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The Impact of Rainfall and Wind Speed on The Outcome of Catching Swanggi Fish Using Cantrang Catch Tools in Brondong National Fishing Port (PPN)

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Abstract

Indonesia has a wealth of natural resources, especially in the fishing sector. The waters of Lamongan are one of the areas that has the potential of swanggi fishing that dominates the fishing sector by catching cantrang fish. The research is aimed at providing information to the Brondong National Fishing Port (PPN) and fishermen around the area about the impact of rainfall and wind speed on the catch of swanggi fish. The results of linear regression method analysis using T test, F test and determination test. The result of lineary regression test T test showed that the regression value of the rainfall variable to catch of fish is the value of sig.<0,05 while the variable of wind speed to Catch of Fish is the number of sig.>0,05. The determination test result of R^2 is 0.445, which means that the variable rainfall and wind speed influenced 44.5% on the catch of the swanggi fish and the rest was affected by other factors.

Keywords: Rainfall, Wind Speed, Swanggi Fish, Linear Regression

1. INTRODUCTION

Indonesia is located in the geographical region exactly between the two oceans, the Indian Ocean and the Pacific Ocean, which means that most of the fish can be found in Indonesian waters as the sea area reaches 3.25 million km2. Indonesia is often referred to as the world's largest island country with a coastline length of more than 95,181 km and a total of 17,499 islands stretching from Sabang to Merauke [1]. Potentials in Indonesia's fishing sector include fishing and farming, which is about 67 million tons per year, where there are some kinds of potential that have high economic value. Increased fish production potential adapts to the fishing industry that will continue to grow and thrive. In addition, the potential of the fishing sector can enhance the success of the country's economy, then it is expected that the regions that have resources in the fisheries sector to make growth to advance the economy of the nation. One of the areas that has the potential of the fishing sector is the Lamongan district. Lamongan District is an area with the potential for the fisheries sector that is located in the northern part of East Java Province. The potential of resources that Lamongan County has is in the marine field because it is directly adjacent to the Java Sea in the North and has a coastline that extends for 47 km [3]. One of the locations of the fishing sector in Lamongan district is the Nusantara Fishing Port (PPN) of Brondong. The fishing port is included in the scope of the largest fishing harbour in Eastern Java with the total catch production reached 248.504 kg in October 2022. One of the types of fish captured in Nusantara Brondong Fishing Harbour (PPNB) is Swanggi Fish or Eye Big.

The swanggi (Priacanthus tayenus) is a species of demersal fish that has special characteristics of red colour, has large eyes and has a spotted coloured stain on the seals in its belly [4]. Besides, swanggi fish have great potential in supporting the satisfaction of food needs. This species of swanggi has an unbearable ability to withstand the pressure of catching, if the catch effort increases then it will show signs like "satisfaction" that ends in overfshing [5]. Catching swanggi fish usually uses catching cantrang fish. Cantrang is a mistaken

modification of a commonly used basic fish catch tool because it has a high and effective productivity and is included in the pocket measurement. (seine net). The main type of catch is used by fishermen in the Nusantara Fisheries Port (PPN) of Brondong, Lamongan district, East Java. The cantrang type fishing gear operating in the Nusantara Fishing Port (PPN) of Brondong is 695 units [6]. The use of a cantrang capture device is because it has the ability to capture various types in large quantities, as well as the low cost spent to make a set of cantrang devices. This has caused the development of the cantrang device in the area of Brondong, East Java is expanding rapidly. The result of the catch of swanggi fish using the catcher canrang requires information about the conditions on oceanographic parameters such as rainfall and wind speed. Based on this, research is carried out related to the impact of rainfalls and wind speeds on the result of catching Swanggi Fish using the Catcher Canrang in Brondong Lamongan PPN.

2. METHODS

The research was carried out in Brongdong Lamongan PPN area. The data used is the Swanggi catch data recorded daily from January 2-31, 2023. The fishing gear used in the form of a Cantrang. The capture data will be analyzed with rainfall and wind speed data. The rainfall data is downloaded on the BMKG website and the wind speed in the ECMWF. The data is processed using Microsoft Excel, SPSS and WRPlot. Data analysis is then performed with descriptive statistics using linear regression methods with T tests, F tests and Determination tests. The results of the analysis will result in how significant the influence of rainfall and wind speed on the catch of Swanggi fish in the PPN area of Brondong Lamongan.The calculation of double linear regression is as follows [7] :

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2$$

Y   = Production of Swanggi Fish (Tons)
a   = Constant
β_1, β_2 = Regression coefficient of each free variable
X1   = Rainfall (mm)
X2   = Wind speed (m/s)
e   = standard error

In the regression method there are several tests such as the T test, the F test and the Determination test. According to [8] it is explained that T test is a test of free variables (X1 and X2) individually on the bound variable (Y). whereas F test is testing free variable jointly on the binding variable and determination test (Rsquare) to predict how great the constitution of the influence of the free variabel (X) on bound (Y) variable is on the condition that the result of F test in a significant regression analysis.

3. RESULTS AND DISCUSSION

3.1. Swanggi Fish Production Outcome

The results of Swanggi fish production in **Figure 1** show that there was a fluctuation on January 2-31 2023. Where in the fish production most occurred on January 25, 28 and 29 2023 with an average production of 43 Tons of Swanggi fish. Whereas the lowest production took place on January 2, 4 and 15 2023, with a mean production of 15 Tons.
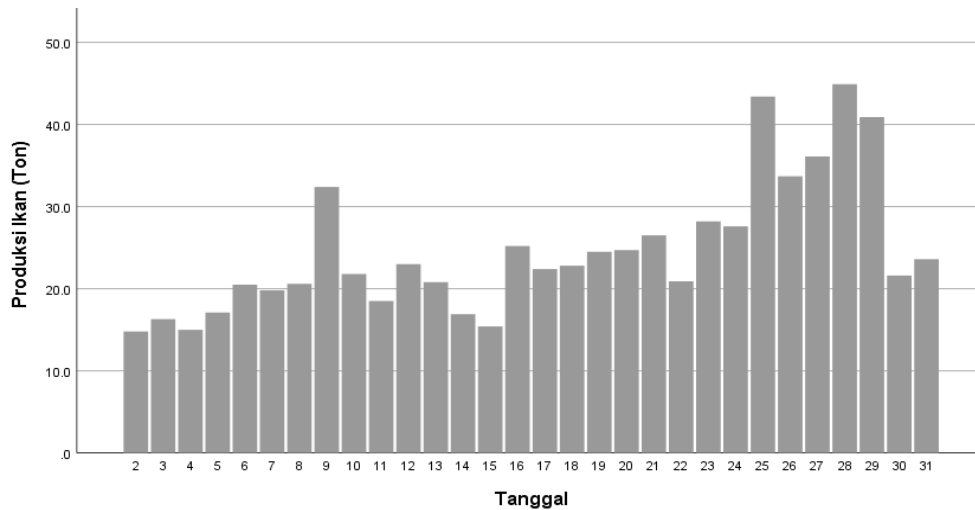
Figure 1. Swanggi fish catch results in January 2023

According to [9] fluctuating catches can be influenced by several natural factors such as sea waves, climate, winds, rainfall and seasons so that it can affect fishermen's income as well. Therefore, the results of Swanggi fish production data will be in the analysis of the influence of rainfall and winds in Brondong Lamongan East Java PPN.

3.2 Rainfall

Rainfalls in January 2023 in PPN Brondong do not experience daily rain as shown in **Figure 2**.
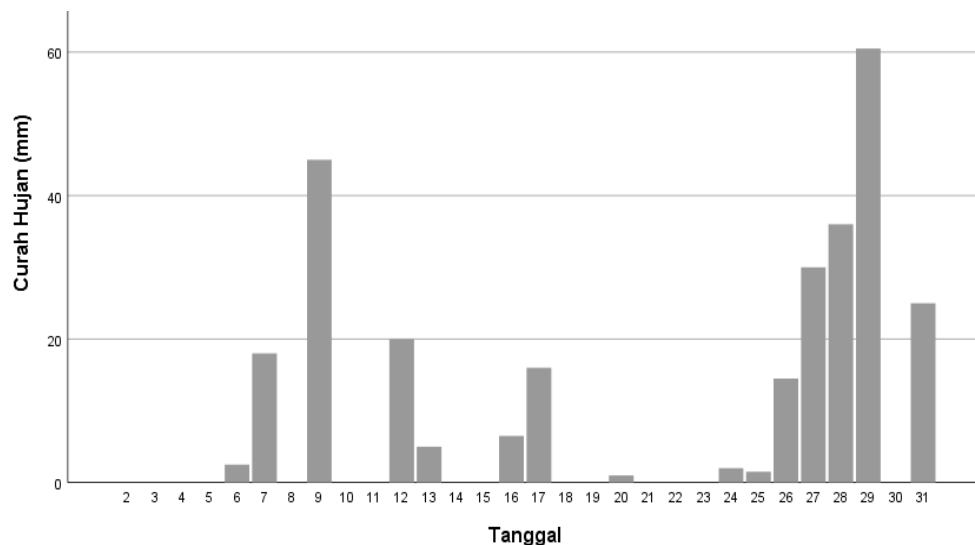

Figure 2. Rainfall in Lamongan District January 2023

In the beginning to mid-January, the intensity of rainfall does not often experience rainfall, but at the end of the month there is daily rainfall. On 26th to 29th the rainfall intensity increased with a range of rainfall of about 14-60 mm. The highest rainfall was on 29th January with a value of 60.5 mm.

3.3 Wind

Wind is one of the variables that will be discussed in relation to the influence of wind speed on capture results. The wind result here is the dominant wind direction using the WRPlot and wind speed. The data is obtained from downloading on the ECMWF page the velocities u and v and then the data is processed into the wind speed and wind direction dominant in Microsoft Excel. The result is shown in **Figure 3**.
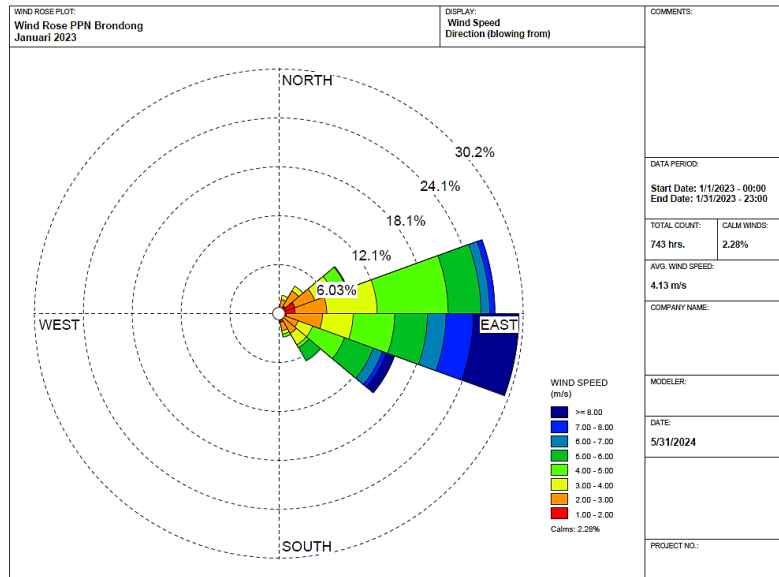
Figure 1. Windrose PPN Brondong January 2023

Windrose results show that the wind direction comes from the east to the west. Where the average wind speed is 4.13 m/s. The lowest wind speed occurred on January 9, 2023 at about 1.3 m/sec while the highest speed on January 2, 2023 was around 7.3 m/sec.

3.4 The impact of rainfall and wind speed on the catch of Swanggi fish

Rainfall and wind speed are one of the environmental factors that will affect the catch of Swanggi fish. In the analysis of this study, the influence of rainfall significantly affects the catch of Swanggi fish shown in **Table 1**.

Table 1. Significant value of variable X against Y

Test	Variable of X	Sig.
T	Rainfall	0.001
	Wind Speed	0.168
F	Rainfall and wind speed	.000

In the T test, the sig. value of the rainfall variable indicates a sig. $< \alpha$ where α is a significant measure of 0.05 or 5% which means that the variable of rainfall has a significant influence on the catch of Swanggi fish. While for sig. the wind speed variable value is sig. $> \alpha$ which means the value of wind speed is not qualified and has no significant impact on the Catch result. The combination of the precipitation variable and wind speed in the F test has a value of 0,000 which means a sig value $< \alpha$ and the criteria are met.
The determination coefficient R^2 is 0.445, which means that the variables of rainfall and wind speed influence 44.5% of the catch and the rest is influenced by other factors.

3.5 Relationship between Rainfall and Wind Speed on Swanggi Fish Catch Results

The ratio of rainfall and wind speed to the catch of swanggi fish in the Nusantara Fishing Port (PPN) of Brondong in 2023 is shown in **Figure 4**.
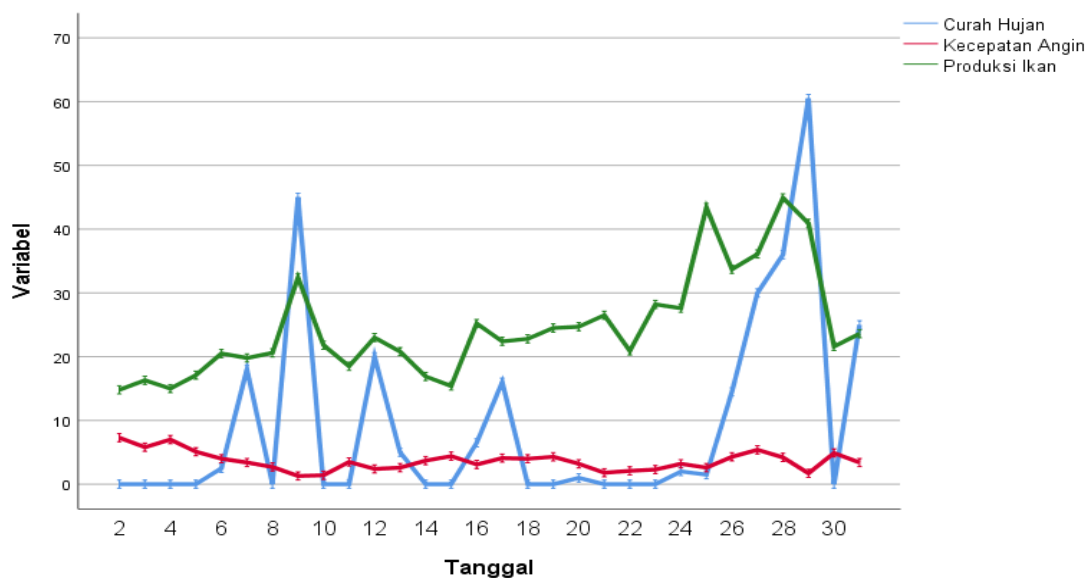
Gambar 4. Graphic Relationship of Rainfall, Wind Speed and Fish Production in January 2023

Based on Figure 4 above, it shows that the highest production of swanggi fish was 44.9 tons with an average rainfall value of 36.0 mm and an average wind speed value of 4.2. Meanwhile, the lowest swanggi fish production yield was 14.8 tons with an average rainfall value of 0.0 mm and an average wind speed value of 7.3. The relationship between rainfall has a significant influence on the production of swanggi fish catches, if rainfall increases then the production of fish catches will decrease, and vice versa. Meanwhile, the relationship between wind speed and swanggi fish catch production does not tend to have a significant effect, if wind speed increases then fish catch production will also increase. According to [10], there is a relationship between wind speed and swanggi fish catch production, while rainfall and fish catch production do not have a significant relationship.

4. CONCLUSION

The rainfall on the output of the swanggi fish catch at the Nusantara Fishing Harbour (PPN) of Brondong has given a significant impact on the relationship. The results of linear regression method analysis using T test, F test and determination test. The result of lineary regression test T test showed that the regression value of the rainfall variable to catch of fish is the value of sig.<0,05 while the variable of wind speed to Catch of Fish is the number of sig.>0,05. The determination test result of R^2 is 0.445, which means that the variable rainfall and wind speed influenced 44.5% on the catch of the swanggi fish and the rest was affected by other factors.

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