IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT)
e-ISSN: 2319-2402,p- ISSN: 2319-2399.Volume 14, Issue 7Ser. III (July 2020), PP 48-52
www.iosrjournals.org

Analysis on the Effect of Rainfall and Wind Influenceon Fishing Trip (Study in North Galesong District,Takalar Regency, Indonesia)

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Abstract: *Bad weather conditions in Takalar waters cause hundreds of traditional and modern fishing boats to be afraid to go fishing. They stopped temporarily in fishing to avoid accidents at sea due to extreme weather. This study aims to determine the effect of rainfall and wind on the frequency of fishing trips based in North Galesong District, Takalar Regency.Rainfall is the amount of water that falls on a flat surface during a certain period measured in millimeters in height above the horizontal surface. Wind is the mass of moving air. Wind can move horizontally or vertically with varying speed and fluctuate dynamically. The driving factor for the movement of air masses is the difference in air pressure between one place and another. The operation trip is a fishing activity since the fishing unit leaves the base to go to the operation area, looking for a fishing area. fishing, until returning to the place of origin or to another landing site.The results showed that rainfall will not affect the fishing operation trip if it is not accompanied by high wind speeds. Rainfall in Indonesia will have one peak of rain in a particular month, usually occurring in January and March. The wind is very influential on the type of Fiber boat (1 GT) that is equal to 80% while on Jolloro type vessels (5-10 GT) and Pa'rengge type vessels (10-30 GT) very small influence 0.9% to 40%. Apart from the size factor of the ship that is able to compensate for the wave height, the demand for food is not sufficient, causing fishermen to continue to take the courage to conduct a fishing trip in extreme weather.*

Key Word*:Rainfall; Wind; Trip Operations; Fishing; Takalar*

Date of Submission: 25-07-2020 Date of Acceptance: 09-08-2020

I. Introduction

Indonesia has areas that are crossed by the equator and most areas in Indonesia are tropical, however some regions in Indonesia have quite large rainfall intensity. Rain is a process of condensing water vapor in the atmosphere into grains of water heavy enough to fall and usually arrive at the surface. Rain usually occurs due to cooling air temperatures or the addition of water vapor into the air [1]. This is inseparable from the possibility of going together. The falling rain is usually not free from the influence of air humidity which stimulates the number of water points contained in the air.

Rainfall is the amount of water that falls on a flat surface during a certain period measured in millimeters (mm) in height above the horizontal surface [2]. In another explanation, rainfall can also be interpreted as the height of rainwater collected in a flat, non-evaporating, non-absorbing and non-flowing place. Indonesia is a country that has a varying amount of rainfall due to the region and different heights. Rainfall one millimeter, meaning that in an area of one square meter in a flat place that holds water as high as one millimeter or accommodated as much as one liter of water. Rainfall in Indonesia varies greatly spatially and temporally. Ingeneralthere are annual and semi-annual cycles in the seasonal pattern of rainfall in Indonesia [3].

Wind is the air that moves due to the rotation of the earth and the difference in air pressure around it. The wind moves from a place of high pressure to low pressure air [4]. When heated, the air expands. Expanding air becomes lighter so it rises. If this happens, the air pressure drops because the air decreases. The cold air around it flowed to the lowpressureplace earlier. The air shrank heavier and descended to the ground. On the ground the air became hot again and rose again. The flow of warm air rising and falling of the cold air is called convection. Strong winds can cause high sea waves, so that it can endanger the fishermen who are fishing [5]. Wind speeds that are too large usually scare the fishers when fishing, so their work is not optimal.

Waves are up and down movements of water in a direction perpendicular to the surface of the sea that forms a sinusoidal curve or graph [6]. The dominant generator of sea waves is wind. Another factor that causes waves is the earth-moon-sun-pulling force, earthquake or waves caused by ship motion. Waves caused by wind can generate energy to form a beach, generate currents and sediment transport. Sea waves due to tides occur around bays, estuaries, and river mouths where tide and tide elevations can be used as a reference in development around the coast [7]. The height and period of ocean waves is influenced by fetch, which is the distance of the waves from the start of their generation. The longer the fetch distance, the greater the height of the wave. Wind also influences wave height. The stronger the wind blows, the bigger the waves are produced [8]. Wave motion in shallow water will slow down at the bottom when it borders the bottom of the water. The top of the wave that does not rub against the bottom of the water will continue to move so that the peak of the wave is sharper and the valley is getting flatter called the phenomenon of wave breaking.

Marine meteorology is the science that contains information about weather conditions in the maritime and marine fields [8]. Meteorology has parameters that can be factors that influence the performance of fishers, namely: temperature, wind, rain, pressure and humidity are interrelated. Wind is an important factor that needs attention in the science of capture fisheries[9, 10]. Wind speed can affect the height of the waves, the greater the wind speed the higher the waves in an area of water. Waves occur because of the wind energy that blows over the surface of the waters [11]. The existence of wind energy will cause a push against the surface of the water so that it becomes lower than the surrounding area. This will cause an imbalance, resulting in a higher mass of water to fill the lower place. This process will take place continuously or continuously [12-13].

The operation trip is a fishing operation activity since the fishing unit leaves the base to go to the operation area, looking for a fishing area [14], fishing, until returning to the place of origin or to another landing place. Fishing trips can be done once a day, leaving in the morning and returning in the afternoon or departing in the afternoon and returning in the morning on the following day [15]. One fishing trip can also occur in, more than one day, depends on the size of the ship and the fishing gear used. The number of fishing trips from one fishing unit is carried out in a certain period of time [16]. In a period of one had can do several fishing trips, then one fishing day is counted as one trip [17-19].

North Galesong District is one of the biggest fish-producing districts in Takalar Regency where the activities of ship types occur [20]. Based on this, the purpose of this study is to reveal the effect of rainfall and wind on fishing operations in the Galesong District. The analytical method used is a graphical method and a questionnaire to reveal the relationship between wind speed and operating trip [21].

Bad weather conditions in Takalar waters cause hundreds of traditional and modern fishing boats to fear going to the sea. They stopped temporarily to catch fish to avoid accidents at sea due to extreme weather [22]. Most fishing boats do not dare to go to sea, because it is very dangerous to the safety of the fishers, but there are also some fishing boats that still the stay at the sea.Based on this fact, it is considered necessary to conduct research to determine the effect of rainfall and wind on fishing operations in Galesong District, Takalar Regency.

II. Material And Methods

The purpose of this study was to determine the effect of rainfall and wind on the frequency of fishing trips based in North Galesong District, Takalar Regency. The analytical method used is a graphical method and a questionnaire to reveal the relationship between rainfall and wind speed on the frequency of fishing trips. Fishing parameters were focused on the specifications of the size of the ship, engine size, and type of fishing gear [23].

To achieve these objectives that rainfall patterns in fishing operations were observed. Analysis reveal the effect of rainfall on the frequency of fishing trips as well as the effect of wind on fishing trip frequency.

The Fishing Operation Trip in North Galesong District is a fishing activity which is calculated from the fishing unit leaving the base to the fishing location and returning to the base. Data on fishing trips were obtained from interviews with ship captains, skippers and boat crews of purse seine units [24]. Trip data was also obtained by observing the logbook of the ships as well as interviews with PSDKP staff, SATWAS Takalar.

The types of ships in North Galesong are divided into 3 types namely, ships of Pa'rengge (20-30 GT), Jolloro (5-10 GT) and Fiber boats (1 GT) [25]. The following is an average fishing trip of several types of fishing vessels located in the District of North Galesong, Takalar Regency.

III. Result and Discussion

Based on the data obtained in the field, it is revealed that the influence of rainfall and wind on fishing trip operations varies greatly, some have a big influence and some have a small effect. Figure 1 shows that in 2012-2016 the average rainfall will be directly proportional to the average maximum speed of the wind [26-28]. However, based on the results of interviews with all fishers indicated that rainfall will have no effect if it is not accompanied by high wind speeds so it can be said that rainfall does not have a large influence on the fishing

process even though rainfall is directly proportional to the existing wind speed [29]. Rainy peaks and wind speeds in January are 737 mm for rainfall and 37.6 knots for maximum wind speed, this number will continue to decrease until it reaches 0 mm and 0 knots in August and thereafter will slowly increase until it reaches its peak in January.

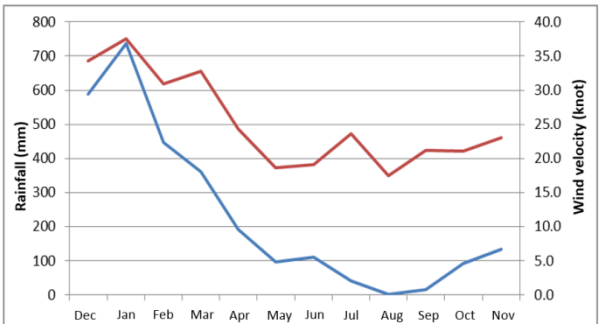
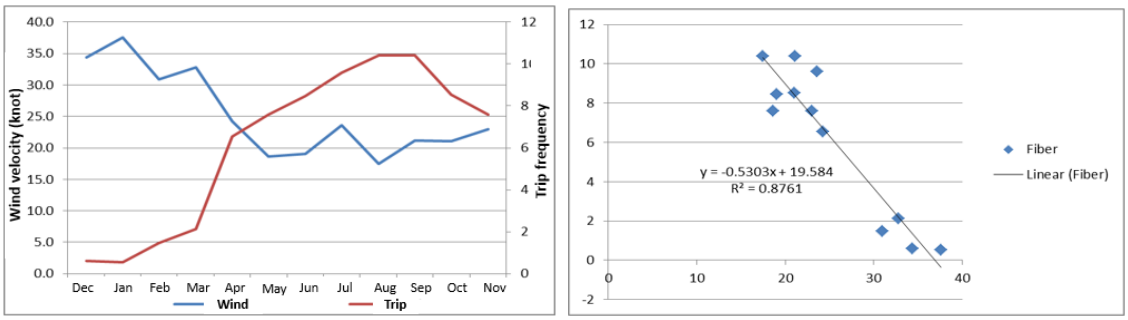


Figure 1. The graph of the relationship of rainfall to wind in 2012-2016

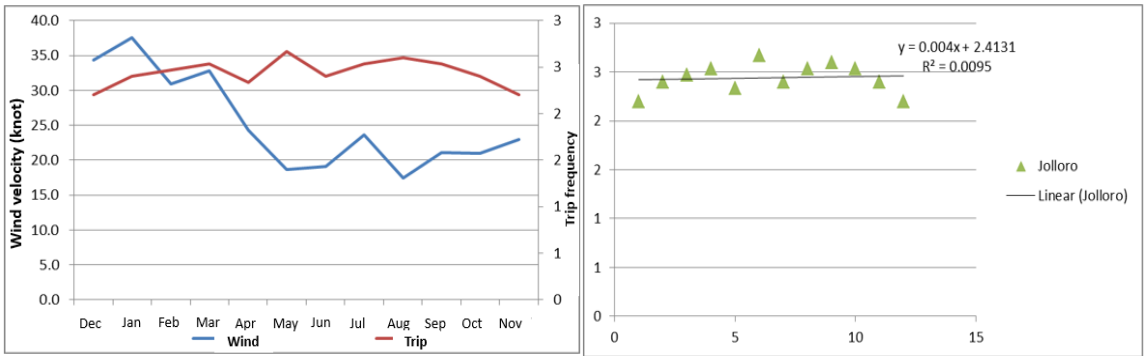
Data on the effect of wind speed on Fiber type vessels is presented in Figure 2.Figure 2 shows that the influence of wind speed on fishing operation trips on a Fiber boat is very large. This is indicated by the 80% variance trip affected by the wind variance and the significance value of the anova regression results which are below 0.05. Based on the trend line above it can be seen that each increase in wind speed of 1 knot then the trip decreases by 0.5 or in other words every increase of 2 knots of wind speed then the trip decreases by 1 trip. This is because ships with a size of 1 GT do not have the ability to deal with waves with a height exceeding 1.5 m. Therefore the safety factor is number one for fishers who use this type of boat to conduct fishing trips. The wave height caused will be directly proportional to the existing wind speed. As a result of this fishers on this type of boat will reduce the frequency to do the trip drastically in December-February and will start fishing again in the east season in March-November. There are also fishers who continue to do the trip but using other types of ships.



(a) (b)

Figure 2. Graph of wind relation to fishing trips on Fiber boats in 2012-2016 (a). Scatter plot with trend line (b)

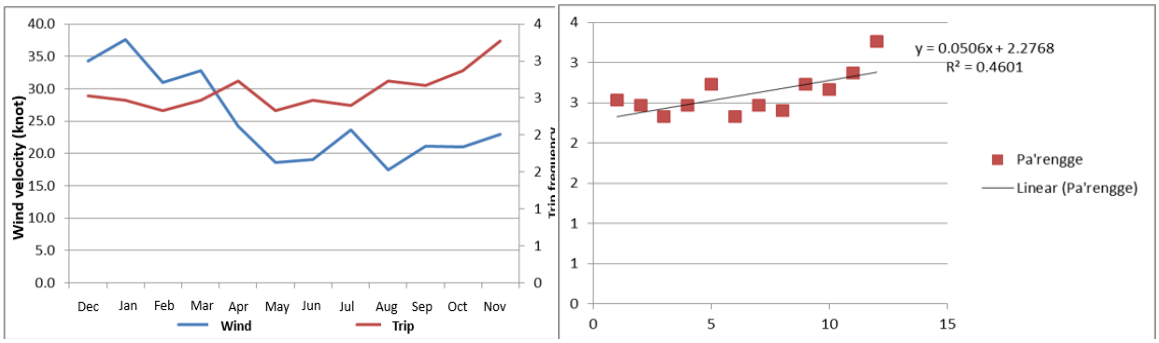
Data on the influence of wind speed and rainfall on Jolloro type ships is presented in Figure 3.In Figure 3, it can be seen that the wind speed has very little effect on the fishing operation trip on Jolloro boat. This is indicated by the 0.9% trip variance influenced by the wind variance and the significance value of the anova regression results above 0.05. Based on the trend line above it can be seen that each increase in wind speed of 1 knot then the trip has decreased by 0.04 trip. This is due to the fact that Jolloro ships are able to penetrate waves with a height of 2-3.5 m. reach 4 m if their food needs have not been fulfilled. If the fishers will start a trip to the fishing area and the wind speed reaches 30 knots then usually the fishers will rest on the nearest island and will continue the trip if the wind speed has decreased. This type of boat will continue to operate December-February, which is the highest rainfall and wind peak in the last 5 years.



(a) (b)

Figure 3. Graph of wind relation to fishing trips on Jolloro ships in 2012-2016 (a). Scatter plot with trend line (b)

Data on the effect of wind speed on Fiber type vessels is presented in Figure 4.In Figure 4 it can be seen that the influence of wind speed on fishing trips on Pa'rengge vessels is very low. This is indicated by the 40% trip variance influenced by the wind variance and the significance value of the anova regression results above 0.05. Based on the trend line above it can be seen that each increase in wind speed of 1 knot then the trip decreased by 0.05 trip, this is because the ship Pa'rengge can penetrate waves with a height of 3-3.5 m. if the wind speed during the trip is very high, the crew will stop on the nearest island and will continue the trip if the wind speed starts to decrease so that the existing trip will remain the same even though the wind at that time is very high. This type of boat will continue operating in December-February which is the highest rainfall and wind peak in the last 5 years. Fishers on this type of ship will rest while doing logistical preparations when the full moon arrives.



(a) (b)

Figure 4. Graph of wind relation to fishing trips on Pa'rengge vessels in 2012-2016 (a). Scatter plot with trend line (b)

IV. Conclusion and Recommendation

Rainfall will not affect the fishing operation if it is not accompanied by high wind speeds. Rainfall in Indonesia will have one peak of rain in a particular month, usually occurring in January and March.The wind has a very big influence on the type of Fiber boat (1 GT) that is equal to 80% while on the type of Jolloro boat (5-10 GT) and the type of Pa'rengge (10-30 GT) very small influence 0.9% to 40 %. Aside from the size factor of the ship that is able to compensate for the height of the waves, fish demands are not yet sufficient, causing the fishers to continue fishing trip even though in extreme weather.

This research is more focused on the effect of rainfall and wind on fishing trips, therefore further research is needed on the condition of the seasons and even climate on all aspects of the fishers. We need to disseminate data on weather parameters and the effects of El Nino and La Nina for fishers to reduce the number of work accidents for the fishers and maximize the catch [29].

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Esther Sanda Manapa, et. al. "Analysis on the Effect of Rainfall and Wind Influenceon Fishing Trip (Study in North Galesong District, Takalar Regency, Indonesia)." *IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT)*, 14(7), (2020): pp 48-52.