Research Report

Compare the water quality in canals receiving wastewater from both household and industrial sources with areas not affected by industrial wastewater.

Research

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Research title: compare the water quality in canals receiving wastewater from both household and industrial sources with areas not affected by industrial wastewater.
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Abstract

The research examines and compares the quality of water in a canal that receives water from domestic and industrial sources with an area that does not receive industrial effluents. The objectives of the study are to compare the water quality in the canal receiving water from industrial and non-industrial sources. The methodology involves collecting water samples for analysis, studying the physical characteristics of water, including:1. Determining the pH (acidity-alkalinity) of the water. 2. Measuring the water temperature. 3. Assessing the dissolved oxygen (DO) levels in the water. The study involved recording images and data from the analyzed water samples. The analysis was conducted using the following tools: 1. Alcoholic-acidimetric thermometer. 2. Kit for testing the dissolved oxygen content in water. 3. pH testing kit. The results of the study indicate that water in the area not affected by industrial effluents has better quality compared to water in the canal that receives water from industrial sources.

Keywords: Comparing water quality, pH levels, temperature, and oxygen levels.

Introduction

Due to the presence of multiple water sources at present, there is an interest in understanding the varying quality of water in each location. The aim is to study and gain insights into the suitability of using this water for daily life. This involves passing the water through various filtration processes.

Water is a vital source for the sustenance of life for animals, plants, and humans. Our existence depends on water, and we can survive for no more than three days without it. Water is crucial in both agricultural and industrial sectors, serving essential purposes such as drinking, food preparation, and personal hygiene. Therefore, the research team conducted tests to compare the quality of water in two different areas and understand the differences in quality.

The purpose of the research project

To compare the quality of water in a canal that receives water from domestic and industrial sources with water in an area that does not receive industrial effluents.

Research questions

How do the physical characteristics of water, such , pH value, oxygen content, temperature, differ among different water sources?

Hypothesis of the research

The physical characteristics of water, pH level, oxygen content, water temperature, and water quality in the canal that receives water from households, factories, and industrial areas differ how when compared to water from areas not impacted by household or industrial activities?.

Methods and materials

1) Thermometer

2) Oxygen Dissolved Quantity Test Kit

3) pH Value Testing Kit

Setting Study Points

The study areas include the Nang Noi Canal area in Namaensri Sub-district, Nayong District, Trang Province, and the Phruey Nong Public Park in Nong Bo Sub-district, Yantakao District, Trang Province.

Research Procedure

1. Preparatory Stage

1) Define the research topic by selecting the subject of study.

2) Conduct a literature review to gather knowledge and theories related to the research.

3) Establish the objectives of the study.

4) Identify the sampling points for collecting samples within the study area.

2. Operational Stage

1) Develop a research action plan.

2) Survey the research area.

3) Collecting water samples for analysis involves studying and measuring various factors. These include geographical coordinates, physical characteristics of the water, pH levels, oxygen content, and water temperature.

Water Sampling and Area Survey

1. Define the study area for collecting water samples for physical and chemical water quality analysis.

2. Collect water samples from the designated areas.

3. Measure the water temperature using an alcohol-acidimetric thermometer. Submerge the thermometer into the water at a depth of approximately 10 centimeters for about 3-5 minutes. Read the thermometer at eye level, and tap it gently while still submerged for an additional 1 minute for the second and third readings. Record the temperature in degrees Celsius (°C) for all three readings. If the readings differ by no more than 1 degree Celsius, it is considered an acceptable value. Record the result.
4. Measure the water pH using a pH test strip. Fill the sample container with water twice, then immerse the pH test strip and compare its color with the color scale on the strip packaging to determine the pH value.
5. Measure the dissolved oxygen by rinsing the sample bottle three times before collecting water. Submerge the sample bottle and open the first reagent cap, adding 2 drops, then open the second reagent cap, adding 2 drops, and close the cap. Shake until yellow foam forms, then open the third reagent cap, adding 5 drops. Shake until the foam turns completely colorless. Transfer the obtained water into a new test tube, adding 1 drop of the fourth reagent at a time, counting the drops until the water turns faint yellow. Then, add 2 drops of the fifth reagent, and count the drops until the water turns colorless. Finally, read the value.

Analysis and Research Summary

1) Analyze and compare the relationships used in data analysis, which include water temperature, average pH level, and dissolved oxygen (DO) levels in the water.
2) Create a table showing the average data comparison.
3) Summarize the experimental results.

Results and data

Geographic Coordinates - The study was conducted to compare the water quality in the canal receiving wastewater from households and industrial factories, Nang Noi Canal, Namaensri Sub-district, Nayong District, Trang Province, with the area not affected by industrial wastewater, Phruey Nong Public Park, Nong Bo Sub-district,

Yantakao District, Trang Province. Table 1 presents the geographic coordinates.Table 1 Geographic coordinates.

Study point	Geographic Coordinates	
Nang Noi Canal, Namaensri Sub-district, Nayong District, Trang Province	Latitude (N)	Longitude (E)
	7.580923	99.666800
Phruey Nong Public Park, Nong Bo Sub-district, Yantakao District, Trang Province	Latitude (N)	Longitude (E)
	7.408696	99.696627

Table of physical characteristics of water

1.. Water Acidity-Alkalinity (pH)

Water Source	Acidity-Alkalinity (pH)			Average
	First time	second time	Third time	
Nang Noi Canal, Namaensri Sub-district, Nayong District, Trang Province	6	6	6	6
Phruey Nong Public Park, Nong Bo Sub-district, Yantakao District, Trang Province	6	7	7	6.67

In summary of the pH findings, the water in the canal that receives water from domestic and industrial sources, specifically Khlong Nang Noi, Namoengsi, Noyang, Trang, has a pH level of 6, indicating higher acidity compared to the water in the area not affected by industrial effluents, Suan Sathaan Phruyn, Nongbo, Yantakao, Trang, which has a pH level of 6.67.

2. Water Temperature

Water Source	Water Temperature			Average
	First time	second time	Third time	
Nang Noi Canal, Namaensri Sub-district, Nayong District, Trang Province	29℃	28 ℃	28 ℃	28.67
Phruey Nong Public Park, Nong Bo Sub-district, Yantakao District, Trang Province	27 ℃	28 ℃	28 ℃	27.67

In summarizing the temperature findings, the water in the canal that receives water from domestic and industrial sources, specifically Khlong Nang Noi, Namoengsi, Noyang, Trang, has a water temperature of 28.67 degrees Celsius, indicating a higher water temperature compared to the water in the area not affected by industrial effluents, Suan Sathaan Phruyn, Nongbo, Yantakao, Trang, which has a water temperature of 27.67 degrees Celsius.

3. Dissolved Oxygen (DO)

Water Source	Dissolved Oxygen (DO) Mg Oxygen/l			Average
	First time	second time	Third time	
Nang Noi Canal, Namaensri Sub-district, Nayong District, Trang Province	4.5	7.5	6.5	6.1
Phruey Nong Public Park, Nong Bo Sub-district, Yantakao District, Trang Province	8	6.5	8.5	7.6

Summary of Dissolved Oxygen Findings: The water in the canal receiving waste water from households and industrial factories, Nang Noi Canal, Namaensri Sub-district, Nayong District, Trang Province, has a dissolved oxygen (DO) value of 6.1 mg/l. the dissolved oxygen (DO) level in the canal receiving wastewater from households and industrial factories, Nang Noi Canal, Namaensri Sub-district, Nayong District, Trang Province, is lower than that in the area unaffected by industrial wastewater, Phruey Nong Public Park, Nong Bo Sub-district, Yantakao District, Trang Province. The DO value in the canal is 6.1 mg/l, while in the unaffected area, it is 7.6 mg/l.

Discussion

From the study, it was found that the water in the canal that receives water from domestic and industrial sources, specifically Khlong Nang Noi, Namoengsi, Noyang, Trang, has a pH level of approximately 6, indicating a higher acidity compared to the water in the area not affected by industrial effluents, Suan Sathaan Phruyn, Nongbo, Yantakao, Trang, which has a pH level of approximately 6.67.

In the study, it was also found that the water in the canal that receives water from domestic and industrial sources has a water temperature (Water Temperature) of approximately 28.67 degrees Celsius, which is higher than the water in the area not affected by industrial effluents. The water temperature in the unaffected area is approximately 27.67 degrees Celsius.

Additionally, the study found that the dissolved oxygen (DO) level in the canal receiving water from domestic and industrial sources, specifically in Khlong Nang Noi, Namoengsi, Noyang, Trang, is 6.1 mg/l. This value is lower than the DO level in the water from the area not affected by industrial effluents, particularly in Suan Sathaan Phruyn, Nongbo, Yantakao, Trang, which is 7.6 mg/l.

Conclusion

In summary, the study concludes that water in the area not affected by industrial effluents has better quality than water in the canal receiving water from domestic and industrial sources.

Declaration of Independence

Research on environmental issues: A comparison of water quality in canals that receive water from household and industrial sources with areas that do not receive water from household and industrial sources. The researchers would like to express gratitude to Teacher Kwanjai Kanjanasrimet, who provided knowledge and a place to gather data. Special thanks to Teacher Kwanjai Kanjanasrimet for facilitating research activities in various locations, as well as for providing consultation and guidance, offering suggestions for improvement, with great care and consideration. Also, thanks to Wicchienmattayom School for supporting equipment and science laboratory facilities for research, which contributed significantly to the successful completion of this research project. The research team expresses profound gratitude at this juncture.

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GLOBE THAILAND. (2008). Institute for the Promotion of Teaching Science and Technology (IPST). GLOBE Program. Ratchathewi District, Bangkok. Retrieved from: GLOBE THAILAND (ipst.ac.th)

Sanook. (2024). Meaning of Water. Ministry of Education. Retrieved from: Water (Definition and Meaning) - Sanook! Pedia

Ministry of Industry. (2013). Meaning of Wastewater. Bang Kho Laem District, Bangkok. Retrieved from: Wastewater Treatment System, Chemical Treatment System, Wastewater Treatment Equipment, DAF System, Froth Flotation Machine, Pollution Control System Registration (greenwatertreat.com)

Wikipedia. (2013). Geographic Coordinate System. Ministry of Education. Retrieved from: Geographic Coordinates - Wikipedia (w ikipedia.org)