The Study of Water Quality and Application of Synchrotron Light to Investigate Elemental Accumulation in Plants from Water Sources in Chon Buri Province

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Introduction

This project studied water quality in Ban Bueng, Nong Kho, and Map Phrachan Reservoirs using synchrotron light technology. Water quality was measured twice, in May and August, focusing on temperature, dissolved oxygen, pH, and turbidity. Results showed moderate water quality in May (CCME WQI 67.97-75.42) and good quality in August (CCME WQI 79.23-88.18). The project also analyzed elements in water and aquatic plants using the TXRF technique, with results showing consistency between plant and water samples.

Objectives







1. To study and assess the water quality in sample reservoirs in Chonburi Province. 2. To examine the elements accumulated in aquatic plants and water found in study site water sources using synchrotron light-based analysis.

Methodology

Determination of sampling points









Synchrotron Light Research Institute (Public Organization)



Synchrotron Light

Result

- Close to the speed of light.
- Use in a variety of applications



The TXRF (Total Reflection X-Ray Fluorescence) technique is one method used for analyzing elements and compounds in samples by utilizing the total reflection of X-rays.

Water Ouglity, Accession	CCME WQI
Water Quality Assessment	May August

		May	August	
100	88.18		83.8	
90	00.10		83.8	

1. Rinse the bottle 2-3 times then collect the water sample 30 cm depth from the surface.

2. Survey aquatic plants at the study site, throw the quadrant before collect floating plant samples.

> 3. Measure water quality using a multiparameter. Put the probe into the water 50 cm depth from surface.



- 4.1 Clean and separate the plants according to their location of discovery. 4.2 Place in a hot air oven 60°C 48 hr, Divide the aquatic plants into 3 parts (leaf stem roots).
- 4.3 Grind the plants using a mortar and pestle
- 4.4 Clearly divide the locations of discovery

tested	unit	Ban Bueng Reservoir		Nong Kho Reservoir		Map Prachan Reservoir		
	A	В	с	A	В	A	В	
Temperature	C°	30.05	30.82	29.94	30.82	29.94	30.89	29.35
TDS	g/l	0.110	0.115	0.143	0.115	0.143	0.175	0.085
DO	mg/l	3.73	1.53	1.48	1.53	1.48	1.55	1.50
рН	-	7.29	8.05	7.38	8.05	7.38	7.56	7.53
Parameters unit tested		Results						
	unit	unit Ban Bu	n Bueng Reservoir		Nong Kho Reservoir		Map Prachan Reservoir	
	A	В	с	А	В	A	В	
Temperature	C°	29.59	28.92	30.93	30.54	30.84	35.12	39.50
TDS	g/l	0.115	0.115	0.116	0.116	0.147	0.221	0.183
DO	mg/l	5.12	5.96	5.15	4.97	6.87	5.52	4.06
рН	-	7.49	7.94	7.48	6.88	7.02	7.17	6.89



2nd round, August



Comparison of spectrum samples from aquatic plants in the Ban Bueng reservoir, extending from site A and site B



At study site B, some heavy metals such as Fe and Mn were found to be higher due to rusting of iron structures or the release of industrial waste. Therefore, study sites near industrial areas show higher accumulation of heavy metals.

Conclusion

In May water quality from CCME WQI values ranging from 67.97 to 75.42. However, by August, water quality improved to a good level, with CCME WQI values ranging from 79.23 to 88.18. This indicates an improvement in water quality, Aquatic plants release oxygen into the water, which directly affects the dissolved oxygen (DO) levels. This aligns with the trend observed, where water quality in August was better than in May. Aquatic plants, such as water hyacinth, grow well during the rainy season. As a result, in August (the rainy season), the DO levels increased, and the water



5.1 Place plant and water samples into microtubes, add Cr 100 mg/L and TritonX 990 µl 5.2 Mix using a vortex mixer, and wait for sedimentation. 5.3 Use a micropipette to dispense the sample onto a silicon wafer. Place in a hot air oven 60°C 15 m 5.4 Analyze elements with the TXRF machine to obtain the elements spectrum.

temperature decreased.

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