

Kanyanat Soontornprasit 2007: Development of Integrated Model for Assessment of Allowable Maximum Pollutant Loads: A Case Study of Bangpakong River in Ban Pho District, Chachoengsao Province. Doctor of Philosophy (Fisheries Science), Major Field: Fisheries Science, Department of Fishery Biology. Thesis Advisor: Associate Professor Charumas Meksumpun, Ph.D. 298 pages.

This study was aimed to assess aquatic status and their potential on pollution carrying capacity, and to evaluate on remediation potential of land and water resource that received pollutants from small canals flowing into Bangpakong River in Ban Pho District, Chachoengsao Province. In this study, information on community-based utilization pattern was gathered and questionnaire-surveyed. Simultaneously, field 2-monthly surveys were carried out during August 2004 to August 2005. The survey area covered 12 stations in the middle zone of Bangpakong River and 12 stations at 12 canals that received pollution loads from the Ban Pho community. In addition, 22 stations of pollution point sources were in cooperative analyzed. Results indicated that the highest level of nutrients were from crocodile farms (5,407.7 and 10,846.9 mg/m³ for NH₄⁺-N and PO₄³⁻-P, respectively), but total maximum pollution loads were from domestic sources. Most of nutrients were higher in high-loading periods than low-loading period. However, PO₄³⁻-P loads were highest during low-loading period. There were temporal and spatial variations in total pollution loads. Areas of Na Lang, Nong Bua, and Pra Wet received significant loads from land utilizations. In particular, Na Lang and Nong Bua should be carefully monitored throughout the year, while Pra Wet should be attended during low-loading period. Lat Nam Khem, despite of the highest loads, it still had high self-remediation potential. In this study, the multivariate analysis was applied for determination of aquatic system response of environmental factors as principle equation; $CHL\ a = b_0 + b_1NH_4^+ + b_2NO_2^- + NO_3^- + b_3Si(OH)_4 + b_4PO_4^{3-} + b_5TSS + b_6Trans + b_7Temp + b_8Sal + b_9pH$. The results indicated that NH₄⁺-N and PO₄³⁻-P had apparent influenced on chlorophyll *a*. In an aspect of model application in order to control of water status as recent condition, the UPPER zone needs the control of maximum NH₄⁺ levels to be less than 0.070 and 0.780 mg/l during high- and low-loading periods, respectively. For the LOWER zone, the controls of maximum NH₄⁺-N and PO₄³⁻-P levels to be less than 0.024 and 0.040 mg/l during high-loading periods, respectively, are needed, while the control of maximum NH₄⁺ to be less than 0.056 mg/l is needed during low-loading periods. Overall views of the results have revealed the importance of understanding on differences of locations and seasons. Such knowledge should be critical useful for zonation management and development so as to conserve and sustainable utilize the Ban Pho District in appropriate ways further.

Student's signature

Thesis Advisor's signature