

## Marine Fisheries and Aquaculture Production of Indonesia: Recent Status of GDP Growth

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### Abstract

Indonesia is among wellknown countries which produce high quality fish and fisheries product in the world. This country has 108.000 km of coastline with 17.504 islands. It is estimated that fish resources in Indonesia cover 37% of the world's fish species, whereas coral reef reaches 10% of the total world's coral reefs. This paper reviews about the performance of fisheries growth in Indonesia including: fisheries production, captured fisheries, aquaculture production and marine conservation area. All data was collected from the Ministry of Fisheries and Marine Affairs, Indonesia Central Bureau of Statistic, and several related literatures. The result showed about the recent growth of fisheries and aquaculture production, the latest volume of conservation area, Fisheries Gross Domestic Product, Fishermen Exchange Rate and Cultivator Exchange Rate in 2019.

**Keywords:** Fisheries, Captured Fisheries, Aquaculture, Conservation Area.

### Introduction

Indonesia is among the largest archipelago country in the world which consist of 17.504 islands. Generally, Indonesia has 6.4 million km<sup>2</sup> of water area, including 0.29 million km<sup>2</sup> of the sea territorial, 3.11 million km<sup>2</sup> archipelagic waters, and 3.00 million km<sup>2</sup> of ZEE. Moreover, Indonesia has additional water zone of 0.27 million km<sup>2</sup>, 2.8 million km<sup>2</sup> of the continental shelf and 108.000 km of coastline length [1].

In terms of fisheries resources, KKP mentioned that fish resources in Indonesia cover 37% of the world's fish species, whereas several species have high economic value, such as: tuna, shrimp, lobsters, reef fish, various types of ornamental fish, shellfish, and seaweed [2]. It is estimated that potential sustainability of marine fish resources in Indonesia is 12.54 million tons per year scattered in the territorial waters and Exclusive Economic Zone Indonesia (EEZI). From this data, government confined that total allowable catching (TAC) is 10.03 million tons per years or about 80% of the sustainable potential. However, it is confirmed that only 6.42 million tons has been utilized in 2017 or only 63.99% of TAC [3]. Furthermore, apart from carried out fishing activities, Indonesia also conducted fish farming activities. Aquaculture production showed increasing since 1980s, especially in grouper, snapper and baronang; and in pond cultivation such as: shrimp and milkfish; as

well as freshwater cultivation such as: goldfish, tilapia, catfish, and others [4-5]. Indonesia has a large potential for cultivated fisheries, namely 17.91 million ha which includes: 2.8 million ha (15.8%) of freshwater, 2.96 million ha (16.5%) of brackish water and 12.12 million ha (67.7%) of sea water. However, utilization of the potential area has not been optimal yet. It approximated only 2.7% has been used. Whereas: sea water zone 278.920 ha, brackish water ponds 605.909 ha, and freshwater cultivation ponds 316.446 ha [2]. Following this condition, it is predicted that if all the potential area utilized and managed well, marine and fisheries sector will become a driving force for national development.

On the other hand, Tri *et al* reported that Indonesia's marine biodiversity is abundant to be exploited both for conservation and production [6]. Based on the satellite image, estimated that Indonesia's coral reef area reaches 2.5 million ha or about 10% of the total world's coral reefs, which is 284.300 km wide [7-8] with the largest contributor is the coral triangle contributed about 34% (73.000 km<sup>2</sup>) to the total area of the world's coral reefs [9]. This condition makes Indonesia as the center of the world's coral which has the highest coral species, namely 569 species of 82 genera and 15 tribes or about 70% of the world's coral species and 5 of them are endemic [10]. Besides coral reefs, another marine natural resources are seagrass and mangroves. KKP stated that the extent

of Indonesian seagrass is 293.464 ha, and mangrove area is 3.5 million ha [2]. Furthermore, Indonesia's marine waters also hold potential non-living resources that have potential economic value such as: maritime industry, biotechnology, marine services, salt production and its derivatives, marine biopharmacology, seawater utilization other than energy, submarine pipeline and cable installation, shiploads, and tourism [11-12].

### Fisheries Production

Indonesian fisheries production in 2019 is targeted to be 38.30 million tons, and the realization is 23.86 million tons (62.31%). If compared with production in 2018, namely 23.13 million tons, the realization in 2019 has increased by 3.16%. Meanwhile, when

compared with the final target of the KKP's Strategic Plan 2015-2019, namely 39.97 million tons, the realization in 2019 has only reached 59.70%. In 2019, fisheries production increased by 3.16% which was 23.13 million tons in 2018 increased to 23.86 million tons in 2019 [2]. Realization of fishery production originating from captured production and aquaculture production. The increased production was caused by an impact of various good fisheries management policy in captured fisheries and aquaculture that have been carried out by the KKP in 2015-2019. Due to the good regulation, Indonesian fishery production in 2019 experienced a growth of 2.34 percent compared to 2018, consisting of captured fisheries growth of 4.17% and aquaculture growth of 3.54 percent [13].

**Table 1: Fisheries Production 2015-2019**

Detail		Fisheries Production				
		2015	2016	2017	2018	2019
<b>Production volume</b>		22.311.895	22.582.510	23.006.927	23.132.926	23.863.633
<b>Captured Fisheries</b>	Sub value	6.677.802	6.580.191	6.891.936	7.361.121	7.533.110
	Marine capture	6.204.134	6.115.469	6.424.114	6.701.834	6.981.505
	Others	473.134	464.722	467.822	659.287	551.605
<b>Aquaculture</b>	Sub value	15.634.093	16.002.319	16.114.991	15.771.805	16.330.523
	Fish	4.364.751	4.952.018	5.658.948	5.451.508	6.412.068
	Seaweed	11.629.342	11.050.301	10.456.043	10.320.297	9.918.455

Source: KKP, 2019

### Captured Fisheries Production

The captured fisheries production in 2019 was 7.53 million tons or 76.64% of the target (8.40 million tons). The volume of captured fisheries production was 6.98 million tons (92.68%) from marine captured and the remaining of 0.55 million tons (32%) from other natural waters. The increase in capture fisheries production is caused by: a. The value of the yield fishing commodity in the sea is higher than in other natural waters; b. Implementation of good fish handling practices; and c. Infrastructure which supports access to markets in coastal areas. In 2019, capture fisheries production increase from 7.36 million tons in 2018 to 7.53 million tons in 2019 [13].

Moreover, KKP mentioned that the increasing production from capture fisheries is caused by some aspects such as: abundance of fish in several locations, good weather, waves and wind that supports fishing activities, increase the number of ships, support for fishing facilities in 19 provinces, 52 Regencies/Cities, 562 units and 720 units of fishing gear in 30 provinces which have been distributed in 2018 [2]. However, the government still need to do much effort in order to increase production of capture fisheries, for instant: optimization of operational assistance in fishing facilities, improving facilities and infrastructure for boat landing/ fishing port, and optimization the data collection of capture fisheries production and also easy access of financial capital for fishermen.

### Aquaculture Production

Aquaculture production in 2019 was 16.33 million tons or 54.61%

of the target (29.9 million tons). This production consists of 6.41 million tons (39.25% of fish production) and the remaining 9.92 million tons (60.74%) came from seaweed production. During 2015 to 2019 period, the achievement of aquaculture production increased on average of 1.12% per year. 15.63 million tons in 2015 to 16.33 million tons in 2019. In 2019, aquaculture production has increased by 3.56%, from 15.76 million tons in 2018 to 16.33 million tons in 2019 [2]. Following the current situation, it may be concluded that some factors support the production increment are: improved in ponds facilities, good quality of seeds and breeders, and development of aquaculture business patterns. The production achievement also supported by industrialization of aquaculture, which focuses on grouper, shrimp, milkfish, seaweed and catfish.

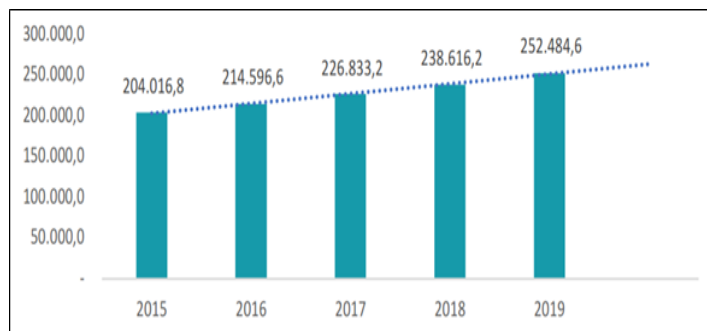
Based on the data above, showed that aquaculture sector could be one of fundamentals for economic growth in Indonesia. Nowadays, this sector provides employment, increase income, better livelihood for coastal communities, foreign earnings, and revenue to the country [12]. The sector offers employment to approximately 12 million fish farmers which dominated by shrimp, milkfish, tilapia and catfish culture [2,13]. Besides that, seaweed farming also contributed to food production and achieving self-sufficiency in aquatic products supplies.

Tribunbisnis mentioned that fish farming heightens people with nutrition, employment, increase income in rural areas and revenue to the country [14]. Eventhough, commonly coastal communities who investing in the aquaculture industry sometimes faces numer-

ous challenges since they have to control and provide a suitable environment for fish growth; but aquaculture industry has proven profitable for them. Therefore, if aquaculturist practicing the best management aquaculture and providing good environment, it could be possible to receive higher yields [15]. The common problems that mostly reported by Indonesian's fish farmers are: limited availability good quality broodstock, the price of feed is still controlled by feed industry, the potential fish feed in the community which using local feed raw materials has not been optimally utilized, limited knowledge of human resources in aquaculture business, limited access to capital for aquaculture business, environmental management and fish disease management is still low, and infrastructure conditions is still not yet optimal in supporting fisheries business development. In addition, KKP mentioned that low productivity and competitiveness of fisheries businesses caused by the integration system of fish production in the upstream and downstream areas is not optimal, the provision of facilities and infrastructure is still limited and the logistics costs still high [2].

### Fisheries GDP and FER Growth

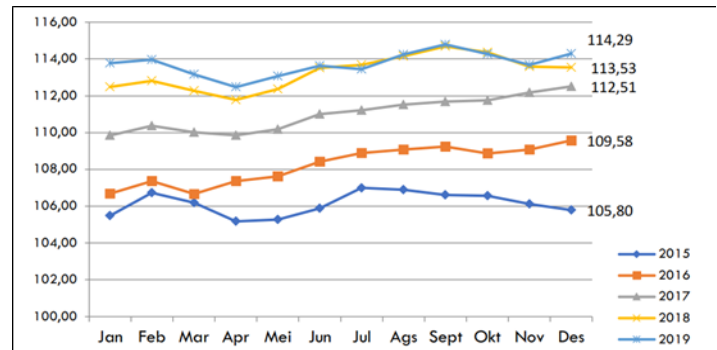
Fishery Gross Domestic Product (GDP) is the total value added of goods and services produced by the fishery sector. Economic growth in the fisheries sector represents the change in GDP of the fisheries sector from one period to the next period. Fisheries GDP is based only on the primary sector which includes capture fisheries and aquaculture [16]. Based on data, the growth of Indonesian fisheries GDP in 2019 reached 5.81% or 52.81% of the target. When compared with the realization in 2018, achievements in 2019 experienced a growth of 11.94% [13]. Eventhough still has not been able to reach the target set in the Agreement document Performance, however, Fisheries GDP Growth in 2019 has exceeded or above the average National GDP growth which only reached 5.02% [2]. The value of fisheries GDP continued to increase from 204.016 billion in 2015 to 252,484 billion in 2019 (Figure 1).



Source: KKP, 2019

Figure 1: Fisheries GDP Value Trend 2015-2019

On the other hand, Fishermen Exchange Rate (FER) is a measuring tool for the welfare of fishermen obtained from the comparison of the price received by fishermen with price paid by fishermen [17]. Data obtained from reported an increase of the fishermen exchange rate (FER) from 113.28 in 2018 to 113.74 in 2019 [13]. This indicated the level of fishermen's community welfare is increasing. The higher FER rate implies the higher impact of the volume and the value of production benefited to fishermen. The realization of FER during the last five years (2015-2019) continues to increase from 106.14 (2015) to 108.24 (2016) and 111.02 (2017) to 113.28 (2018) and reached 113.74 in 2019.



Source: KKP, 2019

Figure 2: Fishermen Exchange Rate Development per Month 2015-2019

During 2019, FER experienced an upward trend and reached the highest value in September 2019 with a value of 114.79. The trend of FER increasing is predicted due to the increase in the income index of fishermen following the fish season. While the lowest value seen in April 2018 (112.47) which is influenced by weather factors. Overall, FER during 2015 to 2019 showed a fluctuating with a trend as follows, from 2015 to 2016 an increased of 1.98% ; from 2016 to 2017 (2.57%); 2017 to 2018 (2.04%) and from 2018 to 2019 only 0.41%.

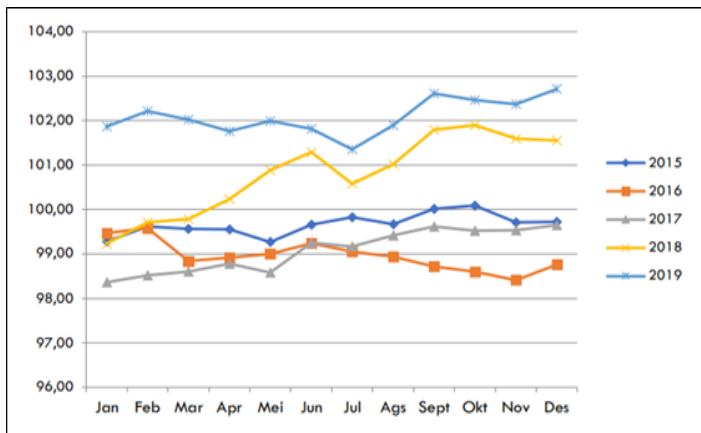
### Cultivator Exchange Rate

Cultivator Exchange Rate (CER) is a measure of cultivator welfare obtained from a comparison of the price received by the cultivator at the price paid by the cultivator [18]. BPS published CER value as shown in Table 2 [13].

**Table 2: The achievements of CER in 2015-2019**

Strategic Target			The realization of Marine and Fisheries Community Welfare					
IKU			Fisheries Community Welfare Index					
Performance Indicator			Cultivator Exchange Rate					
Realization			Year 2019				KKP Strategic Planning 2015-2019	
2016	2017	2018	Target	Realization	Achievement (%)	Increment (%)	Target 2019	Achievement of 2019 Target (%)
98.96	99.09	100.80	103.00	102.09	97.86	1.28	103.00	97.86

Source: BPS, 2020



Source: KKP, 2019

**Figure 3: Fish Cultivator Exchange Rate (NTPi) 2015-2019**

Based on the data collected by [13] in 34 provinces, the average of CER from January to December 2019 amounted to 102.09 or 97.86% of 2019's target.

### Marine Conservation Areas

A study about potential area for Marine Conservation Area in Indonesia actually has been conducted since 1984, produced Atlas of Indonesian Marine Conservation area [19]. The atlas showed information of some endangered species and reported 179 potential MPA areas in Indonesia. Furthermore, Spalding et al, divided Indonesia into 12 ecoregions, including: Malacca Strait, Western Sumatra, Java Sea, Southern Java, Sundas strait, Halmahera, North Borneo, Tomini Bay, Arafura Sea, Sulawesi Sea, Papua, and Banda Sea [20].

Recently, KKP reported the area of conservation covering 23.146.374.81 ha or 107.67% of the target (21.50 million ha) [2]. The area of 23.14 million ha consists of 196 conservation areas managed by Ministry of Fisheries and Marine Affairs or called The National Water Conservation consists of 10 areas with volume of 5.34 million ha, and a conservation area managed by Ministry of Forestry and Environment 30 areas with volume of 4.63 million ha, and conservation areas under the authority of the provincial government or what is called the regional marine conservation area there are 156 areas with a volume of 13.17 million ha. Details

of the conservation area are presented in the following table

**Table 3: Indonesia's Conservation Area in 2019**

No	Conservation area	Total Number	Volume Area
	Managed by the Ministry of Fisheries Marine Affairs	10	5.342.023,02
1	Marine National Park	1	3.355.352,82
2	Watershed Sanctuary	3	445.630,00
3	Water Park	6	1.541.040,20
	Managed by Ministry of Forestry and Environment	30	4.632.009,30
4	Marine National Park	7	4.043.541,30
5	Marine Nature Park	14	491.248,00
6	Marine Wildlife Reserve	4	5.400,00
7	Marine Nature Reserve	5	91.820,00
	Managed by provincials government	156	13.172.342,49
8	Regional Water Conservation Areas	156	13.172.342,49

Source: KKP, 2019

From the data above can be seen that realization in 2019 has added a volume of 2,315,254.37 ha compared with the volume of the conservation area in 2018, namely 20,875,134.08 hectares. The problem in achieving an optimal conservation area is management of conservation area should be integrated, whereas before being defined and managed, conservation areas must be prepared for zoning and management plans. Therefore, it is essential for provincials' government to assist in the preparation of zoning and plans. Once the zoning and management plan is drawn up, the provincial government can immediately propose the stipulation to the Minister of Marine Affairs and Fisheries.

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