

Water quality monitoring at Kaeng Don Klang, Kalasin Province to ensure good water quality for the community

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Abstract

This study analyzed water quality in the Kaeng Don Klang area and assessed its suitability for community use. Water samples were collected from five different locations: upstream, midstream, downstream, and mixing zones to ensure comprehensive coverage. Physical and chemical water quality parameters were measured, including temperature, dissolved oxygen (DO), electrical conductivity (EC), pH, and salinity. The results indicated that water temperature ranged from 24.1 to 28.9°C, DO ranged from 4.69 to 7.71 mg/L, electrical conductivity ranged from 153 to 345 $\mu\text{S}/\text{cm}$, pH values ranged from 6.06 to 6.17, indicating slightly acidic conditions, and salinity ranged from 101 to 345 parts per million (ppm).

Overall, the findings suggest that water quality in the Kaeng Don Klang area generally remains within acceptable standards for community use, particularly in the upstream and midstream mixing zones, where water quality closely reflects natural environmental conditions. This project provides valuable baseline data on water quality and can serve as a guideline for the management and conservation of local water resources to maintain their quality and sustainability.

Background and Significance



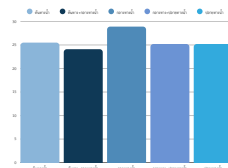
Kaeng Don Klang is a large natural water body that serves as a major water storage area and the primary water source for the community, playing a vital role in domestic use and daily activities.

If the water source is of inadequate quality, it may adversely affect public health, ecosystems, and the overall quality of life of the community. This water source is used throughout the year.



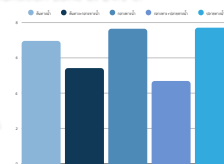
The Kaeng Don Klang community uses water from Kaeng Don Klang for agriculture, vegetable cultivation, fisheries, and daily living activities.

Results

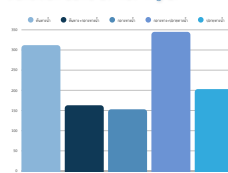


The water temperature at different sampling locations was measured using a water temperature meter. The highest temperature was recorded at the midstream site at 28.9°C, while the lowest temperature was observed at the upstream-midstream transition zone at 24.1°C.

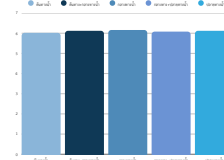
The dissolved oxygen (DO) levels at different sampling sites were measured using a DO meter. The highest DO value was recorded at the downstream site at 7.71 mg/L, while the lowest DO value was observed at the midstream-downstream transition zone at 4.69 mg/L.



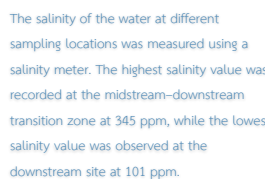
The electrical conductivity (EC) of the water at different sampling locations was measured using a conductivity meter. The highest EC value was recorded at the midstream-downstream transition zone at 345 $\mu\text{S}/\text{cm}$, while the lowest EC value was observed at the midstream site at 153 $\mu\text{S}/\text{cm}$.



The pH values of the water at different sampling locations were measured using a pH meter. The highest pH value was recorded at the midstream site at 6.17, while the lowest pH value was observed at the upstream site at 6.06.



The salinity of the water at different sampling locations was measured using a salinity meter. The highest salinity value was recorded at the midstream-downstream transition zone at 345 ppm, while the lowest salinity value was observed at the downstream site at 101 ppm.



Discussion

The assessment of water quality in the Kaeng Don Klang area, Mueang District, Kalasin Province, was conducted by collecting water samples from five locations, including upstream, midstream, downstream, and the transitional zones between each section. The results indicated that water temperature varied slightly among sampling sites, ranging from approximately 24.1 to 28.9°C. The upstream area exhibited lower temperatures than the midstream and downstream sections, likely due to greater shading and more consistent water flow, which limited heat accumulation. In contrast, the midstream and downstream areas were more exposed and received direct sunlight, resulting in higher water temperatures. Such temperature variations may affect aquatic organisms and the concentration of dissolved oxygen in the water.

Dissolved oxygen (DO) levels were highest at the upstream site, with values ranging from 4.69 to 7.71 mg/L, indicating relatively good water quality and suitability for aquatic life. However, DO levels decreased in the midstream and downstream areas, with the lowest values observed downstream. This reduction may be attributed to the accumulation of organic matter, community activities, or slower water flow, which increases oxygen consumption during organic decomposition. Measurements of electrical conductivity (EC) and salinity revealed higher values in the midstream and downstream areas compared to the upstream site. EC values ranged from 153 to 345 $\mu\text{S}/\text{cm}$, while salinity ranged from 101 to 345 parts per million (ppm), indicating the accumulation of dissolved substances and minerals in the water. These substances may originate from agricultural runoff or nearby community wastewater. Nevertheless, the measured values remained within levels that are not harmful for community water use.

Regarding pH, the water at all sampling sites exhibited similar values, ranging from 6.06 to 6.17, indicating slightly acidic conditions within acceptable standards. This suggests that the water remains chemically balanced, neither excessively acidic nor alkaline, and suitable for sustaining aquatic life.

Conclusion

The water quality assessment in the Kaeng Don Klang area indicates that water quality varies according to the flow position, with the upstream section exhibiting the highest quality. This reflects a relatively intact environment, characterized by suitable water temperature and high levels of dissolved oxygen, which support aquatic life. In contrast, measurements in the midstream and downstream sections indicate a declining trend in water quality, with higher temperatures and lower dissolved oxygen levels. These changes are consistent with increases in electrical conductivity and salinity, suggesting the accumulation of dissolved substances and the influence of human activities in nearby areas. The pH values at all sampling sites remained within standard ranges, indicating that the water remains chemically balanced and has not reached strongly acidic or alkaline conditions.

The results of this assessment suggest that the water resources in the Kaeng Don Klang area are still suitable for use; however, continuous monitoring is necessary, particularly in areas near communities, to prevent long-term degradation of water quality.

Experimental Procedure

Step 1: Water Sample Collection



1.1 Water samples were collected from five locations along the water flow: Upstream Upstream-Midstream Midstream Midstream-Downstream Downstream

Step 2: Water Quality Measurement

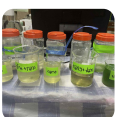


Five water quality parameters were measured as follows:

- 2.1 Water temperature
- 2.2 Dissolved oxygen (DO)
- 2.3 Electrical conductivity (EC)
- 2.4 pH value
- 2.5 Salinity



Step 3: Data Comparison and Conclusion



The measured data were compared among the five sampling locations to analyze variations in water quality, and the results were summarized and interpreted.

References

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- World Health Organization. (2017). Guidelines for drinking-water quality.