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by Andre Scabra

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Socio-economic impacts on lobster fishery actors after the implementation of Regulation No 12/PERMEN-KP/2020

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Abstract. The promulgation of Ministry of Marine Affairs and Fisheries Regulation Number 12/PERMEN-KP/2020 on Management of Lobster (*Panulirus* spp.), Mud Crab (*Scylla* spp.), and Blue Swimming Crab (*Portunus* spp.) in the Territorial waters of the Republic of Indonesia has implications for the management of lobster fisheries within the Indonesia's Territorial Waters and Fisheries Management Areas (FMAs). This research aims to outline the current condition of lobster fisheries with the enactment of the ministerial regulation's KP number 12/2020 on lobster fishery and to analyse the policy gaps regarding the implementation of lobster fisheries regulations. Data were collected within FMA 573 through a structured interview technique using a clustered questionnaire system and Focus Group Discussions (FGDs) with key informants. The impacts of the regulation were analysed quantitatively and qualitatively using a descriptive approach. The results indicate that the implementation of regulation No. 12/PERMEN-KP/2020 has not resulted in significant increases in income for lobster fishers and traders, in fact rather the reverse. The legalization of juvenile lobster capture has increased the supply, leading to a decrease in juvenile lobster prices. The price per lobster has fallen from IDR 6,000-10,000 to IDR 3,500-4,000, IDR17,500 to IDR 10,000-11,000 andIDR 27,500-30,000 to IDR 16,000-17,000 for fishermen, middlemen and exporters, respectively. The positive impacts on lobster fishers were an increased sense of security since it is no longer illegal to catch and trade juvenile lobsters.

1. Introduction

The southern coast of Lombok Island is in Indonesian fisheries management area (FMA) 573 and is recognised as an area with high potential for lobster fisheries [1, 2]. Soaring overseas market demand together with high market prices for lobster has made this fishery product a strategic commodity. Lobster is a germplasm resource originating from marine ecosystems that should be managed rationally and wisely for public welfare while maintaining its potential and sustainability. Thus, rational and wise management of lobsters should be carried out in a planned, integrated, and transparent manner while following sustainability principals. Based on these considerations, there is an urgent need for regulations to govern lobster resource management in the seas around Nusa Tenggara Barat (NTB) Province.

The promulgation of the Minister of Marine Affairs and Fisheries Regulation Number 12/PERMEN-KP/2020 on the Management of Lobster (*Panulirus* spp.), Mud Crab (*Scylla* spp.), and Blue Swimming Crab (*Portunus* spp.) within the Fisheries Management Areas of the Republic of

Indonesia has implications for lobster fishery management in FMA 573. This research aimed to map the socio-economic conditions of lobster fishermen, to analyse community perceptions and impacts arising from the implementation of regulation Number 12/PERMEN-KP/2020, and adaptation strategies of lobster fishery actors to the implementation of this Regulation in FMA 573.

2. Methods

The research took place over fourteen weeks from July to September 2020. Study areas were chosen due to their significance as hubs for lobster fishing activities in FMA 573. Data were collected from several sites across NTB Province: Awang Bay, Bumbang Bay and Gerupuk Bay, Mertak and Sengkol Villages in Pujut District, Central Lombok Regency as well as Jerowaru Village, Batu Nampar Village and Ekas Buana Village in Jerowaru District, East Lombok Regency (Figure 1).

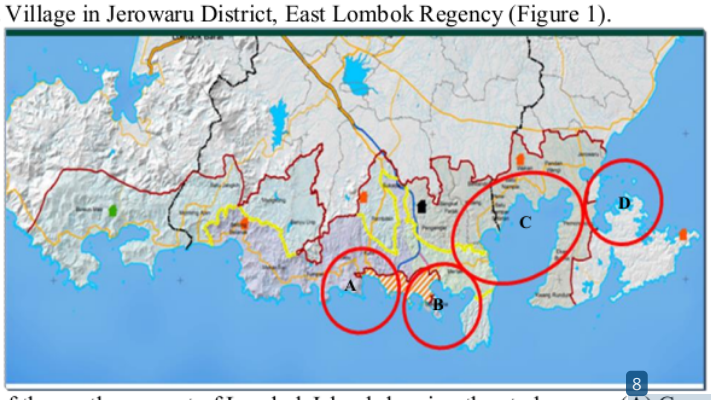

Figure 1. Map of the southern coast of Lombok Island showing the study areas: (A) Gerupuk Bay; (B) Bumbang Bay; (C) Awang Bay; (D) Jerowaru, Batu Nampar and Ekas Buana.

Data were collected through structured interviews using a questionnaire and Focus Group Discussions (FGDs). Structured interviews were carried out by interviewing lobster fishermen to obtain information regarding the size of the lobster juveniles collected and the size of lobsters caught for consumption. In depth interviews with key informants and FGDs were conducted in five locations, involving well-respected fishermen (local leaders) and lobster traders.

The impacts of and adaptation strategies to the implementation of Regulation No. 12/PERMEN-KP/2020 were analysed quantitatively and qualitatively using a descriptive approach. This approach was adopted to characterise the respondents in terms of their socio-economic conditions, their perceptions towards the current state of lobster resources and their views regarding the effects of the implementation of Regulation Number 12/PERMEN-KP/2020, as well as the adaptation strategies of lobster business actors. Limitations in the analysis of the impacts of Regulation No, 12/PERMEN-KP/2020 at the study sites included: (1) the prices used are the prices prevailing at the time the study was conducted (July to September 2020); (2) The fishermen interviewed included lobster seed and consumption-sized lobster fishers; (3) the data used were the best data available, including primary and secondary data.

3. Results and Discussion

For the majority of fishers living in the coastal areas of Central Lombok and East Lombok, by 2015 collecting lobster juveniles (seed) had become their main source of livelihood [3]. This fishery was expected to play a significant role in supporting and improving the welfare of fishing households. Furthermore, prior to the issuance of Permen 12/2020, according to [3] the regulation Permen KP No.1 of 2015 had a significant negative socio-economic impact in terms of a decrease in fishermen's earnings due to the restriction on the size of lobsters that could be caught (≥ 300 g wet weight).

3.1. Demographics and socioeconomic characteristics of the respondents

There were 90 respondents in this study, consisting of 79 male and 11 female respondents. All respondents (100%) were Muslims. The ethnicity of the respondents was predominantly Sasak(81 people); the remainder were from Bajo (4) and Bugis (2) with one each from Javanese, Madureseand Bima ethnic groups. The majority (90%) were indigenous people, and the respondents had lived in the area on average for around 37 years. The households of most respondents generally consisted of four family members; father, mother, and two children.

The age structure of the respondents (Figure 2) shows that 80 respondents (88.9%) were in the productive age-range (18-57 years old), while 10 (11.1%) were over 57 years old, which is categorized as a non-productive age in Indonesian statistics. The educational attainment of the respondents (Figure 3) varied from no formal schooling (17 people) to undergraduate degrees (1 person). The majority (44 people, nearly 60%) had either partial or full primary education and 21 people (just over 22%) had graduated from lower or higher secondary schools.

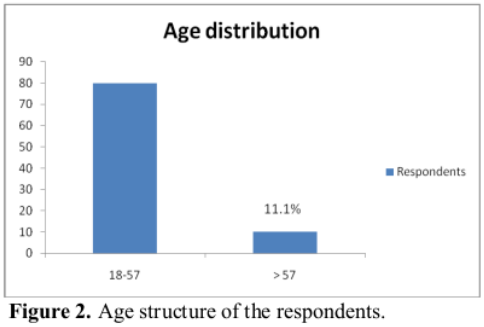

Figure 2. Age structure of the respondents.

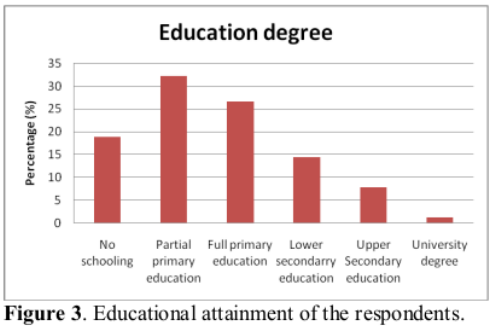

Figure 3. Educational attainment of the respondents.

In terms of occupation, 43 people (47.77%) were full-time fishers with no other job, while 40 people (44.44%) were both fishers and farmers, and 7 people (7.79%) had three sources of livelihood: fishing, farming and providing some kind of service. The number of dependents varied, with 49 respondents (54.39%) with 3-4 dependents, 32 respondents (35.52%) with less than three dependents and 9 respondents (10.08%) with more than four dependents.

The income level of the respondents was classified based on the NTB Province Regional Minimum Wage (UMR) in 2019, which was IDR 2,117,000 per month. Just over half (55.5%) of respondents had an income of less than IDR 2,000,000 per month, around 27% earned an income between IDR 2,000,000 and IDR 3,000,000 per month, approximately 9.5% earned between IDR 3,000,000 and IDR 4,000,000 per month, 2% had an income between IDR 4,000,000 and IDR 5,000,000 per month, and 7% of the respondents had an income above IDR 5,000,000 per month. Respondent welfare category was based on the assessment of indicators including asset ownership in the form of land, houses, livestock and motorized vehicles. Previous study showed that there was diverse amount of income between the fishery [8].

Land ownership was assessed by the extent, from less than 0.5 ha to over 3 ha. A total of 6.7% of respondents owned less than 0.5 ha, 8.8% owned 0.5-1 ha, 2.5% owned 1.5-2 ha, 0.7% owned 2.1-3 ha, and only 1.4% owned more than 3 ha. Around 81.11% of respondents owned one house and about 2.22% owned more than one house. Most respondents owned some form of transport, with 4.9% owning a car, 43.9% owning a motorbike, and 66.7% owning a boat.

Livestock assessed included chickens, ducks, goats and cattle. The selling prices were IDR 95,000-110,000 fora chicken, IDR 85,000-100,000 for a duck, IDR 3,500,000-4,500,000for a goat, and IDR 7,500,000-11,000,000 for a cow. Of the respondents, 12.3% were raising chickens, 11.9% had cattle, 6% had goats, and 3.2% had ducks. Based on the livestock selling prices, the livestock assets of around 17% of the respondents had a value of less than IDR 1,500,000, 8% were worth IDR

1,500,000-2,500,000, 3% were worth IDR 3,500,100-4,500,000, and 43% were worth more than IDR 4,500,000.

Other house-hold assets evaluated included entertainment facilities, fuel sources, cooling equipment and means of communication. Regarding the entertainment facilities (television, radio, and Video Compact Disk (VCD) players), more than half (56.8%) of the respondents owned a television, 14.4% had a radio, and 21.5% owned a VCD player. The most common type of fuel used in the respondent's households was gas, with around a third (31.6%) of the respondents owning gas appliances. Around 11.2% of respondents owned a refrigerator, 16.8% had an air conditioner and 27.4% had cooling fans. Additional assets owned by the respondents included parabolic antennas (63.9%) as well as rice cookers and/or mobile phones (13.7%).

Respondent welfare categories were calculated based on the indicators above (education level, income level, asset ownership, and household facilities) using a scoring system (scale from 1 to 5) measured against a predetermined set of welfare indicators. The majorityof respondents (81.11%) were in the lower class, 16.67% in the middle class, and 2.22% in the upper class category.

There are several reasons that can motivate fishers to collect juvenile lobsters. The main reason given by more than a quarter of the respondents (27.9%) was limited [alternative] employment opportunities, while 20.6% said that the juvenile lobster fishing grounds were relatively close to their home, reducing the risks due to adverse weather conditions. Meanwhile 7.4% each said that it was a family business; that other fisheries stocks had decreased; and that the price of lobsters was higher than that of other fish (7.4%). The remaining respondents (2, 9%) cited the relatively low operational costs as a reason.

3.2. Perceptions regarding the condition of lobster resources

The lobster fishermen involved included those targeting juveniles (lobster seed) and/or consumption-sized lobsters, as well as those rearing lobsters (lobster growout farmers) were asked about their perceptions regarding catches over the past year, their expectations or forecasts about the condition of lobster stocks and catches over the next three years, and what they though fishermen could do to increase their lobster catch in the future.

The perception of respondents regarding the catch of consumption-size lobsters, now and over the next three years (Figure 6), show that 45.6% of the respondents said it waslow, while 32.4% of respondents said it was moderate and 1.5% each said that lobsters were still abundant or already very few. The respondents who considered that consumption-sized lobsters (individual weight > 1 kg) were very hard to find considered that this was because the number of lobster fishermen was increasing all the time, and also because there was no size-selectivity, with the consequence that lobsters did not have the opportunity to grow large as they were being caught first. In addition, several fishermen stated that the fishing grounds with consumption-sized lobsters are getting farther away, requiring them to travel longer; they were experiencing difficulties in accessing ever more distant fishing grounds. For example, in 1994, it took them only about 30 minutes to reach the nearest lobster fishing grounds, while in 2019 they needed about 2 hours to reach productive fishing grounds [4]. In addition, a study in 2006 showed that experimental catch per unit effort ranged between 4 to 154 lobsters per 600 m of net per day and commercial catch per unit effort ranged from 0 to 10 lobsters per 600 m of net per day [7].

The lobster seed fishermen were divided in their opinions also, with almost half (48,9%) who considered that the catch was high/seeds were abundant, while 40.2% considered the catch/abundance to be moderate, 2,2% considered lobster seed very abundant, 6,5% considered the abundance was low and 1.1% considered it very low (Figure 5).

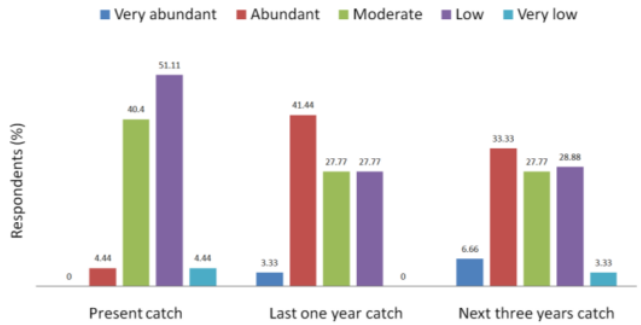

Figure 4. Perception of respondents regarding the catch of consumption-sized lobsters now and for the next three years.

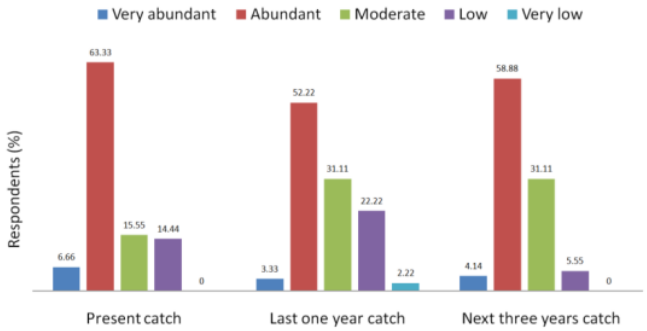

Figure 5. Perception of respondents regarding the catch of seed-sized lobsters now and for the next three years.

Based on the results of this perception analysis it can be concluded that there is optimism among lobster farmers in the study location regarding the availability of wild-caught lobster seeds now and for the next 3 years. Several respondents claimed that the current massive take of juvenile lobsters will not affect the future availability of lobster seeds, because the abundance of lobster seed [larvae] is so great, and if they were not caught as seeds, most would die and be carried away by the currents.

The lobster farmers perception on the availability of lobster seeds for grow-out are in line with the perceptions of the lobster seed fishermen, with 48.9% of the respondents considering that puerulus stage lobsters (i.e. juvenile lobsters or lobster seed) for lobster farming were still abundant, while 40.2% considered the lobster seed stock was still moderately abundant. Small proportions of respondents considered that lobster seed abundance was still very high (2.2%), or conversely low (6.5%) or very low (1.1%). Based on these responses, it can be concluded that most of the lobster farmers are optimistic about the future as regards the availability of wild-caught lobster seeds in the present and for the next three years at least (Figure 6). However, according to of lobster farming (growout) respondents, there are several factors that may disrupt the sustainability of lobster production in the study location. These include changes in water quality and sea conditions (58.7%), limited availability of natural feed (32.6%), the lack of natural seeds/puerulus stage lobsters (28,3%), outbreaks of disease (4.3%), the increasing number of lobster grow-out farmers (3.3%), the lack of security (3.3%), pests (3.3%), damage to holding nets due to natural disturbances and/or wearing out (2.2%), net damage caused by fishes and/or other pests (2.2%), limited capital (1.1%), and low selling prices for lobsters (1.1%).

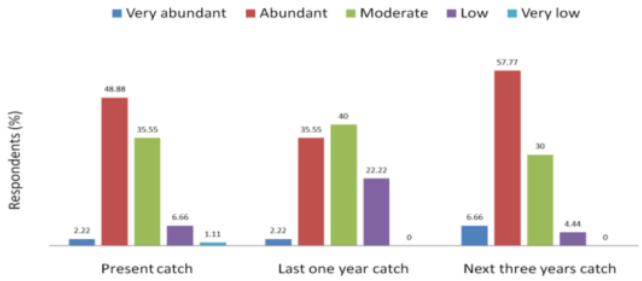

Figure 6. Perception of respondents regarding the availability of lobster seed for growout now and for the next three years.

Respondents who collected lobster seed argued that there were several factors that could influence the number of lobster juveniles collected in the study site. These included weather conditions (43.2%), the use of bombs/explosives to catch fish (24.3%), the use of toxic substances/poisons to catch fish (21.6%), overfishing (10.8%), theft (6.8%), seasonal factors (5.4%), pests such as fish (2.7%), and the light from the net cages (1.4%).

Lobster farming respondents suggested several ways in which the community could support lobster abundance. These included maintaining suitable water quality in lobster nursery grounds and grow-out areas (48.9%), maintaining the continuity of feed availability (42.4%), increasing security (2.2 %), addressing pests and diseases (2.2%), controlling the number of net cages (2.2%), good aquaculture/husbandry practices (1.1%), and increasing the number of net cages (1.1%).

Lobster seed collecting respondents also made suggestions for increasing the abundance of lobsters. These included reducing the use of poisons (25.7%), reducing the use of bombs (23%), increasing lighting units (10.8%), increasing net cage units (5.4%), improving security (2.7%), protecting the sea (2.7%), not collecting lobster broodstock (1.4%), fishing in far away locations (1.4%), law enforcement (1.4%), and public awareness campaigns (1.4%).

3.3. Respondent knowledge regarding Regulation No. 12/PERMEN-KP/2020

Several parameters were used to determine the level of the respondent's knowledge and understanding of Regulation No. 12/PERMEN-KP/2020 (hereafter abbreviated to KP 12/2020). In particular, what dothey know about: (1) the promulgation/content of KP 12/2020; (2) the goals of KP12/2020 implementation; (3) the impact of the regulation on community welfare; and lastly (4) how satisfied are they with the enactment of KP 12/2020. The results are shown in Table 1.

Table 1. Respondent perceptions and knowledge regarding Regulation No. 12/PERMEN-KP/2020.

No	Regulation	Respondents	Understood (%)	Not understood (%)
1	Permen KP No 12/2020 policy content	Juvenile lobsters collectors	34.44	65.56
		Fisherman	0	100
		Tourism workers	0	100
2	Purpose of KP 12/2020	Juvenile lobsters collectors	23.33	76.67
		Fisherman	22.22	77.78
		Tourism workers	16.67	83.33
		Non fishery workers	12.22	87.77

With regards to the contents and objectives of KP 12/2020, the majority of respondents answered "don't know". In particular, of the respondents who collect juvenile lobsters, 65.56% stated that they do not know and had never read the contents and the items regulated in the document, while 34.44%

of the respondents were aware of the general content but not the details, because they had attended a meeting discussing this regulation. The group who claimed to be aware of the contents of KP 12/2020 said that they found out about it from the NTB Provincial Marine and Fisheries Agency and at the time when they applied for a permit for the lobster business.

Responses regarding the knowledge of the goals of KP 12/2020 (Table 1) show that the percentage of fishermen who answered "do not know" was greater than those who answered that they understood the purpose or goals of KP 12/2020 implementation. This large number of "do not know" respondents is an indication that the socialization and dissemination of this regulation is still very limited, and has only reached certain groups.Fishermen's knowledge regarding government regulations restricting the lobster fisheries is necessary to supporting effective implementation [5]in order to raise awareness and improve knowledge for managing lobster (*Panulirus* spp.) resources. The group of respondents who claimed that they understood the purpose of KP 12/2020 implementation obtained the information from their friends, printed and electronic media, or from local meetings. A few had actually read the regulation in detail, but some of them still could not fully understand it. What they mostly understood was that the capture of lobster seeds was now permitted for export activities and for farming (grow-out) that is now already by the government, but very few understand how many lobsters are allowed to be caught. Several respondents (23.33%) understand the procedures necessary to obtain business permits for lobster fisheries. However, almost all respondents who understand the requirements and procedures for arranging business permits for lobster export, argued that they would be impossible for local community members as the procedures are very strict and the conditions for export could only be met by large investors.

When compared to the regulations in place before the enactment of KP 12/2020, the respondents had a favourable attitude towards the change (Table 1). Although 20.6% considered that KP 12/2020 is oriented towards the interests of [big] businesses, 23.5% of the respondents considered the policy orientation of the regulation was reasonable, and 8.8% considered it good because it opened up a great opportunity to improve the welfare of lobster fishermen and to support aquaculture (Tab1e 1). Regulation KP 12/2020 was expected to be able to return assets, return strategic livelihoods, meet market demand, restart production and produce large profits, even though in fact there had not yet been any significant increase in the income of lobster fishermen since the enactment of KP 12/2020.

In general, the level of respondent satisfaction regarding the implementation of KP 12/2020 at the study locations can be considered as reasonable satisfied, with 45.5% of lobster seed collectors, 35.7% fishermen, 22.2% of tourism workers, and 30% of non-fishery workers considered regulation the enactment of KP 12/2020 as a good thing (Table 1). Reasons for this acceptance were that communities felt safe and secure in carrying out lobster fishing livelihood activities without feeling any pressure or fear. For fishing communities, safety and security are of primary importance, especially when it comes to livelihood activities.

Regarding which institutions play the biggest role in supervising the implementation of KP 12/2020, most of the respondents from the fishermen group said that the government had the most prominent role (Table 1). Meanwhile, non-fishery workers mostly said that they did not know which institution should have the primary role in overseeing the implementation of KP 12/2020.

With regards to the impact on income and welfare, most respondents answered "don't know" or stated that they had not experienced significant benefits from the implementation of KP 12/2020 in terms of their income (Table 1). Only a small proportion of respondents claimed that the regulation had been very helpful in improving the welfare of their family. This may be due to the relatively recent enactment of the regulation, so thatmore time is needed to see community adaptations to the regulation. Another possible reason is related to the Covid-19 pandemic, which has disruptedoverseas markets such as China, resulting in a very low market demand for lobster supply (especially lobster seeds), at the same time as the government has allowed the catching of lobster seeds. As the supply of lobsters has increased, market demand has decreased, leading to lower prices, as illustrated in Table 2, so that fishing families have not felt a significant increase in income.

Table 2. Comparison of lobster selling prices before and after the enactment of Regulation No. 12/PERMEN-KP/2020.

Assessment indicator	Before KP 12/2020	After KP 12/20 implementation
Seed collection (export/growout)	prohibited	legalised
Lobster seed price - fishermen	IDR 6.000 -10.000	IDR 3,500 - 4,000
• *Panulirus homarus*		IDR 5,000 – 8,000
• *Panulirus ornatus*		IDR 15,000 –20,000
Lobster seed price - collectors	IDR 15.000 - 17.500	IDR 10,000 - 11,000
Lobster seed price - middlemen	IDR 27.500 - 30.000	IDR 16,000 - 17,000
Export price of puerulus stage lobster seed (BBL)		
Panulirus homarus	IDR 50-65,000	IDR 55,000
Panulirusornatus	IDR 130-160,000	IDR 145,000
Company export tax (PNBP) for *Panulirus homarus* puerulus depending on volume (number of seeds/pueruli)	-	1-10,000: IDR 1,000 10,000-25,000 : IDR2,000 25,000-50,000: IDR 3,000 50,000-100,000: IDR 4,000 > 100,000 IDR 5,000,
Company export tax (PNBP) for *Panulirus ornatus* puerulus depending on volume (number of seeds/pueruli)t	-	1-10,000: IDR 1,500 10,000-25,000: IDR 3,000 25,000-50,000: IDR 5,000 50,000-100,000: IDR 7,500 > 100,000 head: IDR 10,000

3.4. Fishermen's strategies for adapting to Regulation No. 12/PERMEN-KP/2020

The issuance of KP 12/2020 within the Territory of the Republic of Indonesia should provide strategic momentum for lobster business actors. However, it is feared that the ramifications of this regulation will boost the exploitation of lobster seeds for export purposes. In anticipation of this likelihood, fishermen should have an adaptation strategy if their future catches start to decline.

In this study, 91.2% of the respondents stated that they would continue business as usual, 5.9% of the fishermen would look for alternative jobs, and only 1.5% would reduce theirfishing frequency. The adaptation strategies that respondents in the study location would undertake if their catch was reduced by 50% per year were similar to those for a 20% decline in lobster abundance per year. Most fishermen (85.3 % of respondents) would continue to fish as usual, some would try to find alternative jobs (8.8%), decide to reduce the frequency of fishing (1.5%), or think about changing their operational strategy (1.5%). This result was supported by previous study [6] where spiny lobster fisheries have been in decline for many years. This was caused by the growth overfishing, including the capture of undersized specimens, which reached more than 50%.

If their income decreased by 20% per year, most of the lobster fishers (64.7%) would choose to work in normal way as long as they were still healthy, as would 63.2% of the respondents if their income decreased by 50% per year. Some respondents gave adaptation strategy plans. If their income decreased by 20% per year, 5.9% of respondents would add to and or change their fishing gears, 4.4% would expand their fishing area, 4.4% would plan to increase the number or size of their fishing boats/vessels, and 10.3% would put more capital in the fishing activities. Meanwhile, adaptation strategies if their catch was reduced by 50% per year were similar, with 11.8% of the respondents intending to change their fishing gears, 2.9% to expand their fishing area, 4.4% would increase the size or number of fishing boats/vessels, and 10.3% would invest more capital.

3.5. Recommendations for Improving the Implementation of Regulation No. 12/PERMEN-KP/2020

Based on the results of the study regarding the impact of the implementation of KP 12/2020, as well as the emergence of problems resulted from these government policies, here we propose several intervention recommendations for improving the implementation of this policy. The government needs

to ensure that fishermen who are registered with fishing companies should be empowered, taking into account considerations of fairness and justice so that fishermen retain their agency and independence.The government also needs to set strict quotas for companies exporting lobster seed, including ensuring compliance with the payment of the appropriate taxes (PNBP) to ensure that the country willbenefit from exportsthrough tax revenue as well as foreign exchange. The export tax should be able to maintain and ensure the sustainability of lobster resources, improve community welfare, to ensure equity in aquaculture technology, develop investment opportunities, increase foreign exchange, and develop lobster (*Panulirus* spp.) aquaculture.

The Provincial Marine and Fisheries Services (MFS) together with the Ministry of Marine Affairs and Fisheries (MMAF) should jointly determine the allocation of lobster stocks that are allowed to be caught in WPP 573. The MFS should systematically strengthen the capacity and of provide support for surveillance of lobster management and exploitation. In addition to ensuring the use of appropriate and environmentally friendly fishing gear, there should be regulations on time-limited fishing ground closures. Prospective lobster farmers and exporters should be selected and limited, and the restocking obligations for exporters should take into account social and economic feasibility. Due to the high mortality rate, lobster cultivation development should be regulated to avoid resource scarcity.

4. Conclusion

Several conclusions can be drawn from the results of this study. Regulation No. 12/PERMEN-KP/2020 has not resulted in quantitative increases in income for lobster fishermen and other lobster fishery actors. It seems highly likely that this is a result of the legalization of lobster seed collection for export purposes which has resulted in an abundant seed (puerulus) supply from the fishermen leading to a reduction in lobster prices.The positive impact on lobster fishermen arising from the implementation of this regulation is an increase sense of security felt by the fishers who can be relaxed while doing their business since the regulation provides for legal permits to catch juvenile lobster. This has helped to minimize vertical conflict between the local communities and the government.

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