Abstract

Research Title : A Study on Changes in Water Before and After Adding Artificial Watercolor in the Water Source Between Building 2 and Building 3 at Wichienmatu School, Khok Lor Subdistrict,Mueang Trang District, Trang Province

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This study aims to examine the changes in water before and after adding artificial watercolor in terms of physical and chemical properties, as well as differences in living organisms in the water source between Building 2 and Building 3 at Wichienmatu School, Khok Lor Subdistrict, Mueang Trang District, Trang Province. The water samples were collected between November 20, 2024, and January 22, 2025. The samples were analyzed for cloudiness, iron content, phosphate content, nitrate content, dissolved oxygen, temperature, electrical conductivity, pH, and water transparency. Before adding artificial watercolor, it was found that the cloudiness level was 70%, the electrical conductivity was 0.2 ppt, the water transparency was 68.5 cm, the temperature was 33°C, the pH level was 8.1, the dissolved oxygen concentration was 5.5 ml/L, the iron content was 0.1 mg/L, and the phosphate content was 0.1 mg/L. After adding artificial watercolor, it was found that the cloudiness level was 67.81%, the iron content remained at 0.1 mg/L, and the phosphate content remained at 0.1 mg/L. The dissolved oxygen concentration ranged from 4.5 to 6 ml/L, the water temperature ranged from 26 to 29°C, the electrical conductivity ranged from

0.1 to 0.2 ms, the pH level ranged from 7.7 to 8.86, and the water transparency ranged from 49.3 to 86.0 cm. Nitrate content was not detected in the water source. After adding artificial watercolor, the number of small organisms decreased, while the number of large organisms increased.

Keywords : Water quality, water quality changes, artificial watercolor, living organisms

Introduction

The water source is located in Village No. 12, Khok Lor Subdistrict, Mueang Trang District, Trang Province. It is an artificial water body with no flowing water and an unattractive color. To enhance its appearance, the school has added artificial watercolor (Blue Sea) to make the water visually appealing. This led to an interest in understanding how artificial watercolor affects water quality. Therefore, this study aims to monitor and assess changes in water quality and efficiency after adding artificial watercolor. Artificial watercolor is a coloring powder used to turn water blue, with the shade adjustable depending on the amount added. A higher concentration results in a darker blue, while a lower concentration produces a lighter shade. This product is designed to dissolve and disperse well in water, ensuring an even and aesthetically pleasing color. Artificial watercolor is widely used in locations where an attractive and visually striking water feature is desired. It helps enhance the appeal of such areas, often attracting visitors for photography or sightseeing. Artificial watercolor is formulated to be safe, posing no harm to aquatic ecosystems. It contains no hazardous chemicals that could negatively impact aquatic organisms or the surrounding environment. Additionally, it does not leave stains or residues in the water after use. As a result, artificial watercolor has become a popular choice for individuals looking to enhance the beauty of water features without harming nature. Given these factors, this research focuses on studying the water quality in the area between Building 2 and Building 3 at Wichienmatu School, Khok Lor Subdistrict, Mueang Trang District, Trang Province. The study involves examining the physical, chemical, and biological properties of the water while also evaluating its quality after adding artificial watercolor. The findings will provide valuable insights into the effects of artificial watercolor on water sources used for fish farming.

Research Objectives

1. To study the water quality parameters before and after adding artificial watercolor, focusing on the physical and chemical properties of the water source. The parameters include iron content, phosphate content, nitrate content, dissolved oxygen, temperature, electrical conductivity, copper content, pH, water transparency, and cloudiness levels in the water source between Building 2 and Building 3 at Wichienmatu School, Khok Lor Subdistrict, Mueang Trang District, Trang Province.

2. To examine the differences in aquatic organisms before and after adding artificial watercolor.

Research Questions

1. Does artificial watercolor affect aquatic organisms? If so, how?

2. How does adding artificial watercolor impact water quality? What are the differences before and after its application?

Research Hypotheses

1. Artificial watercolor affects aquatic organisms, leading to an increase in their population after its addition.

2. Artificial watercolor does not impact water quality, resulting in no significant differences between the water conditions before and after its application.

Materials, Equipment, and Research Methodology

1. Beaker
2. Dropping pipette.
3. Measuring tape.
4. Distilled water
5. Thermometer
6. pH meter
7. Dissolved oxygen test kit
8. Iron test kit
9. Phosphate test kit
10. Electrical conductivity meter
11. Secchi disk
12. Nitrate test kit
13. Notebook and stationery
14. Photography equipment
15. Nylon rope
16. Scissors
17. Tissue paper
18. Notebook and stationery

Study Area and Sampling Schedule

The study area is the water source located between Building 2 and Building 3 at Wichienmatu School, Khok Lor Subdistrict, Mueang Trang District, Trang Province. Water samples were collected every week for a total of eight sampling sessions. The study was conducted between 14:20 and 16:00

Research Methodology

Preparation Phase

1. Define the research topic and questions to study.

2. Conduct literature review and gather relevant information related to the research.

3. Establish clear objectives for the study.

4. Determine the sampling locations within the area to be studied.

Implementation Phase

1. Develop a work plan for the research.

2. Survey the study area to assess the site conditions.

3. Collect water samples to analyze physical and chemical water quality. The parameters to be measured include cloudiness, iron content, phosphate content, dissolved oxygen, temperature, electrical conductivity, pH, and transparency. The study will take place from 14:20 to 16:00, once a week for a total of 8 sessions.

4. Analyze the collected data and summarize the research findings.

Part 1: Study of Physical Water Quality

1. Determine Sampling Points Identify specific locations for collecting water samples.

2. Set Study Point for Transparency Measurement Select one area to measure water transparency.

3. Survey Geographic Coordinates Use a mapping application (iOS system) to record the geographic coordinates of the study area.

4. Study Transparency Use a Secchi disk to measure water transparency. First, place the Secchi disk at the water's surface and pull the rope to chest level. Tie the rope at this level, then release it into the water until the disk is no longer visible. When the disk is no longer

visible, tie the rope at that point and lift it 10 cm above the water's surface. Measure the distance from the tied rope point to the Secchi disk using a measuring tape and record the results. Repeat the process two more times to ensure accuracy.

5. Set Study Point for Temperature Measurement Identify two additional areas to measure water temperature.

6. Measure Water Temperature Use a thermometer to measure water temperature by submerging it in the water for 3 minutes. Record the temperature after the measurement.

Part 2: Water Sample Collection for Chemical Water Quality Study

1. Measure the dissolved oxygen in the water samples collected from two areas using a dissolved oxygen test kit.

2. Measure the levels of iron, phosphate, nitrate, and copper in the water samples using specific test kits for each substance. Compare the results with standard values and record the findings.

3. Use a pH meter to measure the pH of the water samples. Submerge the pH meter in the water for 1 minute, then record the pH value.

Geographic coordinates Study of the water source area between Building 2 and Building 3 in the area of Wichianmat School, Khok Lo Subdistrict, Mueang Trang District, Trang Province

It has coordinates 7.5037677°N, 99.6297318°E.

Figure 1 Map of water quality study points in the water source between Building 2 and Building 3, Wichianmat School area, Khok Lo Subdistrict, Mueang Trang District, Trang Province.

Source: iOS Map Application.

Table 1 shows the geographic coordinates of the water quality study points.

Place to study water samples	Geographic coordinates	
	Latitude(N)	Longitude(E)
Water source behind Building 2, Wichienmatu School, Khok Lo Subdistrict, Mueang Trang District, Trang Province	7.5037677	99.6297318

Table 2 Duration of water quality study.

Time	Water quality research study period	
	Day/Month/Year	Period
1	04/12/2024	02:20 p.m. - 04: 00 p.m.
2	11/12/2024	02:20 p.m. - 04: 00 p.m.
3	18/12/2024	02:20 p.m. - 04: 00 p.m.
4	25/12/2024	02:20 p.m. - 04: 00 p.m.
5	03/01/2025	02:20 p.m. - 04: 00 p.m.
6	08/01/2025	02:20 p.m. - 04: 00 p.m.
7	15/01/2025	02:20 p.m. - 04: 00 p.m.
8	22/01/2025	02:20 p.m. - 04: 00 p.m.

Physical and chemical water quality analysis. Water samples were collected at the water source between Building 2 and Building 3 in the area of Wichianmat School, Khok Lo Subdistrict, Mueang District, Trang Province. Parameters measured in the field were cloudiness, iron content, phosphate content, nitrate content, oxygen content in water, temperature, electrical conductivity, copper content, water acidity-alkalinity, and transparency, as shown in Table 3.

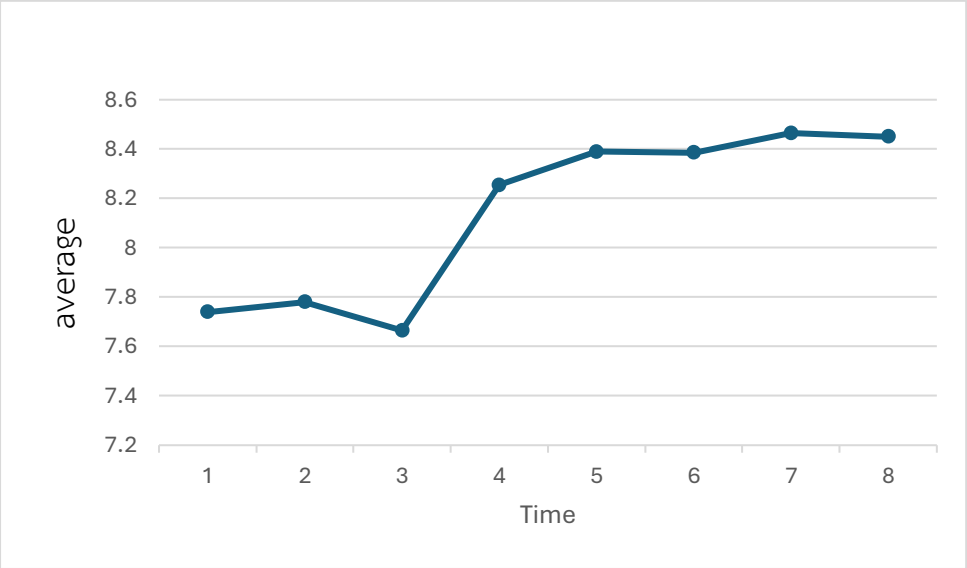
Results of the study

1. The results of the physical and chemical water quality analysis of the water source between Building 2 and Building 3 in the area of Wichianmat School, Khok Lo Subdistrict, Mueang District, Trang Province during November 2024 to January 2025 are as shown in Table 3. With the cloud content value in the range of 67.81%, the electrical conductivity in the range of 0.1-0.2 ppt, the transparency in the range of 49.30-86.00 cm, the temperature in the range of 26-29 degrees Celsius, the acidity-alkalinity in the range of 7.7-8.86, the amount of oxygen dissolved in water in the range of 4.5-6 ml/L, the amount of iron in the range of 0.1 mg/L, and the amount of phosphate in the range of 0.1 mg/L.

Table 3 Physical and chemical water quality of water sources between Building 2 and Building 3 in Wichianmat School, Khok Lo Subdistrict, Mueang District, Trang Province.

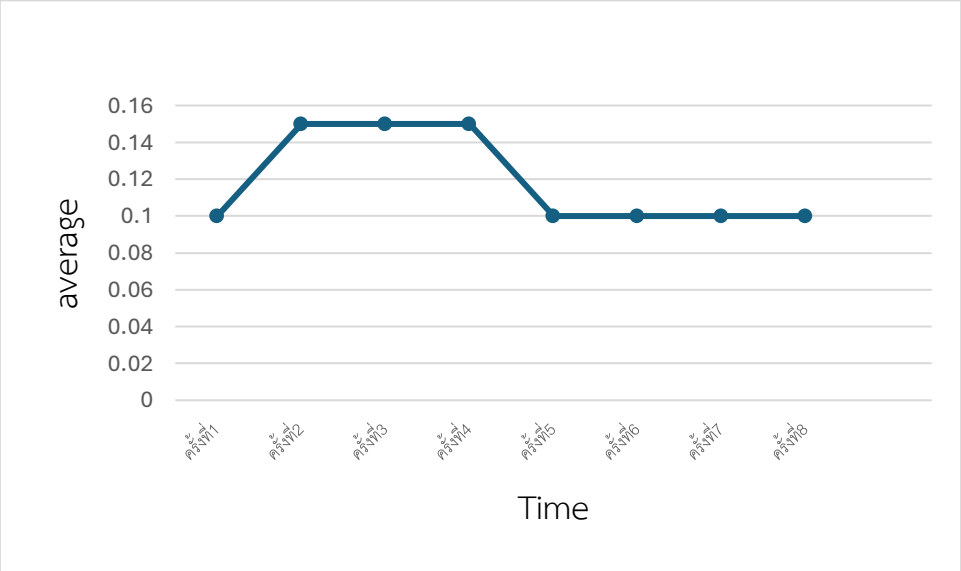
Value / d/m/y	Cloudiness (%)	Transparency (cm)	Temperature (°C)	pH	Electrical (ppt)	Oxygen (ml/l)	Phosphate (mg/l)	Iron (mg/l)
27/11/2024	70	68.5	33	8.1	0.2	5.5	0.1	0.1
04/12/2024	70	63.6	26	7.74	0.1	6.25	0.1	0.1
11/12/2024	82.5	59.6	27.6	7.78	0.15	4.75	0.1	0.1
18/12/2024	100	69.65	27.2	7.67	0.15	5.75	0.1	0.1
25/12/2024	97.5	58.7	28.5	8.25	0.15	5.5	0.1	0.1
03/01/2025	57.5	65.8	28.5	8.4	0.1	6.5	0.1	0.1
08/01/2025	50	72.35	28.5	8.38	0.1	6.75	0.1	0.1
15/01/2025	40	64.75	28.5	8.47	0.1	5.75	0.1	0.1
22/01/2025	45	66.85	29.25	8.45	0.1	5.75	0.1	0.1

pH



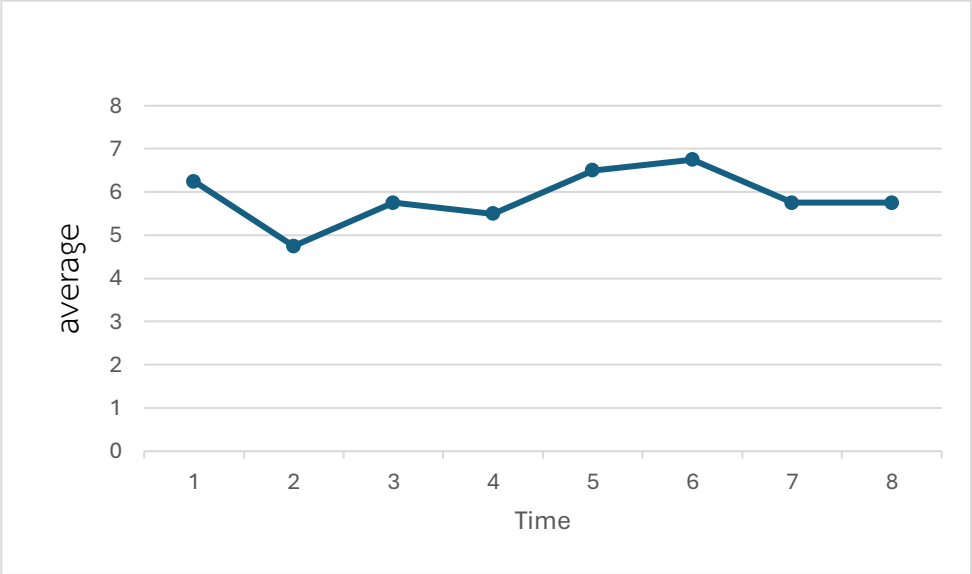
From the graph, the pH value was 7.74 in the first measurement. It increased to 7.78 in the second measurement, showing an increase of 0.04. Then, it decreased to 7.67 in the third measurement, a decrease of 0.11. After that, it increased continuously.

Electrical conductivity (µm/cm)



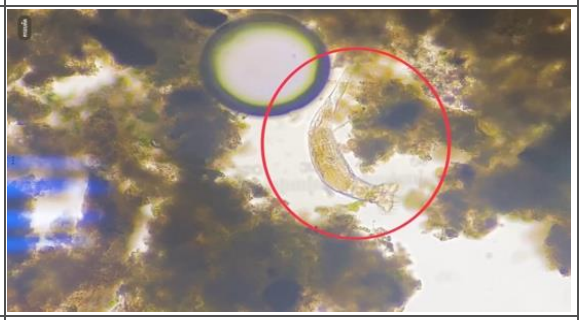
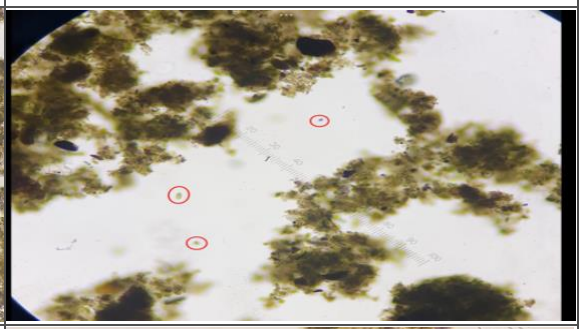
From the graph, the electrical conductivity was 0.1 u/cm in the first measurement. It increased to 0.15 u/cm in the second measurement, showing an increase of 0.05 u/cm. This trend continued until the fifth measurement, when the conductivity decreased to 0.1 u/cm, showing a decrease of 0.05 u/cm, and continued to decrease until the eighth measurement.

Oxygen content in water (mg/l)



From the graph, the oxygen content in the first time was 6.2 mg/L, in the second time was 4.8 mg/L, decreasing in the third time, it was 5.8 mg/L, increasing by 1.0 mg/L, in the fourth time was 5.5 mg/L, decreasing by 0.3 mg/L, in the fifth time was 6.5 mg/L, increasing by 1.0 mg/L, in the sixth time was 6.8 mg/L, increasing by 0.3, and in the seventh and eighth times, the oxygen content decreased to 5.8 mg/L, decreasing by 1.0 mg/L.

Chapter 4 Study of aquatic life before and after adding chemicals and artificial dyes

Living things before adding substances	Living things after adding substances
	
	No living things found
	
No living things found	

No living things found	
No living things found	
No living things found	

Summary of the study

The results of the study of aquatic organisms before and after adding the substance found that the artificial color had an effect on the water and organisms both before and after adding it because before adding the artificial color, there were fewer organisms and after adding the artificial color, there were more organisms. It can be concluded that adding the artificial color to the water made the organisms grow better.

Acknowledgements

This research was successfully completed with the support from many parties. The research team would like to thank Ms. Jiraporn Sirirat, the lecturer who gave advice and suggestions and helped improve this research successfully. We would like to thank Mr. Sakda Paisomboon, the director of Wichienmatu School, for supporting the budget for the research and Wichianmat School for supporting the equipment used in the research and the science laboratory, which played an important role in facilitating the research process to proceed efficiently and achieve the goals.

With gratitude for the kindness and support received, the research team would like to express our deepest gratitude to everyone here.

BADGES

1.I AM A STUDENT RESEARCHER

Because of the suspicion of the changing color of the water source and the inquiry with the school personnel who are responsible for this duty, we found out that the substance that the school personnel put into the water in the school area was artificial color. Our group is interested in artificial color and wants to study the quality of water with artificial color added, so this environmental research was created and collected by asking the school personnel and using the internet to study and research.

2.I AM A DATA SCIENTIST

Because the data from the experiment was collected by using the GLOBE database to identify trends.

Changes in the project studied, tables were created with the experimental results, average data for each time, and raw data tables with details, experimental methods, conclusions of experimental results, and interpretations of experimental results using graphs to help see the differences in the data more clearly. Data was summarized before and after the study to see if there were any changes and to be able to answer the research questions from the study about the project topic studied.

3.I AM A COLLABORATOR

Because our group is the project researcher, each person plays an important role in the work by studying the quality of water before and after adding artificial color. They jointly arranged and planned the experiment to collect water samples for study and experiment. After receiving data from the experimental study, they jointly analyzed and interpreted the data. They studied the effects of changes in water before and after adding artificial water colors, and jointly summarized the results of the experimental study and the results of the project.

References

Kesaraporn Raknui, Kantinan, Sai-ngam, Thanchanok Phol-in (2022) Study of water quality and plankton diversity in Lam Pikun Canal, Yan Ta Khao District, Yan Ta Khao Subdistrict, Trang Province Chatchaporn Duangdara, Nichakorn Sriphumbang, Angkana Suksongsa (2022) Water quality adjustment for the environment of Chonburi Sukbot School

Adding artificial dyes to water Appendix

Adding artificial dyes to Water

Wait for the color and water to mix together

Measure the temperature for 3 minutes using a thermomet

Find the amount of oxygen. in water by Dissolved Oxygen.

Find the pH value in. water using a pH meter.

Study aquatic life through a microscope.

Find the conductivity in water Using a Conductivity meter.

Find the transparency. in water using Seki Disk.

Find the iron and phosphate values using Phosphate Test and iron Test.

Value	Day/Month/Year	First Time	Second time	Average
Cloudiness	04/12/2024	70	70	70
	11/12/2024	80	85	82.5
	18/12/2024	100	100	100
	25/12/2024	95	100	97.5
	03/01/2025	55	60	57.5
	08/01/2025	45	55	50
	15/01/2025	40	40	40
	22/01/2025	45	45	45

Value	Day/Month/Year	First Time	Second time	Average
pH	04/12/2024	7.78	7.7	7.74
	11/12/2024	7.86	7.7	7.78
	18/12/2024	7.83	7.5	7.665
	25/12/2024	8.41	8.1	8.255
	03/01/2025	8.4	8.38	8.39
	08/01/2025	8.45	8.32	8.385
	15/01/2025	8.47	8.46	8.465
	22/01/2025	8.57	8.33	8.45

Value	Day/Month/Year	First Time	Second time	Average
Temperature	04/12/2024	26	26	26
	11/12/2024	27.5	27.7	27.6
	18/12/2024	27.2	27.2	27.2
	25/12/2024	28	29	28.5
	03/01/2025	29	28	28.5
	08/01/2025	29	28	28.5
	15/01/2025	29	28	28.5
	22/01/2025	29	29.5	29.25

Value	Day/Month/Year	First Time	Second time	Average
Iron	04/12/2024	0.1	0.1	0.1
	11/12/2024	0.1	0.1	0.1
	18/12/2024	0.1	0.1	0.1
	25/12/2024	0.1	0.1	0.1
	03/01/2025	0.1	0.1	0.1
	08/01/2025	0.1	0.1	0.1
	15/01/2025	0.1	0.1	0.1
	22/01/2025	0.1	0.1	0.1

Value	Day/Month/Year	First Time	Second time	Average
Phosphate	04/12/2024	0.1	0.1	0.1
	11/12/2024	0.1	0.1	0.1
	18/12/2024	0.1	0.1	0.1
	25/12/2024	0.1	0.1	0.1
	03/01/2025	0.1	0.1	0.1
	08/01/2025	0.1	0.1	0.1
	15/01/2025	0.1	0.1	0.1
	22/01/2025	0.1	0.1	0.1

Value	Day/Month/Year	First Time	Second time	Average
Transparency	04/12/2024	64.8	62.4	63.6
	11/12/2024	59.2	60	59.6
	18/12/2024	69.3	70	69.65
	25/12/2024	58.9	58.5	58.7
	03/01/2025	66.2	65.4	65.8
	08/01/2025	72.2	72.5	72.35
	15/01/2025	64	65.5	64.75
	22/01/2025	67.8	65.9	66.85

Value	Day/Month/Year	First Time	Second time	Average
Dissolved Oxygen	04/12/2024	6.5	6	6.25
	11/12/2024	4.5	5	4.75
	18/12/2024	6	5.5	5.75
	25/12/2024	5	6	5.5
	03/01/2025	6	7	6.5
	08/01/2025	6.5	7	6.75
	15/01/2025	5.5	6	5.75
	22/01/2025	6	5.5	5.75

Value	Day/Month/Year	First Time	Second time	Average
Electrical Conductivity	04/12/2024	0.1	0.1	0.1
	11/12/2024	0.2	0.1	0.15
	18/12/2024	0.1	0.2	0.15
	25/12/2024	0.1	0.2	0.15
	03/01/2025	0.1	0.1	0.1
	08/01/2025	0.1	0.1	0.1
	15/01/2025	0.1	0.1	0.1
	22/01/2025	0.1	0.1	0.1