AN ANALYSIS OF SUITABLE WATER HUMBACK GROUPER (*Cromileptes altivelis)* FISH CULTIVATION IN THE WATERS OF THE KAMPUNG MESJID LAMA TALAWI DISTRICT BATUBARA REGENCY

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Abstract

Batu Bara Regency has the potential for Humback grouper cultivation in North Sumatra. The condition of the coastal area which is quite extensive can be used as an opportunity for marine fisheries cultivation. Marine aquaculture is a business activity that requires a lot of capital, with community involvement, and economic dependence on business activities is very high. One of the Subdistricts is developing a seawater aquaculture business in Batu Bara Regency, a district of Talawi, the Kampung Mesjid Lama . This research was conducted in March 2019 with the location of the Kampung Mesjid Lama as one of the coastal areas in the Batu Bara Regency which has potential fisheries resources, especially grouper fishponds. Assessment of water quality parameters to analyze land suitability in the Kampung Mesjid Lama . Suitability for Humback grouper aquaculture at Station 1 is 72%, Station 2 is 78%, Station 3 and 4 are 70%, station 5 is 72% and Station 6 is 76%. Based on these results it can be said that Station 1,3,4, and Station 5 are corresponding marginal, Station 2 and 6 are quite appropriate.

Keywords: *Land Suitability Analysis, Humback grouper, Desa Mesjid Lama.*

A. Introduction

The rapid growth of the world population today has resulted in the increasing need for protein. Therefore, the need for diversification of protein sources from fish continues to increase as well, in line with the development of various fish farming businesses, such as groupers. However, according to Soetomo (1997), judging from the low consumption of animal protein in Indonesia which is only 6.3 g / capita / day, it can be seen that the results of fish farming have not been able to meet the need for animal protein.

One of the districts in the East Coast region of North Sumatra that has great potential is the Batu Bara Regency. Administratively, Batu Bara District consists of 7 sub-districts and 151 villages / kelurahan with an area of 904.96 km2. In this region there are 21 coastal villages located in 5 sub-districts with a coast length of 58 km. With such area and length of the beach. of course the coastal area of Coal stores a huge potential, including: (1) Capture fisheries resources and high aquaculture resources; (2) Opportunities for mangrove nurseries; (3) Beaches that are potential to be developed as locations for coastal tourism and marine tourism. In addition, various data indicate that Batu Bara District is a high potential economic area. One indicator that can give a picture of this potential is the level of GDP per capita.

Batu Bara Regency is the highest in North Sumatra. The condition of the coastal area which is quite extensive can be used as an opportunity for marine fisheries cultivation. Marine aquaculture as a business activity that requires a lot of capital, with community involvement, and economic dependence on business activities is very high. One of the Subdistricts is developing a seawater aquaculture business in Batu Bara Regency, a district of Talawi, the Kampung Mesjid Lama. This region,has known as a provider of fish and shrimp, consumes sea water in North Sumatra. One of the cultivation is grouper cultivation. Humback groupe*r* cultivation has bright prospects for both the domestic market and export market and is very promising because the selling price is higher compared to other fish commodities for each kg, prices are relatively stable and grouper cultivation is still limited and not many other countries have developed it.

The existence of Humback grouper fish enlargement on ponds in the the Kampung Mesjid Lama. is known to more than 10 business units. To maintain the continuity of grouper aquaculture in enlargement activities, a number of fish hatchery groups were formed, which consisted of several farm business units. The obstacle that is often faced in the development of

marine aquaculture business is the decline in the quality standard of water quality in fish farming caused by environmental pollution due to the exchange of pond water from the surrounding area and the high waste from fish farming activities such as shrimp skin waste which can reach 5 tons / day. The above conditions were experienced by seawater fish farmers in the Kampung Mesjid Lama of Talawi District, Batu Bara District, who joined the humback grouper Cultivation group "Compact Together" with the group leader Mr. Ruslan Ritonga.

This hatchery group was formed in 2010, with a membership of 15 people, with an average ownership of farms of 8 plots, with an area of 16 m3 - 24 m3 each. Cultivated commodities include or mouse grouper. The cultivation system used is a semi-intensive system.

Data on seawater fish production in the Kompak Bersama Group shows that in 2010 fish seed production from 120,960 tails / year decreased to 100,720 tails / year in 2015. This was due to the lack of proper fish farming techniques. Data obtained from group leaders or program partners is known that environmental factors, especially floods, high intensity of rainfall and the resulting waste and lack of understanding of water quality management in grouper fishponds. Grouper is one type of reef fish that has high economic value and is widely cultivated in Indonesian marine waters. Humback grouper cultivation must carry out proper water quality management. Water quality is a key factor in the success of marine aquaculture including humback grouper cultivation. Analysis of the suitability of aquatic parameters for aquaculture commodities needs to be done for the cultivated commodities.

B. Method

This research was conducted in March 2019 with the location of the Kampung Mesjid Lama as one of the coastal areas in the Batu Bara District which has potential fisheries resources, especially humback grouper fish ponds. Assessment of water quality parameters to analyze land suitability in the Kampung Mesjid Lama is presented in Table 1.

Table 1. Assessment of water quality parameters for land suitability analysis

Parameter	Range	Rating Score (A)	Weight (B)	(A) x (B)
Depth	15-25 m	5	3	15
	4-14 m dan 14-24 m	3		
	<5 m dan >25 m	1		

Dissolved Oxygen	7-8 mg/l	5	3	15
	4-6 mg/l dan 8,5-9 mg/l	3		
	<3,5 mg/l dan >9 mg/l	1		
Brightness	5-10 m	5	3	15
	3-4 m dan 10,5-11 m	3		
	<2 m dan >11 m	1		
Salinity	30-34 ppt	5	3	15
	28-29 ppt dan 33,5-35 ppt	3		
	< 27 ppt dan >35 ppt	1		
Temperature	28°C-32°C	5	2	10
	20-27 °C dan 32,5-33°C	3		
	<20 °C dan >33 °C	1		
Flow Speed	20-50 m/s	5	2	10
	10-19 m/s dan 51-75 m/s	3		
	<10 m/s dan >75 m/s	1		
pH	7,7-8,0	5	2	10
	5-7,6 dan 8,1-9	3		
	<5 dan > 9	1		
Nitrate	0,9 mg/l – 3,2 mg/l	5	3	5
	0,02-0,8 mg/l dan 3,1-3,3 mg/l	3		
	<0,01 mg/l dan >3,3 mg/l	1		

Table 1. Assessment of water quality parameters for land suitability analysis (Next)

Parameter	**Range**	**Rating Score (A)**	**Weight (B)**	**(A) x (B)**
Phosphate	> 0,2-0,5 mg/l	5	3	15
	0,1-0,19 mg/l dan 0,49-0,6 mg/l	3		
	<0,2 mg/l dan >0,6 mg/l	1		
Maximum Total Score				100

The total score from the multiplication of parameter values with its weight is then used to determine the suitability class of humback grouper aquaculture land based on the characteristics of water quality and can be calculated by calculation (Ministry of Marine Affairs and Fisheries, 2002):

$$\frac{\text{Total Score}}{\text{Maximum Total Score}} x100$$

Information:
Conformity Evaluation is classified into several classes, namely:

1. Class S1: Very Suitable (Hightly Suitable) with a value of 85-100%
2. S2 Class: Quite Appropriate (Moderately Suitable) with a value of 75-84%
3. S3 class: According to Marginal (Marginally Suitable) with a value of 65-74%
4. Class N: Not Suitable with a value of <65%.

C. Discussion

The existence of grouper fish enlargement on ponds in the Kampung Mesjid Lama is known to more than 10 business units. To maintain the continuity of grouper aquaculture in enlargement activities, a number of fish hatchery groups were formed, which consisted of several farm business units. The location of water sampling is presented in Figure. 1.

Picture 1. Research Location MAP

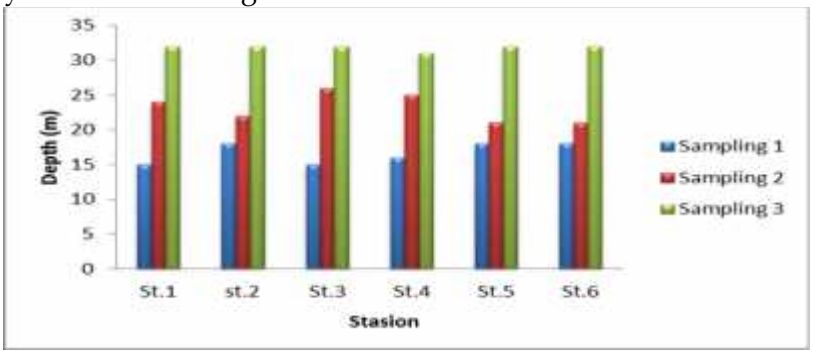
Water quality

The results of measurements of water quality for the location of Humback grouper cultivation in the Kampung Mesjid Lama of Batu Bara district can be seen in Table 2.

Table 2. Pond Water Quality Measurement Data

Variable	Range	Average	Information
Depth (m)	15 - 32	24	In situ
Dissolved Oxygen (mg / l)	5,20 - 10,5	8,4	In situ
Brightness (m)	8,61 - 12,71	9,46	*In situ*
Salinity (PPT)	33	33	*In situ*
Temperature (oC)	30	30	*In situ*
Flow Speed (cm / second)	0,03 - 0,15	0,06	*In situ*
Nitrate (mg / l)	0,918 - 1,011	0,908	Lab Bdp
Phosphate (mg / l)	0,721 - 0,921	0,81	Lab Bdp

The results of measuring the depth of the water for the location of Humback grouper cultivation in the Kampung Mesjid Lama of Batubara Regency can be seen in Figure 2.



Picture. 2. Pond depth

Based on Figure 2, it is known that the depth value in the waters of Kampung Mesjid, Batubara Regency ranges from 15 - 32 m for all stations with an average value of 24 m. These results are considered good enough to support Humback grouper aquaculture activities because according to Kordi and Andi (2005), the optimal depth of waters that can be used for Humback grouper aquaculture is in the range of 15-25 m (Table 1).

Dissolved Oxygen in the Kampung Mesjid of Batubara Regency. The results of measurements of oxygen content for the location of Humback grouper aquaculture in Kampung Mesjid, Batubara Regency can be seen in Figure 2.

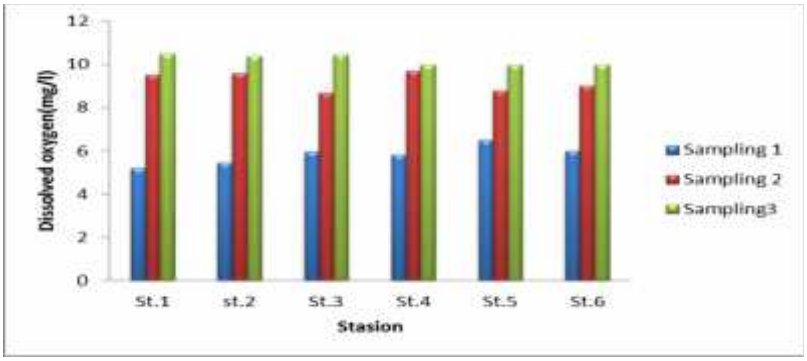


Figure 3. Dissolved oxygen content in the waters

Based on Figure 3 it is known that the results of dissolved oxygen content in the waters of the Kampung Mesijd of Batubara Regency ranged from 5.20 - 10.5 mg / l where the results of this sampling can be averaged by the amount of 8.40 mg / l. This means that the value of dissolved oxygen in the waters of the Kampung Mesijdof Batubara Regency is very good to support the condition of Humback grouper cultivation because groupers can live well with dissolved oxygen concentrations of more than 5 mg / l (Evalawati *et al*., 2001).

Temperature of the Water of the Kampung Mesijdin Batubara Regency

The temperature of the waters of the Kampung Mesjid in Batubara Regency has the same results in each location, which is 30oC. The good temperature for the cultivation of Humback grouper is between 28 - 32 oC (Table 1). The value of this temperature measurement also depends on the time of sampling. During the day the intensity of sunlight entering into a waters is more than in the morning and night. The water temperature at the research location is considered still good for the growth of Humback grouper according to Tiskiantoro (2006) which states that the optimal temperature for Humback grouper aquaculture C,altivelis is 27 - 32 ° C.

Salinity of the Water of the Kampung Mesijdin Batubara Regency

Salinity obtained in these waters is 33 ppt. Each station gets the same results. According to Kordi and Ghufran (2004) in the cultivation of good salinity Humback grouper is 33 - 35 ppt. Whereas explained in Table 1, that 33 ppt salinity is good salinity for Humback grouper aquaculture.

Brightness of the Water of the Kampung Mesjid in Batubara Regency

The brightness value for the location of Humback grouper cultivation in Kampung Mesjid, Batubara Regency can be seen in Figure 4.

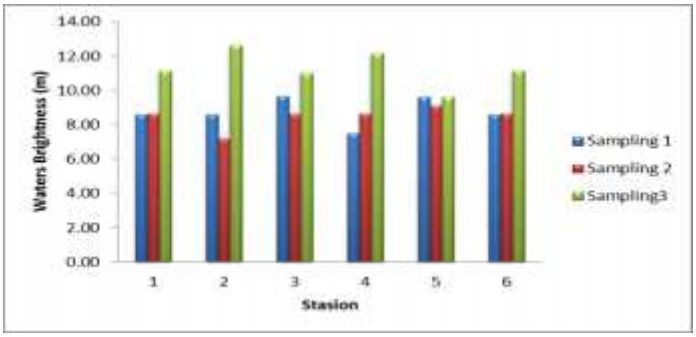


Figure 4. Waters Brightness

Based on Figure 4, it is known that the brightness in the waters of the eKampung Msjid of Batubara Regency has the lowest yield at 7.67 and the highest result is 12.67. Brightness in these waters is considered moderate for Humback grouper cultivation (BBL Lampung, 2001) (Table 1). This is because the more turbid the waters, the less light can enter and the brightness level will also be low (Mujito et al., 1997).

Speed of Flow of Water in the Kampung Mesjid of Batubara Regency.

The results of the current velocity measurements for the location of Humback grouper cultivation in Mesjid Village, Batubara Regency can be seen in Figure 5.

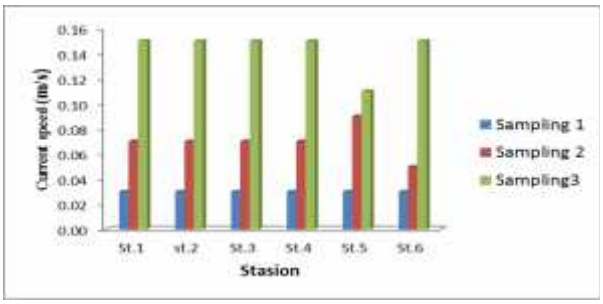


Figure 5. Current velocity in the waters of the Kampung Mesjid Lama Batubara Regency

Based on Figure 5 it is known that the current velocity in the waters of the Kampung Mesjid of Batubara Regency ranges from 0.03 - 0.15 m / s with an average of 0.06 m / s. This current speed is considered not suitable for Humback grouper aquaculture activities, this is in accordance with the opinion of the Department of Maritime Affairs and Fisheries (2002) which states that a good current velocity for enlarging Humback grouper is between 20-50 m/s (Table 1).

The Degree of Acidity (pH) of the Kampung Mesjid of Batubara Regency

The pH value obtained in the waters of the Kampung Mesjid of Batubara Regency is 6. This value is considered not good for the cultivation of Humback grouper because it is too acidic. Where a good pH for cultivation ranges from 5.5-9.0 (Kordi and Ghuffron, 2004). The influence of this pH can also affect the level of water fertility because it affects the life of microorganisms, including phytoplankton and zooplankton.

Nitrate of the Kampung Mesjid of Batubara Regency

The results of the measurement of nitrate content for the location of Humback grouper cultivation in Kampung Mesjid, Batubara Regency can be seen in Figure 6.

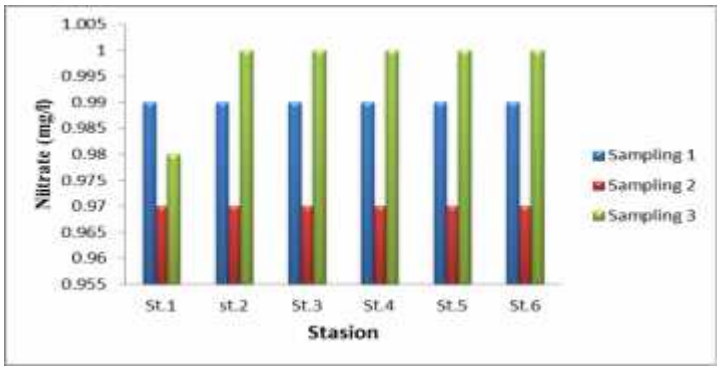


Figure 6. Nitrate content in the waters of the Kampung Mesjid of Batubara Regency

Based on Figure 6, it is known that the nitrate yield ranges from 0.918 - 1.011mg / l with the average value obtained is 0.908 mg / l. It can be said that the nitrate content in the waters of the Mosque Village of Batubara Regency is very good for Humback grouper aquaculture. In accordance with the opinion of the Department of Maritime Affairs and Fisheries (2002) which states that the nitrate concentration needed for marine cultivation is in the range of 0.9 - 3.2 mg / l.

Phosphate Waters of the Kampung Mesjid of Batubara Regency

The results of phosphate measurements for the location of Humback grouper cultivation in Kampung Mesjid, Batubara Regency can be seen in Figure 7.

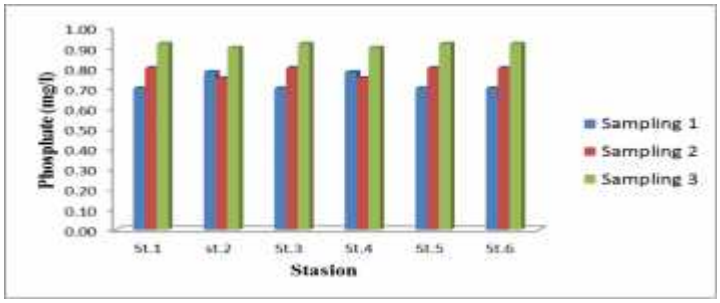


Figure 7. Phosphate content in the waters of the Kampung Mesjid of Batubara Regency

Based on Figure 7 it is known that phosphate in the waters of the Kampung Mesjid of Batubara Regency ranges from 0.721 mg / l - 0.921 mg / l with an average value of 0.810 mg / l. This value is suitable for Humback grouper cultivation because according to Wardoyo (2002), if the phosphate content is more than 0.051 mg / l, eating water can be said to be good. The standard quality of the maximum concentration of phosphate for the life of marine biota is 0.015 mg / l (KLH, 2004).

Suitability of the Waters of the Mosque Village in Batubara Regency

After data processing, weighting and scoring based on the water suitability assessment system for Humback grouper cultivation, the scoring results can be described in Tables 8, 9, 10,11,12 and 13.

Table 8. Suitability of waters for Humback grouper cultivation at Station 1

Variable	Average	(A)	(B)	Score
Water Depth	15	5	3	15
Dissolved Oxygen	5,4	3	3	9
Water Brightness	8,61	3	3	9
Salinity	33	5	3	15
Temperature	30	5	2	10
Flow Speed	0,03	1	2	2
Acidity	6	3	2	6
Nitrate	0,99	5	1	5
Phosphate	0,72	1	1	2
Total Score				**73**
Score Value (%)	**73%**			**73%**

Table 9. Suitability of waters for Humback grouper cultivation at Station **2**

Variable	Average	(A)	(B)	Score
Water Depth	18	5	3	15

Dissolved Oxygen	8	5	3	15
Water Brightness	8,61	3	3	9
Salinity	33	5	3	15
Temperature	30	5	2	10
Flow Speed	0,05	1	2	2
Acidity	6	3	2	6
Nitrate	0,91	5	1	5
Phosphate	0,72	1	1	1
Total Score				**78**
Score Value (%)	**78%**			**78%**

Table 10. Suitability of waters for Humback grouper cultivation at Station 3

Variable	Average	(A)	(B)	Score
Water Depth	25	5	3	15
Dissolved Oxygen	10,5	1	1	1
Water Brightness	9.00	5	3	15
Salinity	33	5	3	15
Temperature	30	5	2	10
Flow Speed	0,15	1	2	2
Acidity	6	3	2	6
Nitrate	0,98	5	1	5
Phosphate	0,8	1	1	1
Total Score	**70%**			**70**

Table 11. Suitability of waters for Humback grouper cultivation at Station 4

Variable	Average	(A)	(B)	Score
Water Depth	32	5	3	15
Dissolved Oxygen	8	5	3	15
Water Brightness	12.71	1	1	1
Salinity	33	5	3	15
Temperature	30	5	2	10

Table 12. Suitability of waters for Humback grouper cultivation at Station 4 (Next)

Variable	Average	(A)	(B)	Score
Flow Speed	0,07	1	2	2
Acidity	6	3	2	6

Nitrate	0,97	5	1	5
Phosphate	0,92	1	1	1
Total Score				**70**
Score Value (%)	**70%**			**70%**

Table 13. Suitability of waters for Humback grouper cultivation at Station 5

Variable	Average	(A)	(B)	Score
Water Depth	32	5	3	15
Dissolved Oxygen	10,5	5	3	15
Water Brightness	9,5	1	3	3
Salinity	33	5	3	15
Temperature	30	5	2	10
Flow Speed	0,05	1	2	2
Acidity	6	3	2	6
Nitrate	0,98	5	1	5
Phosphate	0,92	1	1	1
Total Score				**72**
Score Value (%)	**72%**			**72%**

Table Suitability of waters for Humback 13. grouper cultivation at Station **6**

Variable	Average	(A)	(B)	Score
Water Depth	21	5	3	15
Dissolved Oxygen	7,5	5	3	15
Water Brightness	9,6	1	3	3
Salinity	33	5	3	15
Temperature	30	5	2	10
Flow Speed	0,05	1	2	2
Acidity	6	3	2	6
Nitrate	0,98	5	1	5
Phosphate	0,8	5	1	5
Total Score				**76**
Score Value (%)	**76%**			**76%**

From Tables 8, 9, 10,11,12 and 13 it is known that the suitability for Humback grouper aquaculture at Station 1 is 72%, Station 2 is 78%, Station 3 and 4 are 70%, station 5 is 72% and Station 6 is 76%. Based on these results it

can be said that Station 1,3,4, and Station 5 are corresponding marginal, Station 2 and 6 are quite appropriate.

D. Conclusions

The results showed that the waters of the Kampung Mesjid Lama of Batu Bara Regency had a fairly appropriate level of water suitability (St 3), according to marginal (St 1 and St 2) and incompatible (St 4) for Humback grouper aquaculture (*Cromileptes altivelis*).

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