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Analysis of Water and Seagrass Quality in Estimating Possibility of Fish Cultivation around Mallusetation Beach, Barru Regency, Indonesia

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Abstract:
This research aims to determine the possibility of fish farming on the coast of Mallusetasi, Barru Regency, Indonesia based on water quality analysis and the presence of seagrass. The data obtained were then processed and analyzed by descriptive analysis. The results showed that the water quality such as the current velocity of 0.14-2.4 m/s was still suitable for seagrass growth, the brightness value was 2.4-5.4 m and the water temperature during the study was in the range of 27.27^{o}C -28.47^{o}C.and this is still in accordance with the needs of seagrass to carry out photosynthesis and grow. Likewise, the pH of the water during the study was in the range of 7.86-8.22 which was still in accordance with the needs of seagrass. The average dissolved oxygen during the study was in the range of 3.51-5.11 ppm,the salinity of seawater during the study at the research site was in the range of 33.3-34 ppt which was still within the tolerance limit. Likewise, the presence of seagrass plants is still found on the coast of Mallusetasi Beach. Based on the results of the analysis of water quality and the condition of the seagrass beds, it can be stated that Mallusetasi Beach has the possibility or potential to develop fish farming.

Keywords: *Water quality, seagrass, coastal, beach, mallusetasi*

1. Introduction

Coastal areas are ecosystems that are most easily affected by human activities.Rapid industrial progress also poses serious problems for coastal ecosystems. Namely the decreasing water quality due to the increasing amount of pollutants.Namely the decreasing water quality due to the increasing amount of pollutants.

The coastal area is also a created area between land and sea. When viewed from the coastline, a coastal area has two kinds of boundaries, namely the parallel to the shoreline and the perpendicular to the shoreline (Dahuri*et al*., 2004).

Shallow sea waters are a productive marine environment and at the same time receive the most impacts from human activities. In these waters, sunlight can penetrate to the bottom of the water and receive nutrients from both directions namely land and sea. In this area also seagrass vegetation can grow and develop (Jaelani, 2006).

Seagrasses are flowering plants (Angiospermae) that are fully adapted to the marine environment.These plants have several properties that allow them to live successfully in the sea, such as being able to live in saltwater media, functioning normally in a submerged state,a well-developed root system capable of carrying out a generative cycle even in a state of immersion, because it has roots and an effective internal system to utilize gases and nutrients (Romimohtarto and Juwana, 2001).

Seagrass ecosystem is one of the important ecosystems in the sea, in addition to coral reefs and mangroves as a support for biota life.Seagrass ecosystems have ecological functions including habitat (place to live),spawning ground, nursery ground, rearing ground and feeding ground from various biota. In addition, as a primary producer, sediment catcher, and recycler of nutrients (Kordi, 2011)

Based on the findings of Jaelani (2006) who conducted research in the coastal waters of Bontan City, East Kalimantanfound three main constituent species of seagrass in these waters, namely *Enhalus acoroides*, *Thalassia hemprichii* and *Cymodocea serrulata*,with the scatter pattern influenced by the characteristics of water quality, especially salinity, brightness and temperature.

In addition to the aspect of the existence of seagrass beds, the aspect of water quality also plays an important role in a waters.Water quality not only has a role in the existence of fish, but also affects the life of seagrass beds which are one

of the habitats for various types of fish.These two parameters, namely water quality and seagrass beds play an important role in the life of fish and other biota.

2. Research Purposes

This research aims to determine the possibility of fish farming on the coast of Mallusetasi, Barru Regency, Indonesia based on analysis of water quality and the presence of seagrass.

3. Method

The method used in this research is descriptive with case studies.According to Suryabrata (1998) in Kurniawan (2012) the purpose of descriptive research is to make a systematic depiction,factual and accurate about the facts and characteristics of a particular population or area, while a case study is a study that is researched in depth at a limited time, place and population,thus providing an overview of local situations and conditions and the results do not apply to different places and times. Thus providing an overview of local situations and conditions and the results do not apply to different places and times.

This research was conducted for 4 (four) months, from May to August 2020.Determination of research locations based on differences in environmental characteristics at each research location.At Station (ST) A is located at the port or crossing to Dungan Island, and Station (ST) B is at the shrimp hatchery unit and Station (ST) C is located to the east of Dutungan Island, Mallusetasi sub-district.

The materials used in this study were samples of sea water and seagrass vegetation.Meanwhile, the tools and methods used to measure or retrieve data on the physico-chemical quality of water are as shown in Table 1.

Parameter	Unit	Tool/Method
- Temperature	^{o}C	Thermometer/insitu
- Salinity	ppt	Hand Refraktometer/*insitu*
- Brightness	m	Secchi Disk/*insitu*
- pH	-	pH meter/*insitu*
- Dissolved oxygen	ppm	DO meter/*insitu*

Table 1: Tools and Methods for Measuring Physical-Chemical Quality of Water
Source: Jaelani (2006)

Before taking seagrass data, transects were carried out first. Three transect lines 50 m apart between transect lines lead from shallow to deeper sections. Seagrass sampling using a wire frame measuring 1 m x 1 m. Seagrasses that are in the frame are harvested and then counted. The data obtained were collected, processed and then analyzed using descriptive analysis.

4. Results and Discussion

4.1. Current Velocity

Dahuri (2003) stated that the speed of water currents affects the productivity of seagrass beds. Currents with a speed of 0.5 m/s are able to support seagrass growth well. Currents are also very important for seagrass beds which function to clean sediment or silty sand particles that stick.

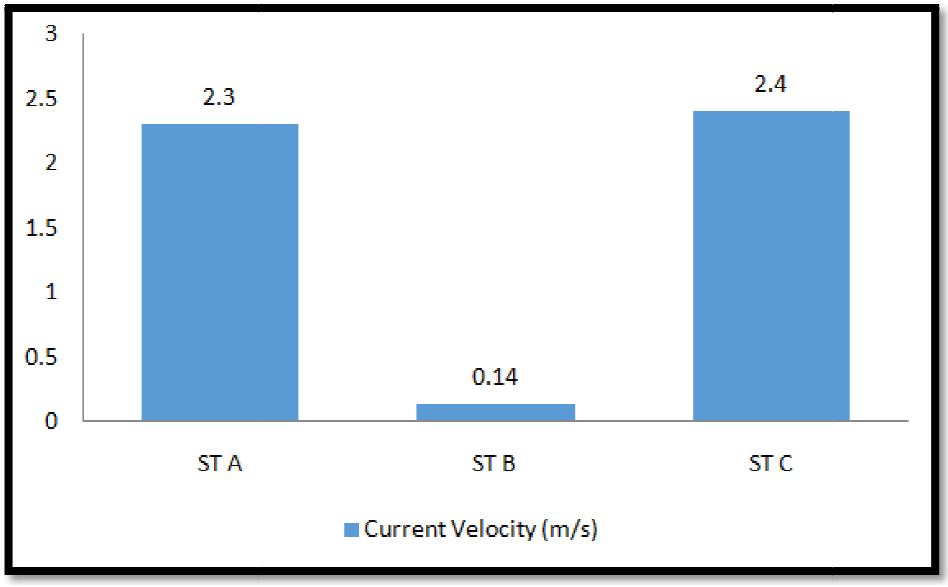

Figure 1: Average Current Velocity (m/s) When the Study

The results showed that the average current velocity at the study site was in the range of 0.14-2.4 m/s (Figure 1),namely the highest current velocity value was obtained at C Station of 0.14 m/s, followed by A Station of 2.3 m/s, and the last or lowest was at B Station, which is a location near the shrimp hatchery unit in front of Dutungan Island of 0.14 m/s.The high current velocity at A Station and C Station is thought to be due to the very high movement of water from the sea at that location, both from the north and from the south, while at the location near the shrimp hatchery unit the water movement is lower because the location is close to the mainland.

4.2. Water Brightness

According to Putri (2004), different types of seagrasses will be found based on the depth of the waters. In addition, depth has a close relationship with temperature stratification, light penetration, and nutrients. This is in accordance with the opinion of Hutabarat and Evans (1985), the depth of waters is closely related to the penetration of sunlight into the water column used by plants that have chlorophyll for photosynthesis. These plants cannot live continuously without sufficient sunlight.

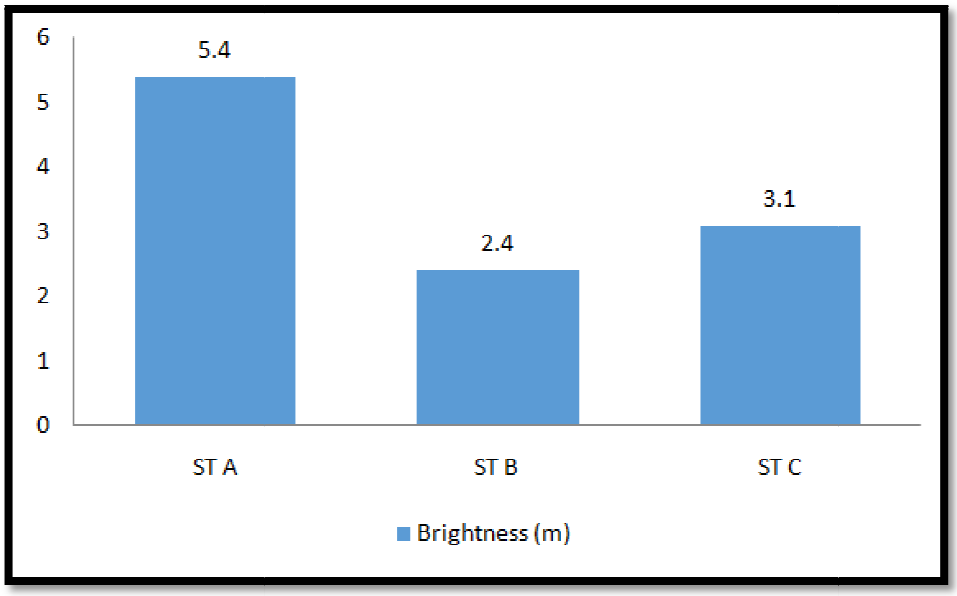

Figure 2: Average Water Brightness (m) When the Study

Figure 2 shows that the brightness of the sea water when the study was in the range of 2.4-5.4 m, where the highest brightness value was at A Station of 5.4 m, followed by C Station, which is the location at DutunganIsland Pier at 5 ,4 m, followed by C Station at 3.1 m, and the lowest at B Station at 2.4 m. The low brightness at B Station is thought to be due to the location being close to the mainland and the topography of the land is sloping.

4.3. Temperature

Nybakken (1992), that the optimal temperature range for the development of seagrass species is 28°-30°C, while for photosynthesis of seagrass requires the optimum temperature between 25°-35°C and at full light. The ability of the photosynthesis process will decrease sharply if the water temperature is outside this range.

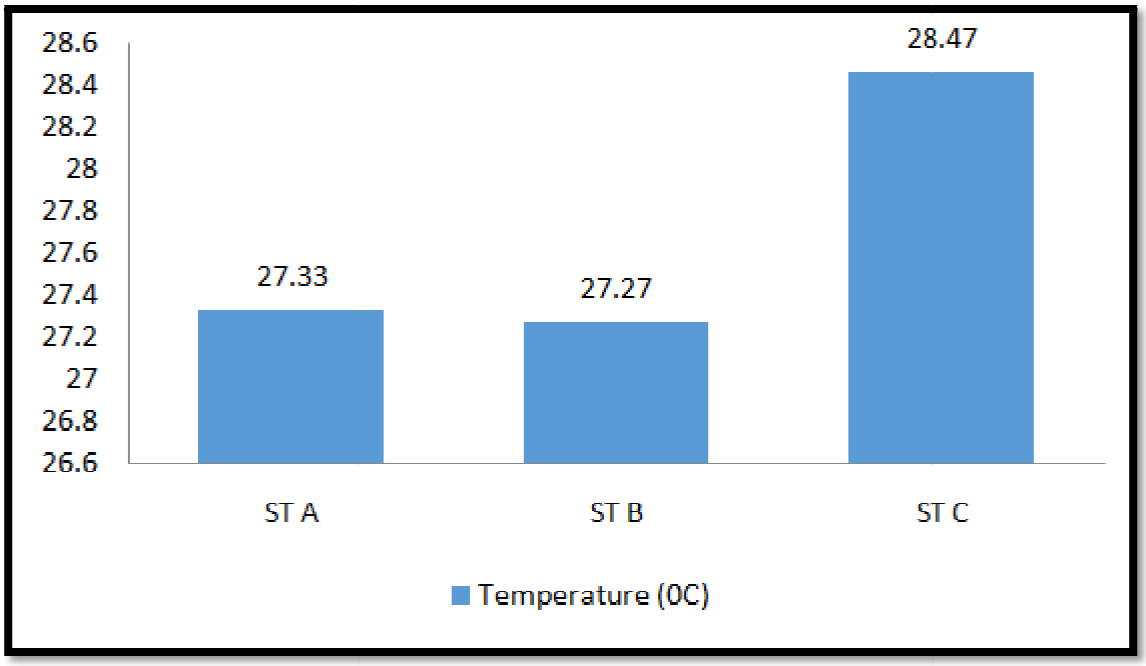

Figure 3: Average Water Temperature (^{0}C) When the Study

Figure 3 shows that the water temperature when the study was in the range of 27.27-28.47oC, where the highest water temperature was obtained at Station C at 28.47^{o}C, followed by Station A at 27.33oC and the lowest at Station B at 27.27^{o}C.Generally based on KEPMEN LH Indonesia No. 51 Year 2004 Regarding sea water quality standards for biota, the water temperature at the research site is still at the threshold set for mangroves, coral reefs and seagrass, which is 28-32^{o}C.

4.4. pH

The pH value expresses the intensity of the acidity or alkalinity of a sample of water and represents the hydrogen ion concentration. This concentration of hydrogen ions will have a direct impact on organisms and reduce chemical reactions that will occur (Zarfen*et al*., 2017).

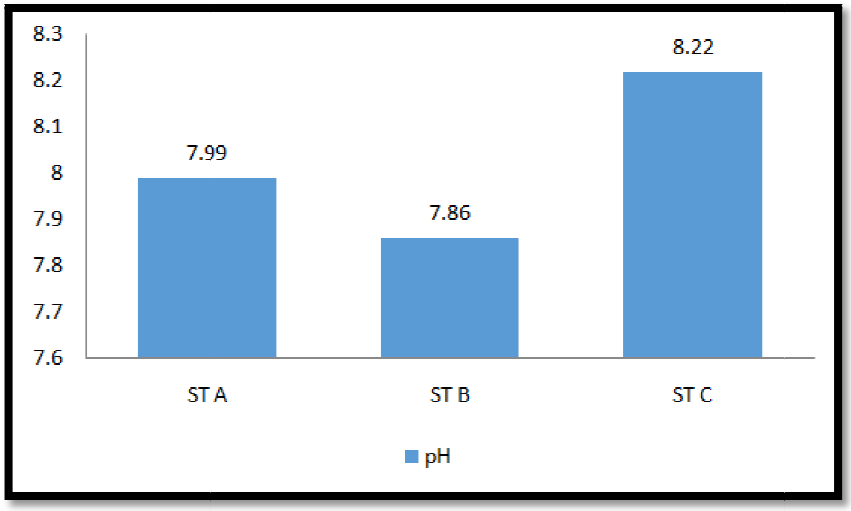

Figure 4: Average Water pH (m/s) During the Study

The results showed that the average value of water pH during the study was in the range of 7.86-8.22 (Figure 4),with a pH value of 8.22 at C Station, followed by A Station at 7.99 and the lowest at B Station at 7.86.The pH value greatly affects the biochemical processes of waters, in the range of pH < 4.00, most aquatic plants will die because they cannot tolerate low pH (Effendi, 2003).The results of this study are still lower than the results of research conducted by Zarfen*et al*. (2017) who conducted research in the waters of Kelong Village with pH values showing pH values ranging from 8.1 to 8.5 with an average of 8.3

4.5. Dissolved Oxygen

Dissolved oxygen is above the quality standard, which is >5 (KEPMEN LH Indonesia No.51 year 2004). Dissolved oxygen levels in waters are usually less than 10 ppm, while in marine waters it ranges between 11 ppm at 0°C and 7 ppm

at 25°C.However, according to Effendi (2003), almost all aquatic vegetation likes conditions where dissolved oxygen levels are > 5.0 ppm.

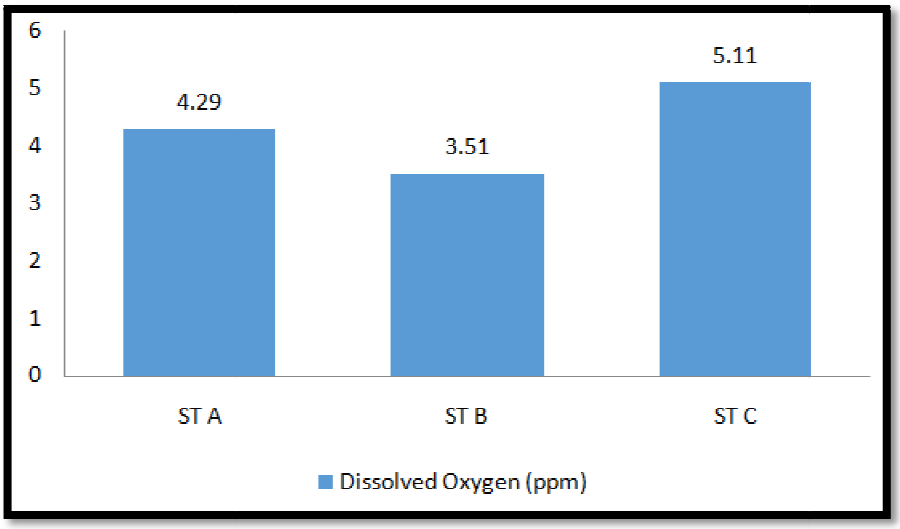

Figure 5: Average Dissolved Oxygen (ppm) During the Study

The results showed that the average dissolved oxygen during the study was in the range of 3.51-5.11 ppm, where the highest dissolved oxygen value was obtained at C Station of 5.11 ppm,followed by A Station at 4.29 ppm and the lowest dissolved oxygen value at B Station at 3.51 pp. The low value of dissolved oxygen at B Station is thought to be due to the location being close to a shrimp hatchery unit or close to the mainland so that the movement of water is very low which can cause oxygen to increase.

4.6. Salinity

Hutomo (1999) in Hasanuddin (2013) explained that seagrasses have different tolerances for salinity, but most have a wide range of 10-40 pp. The optimum salinity value for seagrass is 35 ppt. Although seagrass species have different tolerances for salinity, most of them have a wide range of salinity between 10-30 ppt.

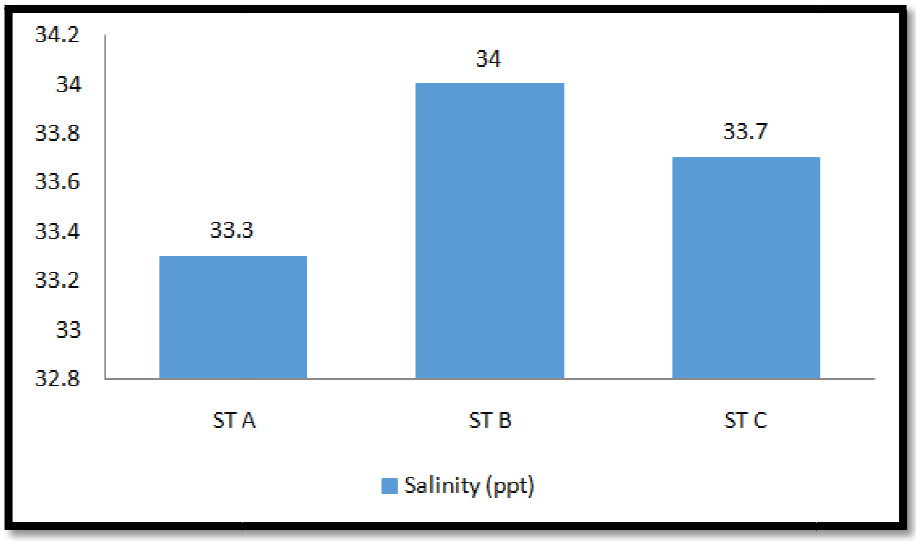

Figure 6: Average Water Salinity (ppt) During the Study

Figure 6 shows that the salinity value of seawater during the study at the research site was in the range of 33.3-34 ppt, where the lowest salinity value was at A station of 33.3 ppt, followed by C Station of 33.7 ppt and the highest salinity was at C Station, B Station of 34 pp. The high salinity of seawater at Station B is thought to be caused by the fact that the location is close to the mainland, resulting in deposition of salt particles and low seawater movement.

5. Conclusion

Water quality such as the current velocity of 0.14-2.4 m/s is still suitable for seagrass growth, the brightness value is 2.4-5.4 m and the water temperature during the study is in the range of 27.27-28.47°C is still in accordance with Seagrass needs to carry out photosynthesis and grow. The average pH of the water during the study was in the range of 7.86-8.22, still in accordance with the needs of seagrass, the average dissolved oxygen during the study was in the range of 3.51-5.11 pp. The salinity value of seawater during the study at the research site was in the range of 33.3-34 ppt, still

within the tolerance limit, although the optimum salinity for seagrass was 35 pp. With the condition of seagrass beds that grow well, coupled with good water quality conditions, it can be stated that the Mallusetasi coast allows for fish cultivation.

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