# Water Quality Analysis Web Application

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## Abstract

Currently, many Thais use water from sources with unknown quality for various activities, which may lead to inappropriate use without awareness, resulting in safety and accuracy issues. To address this problem, researchers have developed a web application to analyze water quality, enabling users to easily and quickly assess water quality without prior knowledge or experience in water quality analysis. Comparing the pH levels and activities suitable for different pH levels reveals appropriateness. For consumption, pH levels between 6.5-8.5 are ideal, while for fishing and agriculture, the range is 5.0-9.0. Regarding Total Dissolved Solids (TDS), appropriate levels range from 0-400 mg/L for consumption, 0-50 mg/L for drinking, 0-400 mg/L for fishing, and 0-2000 mg/L for agriculture. Dissolved Oxygen (DO) levels should be within 6.7-9.0 mg/L for consumption, 8-9 mg/L for drinking, 6-9 mg/L for fishing, and 4-9 mg/L for agriculture. Electrical Conductivity (EC) levels should range from 0-2500 μS/cm for consumption, 0-800 μS/cm for drinking, 100-50000 μS/cm for fishing, and 0-2500 μS/cm for agriculture. Water temperature should not exceed 3°C above room temperature for all activities. Transparency levels should be ≥400 cm for consumption and fishing, 30-

60 cm for fishing, and 10-400 cm for agriculture. Salinity levels should be ≤0.02% for consumption and fishing in fresh water, 0.05-3% for brackish water fishing, and >3% for agriculture. The web application simplifies water quality analysis by requiring only pH, TDS, DO, EC, water temperature, transparency, and salinity values. It provides suitable water quality information for various activities. In Thailand, water resource problems serve as fundamental issues that have not been adequately addressed, developed, or managed, as evident in news reports concerning various water resource challenges such as droughts, flooding, and water contamination. These issues are interrelated and have multiple causes, including population growth and industrialization.

## Objectives:

- To develop and improve the effectiveness of the Web Application.
- To study the process of creating a Web Application.

**Methodology:**

## Figure 1: Sampling of Water for Examination

1. Water samples will be collected from four sources:

    1. In front of Building 1

    2. Pond

    3. Well within the school premises

    4. Tap water

    These water samples are used for drinking, consumption, fishing, and agriculture purposes.

2. The collected water samples will be examined using the following equipment:

    1. pH meter

    2. DO (Dissolved Oxygen) meter

    3. TDS (Total Dissolved Solids) meter

    4. EC (Electrical Conductivity) meter

    5. Water thermometer

    6. Turbidity meter

    7. Salinity meter

3. The measured values will be entered into the web application for water quality analysis and processing.
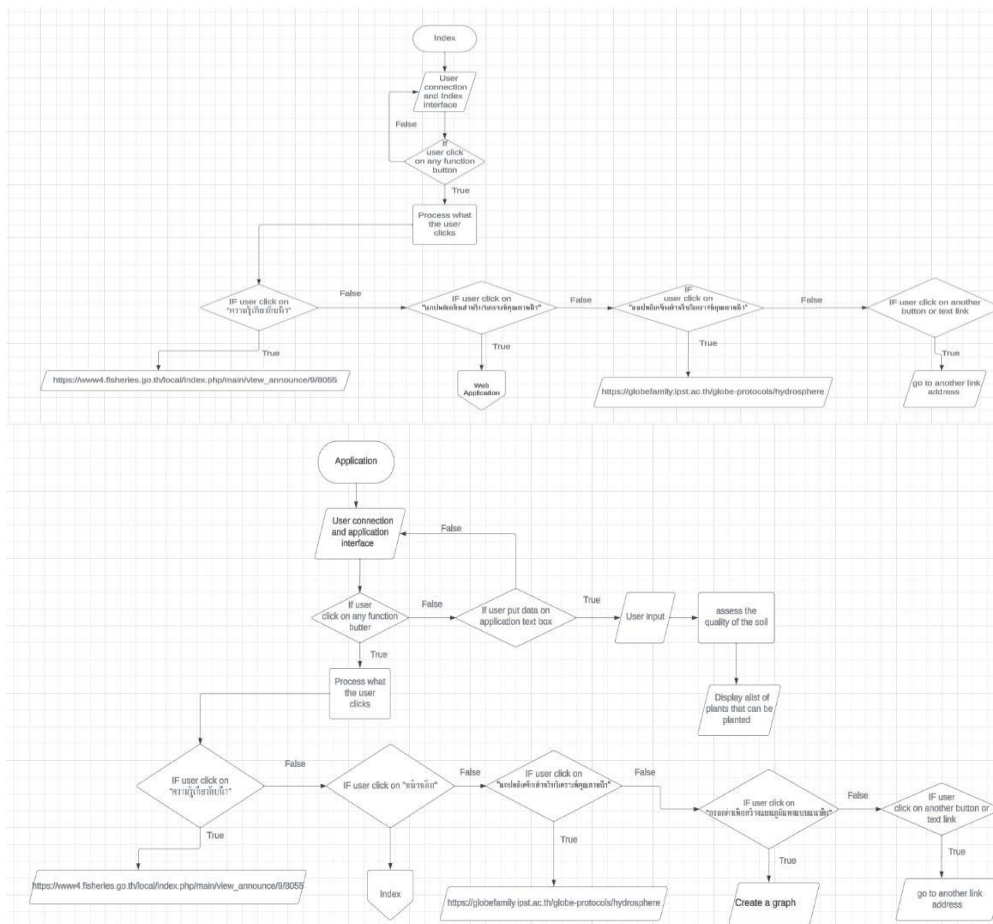
**Principles of Operation:**



Figure 2: Workflow of the Water Quality Analysis Web Application

When a user accesses the website, the system will display the homepage. Subsequently, it will enter the condition "if the user clicks on any button." If true, the system will process and display the output as a website or the designated link. If false, it will not process and return to display the same homepage. Within this condition, if the user clicks on "Application for Water Quality Analysis" and wishes to view the graph results, they can input numerical values followed by commas to generate the graph. The operational principle is that the system will display the application window of the website. Afterward, it will enter the condition "if the user clicks on any button." If true, the system will process and display the output as a website or the designated link. If false, it will proceed to

the next condition, which is to "if the user inputs water quality values on the website." It will then store the data for processing. Following this, it will display the suitable sources for water usage. The graph will be separated for further analysis, allowing users to decide if they want to view the graph or not.

Experimental Results and Analysis: Experimental results include a table showing **the standard values of water quality**

| Checked water / Measurement value | Water for consumption | Water for household | Water for fishery | Water for agriculture |
|---|---|---|---|---|
| pH | 6.5-8.5 | 6.5-8.5 | 5.0-9.0 | 5.0-9.0 |
| TDS (mg/L) | 0-400 | 0-50 | 0-400 | 0-2000 |
| DO (mg/L) | 6.7-9.0 | 8-9 | 6.0-9.0 | 4-9 |
| EC (µS/cm) | 0-2500 | 0-800 | 100-50000 | 0-2500 |
| Water temperature (°C) | Not more than normal temperature 3°C | Not more than normal temperature 3°C | Not more than normal temperature 3°C | Not more than normal temperature 3°C |
| Transparency (cm) | ≥40 | ≥40 | 30-60 | 10-400 |
| Salinty (%) | ≤0.02 | ≤0.02 | split table | 0.25-0.175 |

| Fresh water, salinity between 0-0.05% | Saltwater, salinity greater than 3% or more | Brackish water, salinity between 0.05-3% |
|---|---|---|

**The table showing the drinking water quality measured from 5 brands of drinking water**

| Checked water measurement value | Drinking water A | Drinking water B | Drinking water C | Drinking water D | Drinking water E |
|---|---|---|---|---|---|
| pH | 6.53 | 6.40 | 6.05 | 6.42 | 6.32 |
| TDS (mg/L) | 24 | 4 | 313 | 0 | 3 |
| DO (mg/L) | 6.88 | 7.05 | 7.15 | 7.03 | 7.20 |
| EC (µS/cm) | 50 | 8 | 627 | 3 | 66 |
| Water temperature (°C) | ≈26 | ≈26 | ≈26 | ≈26 | ≈26 |
| Transparency (cm) | ≥40 | ≥40 | ≥40 | ≥40 | ≥40 |
| Salinty (%) | 0 | 0 | 0.03 | 0 | 0 |

The table showing water quality measured for household and natural water sources

| measurement value \ Checked water | Tap water | natural water source 1 | natural water source 2 | natural water source 3 |
|---|---|---|---|---|
| pH | 6.26 | 6.02 | 6.243 | 6.243 |
| TDS (mg/L) | 56 | 243 | 160.3 | 113.3 |
| DO (mg/L) | 6.796 | 3.46 | 7.016 | 2.69 |
| EC (µS/cm) | 111.3 | 488 | 318.3 | 221 |
| Water temperature (℃) | 25 | 25 | 25 | 25 |
| Transparency (cm) | ≥40 | 120 | 107 | 31 |
| Salinty (%) | 0 | 0.02 | 0.01 | 0.01 |

**Experimental Results Discussion:**

The field data collection yielded accurate values for water pH, Total Dissolved Solids (TDS), Dissolved Oxygen (DO), Electrical Conductivity (EC), Water Temperature, Transparency, and Salinity. These values align well with the data reported in the document (file:///D:/PC/Downloads/StdWSrc%20(2).pdf). Processing the data through the Web Application enabled analysis of water quality, determining its suitability for various activities. Users can input their data and utilize it safely and effectively.

The project's Web Application analyzed the water quality experimentally. The comparison of pH values and activities suitable for water with varying pH levels

was appropriate. Water with pH levels between 6.5-8.5 is suitable for consumption, between 5.0-9.0 for fishing, and between 5.0-9.0 for agriculture.

Regarding Total Dissolved Solids (TDS), the suitable range for consumption is 0-400 mg/L, while for fishing, it is 0-50 mg/L, and for agriculture, it ranges from 0-2000 mg/L.

The Dissolved Oxygen (DO) levels suitable for consumption range from 6.7-9.0 mg/L, from 8-9 mg/L for fishing, and from 6-9 mg/L for agriculture. The appropriate Electrical Conductivity (EC) values range from 0-2500 µS/cm for consumption, from 0-800 µS/cm for fishing, from 100-50000 µS/cm for agriculture.

Water temperature should not exceed 3°C above room temperature for any activity. Transparency levels should be ≥400 cm for consumption, ≥400 cm for fishing, 30-60 cm for agriculture. Salinity levels should be ≤0.02% for consumption, ≤0.02% for fishing in fresh water, 0-0.05% for fishing in brackish water, 0.05-3% for fishing in saltwater, and 0.017% for agriculture.

The Web Application testing revealed that by inputting values for pH, TDS, DO, EC, water temperature, transparency, and salinity, the application can effectively analyze water quality suitability for various activities.

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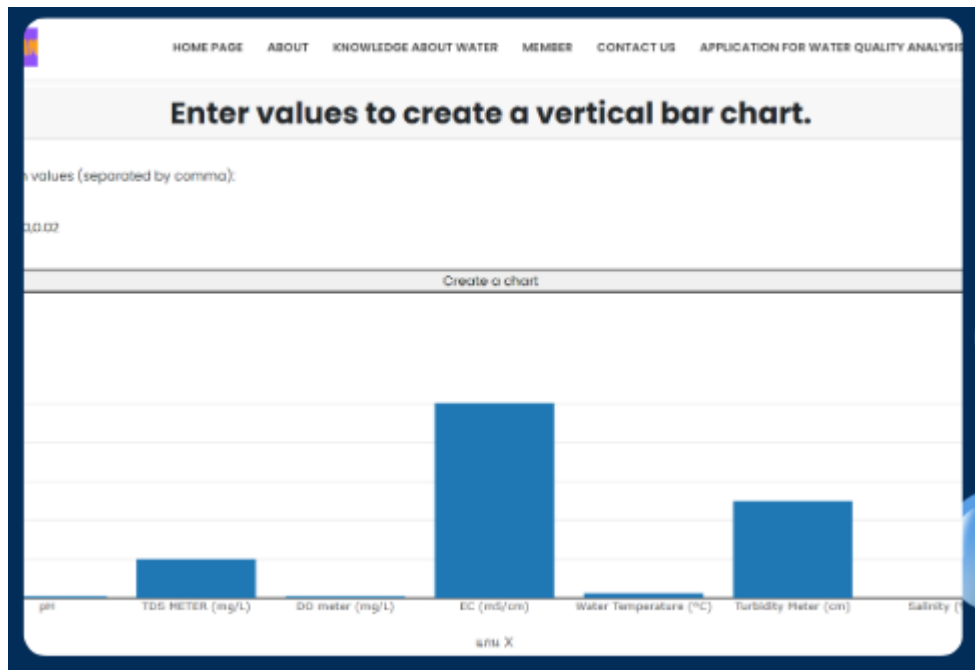
## Main menu
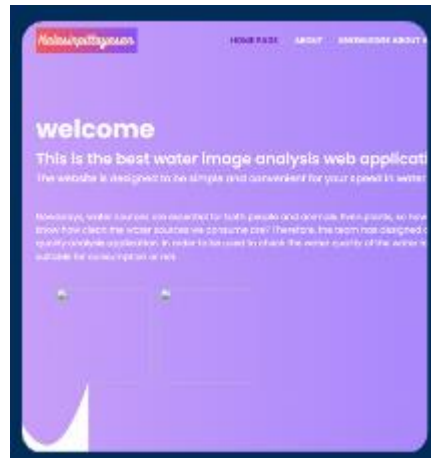


## Analysis process system ofWater quality



## Analysis Chart Water quality

Vertical bar temperature graph showing 7 consecutive numerical values