Pattrawut Thaipichitburapa 2013: Pesticide Dynamic Model for Aquatic Ecosystem of Tha-Chin River, Thailand. Doctor of Philosophy (Fisheries Science), Major Field: Fishery Science, Department of Fishery Biology. Thesis Advisor: Associate Professor Charumas Meksumpun, Ph.D. 247 pages.

The results indicated that dissolved oxygen (DO) and ammonium-nitrogen (NH_4^+-N) were the distinct indicators reflecting deterioration of the water quality. Accordingly, Samutsakorn Province was the most risk area of pollutant accumulation, in where the levels of DO and NH_4^+-N were of 1-2 mg/L and 60-80 μM, respectively. The results of self-remediation efficiency of the river water implied that the river subsystem in Supanburi province possessed the highest self-remediation efficiency (65.2%), whereas those in Samutsakorn province had the lowest efficiency (11.49%). Two types of pesticides, endosulfan and diuron were found in the levels of 0.020-0.052 and 2.22-19.66 µg/l, respectively. These levels were high and above the UCDAVIS (2010) criteria. High concentrations of these pesticide were observed in commercial fish species (i.e. *Trichogaster pectoralis*, *Clarias macrocephalus*, and *Pangasius hypophthalmus*) inhabiting the river. In those species, 0.076, 0.711, 0.109 µg/g, respectively, of endosulfan, and 0.20, 0.02, 0.10 µg/g, respectively, of diuron were found. Their levels in benthic fauna (*Branchiura sp*) were 2.26 and 0.34 µg/g, respectively. Analysis of inter-relationship among the pesticides and environmental factors indicated that diuron (CD_W; µg/l) and endosulfan (CE_W; µg/m^3) in water related with NH_4^+-N (µM) and $Si(OH)_4^-$-Si (µM) as the equations; $CD_W = 1.33\ [NH_4^+\text{-N}] - 11.60$ ($R = 0.798$, $P < 0.05$), and $CE_W = 0.66\ [Si(OH)_4^-\text{-Si}] - 51.95$ ($R = 0.679$, $P < 0.05$), respectively. The relationship between sedimentary pesticides, diuron (CD_S; µg/g) and endosulfan (CE_S; µg/m3), and the sediment total organic matter (TOM; %) were; $CD_S = 1.30\ [TOM] + 15.44$ ($R = 0.993$, $P < 0.01$), and $CE_S = -0.237\ [TOM] + 4.94$ ($R = 0.713$, $P < 0.05$), respectively. The pesticide dynamic model developed accordingly to those relationships indicated that diuron contaminations were composed of the fractions of phytoplankton, benthos, fish, and sediment of *ca* 2.52-5.96, 0.6-8.8, 0.03-0.30, and 0.7-4.6 %, respectively. The endosulfan contaminations were composed of the fractions of phytoplankton, benthos, fish, and sediment of *ca* 0.01-0.27, 0.01-0.04, 0.03-0.49, and 0.0001-0.002 %, respectively. Diuron can accumulate more in sediments, but endosulfan can accumulate more in living organisms. Those contaminations varied by seasons. The river had higher remediation efficiencies during the high-loading period.

The overall results implied the risk of pesticides, endosulfan in particular, which can harmful impact our food chain. Thus, effective control of pesticide utilization and suitable management are urgently needed. The overall result depicted that the environmental factors, particularly those of NH_4^+-N and sedimentary TOM, had rolled on dynamics of pesticides contaminated into the river ecosystem. Moreover, such environmental factors could cause the area eco-zonation and seasonal differences. In order to achieve the effective remediation purpose, the river environment should thus be deserved careful consideration and suitable controlled further.

__________________________ __________________________ ___ / ___ / ___

Student's signature Thesis Advisor's signature