

Relationship Between Seawater Quality and Phytoplankton Density Along Mueang Chonburi District's Coastline

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Abstract

This study examines the relationship between seawater quality and phytoplankton density along the coast of Mueang Chonburi District. Samples were collected from three sites: Chonlamarkwithi Bridge, Ang Sila Fishing Pier, and Wonnapha Fishing Pier in July, August, and November 2024. Results showed that Chonlamarkwithi Bridge had pH and DO levels below seawater quality standards for Type 6 according to the Pollution Control Department (2006). Ang Sila Fishing Pier had pH levels below the Type 5 standard, while Wonnapha Fishing Pier mostly showed pH levels below the Type 4 standard. Ecological assessments indicated that Wonnapha Fishing Pier had a moderate ecological condition, whereas Chonlamarkwithi Bridge and Ang Sila Fishing Pier were highly productive. Phytoplankton densities at Chonlamarkwithi Bridge, Ang Sila Fishing Pier, and Wonnapha Fishing Pier ranged from 2.9×10^4 – 1.2×10^5 , 4.5×10^4 – 6×10^4 , and 2.3×10^4 – 1×10^5 units/liter, respectively. Statistical analysis showed a significant correlation ($p < 0.05$) between water transparency and phytoplankton density. However, comparison of in-situ chlorophyll-a data with satellite observations revealed inconsistencies.

Keywords: seawater quality, phytoplankton, chlorophyll-a, coastal areas, Mueang Chonburi District.

Research question

1. Is there any relationship between seawater quality and phytoplankton density in the Mueang Chonburi District?
2. Are there variations in seawater quality and phytoplankton density among the different study areas?
3. Do field-derived chlorophyll-a contents align with satellite observations?

Introduction



Phytoplankton play a crucial role in aquatic ecosystems as primary producers within the food chain. Through photosynthesis, they use chlorophyll to produce their own food and serve as a vital food source for organisms like zooplankton (Nantana, 2001). These microscopic organisms significantly influence primary production and the overall health of aquatic environments, with their density and abundance acting as indicators of nutrient levels and water quality. Any changes in water quality can directly impact phytoplankton populations, affecting ecosystem dynamics and fisheries productivity.

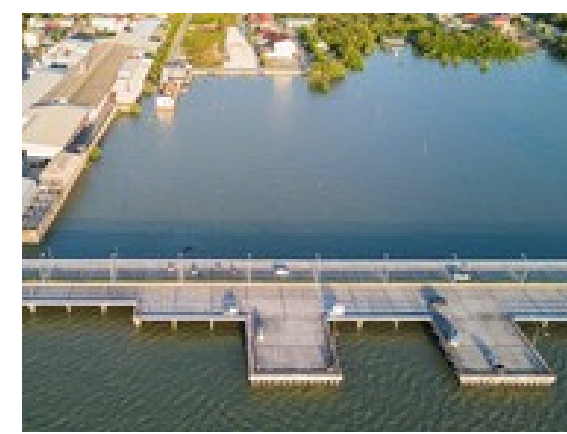
The coastal region of Mueang Chonburi District, situated near the Bang Pakong River estuary, is an important area for both fishing and tourism. This coastal zone also receives water from the Bang Pakong River and nearby canals (Anukul & Prasan, 2008). As a large urban center, Mueang Chonburi faces various environmental challenges, including pollution from human activities such as industrial waste, agricultural runoff, and marine debris. These factors can influence the abundance and distribution of phytoplankton in the area. Environmental parameters such as light, temperature, wind currents, water turbidity, nutrient concentrations, and grazing pressure from consumers all affect phytoplankton populations (Tiwaron Nuanta, 2001).

This research seeks to assess the seawater quality and phytoplankton density along the Mueang Chonburi coast, with the objective of providing valuable insights for marine resource conservation. By examining the relationship between seawater quality parameters and phytoplankton density, this study aims to better understand how various environmental factors influence local aquatic ecosystems. Additionally, satellite-based chlorophyll-a data will be integrated with field measurements, enabling a comprehensive evaluation of water quality. The findings from this study will contribute to establishing a robust database that can be used for future environmental monitoring and management efforts in the region.

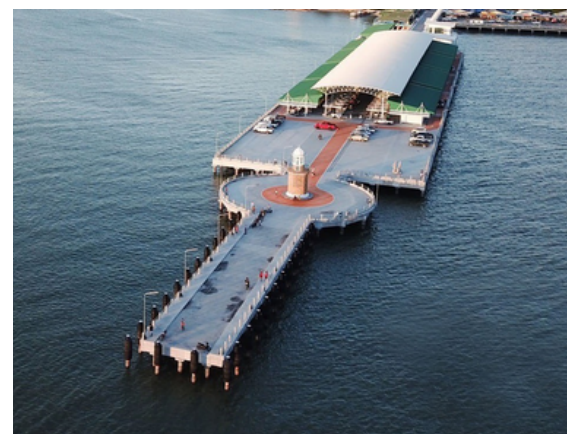
Research methods

Study area

Chonlamakwithi Bridge (S1)



Ang Sila Fish Bridge (S2)

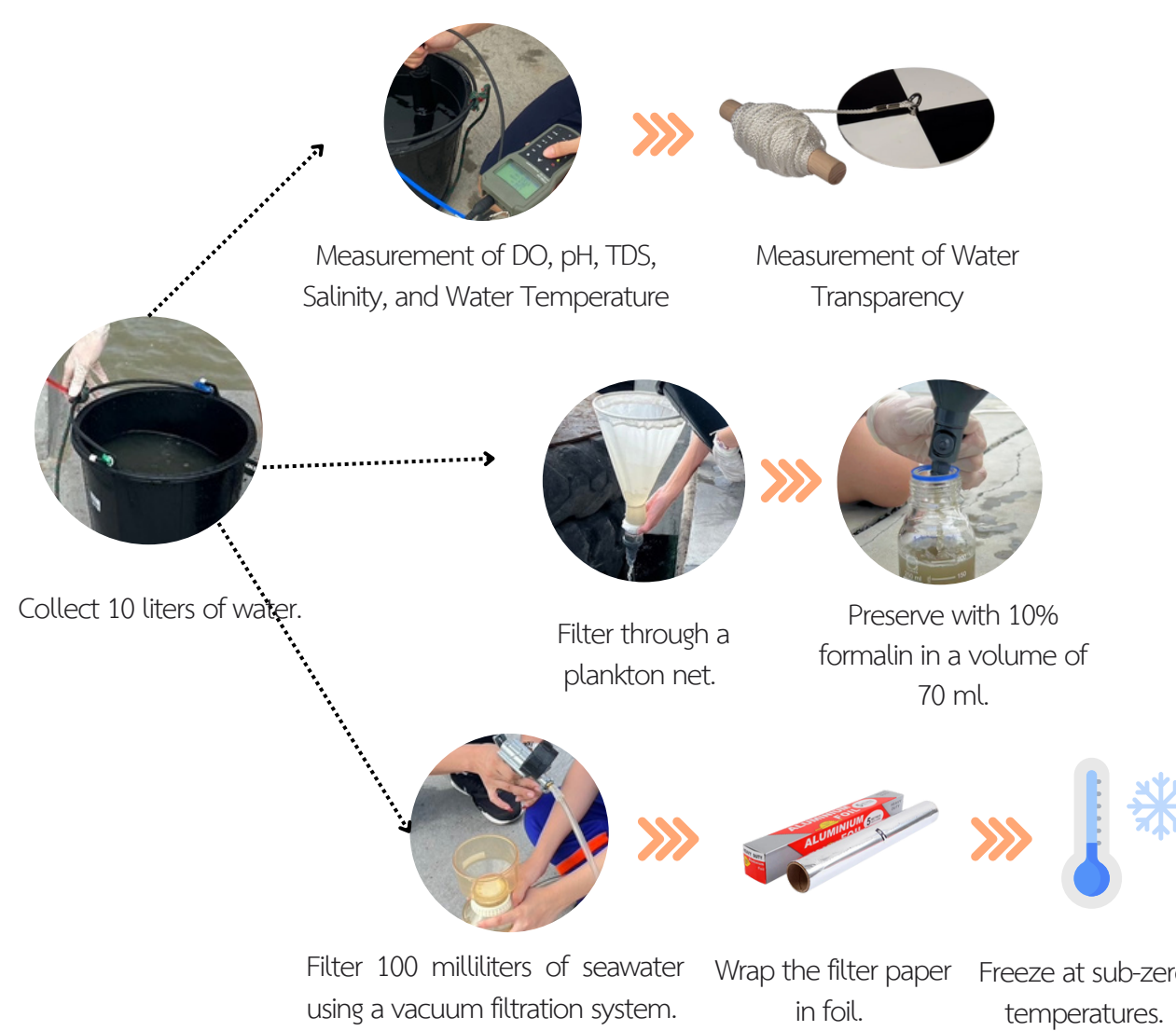


Wonnapha Beach Fish Bridge (S3)



METHOD : Field

Conduct water quality measurements following the standard operating procedures of the GLOBE Program.

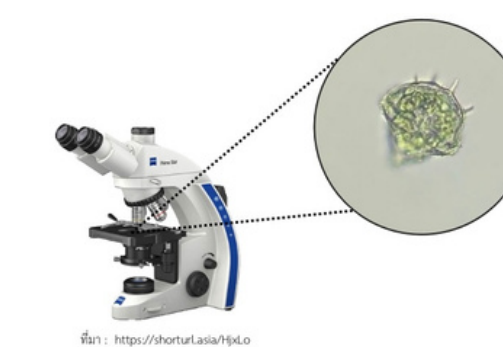


METHOD: Laboratory

spectrophotometric method



data analysis

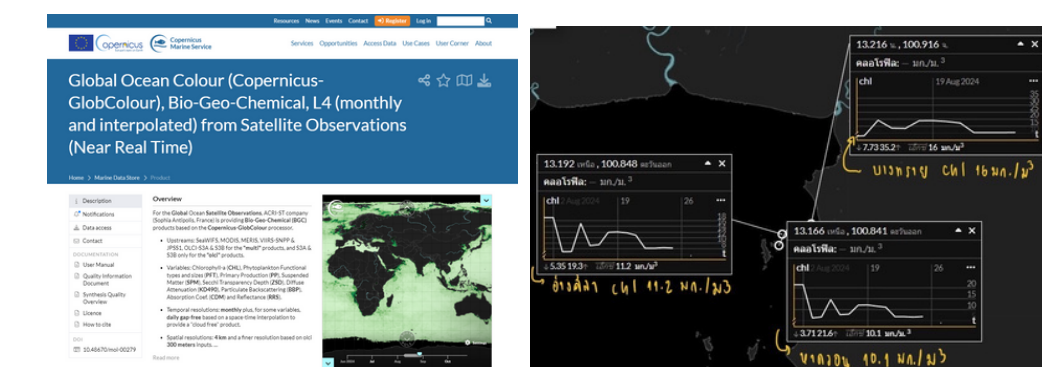


Identify and quantify the phytoplankton genera



Analyze the relationship in IBM SPSS Statistics 30.0.0.0

Analysis of Satellite Observation Data



Search for chlorophyll-a data from websites : <https://data.marine.copernicus.eu/>



Use the chlorophyll-a concentration to support the data collected from the field.

Badges selection

I AM A DATA SCIENTIST

This research investigates the relationship between seawater quality and phytoplankton density along the coast of Mueang Chonburi District. We conducted an in-depth analysis using both field measurements and satellite data. Our findings emphasize the importance of monitoring water quality and

I AM AN EARTH SYSTEM SCIENTIST

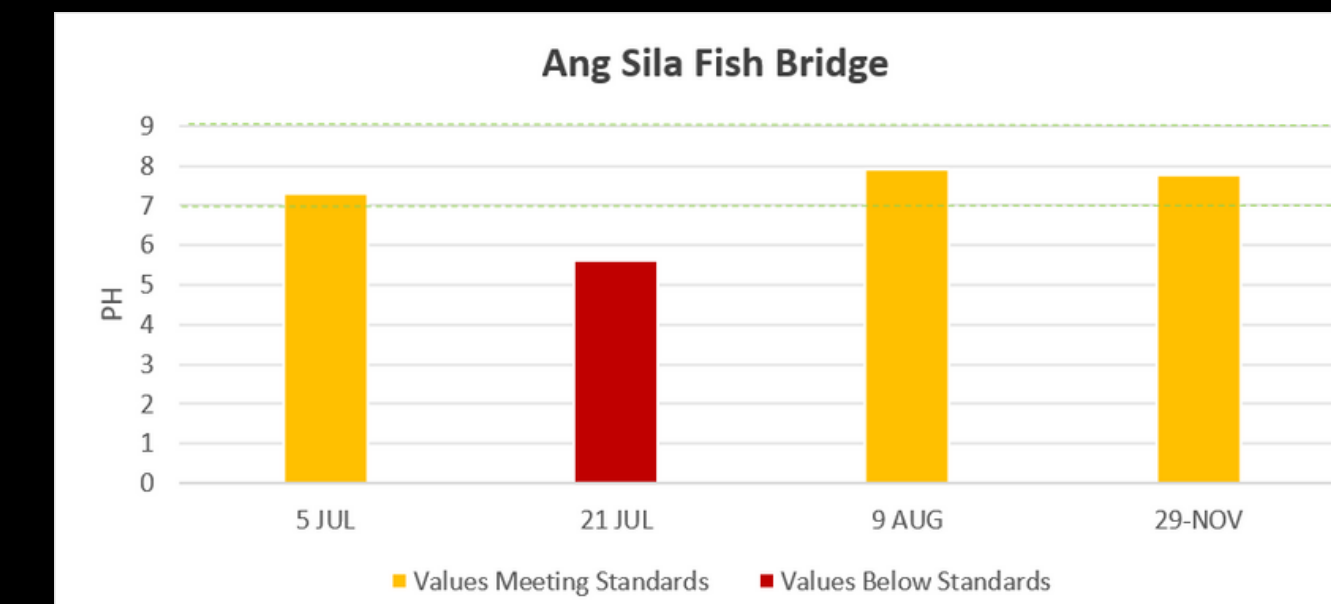
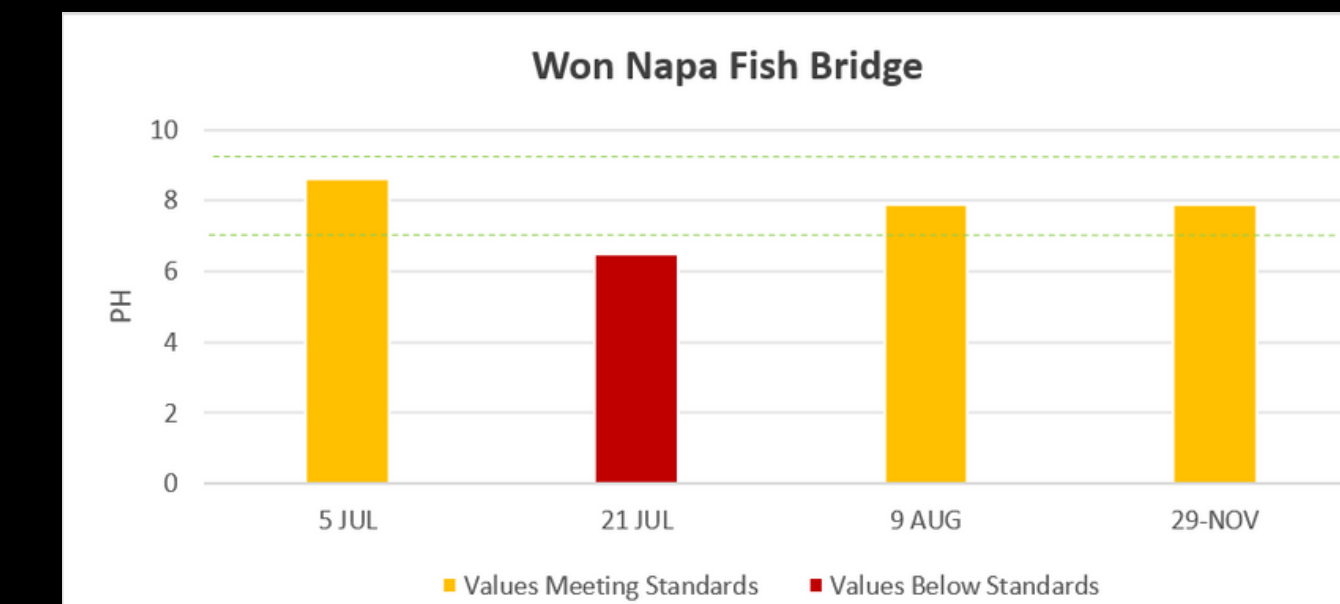
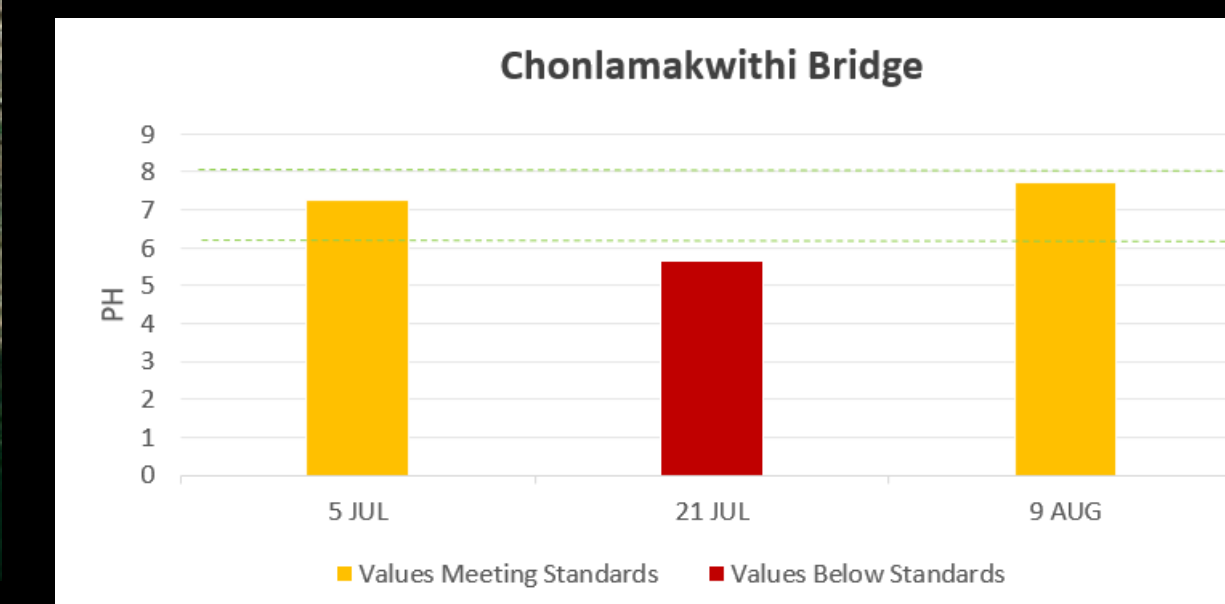
This research demonstrating the interconnectedness of the hydrosphere and biosphere. By analyzing key water parameters and phytoplankton variation, we highlight how environmental changes influence marine ecosystems, emphasizing the importance of preserving water quality.

I WORK WITH A STEM PROFESSIONAL

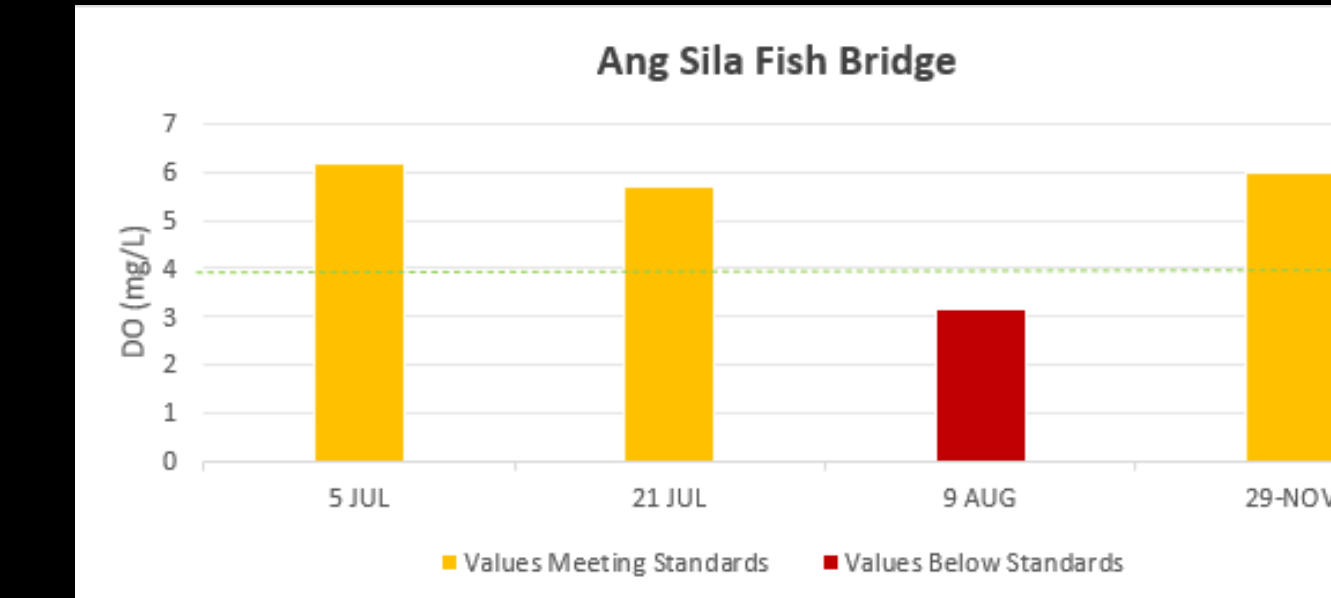
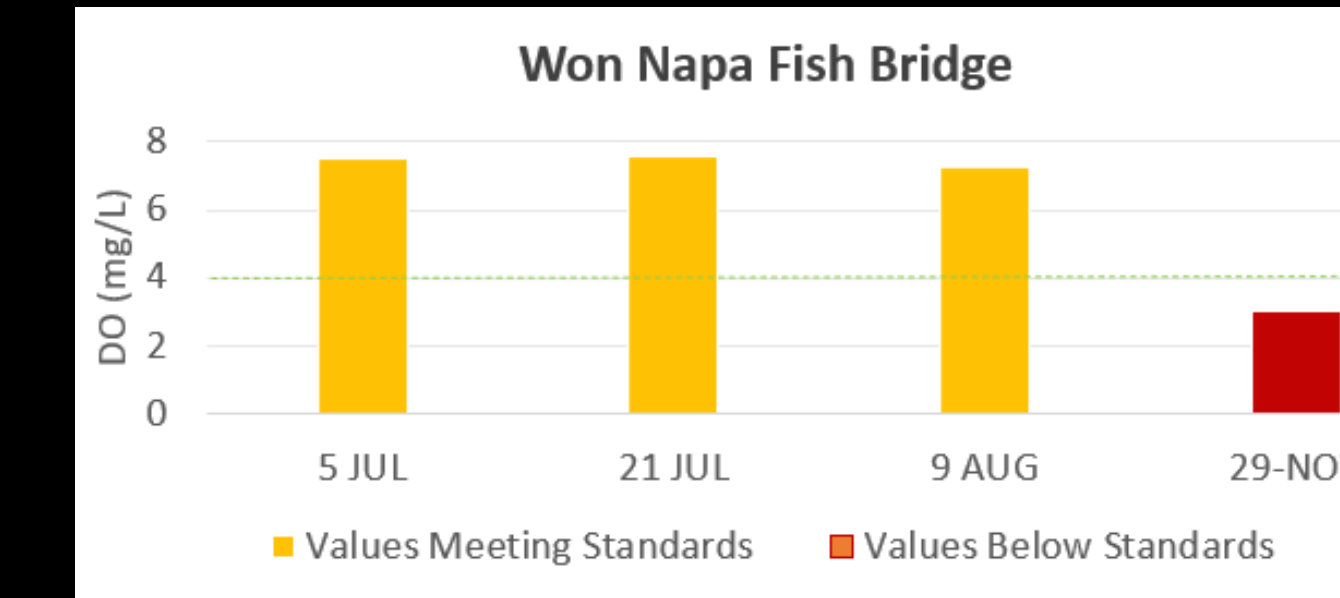
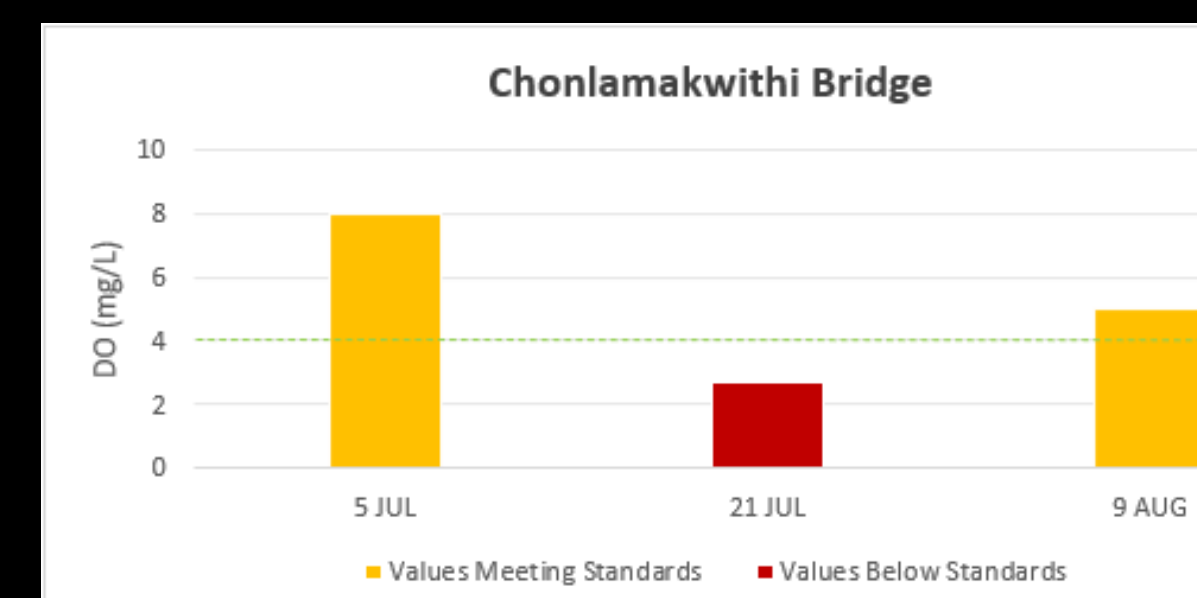
Our research collaboration with Assistant Professor Dr. Vichaya Gunbua, an expert in marine planktonology and estuarine ecosystems, significantly enhanced our study. Dr. Gunbua provided critical guidance on research design, seawater sampling, and phytoplankton analysis. Her direct involvement in fieldwork and methodological expertise ensured precision, rigor, and substantial improvements to our research outcomes.

Results

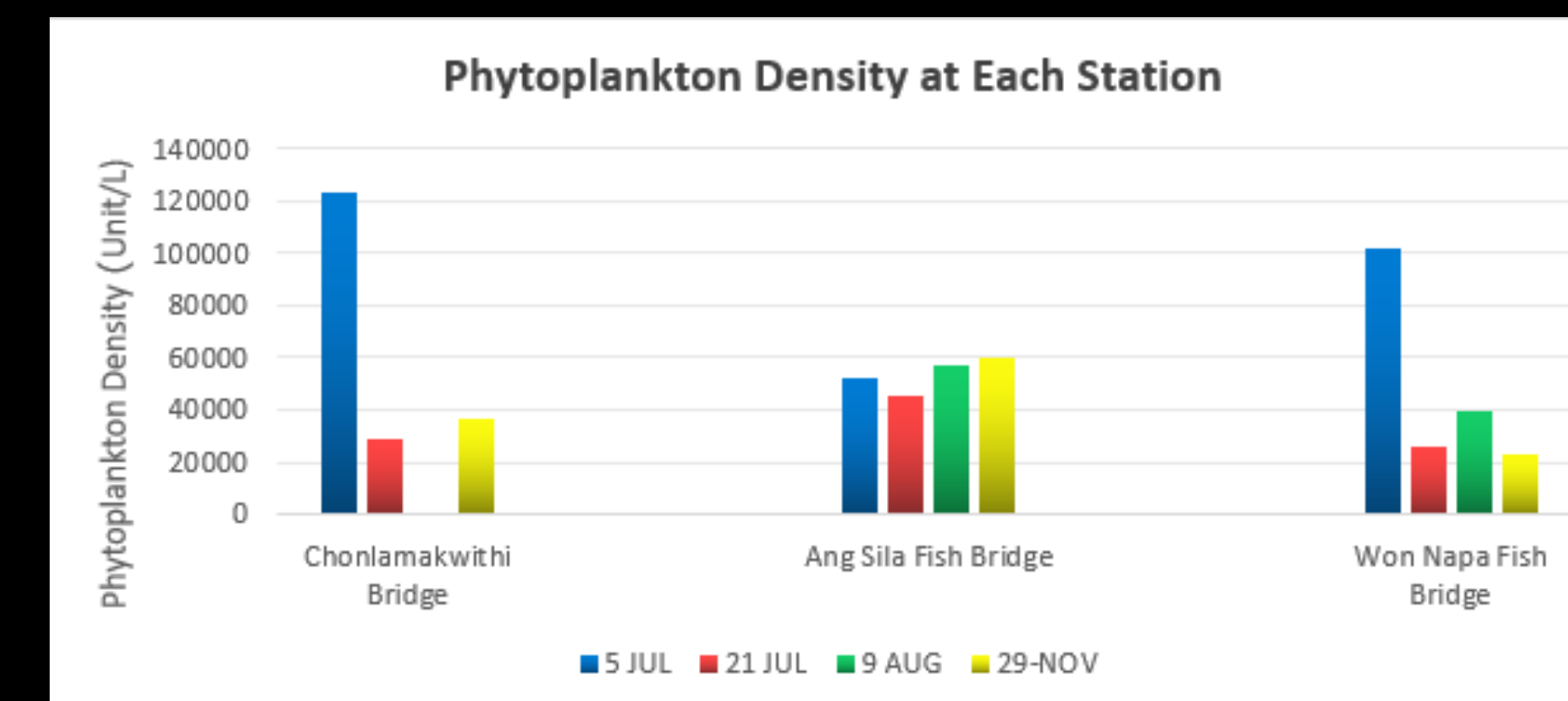
- Graph displaying pH values at each station compared to standard values



- Graph displaying dissolved oxygen levels at each station compared to standard values



- Graph displaying phytoplankton density during each study period and across study areas



- Representative Images of Plankton Characteristic of Blooms in the Studied Areas



- The results of the phytoplankton density measurements at each station

	สะพานชลมารควัฒน์	สะพานปลาอ่างศิลา	หาดวอนนภา
5 JUL	122850	52350	101400
21 JUL	28950	45000	25950
9 AUG	-	56850	39450
29-NOV	36750	60450	23100

Reference

1. Ladda Wongrat. (1999). *Phytoplankton*. Kasetsart University Press. Bangkok.
2. Phatarawut Thaipichitburapa, Anukul Buranapratheeprat, Wichaya Kanbua, Thanaphon Chaiyaphiphatnakhajorn, Napiththa Kingkaew, and Prasarn Intacharoen. (2024). *A Study of Methods for Measuring Chlorophyll-a Concentration at the Sea Surface Using Sentinel-3 Satellite Imagery in the Coastal Areas of Trat Province*. Burapha Science Journal.
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