Impacts of Lesser Whistling Duck (*Dendrocygna javanica*) Populations on Water Quality in the Saluang Subdistrict Reservoirs, Mae Rim District, Chiang Mai Province.

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Abstract

This study aimed to investigate seasonal variations in water quality and to assess the impact of the population of the Lesser whistling duck (*Dendrocygna javanica*) on surface water quality. Water samples were collected five times: in February, March, June, August, and October 2025 from three reservoirs in Saluang Subdistrict, Mae Rim District, Chiang Mai Province: Saluang Community Reservoir, Huai Pa Tueng-Piang Reservoir, and Pong Mai Daeng Reservoir. Physical and chemical water quality parameters were analyzed, and the population of Lesser whistling ducks was surveyed during each sampling period. The results showed that Biochemical Oxygen Demand (BOD), Ammonia-N, and orthophosphate (PO_4^{3-}) concentrations were highest during the rainy season and lowest during the dry season. In contrast, the population of Lesser whistling ducks was highest in the dry season and lowest in the rainy season. Overall, surface water quality varied significantly across seasons. However, no significant relationship was found between the number of Lesser whistling ducks and water quality in the study areas.

Introduction

Previous studies have shown that bird droppings contain nitrogen and phosphorus, which are essential nutrients for the growth of phytoplankton and aquatic plants. An increase in bird populations may therefore contribute to eutrophication, and among all waterbirds, the Lesser whistling duck (*Dendrocygna javanica*) is the species that contributes the greatest amount of nutrients to the lake. (Adhurya, Das, & Ray, 2022)

The findings of this study provide baseline information on the relationship between Lesser whistling duck populations and water quality in the study area. This information may be useful for future water quality monitoring and water resource management planning.

Objectives

- To examine the impact of the Lesser whistling duck (*Dendrocygna javanica*) on water quality in the study sites.
- To investigate seasonal variations in 3 reservoirs in Mae rim district.

Methodology

Field Activities

- **Lesser whistling duck population count**

  The number of birds present in the reservoir areas was recorded by focal species count on the sampling day.

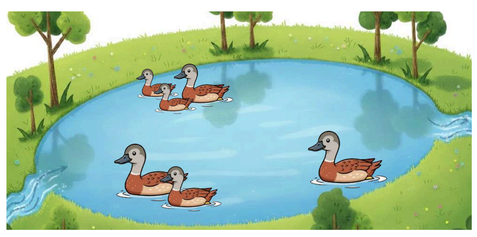


Figure 1: Lesser whistling duck population count

- **Measure the water quality parameters**
  - Turbidity
  - pH
  - Conductivity
  - Total Dissolved Solids (TDS)
  - Dissolved Oxygen (DO)

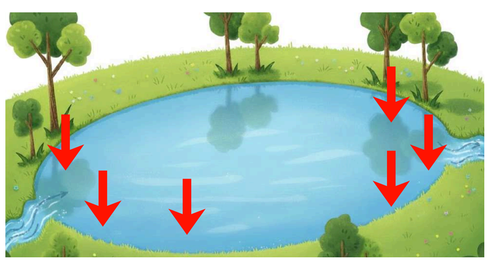


Figure 2: Measure the water quality parameters









Figure 3: Lesser whistling duck and Study areas

Laboratory Analyses

- **Measurement of Water Quality Parameter**
  - Measurement of Biochemical Oxygen Demand (BOD) by Azide-Winkler method
- **Nutrition Assessment**
  - Phosphate ion (PO_4^{3-}) determination by the Ascorbic acid method
  - Ammonia-Nitrogen (NH_3-N) determination by the Nessler method

Data Analyses

- One-way ANOVA
- Tukey's pairwise

Result & Discussion

parameter	Saluang community reservoir		Huai Pa Tung Piang reservoir		Pong Mai Daeng reservoir		Mean ± SD	
	Dry season	Wet season	Dry season	Wet season	Dry season	Wet season	Dry season	Wet season
Higthest population	0	1	0	0	312	20		
pH	9.78	8.29	7.92	7.54	7.47	7.31	8.39 ±1.11	7.71 ±1.33
DO (mg/L)	12.55	8.99	7.84	8.55	3.66	6.03	8.02 ±4.45	7.86 ±2.86
BOD (mg/L)	8.30	21.09	2.83	2.02	1.74	6.00	3.49 ±2.81	9.70 ±11.96
Conductivity (ms/cm)	0.25	0.20	0.03	0.03	0.09	0.11	0.12 ±0.10	0.11 ±0.08
TDS (g/L)	0.16	0.13	0.02	0.04	0.06	0.07	0.08 ±0.06	0.07 ±0.05
Turbidity (NTU)	40.57	62.61	13.32	28.87	5.06	11.82	19.65 ±16.87	34.43 ±26.61
Ammonia-N (mg/L)	0.87	3.74	0.33	0.84	0.35	0.53	0.51 ±0.25	1.40 ±1.85
Orthophosphate* (mg/L)	0.25	0.31	0.13	0.09	0.04	0.09	0.14 ±0.10	0.16 ±0.17

Table 1: Comparison between the mean population of Lesser whistling ducks and various water quality parameters, classified according to Thailand's surface water quality standards. and *Orthophosphorus concentration compared with the standard of the United States Environmental Protection Agency (USEPA). Color coding is applied as follows: Red indicates Class 5; Orange indicates Class 4; Yellow indicates Class 3; Blue indicates Classes 1 and 2; Green indicates compliance within the shared threshold range of Classes 1–4; and Pink indicates above the standard limit.

Conclusion

This study indicated that water quality in the three reservoirs varied seasonally. However, variations in water quality were also observed within the same season, depending on other environmental factors such as site characteristics and human activities, which had a greater influence on water quality than the presence of Lesser whistling ducks. Although Lesser whistling ducks may contribute some nutrients to the water, internal processes within the aquatic system—such as photosynthesis by algae and aquatic plants, the decomposition of organic matter, nutrient uptake by aquatic vegetation, and rainfall runoff — are key factors regulating changes in water quality in the study areas. Therefore, it can be concluded that, in this study, Lesser whistling ducks did not significantly affect water quality. This may be because the population size of Lesser whistling ducks observed in this research was not large enough to cause measurable impacts on the reservoirs.It should also be noted that water quality in the reservoirs near human settlements is worse than that of the reservoir with the Lesser whistling duck. Thus, the protection of water quality should take this relationship into consideration.

Acknowledgment

The author would like to thank the Department of Biology, Faculty of Science, Chiang Mai University, for supporting this research. I am also grateful to my advisor for valuable guidance and suggestions throughout the study. Special thanks to everyone who assisted with fieldwork and data collection.

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