Original Research Article

ANALYSIS OF THE BUSINESS REVITALIZATION OF VANAME SHRIMP (LITOPENAEUS VANNAMEI) AND MILK FISH CULTIVATION TRADITIONALLY POLICULTURAL BASED ON WATER QUALITY ANALYSIS : Case Study in Muara Kintap Village, Kintap District, Tanah Laut Regency

ABSTRACT

Shrimp and milkfish are the main commodities of aquaculture in ponds, which have considerable development potential in almost all coastal areas in Indonesia. Based on the description above, to revitalize ponds in the village of Muara Kintap, Kintap District, the research aims to analyze the business of revitalizing vannamei shrimp (litopenaeus vannamei) and milkfish aquaculture ponds in a polycultural manner based on water quality analysis in Muara Kintap village, Kintap District, Tanah Laut Regency, South Kalimantan Province. Implementation is planned for June 2023, with the location of the research being in the community pond area of Muara Kintap Village, Resistant Laut District, South Kalimantan Province. Business revitalization of vaname shrimp (Litopenaeus vannamei) and milkfish aquaculture ponds in polyculture based on water quality analysis in Muara Kintap Village, Kintap District, Tanah Laut Regency, Kalimantan obtained an average R/C ratio of vannamei shrimp farming business which is worth 1.43, which means that vannamei shrimp farming business as a whole Traditional polyculture is efficient in the use of business costs, because every 1 unit of currency (Rp 1.43) issued as the cost of the vannamei shrimp farming business will provide business revenue. The feasibility study for the location of vannamei shrimp ponds based on water quality analysis in Kintap District, Tanah Laut Regency which was carried out at 4 coordinate points, the appropriate station for adding vannamei shrimp was at ST1 because of a total of 10 water quality parameters for vannamei shrimp ponds there were only 2 Parameters that do not meet water quality standards, namely nitrate and phosphate content that exceed water quality standards.

Keywords: Polyculture, vannamei shrimp, milkfish, Muara Kintap, Business, Water quality

INTRUDUCTION

Muara Kintap Village is one of the villages in Kintap District, Tanah Laut Regency, South Kalimantan Province. This village is a coastal village so that some of its residents work as fishermen. The residents of Muara Kintap village are actually not originally from Kalimantan (Banjar tribe), but most of the population comes from the Bugis tribe. But cultural acculturation has been going very well here. Analysis of spatial use in the coastal fisheries development area of Muara Kintap village, Tanah Laut District, South Kalimantan according to Yunandar, 2007 that space utilization is dominated by ponds 36.67% (1640.59 hectares) and the smallest settlement is 2.28% (102.15 hectares). The economy of the Muara Kintap village study area is reflected in the structure of the livelihoods of its inhabitants which differ from one village to another, namely the dominant sub-sectors of work are fisheries/services (49.62%), livestock (30.12%), trade services (5.12%) %), and communication and transportation services (9.56%). Muara Kintap Village is the only advanced fisherman village in South Kalimantan (South Kalimantan) to receive a Fisherman's Proficiency Certificate (SKN). This was revealed by the Regent of Tanah Laut (Tala) H.M. Sukamta when handing over SKN for fishermen from Muara Kintap Village in a series of Manunggal Tuntung Pandang (MTP) activities in Kintapura Village, Kintap District, Friday (10/2/2023).

Based on the results of Hidayat's research (2017) it shows that the condition of shrimp ponds in Tanah Laut Regency, South Kalimantan Province, is under very strong environmental pressure from various mining and plantation activities in the vicinity so that shrimp farming cannot run productively. One of the obstacles for vannamei shrimp cultivators is that the seeds or fry that have been stocked have died. The cultivated vannamei shrimp died when they were still small because they could not adapt to the new environment. In addition, the vannamei shrimp seeds that had been sown in the cultivation container died due to stress during transportation from their place of origin to the new cultivation container. Other causes are also caused by water quality that does not meet the requirements for vannamei shrimp to survive. Factors that can affect water quality include unsuitable temperatures, low oxygen levels, unstable pH levels, high ammonia levels, water turbidity, and contamination by chemicals or pollutants. This condition is also influenced by erratic weather, causing fluctuations in water quality in ponds in the Kintap District. Waste from aquaculture inputs will increase with increasing shrimp biomass and shrimp culture age (Culberson and Piedrahita, 1996; Brown et al, 2015). So, to go through the desired shrimp farming cycle. So cultivators must understand the dynamics of fluctuations in water quality, as well as routinely to control the condition of water quality parameters in ponds (Edhy et al, 2010)

MMAF is targeting national shrimp production of 2 million tons per year by 2024. Area-based shrimp pond development is carried out using ecological and economic considerations. In this way, it is hoped that not only will there be an increase in community welfare and local revenue, but also that ecosystem sustainability can be maintained. In addition to the development of area-based shrimp ponds, there is also a breakthrough in revitalizing traditional Indonesian shrimp ponds which cover an area of 5,000 hectares throughout Indonesia. Based on KKP data via statistic.kkp.go.id, West Nusa Tenggara (NTB) Province has the highest production volume in 2020, namely 159,013.10 tons which opens the opportunity for NTB to become the main shrimp producer in Indonesia. NTB itself has a potential land area of 27,929.5 hectares with details of 10,2375 hectares in Sumbawa; 4,998.5 hectares in Bima; 3,500 in East Lombok; and all districts in NTB own up to 4,700 hectares of land. But of the total land, only around 4,926.5 hectares have been utilized. The development of vaname shrimp production in NTB which continues to increase has encouraged KKP to make a breakthrough in NTB Province by realizing the construction of integrated shrimp ponds in Sumbawa NTB Regency which is planned to have an area of 528.15 ha with a total of 1,811 ponds. This modern shrimp pond area will be equipped with facilities and infrastructure such as a central management control office, laboratory, employee mess, nursery pond, control office, and roads.

Shrimp and milkfish are the main commodities of aquaculture in ponds, which have considerable development potential in almost all coastal areas in Indonesia. Based on the description above, to revitalize ponds in the village of Muara Kintap, Kintap District, Tanah Laut Regency, it is deemed necessary to conduct a business analysis study of the revitalization of vannamei shrimp ponds (litopenaeus vannamei) based on water quality analysis in the Kintap sub-district, Tanah Laut district in order to determine land suitability and carrying capacity. waters for vanname shrimp and milkfish cultivation. The vannamei shrimp and milkfish commodities were chosen because they are one of the leading commodities in supporting the industrialization of aquaculture, because they have high economic value, high market demand (high demand product), these commodities are even currently the prima donna for exports. aquaculture products. The aim of this study was to analyze the revitalization of vannamei shrimp (litopenaeus vannamei) and milkfish aquaculture ponds in poly-culture based on water quality analysis in Muara Kintap Village, Kintap District, Tanah Laut Regency, South Kalimantan Province.

METHODS

Schedule, time and Place of Implementation

Implementation is planned for June 2023, with the location of the research being in the community pond area of Muara Kintap Village, Resistant Laut District, South Kalimantan Province.

Data collection

The data used in this study are primary data and secondary data. Primary data is data obtained through direct surveys in the field, namely the biophysical and social environmental conditions of Muara Kintap Village, Tanah Laut District, South Kalimantan. Meanwhile, secondary data was obtained through a study of research reports, scientific publications, laws and regulations and regional publications. The data comes from government and private agencies that have relevance to the research objectives.

Data analysis technique

Data analysis techniques to analyze the advantages of vannamei shrimp farming using traditional polyculture are used, namely:

$$\pi = TR - TC$$

Information:

π = *Profit*

TR = *Total Revenue*

TC = *Total Cost*

Total revenue is all the results obtained from the sale of all production results. The formula is:

$$TR = P \times Q$$

Information:

P = Selling price /kg

Q = Production amount and *output* (*Quantity*)

Total costs are all costs incurred in one production cycle, generally consisting of fixed costs and variable costs. The formula is:

$$TC = FC + VC$$

Information:

FC = *Fixed Cost*

VC = *Variabel Cost*

The market opportunity criteria are as follows:

If $TR < TC$, then π decreases.

If $TR > TC$, then π increases.

Water Quality Measurement Techniques

A. Temperature Measurement

The temperature measurement is carried out in the water column using a water quality checker, as for the working procedure, namely by dipping the pen of the water quality checker into sea water then reading the results listed and recording the results. After the temperature measurement is complete, the pen tool is recalibrated from the water quality checker so that it is in normal conditions.

B. Measurement of dissolved oxygen or DO

The DO measurement is carried out in the water column using a water quality checker. The working procedure is to dip the pen from the water quality checker into sea water, then wait a few moments until the numbers on the monitor slow down, then read the results and record the results. After the Do measurement is complete, the pen tool is recalibrated from the water quality checker so that it is in normal condition.

C. Salinity Measurement

Water salinity measurements were carried out on the surface of the waters using a handrefractometer by dripping seawater on the blue prism. Then cover the blue prism with a glass cover and point the hand refractometer at the light source to find out the indicated salinity value. Then look at and observe the salinity value obtained then record the results on the note sheet. Prior to data collection, the blue prism was first calibrated with distilled water and then cleaned using a tissue.

D. Acidity (pH)

Measurement of the pH of the waters is used using a pH kit. Before using the pen from the pH kit, it must first be calibrated using distilled water, then cleaned using a tissue. After that, dip it slowly into sea water, then read the results of the pH value and write it into a notebook sheet. After the pH measurement is complete, the pen pH kit is recalibrated so that it is in normal conditions.

D. Sampling and analysis of phosphate, nitrite, nitrate, TSS, BOD5 and organic matter

Taken at each predetermined observation station. Water sampling is carried out directly on the surface of the water using the provided sample bottle until it is completely filled. Water samples that have been taken as much as 1 liter are then marked and stored in a cool box, then the samples will be analyzed ex situ at the Water Quality Laboratory of the ULM Faculty of Fisheries and Marine Affairs to determine the content values of Phosphate, Nitrite, Nitrate, TSS, BOD5 and organic matter..

Data analysis

Land suitability for aquaculture in this case is based on criteria adopted from the Fisheries Research Center (1992) and Poernomo (1992). Analysis of the suitability of pond areas is intended to determine the suitability of land and coastal waters (physical, chemical, and biological) for pond cultivation, carried out by measuring several environmental parameters which are ecological requirements for aquaculture development, namely substrate physics, water quality, and hydrooceanography (Fredinan 2008). The condition of the aquatic environment is a limiting factor for determining the suitability of cultivating land (Arifin et al. 2011)

The carrying capacity of the waters is assessed from the water quality data that has been obtained from field measurements, then analyzed spatially. Data analysis in this study consisted of the stages of contouring and spatial modeling by deriving physical, chemical and biological parameters based on a geo-statistical model, which refers to Hartoko (2000). The results of the interpolation of each water quality variable are then arranged in the form of thematic maps. The matrix or criteria used in this study consists of 10 parameters, namely Temperature, Salinity, pH, DO, Nitrite, Nitrate, Organic Matter, TSS, Phosphate. , BOD5. The suitability level is divided into 3 classes, namely S3 class: Very suitable, S2 class: Appropriate and S1 class: Conditional Compliant.

RESULTS AND DISCUSSION

Business Analysis

The results of the analysis of the profit analysis of vannamei shrimp farming using the traditional polyculture method in Muara Kintap Village are based on a profit analysis consisting of the total costs, which are all costs incurred in one production cycle to profits in the production cycle, with the cultivated land used, namely the cultivator's private property. The investment costs for vannamei shrimp cultivation in a traditional polyculture manner are in the following table:

Table 1. Investment Costs

No	Investment Cost	Vol	Unit	Unit price	Sum	UE (Th)	Shrinkage
1	Land preparation	2	Ha	2.500.000,-	5.000.000,-	10	Rp 500.000,-
	Total						Rp 500.000,-

Primary data: 2023

Based on the investment costs obtained from the cost of depreciation and maintenance of cultivation facilities. The value of this investment cost is obtained from an average for vaname shrimp cultivation of Rp. 500,000.- From the depreciation cost data, it will be followed by calculating the fixed costs per year. These fixed costs consist of costs for depreciation and maintenance of cultivation facilities. The value of these fixed costs is obtained from the average cost incurred by cultivators of Rp. 500,000, - can be seen in Table 3 below:

Table 2. Fixed Costs

No.	Fixed cost	One year
1	Shrinkage	Rp 500.000,-
2	Facility maintenance	Rp 300.000,-
	Total	Rp 800.000,-

Primary data: 2023

Variable costs consist of seed prices, feed prices, and medicines/vitamins. These variable costs are presented in the following table:

Table 3. Variable Costs

No.	Variable Cost	Vol	Unit	Unit price (Rp)	Production cost (Rp/production)
1	Fertilizer	4	Sack	Rp 500.000,-	Rp 2.000.000,-
2	Shrimp Seeds	20.000,-	pcs	Rp 250,-	Rp 5.000.000,-
3	Milkfish Seeds	2.000,-	pcs	Rp 250,-	Rp 500.000,-
	Total				Rp 7.500.000,-

Based on the results of the research, it was obtained the results of a one-time variable cost of production, the average variable cost in traditional polyculture ponds incurred by cultivators was Rp. 7.500.000,- one time production. Based on the results of the analysis of fixed costs and variable costs of traditional polyculture vaname shrimp cultivation in Kintap District, the reception and profit of cultivators are presented in the following table:

Table 4. Total Operational Costs

No.	Cost	Price (Rp)
1	Fixed cost	Rp 800.000,-
2	Variable Cost	Rp 7.500.000,-
	Total	Rp 8.300.000,-

Table 5. Revenue

Production	Vol (Kg)	Unit price (Rp)	Revenue/year (Rp/year)
Vaname shrimp	200	95.000,-	Rp 19.000.000,-
Milkfish	500	15.000,-	Rp 7.500.000,-
	Total		Rp 26.500.000,-

Profits = Revenue – Total operating costs
= Rp. 26.500.000,- – Rp. 8.300.000,-
= Rp. 18.200.000,-

Based on the results of the profit/profit analysis that has been obtained from the research, then it is averaged, the net profit gain for vannamei shrimp farming in traditional polyculture ponds in Muara Kintap Village, Kintap District, is Rp. 18,200,000.00 per production. It is known that during the maintenance of vannamei shrimp there was around 75% death and milkfish had around 50% death. Vannamei shrimp ponds have a profit that is still above the UMP of South Kalimantan Province, namely Rp. 3,755,761.- per month, so that the business results are still able to meet the needs of the cultivator's family. The cost efficiency of vannamei shrimp farming is traditionally polyculture and is carried out through R/C ratio analysis. Where the R/C ratio is the comparison between the average total revenue and the average total cost. The greater the R/C ratio, the greater the profit the farmer will get. After the R/C ratio analysis was carried out, an analysis was needed to find out the difference in the cost efficiency of traditional polyculture vannamei shrimp farmers. The results of the analysis of the R/C ratio are in the following table:

Table 6 : Average R/C ratio

No	Description	Polyculture	
1	Average Total Revenue	Rp. 26.500.000,-	Rp. 450.000.000,-
2	Average R/C ratio	3.19	1.43

The average R/C ratio of vannamei shrimp farming in a traditional polyculture manner with an average value of R/C ratio in vannamei shrimp farming is worth 1.43, which means that the vannamei shrimp farming business in a traditional polyculture manner is efficient in the use of business costs, because every 1 the unit of currency (Rp. 1.43) issued as the cost of the vannamei shrimp farming business will provide business revenue. According to Yuni., et al (2014) the average income of vannamei shrimp farming using traditional polyculture is IDR 61,317,111.00/ha/cycle while the average income of vannamei shrimp farmers is IDR 727,773,104.00/ha/cycle. This shows that the cultivation of vannamei shrimp in traditional polyculture ponds and ponds is profitable and there is no significant difference between the average efficiency of pond vannamei shrimp cultivation and traditional polyculture ponds in Situbondo Regency with a significance value of 0.916.

The investment requirements for polyculture and traditional ponds are different. The most striking difference between polyculture and traditional investments is the water wheel. Traditional polyculture pond business only requires land and equipment. Waterwheels are needed in ponds because the stocking density of the two types of ponds is quite dense (Nainggolan et al., 2021). Policy recommendations for traditional polyculture ponds are very profitable economically when viewed from short-term business performance indicators, such as revenue, profit, revenue/cost ratio, and pay back period.

Water Quality Parameters

Water quality in aquaculture includes physical, chemical and biological factors of water that can affect aquaculture production. Shrimp are very sensitive to changes in water quality. Poor water quality can result in low survival rate, growth and reproduction of shrimp. Most of the water quality management is aimed at improving the chemical and biological conditions in the culture medium. Physical factors often cannot be controlled or depend on the selection of the appropriate location. Physical factors are very dependent on the geological and climatic conditions of a place (Boyd, 1990).

The condition of pond water quality will play a role in the condition and performance of the shrimp cultivated (Gao et al, 2016). Fluctuating water quality will make vaname shrimp easily experience stress due to abnormal conditions (Ariadi et al, 2019). Shrimp that are stressed are very susceptible to disease and die, so that the mortality rate in aquaculture will increase (Edhy et al, 2010). Fluctuations in water quality parameters are dynamic, one of which is influenced by input factors and aquaculture waste. Waste from aquaculture inputs will increase as vannamei shrimp biomass increases and the age of vannamei shrimp culture increases (Brown et al, 2015).

The results of measuring water quality parameters at the research location of the planned revitalization of vannamei shrimp and milkfish ponds in Muara Kintap Village, Tanah Laut Regency, South Kalimantan Province can be seen in the following table:

Table 7. Water quality data

Parameter	Coordinate	115°15'24.70"E	115°16'8.07"E	115°16'9.89"E	115°16'3.19"E
		3°54'23.73"S	3°53'36.18"S	3°53'40.71"S	3°53'48.67"S
	Quality standards	**ST1**	**ST 2**	**ST 3**	**ST 4**
Salinity (ppm)		29	22	26	17
DO (mg/l)	> 5	6	6.9	6.5	7.9
Temp (C)	28-32	32.2	33.5	33.8	33.6
pH	7-8,5	7.12	7.18	6.89	7.37
TSS (mg/l)	80 mg/l	9	8	9	10
Nitrate (mg/l)	0,008 mg/l	0.02	0.01	0.01	0.01
Nitrite (mg/l)	0,06 mg/l	0.03	0.03	0.01	0.04
Phosphate (mg/l)	0,015 mg/l	0.82	0.07	0.07	0.03
Organic Matter	40 mg/l	5.4	4.5	4.8	5
BOD 5	20 mg/l	11.9	11.8	13.5	12.1

The table above is the results of water quality measurements at 4 coordinate points, namely ST1:115°15'24.70"E, 3°54'23.73"S, ST2: 115°16'8.07"E, 3°53'36.18"S, ST3: 115°16'9.89"E, 3°53'40.71"S and ST4: 115°16'3.19"E, 3°53'48.67"S, with 10 water quality parameters namely salinity, DO or Dissolved Oxygen , temperature, pH, TTS (Total Suspended Solids), Nitrate, Nitrite, Phosphate, Organic matter and BOD 5 or Biochemical Oxygen Demand at 5 days).

The results of measuring the feasibility of water quality for the location of added vannamei shrimp at station I with the symbol ST1:115°15'24.70"E, 3°54'23.73"S, obtained water quality results including salinity, DO or Dissolved Oxygen, temperature , pH, TTS (Total Suspended Solids), Nitrate, Nitrite, Phosphate, Organic matter and BOD 5 or Biochemical Oxygen Demand at 5 days. The results of the Salinity measurement obtained a salinity value of 29 ppm. The DO or Dissolved Oxygen value at ST1 is 6 mg/l, the temperature value is 32.2 OC. The pH measurement results from Station 1 were 7.12, with TSS results of 9 mg/l, nitrate with a value of 0.02mg/l, and nitrite 0.03mg/l. The result of the phosphate measurement was 0.082mg/l, the organic matter value was 5.4 mg/l and the BOD 5 value at ST1 was 11.9 mg/l. A total of 10 water quality parameters for vannamei shrimp ponds at ST1: 115°15'24.70"E, 3°54'23.73"S, there are 2 parameters that do not meet water quality standards, namely nitrate and phosphate content which exceeds water quality standards.

The results of measuring the feasibility of water quality for the added location of vannamei shrimp at ST2 with coordinate points 115°16'8.07"E, 3°53'36.18"S obtained a salinity value of 22 ppm, DO value of 6.9 mg/l, temperature value of 33.5 OC, pH value 7.18, TSS value 8mg/l, nitrate value 0.01 mg/l, nitrite value 0.03 mg/l, phosphate value 0.07 mg/l, organic matter value 4.5mg/l and BOD value 5 11.8mg/l. Total of 10 water quality parameters for vannamei shrimp ponds at ST2: 115°16'8.07"E, 3°53'36.18"S, there are 3 parameters that do not meet water quality standards, namely water temperature, nitrate and phosphate content which exceeds the quality standard water quality.

Subsequent measurements were made at ST3 with coordinates 115°16'9.89"E, 3°53'40.71"S obtained a salinity of 26 ppm, DO value of 6.5 mg/l, temperature value of 33.8 OC, pH value of 6.89, TSS value of 9 mg/l l, the value of nitrate is 0.01mg/l, the value of nitrite is 0.01mg/l, the value of phosphate is 0.07mg/l and the value of organic matter is 4.8mg/l and the value of BOD 5 is 13.5 mg/l. A total of 10 water quality parameters for vannamei shrimp ponds at ST3: 115°16'9.89"E, 3°53'40.71"S, there are 4 parameters that do not meet water quality standards, namely water temperature, pH, nitrate and phosphate content that exceeds water quality standard.

The last measurement was carried out at station 4, namely ST4 with coordinates 115°16'3.19"E, 3°53'48.67"S, obtained a salinity value of 17 ppm, DO value of 7.9 mg/l, temperature value of 33.6 OC, pH value of 7.37, TSS value 10 mg/l, nitrate value 0.01 mg/l, nitrite value 0.04 mg/l, phosphate value 0.04 mg/l, organic matter value 5mg/l and BOD value 5 12.9mg/l. Total of 10 water quality parameters for vannamei shrimp ponds at ST3: 115°16'9.89"E, 3°53'40.71"S, there are 3 parameters that do not meet water quality standards, namely water temperature, nitrate and phosphate content which exceeds the quality standard water quality.

The feasibility of vaname shrimp ponds based on water quality analysis on the salinity parameter is an important parameter in monitoring water quality, especially in aquatic environments such as the sea. However, significant fluctuations in salinity can affect marine organisms, especially those that cannot tolerate rapid changes in salinity (Bange & Robinson, 2011). One of the good water quality for vaname shrimp can be seen from the level of salinity in the good range for the growth of vannamei shrimp, which requires a salt content of 15 – 25 ppt so that their growth can be optimal. After more than 2 months of age, shrimp growth is relatively good at salinities between 5 – 30 ppt. After stocking the shrimp fry, the optimal level of salinity is in the range of 10 – 30 ppt (Supono, 2019) and the salinity level for growing Vaname Shrimp is in the range of 26 – 32 ppt (SNI, 2016).

According to Alyandri (2019) the concentration of DO (Dissolved Oxygen) in water is below the specified quality standard, this may indicate a problem with the quality of the water. The presence of low DO can negatively impact aquatic organisms that require dissolved oxygen to survive. Low DO concentrations can indicate the presence of organic pollution or other contaminants in the water. The process of decomposing organic matter by microorganisms consumes oxygen, thereby reducing its availability for other organisms and reducing overall water quality. The concentration of DO (Dissolved Oxygen) in water is above the specified quality standard, this is generally considered a good thing for aquatic organisms. Adequate DO concentrations are important to support healthy aquatic life. The abundant presence of oxygen indicates an effective oxygenation process in the water, which means that the water is of good quality and free from significant organic pollution.

The temperature value observed, based on the research results, the temperature value is still in accordance with the life of the shrimp, where according to (Yudiati et al., 2010), that the optimal temperature for supporting the life of the Vaname Shrimp is around 27.2-32 °C, this statement is in accordance with the temperature value in the study conducted, it was >27 °C (SNI. 2016). If the temperature is more than the optimum number, the metabolism in the shrimp's body takes place quickly, but if the ambient temperature is lower than the optimum temperature, the growth of the shrimp decreases with a decrease in appetite (Supriatna et al., 2020). The high environmental temperature of the body temperature of aquatic organisms is also high so that the body metabolism of aquatic organisms is fast and vice versa at low temperatures the metabolism of aquatic organisms is also low. This affects the appetite of aquatic organisms which will in turn affect fish growth and ultimately affect production (Hasttiningrum et al, 2020).

According to (Kordi, 2010), the relationship between pH and the life of Vaname Shrimp is in the range of 6.1 –7.5 (moderate production), in the range of 7.6 –8.0 (Good enough for shrimp farming), in the range of 8.1 –8.7 (Good for shrimp maintenance), in the range 8.8 –9.5 (Production starts to decline). At low pH (high acidity), the dissolved oxygen content will decrease, resulting in decreased oxygen consumption, increased respiratory activity and decreased appetite. The opposite occurs in alkaline conditions.

TSS is solid particles in the form of colloids, sediments, silt, dust, powders, or other organic or inorganic materials. TSS confinement from ST1 to ST4 is still within normal quality standards. Normal TSS values may vary depending on the water source and specific environmental conditions. However, in general, water that is considered to have a normal TSS is water that has a low concentration of solid particles (Rahardi, et al, 2019).

The maximum nitrite limit for growing Vaname Shrimp is at a value of ≤ 1 mg/l (SNI, 2016). Nitrate and nitrite are the two main forms of oxidized nitrogen compounds found in waters. Both have a close relationship in the nitrogen cycle and can change each other through biochemical processes. Nitrate and nitrite are involved in the nitrification process, where ammonium (NH_4^+) is converted to nitrite by nitrite bacteria (Nitrosomonas), and then nitrite is oxidized to nitrate by nitrate bacteria (Nitrobacter). This process is an important part of the nitrogen cycle in aquatic ecosystems. One of the main causes of increased nitrate levels in waters is the presence of nitrogen-containing chemicals (Rahman et al, 2021).

Phosphate in water (expressed as PO_4-P) is a phosphate compound dissolved in the form of phosphate ion (PO_4^{3-}). Phosphate is one of the main forms of the nutrient phosphorus (P) in waters. Phosphates in water can come from a variety of sources, including human and natural activities. Phosphate in water can come from various sources, such as agricultural activities (use of phosphate fertilizers), domestic waste, industrial waste, soil erosion, and organic decomposition. Human activities, especially agriculture and domestic/industrial waste, are the main causes of increased phosphate concentrations in water (Sabli & Zahra, 2017). The recommended BOD for brackish water or sea water is below 5 mg/L (milligrams per liter). (Yudoo, 2018).

CONCLUSION

The business of revitalizing vannamei shrimp (litopenaeus vannamei) and milkfish aquaculture ponds in polyculture based on water quality analysis in Muara Kintap village, Kintap District, Tanah Laut Regency, obtained an average R/C ratio of vannamei shrimp farming business which is worth 1.43, which means that vannamei shrimp farming business as a whole Traditional polyculture is efficient in the use of business costs, because every 1 unit of currency (Rp 1.43) issued as the cost of the vannamei shrimp farming business will provide business revenue. The feasibility study for the location of vannamei shrimp ponds based on water quality analysis in Kintap District, Tanah Laut Regency which was carried out at 4 coordinate points, the appropriate station for adding vannamei shrimp was at ST1 because of a total of 10 water quality parameters for vannamei shrimp ponds there were only 2 Parameters that do not meet water quality standards, namely nitrate and phosphate content that exceed water quality standards.

REFERENCE

1. Achmad S. Hidayat, 2017. Problem analysis and development strategy of shrimp culture in Tanah Laut Regency, South Kalimantan Province, Indonesia. AACL Bioflux, 2017, Volume 10, Issue 4. http://www.bioflux.com.ro/aacl
2. Alyandri, F. H., Mulya, N., Sari, R. R., Nofrilianti, S. I., Permana, E.S., & Novendri, F. (2019). Water Quality Analysis and Three-Point River Water Pollution Control Strategy in Padang City District. Journal of Kapita Selekta Geography, 2(5), 13–24.
3. Amri, K and Iskandar, K. 2008. Vannamei Shrimp Cultivation. PT. Garamedi Main Library. Jakarta
4. Ariadi, H., Mahmudi M., Fadjar M., 2019. Correlation between the density of vibrio bacteria with Oscillatoria sp. abundant on intensive Litopenaeus vannamei shrimp ponds. Research Journal Life Science 6(2): 114-129.
5. Arifin, T., Yulius and I. S. Arlyza. 2011. Patterns of Spatial Distribution and Characteristics of Dissolved Nitrate-PhosphateOxygen in Coastal Waters of Makassar. Segara Journal, Vol. 7, No. 2 : 88-96.
6. Bange, H.W., & Robinson, C. (2011). The Oceanic Sink for Anthropogenic CO2. In: Delille, B., & Harlay, J. (Eds.), Coastal Marine Sciences: 1. Ocean and Coastal Studies. Springer.
7. Boyd, C.E. 1990. Water Quality in Ponds for Aqua Culture. Alabama agriculture experiment station. Auburn Univ
8. Brown, T.W., Boyd C.E., and Chappell J.A., 2015. Organic Carbon and Dissolved Oxygen Budgets for a Commercial-Size, In-pond Raceway System. Journal of The World Aquaculture Society 46(5): 539-548.
9. Edhy, W.A., Azhary K., Pribadi J., Chaerudin M.K., 2010. White Shrimp Cultivation (Litopenaeus vannamei. Boone, 1931). CV. Noble Beautiful. Jakarta.
10. Fredinan Y. Study of the Suitability and Carrying Capacity of the Spatial-Based Pond Environment in the Coastal Area of North Aceh Regency, East Coast of Nanggroe Aceh Darusalam ProvinceJournal of Indonesian Water and Fishery Sciences, December 2008, Volume 15, Number 2: 157-163
11. Gao, W., Tian L., Huang T., Yao M., Hu W., and Xu Q., 2016. Effect of Salinity on The Growth Performance, Osmolarity Andmetabolism-Related Gene Expression in White Shrimp Litopenaeus vannamei. Aquaculture Reports 4:125-129.
12. Hartoko, A. 2000. Dynamic Mapping Technology of Pelagic Fish Resources through Integrated Analysis of Oceanographic Characters and NOAA Satellite Data, Landsat_TM and SeaWIFS_GSFC in Indonesian Sea Waters. Office of the State Minister for Research and Technology, National Research Council, Jakarta.
13. Hastutiningrum, S., Muchlis, & Astari, N. A. (2020). The Influence of Land Use on Water Quality and Pollution Load Capacity of the Yogyakarta Mataram Ditch. Technology Journal. 12(2), 189–194. https://ejournal.akprind.ac.id/index.php/technoscientia/article/view/2809
14. Kordi, M.G.H. 2010. Sea Shrimp Cultivation. Edition I. Lily Publisher. Yogyakarta
15. Kristina Yuni. 2014. Analysis of the Factors Influencing Production and Income of Vannamei Shrimp Aquaculture in Pasekan District, Indramayu Regency. Thesis, Bogor:Department of Resource and Environmental Economics, Faculty of Economics and Management, Bogor Agricultural University
16. Nainggolan, A.I., Lesmana, I., Utomo, B., Usman, S., & Suryanti, A. (2021). Study of the financial feasibility of vannamei shrimp (Litopenaeus vannamei) cultivation in Pantai Cermin District, Serdang Bedagai Regency, North Sumatra Province. MarsIsland, 1(2), 13—23
17. Poernomo, 1992. Selection of Locations for Shrimp Ponds with an Environmental Insight. Center for Research and Development of Fisheries Agency for Research and Development of Agriculture. Jakarta

18. Rahadi, B., Suharto, B., & Monica, F. Y. (2019). Identification of the Pollutant Load Capacity and Water Quality of the Lesti River before the Construction of the Hotel Journal of Natural Resources and Environment. Journal of Natural Resources and Environment, 6(3), 1–10.
19. Rahadi, B., Suharto, B., & Monica, F. Y. (2019). Identification of the Pollutant Load Capacity and Water Quality of the Lesti River before the Construction of the Hotel Journal of Natural Resources and Environment. Journal of Natural Resources and Environment, 6(3), 1–10.
20. Rahman, A., Jahanara, I., & Jolly, Y. N. (2021). Assessment of physicochemical properties of water and their seasonal variation in an urban river in Bangladesh. Water Science and Engineering, 14(2), 139–148. https://doi.org/10.1016/j.wse.2021.06.006
21. Royani, S., Fitriana, A. S., Enarga, A. B. P., & Bagaskara, H. Z. (2021). Study of Cod and Bod in Water in the Final Processing Site (Tpa) of Kaliori Garbage, Banyumas Regency. Journal of Environmental Science & Technology, 13(1), 40–49. https://doi.org/10.20885/jstl.vol13.iss1.art4
22. Sabli, T. E., & Zahrah, S. (2017). Reduction of phosphate content in detergent wastewater using swamp bamboo system reduction of phosphate contents in waste water detergent using swamp bamboo system. Journal of Agricultural Dynamics, XXX, 101–108. https://journal.uir.ac.id/index.php/dinamipertanian/article/view/802/480
23. SNI. 2016. General Guidelines for Enlargement of Tiger Shrimp (Penaeus monodon) and Vaname Shrimp (Litopenaeus vannamei). Number 75. Minister of Maritime Affairs and Fisheries of the Republic of Indonesia. Jakarta
24. Sulistinarto, D. and Adiwijaya, D.S. 2008. Guidelines for Simple and Semi-Simple Vaname Shrimp (Litopenaeus vannamei) Cultivation in Ponds. Directorate General of Aquaculture Fisheries Directorate of Production, Brackish Water Cultivation Center, Jakarta.
25. Supono. 2019. Low Salinity Vaname Shrimp Cultivation Solutions for Cultivation in Critical Lands. 1st Edition. Science House. Yogyakarta
26. Supriatna, Mahmudia, M., MusaaM., Kusriania. 2020. Relationship between pH and Water Quality Parameters in Vannamei Shrimp (Litopenaeus vannamei) Ponds. Journal of Fisheries and Marine Research.4 (3):368-374.
27. Wibowo, H. 2006. How to Choose Quality Vaname Shrimp Benur. Situbondo Brackish Water Seed Center. Situbondo.
28. Yudiati, E., Arifin. & Riniatsih, I. 2010. The Effect of Probiotic Application on the Survivl Rate and Growth of Vannamei Shrimp (Litopenaeus vannamei) Broccoli, Population of Vibrio Bacteria, and Ammonia Content and Organic Materials of Culture Media. Marine Science.15 (3):153 -158
29. Yudo, S., 2018. Conditions of Ciliwung River Water Quality in the DKI Jakarta Region in View of Organic, Ammonia, Phosphate, Detergent and Coli Bacteria Parameters. Indonesian Air Journal, 6(1). https://doi.org/10.29122/jai.v6i1.2452
30. Yunandar, 2007. Analysis of Space Utilization in the Muara Kintap Coastal Fisheries Development Area, Tanah Laut Regency, South Kalimantan Province. Diponegoro University Semarang graduate program thesis