Date: 12/21/2010
GAIN Report Number: ID1040

Indonesia

Post: Jakarta

Indonesian Aquaculture Report 2010

Report Categories:
Fishery Products
Grain and Feed
Agricultural Situation

Approved By:
Jonn Slette
Prepared By:
Denny D. Indradjaja

Report Highlights:

Executive Summary:
Total aquaculture production increased on average by 49.68% from 2007-2009 or from 3.193 million metric tons (MT) to 4.780 million MT in Indonesia. The biggest contribution of growth came from the increased production of *Pangasius* spp (catfish) which reached 132.600 MT in 2009, an increase of 260% since 2007. *Clarias* spp (catfish) also rose by 118%. Growth in Tilapia 82% and growth in seaweed was 49%. However, shrimp decreased by 15% since 2008, from 409.590 MT to 348.100 MT.

Fish intensive aquaculture systems only increased by average 13%. This estimated is based on increased fish feed consumption, because feed consumption has a strong relation to the development of intensive aquaculture activities. Decreasing shrimp production is also reflected by a 13% decline in shrimp feed consumption. Post predicts that this indicates that Indonesian shrimp production declined by roughly by 15%.

Indonesia exported fisheries products to more than 210 countries of destination. The main importing countries were Japan, Hong Kong, the United States, France, South Korea, Australia, Germany, the United Kingdom, and the Netherlands. In 2009 Indonesia's export volume decline compare previous years, particularly for shrimp exports. The main Indonesian export commodities consisted of shrimp, tuna, skipjack tuna, crab and seaweed. Fish aquaculture product exported only frozen fillet Tilapia and *Pangasius spp* and also life groupers. Export data for seafood products does not separate farm raised aquaculture products from wild caught seafood products.

This report focuses on five fish main commodities, to include Tilapia, Catfish (*Pangasius spp & Clarias spp*), common carp and grouper. The consideration to focus only five fish main commodities is that those five commodities meet one of the following criteria, namely: 1) consumes pellet feeds; 2) has a relatively high price; 3) has an opportunity for further development and enhanced exports.

General Information:

I. GENERAL INFORMATION OF INDONESIAN AQUACULTURE

Aquaculture Overview

Indonesia is an archipelago with more than 17,000 islands and a coastline of about 81,000 km. The area that can potentially be used for aquaculture development is of 26,606,000 ha. Aquaculture plays an important role in reducing unemployment. In 2003 there were 2,284,208 households involved in the aquaculture industry, representing around 40 percent of the total number of people employed in the fisheries sector (FAO, 2005).

Aquaculture in Indonesia is practiced in fresh, brackish and marine water using a variety of

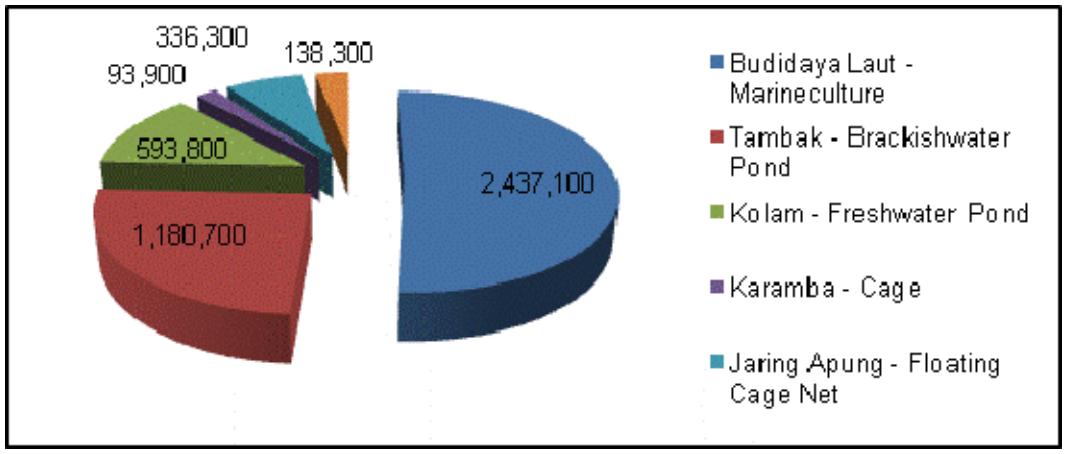
species, production facilities and methods. Freshwater aquaculture began to develop in the late 1970s when there was a significant increase in production from freshwater aquaculture as a result of the introduction of new farming technologies that contributed to the availability of hatchery-produced seed and the development of compound feed. The most common aquaculture species are common carp (*Cyprinus carpio*), catfish (*Clarias* spp., *Pangasius* spp.) and Nile tilapia (*Oreochromis niloticus*). In 1978, brackish water pond areas increased significantly with the successful development of the eyestalk ablation technique and the rapid growth of shrimp hatcheries. In South Sumatra and Lampung Provinces brackish water pond areas were expanded by the private sector to develop large-scale pond culture using the Nucleus Estate System. Penaeid shrimps and milkfish (*Chanos chanos*) are the common commodities. Mariculture has only developed in the last ten years, and is dominated by the grouper species such as humpback grouper (*Cromileptes altivelis*) and brown-marbled grouper (*Epinephelus fuscoguttatus*) as well as seaweeds (*Eucheuma* spp. and *Gracilaria* spp.) (FAO, 2005).

Furthermore, in 2005, the *P. vannamei* (white shrimp) with SPF and SPR has been introduced to change *Penaeus monodon* culture. It was caused by the outbreak of virus and diseases that hampered *P. monodon* shrimp culture in early year of 2000. After the success of white shrimp culture in 2007, almost 90% of Indonesian shrimp aquaculture production is *P. vannamei*.

As mention above, Indonesia has a variety of species ranging from marine aquaculture to paddy field aquaculture. Every year the Indonesian aquaculture production continues to increase. Based on production data between 2008 and 2009, marine aquaculture increased by 23.96 percent, brackish water aquaculture rose by 23.5 percent, fresh water aquaculture ponds rose by 23.92 percent, aquaculture cages increased by 23.93 percent, the cultivation of floating net rises 27.79 percent, while paddy field aquaculture increased by 23.94 percent. For more details, aquaculture production data from 2004 to 2009 are presented in the Appendix 1.

Based on preliminary figures from the Ministry of Fisheries & Marine Affairs in 2009 showed that marine aquaculture has the highest production that achieved 2,437,100 MT, while brackish water production was 1,180,700 MT, fresh water pond production was 593,800 MT, while production of floating net was 336,300 MT. For more details regarding the production of another

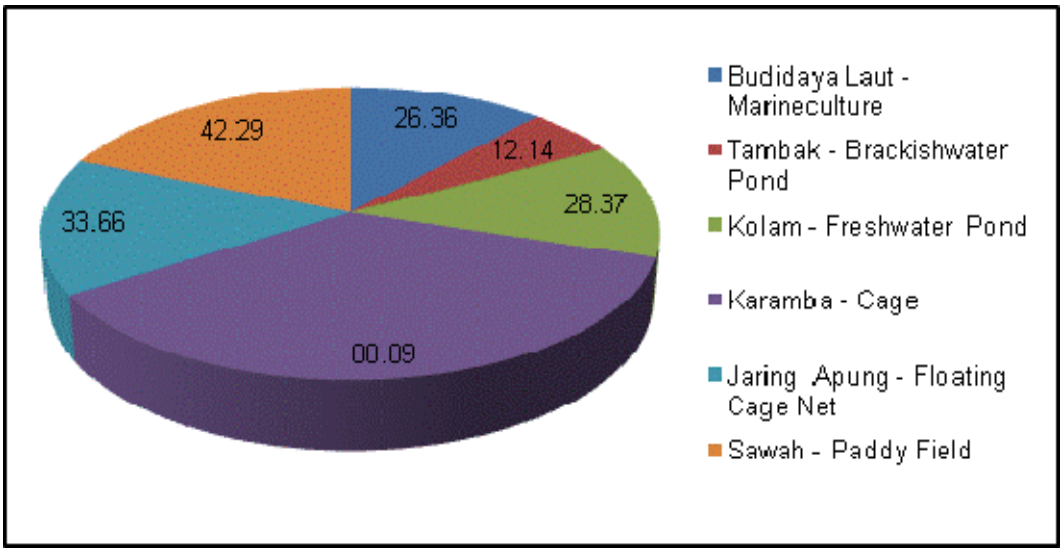
fish culture can be seen in figure 1.



Source : Ministry of Fisheries & Marine Affair (2009)

Figure 1. Aquaculture Production Based on Culture Types (In MT)

In addition, value of aquaculture production in 2009 from marine culture was 11.67 trillion IDR, brackish water aquaculture was 19.40 trillion IDR, fresh water ponds was 8.73 trillion IDR, aquaculture cages was 2.93 trillion IDR, floating cage aquaculture 1.99 trillion IDR, while the value of aquaculture production of paddy field was 1.95 trillion IDR. Meanwhile, the percentage increased from the year 2008-2009 can be seen in the figure below.



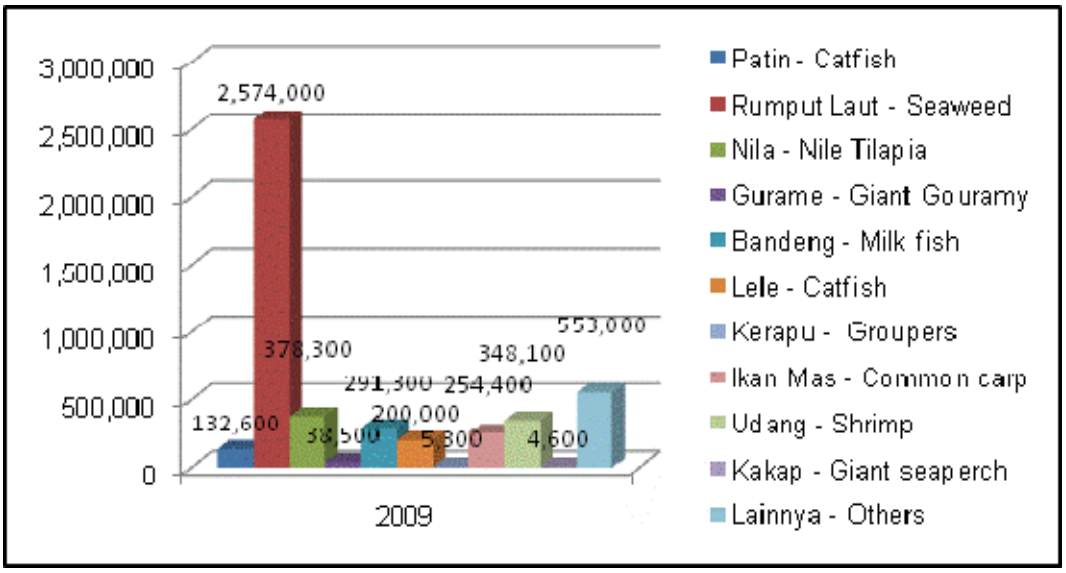
Source : Ministry of Fisheries & Marine Affair (2009)

Figure 2. Percentage Growth of Production Value for each Type of Culture (In MT) 2008-2009

Based on the Figure above, it was found that the highest percentage increase in value of

production occurred respectively, aquaculture cages rose by 80.89 percent, paddy field aquaculture increased by 42.29 percent, floating net rose by 33.66 percent, while for fresh water pond increased by 28.37 percent. For more details about the development of the production value of each type of fish culture from 2005 to 2009 are presented in Appendix 2.

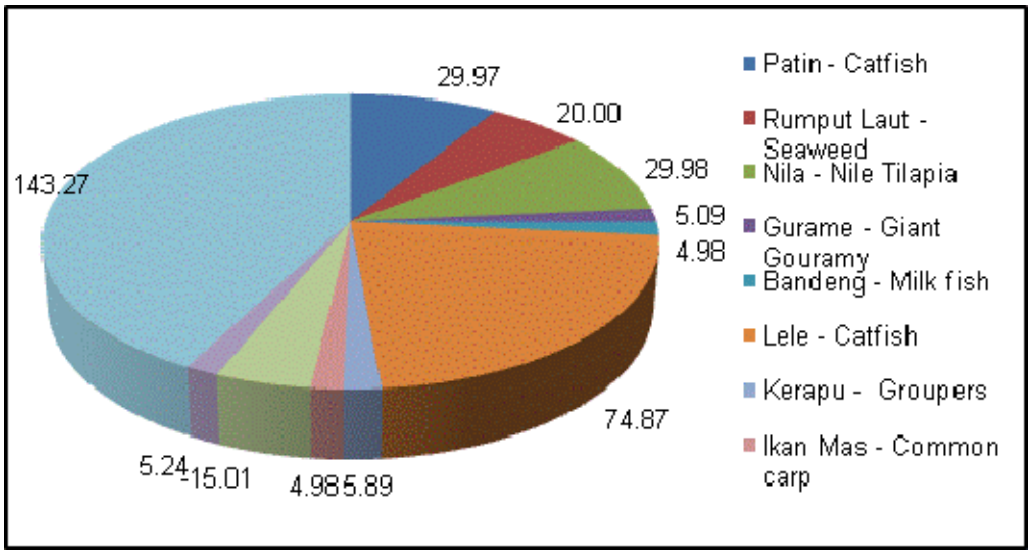
Based on data from the Ministry of Fisheries and Marine Affairs in 2009, the highest aquaculture production was obtained by 2,574,000 MT of Seaweed, 379,300 MT of Tilapia, 348,100 MT of Shrimp, 291,300 MT of Milkfish, 254,400 MT of Carp, and 200,000 MT of Catfish. For more details about the amount of aquaculture production based on commodity can be seen in the Figure 3.



Source : Ministry of Fisheries & Marine Affair (2009)

Figure 3. Aquaculture Production Based on Main Commodity (In MT), 2009

Increasing percentage on production of five major commodities of aquaculture in Indonesia was 74.87 percent achieved by catfish; 29.98 percent achieved by tilapia, *Pangasius spp* achieved by 29.97 percent, the 20.00 percent achieved by seaweed, and 5.89 percent achieved by grouper.



Source : Ministry of Fisheries & Marine Affair (2009)

Figure 4. Percentage Increase of Five major Commodities (In MT), 2008-2009

However, shrimp production was decreased by 15.01 percent between 2008-2009 or a decrease of 61,490 MT in the year 2009 compared with the previous year. Fish Production 2007-2009 is shown on the Table 1. as follows:

Table 1. Aquaculture Production by Major Commodities, 2007-2009 (In MT)

No	*Species*	*Year*			*Increasing Average (%)*	
		2007	**2008**	**2009*)**	**2007-2008**	**2008-2009**
1	*Pangasius* spp	36,755	102,021	132,600	177.57	29.97
2	Seaweed	1,728,475	2,145,060	2,574,000	24.10	20.00
3	Nile Tilapia	206,904	291,037	378,300	40.66	29.98
4	Giant Gouramy	35,708	36,636	38,500	2.60	5.09
5	Milk fish	263,139	277,471	291,300	5.45	4.98
6	*Clarias* sp-Catfish	91,735	114,371	200,000	24.68	74.87
7	Groupers	8,035	5,005	5,300	-37.71	5.89
8	Common carp	264,349	242,322	254,400	-8.33	4.98
9	Shrimp	358,925	409,590	348,100	14.12	-15.01
10	Giant seaperch	4,418	4,371	4,600	-1.06	5.24
11	Others	195,122	227,317	553,000	16.50	143.27
Total		**3,193,565**	**3,855,200**	**4,780,100**	**20.72**	**23.99**

*) Preliminary Figures

Source : Ministry of Fisheries & Marine Affair (2009)

Overall progress on the basis of commodity production has increased significantly only in shrimp culture has decreased considerably. This phenomenon occurred due to the rise of shrimp diseases that infected the *P, vannamei* shrimp and lead to the decreasing amount of production. The kinds of disease include White Spot Syndrome Virus (WSSV), Infectiuos Myonecrosis Virus (INMV), Tauro Syndrome Virus (TSV), Monodon Baculo Virus (MBV) and others.

In addition, Milkfish (*Chanos chanos*) also has a third position in fish production, even the growth rate was only average 5% between 2007 to 2009. Milkfish is cultured in brackish water pond that use traditional and semi-intensive system, mainly there cultivate Blue Green Algae (Klekap) as a source of feed and sometimes they use pellet feed as fattening to boost growth of milkfish 1 month before harvesting. Milkfish is consumed almost 50% directly in fresh and frozen boneless milkfish, the rest is processed to be smoked milkfish, soft fish bones milkfish that is very famous as special food souvenirs from Central Java and East Java.

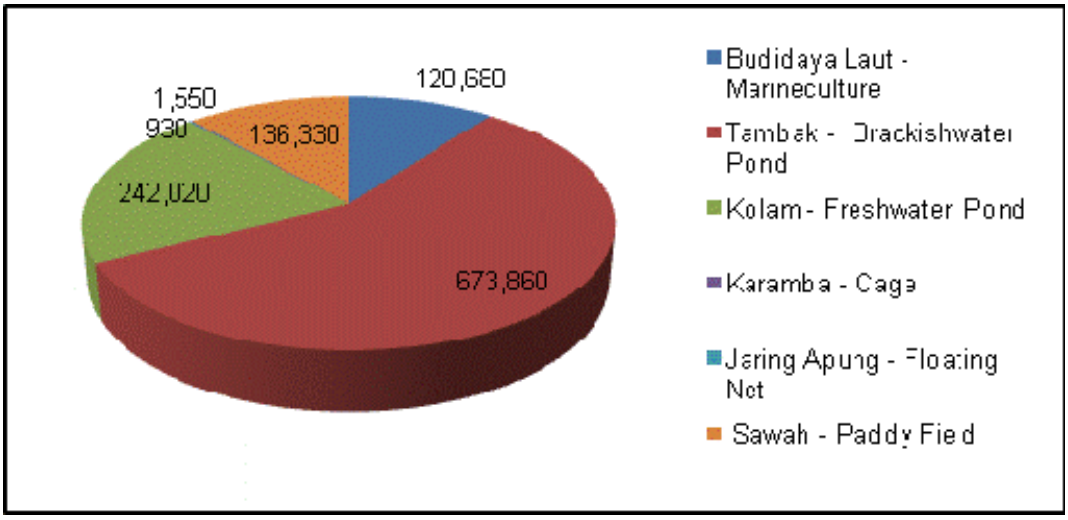
Now days, there are growing demand of 50 gram of milkfish as a Tuna bite for Tuna fishing boat. However, there is not yet exactly data how much the demand of young milkfish for Tuna bite regularly. There is no milkfish belly fat canning industry developed in Indonesia rather than Philippine.

The slowest growing production was Giant Gouramy. As a premium fresh water fish for middle-up class restaurant is cultured mainly in West Java, Southern Central Java, and South Sumatera. The culture of Gouramy also need longest period of farming compare to other freshwater finfish. In addition, there requires an extra concerning on good water quality, good seed quality and good feed quality. The transportation of life Gouramy from central production area to the restaurants in big city is a difficulty in its distribution, because the best taste of gouramy is to cook it directly as soon as after capturing from storage pond or tank.

Aquaculture Area

Aquaculture activities in Indonesia are carried out in several types of land that include in the sea, brackish water ponds, fresh water ponds, cages, floating nets, and paddy fields. Based on data

collected in 2009 by the Ministry of Maritime Affairs and Fisheries acquired land area for each type of cultivation is as follow:



Source : Ministry of Fisheries & Marine Affair (2009)
Figure 5. Aquaculture Area Based on Type of Culture 2009 (In Ha)

Land area of aquaculture by type of culture in 2009 that amounted to 673.860 Hectares of brackish water pond; 242.020 Hectares of fresh water ponds; 136.330 Hectares of paddy field aquaculture, 120.680 ha of marine culture; 1.550 Hectares of Floating Net; 930 Hectares of cages (Figure 5). This area does not include the potential land for aquaculture that has not been explored despite that's area has potential benefits.

Table 2. Aquaculture Area by Type of Culture, 2004-2009 (In Ha)

Type of Aquaculture	***Year***					
	2004	**2005**	**2006**	**2007**	**2008**	**2009*)**
Marine culture	1,227	62,629	74,543	84,481	87,790	120,680
Brackish water Pond	480,762	512,524	612,530	611,889	613,174	673,860
Freshwater Pond	99,739	107,785	113,132	125,398	241,891	242,020
Cage	93	401	320	433	207	930
Floating Net	952	966	921	1,058	736	1,550
Paddy Field	124,495	125,884	119,057	118,320	127,944	136,330
Total	**707,268**	**810,189**	**920,503**	**941,579**	**1,071,742**	**1,175,370**

*) Preliminary Figures
Source: Ministry of Fisheries & Marine Affair (2009)

The development of aquaculture land area in Indonesia is facing problem of land use shifting and water pollution. In general, from 2004 to 2009, area of seaweed farming increased by 1,015.59 percent, brackish water pond rose by 7.22 percent, fresh water ponds increased by 23.36 percent, cages rose by 128.68 percent, floating net rose by 18.37 percent, while the fish culture on paddy land had been developed by only 1.95 percent.

Percentage of fish culture land development from 2008 to 2009 based on data collected by the Ministry of Maritime Affairs and Fisheries consist of: The development of marine culture area was 37.46 percent, 9.90 percent of land for brackish water ponds, fresh water stagnant ponds at 0.05 percent, cages was 349.28 percent, floating net amounted to 110.60 percent, while the cultivation of paddy land had been developed at 6.55 percent. As for the potential land area of cultivation in Indonesia and its utilization rate by province in 2007 can be seen on the Table 3.

Table 3. Potency of Indonesia Aquaculture Area by Province, 2007
(In Ha)

Region	***Type of Aquaculture***				
	Marine Culture	***Brackish water Pond***	***Freshwater Pond***	***Inland Open water***	***Paddy Field***
SUMATERA	1,325,660	428,558	144,300	49,338	476,267
JAWA	99,601	166,740	268,000	1,136	721,304
BALI - NUSATENGGARA	220,915	63,328	30,100	102	54,408
KALIMANTAN	1,552,348	286,933	11,800	39,738	49,984
SULAWESI	637,772	248,589	61,700	2,533	231,688
MALUKU - PAPUA	4,527,205	29,928	25,200	46,489	4,728
Total	**8,363,501**	**1,224,076**	**541,100**	**139,336**	**1,538,379**

Source : Ministry of Fisheries & Marine Affair (2009)

Potential land is the area that has not been utilized but has potential benefits to be used as aquaculture land. Based on data collected by the Ministry of Maritime Affairs and Fisheries in 2007 about potential aquaculture land in each province as in Table 3, the data could be classified into 6 zoning then it is proved that the Sumatran region of potential acquired land for the marine culture is 1,325,660 ha of sea, brackish water ponds is 428,558 ha, fresh water area is 144,300 ha, 49,338 ha swamp and wet land, and cultivation of paddy fields 476,267 ha. Potential areas of aquaculture in Java, it was found that for marine culture area of 99,601 ha, 166,740 ha brackish water ponds, fresh

water ponds 268,000 ha, 1,136 ha swamp & wet land, and paddy fields 721,304 ha. Potential areas of aquaculture in Bali and Nusa Tenggara widely available for marine culture area of 220,915 ha, 63,328 ha brackish water pond, fresh water pond area of 30,100 ha, 102 ha swamp & wet land, and 54,408 ha paddy field.

Potential Area of aquaculture in Kalimantan region obtained for marine culture area of 1,552,348 ha, 286,933 ha brackish water pond, fresh water ponds 11,800 ha, swamp & wet land covers an area of 39,738 ha, and paddy field area of 49,984 ha. Sulawesi region of potential land available for aquaculture of marine 637,772 ha, 248,589 ha brackish water pond, fresh water pond 61,700 ha, 2,533 ha swamp & wet land, and paddy field area of 231,688 ha. Maluku and Papua, the potential land available for aquaculture of the sea area of 4,527,205 ha, 29,928 ha brackish water pond, fresh water ponds 25,200 ha, 46,489 ha swamp & wet land and aquaculture of paddy field 4,728 ha.

Production:
FISH CULTURE

Tilapia Culture

Tilapia is one of the major commodities in Indonesia, that culture in cages, paddy field, fresh water pond, running water pond and floating net. Tilapia fish production from year to year has increased significantly. The volume Tilapia production in cages in the year 2008 has increased from 15,240 MT in 2004 to 22,271 MT. However, decreasing production during the period 2004-2008 occurred in the period 2005 – 2006. In 2005 tilapia production was 23.402 MT compare to production in 2006 that produced only to 15,623 MT or declined by 7,779 MT. The other phenomenon was that the production in 2005 was still higher than in 2008. For more details can be seen in Table 4.

Regions	***Year***				
	2004	**2005**	**2006**	**2007**	**2008**
SUMATERA	5,681	17,391	8,902	6,815	12,971
JAWA	6,024	2,396	1,514	1,734	1,869
BALI - NUSATENGGARA	148	181	190	269	728
KALIMANTAN	2,557	2,465	3,297	4,127	6,106

SULAWESI	785	846	1,256	927	337
MALUKU - IRIAN JAYA	45	123	464	168	260
Total	**15,240**	**23,402**	**15,623**	**14,040**	**22,271**

Source: Ministry of Marine Affairs and Fisheries. 2009

Increased production of tilapia fish also occurred in paddy fields culture from 2004 to 2008. Total tilapia production in 2008 amounted to 21,578 MT. This number increased from the year 2007, which amounted to 17,637 MT, an increase of 3,941 MT. In 2006 total production amounted to 15,942 MT and this amount has increased from previous years amounting to 14,430 MT in 2005 compare to 9,555 MT in 2004. For more details can be seen in Table 5.

Table 5. Tilapia Production in the Paddy Field Culture by Regions, 2004-2008, (In MT)

Regions	***Year***				
	2004	**2005**	**2006**	**2007**	**2008**
SUMATERA	3,030	6,033	6,033	8,522	12,813
JAWA	5,738	7,504	8,611	8,019	7,573
BALI - NUSATENGGARA	74	98	403	148	148
KALIMANTAN	62	85	77	140	188
SULAWESI	651	710	818	808	856
MALUKU - IRIAN JAYA	-	-	-	-	-
Total	**9,555**	**14,430**	**15,942**	**17,637**	**21,578**

Source: Ministry of Marine Affairs and Fisheries. 2009

In the farming on fresh water pond, the total tilapia production increased significantly from 2004 to 2008. There has been an increase in production was almost twice or exactly 80.5 percent. In 2004 the total production only amounted to 57,002 MT and increased to 73,916 MT in 2005, or by an additional production of 16,914 MT. The increase was almost the same also happened in 2006 in the amount of 16,755 MT, or the total production achieved to 90,671 MT. In 2007 production was still increasing, although not as big as the previous year. Total tilapia production in 2007 amounted to 93,520 MT or an increase of 2,849 MT. In 2008, production increases continue to achieve with a considerable amount to 102,863 MT. It is shown in Table 6.

Table 6. Tilapia Production in the Freshwater Pond by Regions, 2004-2008, (In MT)

Regions	*Year*				
	2004	**2005**	**2006**	**2007**	**2008**
SUMATERA	15,874	29,197	37,054	44,067	49,163
JAWA	35,900	36,144	41,098	39,445	42,733
BALI - NUSATENGGARA	494	1,153	3,184	1,712	1,639
KALIMANTAN	1,734	2,141	3,928	2,845	3,902
SULAWESI	2,537	4,822	3,739	4,983	4,366
MALUKU - IRIAN JAYA	463	459	1,668	468	1,060
Total	**57,002**	**73,916**	**90,671**	**93,520**	**102,863**

Source: Ministry of Marine Affairs and Fisheries. 2009.

Production of tilapia was the most drastic increase that was derived from the cultivation through the floating net cage. This is due to the number of fish farmer with floating nets increased significantly in areas of reservoirs, lakes or large rivers, such as in Sumatra and Java.

Production of tilapia in all areas in Indonesia has increased more than 8 times or exactly 832 percent from 2004 to 2008. Production of tilapia in 2004 only amounted to 15,319 MT and increased to 35,961 MT in 2005, or by an additional production of 20,642 MT. In 2006 total production was also increased in the amount of 11,196 MT that achieve to 47,157 MT. In the year 2007, there was a significant increase in production was 32,053 MT bringing total production to 79,210 MT. The greatest improvement occurred in 2008 that lead to the total tilapia production to 142,721 MT, or have additional amounts of production of 63,511 MT. For more details can be seen in Table 7.

Table 7. Tilapia Production in Floating Net by Regions 2004-2008, (In MT)

Regions	*Year*				
	2004	**2005**	**2006**	**2007**	**2008**
SUMATERA	2,493	5,871	7,235	10,497	59,698
JAWA	8,053	22,640	37,672	60,374	74,589
BALI - NUSATENGGARA	94	104	132	161	194
KALIMANTAN	66	114	327	512	350
SULAWESI	4,611	7,230	1,789	7,632	7,833
MALUKU - IRIAN JAYA	2	2	2	34	57
Total	**15,319**	**35,961**	**47,157**	**79,210**	**142,721**

Source: Ministry of Marine Affairs and Fisheries. 2009.

For tilapia feed consumption, there has been increased consumption by 1.5 times within the past 6 years. Feed consumption of tilapia in 2004 only 103,600 MT with a large increase to 160,212 MT in

2005, or by an additional consumption of 56,612 MT. In 2006, tilapia feed consumption also increased by 15,834 MT that achieved to 176,046 MT. In 2007, feed consumption has increased again in larger quantities in the amount of 35,612 MT, to reach a total of 211,658 MT. After that, from 2008 to 2009 the feed consume has been increased by 28,446 MT to be 237,057 and 265,503 MT, respectively (see Table 8).

Table 8. Tilapia Feed Consumption by Regions, 2004-2009
(In MT)

Regions	***Tilapia***					
	2004	**2005**	**2006**	**2007**	**2008**	**2009**
SUMATERA	28,841	64,775	77,364	82,001	91,842	102,863
JAWA	58,833	72,419	77,528	85,530	95,794	107,289
BALI - NUSATENGGARA	861	1,682	2,574	2,375	2,660	2,979
KALIMANTAN	5,187	5,561	5,597	21,930	24,561	27,509
SULAWESI	9,282	15,091	12,426	18,904	21,173	23,713
MALUKU - IRIAN JAYA	597	683	557	917	1,027	1,150
Total	**103,600**	**160,212**	**176,046**	**211,658**	**237,057**	**265,503**

Source: Indonesian Feed mills Association (GPMT), 2009 and calculated by Denny D. Indradjaja

Besides consumed for domestic purposes, tilapia has also been exported to overseas. Tilapia fish mainly exports to the United States. Tilapia export products are mostly made in the form of frozen fillets. Total production of tilapia to the United States has increased from 2004 to 2008 and in 2009 has decreased. Number of tilapia fish exports in 2004 amounted to 501,163 kg and increased to 730,288 kg in 2005, or increased by 229,125 kg. In 2006 total exports also increased to 137,645 kg became 867,933 kg. The export volume in 2007 amounted to 960,227 kg and 804,820 kg in 2008 was slightly decline. The decline also occurred in 2009 where export volume amounted to 737,434 kg. For more details can be seen in Table 9.

Table 9. Tilapia Export to USA, 2005-2009 (In Kg)

Type	***Year***					
	2004	**2005**	**2006**	**2007**	**2008**	**2009**
Frozen Fillets	501,163	548,796	867,933	851,507	804,820	737,434
Frozen	0	181,492	0	108,720		
Total	**501,163**	**730,288**	**867,933**	**960,227**	**804,820**	**737,434**

Sources:www.st.nmfs.noaa.gov/st1/trade/cumulative_data/TradeDataCountry.html

Pangasius *spp* Culture

Catfish (*Pangasius spp*) is a species of freshwater fish that many cultured and also recently, become one of the major commodities in Indonesia. It is cultured in the cages, paddy fields, fresh water pond, and floating net. Overall production has increased from year to year, the volume of catfish production in 2008 amounted to 19,093 MT increase from 2007, which amounted to 7,414 MT, or an increase of 11,679 MT. However, production has decreased during the period 2005-2007. In 2005 the decline of production was 4,253 MT compare to 2004 in which production was 11,347 MT. In the period 2005-2006, there was a slight increase of production from 7,094 MT to 7,806 MT. Yet, in 2007 there was a slight decrease again that only produce to 7,414 MT (see in Table 10).

Table 10. *Pangasius spp* Production in Cage by Regions, 2004-2008, (In MT)

Regions	***Year***				
	2004	**2005**	**2006**	**2007**	**2008**
SUMATERA	1,447	2,063	2,288	1,876	12,666
JAWA	34	59	51	60	2
BALI - NUSATENGGARA	-	-	-	-	-
KALIMANTAN	9,866	4,972	5,467	5,478	6,425
SULAWESI	-	-	-	-	-
MALUKU - IRIAN JAYA	-	-	-	-	-
Total	**11,347**	**7,094**	**7,806**	**7,414**	**19,093**

Source: Ministry of Marine Affairs and Fisheries. 2009.

In area paddy fields, *Pangasius spp* culture in general, increased significantly from 2006 to 2008. In 2006 total production amounted to 143 MT and continues to increase in 2007 to 236 MT or an increase of production of 93 MT. The number of production in 2008 was not much different from the previous year that produced only 235 MT. For more details can be seen in Table 11.

Table 11. *Pangasius spp* Production in the Paddy Field Culture by Regions, 2004-2008, (In MT)

Regions	***Year***				
	2004	**2005**	**2006**	**2007**	**2008**
SUMATERA	-	-	143	236	195
JAWA	-	-	-	-	40
BALI -	-	-	-	-	-

NUSATENGGARA					
KALIMANTAN	2	-	-	-	-
SULAWESI	-	-	-	-	-
MALUKU - IRIAN JAYA	-	-	-	-	-
Total	**2**	**-**	**143**	**236**	**235**

Source: Ministry of Marine Affairs and Fisheries. 2009.

In the cultured using fresh water pond, the number of *Pangasius spp* production has increased significantly from 2004 to 2008 that has achieved more than 4 times. In 2004 the total production only amounted to 10,686 MT and increased to 21,606 MT in 2005, or by an additional production of 10,920 MT. However, in 2006 and 2007, the production has declined almost 6.1 percent, consequently, the number of *Pangasius spp* production reduced to 15,513 MT and 15,158 MT. Recovery of production occurred in 2008 that reached 57,454 MT, or experienced a huge increase of 42,296 MT from 2007. For more details can be seen in Table 12.

Table 12. *Pangasius spp* Production in the Freshwater Pond by Regions, 2004-2008, (In MT)

Regions	***Year***				
	2004	**2005**	**2006**	**2007**	**2008**
SUMATERA	8,001	17,895	12,553	9,421	47,812
JAWA	1,013	1,841	1,741	2,178	3,336
BALI - NUSATENGGARA	-	2	-	3	7
KALIMANTAN	1,672	1,862	1,216	3,556	6,299
SULAWESI	-	6	3	-	-
MALUKU - IRIAN JAYA	-	-	-	-	-
Total	**10,686**	**21,606**	**15,513**	**15,158**	**57,454**

Source: Ministry of Marine Affairs and Fisheries. 2009.

Unlike the previous *Pangasius spp* cultured system, production from floating net has decreased from 2004 to 2008 that reached more than 100 percent. This is due to the occurrence of vacancy production in several parts of Indonesia such as Bali-Nusa Tenggara, Sulawesi and Maluku, West Papua. Production of *Pangasius spp* is still fairly high in 2004 to 2005 that amounted to 51,439 MT and 52,344 MT. Declining in *Pangasius spp* fish production in floating net has been occurred since 2006 that achieved to 13,437 MT. The most severe decline in production occurred in 2007 that was equal to 24,960 MT, led to the total production only reached 13,947 MT. For more details can be seen in Table 13.

Table 13. *Pangasius spp* Production in Floating Cage by Regions, 2004-2008, (In MT)

Province	*Year*				
	2004	**2005**	**2006**	**2007**	**2008**
SUMATERA	9,813	6,286	12,054	4,457	5,435
JAWA	36,536	41,473	24,046	9,294	19,781
BALI - NUSATENGGARA	447	255	782	-	-
KALIMANTAN	68	372	111	196	23
SULAWESI	4,551	3,936	1,460	-	-
MALUKU - IRIAN JAYA	24	22	454	-	-
Total	**51,439**	**52,344**	**38,907**	**13,947**	**25,239**

Source: Ministry of Marine Affairs and Fisheries. 2009.

The declining fish production of floating cages was caused by the scarcity of seed supply and the water quality deterioration in lake and reservoirs. In additions, the price was not quite interesting compare to others fish (Common carp and Tilapia) in 2007.

Pangasius spp catfish are also export commodities abroad, particularly to USA. Its catfish export products mainly in the form of frozen fillets (Frozen Fillets). Total export of *Pangasius spp* in 2008 to the United States is still relatively small that is equal to 69,591 kg. See detail in Table 14.

Table 14. *Pangasius spp* Export to USA, 2005-2009 (Kg)

Type	*Year*					
	2004	**2005**	**2006**	**2007**	**2008**	**2009**
FILLET FROZEN	0	0	173,465	69,591	0	0
Total	**0**	**0**	**173,465**	**69,591**		

Sources:www.st.nmfs.noaa.gov/st1/trade/cumulative_data/TradeDataCountry.html

Catfish (*Clarias spp*) Culture

Catfish (*Clarias spp*) is a freshwater fish that are very famous cultured by fish farmers. This phenomenon is caused by that the type of fish is very easy to be cultured because this fish is relatively resistant to disease attack, not abundance water needed and also its rapid growth. In general, Clarias catfish production through cages cultured from year to year has increased significant, even the total number of production is still smaller than culture in paddy fields and fresh

water ponds. This increase has been occurred in some regions of Sumatra, Java and Kalimantan.

Overall, the volume of *Clarias spp* production from cages cultured in Indonesia has increased almost more than 300% from 2004 to 2008. In 2004 total production amounted to 266 ton, and in 2008 has increased to 821 MT. The greatest growth of production has been occurred since 2005 from 495 MT to 761 MT. In subsequent years, it continued to increase and to reach its peak in 2007 that amounted to 984 MT. This phenomenon can be seen in Table 15.

Table 15. Cat Fish Production in Cage by Regions, 2004-2008, (In MT)

Regions	***Year***				
	2004	**2005**	**2006**	**2007**	**2008**
SUMATERA	148	601	661	745	641
JAWA	95	128	144	234	30
BALI - NUSATENGGARA	1	-	-	-	5
KALIMANTAN	7	16	35	5	145
SULAWESI	-	-	-	-	-
MALUKU - IRIAN JAYA	15	16	-	-	-
Total	**266**	**761**	**840**	**984**	**821**

Source: Ministry of Marine Affairs and Fisheries. 2009.

The most drastic increase of production of *Clarias spp* catfish was derived on the paddy field culture. This occurrence was due to a lot of fish farmers developed a lot of intercropping rice with farming *Clarias spp* catfish. In addition, *Clarias spp* are resistant to poor water quality, and also it can easily adapt to the conditions of paddy field waters quality. From 2004 to 2008 the production of Clarias catfish in all areas in Indonesia has increased more than 15 times. Its production in 2004 only amounted to 244 MT and increased to 519 MT in 2005, or by an additional production of 275 MT. In 2006 total production was also increased in the amount of 549 MT, making the total to 1068 MT. In the year 2007, there was a significant increase in production to 361 MT that led to total production to 1,429 MT. After that, the substantial growth occurred in 2008 that achieved to 4,142 MT of catfish, or with additional amounts of production by 2,713 MT. For more details can be seen in Table 16.

Table 16. Catfish Production in the Paddy Field Culture by Regions, 2004-2008, (In MT)

Regions	*Year*				
	2004	**2005**	**2006**	**2007**	**2008**
SUMATERA	115	131	352	437	2,580
JAWA	43	332	698	961	1,539
BALI - NUSATENGGARA	1	-	-	-	-
KALIMANTAN	-	-	-	-	-
SULAWESI	85	56	18	31	23
MALUKU - IRIAN JAYA	-	-	-	-	-
Total	**244**	**519**	**1,068**	**1,429**	**4,142**

Source: Ministry of Marine Affairs and Fisheries. 2009.

In the culture using fresh water pond, the number of *Clarias spp* catfish production also increased from 99,740 MT in 2004 to 107,785 MT in 2005, or by an additional production of 8,045 MT. However, the production decreased by 32,644 MT, which led to the production attained only 75,141 MT in 2006. Increased re-occurred in 2007, the growth reached to 13,264 MT that led to 88,405 MT. In 2008, increasing production was 20,887 MT that caused the amount of production to 109,292 MT. See in Table 17.

Table 17. Cat Fish Production in the Freshwater Pond by Regions, 2004-2008, (In MT)

Regions	*Year*				
	2004	**2005**	**2006**	**2007**	**2008**
SUMATERA	34,058	36,403	11,390	16,074	20,002
JAWA	50,208	49,666	62,123	69,924	87,204
BALI - NUSATENGGARA	1,842	7,988	175	302	302
KALIMANTAN	5,765	4,402	438	1,773	1,173
SULAWESI	6,575	7,274	98	291	369
MALUKU - IRIAN JAYA	1,292	2,052	917	41	242
Total	**99,740**	**107,785**	**75,141**	**88,405**	**109,292**

Source: Ministry of Marine Affairs and Fisheries. 2009.

For *Clarias spp* catfish feed consumption, there has been increased consumption of more than 80 percent within the past 6 years. *Clarias spp* feed consumption in 2004 only achieved to 39,645 MT with significant growth 48,827 MT in 2005, or by an additional consumption amounted to 9,182

MT. In 2006, total feed consumption declined slightly to 47,388 MT. In 2007, the consumption of feed increased by 12,202 MT became 59,590 MT. In the year 2008 to 2009 the number has been increasing by 8,009 MT became 74,749 MT. Table 18 present Catfish feed consumption, below:

Table 18. Catfish Feed Consumption by Province, 2004-2009
(In MT)

Province	***Catfish***					
	2004	**2005**	**2006**	**2007**	**2008**	**2009**
SUMATERA	7,011	9,780	11,238	12,595	14,107	15,800
JAWA	31,996	38,188	35,279	45,561	51,028	57,152
BALI - NUSATENGGARA	131	102	144	134	150	168
KALIMANTAN	124	172	120	491	550	616
SULAWESI	143	431	508	562	629	705
MALUKU - IRIAN JAYA	240	154	99	246	276	309
Total	**39,645**	**48,827**	**47,388**	**59,590**	**66,740**	**74,749**

Source: Indonesian Feed mills Association (GPMT), 2009

Common Carp Culture

Production of common carp farming in Indonesia is supported from the cages, paddy fields, fresh water ponds and floating net. Production of common carp in cages decreased from 9,876 MT in 2008, compared to 26,514 MT in 2007, when it's a peak time production period between 2004-2008. The highest production of common carp in 2008 was generated by Kalimantan region that amounted to 6,322 MT, while from 2004 to 2007 the highest production was from the Sumatra region. This means there has been a very big decline in Sumatra region in 2008. Details data can be observed in the Table 19.

Table 19. Common Carp Production in Cage by Regions, 2004-2008, (MT)

Regions	***Year***				
	2004	**2005**	**2006**	**2007**	**2008**
SUMATERA	8,694	11,217	14,655	16,450	2,918
JAWA	2,621	462	1,000	541	392
BALI – NUSATENGGARA	200	168	231	250	172

KALIMANTAN	4,288	4,623	4,113	8,977	6,322
SULAWESI	545	690	798	171	66
MALUKU - IRIAN JAYA	146	91	26	125	6
Total	**16,494**	**17,251**	**20,823**	**26,514**	**9,876**

Source: Ministry of Marine Affairs and Fisheries. 2009.

Common carp production from paddy field amounted to 39,881 MT in 2008. In fact, common carp production in 2008 decreased compared to production in 2007 that amounted to 50,402 MT. The Central of common carp production in paddy field culture is Java region (particularly West Java), where was in 2008 the production achieved 24,821 MT. The largest production from 2004 to 2008 occurred in 2004, where was common carp production of paddy field culture was 53,682 MT. For more details can be seen in the Table 20.

Table 20. Common Carp Production in the Paddy Field Culture by Regions, 2004-2008, (MT)

Regions	***Year***				
	2004	**2005**	**2006**	**2007**	**2008**
SUMATERA	8,514	13,860	13,662	18,723	11,921
JAWA	40,560	32,761	29,469	28,122	24,821
BALI – NUSATENGGARA	429	330	985	250	295
KALIMANTAN	40	155	33	90	59
SULAWESI	4,139	2,205	2,125	3,217	2,764
MALUKU - IRIAN JAYA	-	-	-	-	21
Total	**53,682**	**49,311**	**46,274**	**50,402**	**39,881**

Source: Ministry of Marine Affairs and Fisheries. 2009.

Production of common carp from fresh water stagnant pond was the largest production compared with common carp production from other types of culture. Common carp production volume in 2008 amounted to 105,795 MT was lower than production in 2007 that produced only 106,592 MT (the highest production year).

The region of Sumatra is largest common carp production of stagnant pond in Indonesia. The common carp production achieved to 47,973 MT in 2008. However, the production volume decreased in 2008 compared with the 2007 production that reached 60,670 MT. Furthermore, the

highest production increase in 2008 occurred in the territory of Java that reached 47,570 or an increased by 14,068 MT. Nevertheless, the production only amounted to 33,502 MT in 2007. For more details about the production volume of common carp cultured from stagnant pond from the period 2004-2008 can be seen on the Table 21.

Table 21. Common Carp Production in the Freshwater Pond by Regions, 2004-2008, (MT)

Regions	***Year***				
	2004	**2005**	**2006**	**2007**	**2008**
SUMATERA	35,877	35,521	51,663	60,670	47,973
JAWA	37,634	39,997	41,291	33,502	47,570
BALI – NUSATENGGARA	876	1,081	2,880	1,270	1,470
KALIMANTAN	913	1,369	2,459	4,992	2,398
SULAWESI	4,091	6,388	4,963	5,437	5,566
MALUKU - IRIAN JAYA	509	504	1,878	721	818
Total	**79,900**	**84,860**	**105,134**	**106,592**	**105,795**

Source : Ministry of Marine Affairs and Fisheries. 2009.

Volume production of common carp from floating net culture system in 2008 amounted to 86,770 MT. The highest production volume was Java Region achieved to 54,859 MT. The production of common carp from the floating net culture has been constantly increasing between 2004-2008. Huge volume increased from 2007 to 2008 that amounted to 5,928 MT. However, total common carp production of Java region decreased from 69,180 MT in 2007 to 54,859 MT in 2008 due to KHV (Koi Herpes Virus).

The biggest increase in production during the period 2007-2008 occurred in Sumatra, where in 2007 the production amounted to 9,048 MT, while in 2008 production amounted to 29,257 MT, or there was an increase of 20,209 MT. For more details regarding the production of common carp in floating net based on the area can be seen on the Table 22.

Table 22. Common Carp Production in Floating Cage Net by Regions, 2004-2008, (In MT)

Province	***Year***				
	2004	**2005**	**2006**	**2007**	**2008**
SUMATERA	6,996	4,678	6,354	9,048	29,257
JAWA	33,504	58,639	68,630	69,180	54,859
BALI -	13	7	10	35	8

NUSATENGGARA					
KALIMANTAN	54	74	65	654	375
SULAWESI	1,806	2,092	334	1,742	2,159
MALUKU - IRIAN JAYA	8	8	9	183	112
Total	**42,381**	**65,498**	**75,402**	**80,842**	**86,770**

Source: Ministry of Marine Affairs and Fisheries. 2009.

Common carp feed that consumed during the period 2004 to 2009 continue to increase significantly. Common carp has consumed feed in 2009 amounted to 327,767 MT. The demand of feed in 2009 increased compared to the year 2008, which only amounted to 292,649 MT. Increasing the feed consumption could reflect that many fish farmers has developed their fish culture system from traditional to be in semi-intensive and intensive systems with using full feed.

The island of Java is the largest common carp production in Indonesia and also as a largest common carp feed consumption, because almost 90% of common carp farmers use semi-intensive and intensive common carp culture system. The need of feed for Java region reached 185,348 MT in 2009. For more details about the needs of aquaculture carp feed can be seen in the Table 23.

Table 23. Common Carp Feed Consumption by Province, 2004-2009 (In MT)

Regions	***Year***					
	2004	**2005**	**2006**	**2007**	**2008**	**2009**
SUMATERA	66,006	65,812	74,022	72,083	80,733	90,421
JAWA	94,413	126,845	146,129	147,758	165,489	185,348
BALI - NUSATENGGARA	1,394	1,608	2,480	2,230	2,498	2,798
KALIMANTAN	6,726	7,764	6,672	23,764	26,616	29,810
SULAWESI	8,246	11,738	11,399	14,396	16,124	18,059
MALUKU - IRIAN JAYA	849	772	7,924	1,062	1,190	1,332
Total	**177,633**	**214,540**	**248,627**	**261,294**	**292,649**	**327,767**

Source: Indonesian Feed Mills Association (GPMT), 2009 and Calculated by Denny D. Indradjaja

Groupers Culture

Production of fish for grouper of marine culture in Indonesia during the period 2004 to 2008 was still dominated by the production in Sumatra. Volume total grouper production for the Sumatran region in 2008 amounted to 1,918 MT. Production in the Sumatran region in 2008 decreased

compared to production in 2007 that reached to 4,214 MT. In general, the Indonesian grouper production in 2008 only achieved to 4,268 MT, its decreased compared to 6,370 ton in 2007. The biggest production of the 2004-2008 period occurred in 2004 that reached 6,552 MT. Regarding the production of grouper marine culture can be seen on the Table 24.

Table 24. Groupers Production in Marine Culture by Province, 2004-2008, (In MT)

Regions	***Year***				
	2004	**2005**	**2006**	**2007**	**2008**
SUMATERA	4,905	5,448	826	4,214	1,918
JAWA	368	54	163	136	159
BALI - NUSATENGGARA	239	322	195	187	194
KALIMANTAN	58	130	196	786	308
SULAWESI	356	475	1,312	611	751
MALUKU - IRIAN JAYA	626	64	440	436	938
Total	**6,552**	**6,493**	**3,132**	**6,370**	**4,268**

Source: Ministry of Marine Affairs and Fisheries. 2009.

Consumption of feed for grouper aquaculture is currently increasing slowly. In 2009 the needs of grouper fish feed reached 5,649 MT, a rise of 605 MT when compared to production in 2008 that reached 5,044 MT. Largest grouper fish feed consume by region in 2009 occurred in Sulawesi. Largest feed consume from period 2004 to 2009 occurred in 2004 that reached 6,552 MT and the largest consume was in Sumatra region. As for more details about the needs of feed for aquaculture of grouper can be seen on the Table 25.

Table 25. Groupers Feed Consumption by Province, 2004-2009
(In MT)

Regions	***Year***					
	2004	**2005**	**2006**	**2007**	**2008**	**2009**
SUMATERA	4,905	984	1,263	1,415	1,584	1,774
JAWA	368	1,003	615	689	771	864
BALI - NUSATENGGARA	239	2	195	218	245	274
KALIMANTAN	58	680	196	220	246	275
SULAWESI	356	264	1,312	1,469	1,646	1,843
MALUKU - IRIAN JAYA	626	2	440	493	552	618
Total	**6,552**	**2,935**	**4,021**	**4,504**	**5,044**	**5,649**

Source: Indonesian Feed mills Association (GPMT), 2009

FAO (2005) reported that Grouper is the most expensive of the coral fishes. Local demand is rather limited. Nowadays, production from ASEAN countries such as Indonesia, Thailand, Philippines and Malaysia is exported live by air. Within Asian countries, Japan is the most important market for live fish. Grouper is also popular in Hong Kong, Taiwan Province of China, Korea and Singapore. Transporting live fish to markets that are sometimes a hundred miles away may cause stress in fish, which requires special attention. For this purpose, basic considerations for efficient transport and marketing of live groupers should be planned and implemented.

However, the number of grouper life fish export are rather difficult to register in Indonesia, because the vessel from Hong Kong, China are directly to buy and make transaction from the vessel in place of floating net in the sea. However, in 2010 there are a few of frozen groupers export that are registered export to USA (see Table 26)

Table 26. Grouper Export to USA (In Kg)

Type	***Year***					
	2005	**2006**	**2007**	**2008**	**2009**	**2010***
FROZEN	0	0	0	0	0	1,078
Total	**0**	**0**	**0**	**0**	**0**	**1,078**

Note:
**): As a July 2010*
Sources:www.st.nmfs.noaa.gov/st1/trade/cumulative_data/TradeDataCountry.html

Consumption:
Fish Domestic Consumption

Demand of fish consumption in Indonesia each year continues to increase, in the year 2009 based on the value of the target from the ministry of maritime affairs and fisheries needs of domestic fish consumption will reach 30.17 kg/capita/year from all kinds of fish both farmed fish and fish catches at sea. The average increase in fish consumption from 2005 to 2009 reached 5.96 percent, while the increase of fish consumption from 2008 to 2009 reached 7.75 percent.

While the consumption of fish from farmed fish species from 2005 to 2009 continues to increase. In

2009 according to the target that set up by government, the farmed fish consumption will reach 7.7 kg/capita/year. The average increase in consumption of fish farming from 2005 to 2009 reached 34.47 percent, while the increase in farmed fish consumption between the years 2008 to 2009 reached 60.42 percent. It can be seen in Table 27, below.

Table 27. Fish Consumption, 2005-2009

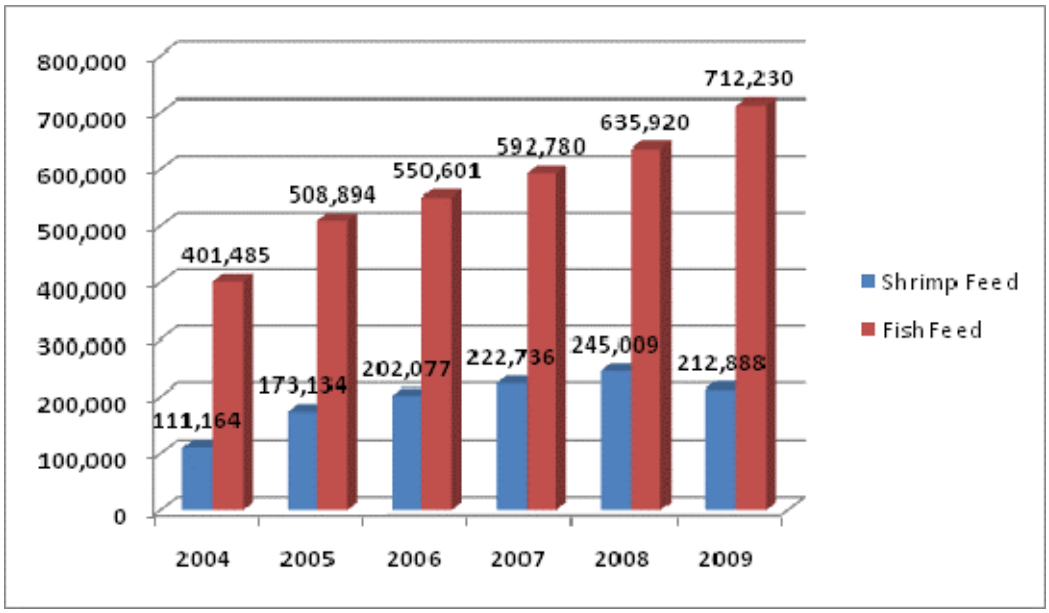
Item	*Year*					*Increasing Average (%)*	
	2005	**2006**	**2007**	**2008**	**2009 *)**	**2005-2009**	**2008-2009**
Per Capita (Kg/Kap/Th)	23.95	25.03	26.00	28.00	30.17	5.96	7.75
Per Capita from Aquaculture Only (Kg/Kap/Th)	2.5	2.5	3.3	4.8	7.7	34.47	60.42

*) Target

Source: Ministry of Marine Affairs and Fisheries, 2009 and calculated by Denny D. Indradjaja

Feed Consumption

The need for the cultivation of fish feed in total per year starting from 2005 to 2009 continues to increase. In 2009 the need of feed for shrimp enterprises reached 212,888 MT or decreased compared to 2008 that reached 245,009 ton. For the needs of fish feed in the year 2009 reached 712,230 MT, an increase of 76,310 MT of feed demand in 2008 reached 635,920 MT. As for more details regarding the development requirement for the cultivation of feed can be seen in Figure 6.



Source : Indonesian Feed mills Association (GPMT), 2009 and calculated by Denny D. Indradjaja

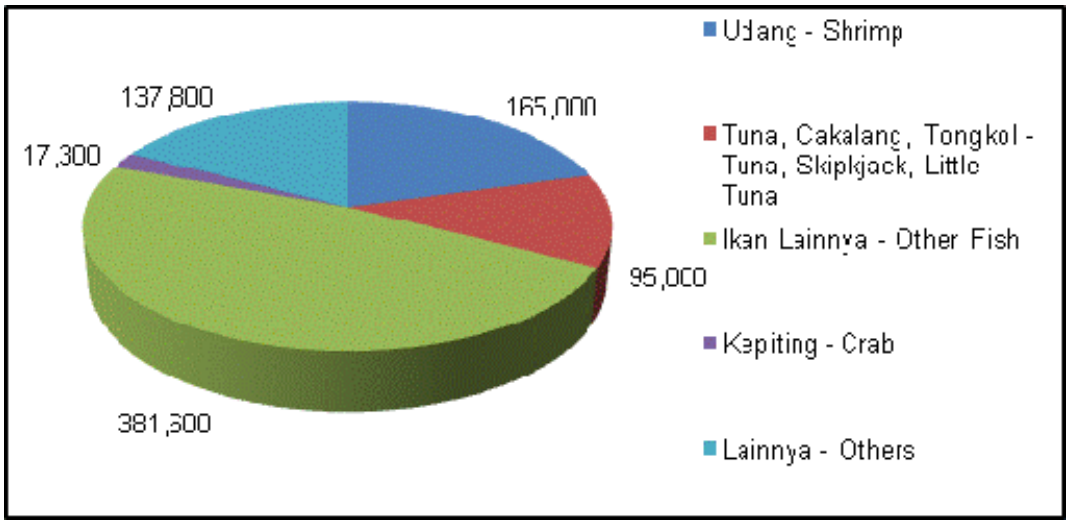
Figure 6. Total Aquaculture Actual Feed Usage, 2004-2009 (In MT)

Trade:

Export Products

Indonesia is one of the countries exporting the products of fisheries, both marine fishery products and aquaculture products. The main Indonesian export commodities consist of shrimp, tuna, skipjack tuna, crab and seaweed. However, data on exports of fisheries products does not separate aquaculture products from capture fishery products. Shrimp is the prime commodity for fisheries product export, and contributed 52 percent by value and 16 percent by volume in 2003 (FAO, 2005).

In 2009 the volume of exports of fishery commodities reached 165,000 MT of shrimps, crabs of 17,300 MT. In the same year, the export volume for these types of tuna, skipjack and tuna reached 95,000 MT (in Figure 7).

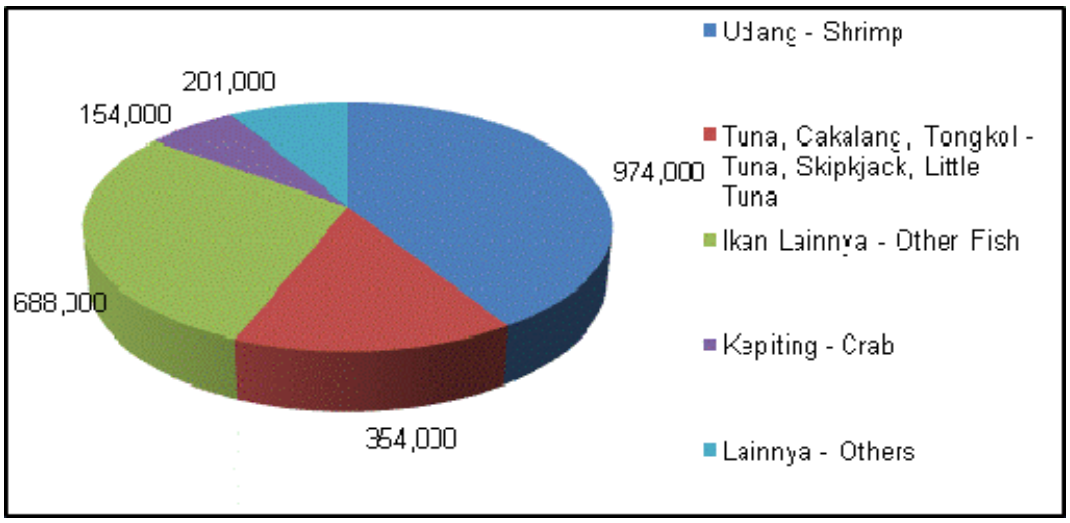


Source: Ministry of Fisheries & Marine Affair (2009)

Figure 7. Volume Export Production of Indonesian Fisheries, 2009

(In MT)

Value of Indonesian Export in 2009 for shrimp commodities reached U.S. $ 974,000,000, -. Value of exports under on the type of tuna, skipjack and tuna reached U.S. $ 354,000,000, -. As for the value of commodity exports reached U.S. $ 154,000,000 crab. For more details about the value of Indonesian exports by type of commodity can be seen in Figure 8.

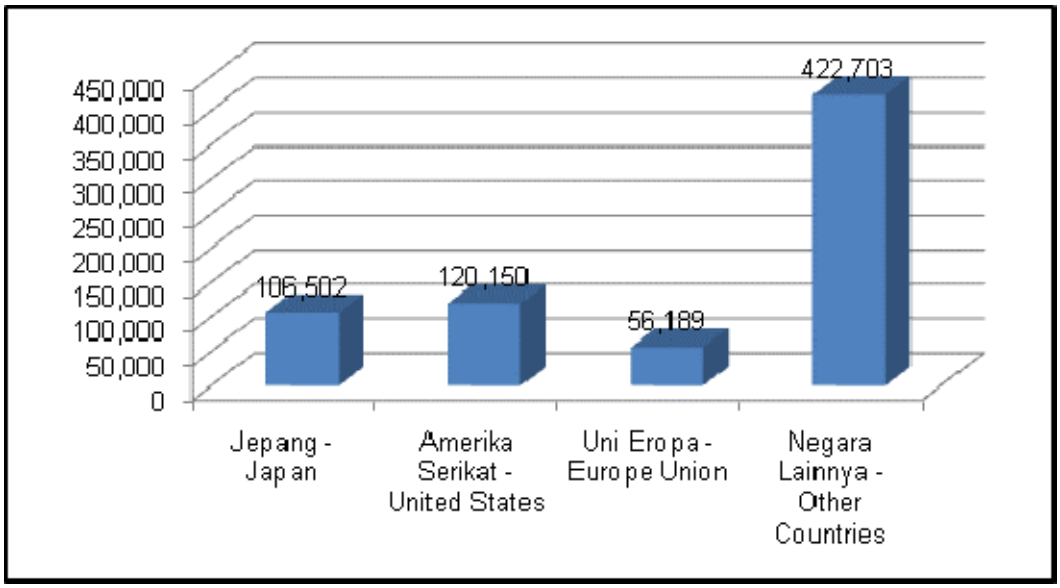


Source : Ministry of Fisheries & Marine Affair (2009)

Figure 8. Value Export Production of Indonesian Fisheries, 2009

(US$ 1000)

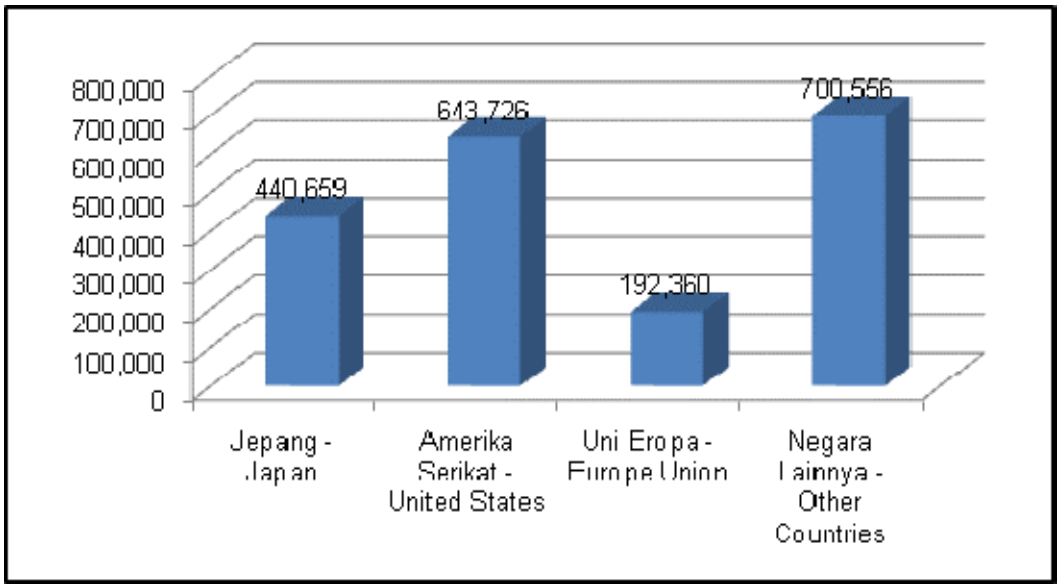
The country's largest export destination for Indonesian fishery products are Japan, USA and the European Union. For Japan the country of Indonesia's export volume reached 106,502 MT in 2009. The volume of exports to American countries reached 120,150 MT, while for the European Union volume of Indonesian exports reached 56,189 MT. Besides the three countries, Indonesia also exports to other countries, the total value of exports to other countries besides the three countries that were mentioned earlier reached 422,703 MT in the same year.



Source : Ministry of Fisheries & Marine Affair (2009)

Figure 9. Export of Indonesia by Destination Country, 2009 (In MT)

The value of Indonesian exports to Japan reached U.S. $ 440,659,000. In addition, value of exports to USA countries reached U.S. $ 643,726,000, - and the value of exports to European Union countries reached U.S. $ 192,360,000. As for countries other export destination reached U.S. $ 700,556,000. Viewing of images export destination was concluded that the export destination for Indonesian fishery products is mainly to the United State.

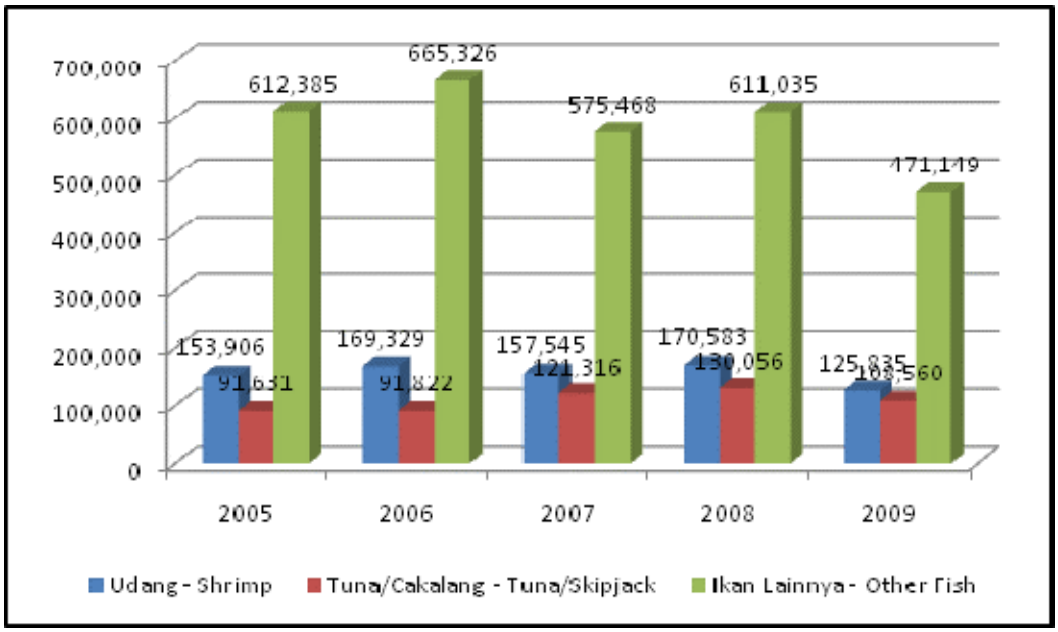


Source : Ministry of Fisheries & Marine Affair (2009)

Figure 10. Value Export of Indonesia by Destination Country, 2009

(US$ 1000)

When viewed the development of export volumes from 2005 to 2009 for key commodities such as shrimp, tuna or skipjack, and other fish found that Indonesia's export volume fluctuated. However, in 2009 Indonesia's export volume declined compared with previous years, where for shrimp export volume reached 125,835 MT, the type of tuna / skipjack reached 108,560 MT, and for other fish species reach 471,149 MT. Indonesia's largest export volume from period 2005 to 2009 for commodity shrimp and tuna / skipjack occurred in 2008. The volume of shrimp exports in 2008 reached 170,583 MT, and for commodities of tuna / skipjack reach 130,056 MT. For more details about the development of Indonesia's export volume can be seen in Figure 10.



Source : Ministry of Fisheries & Marine Affair (2009)

Figure 11. Fish Export by Volume Indonesia 2005-2009 (In Ton)

Meanwhile, based on the estimation of feed consumption, the biggest farm of Tilapia Aquaculture in Indonesia (P.T. Aquafarm Nusantara) exports Tilapia frozen fillet regularly to USA and EU approximately 2,500 MT per month *(estimated by Denny D. Indradjaja).*

Indonesian export on aquaculture products is still limited on Shrimp, Tilapia, *Pangasius spp*, and Seaweed. Based on the estimation, 80% of total shrimp export comes from aquaculture while the rest comes from shrimp capture. Data export availability on aquaculture product only is quite limited, because Indonesian Government do not separate the export product based on the kind of fish but an aggregate of all fish (capture and aquaculture).

The export market can be further developed because Indonesia has various fish species and processed products that are in high demand abroad. For example, the main exports from aquaculture are shrimp (unfrozen, frozen and canned), crabs (unfrozen, frozen and canned), frog legs (fresh or chilled), seaweed (dried), ornamental fish (freshwater and mariculture), molluscs (scallops and snails), pearls and others, including capture products such as tuna, jelly fish and coral fish as well as fish fat/oil and shrimp crackers (FAO, 2005).

Author Defined:
Conclusions and Suggestions

1. There are only 5 kinds of fish that are mainly cultured (exclude shrimp) by fish farmers, including Common carp, Tilapia, *Clarias spp* &, *Pangasius spp* (catfish) and groupers. Even though, there is milkfish also has third highest production, the growth of milkfish is only 10,7 % and mostly do not implement yet a high technology and intensive system. In addition, Gouramy culture concentrates only on several area in Indonesia, even Gouramy has a high price for middle-up class restaurant.
2. Most of semi intensive and intensive system are used to culture mainly for:
    a. Common carp in West Java, Southern Sumatera, West Sumatera and North Sumatera
    b. Tilapia is cultured in Java, Sumatera, Southern Kalimantan, North Sulawesi
    c. *Clarias spp* catfish in Java, North Sumatera, Southern Sumatera.
3. *Pangasius spp* is growing more popular to be cultured in stagnant fresh water ponds and cages since couples of years a go, before that feral Pangasius spp was captured from the rivers, mainly in Sumatera and Kalimantan.
4. Export of fresh water fish to USA is mainly dominated by Tilapia. Pangasius spp has started export since 2 years ago to entry US market. There are several important issues that explain why fresh water fish in Indonesia is still not significant to export compare to Vietnam, Thailand and China:
    a. Local price of freshwater fish is more expensive compare to export price
    b. Size of fish for export is bigger that for local market lead to the longer culture period and increasing cost production, particularly feed cost.
5. To boost aquaculture development in Indonesia, The Government of Indonesia (GOI) should provide more capital and mentoring program to the fish farmer in order to able to develop their aquaculture system from traditional to semi and intensive system.

6. In addition, GOI should develop and improve facilities and infrastructure to accelerate growth fish and shrimp production in order to be able to achieve 353% growth of production in 2014.

7. Finally, GOI and other stakeholders should cooperate in boosting Fish consumption campaign to increase domestic fish consumption per capita and also creating new market for export oriented.

REFERENCES

Indonesian Feedmills Association. 2009. Feed Consumption Data 2009. Unpublished

FAO, 2005. National Aquaculture Sector Overview Indonesia.

GPMT, 2010. Data Base Aqua Feed Consumption. Unpublished

Ministry of Marine Affairs and Fisheries. 2010. Aquaculture Statistics of Indonesia.

Ministry of Marine Affairs and Fisheries. 2009. Aquaculture Statistics of Indonesia.

Ministry of Marine Affairs and Fisheries. 2008. Aquaculture Statistics of Indonesia.

Ministry of Marine Affairs and Fisheries. 2007. Aquaculture Statistics of Indonesia.

Ministry of Marine Affairs and Fisheries. 2006. Aquaculture Statistics of Indonesia.

Ministry of Marine Affairs and Fisheries. 2005. Aquaculture Statistics of Indonesia.

National Oceanic and Atmospheric Administration (NOAA). 2010. *Trade Data Country*. NOAA. Washington DC. http://www.st.nmfs.noaa.gov/st1/trade/cumulative_data/ TradeDataCountry.html.

Working Group of Marine and Fisheries for Data and Statistics. 2009. *Indonesia Aquaculture Statistics 2008*. Ministry of Marine Affairs and Fisheries. Centre of Data, Statistics and Information. Jakarta.

Working Group of Marine and Fisheries for Data and Statistics. 2009. *Marine and Fisheries in Figures 2009*. Ministry of Marine Affairs and Fisheries. Centre of Data, Statistics and Information. Jakarta.