CHAPTER 3

SITE DESCRIPTION

The ten sample sites, belonging to four different types of water bodies viz. stream, river, irrigation canal and sewage canal were subjected to this study (Figure 1). The table 1 indicates the corresponding number of sites in each water body and their altitude.

Table 1 : Number of sampling sites, altitude and corresponding codes used in text.

Type of water body	Number of sample sites	Code	Altitude (m)
Stream	4	ST 1	800
		ST 2	720
		ST 3	680
		ST 4	350
River	2	R 1	360
		R 2	330
Irrigation canal	2	IC 1	340
		IC 2	330
Sewage canal	2	SC 1	350
		SC 2	330

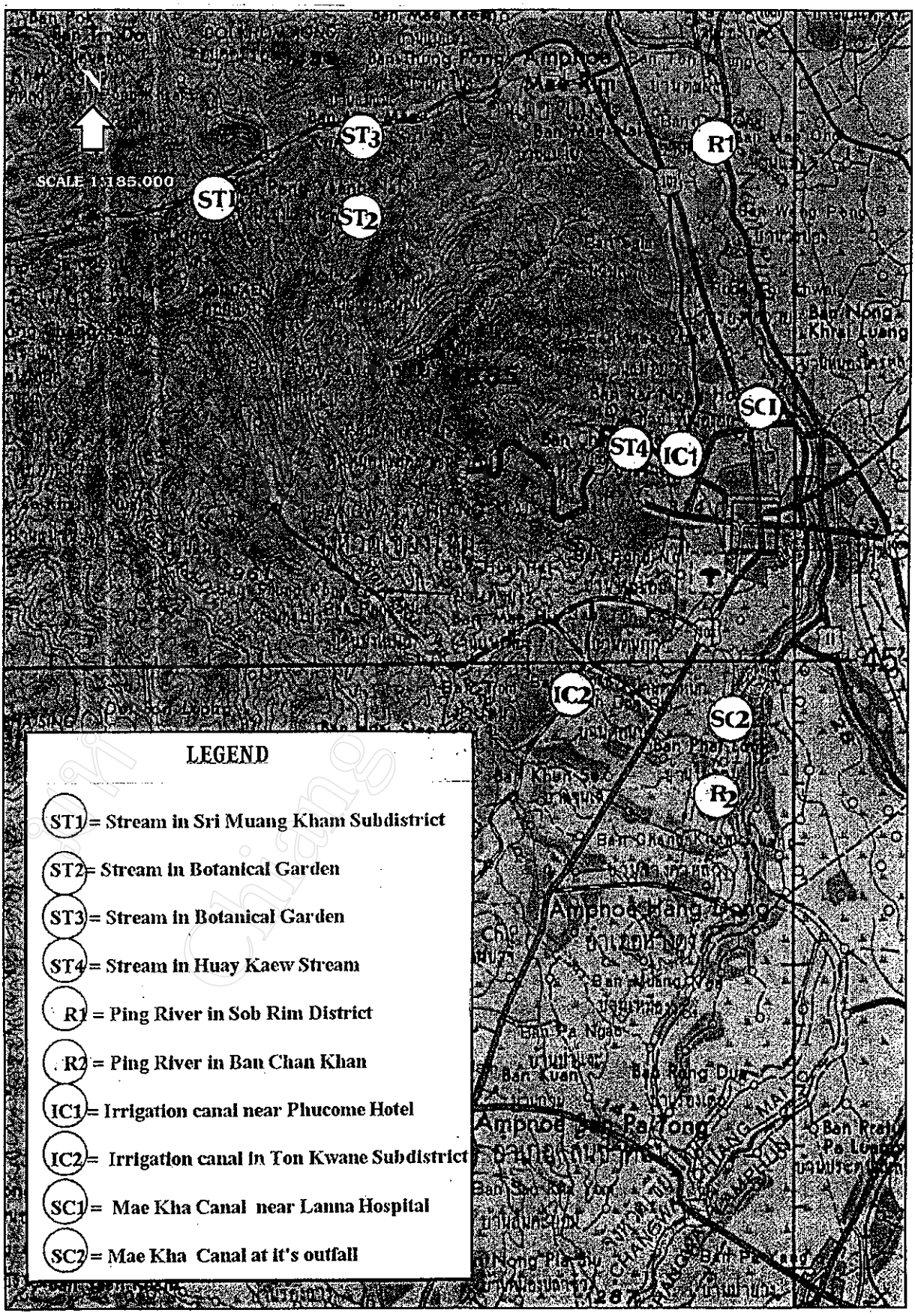

Figure 1: Map of the study sites.

Table 2 : Physical and chemical parameters of the study sites in dry and wet season

Site	Temperature (^{0}c)		Conductivity (µs)		Velocity (m/s)		pH		Dissolve O_2 (mg/l)		BOD_5 (mg/l)		Alkalinity	
	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
ST 1	23.6	22.8	294	225.0	0.67	0.57	7.8	7.6	7.3	7.4	0.2	0.1	145	94.0
ST 2	23.7	22.1	75.4	102.4	0.21	0.20	7.6	7.7	6.7	7.5	1.0	0.1	45	42.0
ST 3	24.1	23.0	307	187.8	0.28	0.65	8.7	8.2	7..3	8.0	0.1	0.1	155	57.0
ST 4	27.2	24.7	108.3	48.8	0.41	0.17	7.5	7.4	5.5	7.3	0.6	0.1	45	21.0
R 1	29.6	28.4	212	221.0	0.39	0.42	7.8	7.9	6.1	6.7	0.7	1.4	100	97.5
R 2	28.0	28.3	208	231.0	0.37	0.72	7.8	7.6	5.8	6.5	0.7	0.75	85	97.5
IC 1	33.1	28.1	277	169.6	0.44	0.61	8.4	8.0	8.7	7.2	1.3	0.35	100	53.0
IC 2	30.4	27.2	199	174.7	0.37	0.58	8.1	8.0	6.1	7.1	8.1	0.9	85	55.0
SC 1	32.1	28.1	317	192.7	0.17	0.39	7.9	7.0	5.9	2.6	9	4.2	100	59.0
SC 2	28.2	28.2	523	446	0.75	0.52	7.4	7.1	0	1.5	15	5.88	170	135.0

(Source: Napathalung, - unpublished data)

Note : Dry season data represent month of May and wet season data represent month of October.

Table 2 shows some physical and chemical parameters of the study sites in dry and wet season. Physical and chemical parameters of sampling sites from May 1996 to December 1996 shown in appendix E.

Streams

Four sampling sites were selected from two different streams, three sites from a stream flowing from the Mae Sa watershed, and another from a stream running through Chiang Mai zoo (= Huay Keaw stream).

ST 1 (stream site 1):

This site is in the upper watershed area of Mae Sa, at Ban Muan Khun, in Mae Rim district, Chiang Mai province. This stream runs through several agricultural areas as well as elephant camp sites. This site is threatened by road construction nearby. The researcher observed during the rainy season that the landslide at this site affected the stream structure (Figure 2).

The stream bed was partly shaded by riparian vegetation. The organic substrate component included about 90-95 % of detritus (mainly logs) and 5-10 % muckmud. Most of the inorganic part is bed rock and the rest includes mainly stones, sand and silt. Average stream width is 8.25 m, and depth is 0.54 m.

ST 2 (stream site 2)

This site is situated in the Queen Sirikit Botanical garden, Mae Rim district and is a branch of the main Mae Sa stream. As the stream runs through densely covered forest the stream bed is highly shaded by riparian vegetation. During the study period researcher observed very low water levels with highly turbid water.

The average stream width is 0.88 m, and depth is 0.34 m. The majority inorganic substrate component composed of bedrock, boulders and stones while sand and silt represent minority. Eighty percent of detritus and 20 % of silt represent as organic substrate components.

ST 3 (Stream site 3) :

This site is also located in Queen Siriket Botanical Garden on the main Mae Sa stream. This site is regarded as the reference site for the current study. It has good water quality (Environmental Risk Assessment (ERA) program- Batch 1995 - Report of 1996) and comparatively little human impact. Stream is partly covered by riparian vegetation.

The average stream depth is 0.41 m, and width is 5.13 m. Inorganic substrate component mainly consist with bed rock, boulders and stones (90%), and rest with silt and sand. Ninety five percent of detritus and 5% muck mud represent as organic substrate component.

ST 4 (stream site 4):

This site is selected from the Huay Khaw stream in the vicinity of Chiang Mai zoo, public park and Huay Khaw village. This site is highly affected by organic loading coming from the above places. The stream banks are covered with grasses.

The average stream width is 2.98 m and depth is 0.25 m. The inorganic substrate component is composed of about 90 % sand and 10 % silt and clay. Detritus play a major role as organic substrate component.

River sites

Two different sites were selected on the Ping river, one above and the other below the Mae Kha canal outfall.

R 1 (Ping River site 1)

This site is located above the Mae Kha sewage canal outfall. The surrounding area includes housing schemes and longan orchards. The bank stability is very low due to the presence of grasses and small shrubs only (Figure 3).

R 2 (Ping River site 2):

This site was selected to see the impact from sewage discharge from the Mae Kha sewage canal. The surrounding area consist of longan orchards and private houses.

Irrigation sites

The sites selected on the irrigation canal are:

IC 1 (Irrigation canal 1):

Situated in front of the Chiang Mai Phukcome hotel. The walls of the canal are made of concrete. Due to the asphalt road running on both sides of the bank there is less shade from vegetation. There are only some grasses present on the banks. There is a constant change of water level and flow rate due to water discharge regulated by the Irrigation Department. The canal is threatened by organic loads releasing by surrounding hotels etc..

IC 2 (Irrigation canal site 2)

This site was selected on the same irrigation canal about 9 Km away from IC 1 site. Physical structure remains the same as at IC1 site. There are some housing schemes, villages and orchards in the vicinity. This site was selected to examine the effect of dilution of organic discharges.

Sewage canal sites

The sites selected on the Mae Kha sewage canal are :

SC 1 (sewage canal 1):

This site is located close to the Lanna Hospital. It was selected to find out the effect of pollutant on aquatic fauna before the canal passes through the city. There is a fluctuation of water flow throughout the year and the rate of water flow is very low due to the abundant presence of aquatic plants (Figure 4).

SC 2 (sewage canal site 2)

This site was located a few meters before the canal reaches the river at Ban Pa Dad, Muang district. The water is highly polluted with black substrate and with bad odour. There are longan orchards and private houses in the vicinity (Figure 5).

Figure 2: Study site ST 1 in Stream. Note landslide occurred in wet season.

Figure 3: River site R 1 in the Ping River. Note the poles near the bank used to hang up the Artificial Substrate Samplers

Figure 4: Sewage canal site SC 1. Note abundant aquatic plant in the canal.

Figure 5: Sewage canal site SC2. Note the color of water and solid wastes on the bank