Water quality in Paphayom canal flow Phatthalung,Thailand

Students: Miss.Jirasutha Watchirasirikul,Miss.Piyanuch Nooma,Miss.Jirapinya Puttasawat and Mr.Nattiwut Chootong

School: Paphayompittayakom school, Thailand

Teacher: Mrs. Paninee Voranetivudti

Email: kimkung11@gmail.com

ABSTRACT

Algal bloom had been a problem in the Paphayom canal for many years that may affect the lake's biodiversity. In order to assess the status of the lake, the lake's plankton and water quality were examined during the study period from June to August 2004. We collected samples from 6 different stations (2 from upstream, 3 from middlestream, and 1 from downstream) of the lake. Water samples were collected to check the density of plankton in water. Forty nine species belonging to 7 different classes were identified including Dinophytes, Cyanophytes, Baccilariophytes, Chlorophytes, Cryptophytes, Euglenophytes and Crysophytes. Temperature, pH, dissolved oxygen (DO), nitrate, and conductivity of water were also checked and recorded. Results showed that, turbidity and nitrate levels did not differ among the stations or streams, but temperature was lower in upperstream than in middle and downstream. On the other hand, dissolved oxygen was lower in downstream than in upper and middlestream. pH also differed among the stations. Density of plankton was negatively correlated with temperature but positively correlated with turbidity and nitrate levels in water.

Keywords: plankton, water quality, stream

1. Introduction

Plankton communities are sensitive to changes in their environment and therefore plankton total biomass and many plankton species are used as indicators of water quality

(Reynolds 1997, Reynolds et al. 2002, Brettum and Andersen 2005). Plankton communities give more information on changes in water quality than mere nutrient concentrations or chlorophyll-a concentration. Water quality is an ensemble of physical, chemical and biological characteristics of the given water (Straskraba and Tundisi 1999) Following this knowledge, eutrophication of freshwater is regarded as a water quality issue which results in the deterioration of the aquatic environment and impacts on water usage. Cyanobacteria have been recognised as a major symptom of eutrophication in fresh water as their blooms are prevalent in waters affected by cultural nutrient enrichment (Reynolds 1984a, Moss 1998). This paper analysis plankton abundance, physical and chemical parameters to measure water quality.

2.Objectives

- To study some physical (temperature, turbidity), chemical (pH, dissolved oxygen, nitrate) and biological (plankton) water qualities in six different stations in the upstream, middlestream and downstream areas of Paphayom flow.
- To see the differences in the physical, and chemical water qualities among the stations, as well as streams.
- To make correlations between plankton and physical/chemical water qualities.

2. Materials and Methods

Study site and data collection

We collected physical, chemical and biological water quality in the upstream, middlestream and downstream areas of Paphayom flow (**Figure 1**)

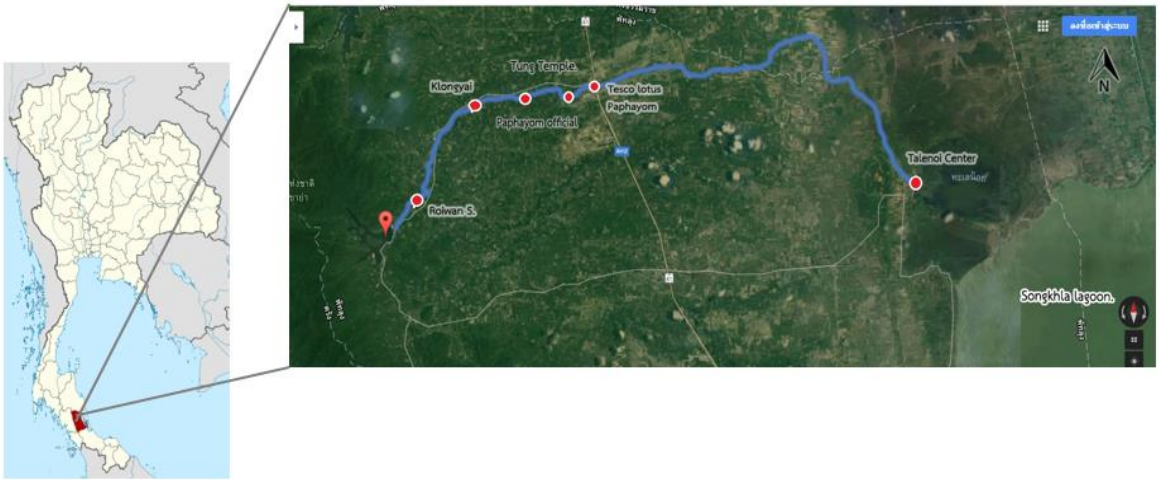


Figure 1 Map of Thailand and study site at Paphayom flow in Patthalung province, Thailand

Meterials and Methods

Samples were collected from six stations along the Paphayom flow in Patthalung province, Thailand. Water samples were collected to check the plankton in water. We identified the planktons, and counted the numbers. We used different equipment to check the physical and chemical parameters (temperature, pH, nitrate, dissolved oxygen and turbidity) in water based on GLOBE hydrology data sheet.

Data analysis

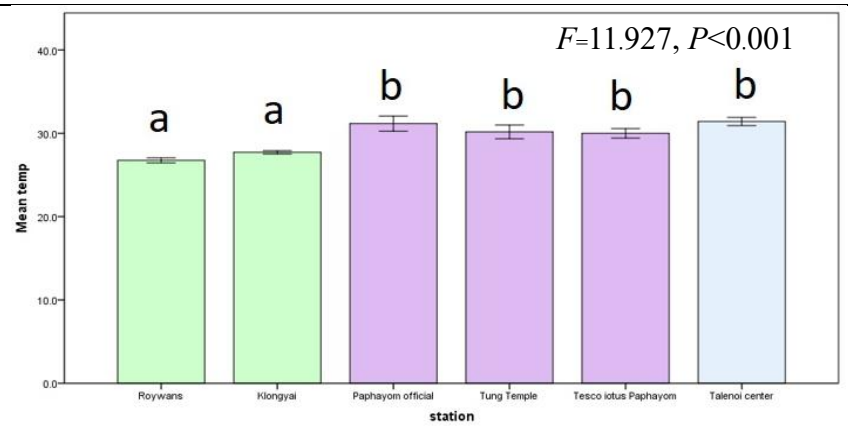
We used one way ANOVA to see the differences in water qualities among the stations. Correlations were made between density of plankton and water qualities. All the significant tests were two-tailed with significant level at $P<0.05$.

Result

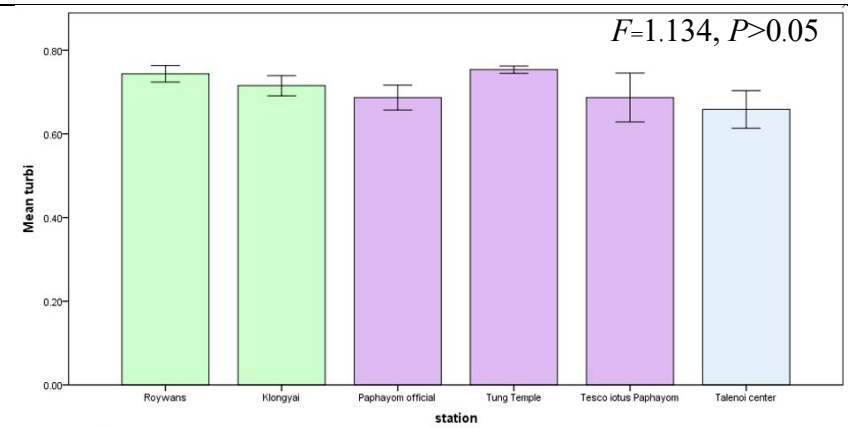
Water qualities among stations:

Temperature was lower in upperstream than in middle and downstream (Fig. 2a). On the other hand, dissolved oxygen was lower in downstream than in upper and middlestream (Fig. 2d). pH also differed among the stations (Fig. 2c). Trubidity and nitrate did not differ among the stations (Fig. 2a,e).

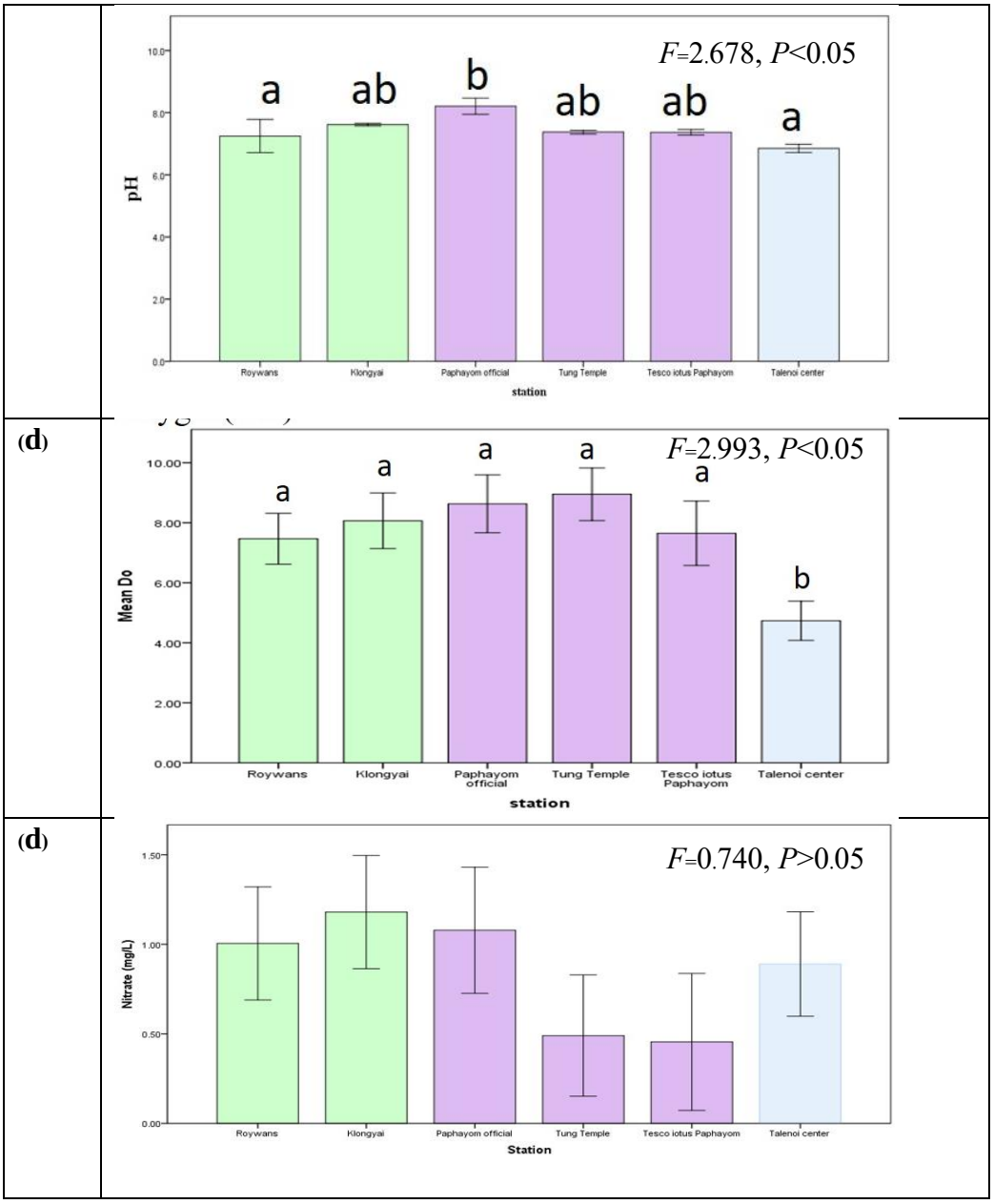
(**a**)



(**b**)



(**c**)



- **Figure 2** Physical analysis and Water quality: (a) Temperature (b) Turbidity (c) pH (d) Dissolved oxygen and (e) Nitrate in Papayom canal, Phatthalung, Thailand

Plankton:

Density of plankton was negatively correlated with temperature (Table 1) but positively correlated with turbidity and nitrate levels (Table 2).

Temperature negative effect with organisms in Papayom canal, Phatthalung, Thailand

Table 1 The organisms were found in Papayom canal, Phatthalung, Thailand

taxa	**Temperature**

Calanoid copepod	$R = -0.53$, $P < 0.005$
Harpecpicoid copepod	$R = -0.41$, $P < 0.05$
Ostracod	$R = -0.37$, $P < 0.05$
Crustacean nauplius	$R = -0.38$, $P < 0.05$
Crustacean copepodid	$R = -0.44$, $P < 0.05$
Diphanosoma spp.	$R = -0.45$, $P < 0.05$
Bosmina spp.	$R = -0.45$, $P < 0.05$
Euchlanis sp.	$R = -0.39$, $P < 0.05$
Filinia sp.	$R = -0.36$, $P < 0.05$
Trichocera sp.	$R = -0.38$, $P < 0.05$

Turbidity of water and Nitrate positive effect with some organisms in Papayom canal, Phatthalung, Thailand

Table 2 The organisms were found in Papayom canal, Phatthalung, Thailand

taxa	**Turbidity**	**Nitrate**
Ostracod	$R = 0.52$, $P < 0.005$	-
Crustacean nauplius	-	$R = 0.52$, $P < 0.005$
Bosmina spp.	$R = 0.50$, $P < 0.01$	$R = 0.36$, $P < 0.05$
Branchiunus spp.	$R = 0.37$, $P < 0.05$	-
Philobina sp.	-	$R = 0.62$, $P < 0.001$

Conclusion

The temperature of Roywan and the Klongyai stations were higher than other stations because these two stations are upstream and there are lots of trees. The pH of Paphayom official was more than Roywan and Talenoi center because this station is linked with two canals where people take shower, wash dishes and cloths with soaps and detergents that may increase the alkalinity of the water. The DO of Talenoi was lower than other stations because this station is belonging to downstream and linked with many canals.

Acknowledgements

We thank Assoc. Prof. Dr. Krisanadej Jaroensutasinee, Assoc. Prof. Dr. Mullica Jaroensutasinee, Dr. Fahmida Wazed Tina, and Anantanit Chumsri for helping with

experimental design, data analysis and manuscript. Preparation. This work was supported in part by Papayompitthayakom school. Center of Excellence for Ecoinformatics, the Institute of Research and Development, Walailak University and NECTEC

References

Brettum P and Andersen T. (2005) The use of phytoplankton as indicators of water quality.NIVAreport SNO 4818-2004.

Moss B. (1998). Ecology of Freshwaters Man and A medium, past to Future, 3rd edition, Blackwell Science Ltd.

Reynolds C.S. (1984a) the Ecology of freshwater phytoplankton, Cambridge University Press, Great Britain.

Reynolds C.S. (1997) Vegetation Processes in the pelagic. A model for ecosystem theory. In: Kinne O. (ed.), Excellence in ecology, Ecology Institute, Oldendorf/Luhe, Germany, pp 1-371

Skalar Analytical,B.V. (1993) Skalar Automated N &P analyser. Publication No: 0711293. Headquarters Skalar Analytical B. V. , P. O. Box 3237, 4800, DeBREDA, The Netherlands.

Straskraba, M. and Tundisi, J.G. (1999). Reservoir Water Quality Management. Guidelines of Lake Management. Volume 9. International Lake Environment Committee (ILEC) Shiga, Japan.