



A Step-By-Step Experimental Procedure for Water Quality Assessment of Blue Lagoon: Comparison to Socio-demographic and Economic Profile for A Teaching Model

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ABSTRACT

The study investigated the water quality assessment of Blue Lagoon in Barangay Margues, Datu Odin Sinsuat, Maguindanaot can be used as a teaching model was conducted to describe the socio-demographic and economic profile of Margues, Datu Odin Sinsuat, Maguindanao. We determined the physicochemical quality in terms of pH, DO, Turbidity, and Temperature of the Blue Lagoon and also determined the presence of Fecal coli from bacteria. Result of the physicochemical quality test of Blue Lagoon in terms of the temperature of between 24.7 and 24.9°C, turbidity of between 384.72 and 396.68 cm, water pH of between 6.41 to 6.93, and the Dissolved Oxygen (DO) of between 6.2 and 6.5 mg/L. The water was positive in gas formation during the presumptive test. However, in the confirmatory test, there is no formation of a green metallic sheen which indicates a negative result on *Escherichia coli*. In terms of the demographic profile of the locality, the area is composed of 2,506 individuals or 332 households and the total land area is 5,050 hectares covering 70% of agricultural area, 20% of residential area, 6% of the idle area, and 4% of forested area. These results are then compared and used for the creation and the creation of a teaching model to sustain the environment.

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1. INTRODUCTION

Blue Lagoon is part of an eco-cycle which is an example of the unique relationship between nature and technology. Thus, the 1987 Philippine Constitution states that “The State shall protect and advance the right of people to a balanced and healthful ecology in accord with the rhythm and harmony of nature”. In many developing countries, the availability of water has become a critical and urgent problem and it is a matter of great concern to families and communities depending on non-public water supply systems (Kabir *et al.*, 2020; Amin *et al.*, 2022; Sheng *et al.*, 2023). The increase in human population has exerted enormous pressure on the provision of safe drinking water, especially in areas of developing countries (Okonko *et al.*, 2008; Irawan *et al.*, 2021). Unsafe water is a global public health threat, placing persons at risk for a host of diarrheal and other diseases as well as chemical intoxication (Fleming *et al.*, 2006; Abdullah & Putra, 2017).

A study of the microbial diversity in the Blue Lagoon fluid was first performed in 1995 and was based on traditional cultivating techniques. The fluid is pumped directly from boreholes to the lagoon (Petursdottir *et al.*, 2009), which may add an extreme factor to this environment. The utilization of culture-independent approaches for describing species composition in various ecosystems has increased enormously during the last decades and has changed the view on the level of prokaryotic diversity. Because the Blue Lagoon is a terrestrial geothermal lake containing fluid of marine origin was interesting to estimate whether the microbial community would be more of a terrestrial or a marine nature.

Demographic, economic, and urban growth are the causes of different types of environmental pollution, among which the production of solid, liquid, and gaseous waste contributes to negative consequences for the health of exposed populations (Adjuik *et al.*, 2002; Hasanah *et al.*, 2020; Appiah *et al.*, 2021).

The general objective of this study was to describe the Water Quality Assessment of the Blue Lagoon in Datu Odin Sinsuat, Maguindanao. Specifically, it aimed to:

- (i) determine the physicochemical quality of the Blue Lagoon in terms of pH, DO, Turbidity & Temperature in Datu Odin Sinsuat, Maguindanao;
- (ii) determine the presence of Fecal coli from bacteria;
- (iii) describe the socio-demographic and economic profile of Margues, Datu Odin Sinsuat, Maguindanao.

This study is beneficial on the part of the local government, for this could serve as a guide on creating a new framework to establish measures on how to develop, protect and promote the said Blue Lagoon. This study intends to help communities to find out that Blue Lagoon should be protected for the benefit of all. Through this study, the community would become responsible for maintaining the Blue Lagoon.

The content of the study will be used as the basis for future research. It can also be used as a reference or guide to similar studies specifically concerning the quality assessment of the Blue Lagoon. Through this study, the people will gain more knowledge and awareness about the water quality assessment of the Blue Lagoon for them to take good care of the water source and it will possibly help them to appreciate the beauty of the natural resources.

2. METHODS

This section includes all the materials, methods, and procedures for the efficient fulfillment of the study. The study was limited only to identifying the presence of coli from bacteria of the Blue Lagoon in Datu Odin Sinsuat, Maguindanao, and the physicochemical quality of the Blue Lagoon. Also includes describing the socio-demographic and economic profile of the area

or it affects the water quality of Blue Lagoon water as it affects the quality of the Blue Lagoon Water.

2.1. Materials

The proponent of this study used the following materials: sampling bottles, fermentation tubes, test tube racks, an Erlenmeyer flask, inoculating loop, an alcohol lamp, aluminum foil, scotched tape, gloves, a beaker, masking tape, an ice chest, spatula, Petri dishes, and other materials needed for gathering data.

2.2. Study Area

Margues is a Barangay of the Municipality of Datu Odin Sinsuat, Maguindanao in the Province of Maguindanao with a population of about 76,332 and its 34 Barangays that belong to the partly urban areas in the Philippines (DILG-ARMM, 2018). Margues has a population of 2,506 individuals. Margues' Blue Lagoon (**Figure 1**). Residents said the water flows into Tamontaka River and comes from the highlands of Labungan, DOS, and North Upi, both located in Maguindanao. It's about 20 minutes from Cotabato City in Barangay Margues.

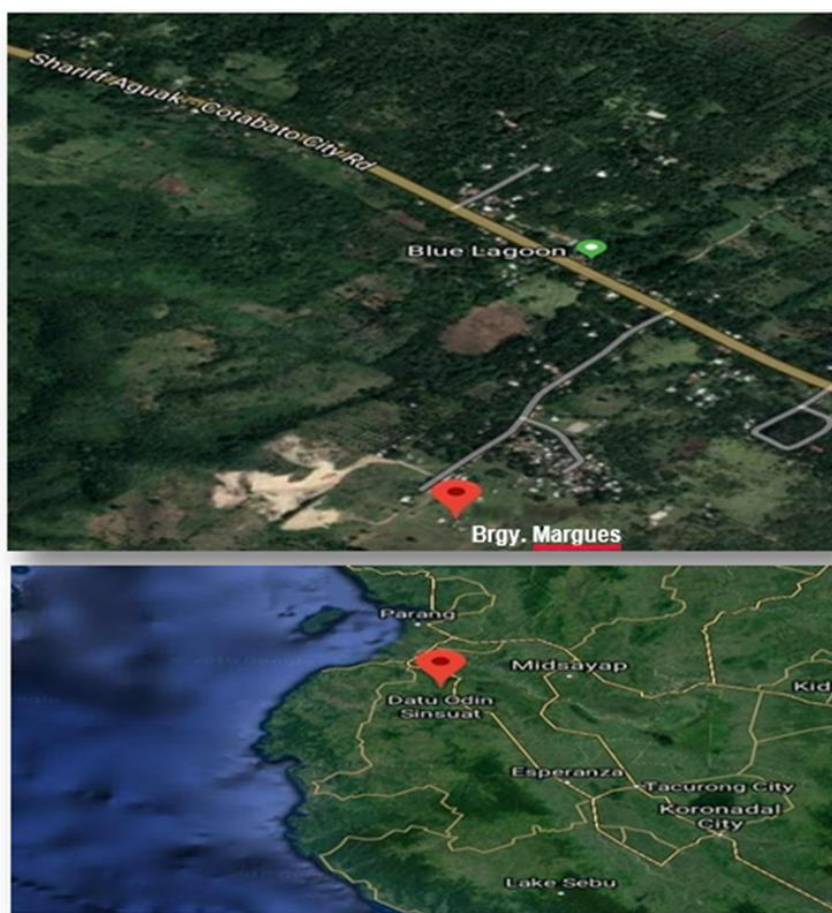


Figure 1. Location map of the study.

2.3. Preparation of Communication

A communication letter was sent to the Local Government Unit of Datu Odin Sinsuat, Maguindanao and to coordinate with the Environmental Management Bureau of the Department of Environment and Natural Resources Region XII in Koronadal City.

2.4. Area Reconnaissance

The area was visited and surveyed to formulate a possible plan for observation in determining the appropriate location for the data gathering. This was done through the assistance of the Local Government Unit (LGU) and the Municipal Tourism Office to obtain the Socio-Demographic and Economic Profile of the area. This was also done to ensure the safety of We and the reliability of the study.

2.5. Socio-Demographic and Economic Profile

The Socio-Demographic and Economic Profile of the area were likewise observed & studied based on the Barangay Development and Community Investment Plan 2015-2017 of Margues, Datu Odin Sinsuat, Maguindanao.

2.6. Location of the Sampling Stations

We determined 5 sampling stations used for determining the Physicochemical quality (Turbidity, temperature, pH, and Dissolved Oxygen (DO) and for determining the Bacteriological Analysis of the Blue Lagoon water (**Figure 2**).

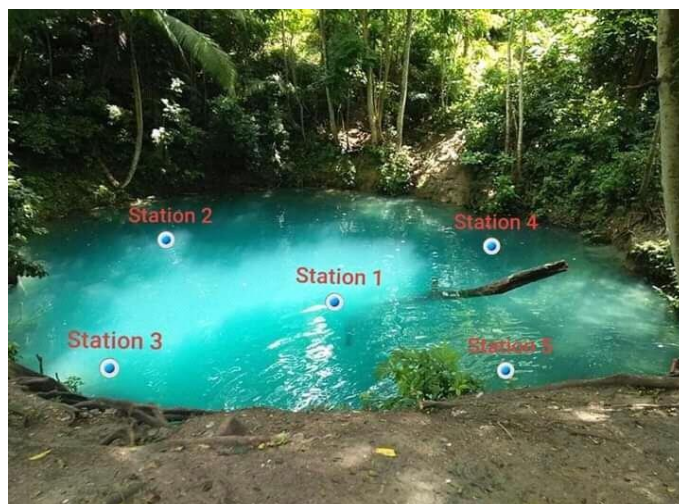


Figure 2. Sampling stations of the study.

2.7. Physicochemical quality

We submitted water samples to the Environmental Management Bureau of the Department of Environment and Natural Resources Region XII in Koronadal City for testing and analysis on the pH and DO. Temperature and Turbidity were tested in the said area using Secchi Disk and Thermometer.

2.8. Temperature Procedure

We used a thermometer to determine the temperature of the Blue Lagoon water in identified sampling stations. The thermometer probe was put into the Blue Lagoon water in five stations and then left in the water for three minutes and determined the temperature of the water.

2.9. Turbidity Procedure

We used Secchi Disk to measure the turbidity of the Blue Lagoon water in identified sampling stations. The Secchi disk was slowly lowered into the Blue Lagoon Water until it was

no longer visible then marked on the rope for further measurement and slowly raised the disk until it became visible once again. The procedure was done in five stations of the Blue Lagoon.

2.10. Site Sampling

Five stations were determined by We to collect water samples and in every station, there were three samples used for replication. A total of 15 water samples were collected.

2.11. Preparation and Sterilization of Materials

All glassware and bottles were washed with detergent soap and rinse thoroughly with distilled water. The materials were arranged in the tray in an inverted position labeled properly and dried in an oven and sterilized for two hours at 180 degrees centigrade temperature.

2.12. Preparation of Culture Media

Lactose Broth is used for the detection of the coliform present organism in water, foods, and dairy products as per Standards Methods. Composition used are:

- (i) Ingredients Gms / Liter
- (ii) Peptic digest of animal tissues
- (iii) Beef extract
- (iv) Lactose

In preparing the lactose broth, the following were dissolved: Three grams of beef extract, three grams of peptone; five grams of lactose powder were dissolved in 1000-mL distilled water. The mixture was heated and stirred with a stirring rod until it completely dissolved. The mixture was dispensed in 10ml volume in each 90-culture tube and each Durham fermentation tube was placed in an inverted position into each lactose broth tube, then it was sterilized using the oven at 171°C for 2 hours, after which the tube was allowed to cool.

In preparing Eosine Methylene blue agar, the following were dissolved: 10 grams of peptone; Two grams of dipotassium phosphate, 0.2 grams of Eosine Y; 0.065 grams methylene blue, and 5 grams in 1 liter of distilled water, and the mixture was heated and stirred using a rod until it was completely dissolved. Then it was sterilized using the oven at 171°C for 2 hours.

2.13. Multiple Fermentation Tube

2.13.1. Presumptive test

The presumptive test was done to initially determine the presence of the coliform organism in the water samples. The bottles containing water samples were shaken vigorously to ensure uniform distribution of microorganisms. A 0.1-mL and 0.00-mL volume of water samples were inoculated in the three separate test tubes and it was inoculated for 24 hours at 37°C. The number of tubes showing gas formation in each dilution was recorded. The tubes with gas appearing inside the inverted vial within 48 hours indicate positives for the presence of coliform in the presumptive test.

2.13.2. Confirmatory test

To be certain that the coliform group is responsible, confirmatory tests were performed. The Petri plates containing Eosine Methylene Blue (EMB) were streaked with a loopful of culture from each primary fermentation tube having as formation. And the Petri plates were incubated for 24 hours at 37°C in an inverted position. And after the incubation, the number

of colonies that exhibited a greenish metallic sheen within 24 hours indicates a positive confirmed test. Eosine Methylene Blue was used in the confirmatory test because they tend to inhibit the growth of bacteria except for *Escherichia coli*. In this medium colonies with a greenish metallic sheen indicated the presence of *Escherichia coli*. Occurrence of non-coliform type colonies within 24 hours, indicated a negative confirmatory test.

2.13.3. Completed test

A completed test was done to identify the coliform colonies from the result of the confirmatory test. A discrete colony of *Escherichia coli* on the surface of the Eosine Methylene Blue Agar (EMB) plates was selected and inoculated in the tubes containing 10 ml of lactose broth. Then, the tubes were selected and swirled gently. The tubes were inoculated at 37°C and re-examined after 24 hours, after which they were examined for gas formation. And they were incubated at 37°C and re-examined after 24 hours. The number of tubes showing gas formation in each dilution was counted Most Probable Number (MPN)/mL of water was determined using the table of most Probable Number (MPN)/mL of the sample by Fishbein et al (1976).

2.14. Data Gathering

The data gathered in this study were:

- (i) The number of the tube showing gas formation in the presumptive test
- (ii) The number of colonies of the *Escherichia coli*
- (iii) The number of tubes showing a gas formation in the completed test.
- (iv) The result of pH, turbidity, temperature, and dissolved oxygen
- (v) The Socio-demographic and economic profile of Barangay Margues, Datu Odin Sinsuat, Maguindanao.

3. RESULTS AND DISCUSSION

The presentation, analysis, and interpretation of data for the study entitled “Water Quality Assessment of Blue Lagoon Water in Barangay Margues, Datu Odin Sinsuat Maguindanao” was thoroughly discussed in this section. The Socio-demographic and Economic Profiles were taken in secondary data of the Barangay Development and Community Investment Plan 2015-2017 of Margues, Datu Odin Sinsuat, Maguindanao. The physicochemical quality in terms of pH, Dissolved Oxygen, Turbidity, and Temperature of the Blue Lagoon in Barangay Margues, Datu Odin Sinsuat, Maguindanao was determined.

Three trials taken from five stations were taken for the Analysis. The presence of coliform bacteria and the most probable number (MPN) of the coliform bacteria were also determined.

As shown in **Table 1** and **Figure 3**, the water temperature is very low. Station 5 (24.7°C) has the lowest temperature followed by station 2 (24.8°C), and also stations 1, 3, and 4 have the same result of a temperature of 24.9°C.

Table 1 and **Figure 3** also showed that the temperature of different sampling stations of the Blue Lagoon passed the acceptable range of temperature which is according to the DENR reference “Water Quality Guidelines and General Effluent Standards of 2016”. Generally, **Table 2** and **Figure 3** show that the five stations of the Blue Lagoon water are very cold.

Table 2 and **Figure 4** show that the turbidity of the water is low. Based on the graph, station 3 has the highest result of turbidity 396.68 per cm followed by Station 4 (395.73). Station 1 (393.7), Station 2 (390.72), and lastly, Station 5 (384.72) were also followed. It also reveals

that water is near the acceptable range of turbidity which is according to the DENR reference “Water Quality Guidelines and General Effluent Standards of 2016”.

Table 1. Result of temperature in the Blue Lagoon Water of Barangay Margues, Datu Odin Sinsuat, Maguindanao.

Variables	Temperature (per Degree Celsius)
Station 1	24.9
Station 2	24.8
Station 3	24.9
Station 4	24.9
Station 5	24.7

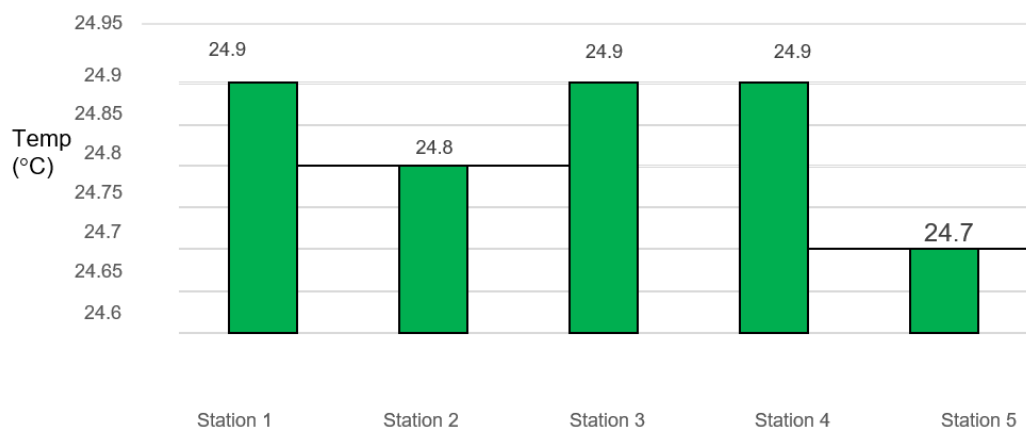


Figure 3. The temperature in the Blue Lagoon.

Table 2. Result of turbidity in the Blue Lagoon Water of Barangay Margues, Datu Odin Sinsuat, Maguindanao.

Variables	Turbidity (per Centimeter)
Station 1	393.7
Station 2	390.72
Station 3	396.68
Station 4	395.73
Station 5	384.72

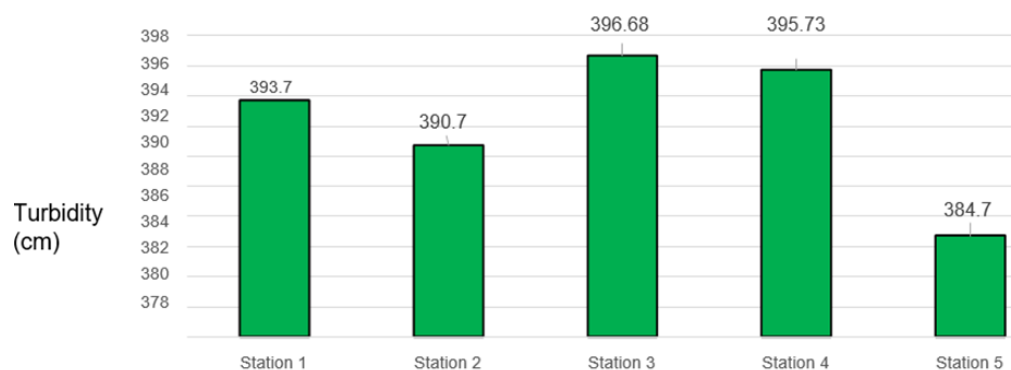


Figure 4. Turbidity in the Blue Lagoon.

Table 3 and **Figure 5** show that the water pH ranges from 6.41-6.93 respectively which implies that the water is basic. Station 2 has the highest pH (6.41) followed by Station 3 (6.84), Station 1 (6.91), Station 5 (6.92), and Station 4 (6.93). According to the DENR reference “Water Quality Guidelines and General Effluent Standards of 2016”, the acceptable range of pH is 6.5-7 indicating that the result of the water pH of the water passed the acceptable range is reported elsewhere.

Table 3. Result of the pH in the Blue Lagoon Water of Barangay Margues, Datu Odin Sinsuat, Maguindanao.

Variables	pH
Station 1	6.91
Station 2	6.41
Station 3	6.84
Station 4	6.93
Station 5	6.92

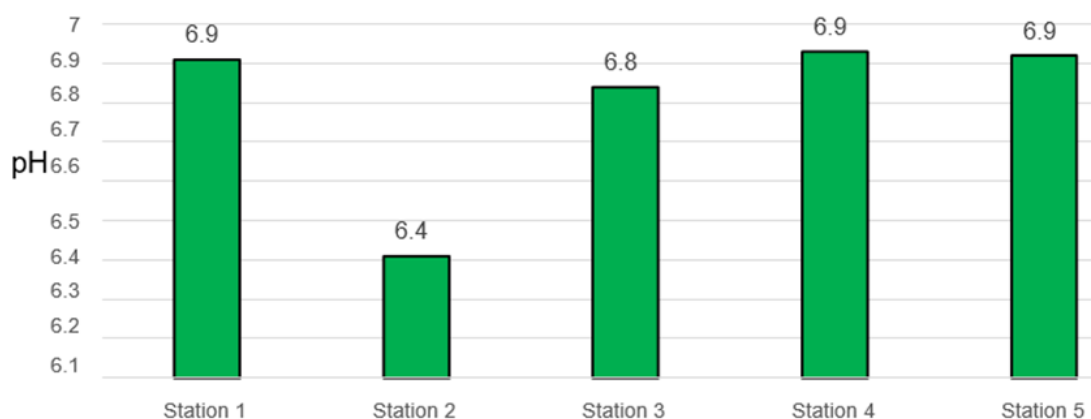


Figure 5. The pH in the Blue Lagoon.

Table 4 and **Figure 6** show that Station 1 has the highest level (6.5) of Dissolved Oxygen, followed by Station 2 (6.3) and 5 (6.3) with the same result. However, Stations 3 and 4 have the same result; also, of 6.2 DO. It also reveals that the DO of the water is high that's why there were organisms that survived in the Blue Lagoon water.

The results of the Presumptive test in the three (3) trials presented in **Tables 5, 6, and 7** showed that all water samples taken from different sampling stations in three replications were positive for coliform bacteria, as indicated by the gas formation in the test tubes. However, these positive results in the Presumptive test of Trials 1, 2, and 3 showed the presence of coliform bacteria in the water samples.

Table 4. Result of the DO in the Blue Lagoon Water of Barangay Margues, Datu Odin Sinsuat, Maguindanao.

Variables	Dissolved Oxygen
Station 1	6.5
Station 2	6.3
Station 3	6.2
Station 4	6.2

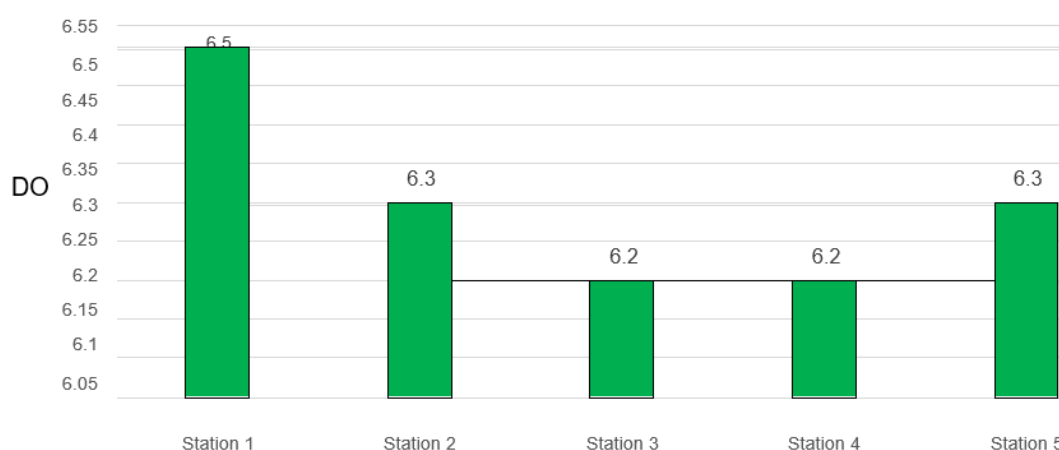


Figure 6. The DO of different sampling stations in the Blue Lagoon water.

Table 5. Result of presumptive test, confirmatory test, and completed test in trial 1 of Blue Lagoon water in Barangay Margues, Datu Odin Sinsuat, Maguindanao.

Trial 1	Total number of			Mean of	Total number of			MPN 100
Sampling Stations	Positive Tube in the Presumptive Test			<i>Escherichia coli</i> colonies in the confirmatory test	Positive Tubes in the Completed Test			mL
	1.0	0.1	0.01		1.0	0.1	0.01	
Station 1								
Sample 1	3	3	3	0	-	-	-	-
2	3	3	3	0	-	-	-	-
3	3	3	3	0	-	-	-	-
Station 2								
Sample 1	3	3	3	0	-	-	-	-
2	3	3	3	0	-	-	-	-
3	3	3	3	0	-	-	-	-
Station 3								
Sample 1	3	3	3	0	-	-	-	-
2	3	3	3	0	-	-	-	-
3	3	3	3	0	-	-	-	-
Station 4								
Sample 1	3	3	3	0	-	-	-	-
2	2	3	3	0	-	-	-	-
3	3	3	3	0	-	-	-	-
Station 5								
Sample 1	3	3	3	0	-	-	-	-
2	3	3	3	0	-	-	-	-
3	3	3	3	0	-	-	-	-

Table 6. Result of presumptive test, confirmatory test, and completed test in trial 2 of Blue Lagoon water in Barangay Margues, Datu Odin Sinsuat, Maguindanao.

Trial 2	Total number of			Mean of	Total number of			MPN 100
Sampling Stations	Positive Tube in the Presumptive Test			<i>Escherichia coli</i> colonies in the confirmatory test	Positive Tubes in the Completed Test			mL
	1.0	0.1	0.01		1.0	0.1	0.01	
Station 1								
Sample 1	3	2	3	0	-	-	-	-
2	3	3	3	0	-	-	-	-
3	3	2	2	0	-	-	-	-
Station 2								
Sample 1	3	3	3	0	-	-	-	-
2	3	3	3	0	-	-	-	-
3	3	1	3	0	-	-	-	-
Station 3								
Sample 1	3	3	3	0	-	-	-	-
2	3	2	3	0	-	-	-	-
3	3	3	3	0	-	-	-	-
Station 4								
Sample 1	1	3	3	0	-	-	-	-
2	2	3	3	0	-	-	-	-
3	3	3	3	0	-	-	-	-
Station 5								
Sample 1	3	3	3	0	-	-	-	-
2	3	3	3	0	-	-	-	-
3	2	2	3	0	-	-	-	-

In the Confirmatory test result, all water samples taken from different sampling stations in three replications were negative in *Escherichia coli*. Tubes in Trials 1, 2, and 3 that showed gas formation in the Presumptive test, were further confirmed in the confirmatory test. The results of the confirmatory test showed that there were no green metallic sheen colonies formed in all two trials of five Stations in three replications. Thus, the result of the confirmatory test confirmed that a certain coliform group was not responsible for gas formation during the presumptive test.

Table 8 shows that the total population of Barangay Margues is 2,506 individuals (based on Census 2007). It has 332 number of households. In the 2,506 population of the Barangay, there were 1,346 or 47% males and 1,513 or 53% females. Most members of the families have not gone to school few were educated with a literacy rate estimated at 33% while illiterate comprise the majority (67%) of the total population. The community is 99% Islam Believer and 1% Roman Catholic. The dialect used by Barangay Margues is Maguindanao since only the Maguindanaon tribe is present in the area. Some of the residents can speak Tagalog and few can speak and understand English.

The total land area is 5,050 hectares covering 70% agricultural area, 20% residential area, 6% idle area, and 4% forested area. It has mountains and hilly portions that are scattered somewhere in the South and or almost part. The lowland portions are in the northern and western parts (**Table 9**).

Table 7. Result of presumptive test, confirmatory test, and completed test in trial 3 of Blue Lagoon water in Barangay Margues, Datu Odin Sinsuat, Maguindanao.

Trial 3	Total number of			Mean of	Total number of			MPN 100
Sampling Stations	Positive Tube in the Presumptive Test			<i>Escherichia coli</i> colonies in the confirmatory test	Positive Tubes in the Completed Test			mL
	1.0	0.1	0.01		1.0	0.1	0.01	
Station 1								
Sample 1	3	3	2	0	-	-	-	-
2	1	3	2	0	-	-	-	-
3	3	3	3	0	-	-	-	-
Station 2								
Sample 1	3	2	3	0	-	-	-	-
2	3	3	2	0	-	-	-	-
3	3	3	3	0	-	-	-	-
Station 3								
Sample 1	3	2	3	0	-	-	-	-
2	1	3	2	0	-	-	-	-
3	2	3	3	0	-	-	-	-
Station 4								
Sample 1	3	2	2	0	-	-	-	-
2	2	3	3	0	-	-	-	-
3	3	1	3	0	-	-	-	-
Station 5								
Sample 1	2	3	3	0	-	-	-	-
2	3	3	2	0	-	-	-	-
3	3	2	3	0	-	-	-	-

Table 8. Socio-demographic profile (based on the barangay development and community investment plan 2015-2017 of Margues, Datu Odin Sinsuat, Maguindanao).

Variables		Frequency (n)	Percentage (%)
Population		2.506	100%
Gender	Male	1.178	47%
	Female	1.328	53%
Literacy rate	Literate	827	33%
	Illiterate	1.679	67%
Dialect		2.481	100%
Religion	Islam	2.481	99%
	Roman chatolic	25	1%

Table 9. Land area of Barangay Margues, Datu Odin Sinsuat, Maguindanao.

Variables	Frequency (n)	Percentage (%)
Agricultural area	3.535	70%
Residential area	1.010	20%
Idle area	303	6%
Forested area	202	4%

The sources of income were farming, charcoal/firewood making, fishing, OFW remittances (DH), sari-sari store/loader, carpentry, jeep/Habal-habal/payong-payong/Kuliglig/Aura

driving, private employee and government employee. The major family expenditures were food, houses, farm inputs, transportation, education, medicines, communication/load, and social obligation [kanduli, wedding, etc. (**Table 10**).

Table 10. Source of income and expenditure pattern.

Source of income	Expenditure Pattern
1. Farming	1. Food
2. Charcoal/firewood making	2. Houses
3. Fishing	3. Farm inputs
4. OFW remittances (DH)	4. Transportation
5. Sari-sari store/loader	5. Education
6. Carpentry	6. Medicines
7. Jeep/Habal-habal/paying-payong/kuliglig/aura driving	7. Communication/load
8. Private employee	8. Social obligation (kanduli, wedding, etc)
9. Government employee	

The Water Quality Assessment of Blue Lagoon in Barangay Margues, Datu Odin Sinsuat, Maguindanao was conducted to analyze the Socio-demographic and Economic Profile, Physicochemical quality of the Blue Lagoon water, and the Most Probable Number of bacteria.

The study on the water quality assessment of Blue Lagoon was conducted at Barangay Margues, Datu Odin Sinsuat, Maguindanao last months of July and August 2018. The study generally aimed to describe the Water Quality Assessment of the Blue Lagoon, specifically, it aimed to describe the socio-demographic and economic profile of Margues, Datu Odin Sinsuat, Maguindanao, to determine the physicochemical quality (in terms of pH, DO, Turbidity, and Temperature) of the Blue Lagoon, and the presence of fecal coli form bacteria at Barangay Margues, Datu Odin Sinsuat, Maguindanao.

The physicochemical quality of the Blue Lagoon in Datu Odin Sinsuat, Maguindanao showed that the Temperature, pH, and DO (mg/L) of different stations passed the acceptable range of Administrative order of DENR, the “Water Quality Guidelines and General Effluent Standards of 2016” except the turbidity which is near the acceptable range.

It was also found that in terms of the Bacteriological Analysis of Blue Lagoon Water, the five stations showed negative from *Escherichia coli* because there was no formation of a greenish metallic sheen in the confirmatory test. The result implies that the socio-demographic and economic profile does not affect the water quality of the Blue Lagoon because the people in the community observed the proper sanitation and water management process as per community resolution.

The result of the study showed that in terms of the socio-demographic profile; the total population of Barangay Margues is 2,506 individuals (based on Census 2007). It has 332 households. In the 2,506 population of the barangay, there were 1,346 or 47% males and 1,153 or 53% females. Most members of the families have not gone to school, few were educated. The literacy rate is estimated about 67% of the total population. The dialect used by Barangay Margues is Maguindanao since only the Maguindanaon tribe is present in the area. Some of the residents can speak Tagalog and few can speak and understand English. The community is 99% of Islam and 1% of Christian.

It was also found that in terms of the socio-economic profile; the total land area of Barangay Margues is 5,050 hectares covering 70% of agricultural area, 20% of residential area, 6% of the idle area, and 4% of forested area. The inventory of local production resources showed that the sources of income were farming, charcoal/firewood making, fishing, OFW

remittances (DH), sari-sari store/loader, carpentry, jeep/Habal-habal/payong-payong/Kuliglig/Aura driving, private employee and government employee. The major family expenditures were food, houses, farm inputs, transportation, education, medicines, communication/load, and social obligation (kanduli, weddings, etc.).

4. CONCLUSION

From the findings of the study, the following conclusions were hereby given:

- (i) Based on the testing on Physicochemical quality in terms of pH, DO, Turbidity & Temperature of the Blue Lagoon in Datu Odin Sinsuat, Maguindanao: the water temperature is very cold, the turbidity is clear/transparent as aquamarine blue, the pH is basic because the hydrogen ion concentration is low, and the DO (mg/L) is normal that's why some organisms survived.
- (ii) Water from the Blue Lagoon in Barangay Margues, Datu Odin Sinsuat, Maguindanao was positive in gas formation during the presumptive test but in the confirmatory test there is no formation of green metallic sheen which indicates a negative result on *Escherichia coli* due to proper waste disposal and sanitation management is observed in the community.

Barangay Margues, Datu Odin Sinsuat, Maguindanao is composed of 2,506 individuals or 332 number of households, and the total land area was composed of agricultural, residential, idle, and forested areas. Recommendations are in the following:

- (i) A more comprehensive research study will be conducted specifically on the Bathymetry and macro invertebrates' identification of the Blue Lagoon to include heavy metals present in the area.
- (ii) A correlational study analysis on the impact water quality of the Blue Lagoon.
- (iii) The Local Government Units should coordinate with various national government agencies to further conduct studies in the said Blue Lagoon.
- (iv) The Local Government Units should engage in various developmental initiatives to preserve the Blue Lagoon and its environment.
- (v) Experts in the field of Biological Sciences should strengthen their research on the rural biodiversity potential for conservation.

5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

6. REFERENCES

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