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Appendix A: Land use classification in 7 sub-districts of Trat Bay in 1987, 1992 and 1997

Sub-district	Land use area (km ²)																				
	Wang Krajae			Nong Samed			Nong Khansong			Thaprik			Takang			Chamrak			Laemklad		
Class of land use	1987	1992	1997	1987	1992	1997	1987	1992	1997	1987	1992	1997	1987	1992	1997	1987	1992	1997	1987	1992	1997
Paddy field	20.31	18.00	14.48	14.32	13.83	13.71	14.06	13.34	12.41	21.42	19.11	18.18	16.23	16.17	15.49	15.63	15.19	13.29	17.16	16.43	15.15
Rubber plantation	36.59	38.14	38.59	6.21	7.22	7.53	2.24	2.24	2.24	-	-	-	2.85	2.94	9.10	4.07	4.15	5.49	-	0.63	0.63
Perennial crop	4.63	4.63	4.63	2.95	0.95	0.67	-	-	-	-	-	-	19.71	19.10	19.10	7.74	7.73	7.15	1.11	1.11	1.21
Forest land	2.18	2.18	2.18	-	-	-	-	-	-	-	-	-	10.04	10.04	10.00	29.27	29.27	29.27	54.69	54.69	54.30
Mangrove	11.05	10.79	10.41	1.85	1.71	1.62	11.18	9.27	9.19	10.66	10.30	10.06	8.20	7.99	7.59	15.33	15.06	14.90	9.86	9.50	4.97
Deforested area	-	-	-	-	-	-	-	-	-	-	-	-	0.07	0.07	0.11	0.16	0.16	0.16	-	-	-
Bush fallow	-	-	-	-	-	-	-	-	-	-	-	-	8.32	9.07	3.31	2.11	2.11	2.11	-	-	-
Shrimp farm	-	1.02	2.62	-	0.21	0.39	1.03	3.66	4.67	0.96	3.63	4.80	-	-	0.57	-	0.64	1.94	-	0.46	5.97
Urban and built up land	2.03	2.03	3.88	1.03	1.03	1.03	1.51	1.51	1.51	1.26	1.26	1.26	2.05	2.05	2.13	0.86	0.86	0.86	0.83	0.83	1.42
Water body	0.35	0.35	0.35	0.05	1.46	1.46	-	-	-	-	-	-	1.04	1.08	1.11	-	-	-	-	-	-
Total	77.14	77.14	77.14	26.41	26.41	26.41	30.02	30.02	30.02	34.30	34.30	34.30	68.51	68.51	68.51	75.17	75.17	75.17	83.65	83.65	83.65

Appendix B: Environmental parameters of the study sites in wet season (August, September and October 1997)

Site	Bangphra Canal			Thaprik Canal			Thaleuan Canal		
	Station1	Station2	Station3	Station1	Station2	Station3	Station1	Station2	Station3
Width (m)*	60.00	47.00	41.00	57.00	38.00	29.00	38.00	34.00	29.00
Depth (m)	6.43 ± 0.1	3.27 ± 0.3	4.1 ± 0.4	2.07 ± 0.1	2.50 ± 1.0	2.57 ± 0.3	3.33 ± 0.8	2.57 ± 0.9	3.37 ± 0.6
Transparency (m)	0.30 ± 0.2	0.42 ± 0.3	0.52 ± 0.3	0.43 ± 0.2	0.53 ± 0.2	0.83 ± 0.1	0.43 ± 0.4	0.52 ± 0.3	0.64 ± 0.2
Surface temperature (°C)	29.3 ± 0.8	30.3 ± 1.5	29.7 ± 0.6	29.5 ± 0.5	29.8 ± 0.2	29.6 ± 0.4	29.7 ± 2.5	29.2 ± 1.6	28.7 ± 1.2
Bottom temperature (°C)	29.0 ± 0.5	29.6 ± 1.3	29.5 ± 0.9	29.4 ± 0.4	29.7 ± 0.3	29.4 ± 0.5	29.7 ± 2.5	29.2 ± 1.6	28.7 ± 1.2
Surface salinity (ppt)	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.3 ± 0.6	0.0 ± 0.0	0.0 ± 0.0	4.7 ± 8.1	1.7 ± 2.9	0.0 ± 0.0
Bottom salinity (ppt)	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.3 ± 0.6	0.0 ± 0.0	0.0 ± 0.0	5.3 ± 9.2	1.7 ± 2.9	0.0 ± 0.0
Surface pH	6.70 ± 0.1	6.63 ± 0.4	6.56 ± 0.4	6.87 ± 0.1	6.68 ± 0.1	6.78 ± 0.2	7.09 ± 0.3	6.67 ± 0.1	6.78 ± 0.2
Surface DO (mg/l)	5.3 ± 1.1	5.7 ± 0.8	5.8 ± 0.3	5.6 ± 1.1	5.9 ± 0.6	5.9 ± 0.6	6.5 ± 0.6	6.2 ± 1.4	5.8 ± 1.0
Bottom DO (mg/l)	5.0 ± 1.2	5.0 ± 0.9	5.0 ± 0.9	5.3 ± 1.3	5.4 ± 0.6	5.0 ± 0.0	6.0 ± 1.1	5.8 ± 1.2	5.5 ± 1.1
Surface NO ₃ -N (µg/l)	56.7 ± 0.0	70.0 ± 0.1	75.0 ± 0.0	73.3 ± 0.1	56.7 ± 0.1	123.3 ± 0.1	20.0 ± 0.0	25.0 ± 0.0	31.7 ± 0.0
Bottom NO ₃ -N (µg/l)	83.3 ± 0.1	66.7 ± 0.1	78.3 ± 0.1	83.3 ± 0.1	86.7 ± 0.1	80.0 ± 0.1	83.3 ± 0.1	56.7 ± 0.1	103.3 ± 0.0
Surface PO ₄ ³⁻ (µg/l)	2.8 ± 0.2	6.0 ± 0.4	4.0 ± 0.4	12.5 ± 1.6	12.2 ± 1.4	6.7 ± 0.4	1.2 ± 0.1	6.0 ± 0.5	1.9 ± 0.0
Bottom PO ₄ ³⁻ (µg/l)	4.4 ± 0.4	1.8 ± 0.1	3.4 ± 0.3	5.6 ± 0.6	12.7 ± 1.4	12.5 ± 0.9	3.3 ± 0.4	1.1 ± 0.1	1.6 ± 0.0
Surface chlorophyll a (mg/m ³)	4.79 ± 0.0	3.75 ± 0.5	3.51 ± 0.1	2.81 ± 1.3	4.68 ± 0.7	3.79 ± 0.2	3.10 ± 0.9	1.24 ± 0.9	2.37 ± 0.3
Zooplankton volume (ml/m ³ water)	2.0 ± 0.1	2.0 ± 0.5	2.2 ± 0.5	2.0 ± 0.0	1.6 ± 0.1	1.4 ± 0.2	1.9 ± 0.6	1.7 ± 0.5	1.4 ± 0.7

Remark: Width* of each station in each study site was measured only one time in August 1997

Appendix C: Environmental parameters of the study sites in dry season (December 1997, January and February 1998)

Site	Bangphra Canal			Thaprik Canal			Thaleuan Canal		
Parameter	Station1	Station2	Station3	Station1	Station2	Station3	Station1	Station2	Station3
Depth (m)	6.33 ± 0.3	3.67 ± 0.5	3.97 ± 1.0	2.37 ± 0.8	2.50 ± 0.5	2.53 ± 0.7	3.50 ± 0.6	2.73 ± 0.5	3.47 ± 0.7
Transparency (m)	1.23 ± 0.0	1.16 ± 0.1	1.55 ± 0.2	0.81 ± 0.2	0.89 ± 0.4	0.77 ± 0.3	0.71 ± 0.1	0.82 ± 0.1	1.13 ± 0.2
Surface temperature (°C)	29.5 ± 1.8	29.4 ± 1.6	29.0 ± 1.1	29.0 ± 3.0	29.7 ± 2.6	29.9 ± 2.1	27.8 ± 2.9	28.0 ± 2.6	29.2 ± 2.0
Bottom temperature (°C)	29.1 ± 2.1	29.0 ± 2.0	28.5 ± 1.50	29.0 ± 3.0	29.3 ± 2.6	29.2 ± 2.0	27.8 ± 3.0	27.7 ± 3.1	28.7 ± 2.1
Surface salinity (ppt)	24.3 ± 6.0	20.0 ± 7.5	17.0 ± 7.5	26.7 ± 1.2	23.8 ± 2.9	21.7 ± 3.1	32.7 ± 1.2	28.0 ± 3.0	28.7 ± 2.3
Bot. salinity (ppt)	25.7 ± 4.0	21.3 ± 6.1	19.3 ± 5.1	27.7 ± 2.1	25.7 ± 0.6	22.7 ± 2.5	33.0 ± 1.0	30.7 ± 0.6	29.3 ± 1.2
Surface pH	7.71 ± 0.1	7.47 ± 0.1	7.41 ± 0.2	7.70 ± 0.2	7.49 ± 0.1	7.51 ± 0.1	7.80 ± 0.2	7.63 ± 0.2	7.63 ± 0.4
Surface DO (mg/l)	5.8 ± 1.6	5.2 ± 1.3	4.1 ± 1.0	5.3 ± 0.7	5.7 ± 0.9	6.9 ± 0.8	4.7 ± 0.3	4.4 ± 0.4	5.0 ± 1.0
Bottom DO (mg/l)	4.5 ± 2.0	4.6 ± 0.8	4.0 ± 0.8	4.2 ± 0.4	4.0 ± 0.8	5.0 ± 0.4	4.2 ± 0.4	4.2 ± 0.3	4.5 ± 1.6
Surface NO ₃ -N (µg/l)	85.0 ± 0.0	103.7 ± 0.0	137.0 ± 0.1	116.7 ± 0.0	95.0 ± 0.0	140.7 ± 0.0	60.0 ± 0.0	45.0 ± 0.0	66.0 ± 0.1
Bottom NO ₃ -N (µg/l)	78.3 ± 0.0	95.0 ± 0.0	67.0 ± 0.0	60.0 ± 0.0	80.7 ± 0.0	120.0 ± 0.0	41.7 ± 0.0	30.0 ± 0.0	61.7 ± 0.0
Surface PO ₄ ³⁻ (µg/l)	17.7 ± 2.5	24.3 ± 3.9	13.5 ± 2.0	28.3 ± 1.0	17.8 ± 2.9	16.4 ± 1.5	2.9 ± 0.2	6.1 ± 1.7	6.7 ± 0.7
Bottom PO ₄ ³⁻ (µg/l)	21.1 ± 3.6	8.2 ± 1.1	13.0 ± 1.4	5.7 ± 0.7	4.3 ± 0.6	33.6 ± 5.7	9.4 ± 0.1	3.5 ± 0.2	2.0 ± 0.2
Surface chlorophyll a (mg/m ³)	3.89 ± 0.9	3.22 ± 1.0	3.29 ± 1.0	2.89 ± 1.3	6.32 ± 2.8	2.95 ± 0.6	3.15 ± 1.4	2.08 ± 1.3	3.93 ± 1.1
Zooplankton volume (ml/m ³ water)	3.4 ± 0.6	2.9 ± 0.4	2.5 ± 0.6	3.0 ± 0.9	2.5 ± 0.4	2.3 ± 0.5	3.0 ± 0.5	2.6 ± 0.4	2.2 ± 0.4

Appendix D: Species number and weight of fish collected from the study sites in wet and dry season

Season	Site	Species number									Weight (g) collected by push net (g)									Weight (g) collected by drift gill net								
		Bangphra			Thaprik			Thaleuan			Bangphra			Thaprik			Thaleuan			Bangphra			Thaprik			Thaleuan		
	Mo. / Station	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Wet	Aug.97	26	25	18	26	14	14	26	19	11	2837.7	1750.6	886.2	2105.5	379.0	982.0	1763.4	667.0	160.0	1697.5	690.0	544.5	982.0	462.5	199.0	529.5	125.0	32.5
	Sep.97	16	15	11	21	9	11	18	14	9	1354.0	559.0	185.0	1425.0	404.0	198.0	2508.5	999.0	180.5	1138.0	930.0	663.5	1101.0	524.0	30.0	917.0	173.5	50.0
	Oct.97	16	15	16	19	15	14	21	17	12	1158.0	1213.0	951.0	1658.0	1002.0	616.0	1890.0	952.0	416.0	887.0	629.0	478.0	941.0	603.0	273.0	769.0	397.0	63.0
	Total/station	32	29	28	35	23	19	32	26	20	5349.7	3522.6	2022.2	5188.5	1785.0	1796.0	6161.9	2618.0	756.5	3722.5	2249.0	1686.0	3024.0	1589.5	502.0	2215.5	695.5	145.5
	Total/site	52			41			39			10894.5			8769.5			9536.4			7657.5			5115.5			3056.5		
Dry	Dec.97	32	24	13	27	19	18	31	16	15	703.0	389.0	497.0	944.0	569.0	415.0	889.0	642.0	242.0	705.0	712.0	707.0	407.0	400.0	459.0	497.0	425.0	240.0
	Jan.98	27	20	17	25	16	19	26	26	23	478.0	311.0	364.0	697.0	445.0	526.0	519.0	397.0	605.0	690.0	639.0	311.0	755.0	479.0	343.0	698.0	357.0	211.0
	Feb.98	32	21	23	34	26	23	32	24	20	1283.0	863.0	591.0	1032.0	861.0	484.0	1140.0	835.0	418.0	819.5	729.5	505.0	597.0	459.0	456.0	592.0	396.0	276.0
	Total/station	51	39	32	42	37	37	49	37	36	2464.0	1563.0	1452.0	2673.0	1875.0	1425.0	2548.0	1874.0	1265.0	2214.5	2080.5	1523.0	1759.0	1338.0	1258.0	1787.0	1178.0	727.0
	Total/site	65			58			64			5479.0			5973.0			5678.0			5818.0			4355.0			3692.0		
Total/ 2 season		95			75			80			16373.5			14742.5			15214.4			13475.5			9470.5			6748.5		

BIOGRAPHY



Miss Nuanchan Singkran was born on April 20, 1970 at Thamai district, Chantaburi province. She graduated with the Bachelor degree of Marine Science from Department of Marine Science, Faculty of Science, Chulalongkorn University in 1993. Since her particular interest is environmental conditions worldwide, she chose to work as environmental news reporter as soon as she finished the Bachelor degree. She was the environmental news reporter of Krungtepturakit daily newspaper of Nation Publishing Groups Company Limited for one year from 1993 to 1994. After that, she turned to be the investigative and environmental news reporter of Bangkok Post daily newspaper, the Post Publishing Public Company Limited, for two years from 1994 to 1996. During her career as journalist she received the 2nd Environmental Article for Eco-tourism of Thailand Award given by Tourism Authority of Thailand in 1993 and the Environmental News Reporter Award given by the Environmental Siam Association in 1994. Besides, she applied to study at Sukhothai Thammathirat University in 1994 and graduated with the Bachelor degree of Communication Arts in 1996. Then, she resigned from Bangkok Post to further study on the Master degree in Environmental Science at Chulalongkorn University.