Original Research Article

Capture Area Compatibility with Map of Fishery Potential Area Based on Chlorophyl-A And Sea Surface Temperature in Aru Sea Waters-Indonesia

ABSTRACT

The Republic of Indonesia's Fisheries Management Area (Wilayah Pengelolaan Perikanan Negara Republik Indonesia) marine waters is an area with high capture fisheries potential, reaching 20% of the national fish potential. Fishing is often hampered by the lack of information related to Fishing Potential Zones, resulting in reduced efficiency. The solution offered is to utilize geographic information systems (GIS) or remote sensing with aqua MODIS satellite images of chlorophyll-a and sea surface temperature as data for mapping potential fishing zones. The objectives of this research are to understand the operation of purse seines, analyze the influence of sea surface temperature and chlorophyll-a on purse seine catches, and determine the level of suitability of fishing areas with maps of potential fishing zones. To answer the objective, non-experimental based applied research was conducted with a case study approach, survey method and correlation approach to determine the effect of chlorophyll-a and sea surface temperature variables on catches. Based on the results of research with small pelagic purse seine vessels with fish collecting aids using FADs and attractor lights with the main catches being Deles flyfish, mackerel men, Bengal flyfish and lemuru. As for the results of statistical testing, there is an influence of chlorophyll-a and sea surface temperature simultaneously and partially on the catch by giving an influence of 73.6%. With the distribution of chlorophyll-a concentration and sea surface temperature in the KM fishing area. The level of conformity of fishing areas with maps of potential fishing zones on fishing trips from December 2020 to April 2021 reached a percentage of conformity of 55.93% with a total catch of 209,360 Kg, indicating the selection of fishing areas by conventional skippers on KM XXX compared to the forecast of fishing areas using aqua MODIS satellite imagery remote sensing technology can be categorized as good even though it only relies on experience and information aboutfishing areas from other vessels.

Keywords: capture area, aru sea, sea surface temperature, chlorophyll-a

1. INTRODUCTION

The State Fisheries Management Area of the Republic of Indonesia around the Aru Sea waters is an area with the highest capture fisheries potential compared to other waters. [1] states that the potential of the waters around the Aru Sea is 1.99 million tons / year or reaches

20% of the national fish potential. Fishing by local fishermen in Aru Sea waters is hampered by the lack of information related to the Zone of Potential Fishing, resulting in reduced fishing efficiency and productivity. The solution offered is to utilize geographic information systems (GIS) as well as remote sensing technology with aqua MODIS satellite images of chlorophyll-a and sea surface temperature as data for mapping potential fishing zones. Oceanographic factors that can be related to the high productivity in the waters are the distribution of chlorophyll-a concentration and sea surface temperature (SST)

SST is used as a marker in determining fertility because it has an impact on the metabolic processes, breeding and distribution of marine organisms. [2] on the other hand, chlorophyll-a concentration can be used as a reference in aquatic fertility indicators [3]. [3]. [4] explained, chlorophyll-a and SPL have a role in influencing fluctuations in the number of fish catches. chlorophyll-a concentration of 0.22 - 4.35 mg/m3. Research conducted [5] concluded that the SPL distribution pattern in the Bali Strait in the east season tends to be lower followed by high chlorophyll-a in this season. This phenomenon is caused by ARMONDO (Indonesian monsoon current) bringing low SPL to the waters of the Bali Strait from the Indian Ocean and also the influence of the upwelling phenomenon. Measuring SPL and chlorophyll-a directly in the field requires high operational costs, so other alternatives are needed to obtain data. One alternative that can be used is remote sensing techniques.

Remote sensing can provide information about objects, areas, and phenomena, done through analyzing data obtained from devices without direct contact with objects. [6]. The Aqua MODIS (Moderate Imaging spectroradiometer) satellite is one of the satellites that can be utilized in obtaining chlorophyll-a and SPL data. [7], [[8] and [[9] have conducted a study on the concentration of chlorophyll-a and SPL with the number of fish catches. The study used monthly Aqua MODIS level 3 data.

This research is an effort to understand the operation of purse seines, analyze the effect of sea surface temperature and chlorophyll-a on purse seine catches, and determine the level of suitability of fishing areas with potential fishing zone maps. To answer that, research will be carried out using a non-experimental based applied research method with a case study approach, survey method and correlational approach to determine the effect of chlorophyll-a and sea surface temperature variables on catches. The variables and data used are fishing area coordinate data, catch data, chlorophyll-a image data and sea surface temperature image for mapping data.

2. MATERIALS AND METHODS

The research time period is December 2020 to April 2021. Research through direct fishing activities using a 170 GT vessel with purse seine gear operating area, namely Aru Sea waters, Indonesia. The tools used hardware, namely laptops and computers with the software needed in this research are SEADAS, SAGA, QGIS, Ms. Excel and SPSS. Data on the distribution of SST and chlorophyll-a used in the study are data from Aqua MODIS level 1x1 kilometer resolution downloaded on the page https://oceancolor.gsfc.nasa.gov/. Aqua MODIS level 3 data has an algorithm for the process of obtaining geophysical data (temperature, brightness, radiance, cloud mask, and NDVI) (21).

The research method used is non-experimental based research with a case study approach. Through a method to collect and analyze data regarding a case. In conducting research using an approach with survey methods. In addition, in making a map of potential fishing zones, this research also uses a correlational approach because it examines the truth of a hypothesis, in accordance with scientific and statistical rules in this case, namely proving whether or not

there is a relationship between the independent variables, namely chlorophyll-a and sea surface temperature with the non-independent variable, namely the catch of purse seines as a first step before going to the next stage for making a map of potential fishing zones.
The correlation approach is a study designed to determine the level of relationship between different variables in a population. The main difference with other approaches is that there is an attempt to estimate the relationship and not just a description. Through this correlation approach, researchers can find out how much the independent variables contribute to the dependent variable and the direction of the relationship that occurs. [10].

The variables used in this study are independent variables and non-independent variables. Independent variables, are variables that cause or have a theoretical possibility of having an impact on other variables. Meanwhile, the dependent variable is a variable that is structurally scientific thinking to be a variable that is caused by changes in other variables. [11] The independent variables in this study are the value of the aqua satellite image of chlorophyll-a in units (mg/m³) and sea surface temperature in units of degrees Celsius (ºC) according to the coordinates of the fishing area in the form of latitude and longitude positions. The independent variable used is the purse seine catch in kilograms (Kg) which will then be analyzed whether there is an influence of the two variables. As an indicator in this study is the effect of independent variables on the independent variable either partially (each independent variable on the independent variable) or simultaneously (together) and the amount of influence of both on the independent variable (chlorophyll-a and sea surface temperature on catch).

Analysis of the Effect of Chlorophyll-a and Sea Surface Temperature on Catch
The analysis used is multiple linear regression because it uses one dependent variable, namely purse seine of catch production and two independent variables, namely sea surface temperature and chlorophyll-a using the SPSS statistical calculation application.
According to [12], regression equations are analyzed to explain the causal relationship of factors of production to the output produced. The values obtained from regression analysis are the t-count, F-count and the coefficient of determination (R2). The t-count value is used to statistically test whether the regression coefficient of each independent variable (Xn) used separately has a real effect or not on the non-independent parameter (Y).
In processing MODIS data, SEADAS 7.5.3 software was used, which is open sources software designed for image processing such as SeaWifs and Terra/Aqua MODIS. In processing, the results obtained are Aqua MODIS images at level 3. Aqua MODIS level 3 imagery already produces sea surface temperature values in units of degrees Celsius (°C) and chlorophyll-a (mg/m³).

3. RESULTS AND DISCUSSION

Fishing Area

Fishing Areas in December distributed the distribution of fishing areas in December 2020 around 04º 51' 06" - 05º 48' 14" LS and 136º 10' 26" - 136º 40' 35". The biggest catch in December was 14,420 kg at the coordinates 05º 08' 39" - 136º 22' 07" while the lowest catch was 80 Kg at 05º 08' 52" - 136º 22' 04". The distribution of fishing grounds in January 2021 is around 05º 03' 24" - 05º 04' 07" LS and 136º 35' 02" - 136º 34' 40". The largest catch in January was 6,330 kg at coordinates 05º 03' 26" - 136º 36' 38" (coordinate number 1 in the figure) while the lowest catch was 1,530 Kg at 05º 04' 07" - 136º 34' 40".
The distribution of fishing grounds in February 2021 is around 05º 03' 26" - 05º 04' 09" N and 136º 35' 02" - 136º 36' 38". The largest catch in February was 6,330 kg at coordinates 05º 03' 24" - 136º 36' 38" while the lowest catch was 50 Kg at 05º 03' 24" - 136º 35' 02"**. The** results of the distribution of fishing grounds in March 2021 are around 04º 55' 36" - 05º 16' 01" N and 136º 18' 15" - 136º 36' 32". The largest catch in March was 6,760 kg at coordinates 05º 09' 58" - 136º 28' 04" while the lowest catch was 90 Kg at 05º 04' 11" - 136º 30' 02". While the

distribution of fishing grounds in April 2021 was around 04º 49' 11" - 05º 20' 09" N and 136º 00' 06" - 136º 31' 25". The largest catch in April was 21,000 Kg at coordinates 04º 52' 03" - 136º 15' 43" while the lowest catch was 26 Kg at 05º 01' 06" - 136º 31' 25" (Figure 1).

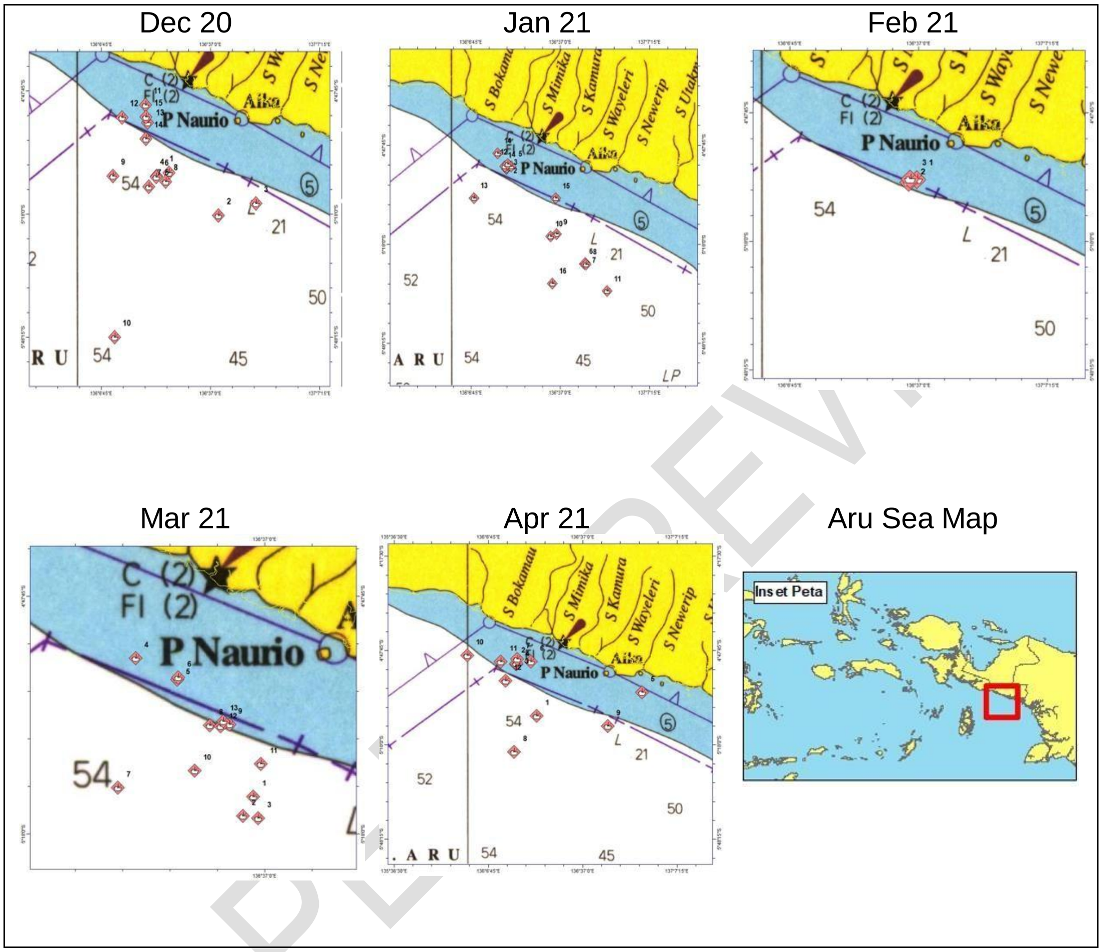

Figure 1. Fishing Areas December 2020 to April 2021

Catch Yield and Composition

Based on the catch results that in the research activities from December 2020 to April 2021 experienced a downward trend observed through the number of catches per *setting* in each month which tended to decrease (Table 1).

Table 1. Average Catch Per *Setting* December 2020 to April 2021

Type of Fish	December (Kg)	January (Kg)	February (Kg)	March (Kg)	April (Kg)
Deles kite (*Decapterus macrosoma*)	51950	13680	1870	4550	580
Male Mackerel (*Rastrelliger kanagurta*)	2660	12970	270	5870	6600
Bengal Kite (*Decapterus russelli)*	9290	3270	1380	3110	2430
Lemuru (*Sardinella lemuru*)	5420	19740	7560	23490	23560
Bycath	1270	890	0	3351	4389
Number of *settings*	15	16	3	13	12

Total catch (Kg)	70.590	50.560	11.080	40.371	37.559
Average per *setting*	4.706	3.160	3.693	3.105	3.130

This is due to significant changes in the value of oceanographic parameters (chlorophyll-a and sea surface temperature) when observed through the distribution map of chlorophyll-a and sea surface temperature. The chlorophyll-a content in December which stabilized at a value of 0.19 - 7.31 mg/m³ increased in the following month but the sea surface temperature increased and peaked in March reaching 31.23 °C. The occurrence of the *upwelling* phenomenon is indicated by a decrease in sea surface temperature and the high nutrient content of the area compared to the surrounding area. The high nutrient content stimulates the development of phytoplankton on the surface.

The development of phytoplankton is closely related to the level of fertility of waters, so the process of rising water is always associated with increasing primary productivity in a body of water and is always followed by an increase in the fish population in these waters or can also be called a *fishing ground.* [2]*. The* type of fish caught experienced a drastic decrease (Table 1) was deles flyfish but on the other hand lemuru fish experienced a significant increase in numbers followed by mackerel men according to information obtained from the crew that indeed in January to April there was a fishing season for mackerel men in Aru Sea waters.

However, this is also accompanied by a decrease in the catch of deles and benggol kites so that low-economic fish such as lemuru, which in the fishing season from August to December becomes *discarded catch,* begins to be taken back and enters the catch in December - April to cover the lack of production of fish with high economic value which begins to decrease. This is in accordance with the report on the production of fish landed at PPP Bajomulyo from 2017 to 2020, if observed, there is always the same trend, namely an increase in catch production from October to December and a downward trend in catch production from January to April.

The highest catch production in the study was highest in December by getting a total catch of 70,590 Kg with the composition of the dominant fish species caught, namely Deles layang fish amounting to 51,950 Kg, while the lowest catch in February was 11,080 Kg with the composition of the dominant fish species caught, namely lemuru fish with an amount of 7,560 Kg.

Conformity of Fishing Areas with Fishing Potential Zone Map

Analysis of the Effect of Chlorophyll-a and Sea Surface Temperature on Catches, it is known that the Sig. value for the effect of X1 on Y is 0.000 <0.05 and the t value is 8.270> t table 2.003, so it can be concluded that H1 is accepted which means there is an effect of Chlorophyll-a (X1) on Catches (Y). While the Sig. value for the effect of X2 on Y is 0.000 < 0.05 and the t value is 3.978 > t table 2.003, so it can be concluded that H2 is accepted which means there is an effect of Sea Surface Temperature (X2) on Catch (Y) (table 1).

Table 2. t test Effect of Chlorophyll-a and Sea Surface Temperature on Catches

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	-108914.635	27090.100		-4.020	.000
	Chlorophyll-a (X1)	4141.220	500.730	.656	8.270	.000
	SPL (X2)	3578.824	899.559	.315	3.978	.000

a. Dependent Variable: Catch (Y)

Based on the output above, it is known that the significance value for the simultaneous effect of X1 and X2 on Y is 0.000 < 0.05 and the value of F count 78.139 > F table 3.16, so it can be concluded that H3 is accepted which means that there is an effect of Chlorophyll-a (X1) and Sea Surface Temperature (X2) simultaneously on Catch (Y) in (table 2).

Table 3. F test Effect of Chlorophyll-a and Sea Surface Temperature on Catches

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.349E8	2	3.675E8	78.139	.000[a]
	Residuals	2.633E8	56	4702631.691		
	Total	9.983E8	58			

a. Predictors: (Constant), SPL (X2), Chlorophyll-a (X1)

While based on the output of Table 3, it is known that the R Square value is 0.736, this means that the effect of Chlorophyll-a (X1) and Sea Surface Temperature (X2) simultaneously on Catch (Y) is 73.6%. These results differ from the cross-correlation test between chlorophyll-a and the number of fish catches showing positive correlation results at the 4th lag of the month. While the correlation of SPL to the number of fish catches in the Gulf of Bali shows a positive correlation. [220].

Table 4. Coefficient of Determination

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.858[a]	.736	.727	2168.55521

b. Predictors: (Constant), SPL (X2), Chlorophyll-a (X1)

c. Dependent Variable: Catch (Y)

Chlorophyll-a Distribution

Chlorophyll-a is one of the parameters that determine primary productivity in the ocean. The distribution and high and low concentrations of chlorophyll-a are closely related to the oceanographic conditions of a body of water. Chlorophyll-a content can be used as a measure of the amount of phytoplankton in certain waters and can be used as a clue to the productivity of waters. The distribution of chlorophyll-a in the sea varies geographically and by water depth. These variations are caused by differences in sunlight intensity, and nutrient concentrations in the waters.

The distribution of chlorophyll-a in the open sea is higher in coastal and coastal waters, and lower in offshore waters. The high distribution of chlorophyll-a concentration in coastal and coastal waters is due to the supply of large amounts of nutrients through *run-off* from land, while the low concentration of chlorophyll-a in offshore waters is due to the absence of direct supply of nutrients from land. In summary, chlorophyll-a was highest in Feb 2021 and lowest in Jan 2021 (Figure 2). Monthly details of chlorophyll-a distribution in Aru Sea waters in December 2020 ranged from 0.19 - 7.31 mg/m³. Distribution of fishing in December at a chlorophyll-a content of 0.38 - 0.82 mg/m³. The largest catch in December was 14,420 kg at a chlorophyll-a content of 0.82 mg/m³ while the lowest catch was 80 kg at a chlorophyll-a content of 0.48 mg/m³.

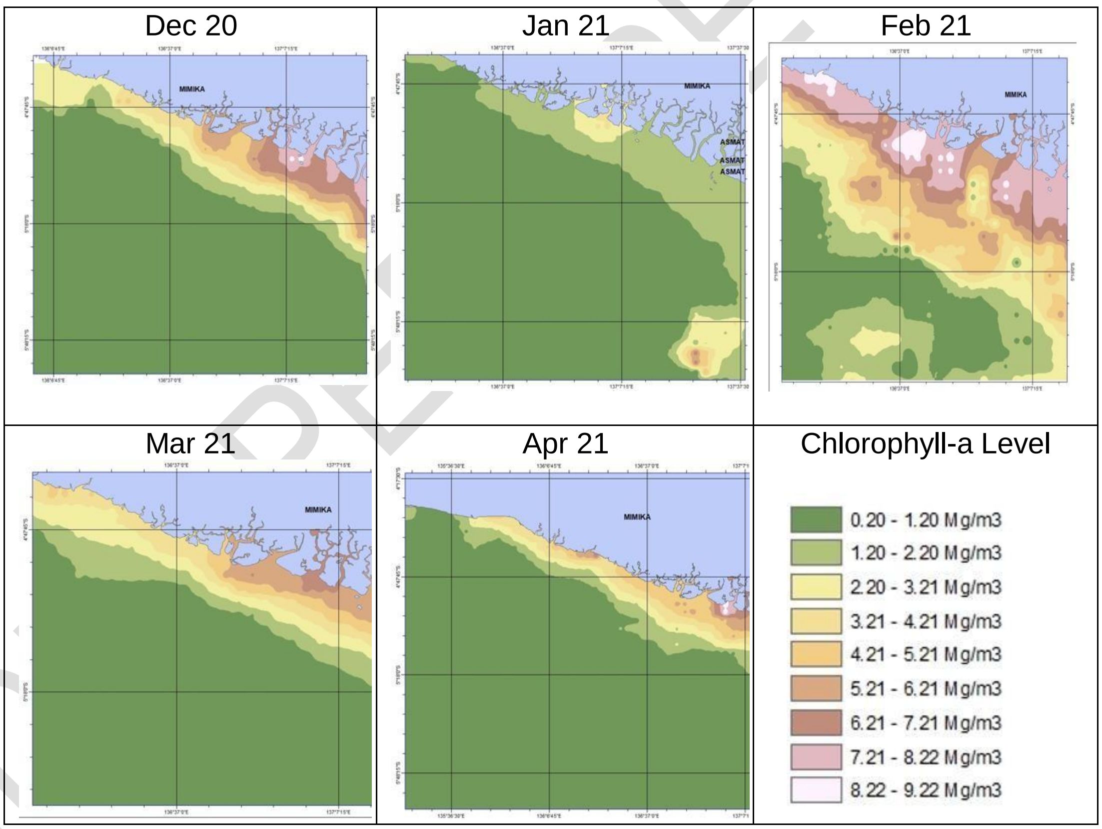

Figure 2. Chlorophyll-a Map Aru Sea December 2020 - April 2021

Chlorophyll-a distribution in Aru Sea waters in January 2021 ranged from 0.24 - 28.42 mg/m³. Distribution of fishing in January at a chlorophyll-a content of 0.49 - 03.35 mg/m³. The largest catch in January was 15,060 kg at a chlorophyll-a content of 3.35 mg/m³ while the lowest catch was 50 kg at a chlorophyll-a content of 0.49 mg/m³. The distribution of chlorophyll-a in Aru

Sea waters in February 2021 ranged from 0.93 - 3.94 mg/m³. Distribution of fishing in February at a chlorophyll-a content of 2.27 - 2.32 mg/m³. The largest catch in February was 6,330 kg at a chlorophyll-a content of 2.32 mg/m³ while the lowest catch was 1,530 kg at a chlorophyll-a content of 2.27 mg/m³. If it is observed that the content of chlorophyll-a value in February has increased from the previous month and with the number of settings that are only 3 times it can be seen to get a catch of 11,080 Kg this is due to entering the western season according to [13], revealing that the *upwelling* phenomenon that occurs in the Aru sea waters during the western season can occur on a small to medium scale. The increase in nutrients from the bottom of the waters will certainly have a positive impact on the fertility of the waters, thus supporting the availability of food in the aquatic ecosystem.

Chlorophyll-a distribution in Aru Sea waters in March 2021 ranged from 0.20 - 9.22 mg/m³. Distribution of fishing in March at a chlorophyll-a content of 0.33 - 1.19 mg/m³. The largest catch in March was 6,760 kg at a chlorophyll-a content of 1.15 mg/m³ while the lowest catch was 90 kg at a chlorophyll-a content of 0.41 mg/m³.

Chlorophyll-a distribution in Aru Sea waters in April 2021 (ranged from 0.15 - 6.88 mg/m³. Distribution of fishing in April at a chlorophyll-a content of 0.31 - 1.61 mg/m³. The largest catch in April was 21,000 kg at a chlorophyll-a content of 0.90 mg/m³ while the lowest catch was 90 kg at a chlorophyll-a content of 1.61 mg/m³. This study differs from research in the waters of Aceh Besar waters was 1.53 mg/m3 in December and the lowest concentration of chlorophyll-a in June and September was 0.20 mg/m3 [14]. The highest average chlorophyll-a concentration in Aceh Besar waters was 1.53 mg/m3 in December and the lowest concentration of chlorophyll-a in June and September was 0.20 mg/m3. Chlorophyll-a is a green pigment found in phytoplankton where the movement of phytoplankton is strongly influenced by currents [18]. Fish react directly to the current by orienting themselves directly to the current [19].

Sea Surface Temperature Distribution

Circular sea surface temperature results (Figure 3) with the highest month in Feb 2021 and the lowest in Dec 2020. The condition of fish in a body of water has a close relationship with oceanographic parameters, one of which is temperature. Temperature is one of the oceanographic parameters that has a very dominant influence, especially on the life of a fish species and generally on marine resources [15]. Sea surface temperature (SST) is one of the oceanographic parameters that characterizes the mass of water in the ocean and is related to the state of the seawater layer underneath, so it can be used in analyzing phenomena that occur in the ocean. Temperature is an important factor for the life of organisms in the sea that can affect metabolic activity and development, in addition to being an indicator of climate change phenomena. [16]. According to [17] SST conditions in Papua waters tend to be warm due to the position of the sun in the southern hemisphere with SST ranging from 30°C - 32°C. [3]

So by knowing information on changes in sea surface temperature, the potential areas for fishing can be known. This information can be used by fishermen in fishing activities, so that fishing will become more efficient and effective.

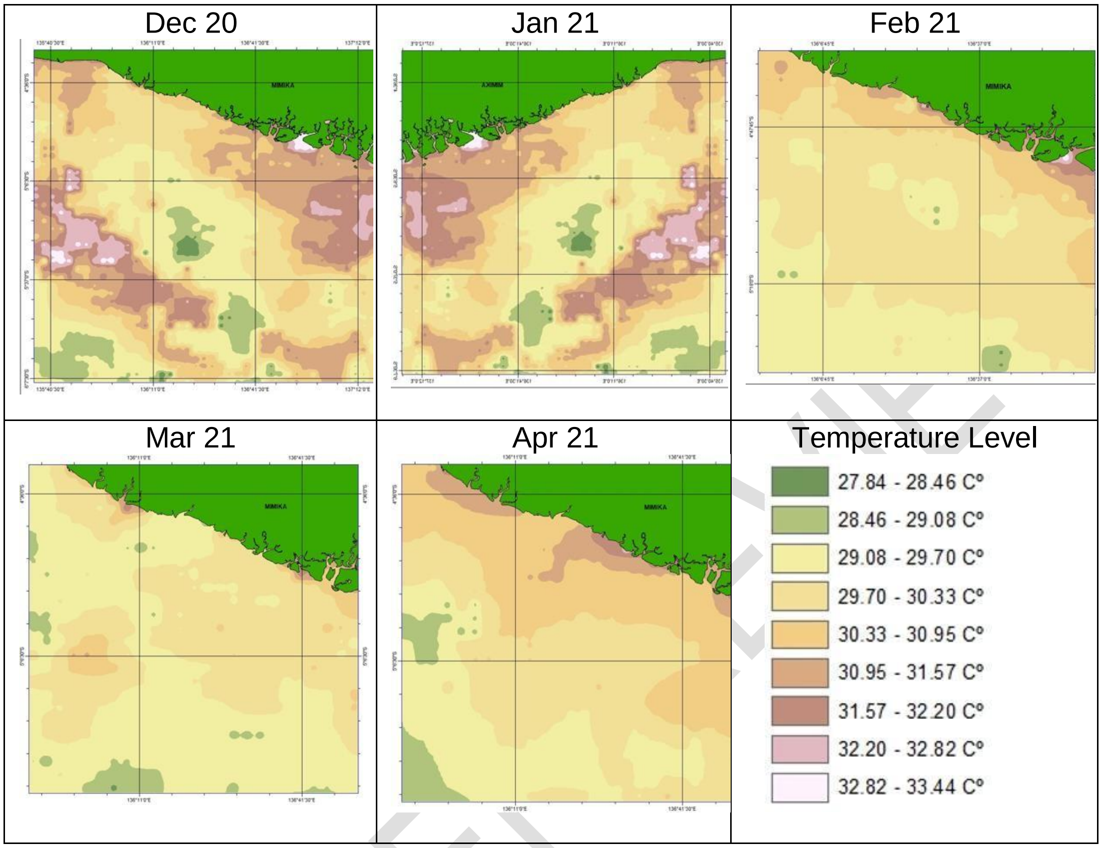

Figure 3. SST Distribution Map Aru Sea December 2020 - April 2021

The distribution of sea surface temperature in Aru Sea waters in December 2020 ranged from 28.33 - 33.96 °C. The distribution of fishing in December at a temperature of 29.59 - 31.32 °C. The largest catch in December was 14,420 kg at 30.82 °C while the lowest catch was 80 kg at 29.62 °C. The distribution of sea surface temperature in Aru Sea waters in January 2021 ranged from 28.32 - 33.94 °C. The distribution of fishing in January at a temperature of 29.93 - 31.23 °C. The largest catch in January was 15,060 Kg at 30.25°C while the lowest catch was 50 Kg at 30.82°C.

The distribution of sea surface temperature in Aru Sea waters in February 2021 ranged from 27.55 - 34.41 °C. The distribution of fishing in February at a temperature of 29.86 - 30.27 °C. The largest catch in February was 6,330 kg at 30.27 °C while the lowest catch was 1,530 kg at 29.86 °C. The distribution of sea surface temperature in Aru Sea waters in March 2021 ranged from 29.60 - 34.13 °C. The distribution of fishing in March at a temperature of 31.10 - 31.25 °C. The largest catch in March was 6,760 kg at 31.11°C while the lowest catch was 90 kg at 31.23°C. The distribution of sea surface temperature in Aru Sea waters in April 2021 ranged from 27.84 - 33.44 °C. The distribution of fishing in April at a temperature of 29.73 - 31.26 °C. The largest catch in April was 21,000 Kg at 30.33°C while the lowest catch was 26 Kg at 31.26°C. The results of this study are slightly different results found the highest sea surface temperature value was in April at 31.62°C and the lowest temperature was in December at 28.45°C. The water temperature becomes low when the rainfall is high [18]. Sea surface temperature in waters can also be influenced by patterns of movement of the sun, wind, and air pressure [19].

Map of Fishing Potential Zones

Predictions of potential fish zones in Aru Sea waters in December 2020 are spread in waters around Mimika Regency. With chlorophyll-a oceanographic parameters with a fairly high range of distribution values of 0.19 - 7.31 Mg/m^3 and sea surface temperature with a range of distribution values of 28.33 - 33.96 ºC. while the distribution of chlorophyll-a values and sea surface temperature in fishing areas is 0.38 - 0.82 Mg/m^3 and 29.59 - 31.32 ºC. In the Western season (December), the chlorophyll-a concentration value continues to decrease until it is in the range of 0.1 mg/m3 and is relatively stable again until February. Seasonal changes result in changes in hydrological conditions of the waters, where in the eastern season (June-September) causes *upwelling* and in the western season (December-March) *downwelling* occurs [2]. [2] Predictions of potential fish zones in the Aru Sea waters in January 2021 are spread in the waters around Mimika Regency but with a farther radius than the previous month. With chlorophyll-a oceanographic parameters with a higher range of distribution values than the previous month, namely 0.24 - 8.42 Mg/m^3 and sea surface temperature with a range of distribution values of 28.32 - 33.94 ºC. while the distribution of chlorophyll-a and sea surface temperature values in fishing areas in January is 0.49 - 3.35 Mg/m^3 and 29.93 - 31.23 ºC. Prediction of potential fish zones in the Aru Sea waters in February 2021 is hampered due to cloud-covered satellite image data. This is in accordance with the weather conditions in February which experienced the peak of bad weather, namely the occurrence of high waves and storms that affected the fishing process.

Chlorophyll-a oceanographic parameters with a higher range of distribution values than the previous month, namely 0.24 - 8.42 Mg/m^3 and sea surface temperature with a range of distribution values of 28.32 - 33.94 ºC. while the distribution of chlorophyll-a and sea surface temperature values in the fishing area in January is 0.49 - 3.35 Mg/m^3 and 29.93 - 31.23 ºC. When observed from the distribution of chlorophyll-a values and sea surface temperature and also the average catch, it can be said that the potential for fishing is relatively high but the weather conditions are less favorable. Prediction of potential fish zones in Aru Sea waters in March 2021 with chlorophyll-a oceanographic parameters with a fairly high distribution value range of 0.20 - 9.22 Mg/m^3 and sea surface temperature with a distribution value range of 29.60 - 34.13 ºC. While the distribution of chlorophyll-a and sea surface temperature values in the fishing area is 0.33 - 1.19 Mg/m^3 and 31.10 - 31.25 ºC. The sea surface temperature detected in March 2021 has increased with an average temperature of 31.15 ºC warmer than the average temperature in other months. Predictions of potential fish zones in the Aru Sea waters in April 2021 are spread in the waters around Mimika Regency with a closer radius from land. With chlorophyll-a oceanographic parameters with a fairly high range of distribution values of 0.15 - 6.88 Mg/m^3 and sea surface temperature with a range of distribution values of 27.84 - 33.44 ºC. while the distribution of chlorophyll-a values and sea surface temperature in fishing areas is 0.31 - 1.61 Mg/m^3 and 29.73 - 31.26 ºC. Fishing zones in the waters of Aceh Besar also differ between months of fishing time [14].

Fishing Area Suitability Map

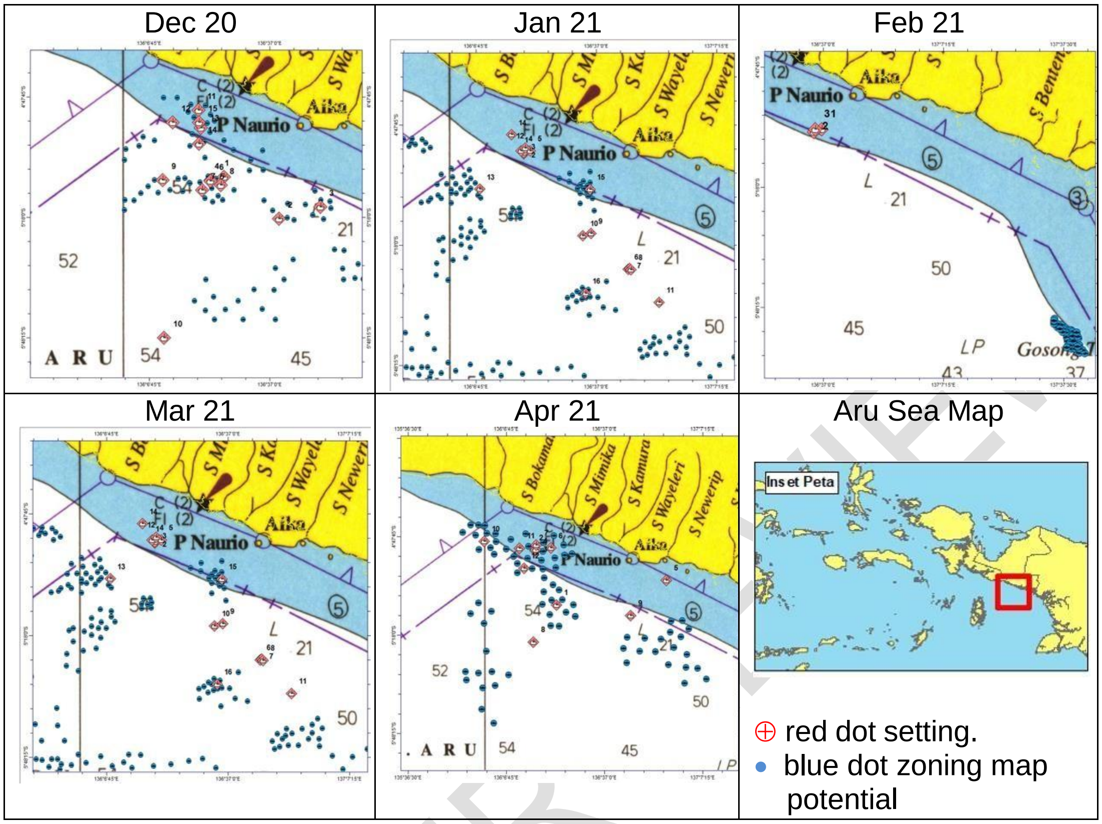

Figure 4. Fishing Potential Zone Map in Aru Sea December 2020 - April 2021

In December 2020, setting 15 times with 13 fishing area coordinates that match the fishing potential zone map and 2 fishing area coordinates that do not match. The percentage of the fishing area suitability rate is 86.66% with a total catch of 70,590 Kg. In January, *setting* 16 times with 3 fishing area coordinates that match the fishing potential zone map and 13 fishing area coordinates that do not match. The percentage of the fishing area suitability rate was 18.75% with a total catch of 50,960 Kg (Figure 4).

In February 2021, the *setting* was carried out 3 times and there was no conformity with the potential fishing zone map because it was hampered by image data that was not detected due to cloud cover so that potential areas were only detected at coordinates that were not covered by clouds, namely entering the southwest of the Asmat area. The percentage of the fishing area suitability level is 00.00% with a total catch of 11,080 Kg. In March 2021, the *setting* was carried out 13 times with 8 coordinates of fishing areas that were in accordance with the potential fishing zone map and 5 coordinates of fishing areas that were not suitable. The percentage of the fishing area suitability level is 61.54% with a total catch of 40,371 Kg. In April 2021, *setting* 12 times with 9 fishing area coordinates that match the fishing potential zone map and 3 fishing area coordinates that do not match. The percentage of the fishing area suitability level is 75.00% with a total catch of 37,559 Kg.

Based on the diagram above, the results of the highest level of suitability of fishing areas were obtained in December 2020. 15 *settings* were made with 13 coordinates of fishing areas that

were in accordance with the fishing potential zone map and 2 coordinates of fishing areas that were not suitable with a percentage of 86.66% getting a catch of 70,590 Kg. while the lowest level of suitability occurred in February with 3 *settings* and a percentage of suitability of 00.00% with a total catch of 11,080 Kg.
So it can be concluded that the level of suitability of fishing areas with a map of potential fishing zones in terms of chlorophyll-a and sea surface temperature on fishing trips from December 2020 to April 2021 with a total of 59 *settings* there are 33 suitable fishing areas and 26 fishing areas that are not suitable, with a percentage of 55.93% with a total catch of 209,360 Kg which indicates that the selection of fishing areas is good even though it only relies on experience and information about fishing areas from other vessels.

4. CONCLUSION

Based on the results of the study there is an effect of chlorophyll-a and sea surface temperature simultaneously and partially on the catch by giving an effect of 73.6%. With the distribution of chlorophyll-a concentrations in the highest fishing area of 3.35 Mg/m^3 and the lowest of 0.30 Mg/m^3 and the distribution of sea surface temperature concentrations in the highest fishing area of 31.32 ºC and the lowest of 29.59 ºC.

The level of conformity of fishing areas in the Aru Sea waters with a map of potential fishing zones on fishing trips from December 2020 to April 2021 reached a percentage of conformity of 55.93% with a total catch of 209,360 Kg, indicating that the selection of fishing areas using remote sensing technology of aqua MODIS satellite imagery can be categorized as good compared to conventional fishing area forecasts.

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