Abstract

Name of research: Comparison of the relationship between water quality and water hyacinth density at Phru Chi Public Park Canal area community water source and Khlong Talad Chinta, Mueang District, Trang Province

Research team : Miss Pinanong Ninlawan

Miss Sirinya Phaibunn

Miss Sutida Mattayant

Grade level : Mathayom 5

Advisor : **Teacher** Miss Jiraporn Sirirat

Miss Naeriya Tonkrongchan

School : Wichian Matu, Trang Province.

This study has compared the relationship between physical and chemical water quality in three areas. The first area is the Phru Chi Public Park canal of Khok Lor Subdistrict. The second area is the water source in the community area of Khok Lor Subdistrict, and the third area is the Cinta Market canal of Thap Thiang Subdistrict by analyzing the physical and chemical quality of water, there are 10 parameters, namely copper content, iron content, nitrate amount, phosphate amount, electrical conductivity, water transparency ,water temperature Acidity-base (pH) water hardness value The amount of dissolved oxygen (DO) and calculation of water hyacinth density from water analysis. It was found that copper content, iron content, phosphate content, electrical conductivity, water temperature Acid-base pH (pH) in the Phru Chi Public Park canal, Khok Lor Subdistrict, water sources in the Khok Lor Subdistrict community, and Cinta Market canal are in a similar range. When evaluating the quality of surface water, it was found that all 3 water sources that are type 2 water sources to be water sources that receive wastewater from certain types of activities and can be beneficial for consumption and use which must go through normal disinfection first and go through the general water quality improvement process first. The water source in the Khok Lor Subdistrict community is of the lowest quality because the amount of dissolved oxygen in the water has an average of 4 mg/L ± 0, the pH of the water has an average of 7 ± 0, and the water's transparency is average was 22.17 cm ± 6.37, the average water hardness was 198.33 mg/L ± 9.81, followed by the Phru Chi Public Park canal. But the water hardness was 209.67 mg/L ± 19.63 and the nitrate was 10 mg/L ± 0, which was higher than the standard. And Cinta Market canal is the source of the best quality. The amount of dissolved oxygen in the water had an average value of 7.67 mg/L ± 1.15, the amount of hardness of the water had an average value of 56.67 mg/L ± 9.81, but the amount of phosphate was 1 mg/L ± 0 and was considered. Water hyacinth density It was found that the water source in the Khok Lor Subdistrict community had the highest density at 6.32 kg/m2, followed by the Phru Chi Public Park canal at 5.68 kg/m2 and Cinta Market canal no water hyacinths were found.

Keyword : Water quality,Water hyacinth

Introduction

Our world is made up of land and water. There are about 3 parts (75%) that are against water and 1 part (25%) that are land. Water is very important for the life of plants and animals on Earth, including humans. Due to the current situation of wastewater discharge and garbage dumping into rivers, the water in rivers and canals is polluted to the point of being unable to be used for human consumption. Meanwhile, water sources in urban communities used for tap water production are of low quality. This causes the government sector to have increased expenses in the production process and improving the quality of tap water. At the same time, the Thai sea has a lot of garbage left over. The main cause of the problem of polluted water sources caused by releasing wastewater into water sources without water management or Treat water before releasing it into water sources. This wastewater is wastewater generated from various activities of community houses establishment Industrial plants, such as water from toilets, wastewater from industrial plants. Water from cleaning, sewage, toxins, and other chemicals such as pesticides and herbicides Chemicals from agricultural fertilizers and manure from animal farms

Water hyacinth is an annual aquatic plant that lasts for many seasons. It is classified as an alien plant that has spread and caused damage to the ecosystem. Because it is a resistant plant to the environment in a wide range Therefore,it can reproduce quickly. When the number of water hyacinths is too large, they will go. obstructing the flow of water As a result, the flow rate of water in rivers and canals slows down. and obstructing the water drainage of Pratunam. In addition, the water hyacinths grow densely together. It will block the sunlight that shines into the water. This makes some underwater plants unable to photosynthesize. It also causes the amount of oxygen dissolved in water sources to decrease, causing the chemical conditions of the water to change. There is polluted water. and in the end, it will have an impact on The biological diversity of water sources in that area

This project therefore has the objective of comparing the relationship between physical and chemical water quality in three areas. The first area is the public canal in Phru Chi Subdistrict, Khok Lor Subdistrict. The second area is the water source in the community area of Khok Lor Subdistrict, and the third area is Chinta Market Khlong Thap Thiang Subdistrict To serve as a guideline for further wastewater disposal.

Research objectives

1. To study and compare the physical and chemical aspects of water quality in the canal area of Phru Chi Public Park. Community water source area and Chinta Market Canal
2. To study and compare the density of water hyacinth with the physical and chemical quality of water, there is a canal in the area of Phru Chi Public Park. Community water source area and Khlong Talad Chinta.

Research questions :

1. Physical and chemical water quality in the Phru Chi Park canal area. Community water source area and Khlong Talad Chinta How is it and is it as specified by the Pollution Control Department?
2. What is the physical and chemical quality of water in the area of Phru Chi Public Park Canal? Community water source area and Khlong Talad Chinta Are there differences in water hyacinth density in areas?

Research hypothesis

1. Physical, biological and chemical water quality in the Phru Chi Public Park canal area Community water source area and Klong Talat Chin has a quality lower than the standard. as specified by the Pollution Control Department .
2. Physical and chemical water quality in the Phru Chi Public Park canal area. Community water source area and Chinta Market Canal have an effect on the density of water hyacinth.

Methods and materials

1) Distilled water
2) Dropper
3) Thermometer kit
4) Water pH meter meter
5) Secchi disk
6) Iron test kit
7) Copper test kit
8) Test kit Phosphate
9) Notebooks and stationery
10) Water oxygen test kit
11) Electrical conductivity meter
12) Nitrate test kit
13) Water storage container
14) Stick about 1 meter long
15) Water measuring kit It is the alkalinity of water.
16) Photography equipment

Determination of study points

Phru Chi Public Park canal area Community water source area and the Chinta Market area Mueang Trang District Trang Province by going to the area to collect random water samples 3 times and collecting water hyacinth in the same area. Study time is 4:00 p.m. – 5:30 p.m.

How to carry out the research

1. Research preparation steps:

1) Set the study topic and select the topic you want to study.

2) Study and collect knowledge and theories related to the research .

3) Set the purpose of the study .

4) Set the sampling point. In the study area

2. Action steps

1) Make a work plan

2) Make a survey of the area where the project will be studied.

3) Collect water samples to test physical and chemical water quality. Relevant factors that must be studied and measured include the amount of iron in water sources. Nitrate content in water sources Phosphate content in water Copper content in water. Water temperature, water pH, water conductivity water transparency alkalinity of water. The amount of dissolved oxygen in the water during the study period was 4:00 p.m. - 5:30 p.m. 4) The values obtained from the survey were analyzed and the study results summarized.

Part 1 Study of physical water quality

1. Determine water sampling points in 3 areas.

2. Survey geographic coordinates using the map application (in the iOS system)

3. Measure the amount of clouds in the area of the water source studied or may It's nearby. To quantify the amount of cloud cover, there will be an open area where the sky can be seen in all directions. To estimate the amount of cloud cover in the sky, groups of 4 people with similar heights were grouped together. Stand with your back shoulder to shoulder. Lift your arms up into a V shape at a 90-degree angle with your left arm touching the right arm of the person next to you. Each person will estimate The amount of cloud cover in the sky in the area From your left arm to your right arm From eye level to overhead level, the percentage of 100% was calculated. Combine the results of estimating the amount of clouds covering the sky from all 4 people, then divide by 4 to get the total amount of clouds covering the sky.

4. Collect 2 water samples. times from water sources By collecting water samples in the designated area. Use a stick approximately 1 meter long to beat the water until it becomes cloudy. Place the resulting water into a storage container.

5. Study the transparency of the water. Using a Secchi disk to measure the transparency, lower the Secchi disk until the black and white symbols at the end of the cylinder cannot be seen. Read the value of the amount of water. Then record the value.

6. Measure the value to find the water temperature. Using a water temperature meter (Thermometer) by putting it in the prepared water, waiting 3 minutes, reading the temperature value the first time and the time the value is read. Record in the data sheet Read the temperature value 2 more times, waiting for 3 minutes each time to read the value. If the value is read all 3 times, then record the value.

7. Measure the electrical conductivity of the water. By using a digital conductivity meter of water, then use the obtained values to record the data.

Part 2 Study of collecting water samples to study water quality chemistry

1. Measure the pH of the water using litmus paper. Soaked in water Soak for about 30 seconds, then record the value according to the color of the paper.

2. Measure the amount of oxygen dissolved in water. using the test kit and then recording the values

3. Measure the amount of nitrate, iron, copper, phosphate and alkalinity of water in source water. Using a kit to check for nitrate, iron, copper and phosphate by comparing with standard values. Then record the obtained values.

Principles of GLOBE

Measurement methods for principles of water measurement methods. (Hydrosphere)

Analysis and summary of research results

1) The data obtained were analyzed and compared for relationships. The statistics used to analyze the data include pH, electrical conductivity, water temperature, nitrate, copper, phosphate, oxygen, and turbidity.

2) Make a graph showing the average of the comparative data.

3) Summarize the results of the experiment . Research resultsหนา

Table 1 shows the geographic coordinates of the water sampling points.

Sample collection location	Geographic coordinates	
	Latitude (N)	**Longitude (E)**
Phru Chi Public Park canal Mueang Trang District, Khok Lor Subdistrict, Trang Province	**7.53941**	**99.61538**
Community water source area Mueang Trang District, Khok Lor Subdistrict, Trang Province	**7.52357**	**99.61077**
Cinta Market canal Mueang Trang District Thap Thiang Subdistrict, Trang Province	**7.55667**	**99.61769**

Geographic coordinates Conducted a study of the area around the water source in Phru Chi Public Park. Mueang Trang District, Khok Lor Subdistrict, Trang Province, has coordinates 7.53941 °N, 99.61538 °E.

Picture 1: Map of water sample collection points in the Phru Chi Public Park area,Mueang Trang District, Khok Lor Subdistrict, Trang Province

Source: iOS map application

Studying the area of water sources in the community water sources, Khok Lor Subdistrict, Mueang Trang District, Trang Province, with coordinates 7.52357 °N, 99.61077 °E.

Picture 2. Map of water sampling points in the community water source area, Khok Lor Subdistrict, Mueang Trang District, Trang Province.

Source: iOS map application

A study of the area around the water source in the Cinta Talat Khlong area. Thap Thiang Subdistrict, Mueang District, Trang Province, with coordinates 7.55667 °N, 99.61769 °E.

Picture 3: Map of water sampling points in the Chinta Talat Khlong area. Blue Thap Thiang Falls, Mueang District, Trang Province

Source: iOS map application

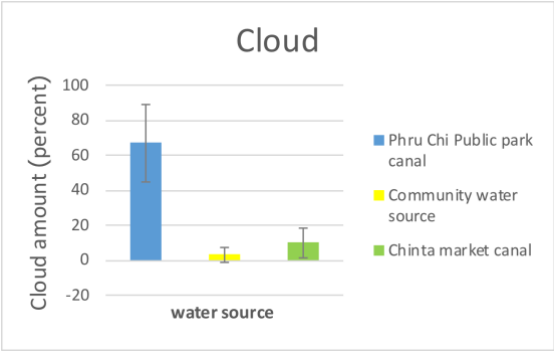
Table 2 Size of the area studied

place	Area size	
	Width (m)	long(m)
Phru Chi Public Park canal Mueang Trang District, Khok Lor Subdistrict, Trang Province	1.16	2.8
Community water source area Mueang Trang District, Khok Lor Subdistrict, Trang Province	3.1	6.68
Cinta Market canal Mueang Trang District Thap Thiang Subdistrict, Trang Province	10.745	15

1. Results and data

1.1 Cloud amount value

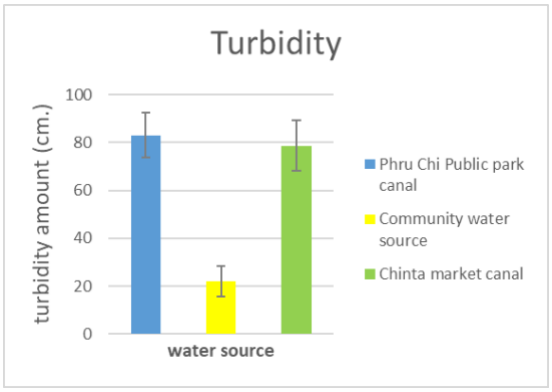
From cloud measurement of Phru Chi Public Park, the community water source area, Khok Lor Subdistrict, and Cinta Market canal were in the range of 40-60, 0-10, and 2-20 percent and had an average cloud amount of 67.5, 3.5, and 10.5 percent, respectively. Values as shown in graph 1



Graph 1 shows the amount of clouds in the water sources around Phru Chi Public Park. ,In the area of community water sources, Khok Lor Subdistrict and Cinta Market canal.

1.2. Terbidity value

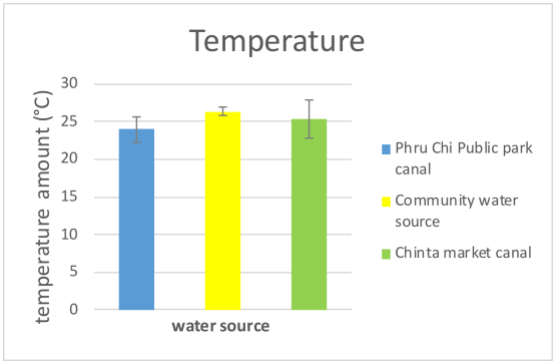
From measuring the **terbidity** value of Canal near Phru Chi Public Park ,In the area of community water sources, Khok Lor Subdistrict and Cinta Market canal., the ranges were 77.5-94, 19-20.5, and 66.5-85.7 cm. and the averages were 83.17, 22.17, and 78.73 cm., respectively, as shown in Graph 2.



Graph 2 shows the amount of **terbidity** of water sources around Phru Chi Public Park canal , community water sources in Khok Lor Subdistrict, and Cinta Market canal.

1.3 Water temperature value

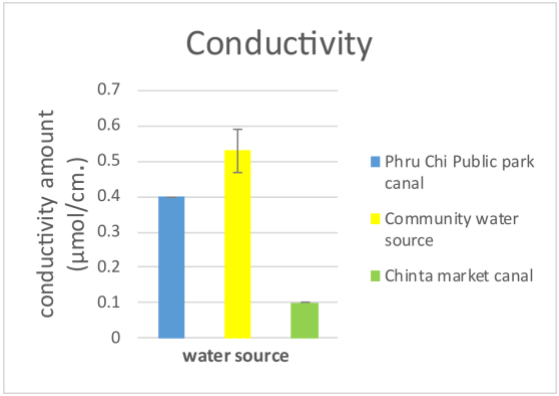
From measuring the temperature of Canal near Phru Chi Public Park ,Community water source areas, Khok Lor Subdistrict and Cinta Market canal have temperatures in the range of 23-26, 26-27, and 23-28 degrees Celsius and average temperatures are 24, 26.33, and 25.33 degrees Celsius, respectively, showing the values as shown in the graph. 3



Graph 3 shows the temperature values of water sources Phru Chi Public Park canal., community water sources, Khok Lor Subdistrict and Cinta Market canal.

1.4 Electrical conductivity

From measuring the electrical conductivity of Phru Chi Public Park canal ,In the area of community water sources, Khok Lor Subdistrict and Chinta Talat Khlong. The average values were 0.4, 0.53, and 0.1 microMohs/cm, respectively. Displays values as in graph 4.

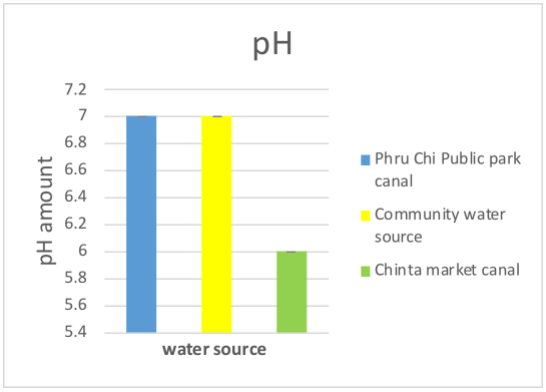


Graph 4 shows the electrical conductivity of water sources near Phru Chi Public Park canal , community water sources, Khok Lor Subdistrict and Cinta Market canal.

2. Results of chemical water quality analysis

2.1 pH value of water

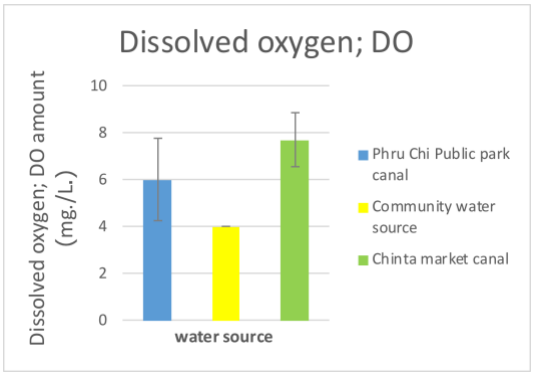
From measuring the pH value of Phru Chi Public Park canal, community water source area, Khok Lor Subdistrict, and Chinta Talad Canal, and the average water pH value was 7. , 7 and 6 pH respectively, showing the values as shown in graph 5.



Graph 5 shows the pH amount and pH value of Phru Chi Public Park. ,In the area of community water sources, Khok Lor Subdistrict and Cinta Market canal.

2.2 Dissolved oxygen value in water

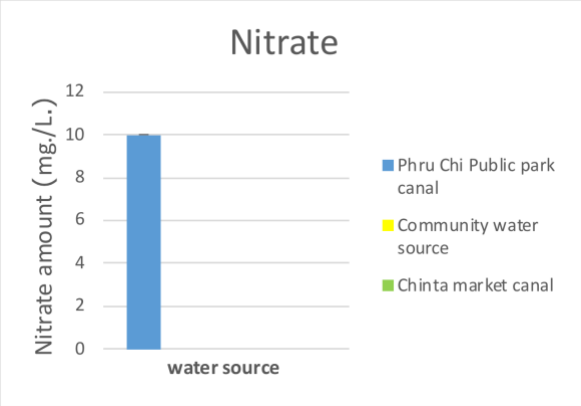
From measuring the amount of oxygen Canal near Phru Chi Public Park ,Community water sources, Khok Lor Subdistrict and Cinta Market canal, and had average oxygen levels of 6, 4, and 7.67 milligrams per liter, respectively, showing the values as shown in Graph 6.



Graph 6 shows the oxygen content Phru Chi Public Park , community water sources, Khok Lor Subdistrict and Cinta Market canal

2.3 Nitrate content value

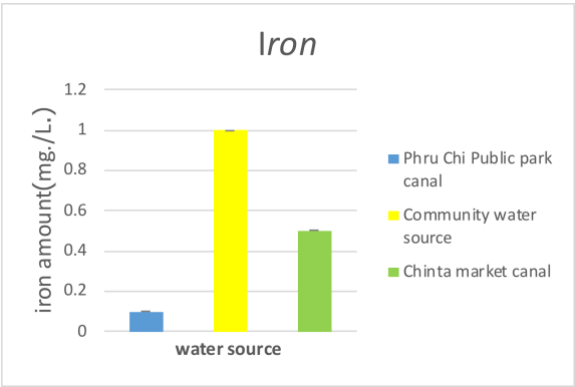
From measuring the nitrate content of Phru Chi Public Park canal ,The area of community water sources, Khok Lor Subdistrict and Cinta Market canal, has average nitrate levels of 10, 0, and 0 milligrams per liter, respectively, showing the values as shown in Graph 7.



Graph 7 shows the nitrate content value of Phru Chi Public Park canal , community water sources, Khok Lor Subdistrict and Cinta Market canal.

2.4 Iron content value

From measuring the iron content of Canal near Phru Chi Public Park ,In the area of community water sources, Khok Lor Subdistrict and Chinta Talad Khlong, the average iron content was 0.1, 1, and 0.5 milligrams per liter, respectively, showing the values as shown in Graph 8.



Graph 8 shows the iron content value of Phru Chi Public Park canal, community water sources, Kh Khok Lor Subdistrict and Cinta Market canal.

2.5 Copper content value

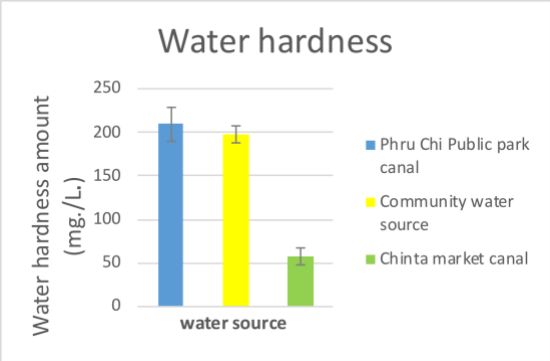
From measuring the copper content of Phru Chi Public Park canal, community water sources, Khok Lor Subdistrict and Cinta Market canal the average copper content was 0, 0, and 0 milligrams per liter, respectively, as shown in Table 4.

Water source	average
Phru Chi Public Park canal	0
Community water sources, Khok Lor Subdistrict	0
Cinta Market canal	0

Table 4 shows the copper content values of Phru Chi Public Parkcanak , community water sources, Khok Lor Subdistrict and Cinta Market canal.

2.6 Water hardness value

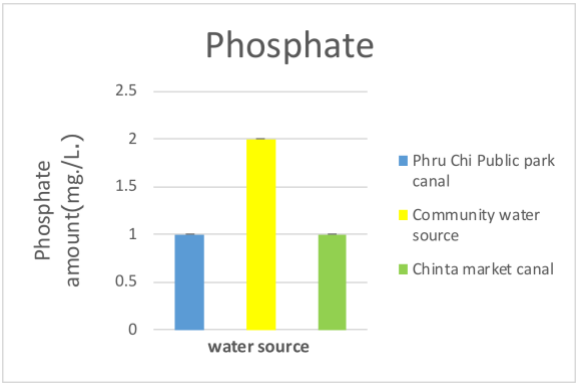
From measuring the alkalinity of Phru Chi Public Park canal ,In the area of community water sources, Khok Lor Subdistrict and Cinta Market canal, the levels were in the range 187-221, 187-204, and 51-68 milligrams per liter and the average alkalinity was 209.67, 198.33, and 56.67 milligrams per liter, respectively, showing values. As in graph 9



Graph 9 shows the hardness amount of Phru Chi Public Park canal , community water sources, Khok Lor Subdistrict and Cinta Market canal.

2.7 Phosphate volume value

From measuring the amount of phosphate of Phru Chi Public Park canal ,In the area of community water sources in Khok Lor Subdistrict and Cinta Market canal. and the average phosphate content was 1, 2, and 1 milligrams per liter, respectively, shown in graph number 10.



Graph 10 shows the phosphate content value of Phru Chi Public Park canal , community water sources in Khok Lor Subdistrict and Cinta Market canal.

3. Results of biological water quality analysis

3.1 Water hyacinth density value

By weighing the water hyacinth in each water source. Take into account the density. From the weight of water hyacinth to a portion of the area has water hyacinth for the area that is taken into account is 0.475 square meters. It can be found that the density of water hyacinths Canal near Phru Chi Public Park in the area of community water sources of Khok Lor Subdistrict and Khlong Talat Chinta, the values were 5.68, 6.32, 0 kilograms per square meter, respectively, as shown in Table 5.

Table 3 water hyacinth density

Water source	Quantity density of water hyacinth (kg/sq m)
Phru Chi Public Park canal	5.68
Community water sources, Khok Lor Subdistrict	6.32
Cinta Market canal	0

Conclusion and discussion

Water quality measurement In the canals around Phru Chi Public Park, around community water sources, Khok Lor Subdistrict, and Chinta Talat Khlong, Trang Province. Data collection began from January - February 2024. The results of the study are as follows.

1. The maximum amount of clouds is The canals in the Phru Chi Park area had an average of 67.5%±22.17. The Chinta Talat Khlong area had an average of 10.5%±8.45 and the lowest cloud amount value was The average water source in the community area is 3.5% ±4.51.

2. The highest electrical conductivity is the water source in the community area with an average value of 0.53±0.06 (micro-Mohs/cm). The canal in Phru Chi Public Park has an average value of 0.4±0 (micro-Mohs/cm). And the lowest electrical conductivity was in the Chinta Talat Khlong area with an average value of 0.1±0 (microh/cm).

3. The highest water transparency value is the canal in Phru Chi Park area with an average value of 83.17 ± 9.39 cm. In the Chinta Talad Canal area, the average value is 78.73 ± 10.63 cm. Water sources in the community area have an average value of 83.17 ± 9.39 cm. 22.17 ±6.37cm.

4. The highest temperature value is the water source in the community area with an average value of 26.33 ± 0.58 degrees Celsius. In the Chinta Market Khlong area, the average value is 25.33 ± 2.52 degrees Celsius.

The canals in Phru Chi Park area had an average temperature of 24 ±1.73 degrees Celsius.

5. The highest pH value is the canal in Phru Chi Park and water sources in the community which have the same value. has an average value of 7 ±0 and the lowest pH value is in the Chinta Talat Khlong area with an average of 6 ±0

6. The highest dissolved oxygen level in the water was in the Chinta Market Canal area with an average of 7.67 ± 1.15 mg/liter. Canals in the Phru Chi Park area had an average of 6 ±1.73 mg/L. Water sources in the community have an average level of 4 ±0 mg/liter.

7. The highest phosphate content is in community water sources with an average of 2 ± 0 mg/liter. The canal in the area of Phru Chi Park and the Chinta Talad Canal area, which have the same value. with an average value of 1 ±0 mg/L

8. The highest nitrate level was in the canal in Phru Chi Park, with an average value of 10 ± 0 mg/liter. And the lowest nitrate levels were the water sources in the community area and the Chinta Talad Canal area with the same average values. On average it is 0 ±0 mg/L.

9. The highest iron content is in community water sources with an average of 1 ± 0 milligrams/liter. Chinta Market Khlong area has an average value of 0.5 ±0 milligrams/liter. And the lowest iron content value was the canal in Phru Chi Public Park, with an average value of 0.1±0 mg/liter.

10. The average values of copper content in all three areas are the same. On average it is 0 ±0 mg/L.

11. The highest water hardness value was the canal in Phru Chi Public Park, with an average value of 209.67 ±19.63 mg/liter. Water sources in the community area had an average value of 198.33 ±9.81mg/liter. And the lowest water hardness value was in the Chinta Market Canal area with an average value of 56.67 ±9.81 mg/liter

Citations

Pollution Control Department. (18 May 2000).Pollution situation in Thailand 1998-1999. Retrieved 14 January 2024 from from http://www.pcd.go.th/public/

Pollution Control Department. 2010. Water quality standards, retrieved on 15 January 2024 from: http://water.rid.go.th/wrd/const14/images/KL/KL3.pdf?fbclid=IwAR2va7ZTXDxFej JQlDVfKcK9X5M67dvGNyyOTxoJ4vy6gjFNbvgiO6zDPCbc

Pollution Control Department. 2018. Wastewater problems in Mae Kha Canal, retrieved on 18 February 2024 from: http://ecap.pcd .go.th/public/property-2.php?id=2

Globe Thailand. (2021). Water(Hydrosphere). [Online].Source:https://globefamily.ipst.ac.th
Retrieved 31 January 2024.

Globe Thailand. (2021). GLOBE Family(GLOBE Thailand Family). [Online]. Source: https://globefamily.ipst.ac.th/
Retrieved 31 January 2024.