Science Project

Analysis of Raw Water Quality in Water Sources Used for Tap Water Production

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Chapter 1: Introduction

1.1 Background and Importance of the Problem

Currently, tap water is the primary water source for daily use, whether for consumption or other activities related to cleanliness and hygiene. However, many areas in Thailand lack awareness about the origin of their tap water sources and the quality of the raw water used for production. This lack of knowledge may lead consumers to unknowingly use low-quality or unsafe water, especially if the raw water sources are polluted or contaminated with hazardous substances.

Without proper knowledge of raw water quality, tap water users face risks related to various parameters such as pH levels, turbidity, hardness, heavy metals, and chemical contaminants, all of which can impact human health. Therefore, understanding and analyzing raw water quality is essential to ensure that people can use tap water safely and take necessary precautions to address potential water quality issues.

Studying and analyzing raw water from sources used in tap water production can provide users with valuable insights into water quality, reducing the risks associated with polluted or contaminated water. This is particularly important in areas where water sources may not be strictly regulated or maintained by relevant authorities. Additionally, the data obtained can be utilized to improve water treatment processes, ultimately ensuring that people have access to safe and high-quality tap water.

Recognizing the importance of this issue, the project aims to help consumers become aware of the quality of the water they use daily, enabling them to take preventive measures against potential health hazards. Furthermore, **the findings of this study could contribute to improving tap water production processes, ensuring that the public receives water that meets quality and safety standards.**

1.2 Research Questions

1. Can the quality of raw water from selected sources be accurately analyzed?
2. How can the analysis results determine the safety of tap water?

1.3 Hypothesis

Analyzing raw water sources used for tap water production will help determine their quality and provide a basis for identifying solutions to improve water quality.

1.4 Objectives

• To analyze the quality of raw water from sources used in tap water production by assessing various parameters such as pH levels, heavy metal content, and chemical contaminants.

• To utilize the data obtained to improve tap water quality and provide useful information for public awareness and safe water usage.

1.5 Scope of the Project

1.5.1 Water Sources for Analysis

Three raw water sources will be analyzed:

• Lam Pao Dam

• Irrigation Canal passing through Lam Phan Subdistrict, Mueang District, Kalasin Province

• Irrigation Canal in Non Yung Subdistrict, Yang Talat District, Kalasin Province

1.5.2 Parameters for Water Quality Analysis

- pH level
- Dissolved oxygen (DO)
- Total dissolved solids (TDS)
- Electrical conductivity (EC)

1.6 Expected Outcomes

1. The analysis of raw water quality in sources used for tap water production will enable consumers to understand the water quality they use. This information can help them make informed decisions regarding water usage and source maintenance.

2. The study will provide essential data to enhance public knowledge of raw water quality issues and contribute to improving tap water safety in specific areas.

Chapter 2: Literature Review

2.1 Water Quality

Water quality refers to the physical, chemical, biological, and radiological characteristics of water that determine its suitability for various uses, including drinking, recreation, aquatic life, agriculture, and industrial processes. It is assessed based on its ability to meet human and environmental needs. (Bard Google, 2023)

2.2 Water Properties

2.2.1 Basic Information

Water is a transparent, tasteless, odorless, and colorless inorganic compound. It is the primary component of rivers, lakes, oceans, and living organisms.

(Wikipedia, 2023)

2.2.2 Chemical Structure

The chemical formula for pure water is H_2O.

(Wikipedia, 2023)

2.3 Equipment for Water Quality Measurement

2.3.1 pH Meter

A pH meter measures the acidity or alkalinity of a solution. It consists of an electrode and a voltmeter, which converts electrical potential into pH values. Calibration is typically done using buffer solutions at pH 4, 7, or 10 to ensure accurate readings.

(Phimphen Pornchaloemphong, 2020)

2.3.2 Dissolved Oxygen (DO) Meter

A DO meter measures the amount of dissolved oxygen in water, an essential factor for aquatic life. The standard dissolved oxygen level for a healthy aquatic environment should not be less than 5 mg/L.

(Entech, 2019)

2.3.3 Total Dissolved Solids (TDS) Meter

A TDS meter determines the total concentration of dissolved solids in water, typically expressed in parts per million (ppm) or milligrams per liter (mg/L). A TDS level below 500 ppm is considered safe, while levels exceeding 1,000 ppm may indicate contamination.

(Neonics, 2022)

2.3.4 Electrical Conductivity (EC) Meter

An EC meter measures a solution's ability to conduct electricity, which depends on the presence of dissolved ions. Pure water does not conduct electricity, but water with dissolved minerals and impurities does.
(Neonics, 2022)

2.3.5 Salinity Meter

A salinity meter measures the salt concentration in a solution. It is commonly used to determine water salinity levels in various applications.

2.4 Water Quality Standards in Thailand

Water quality standards in Thailand are established by the Pollution Control Department under the Ministry of Natural Resources and Environment. These standards classify water into categories based on usage, including domestic consumption, aquatic life sustainability, and agricultural irrigation. (rwater.mnre.go.th, 2023

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Chapter 3: Research Methodology

1. Measuring Water Quality Parameters

• pH Level (using a pH meter)

• Dissolved Oxygen (DO) (using a DO meter)

• Total Dissolved Solids (TDS) (using a TDS meter)

• Electrical Conductivity (EC) (using an EC meter)

• Salinity (using a salinity meter)

2. Experimental Procedures

• Samples were collected from the three selected water sources.

• Each parameter was measured three times for accuracy.

• Data were recorded and analyzed to determine the quality of the water.

Chapter 4: Results and Discussion

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pH	5.77 ±0.10	5.75±0.09	5.73±0.07
TDS(mg/L)	59±5.29	52±0	52±0.58
DO(mg/l)	6.93±0.06	7.24±0.02	6.83±0.19
EC (µS/cm)	119±7.81	104±0.58	105±0.58
salinity (ppm)	58±1.73	52±0	52±0

1. pH Levels: The pH values ranged from 5.73 to 5.77, indicating slightly acidic water. These values are lower than the recommended standard of 6.5-8.5 for drinking water.

2. TDS: All samples had low TDS levels, suggesting minimal dissolved contaminants.

3. DO: The highest DO level was found in Source 2, indicating good oxygenation.

4. EC: The highest EC value was recorded in Source 1, correlating with its higher TDS.

5. Salinity: Source 1 had slightly higher salinity levels than the others.

Chapter 5: Conclusion and Recommendations

• The analysis revealed that raw water quality varies among sources, with some samples being slightly acidic.

• The findings can help improve water treatment processes to ensure safe and high-quality tap water for public use.

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• [https://phld.anamai.moph.go.th/th/water-quality-standards]

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