# THE INVESTIGATION OF WATER QUALITY IN HUAI YANG RESERVOIR AND HUAI THAP THAN CANAL, HUAI THAP THAN, SISAKET


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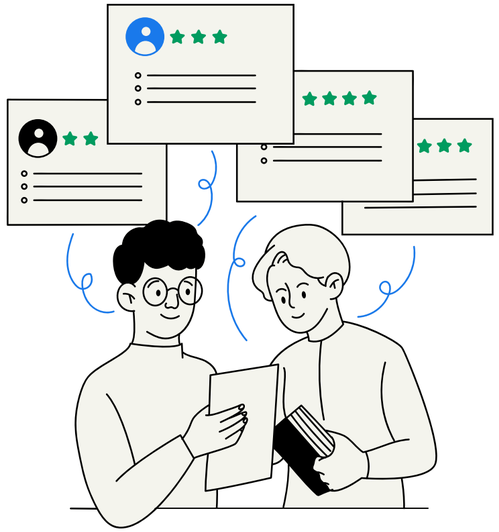
# Introduction



Water is an important natural resource that is closely related to and impacts all forms of life on Earth. Currently, climate change has led to natural disasters such as droughts, floods, and storms. These events have impacted water usage, resulting in severe water shortages during the dry season, as well as a lack of natural water sources for consumption and other needs. Moreover, wastewater treatment systems often fail to meet set standards. The water quality in surface water bodies across the country has deteriorated. The Huai Thap Than River connects with the Huai Yang Reservoir, and most local people rely on the reservoir. As a result, the river has been affected by human activities, such as water use for agriculture, transportation, and wastewater discharge from the community. This polluted water flows into the Huai Thap Than River, near the Provincial Waterworks Authority station that pumps water for the Huai Thap Than and Mueang Chan districts. The research team is therefore interested in studying the water quality in the Huai Yang Reservoir and Huai Thap Than River areas. This includes examining the upstream area near Ban O, the middle section near the Huai Yang Reservoir, and the downstream section of the Huai Thap Than River, which is the last point before the river flows into Samrong Thap District.

# Research Questions

- How does water quality differ among the three study sites?

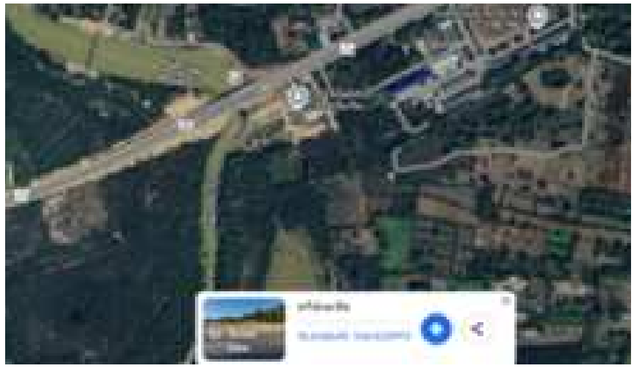


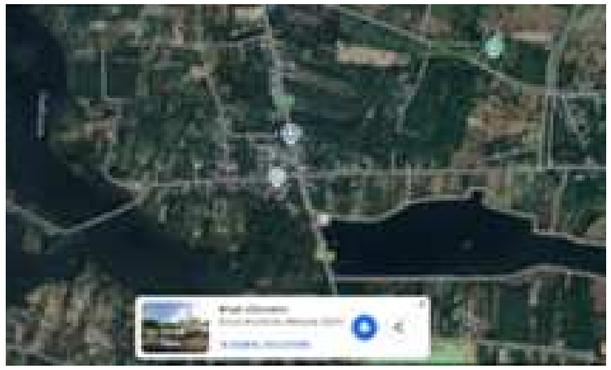
# Research Objectives

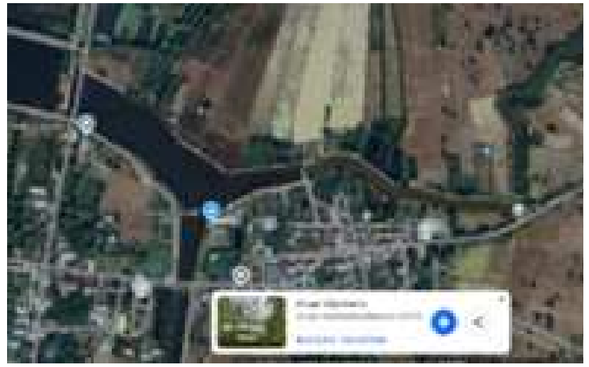
- To study and compare water quality in the Huai Yang Reservoir and Huai Thap Than Stream, Huai Thap Than District, Sisaket Province.

# Research Hypothesis

Water quality in the area of Huai Yang Reservoir and Huai Thap Than River.Each study point is different.







# Study Variables

- Independent Variable: Sampling locations (upstream, midstream, downstream).
- Dependent Variable: Water quality at each study site.
- Controlled Variables: Sampling methods, sampling time, water quality measurement instruments.

# Scope of the Study

### 1.1. Content Scope

Study of physical water quality parameters: water transparency, water temperature.

Study of chemical water quality parameters: pH, dissolved oxygen (DO), nitrate concentration, electrical conductivity (EC), and phosphate concentration.

### 2.1.LocationScope

Three study sites were selected:

Site 1: Upstream (Ban Or Village)

Site 2: Midstream (Huai Yang Reservoir)

Site 3: Downstream (Huai Thap Than Stream)

### 3.1.Time Scope

Water samples were collected once per month on the 30th of each month for three months:

First collection: November 30, 2024

Second collection: December 30, 2024

Third collection: January 30, 2025

# Expected benefits

1. To know the factors that cause changes in water quality in the area of Huai Yang Reservoir and Huai Thap Than River. Huai Thap Than District, Sisaket Province

2. Know the current water quality situation in the area of Huai Yang Reservoir and Huai Thap Than River.

# Research Methodology

1. Set study points

2. Visit the area to survey the study points

3. Water samples were collected at all 3 locations to check water quality according to GLOBE's main methods.

4. Take measured water quality data and compare it with standard criteria.

5. Send data into the program https://www.globe.gov in the Data Entry system

# Step 1: Set the study point




Diagram 1: Water sampling point


Diagram 2, Point 1, upstream point in the Ban Or area.



**Diagram 3, Point 2, mid-water point in the Huai Yang Reservoir area.**

**Diagram 4, Point 3, downstream point, Huai Thap Than River area.**

# Step 2: Visit the survey area



**Area survey pictures**

# Step 3: Collect water samples from all 3 points.

**Water samples were collected at all 3 points to analyze water quality according to the GLOBE method.**

## Measure the temperature of the water

## Measure the pH of water

**Measures the amount of oxygen dissolved in water (DO).**

**Measures the electrical conductivity of water (EC).**

## Measure the amount of nitrate in water.

## Phosphate measurement

# Step 4

Take measured water quality data and compare it with standard criteria.

# Step 5

Send data into the program https://www.globe.gov in the Data Entry system

| Conductivity | |
|---|---|
| Measured Date: | 2025-01-30 |
| Organization Name: | Phakmaiwittayanukul school |
| Site ID: | 376707 |
| Site Name: | อ่างเก็บน้ำห้วยยาง |
| Latitude: | 15.026535 |
| Longitude: | 104.03811 |
| Elevation: | 131.7m |
| Measured At: | 2025-01-30T09:20:00 |
| Conductivity Micro Siemens per cm: | 70 µS/cm |
| Water Body State: | normal |
| GLOBE Teams: | GLOBE Around Us,GLOBETHCampaig |

| Dissolved Oxygen | |
|---|---|
| Measured Date: | 2025-01-30 |
| Organization Name: | Phakmaiwittayanukul school |
| Site ID: | 376706 |
| Site Name: | จุดต้นน้ำ(อ่างเก็บน้ำห้วยยาง) |
| Latitude: | 15.022774 |
| Longitude: | 104.057532 |
| Elevation: | 132.2m |
| Measured At: | 2025-01-30T09:00:00 |
| Water Body State: | normal |
| Dissolved Oxygen via Kit: | 8.9 mg/L |
| GLOBE Teams: | GLOBE Around Us,GLOBETHCampaig |

| Dissolved Oxygen | |
|---|---|
| Measured Date: | 2024-12-30 |
| Organization Name: | Phakmaiwittayanukul school |
| Site ID: | 376706 |
| Site Name: | จุดต้นน้ำ(อ่างเก็บน้ำห้วยยาง) |
| Latitude: | 15.022774 |
| Longitude: | 104.057532 |
| Elevation: | 132.2m |
| Measured At: | 2024-12-30T09:00:00 |
| Water Body State: | normal |
| Dissolved Oxygen via Kit: | 9.5 mg/L |
| Oxygen Kit Mfg: | lamotte |
| Oxygen Probe Mfg: | lamotte |

# Research results



## 1. Basic data analysis of water quality indicators

Table 1 Results of water temperature measurement at all 3 study points between November - January.

| Study point | Temperature value $^0$C | | | | | | |
|---|---|---|---|---|---|---|---|
| | point 1 | point 2 | point 3 | average | SD | Min | Max |
| Nov.2024 | 30 | 32 | 31 | 31 | 1.00 | 30 | 32 |
| Dec.2024 | 31 | 33 | 32 | 32 | 1.00 | 31 | 33 |
| Jan.2025 | 26 | 28 | 27 | 27 | 1.00 | 26 | 28 |

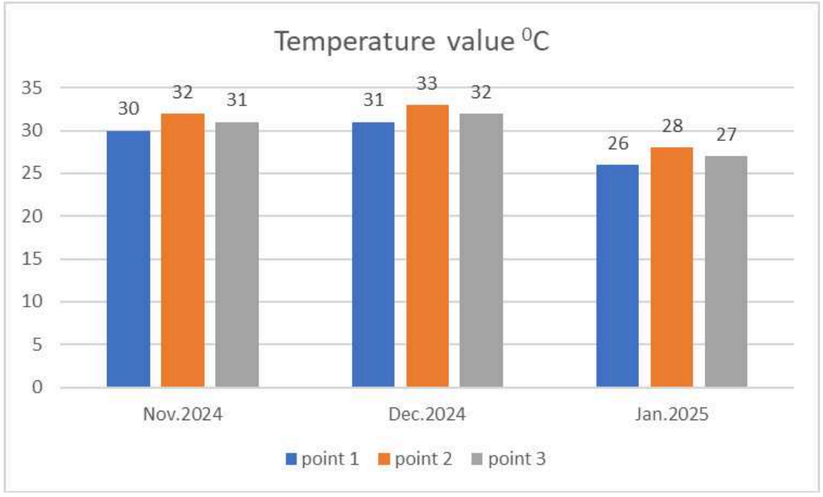


Table 2 Results of measuring the electrical conductivity (EC) of water at all 3 study points between November - January.

| Study point | Electrical Conductivity (EC) of Water µS/cm | | | | | | |
|---|---|---|---|---|---|---|---|
| | point 1 | point 2 | point 3 | average | SD | Min | Max |
| Nov.2024 | 80 | 75 | 62 | 73 | 7.50 | 62 | 80 |
| Dec.2024 | 78 | 72 | 60 | 70 | 9.16 | 60 | 78 |
| Jan.2025 | 75 | 70 | 57 | 68 | 9.29 | 57 | 75 |

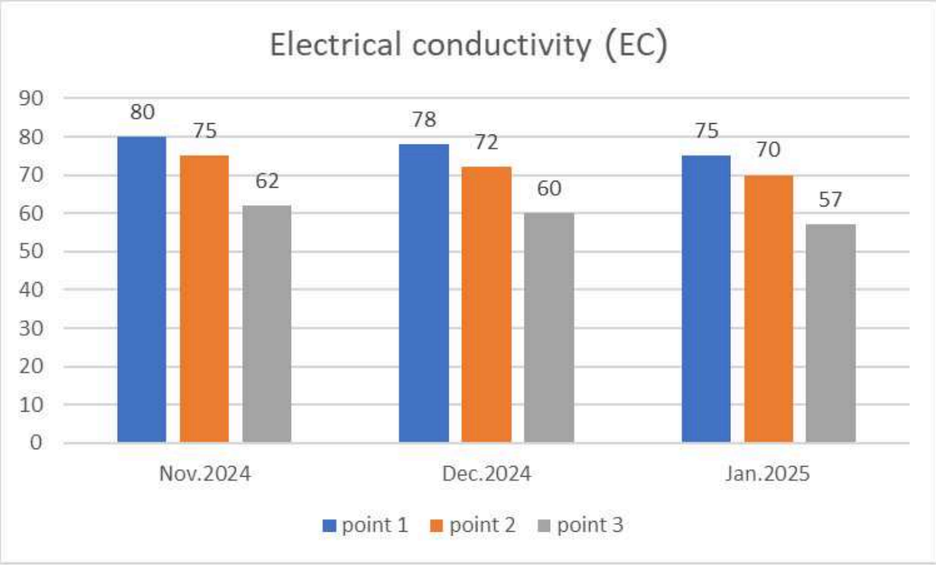


Table 3 Results of measuring pH values of water at all 3 study points between November - January.

| Study point | pH of Water | | | | | | |
|---|---|---|---|---|---|---|---|
| | point 1 | point 2 | point 3 | average | SD | Min | Max |
| Nov.2024 | 7.3 | 7.3 | 7.2 | 7.27 | 0.05 | 7.2 | 7.3 |
| Dec.2024 | 7.5 | 7.9 | 7.4 | 7.60 | 0.26 | 7.4 | 7.9 |
| Jan.2025 | 7.9 | 8 | 7.5 | 7.80 | 0.26 | 7.5 | 8 |

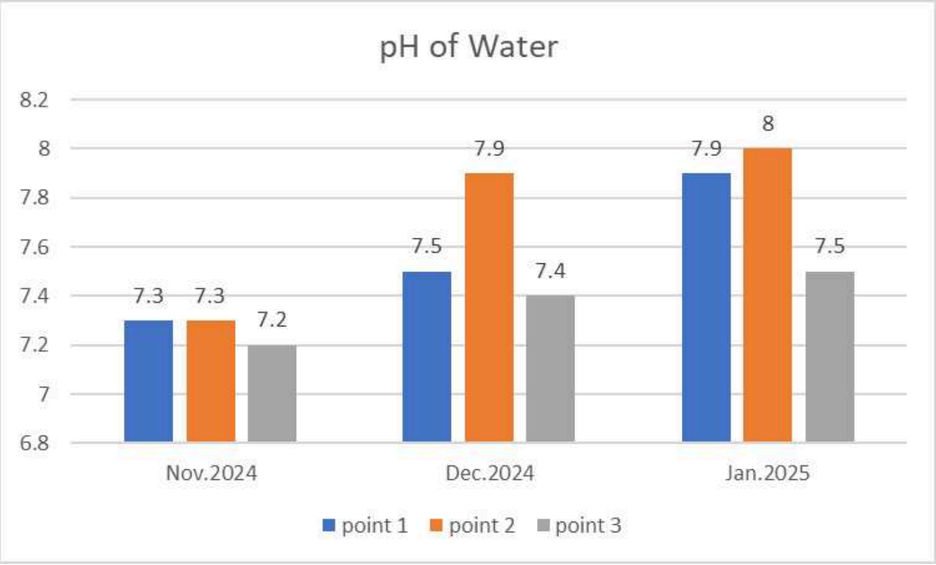


Table 4 Results of measuring the amount of dissolved oxygen in the water (Dissolved Oxygen, DO) of water at all 3 study points between November - January.

| | (Dissolved Oxygen, DO) (mg/L) | | | | | | |
|---|---|---|---|---|---|---|---|
| Study point | point 1 | point 2 | point 3 | average | SD | Min | Max |
| Nov.2024 | 10 | 10.2 | 10.9 | 10.37 | 0.47 | 10 | 10.9 |
| Dec.2024 | 9.5 | 9.8 | 10.6 | 9.97 | 0.57 | 9.5 | 10.3 |
| Jan.2025 | 8.9 | 8.5 | 10.5 | 9.3 | 1.06 | 8.5 | 10.5 |

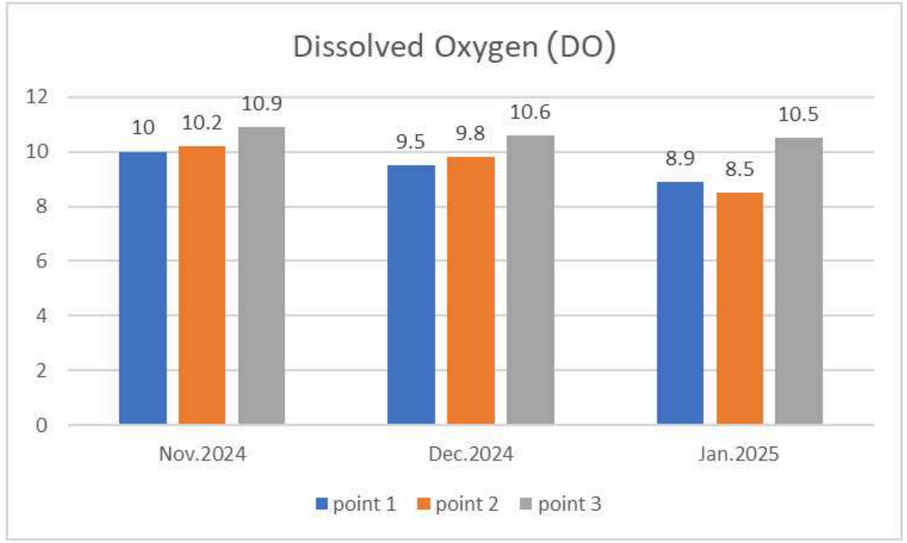


Table 5 Results of measurement of nitrate content in water of water at all 3 study points between November and January.

| Study point | Nitrate levels in water (mg/L) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Point 1 | Point 2 | Point 3 | average | SD | Min | Max |
| Nov.2024 | 0.25 | 0.28 | 0.24 | 0.26 | 0.21 | 0.24 | 0.28 |
| Dec.2024 | 0.28 | 0.28 | 0.25 | 0.27 | 0.02 | 0.25 | 0.28 |
| Jan.2025 | 0.25 | 0.29 | 0.28 | 0.27 | 0.02 | 0.25 | 0.29 |

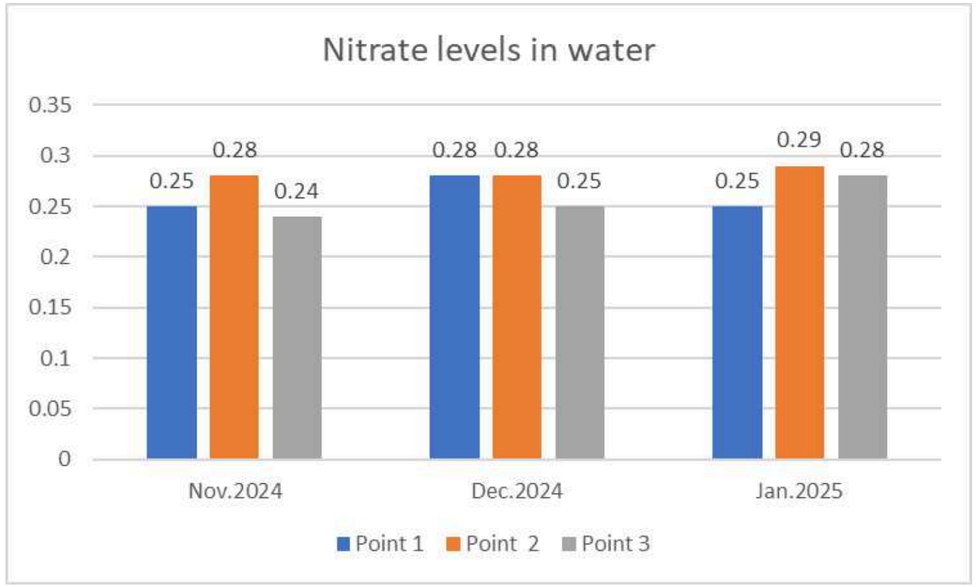
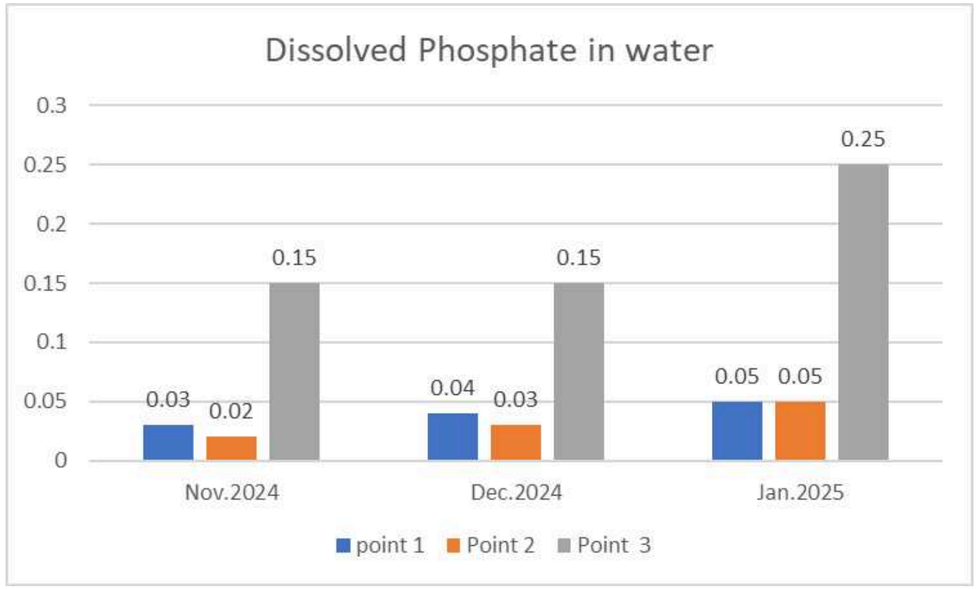


Table 6 Results of measurement of dissolved phosphate in the water of the water at all 3 study points during November - January.

| Study point | Dissolved Phosphate in Water (mg/L) | | | | | | |
|---|---|---|---|---|---|---|---|
| | point 1 | Point 2 | Point 3 | average | SD | Min | Max |
| Nov.2024 | 0.03 | 0.02 | 0.15 | 0.07 | 0.07 | 0.02 | 0.15 |
| Dec.2024 | 0.04 | 0.03 | 0.15 | 0.07 | 0.07 | 0.03 | 0.15 |
| Jan.2025 | 0.05 | 0.05 | 0.25 | 0.12 | 0.11 | 0.05 | 0.25 |



## 2 Water quality analysis using statistical methods

Table 7. Temperature one-way analysis of variance table.

| Measured temperature | Variance Sources | SS | df | MS | F | P-value |
|---|---|---|---|---|---|---|
| November - December | Between Groups | 42.00 | 2 | 21.00 | 21.00 | 0.002 |
| | Within Groups | 6.00 | 6 | 1.00 | | |
| | Total | 48.00 | 8.00 | | | |

Table 8 Results of comparing pairwise averages of temperature values in each month (November 2024 – January 2025)

| Dependent Variable: Scheffe | Temperature | | | | | |
|---|---|---|---|---|---|---|
| Month | | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
| | | | | | Lower Bound | Upper Bound |
| December | Nov. | 1.00000 | 0.81650 | 0.512 | -1.6187 | 3.6187 |
| | Jan. | 5.00000* | 0.81650 | 0.003 | 2.3813 | 7.6187 |

**In the analysis of variance section One-way measurement of water electrical conductivity, pH value, and oxygen content.dissolved in water Nitrate content value and phosphate values in water There was no statistical significant difference.**

# Summarize and discuss research results.

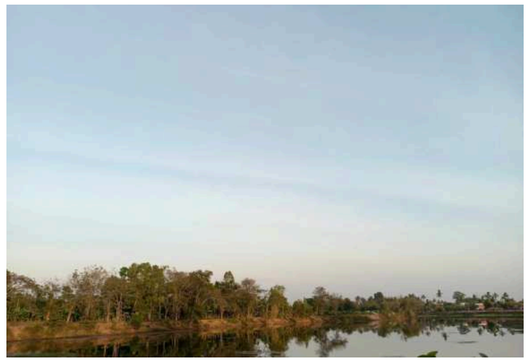


The water quality assessment in the area of Huai Yang Reservoir and Huai Thap Than Stream, Huai Thap Than District, Sisaket Province, was conducted to investigate the causes of water quality changes and to compare the water quality across different months and sampling points. The assessment measured six physical and chemical parameters: water temperature, electrical conductivity (EC), dissolved oxygen (DO), pH, nitrate concentration, and phosphate concentration.

The research findings from the three study sites revealed the following results:

- Water temperature had an average range of 27 – 32°C.
- Electrical conductivity (EC) had an average range of 68 – 73 µS/cm.
- pH levels ranged between 7.2 – 7.80.
- Dissolved oxygen (DO) had an average concentration of 9.30 – 10.37 mg/L.
- Nitrate concentration averaged between 0.26 – 0.27 mg/L.
- Phosphate concentration ranged from 0.07 – 0.12 mg/L.

When compared to the surface water quality standards based on the National Environmental Board's Notification No. 8, B.E. 2537 (1994), it was found that the water quality in Huai Yang Reservoir and Huai Thap Than Stream falls within Surface Water Quality Standard Type 2. This indicates that the water quality is suitable for consumption, agricultural use, and conservation of aquatic life.



# Summarize and discuss research results.



Since the Huai Yang Reservoir area has a large residential community, changes in water quality may be affected by wastewater discharge from the community. However, because the Huai Yang Reservoir is connected to the Huai Thap Than Stream, the water is in motion rather than stagnant. As a result, the water quality remains within the normal range of surface water quality standards. The factor of collecting water samples at the same time but from different sampling points has minimal impact on water quality variations. This may be due to similar activities occurring along the watercourse. However, differences across months result in noticeable variations in certain water quality indicators. The most significant changes in water quality were observed in November. Despite the high population density in the area, the overall water quality assessment indicates that the water remains within a good standard. A one-way analysis of variance (ANOVA) using Scheffé's method was conducted to compare water quality indicators across different months and the three sampling points. The results showed that water temperature was the only parameter with a statistically significant difference, specifically during December and January, at a 0.05 significance level.

# Suggestions



1. You should study other water quality indicators such as BOD value and suspended solids value. and the total amount of coliform bacteria, etc.

2. Water samples taken for testing in the laboratory must be processed immediately. In order not to make incorrect information

3. Additional data should be collected throughout the year. To measure water quality every season.

# Thank you