the highest average value of its exported products at USD 7,446/mt followed by Viet Nam at USD 4,793/mt, Thailand at USD 4,214/mt, Indonesia at USD 4,070/mt, Philippines at USD 3,864/mt, Malaysia at USD 3,012/mt, Brunei Darussalam at USD 2,632/mt, Lao PDR at USD 2,500/mt, and Cambodia at USD 2,035/mt. Meanwhile, Myanmar posted the lowest average value of its exported products at USD 1,247/mt (**Table 51** and **Table 52**).

**Table 51.** Export of fish and fishery products of the Southeast Asian countries from 2005 to 2019 by quantity (mt)

Year	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam	Total
2005	452	53,266	824,823	0	275,006	276,699	137,789	109,564	1,570,762	671,046	3,919,407
2006	736	30,120	885,031	1	255,890	298,071	148,297	96,978	1,743,974	889,266	4,348,364
2007	568	24,100	814,161	0	303,461	286,054	159,406	86,493	1,823,612	891,048	4,388,903
2008	298	25,000	868,349	1	283,494	351,652	192,982	71,721	1,755,255	1,057,399	4,606,151
2009	379	30,000	839,803	2	257,413	324,710	183,801	66,030	1,732,874	850,596	4,285,608
2010	535	35,043	1,061,945	1	290,662	374,187	204,375	68,667	1,862,012	1,191,367	5,088,794
2011	730	30,000	1,100,869	0	295,022	373,898	231,711	57,363	1,762,955	1,373,363	5,225,911
2012	1271	31,025	1,216,681	119	266,469	387,371	253,838	52,931	1,762,131	1,409,253	5,381,089
2013	1497	32,000	1,225,276	43	246,146	376,848	317,973	48,189	1,604,445	1,524,257	5,376,674
2014	1724	31,684	1,235,452	130	238,458	345,247	276,455	35,558	1,664,372	1,714,701	5,543,781
2015	1540	32,664	1,049,218	52	252,748	338,284	225,190	44,219	1,545,968	1,596,160	5,086,043
2016	892	32,201	1,041,066	16	296,626	394,397	234,418	43,757	1,515,437	1,665,798	5,224,608
2017	1,299	37,007	1,062,697	9	237,516	487,886	321,989	39,738	1,354,237	1,823,542	5,365,920
2018	1,505	41,969	1,108,207	6	263,616	568,224	270,879	36,584	1,394,091	1,717,841	5,402,922
2019	2,345	36,957	1,164,572	0.4	298,955	583,675	216,885	42,439	1,391,701	1,814,198	5,551,727

Source: FAO Fishery and Aquaculture Information and Statistics Service



**Figure 34.** Trend of export of fish and fishery products by the Southeast Asian countries, quantity in mt (*above*) and value in USD thousand (*below*)

From 2005 to 2019, fish remained the most important exported fishery commodity with its fresh, chilled or frozen forms contributing the highest export. Crustaceans and mollusks were the second largest exported fishery

commodity with their live, fresh, chilled forms generating high export, and the export of aquatic plants had been rapidly increasing during the past 15 years (**Table 53** and **Figure 36**). In 2019, fish was reported as the highest

**Table 52.** Export of fish and fishery products of the Southeast Asian countries from 2005 to 2019 by value (USD thousand)

Year	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam	Total
2005	3,053	48,551	1,841,643	17	619,653	456,919	380,094	427,544	4,502,821	2,765,366	11,045,661
2006	5,305	26,835	2,017,273	3	624,015	382,951	419,552	396,388	5,275,349	3,379,955	12,527,626
2007	5,038	23,285	2,167,839	3	738,535	376,315	499,539	385,455	5,721,525	3,790,167	13,707,701
2008	2,477	24,679	2,598,922	6	770,273	560,568	672,813	398,016	6,547,742	4,559,252	16,134,748
2009	1,613	30,362	2,350,376	7	657,479	483,230	585,044	321,098	6,248,891	4,311,738	14,989,838
2010	1,797	40,011	2,718,099	9	827,565	495,454	680,905	384,518	7,166,020	5,122,710	17,437,088
2011	1,701	60,000	3,360,923	0	916,456	555,515	711,155	416,370	8,159,613	6,259,788	20,441,521
2012	2,435	61,020	3,752,294	247	846,169	651,129	850,344	367,196	8,144,920	6,291,141	20,966,895
2013	4,311	62,500	4,025,024	107	801,685	652,840	1,185,788	339,621	7,067,700	6,900,612	21,040,188
2014	4,146	63,900	4,467,564	355	866,068	536,255	1,054,800	323,114	6,657,459	8,046,560	22,020,221
2015	3,342	66,046	3,788,795	138	688,356	482,237	805,286	376,654	5,701,788	6,774,148	18,686,790
2016	3,057	65,442	4,009,356	73	712,732	561,826	735,786	365,690	5,914,988	7,344,113	19,713,063
2017	5,819	75,361	4,386,795	45	720,688	696,302	883,537	342,992	6,041,469	8,586,492	21,739,500
2018	4,169	85,306	4,705,215	22	764,999	711,717	912,387	357,504	6,077,436	8,911,638	22,530,393
2019	6,172	75,192	4,740,035	1	900,446	728,080	838,146	316,012	5,864,824	8,694,596	22,163,504

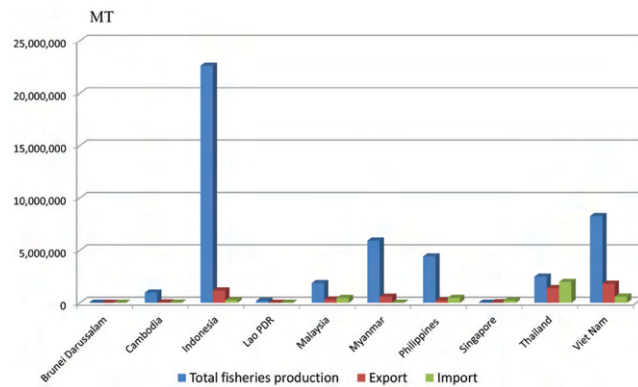
Source: FAO Fishery and Aquaculture Information and Statistics Service



**Table 53.** Fish and fishery products exported by Southeast Asia from 2005 to 2019 by FAO major group, quantity (mt)

Year	Total	Major group of species								
		Fish				Crustaceans and mollusks			Aquatic plants	Others
		Total	Fresh, chilled, or frozen	Dried, salted, and smoked	Prepared or preserved	Total	Live, fresh, chilled	Prepared or preserved		
2005	3,919,407	2,402,471	1,450,922	124,968	826,581	1,279,458	1,042,957	236,501	97,119	140,359
2006	4,348,364	2,649,362	1,623,658	142,659	883,045	1,390,211	1,093,956	296,255	122,207	186,584
2007	4,388,903	2,641,577	1,607,483	139,474	894,620	1,419,067	1,115,866	303,201	110,338	217,921
2008	4,606,151	2,963,573	1,863,329	121,924	978,320	1,378,058	1,061,544	316,514	118,055	146,465
2009	4,285,608	2,725,780	1,604,633	122,923	998,224	1,300,918	965,850	335,068	108,504	150,406
2010	5,088,794	3,175,302	2,014,480	145,185	1,015,637	1,458,696	1,097,872	360,824	144,697	310,099
2011	5,225,911	3,205,151	2,000,322	138,255	1,066,574	1,560,148	1,166,893	393,255	191,153	269,459
2012	5,381,089	3,514,471	2,179,460	150,312	1,184,699	1,361,641	1,006,847	354,794	198,219	306,758
2013	5,376,674	3,477,299	2,125,663	143,622	1,208,014	1,294,257	955,476	338,781	217,046	388,072
2014	5,543,781	3,449,504	2,114,137	139,203	1,196,164	1,404,974	1,049,086	355,888	222,375	466,928
2015	5,086,043	3,154,609	1,895,588	127,587	1,131,434	1,265,618	928,639	336,979	229,436	436,380
2016	5,224,608	3,214,862	1,974,944	133,772	1,106,146	1,325,904	988,159	337,745	198,284	485,558
2017	5,365,920	3,365,214	2,097,838	129,653	1,137,723	1,420,147	1,083,491	336,656	199,731	380,828
2018	5,402,922	3,451,815	2,155,967	128,434	1,167,414	1,334,055	1,012,471	321,584	214,172	402,880
2019	5,551,727	3,509,370	2,201,222	130,359	1,177,789	1,402,569	1,070,565	332,004	221,397	418,391

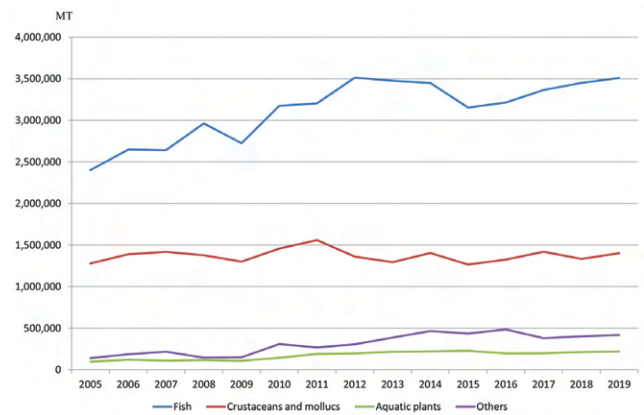
Source: FAO Fishery and Aquaculture Information and Statistics Service



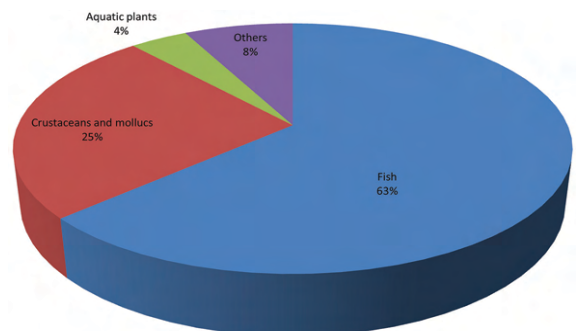
**Figure 35.** Trade of fish and fishery products in the Southeast Asian countries by quantity (mt)

exported commodity accounting for 63.00 % of the total export of fish and fishery products of the region, in terms of quantity, followed by crustaceans and mollusks contributing 25.00 %, and aquatic plants contributing 4.00 % (Figure 37). In the case of Viet Nam, which is the largest exporter in the region, catfish in fillets and frozen forms, was the highest exported commodity contributing about 541,560 mt, followed by skipjack prepared and preserved in Thailand contributing about 427,389 mt.

As the largest importing country in Southeast Asia, Thailand posted a negative trade balance of 596,442 mt in 2019. Meanwhile, Viet Nam posted positive trade balance of about 1,221,989 mt, while the Philippines posted a negative trade balance at 247,803 mt, and Malaysia also posted a negative trade balance at 158,409 mt. Indonesia posted a positive trade balance at 915,611 mt, and Cambodia with a positive trade balance at 16,665 mt. Brunei Darussalam



**Figure 36.** Export of fish and fishery products from Southeast Asia (2005 to 2019) by quantity (mt)



**Figure 37.** Percent share of major groups species exported by Southeast Asia in 2019

**Table 54.** Trade of fish and fishery products of the Southeast Asian countries in 2019 by quantity (mt)

	Total fisheries production	Trade of fish and fishery products		Trade balance (Export-import)
		Export	Import	
Brunei Darussalam	14,658	2,345	13,030	-10,685
Cambodia	969,098	36,957	20,292	16,665
Indonesia	22,614,595	1,164,572	248,961	915,611
Lao PDR	183,900	0.4	5,878	-5,878
Malaysia	1,872,797	298,955	457,364	-158,409
Myanmar	5,931,815	583,675	13,847	569,828
Philippines	4,413,129	216,885	464,688	-247,803
Singapore	7,249	42,439	204,748	-162,309
Thailand	2,488,833	1,391,701	1,988,143	-596,442
Viet Nam	8,270,200	1,814,198	592,209	1,221,989
<b>Total</b>	<b>46,766,274</b>	<b>5,551,727</b>	<b>4,009,160</b>	<b>1,542,567</b>

Source: FAO Fishery and Aquaculture Information and Statistics Service

**Table 55.** Import of fish and fishery products of the Southeast Asian countries from 2005 to 2019 by quantity (mt)

Year	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam	Total
2005	7,215	6,664	128,431	1,454	400,766	1,826	180,945	253,553	1,445,348	164,388	<b>2,590,590</b>
2006	7,694	3,731	165,195	1,206	440,135	1,354	170,834	244,644	1,470,636	200,356	<b>2,705,785</b>
2007	6,617	3,543	126,281	1,175	440,270	1,668	193,578	239,688	1,407,414	228,375	<b>2,648,609</b>
2008	6,505	2,942	198,980	1,251	386,051	2,400	200,331	225,704	1,533,690	253,680	<b>2,811,534</b>
2009	5,848	5,767	252,976	872	411,544	2,827	273,623	221,987	1,585,850	229,727	<b>2,991,021</b>
2010	7,336	4,970	301,569	521	424,032	4,840	195,037	223,131	1,586,764	308,368	<b>3,056,568</b>
2011	7,729	6,755	355,684	608	365,460	6,102	203,682	223,138	1,668,020	332,027	<b>3,169,205</b>
2012	10,037	10,776	270,450	468	417,029	6,592	268,477	215,681	1,662,766	330,521	<b>3,192,797</b>
2013	14,116	12,564	266,027	363	463,242	5,414	257,910	209,369	1,667,820	339,272	<b>3,236,097</b>
2014	12,310	26,766	238,428	520	469,716	7,254	302,917	207,398	1,624,879	413,326	<b>3,303,514</b>
2015	9,510	19,890	212,981	804	424,316	6,009	384,843	207,868	1,620,659	431,110	<b>3,317,990</b>
2016	10,565	24,482	206,729	570	408,251	6,542	417,022	209,231	1,868,170	478,819	<b>3,630,381</b>
2017	10,797	24,118	295,386	5,297	425,901	5,410	493,535	199,087	1,924,537	626,474	<b>4,010,542</b>
2018	12,041	18,937	273,093	5,465	431,308	7,907	473,963	198,175	2,129,606	546,114	<b>4,096,609</b>
2019	13,030	20,292	248,961	5,878	457,364	13,847	464,688	204,748	1,988,143	592,209	<b>4,009,160</b>

Source: FAO Fishery and Aquaculture Information and Statistics Service

with the least fisheries production posted a negative trade balance of 10,685 mt and Singapore also with a negative trade balance of 162,309 mt (**Table 54**).

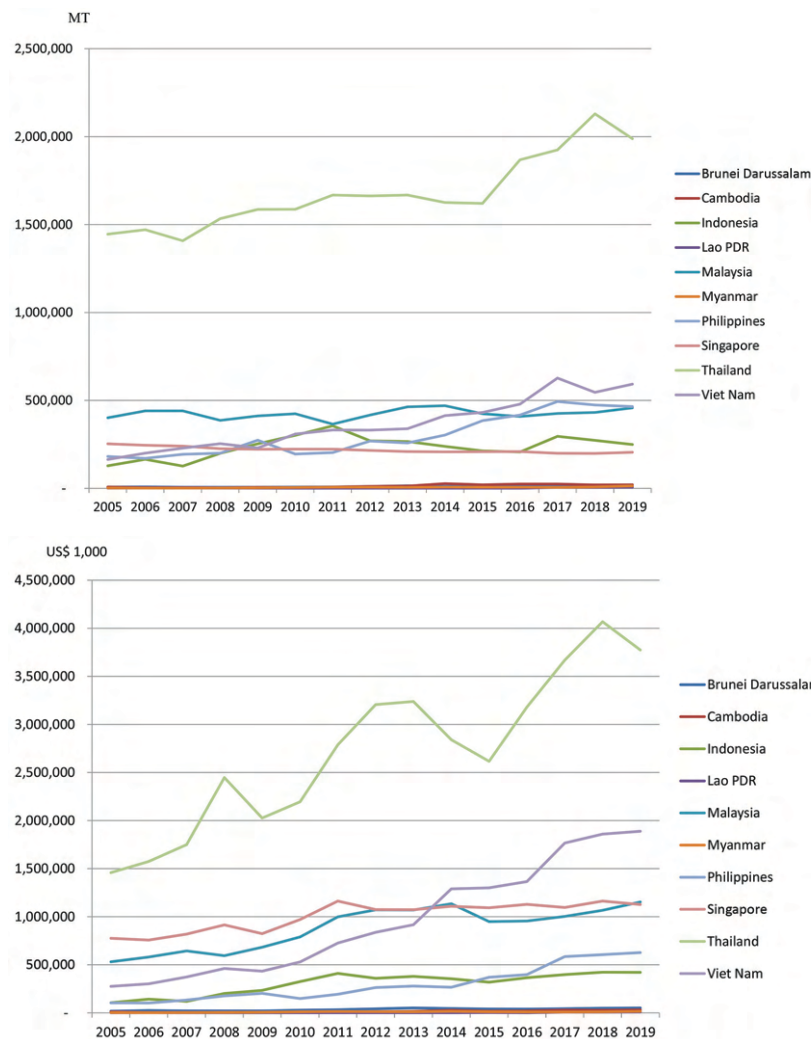
The quantity of fisheries import of the Southeast Asian region had been increasing from 2005 to 2019 at the rate about 101,326 mt/year or 3.20 % annually (**Table 55** and **Figure 38**), posting a trade balance of about 1,542,567 mt in 2019 (**Table 53**). The value of the fishery products imported by the Southeast Asian countries increased by

about USD 415,514/year or 8.00 % annually (**Table 56** and **Figure 38**). In terms of the average value of imported products, Singapore posted the highest value at USD 5,504/mt, followed by Brunei Darussalam at USD 3,918/mt, Viet Nam at USD 3,569/mt, and Malaysia at USD 2,524/mt. While Thailand as the largest importer among the Southeast Asian countries, posted the value of its imports at USD 1,898/mt, and Myanmar's import was the lowest at about USD 1,162/mt.

**Table 56.** Import of fish and fishery products of the Southeast Asian countries from 2005 to 2019 by value (USD thousand)

Year	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam	Total
2005	17,316	9,602	106,330	2,001	530,863	3,186	103,680	776,389	1,457,936	276,576	<b>3,283,879</b>
2006	25,813	4,206	142,742	1,599	580,337	2,533	103,126	757,944	1,573,958	302,425	<b>3,494,683</b>
2007	20,987	3,626	118,966	1,735	644,881	2,914	132,922	818,704	1,750,024	373,470	<b>3,868,229</b>
2008	20,054	2,973	202,029	2,499	594,255	5,189	176,815	914,863	2,447,759	461,125	<b>4,827,561</b>
2009	20,374	5,163	234,531	1,611	683,818	6,376	203,336	824,248	2,026,369	433,337	<b>4,439,163</b>
2010	27,641	4,573	326,108	1,519	790,291	10,996	148,552	971,041	2,195,932	529,849	<b>5,006,502</b>
2011	32,700	6,250	411,209	2,072	998,720	13,666	193,314	1,162,463	2,788,193	726,215	<b>6,334,802</b>
2012	42,875	12,739	358,946	1,451	1,071,037	13,505	263,038	1,074,992	3,205,597	837,929	<b>6,882,109</b>
2013	51,417	15,436	379,626	1,634	1,070,213	10,944	278,737	1,073,334	3,238,637	916,980	<b>7,036,958</b>
2014	46,034	27,491	355,529	2,347	1,134,550	15,187	266,158	1,109,339	2,840,281	1,289,819	<b>7,086,735</b>
2015	40,776	17,363	318,615	3,811	948,710	10,563	369,746	1,093,000	2,616,038	1,300,954	<b>6,719,576</b>
2016	39,853	20,571	365,836	2,042	955,990	9,147	398,264	1,129,644	3,179,244	1,366,351	<b>7,466,942</b>
2017	43,624	28,748	398,007	7,846	1,003,884	9,724	585,047	1,096,665	3,669,269	1,765,991	<b>8,608,805</b>
2018	49,136	26,991	423,664	7,655	1,066,537	11,704	605,809	1,162,525	4,068,941	1,859,331	<b>9,282,293</b>
2019	51,057	31,213	421,635	10,208	1,154,374	16,097	626,626	1,126,942	3,774,411	1,888,515	<b>9,101,078</b>

Source: FAO Fishery and Aquaculture Information and Statistics Service



**Figure 38.** Trend of fisheries import by the Southeast Asian countries in 2005-2019, quantity in mt (above) and value in USD thousand (below)