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Study of the Relationship Between Rainfall, Water Quality, and Seawater Intrusion in the Bang Pakong River

International Virtual Science Symposium 2026

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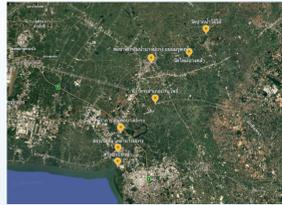
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Abstract

This study, "A Study of the Relationship Between Runoff, Water Quality, and Saltwater Intrusion in the Bang Pakong River," aimed to investigate the relationships among runoff volume, water quality, and saltwater intrusion, and between distance from the river mouth and water quality parameters and saltwater intrusion. Data was collected from June to October. Runoff volume ranged from 102.745 to 550.07 million cubic meters, and average salinity ranged from 0.13 to 1.85 ppt. Runoff volume showed an inverse relationship with salinity, while TDS and electrical conductivity showed a direct relationship with salinity. This is because runoff dilutes salt and pushes back seawater intrusion. High tides in late October led to higher salinity. Dissolved oxygen levels ranged from 2.75 to 8.25 mg/L, exceeding standards at several points. No significant relationships were found between runoff volume, distance from the river mouth, and salinity, due to the influence of organic leaching and local activities. Nitrate levels were undetectable at all points except point A in June, where levels exceeded the standard. Nitrite and ammonia levels remained within standard limits throughout the study. Temperature and pH values were within standard ranges at all points. Monthly CCME WQI values ranged from 85.32 to 95.32, classified as good to very good, primarily affected by DO values below standard and nitrate levels exceeding standard in some areas. Furthermore, location-based comparisons showed that salinity was highest near the river mouth and decreased with distance from the mouth. At the same time, DO and CCME WQI values varied according to local activities. In conclusion, runoff volume and land location play significant roles in changes in salinity and water quality in the Bang Pakong River.

Methodology

Selecting Sampling Locations

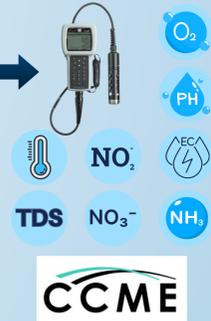


Collecting Water Samples



- 15 June 2025
- 22 July 2025
- 17 August 2025
- 28 September 2025

water quality testing



Fieldwork data recording



Result

June

Items tested	unit	Standard criteria	Test results						
			A	B	C	D	E	F	G
Temperature	Celsius degrees	23 - 32	29.72	31.14	30.76	30.97	30.91	31.22	31.19
Salinity	g/L	≤ 0.5	3.61	1.73	0.70	0.40	0.26	0.24	0.22
pH	-	5 - 9	7.17	7.33	7.07	6.93	6.78	6.80	6.70
DO	mg/L	≥ 6	7	6.25	5.25	6	5.75	5	5.25
Ammonia	ppm	≤ 0.5	0.5	0.25	ND.	ND.	ND.	ND.	ND.
Nitrate	mg/L	≤ 5	10	ND.	ND.	ND.	ND.	ND.	ND.
Nitrite	mg/L	≤ 5	0.25	0.1	0.1	0.1	0.1	0.1	ND.
Conductivity	µS/cm	100 - 1000	7250.80	3732.13	1576.71	922.40	600.50	573.56	508.68
TDS	g/L	-	4.32	2.17	0.92	0.54	0.35	0.33	0.30
CCME WQI	-	-	81.045	100	83.589	100	83.667	83.519	83.589

September

Items tested	unit	Standard criteria	Test results						
			A	B	C	D	A	F	G
Temperature	Celsius degrees	23 - 32	29.01	29.30	29.33	29.70	29.23	29.37	29.39
Salinity	g/L	≤ 0.5	0.19	0.15	0.14	0.12	0.13	0.09	0.09
pH	-	5 - 9	7.60	7.05	7.03	7.03	7.02	7.05	7.12
DO	mg/L	≥ 6	4.25	8.25	2.75	5.5	4.75	4.25	5.75
Ammonia	ppm	≤ 0.5	0.25	0.25	0.25	ND.	ND.	ND.	ND.
Nitrate	mg/L	≤ 5	ND.	ND.	ND.	ND.	ND.	ND.	ND.
Nitrite	mg/L	≤ 5	0.1	0.1	0.1	0.1	0.1	ND.	ND.
Conductivity	µS/cm	100 - 1000	428	346	331	270	303	217	199
TDS	g/L	-	0.26	0.21	0.20	0.16	0.18	0.13	0.12
CCME WQI	-	-	83.093	100	80.298	83.638	83.417	83.093	83.667

July

Items tested	unit	Standard criteria	Test results						
			A	B	C	D	A	F	G
Temperature	Celsius degrees	23 - 32	29.57	29.95	29.90	29.90	29.95	30.06	30.15
Salinity	g/L	≤ 0.5	0.65	1.35	0.28	0.24	0.20	0.19	0.15
pH	-	5 - 9	7.95	7.48	7.50	7.32	7.17	7.03	7.08
DO	mg/L	≥ 6	6	6	5.75	5.50	5.25	8.50	7.50
Ammonia	ppm	≤ 0.5	0.25	ND.	ND.	ND.	ND.	ND.	ND.
Nitrate	mg/L	≤ 5	ND.	ND.	ND.	ND.	ND.	ND.	ND.
Nitrite	mg/L	≤ 5	0.1	0.1	0.1	0.1	0.1	ND.	ND.
Conductivity	µS/cm	100 - 1000	1006.75	611.75	506	506	378.67	343.71	281.5
TDS	g/L	-	0.58	0.30	0.25	0.25	0.19	0.17	0.14
CCME WQI	-	-	100	100	83.667	83.638	83.589	100	100

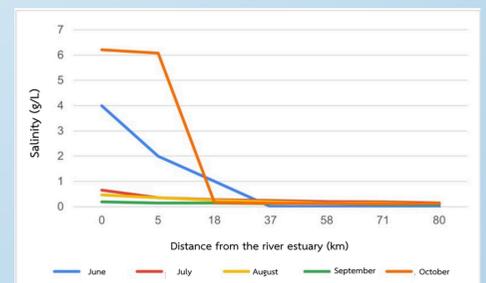
October

Items tested	unit	Standard criteria	Test results						
			A	B	C	D	A	F	G
Temperature	Celsius degrees	23 - 32	28.55	28.96	29.29	29.16	29.11	29.15	28.76
Salinity	g/L	≤ 0.5	6.21	6.08	0.17	0.13	0.12	0.11	0.13
pH	-	5 - 9	8.42	8.37	8.38	7.43	7.57	7.16	7.84
DO	mg/L	≥ 6	3.75	5.75	3.25	6.5	6.25	4.25	5.25
Ammonia	ppm	≤ 0.5	0.25	0.25	0.25	0.25	0.25	0.25	ND.
Nitrate	mg/L	≤ 5	ND.	ND.	ND.	ND.	ND.	ND.	ND.
Nitrite	mg/L	≤ 5	0.25	0.25	0.1	0.1	0.1	0.1	0.1
Conductivity	µS/cm	100 - 1000	11737	11610	388	301	268	250	303
TDS	g/L	-	7.15	4.89	0.23	0.18	0.16	0.15	0.18
CCME WQI	-	-	82.537	83.667	81.66	100	100	83.093	83.589

August

Items tested	unit	Standard criteria	Test results						
			A	B	C	D	A	F	G
Temperature	Celsius degrees	23 - 32	30.07	30.43	30.93	30.70	29.75	30.35	29.89
Salinity	g/L	≤ 0.5	0.47	0.35	0.25	0.20	0.15	0.15	0.11
pH	-	5 - 9	7.68	7.61	7.47	7.43	7.31	7.38	7.43
DO	mg/L	≥ 6	5.75	6.25	6.25	7	6	6.25	5.25
Ammonia	ppm	≤ 0.5	0.25	ND.	ND.	ND.	ND.	ND.	ND.
Nitrate	mg/L	≤ 5	ND.	ND.	ND.	ND.	ND.	ND.	ND.
Nitrite	mg/L	≤ 5	0.1	0.1	ND.	ND.	ND.	ND.	ND.
Conductivity	µS/cm	100 - 1000	1058	810	577	461	360	358	261
TDS	g/L	-	0.63	0.48	0.34	0.27	0.22	0.21	0.15
CCME WQI	-	-	83.667	100	100	100	100	100	83.589

Relationship Between Salinity and Distance from the Estuary



Introduction



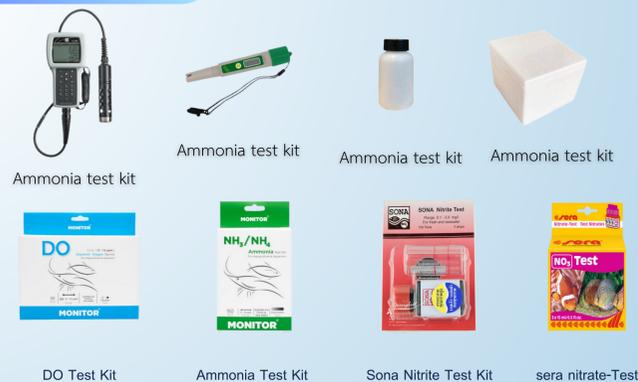
Purpose

- To study the relationship between runoff volume, water quality parameters, and saltwater intrusion.
- To study the relationship between distance from the estuary to water quality, and saltwater intrusion.

Hypothesis

- Months with higher runoff will have better water quality than months with lower runoff.
- Months with higher runoff will have less saltwater intrusion than months with lower runoff.
- Areas that are closer to the estuary will have higher salinity.
- Areas further from the estuary tend to have better water quality indices.

Tool



Conclusion

The study concluded that salinity is inversely proportional to runoff volume and distance from the river mouth. Water quality is influenced by various variables and local activities, resulting in variations at different locations.

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