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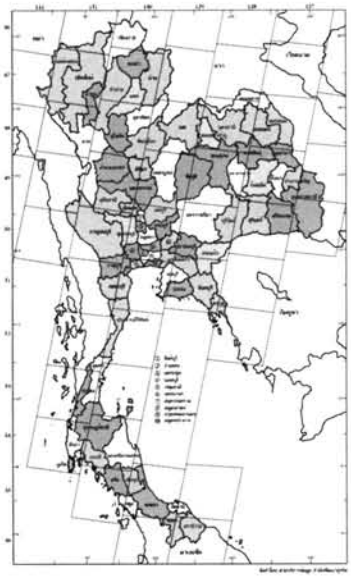
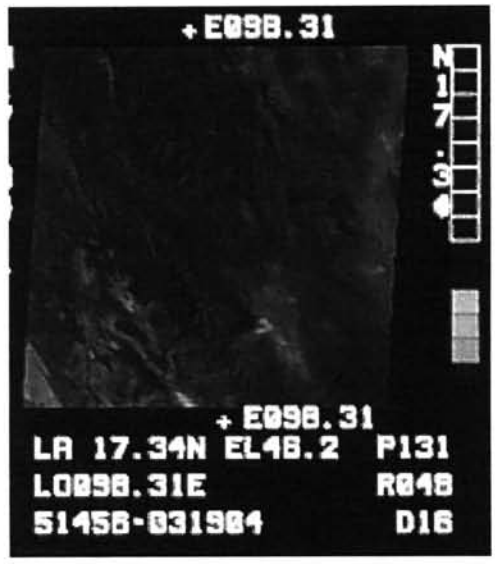
APPENDICES

APPENDIX A

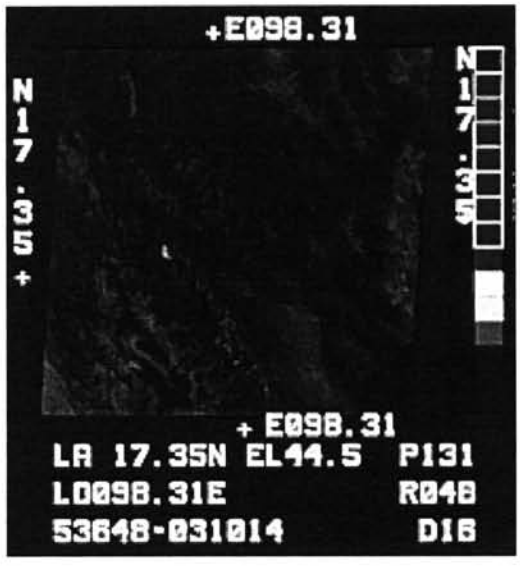
Spatial Data



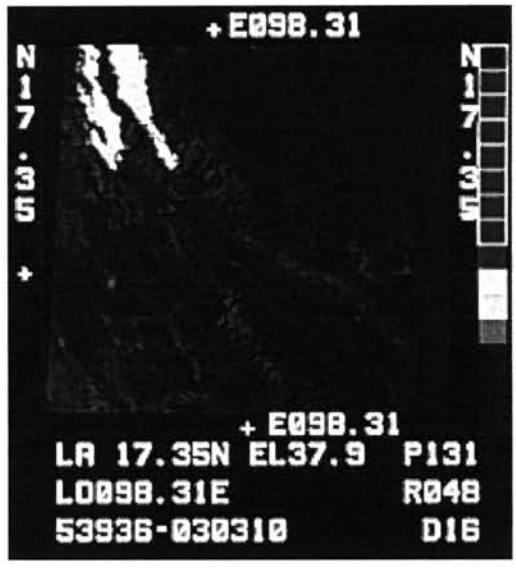
(a) Index of Landsat Imagery over Thailand



(b) Satellite Image of Landsat 5 covers the study area taken on 25/02/1988



(c) Satellite Image of Landsat 5 covers the study area taken on 13/03/1994



(d) Satellite Image of Landsat 5 covers the study area taken on 10/12/1994

Figure A-1. Three satellite images of Landsat 5 taken on different period of time from Geo-Informatics and Space Technology Development Agency (GISTDA).

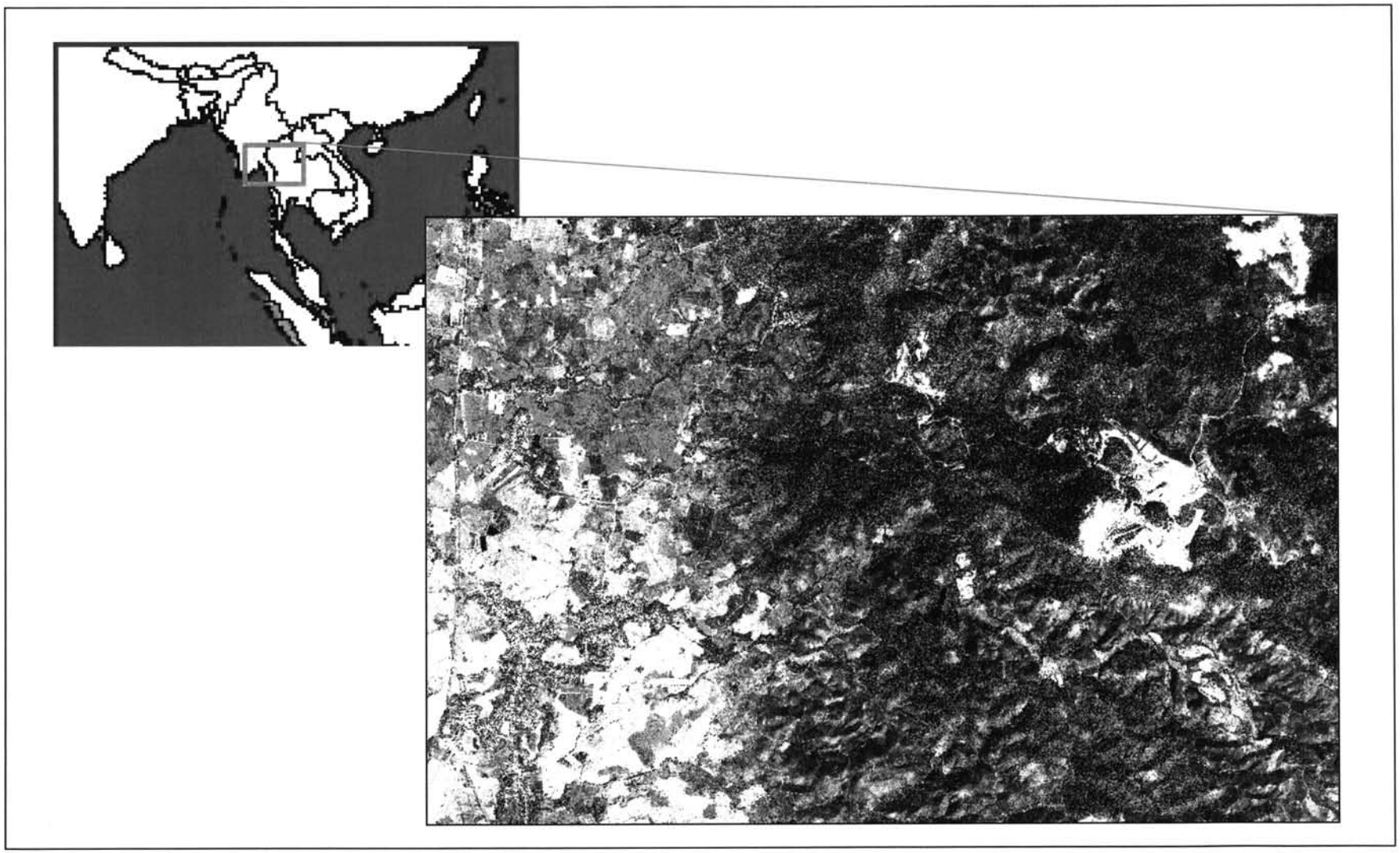
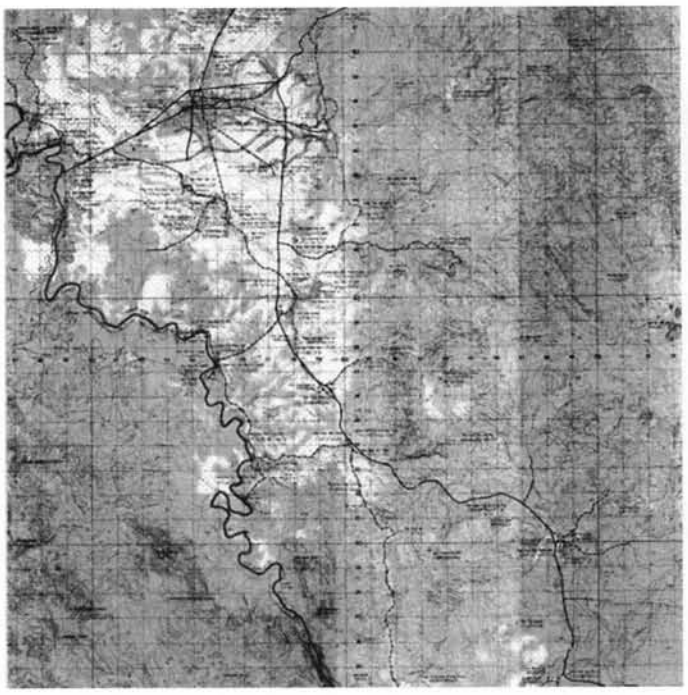
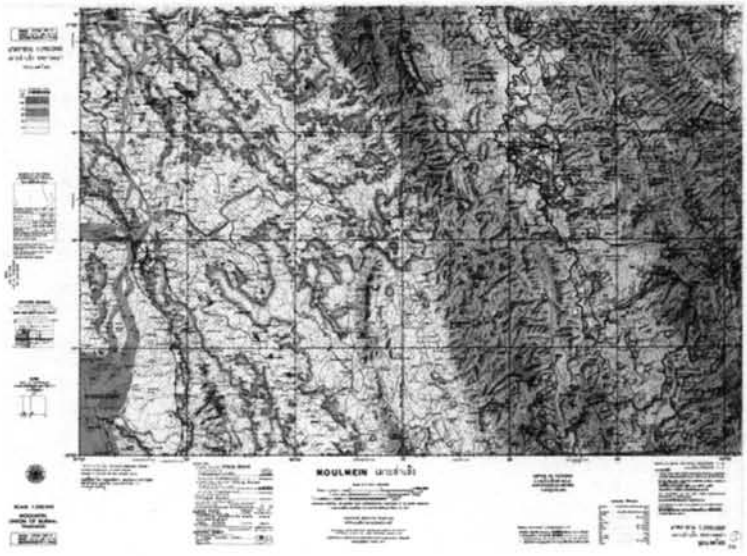


Figure A-2. Figure showing the satellite image of IKONOS covers the study area, taken on 04/02/2003 from GISTDA.



(a) Topographic Map with a scale of 1:50,000, Map Sheet: 4742III



(b) Topographic Map with a scale of 1:250,000, Map Sheet: 47-14

Figure A-3. Topographic maps cover the Mae Sot District of Royal Thai Survey Department.

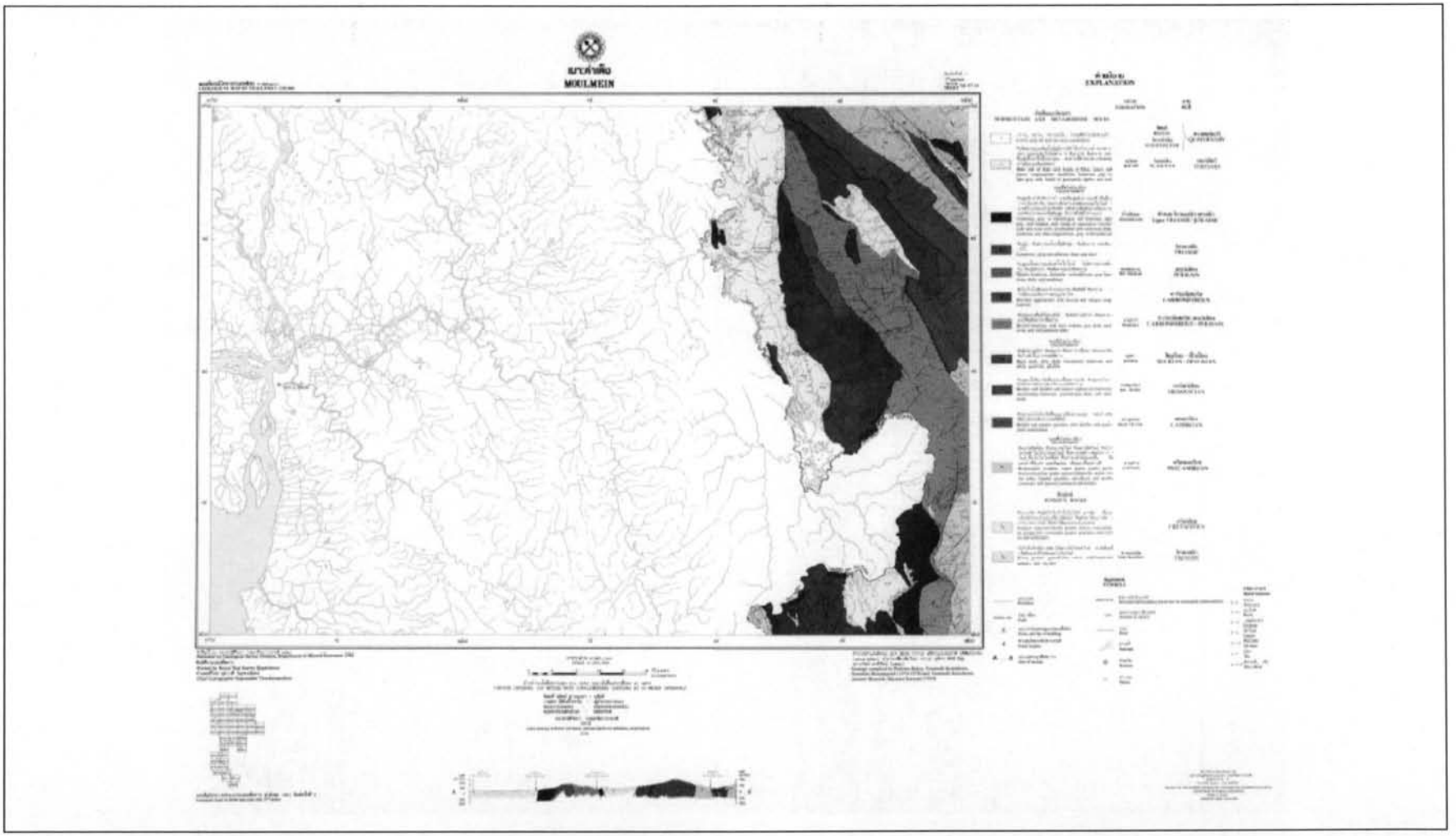


Figure A-4. A geologic map (a scale of 1:50,000, Map Sheet: 47-14) of Department of Mineral Resources, DMR.

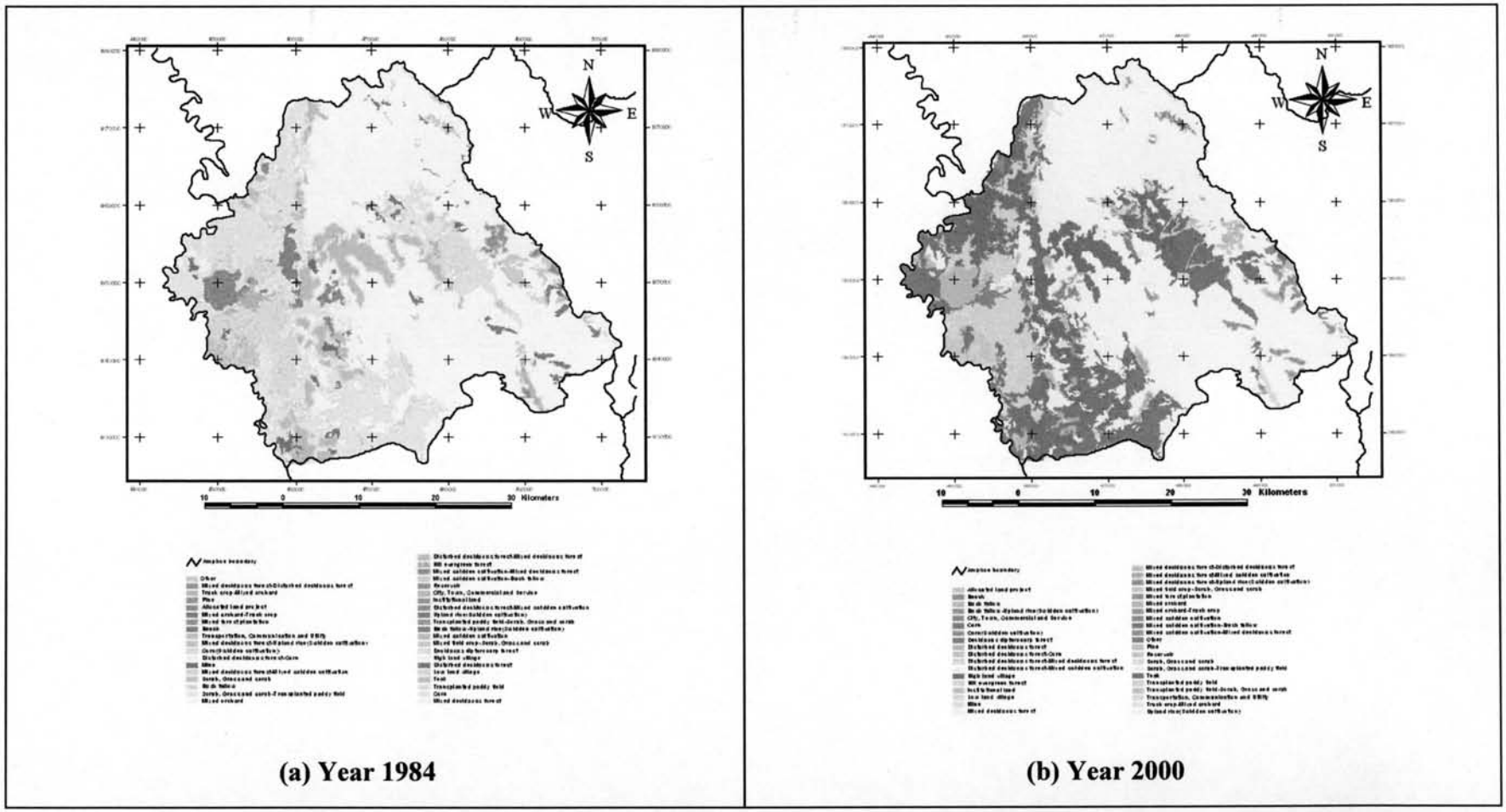


Figure A-5. Two maps showing land use of Mae Sot District, Tak Province in the different year (1984 and 2000) generated from LandPlan program which developed by Land Development Department (LDD).

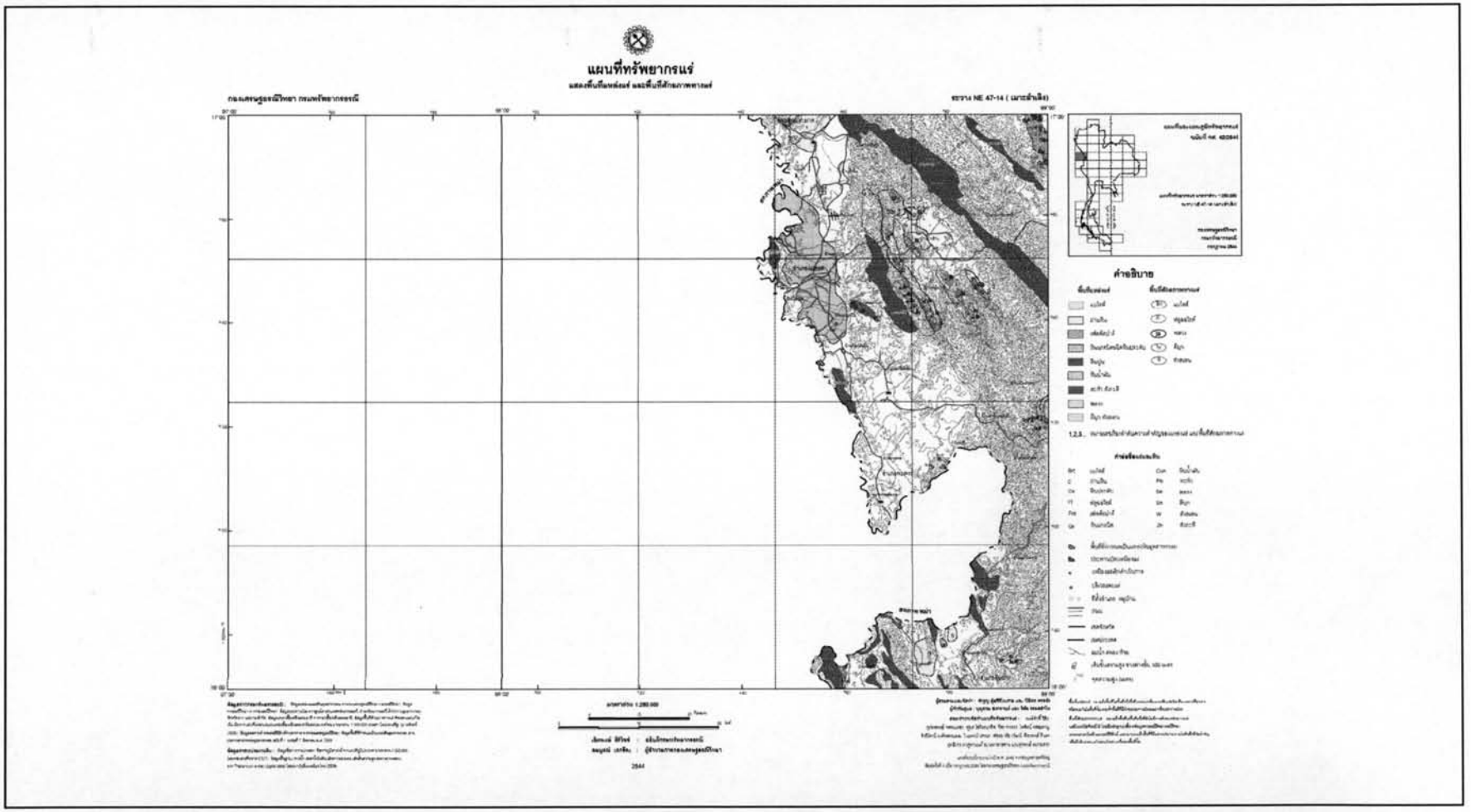


Figure A-6. A map showing mineral potential area around the study area (DMR).

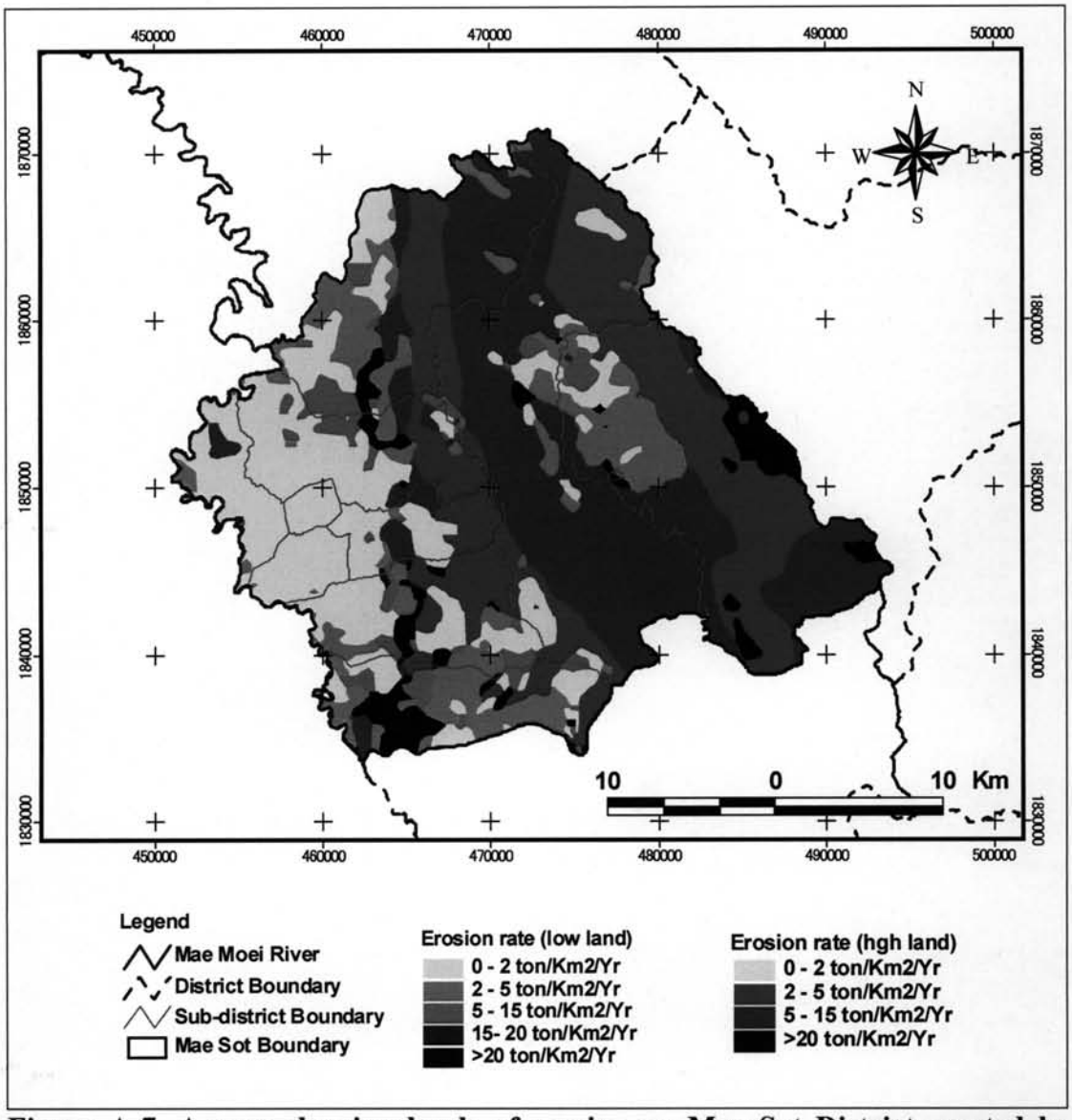


Figure A-7. A map showing levels of erosion on Mae Sot District created by ErosView program which developed by LDD.

APPENDIX B

Attribute Data

Table B-1. Cd and Zn concentration in stream sediment from the study of Maneewong (2006).

Sample No	UTM_X	UTM_Y	pH	Total_Cd (mg/kg)	Total_Zn (mg/kg)
1	462200	1842210	8.31	24.53	1487.30
2	461740	1842420	8.37	64.56	1449.88
3	460960	1842550	8.34	23.69	728.18
4	460880	1842980	8.14	25.06	723.88
5	460450	1843220	8.12	35.17	976.10
6	460000	1843200	8.13	22.85	720.59
7	459110	1842570	8.08	66.19	2300.00
8	458170	1842190	8.3	39.73	1524.80
9	458300	1842840	8.03	32.17	1070.67
10	457600	1842760	7.79	37.21	1333.27
13	461490	1841120	8.16	4.93	106.73
14	461100	1840420	7.66	3.40	383.94
15	460890	1840590	8.11	6.27	296.55
16	459640	1840480	7.96	13.03	579.90
17	458500	1840230	7.88	9.63	399.85
18	458060	1840550	7.65	5.50	40.77
19	457560	1840200	7.65	11.36	502.86
20	457680	1839720	8.03	9.61	456.17
21	462500	1841000	8.11	9.29	297.34
22	462910	1840700	8.37	7.69	217.85
23	463000	1840300	8.26	7.19	200.11
24	461360	1840000	7.8	3.76	28.39
26	460500	1839000	8.12	6.10	62.25
27	460200	1838700	8.07	2.74	17.87
28	460800	1838400	8.39	5.07	62.76
29	459800	1839000	7.6	6.08	77.15
30	458980	1838560	7.5	8.06	93.34
31	458230	1838430	7.81	7.91	99.77

Table B-2. Cd and Zn concentration in stream sediment from the study of Department of Primary Industries and Mines, DPIM (2006).

Sample No	UTM_X	UTM_Y	Total_Cd (mg/kg)	Total_Zn (mg/kg)
SD1	466468.00	1842493.00	1.00	59.00
SD2	464947.00	1842411.00	10.00	815.00
SD3	465234.00	1841554.00	260.00	13000.00
SD4	464395.00	1842186.00	1320.00	59400.00
SD5	463885.00	1842072.00	630.00	14500.00
SD6	463787.00	1842413.00	97.00	3600.00
SD7	463163.00	1842323.00	130.00	14300.00
SD8	461228.00	1842641.00	89.00	9310.00
SD9	460397.00	1843201.00	76.00	4020.00
SD10	460012.00	1843092.00	10.00	780.00
SD11	459051.00	1842648.00	47.00	6360.00
SD12	459004.00	1842650.00	46.00	6410.00
SD13	460461.00	1843172.00	60.00	6600.00
SD14	459244.00	1841212.00	48.00	1650.00
SD15	465981.00	1840978.00	1.00	260.00
SD16	465922.00	1842284.00	0.00	63.00
SD17	465455.00	1839268.00	0.00	85.00
SD18	460838.00	1840582.00	29.00	1180.00
SD19	463168.00	1842322.00	115.00	5070.00
SD20	461584.00	1842371.00	91.00	6040.00
SD21	461969.00	1843782.00	3.00	100.00
SD22	459949.00	1843192.00	23.00	1930.00
SD23	459436.00	1843757.00	6.30	245.00
SD24	460572.00	1842791.00	1.50	125.00
SD25	464242.00	1840363.00	2.60	121.00
SD26	459945.00	1839320.00	100.00	2415.00
SD27	457429.00	1840476.00	6.70	249.00
SD28	456377.00	1843961.00	40.50	1537.00
SD29	462472.00	1840925.00	115.00	9048.00
SD30	462829.00	1842581.00	3.60	925.00
SD31	462203.00	1842624.00	89.20	3288.00

Table B-3. Cd and Zn concentration in soil from the study of Junpho (2006).

Sample ID	X	Y	Elevation (m)	pH	Total_Cd	Total_Zn	BCR_Cd	BCR_Zn	Note
A1	457140	1841210	218		1.41	151.62	0.14	16.92	Residential area
A2	457740	1841010	225		1.86	94.49	0.39	8.63	Paddy field Behide the factory
A3	457920	1841000	225	7.05	1.89	67.74	0.00	8.69	Paddy field
A4	458170	1841000	219	6.99	1.81	82.83	0.00	9.14	Paddy field
A5	458420	1841000	236		2.43	118.16	1.43	10.15	Paddy field
A6	458630	1841000	229		1.86	75.26	2.02	11.55	Paddy field beside pond
A7	458920	1841040	233		10.02	297.25	3.02	184.61	Paddy field beside house
A8	459170	1841080	250		0.67	77.10	0.07	18.89	Paddy field beside school
A9	459420	1841000	232		1.70	110.91	0.45	29.65	Paddy field
A10	459670	1841000	240		2.20	139.98	0.77	42.07	Paddy field
A11	460000	1841000	242	6.7	1.98	138.61	0.45	32.15	Paddy field
B1	457420	1840750	222	6.8	3.98	164.27	1.48	36.53	Paddy field near road
B2	457540	1840770	225	7.03	1.39	45.15	0.15	5.36	Paddy field beside house
B3	457940	1840710	208	7.29	3.64	158.41	0.91	26.26	Paddy field
B4	458160	1840750	220		3.33	66.73	0.09	3.04	Paddy field
B5	458420	1840750	223		3.15	71.14	0.65	9.49	Paddy field
B6	458670	1840750	217	6.7	3.14	93.85	1.23	33.65	Paddy field
B8	459170	1840750	235	7.19	3.09	43.97	0.33	7.04	Paddy field
B9	459420	1840750	239	6.97	2.89	80.59	0.50	12.37	Paddy field
B10	459670	1840750	234		3.39	98.20	0.49	18.52	Paddy field
B11	460000	1840750	239	7.13	2.35	64.42	0.11	5.73	Paddy field
C1	457420	1840500	223	7.17	3.85	141.33	1.13	36.40	Paddy field
C2	457670	1840500	222	6.79	1.97	107.90	0.28	11.29	Paddy field
C3	457880	1840580	224	7.14	3.27	173.02	1.28	57.33	Paddy field

Table B-3. (Cont.) Cd and Zn concentration in soil from the study of Junpho (2006).

Sample ID	X	Y	Elevation (m)	pH	Total_Cd	Total_Zn	BCR_Cd	BCR_Zn	Note
C4	458170	1840550	223	6.92	1.65	94.37	0.38	18.51	Paddy field
C5	458420	1840550	223	6.96	6.60	290.69	4.01	102.48	Paddy field
C6	458670	1840540	227	7.01	2.08	140.24	0.97	34.13	Paddy field
C10	459670	1840500	216	7.12	4.28	233.94	1.88	47.26	Paddy field
C11	460000	1840520	233	6.96	109.65	2001.35	81.20	867.74	Paddy field
D1	457410	1840250	217	6.89	4.34	71.20	0.07	3.15	Paddy field
D2	457670	1840250	217	6.8	3.64	102.20	0.70	24.55	Paddy field
D3	457920	1840250	219	6.59	3.09	97.15	0.35	18.25	Paddy field
D5	458450	1840220	214	6.82	3.94	168.42	0.64	28.15	Paddy field
D6.1	458660	1840190	220	6.79	22.32	893.42	11.99	292.11	Paddy field beside Mae Ku creek
D6.2	458620	1840230	221	6.75	4.91	237.32	1.52	47.30	Paddy field beside Mae Ku creek
D7	458840	1840190	222	7.03	15.47	541.38	9.37	196.89	Paddy field
D8	459220	1840250	228	7.09	5.41	232.07	2.67	84.13	Paddy field
D9	459420	1840250	228	7.01	2.73	114.82	0.57	21.38	Paddy field
D10	459670	1840250	230	7.25	2.95	112.23	0.61	15.49	Paddy field
D11	460000	1840260	231	7.14	5.38	313.20	2.31	68.58	Paddy field
E1	457420	1840000	211	6.9	2.21	75.53	0.18	4.30	Paddy field
E2	457670	1840000	219	7.12	1.98	64.30	0.21	7.36	Paddy field
E3	457910	1840040	230	6.91	1.82	126.13	0.10	16.36	Paddy field
E5	458420	1840030	224	7.15	2.43	144.70	0.27	6.81	Paddy field
E6	458670	1840000	226	7.28	1.72	97.46	0.14	7.58	Paddy field
E7	458820	1840000	223	7.09	1.72	115.66	0.18	10.38	Paddy field
E8	459170	1840000	234	7.57	8.19	296.57	5.16	111.40	Paddy field
E9	459420	1840000	231	6.89	1.96	141.74	0.27	4.47	Paddy field

Table B-3. (Cont.) Cd and Zn concentration in soil from the study of Junpho (2006).

Sample ID	X	Y	Elevation (m)	pH	Total_Cd	Total_Zn	BCR_Cd	BCR_Zn	Note
E10	459670	1840000	240	6.94	1.01	108.46	0.03	2.04	Paddy field
E11	460000	1840000	236	7.08	11.89	563.66	8.69	206.29	Paddy field
F1	457400	1839750	215	6.84	2.30	303.93	0.76	25.44	Paddy field
F2	457670	1839770	211	7.04	1.60	95.94	0.14	17.37	Paddy field
F3	457920	1839750	212	7.28	10.96	510.97	6.33	197.78	Paddy field
F5	458400	1839750	230	7.03	1.39	111.66	0.19	16.40	near pond
F6	458670	1839750	237	6.95	0.46	50.50	0.08	15.26	Paddy field
F7	458920	1839750	222	7.05	1.22	67.70	0.07	12.62	Paddy field
F8	459170	1839750	240	7.35	1.27	122.70	0.17	17.55	Paddy field
F9	459420	1839750	239		1.17	82.58	0.09	15.96	Paddy field
F10	459670	1839750	238	6.78	0.79	75.63	0.24	16.33	Paddy field
F11	460000	1839750	237	7.12	3.59	228.46	1.52	59.23	Paddy field
G2	457710	1839500	220	7.32	1.58	134.36	0.16	14.60	Paddy field
G4	458180	1839420	218	6.95	0.59	95.52	0.08	32.37	Paddy field
G5	458440	1839500	219	6.92	0.73	83.52	0.08	17.85	Corn field
G6	458670	1839500	224	7.05	0.66	240.80	0.09	15.06	Paddy field
G7	458920	1839500	228	6.82	4.81	255.66	2.11	80.33	Paddy field
G8	459170	1839500	226	6.68	9.41	417.21	8.13	176.89	Paddy field
G9	459420	1839500	229	6.91	1.19	91.48	0.26	17.61	Paddy field
G10	459670	1839500	227	7.35	83.65	2093.94	74.14	703.44	Paddy field
G11	460000	1839500	234	7.12	11.49	669.63	8.73	237.26	Paddy field
H1	457420	1839250	230	6.91	3.06	189.68	0.03	52.84	Paddy field
H4	458170	1839250	238	7.1	0.80	67.12	0.05	12.01	Paddy field
H5	458450	1839250	233	6.94	1.12	133.40	0.09	8.91	Paddy field
H6	458670	1839250	224	7.2	1.28	201.75	0.11	12.53	Paddy field

Table B-3. (Cont.) Cd and Zn concentration in soil from the study of Junpho (2006).

Sample ID	X	Y	Elevation (m)	pH	Total_Cd	Total_Zn	BCR Cd	BCR_Zn	Note
H7	458920	1839250	229	7.02	0.87	99.95	0.07	13.34	Paddy field
H8	459170	1839250	233	6.97	2.09	156.56	1.26	34.08	Paddy field
H9	459420	1839250	226	7.16	13.85	849.12	12.14	353.02	Paddy field
H10	459670	1839250	231	7.09	1.36	87.94	0.07	11.77	Paddy field
H11	460000	1839250	232	6.98	1.77	194.04	0.86	37.43	Paddy field
I1	457420	1839000	216	6.84	1.39	74.92	0.03	9.95	Paddy field
I2	457690	1839000	223	7.14	1.46	78.66	0.04	16.86	Paddy field
I3	457920	1839020	222	7.15	1.16	76.03	0.03	11.80	Paddy field
I4	458180	1839070	232	6.87	0.54	55.09	0.04	22.36	Paddy field
I5	458450	1839000	224	6.67	1.81	165.14	0.52	23.42	Paddy field
I6	458760	1839000	235	7.2	1.16	115.28	0.21	19.42	Paddy field
I7	458920	1839000	226	7.11	2.41	212.94	0.84	47.92	Paddy field
I8	459170	1839000	228	6.88	1.12	129.09	0.17	25.32	Paddy field
I9	459430	1839000	236	7.03	4.51	301.82	2.08	96.37	Paddy field
I10	459670	1839000	236	6.99	1.45	148.28	0.18	13.10	Paddy field
I11	460000	1839000	230		0.88	82.61	0.06	17.48	Paddy field
J1	457420	1838750	211	7.13	1.53	92.42	0.15	4.13	Paddy field
J2				7.08	1.66	82.36	0.13	2.35	
J3				6.88	1.28	77.35	0.03	2.92	
J5	458420	1838750	218	6.99	4.23	331.71	1.09	22.26	Paddy field
J6	458670	1838750	219	7.08	1.83	206.60	0.45	10.85	Paddy field
J7	458920	1838750	218	7.02	2.49	204.81	0.47	8.21	Paddy field
J8	459170	1838750	220	7.14	1.56	116.79	0.38	11.76	Paddy field
J9	459420	1838750	230	7.18	1.30	67.86	0.13	4.04	Paddy field
J10	459670	1838750	234	7.28	1.03	64.25	0.05	2.86	Paddy field
J11	460000	1838750	238	7.14	1.25	69.97	0.04	4.16	Paddy field

Table B-4 Rainfall data measured at Tak station from Thai Meteorological Department (TMD).

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1985 Amt.	0	0	6.4	93.6	101.3	73.8	85.2	67.4	300.3	263.7	120	0	1111.7
R-day	0	0	1	4	14	21	15	18	20	15	7	0	115
Max.	0	0	6.4	43.7	33.5	20.7	30	16.7	41.3	50.3	37.3	0	50.3
1986 Amt.	0	0	T	134	246.9	142.4	34.4	160.9	229.5	114.1	20.9	11.3	1094.4
R-day	0	0	0	8	8	15	16	13	12	17	3	3	95
Max.	0	0	T	63.7	175.7	32.9	7.9	67.2	71.7	29.5	17.2	9.6	175.7
1987 Amt.	0	T	20.3	13	92.2	251.4	18	214.9	210.1	62.2	96.4	0	978.5
R-day	0	0	4	6	7	17	12	16	20	10	13	0	105
Max.	0	T	16.7	7.2	56.5	83.7	7.9	30.6	52.6	22	36	0	83.7
1988 Amt.	0	0.7	0	31.7	192.2	187.5	106.9	139.6	251.9	298.6	17.3	0	1226.4
R-day	0	2	0	10	18	19	17	20	18	19	7	0	130
Max.	0	0.5	0	16	50.9	110.8	17.7	36.5	49.6	101.8	9.9	0	110.8
1989 Amt.	T	10	1.3	0	109.5	183.2	171.2	56	82	436.9	42.3	0	1092.4
R-day	0	1	4	0	11	17	12	9	10	17	3	0	84
Max.	T	10	0.6	0	48.5	55.6	45.2	23	23.3	73.6	28.7	0	73.6
1990 Amt.	T	21.5	7.5	45.8	211.3	38.9	35.4	77.7	123	299.3	86.4	0	946.8
R-day	0	1	1	5	17	14	16	10	14	14	3	0	95
Max.	T	21.5	7.5	18.2	64.1	8.3	8	24.7	31.3	120.1	83.4	0	120.1
1991 Amt.	0	0	0	13.2	59.9	168.3	61.5	218.4	97.6	284.6	3	3.2	909.7
R-day	0	0	0	3	8	17	11	19	10	12	1	2	83
Max.	0	0	0	12.8	24.8	61.5	16.3	60.2	58.6	57.8	3	2.9	61.5
1992 Amt.	6.2	89.5	0	1.7	68.2	95.3	176.3	160.9	81.5	237.9	T	50.6	968.1
R-day	1	2	0	1	3	15	19	10	13	19	0	1	84
Max.	6.2	85	0	1.7	53.5	21.5	52	53.7	18.6	49.2	T	50.6	85.0
1993 Amt.	0	0	T	20.9	137.8	30.3	18.9	71.1	256.2	115.9	0	0	651.1
R-day	0	0	0	5	13	8	4	15	18	12	0	0	75
Max.	0	0	T	6.8	49.9	19.6	8.1	19.1	56.9	32.8	0	0	56.9

Table B-4 (cont.) Rainfall data measured at Tak station from Thai Meteorological Department (TMD).

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1994 Amt.	0	0	65	54.7	247.4	209.9	142.9	102.1	81.9	21.3	9.6	1.5	936.3
R-day	0	0	5	5	12	21	20	18	15	4	1	1	102
Max.	0	0	55	29.9	63	46.3	43.8	12.9	41	10.8	9.6	1.5	63.0
1995 Amt.	T	0	T	35.4	177.9	80.7	125.8	206.2	203.2	54	121.7	0	1004.9
R-day	0	0	0	4	14	9	14	21	12	8	8	0	90
Max.	T	0	T	30	31.3	30.5	40.3	31	33.7	14.7	81.2	0	81.2
1996 Amt.	0	10.8	0	92.8	84.9	160.4	68.9	131.6	453.3	147.7	116.9	0.3	1267.6
R-day	0	2	0	5	13	16	13	17	21	13	8	1	109
Max.	0	8.3	0	38.9	33.3	57.6	13.9	40.7	145	37.6	53.2	0.3	145.0
1997 Amt.	0	0	12	19.4	31.8	11.2	129.2	243.1	157.7	88.1	2.1	0	694.6
R-day	0	0	4	7	8	6	15	15	13	7	1	0	76
Max.	0	0	7.3	10.4	8.4	3.3	27	128	66.8	23.5	2.1	0	128.0
1998 Amt.	T	0	T	8.3	219.4	26.2	110.4	105.4	105.8	76.7	73.1	0	725.3
R-day	0	0	0	1	13	8	13	10	16	7	7	0	75
Max.	T	0	T	8.3	74.1	8.1	25.7	33.6	34.1	35.7	34.2	0	74.1
1999 Amt.	1	0.6	7.2	155.4	439.3	89.4	45.4	188.2	187.5	326	110	4.3	1554.3
R-day	2	1	2	10	16	11	12	18	16	23	14	4	129
Max.	0.7	0.6	7	46.8	163.5	40.4	12.8	60.3	88.1	48.6	32.6	2.1	163.5
2000 Amt.	T	24.2	1.8	216.3	200.6	215.3	78.9	85	315.3	199.9	1.2	0	1338.5
R-day	0	3	1	14	10	18	13	15	20	15	1	0	110
Max.	T	8.5	1.8	94.3	100.6	57.5	19.3	27.9	46.4	28.7	1.2	0	100.6
2001 Amt.	3.4	0	138.5	18.1	254.5	176.3	55.6	114.3	81.8	296.4	13.1	10.5	1162.5
R-day	1	0	11	2	23	11	16	12	11	21	4	2	114
Max.	3.4	0	57.8	16.5	53.3	70.5	12.8	36.7	29.7	108.6	6.1	8	108.6
2002 Amt.	11.3	0	0.1	108.5	188.1	10.1	33.1	114.7	471.6	125.9	102.5	15.2	1181.1
R-day	3	0	1	2	14	7	15	18	21	11	9	3	104
Max.	8	0	0.1	77.3	59.8	3.4	9.7	24.7	118.4	63.1	50.3	13.8	118.4

Table B-4 (cont.) Rainfall data measured at Tak station from Thai Meteorological Department (TMD).

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
2003 Amt.	0.7	T	43.6	28.8	74.2	192.1	157.3	111.5	222.2	29.5	T	0	859.9
R-day	1	0	6	3	8	17	18	11	15	10	0	0	89
Max.	0.7	T	24	18.4	24.8	56.5	30.1	44.1	42.9	11.9	T	0	56.5
2004 Amt.	0.8	0.5	0.5	28.2	252.5	124.8	42.4	35.5	406	2.4	3.4	0	897.0
R-day	1	3	1	3	16	22	12	12	15	1	3	0	89
Max.	0.8	0.3	0.5	20.9	67.1	22	14.2	19.5	123.4	2.4	3.2	0	123.4
2005 Amt.	0	5.8	0.2	92.8	46.3	118.3	58.4	74.4	299	128.9	57.7	0.2	882.0
R-day	0	1	1	7	7	17	14	17	21	17	9	1	112
Max.	0	5.8	0.2	48.8	14.4	40.3	13.8	18.1	56	37.7	21	0.2	56.0
2006 Amt.	0	8.5	41.1	-	-	-	-	-	-	-	-	-	-
R-day	0	1	3	-	-	-	-	-	-	-	-	-	-
Max.	0	8.5	31.8	-	-	-	-	-	-	-	-	-	-
MEAN Amt.	1.1	7.8	15.7	57.7	163.6	123.1	83.6	127.6	219.9	171.9	47.5	4.6	1024.1
MEAN R-day	0.4	0.8	2	5	12	14.6	14.1	15	15.8	13	4.9	0.9	98.5
EXT. Max.	8	85	57.8	94.3	175.7	110.8	52	128	145	120.1	83.4	50.6	175.7

Table B-5 Rainfall data measured at Mae Sot station from Thai Meteorological Department (TMD).

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1985 Amt.	0	T	0	86.5	202	385.2	171.2	374.3	187.5	138.6	55.8	0	1601.1
R-day	0	0	0	6	19	29	24	29	19	14	6	0	146
Max.	0	T	0	45.2	26.2	55	22.5	43.9	32.5	58.8	50.2	0	58.8
1986 Amt.	0	0	T	7.7	172.9	152.8	284.2	170.5	122.1	56.5	T	2.2	968.9
R-day	0	0	0	5	23	24	29	30	13	15	0	2	141
Max.	0	0	T	4.7	31.1	16.2	55.7	19	23	27.7	T	2	55.7
1987 Amt.	0	T	28.7	92.5	71.9	240.9	300.4	367.9	134.3	62.3	83.6	0	1382.5
R-day	0	0	5	9	9	30	27	22	21	14	12	0	149
Max.	0	T	22.3	58.7	21.2	34.6	42	93.7	32.6	19.1	26.4	0	93.7
1988 Amt.	0	2.4	0	73.3	166.7	308.3	175.8	174.6	76.3	132.6	28.1	0	1138.1
R-day	0	2	0	6	23	29	24	27	16	17	4	0	148
Max.	0	1.8	0	49.5	23.1	42.8	26	26.4	21.9	23.8	22	0	49.5
1989 Amt.	2	0	36.9	0	165.7	170.2	266	121.7	86.6	59	1.8	0	909.9
R-day	3	0	3	0	19	27	24	25	20	15	1	0	137
Max.	1.3	0	20.2	0	27.4	27	60.9	16.1	19.3	20.2	1.8	0	60.9
1990 Amt.	0	T	8.5	59.4	240.7	312.2	336.6	175.8	92.4	202.6	46.2	T	1474.4
R-day	0	0	2	7	20	28	31	22	22	10	8	0	150
Max.	0	T	7.7	25	50.2	57.7	39.2	31.7	17.8	61.9	31.5	T	61.9
1991 Amt.	0	0	0.2	37.1	36.5	568.3	349.2	397.3	224.3	104	0	11.1	1728.0
R-day	0	0	1	7	12	30	27	31	19	15	0	2	144
Max.	0	0	0.2	19.5	7.3	89.3	53.6	70	73.7	21.5	0	10.3	89.3
1992 Amt.	13	103.7	0	0.3	62	153.4	245	290.7	123.2	172	14.7	61.7	1239.7
R-day	1	3	0	1	10	17	24	25	25	16	2	1	125
Max.	13	73	0	0.3	29.8	43.1	32.9	30.9	14.3	57.7	13.4	61.7	73.0
1993 Amt.	0	0	23.7	45.4	265.4	101.8	192.1	331.8	216.4	68.9	0	T	1245.5
R-day	0	0	2	2	13	18	26	28	17	5	0	0	111
Max.	0	0	22.6	37.7	89.3	12.8	36.1	58.5	42.6	53.8	0	T	89.3

Table B-5 (Cont.) Rainfall data measured at Mae Sot station from Thai Meteorological Department (TMD).

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1994 Amt.	0	0	42.8	26.4	194.3	224.4	908.2	493.8	97.1	53.2	7	0.7	2047.9
R-day	0	0	6	4	17	27	30	31	21	6	1	1	144
Max.	0	0	14.3	14.2	56.2	32.6	207.4	77.4	16.8	22.4	7	0.7	207.4
1995 Amt.	0	0	2.6	2	251.1	151.3	302.8	358.4	319.2	96.3	48.6	T	1532.3
R-day	0	0	2	1	19	22	24	27	22	9	7	0	133
Max.	0	0	1.7	2	58.3	42.2	84	87.5	79	29.5	31	T	87.5
1996 Amt.	0	36.2	T	40.6	133.7	124.5	399.5	272.3	270.7	60.4	64.8	0	1402.7
R-day	0	3	0	7	20	24	22	25	22	9	8	0	140
Max.	0	18	T	18.9	20.2	16.2	108.2	32.2	50.3	16.5	25.3	0	108.2
1997 Amt.	0	0	0.8	21.8	70.8	178.6	588.1	546.7	143.5	101.7	23.2	0	1675.2
R-day	0	0	1	6	9	21	31	30	20	8	2	0	128
Max.	0	0	0.8	6.3	20.4	38.7	80.5	118.8	32	65	13.3	0	118.8
1998 Amt.	0	0	0.5	T	108.1	106.4	151.3	212.4	120.9	15.8	16.2	0.6	732.2
R-day	0	0	1	0	10	19	22	24	17	6	2	1	102
Max.	0	0	0.5	T	60	23.9	40.2	43.2	22.8	7.2	9.8	0.6	60.0
1999 Amt.	0.9	5.5	21.4	64.6	199.7	147.7	256.9	484.3	114.4	72.4	19.7	0.5	1388.0
R-day	1	1	3	11	23	21	27	21	20	15	4	2	149
Max.	0.9	5.5	12	17	48.7	21.3	44.4	85.5	61.7	17.2	8.6	0.4	85.5
2000 Amt.	0.4	10.5	21.6	114.2	175.1	200.8	312.2	256.3	202.8	141.5	0	0.1	1435.5
R-day	1	3	3	11	17	23	25	25	17	14	0	1	140
Max.	0.4	7.4	20.8	21.1	39	29.6	46.3	33.2	38.1	27.8	0	0.1	46.3
2001 Amt.	1	0	68.2	9	186	228.4	367.4	303.2	126.7	56.9	0	0	1346.8
R-day	1	0	8	1	25	25	29	27	19	13	0	0	148
Max.	1	0	25	9	46.5	32.8	49.5	76.4	35.1	15.5	0	0	76.4
2002 Amt.	0	15	5.6	68	290	204	363.7	339	426.6	44.4	116	35.7	1908.0
R-day	0	1	2	5	15	28	31	28	24	8	10	3	155
Max.	0	15	4.6	51.9	121.9	51.6	38	68.9	66.4	20.3	40.7	27.8	121.9

Table B-5 (Cont.) Rainfall data measured at Mae Sot station from Thai Meteorological Department (TMD).

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
2003 Amt.	0.5	0	66.3	39	115.7	368.8	231.4	207.3	164.8	18.7	0	0	1212.5
R-day	2	0	6	3	17	28	25	24	23	7	0	0	135
Max.	0.3	0	24.6	32.6	18.3	73.9	54.3	25.3	20.1	7.3	0	0	73.9
2004 Amt.	10.6	4.5	0	39.6	319.7	631.7	187	364.4	189.9	6.2	0	0	1753.6
R-day	1	1	0	4	21	24	26	29	19	1	0	0	126
Max.	10.6	4.5	0	37.2	121	98.5	27.1	64.1	29.8	6.2	0	0	121.0
2005 Amt.	0	0	48	29.3	85.5	250.9	498.3	460.2	186.1	83.7	7.9	4.5	1654.4
R-day	0	0	1	4	15	29	27	26	22	10	6	1	141
Max.	0	0	48	19.7	21.3	27.2	69.6	60.2	43	44.2	3.7	4.5	69.6
2006 Amt.	0	0.1	30.3	-	-	-	-	-	-	-	-	-	-
R-day	0	1	3	-	-	-	-	-	-	-	-	-	-
Max.	0	0.1	18.9	-	-	-	-	-	-	-	-	-	-
MEAN Amt.	1.3	8.1	18.5	40.8	167.3	248.1	328	319.2	172.7	83.2	25.4	5.6	1418.2
MEAN R-day	0.5	0.7	2.2	4.8	17	24.9	26.4	26.5	19.9	10.8	3.5	0.7	137.9
EXT. Max.	13	73	48	58.7	121.9	98.5	207.4	118.8	79	65	50.2	61.7	207.4

Table B-6 Rainfall data measured at Bhumibol Dam station from Thai Meteorological Department (TMD).

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1985 Amt.	0	0	0.8	40.4	148.4	59.9	61.5	37.7	307.3	194.2	118.2	0	968.4
R-day	0	0	1	5	21	21	13	17	19	15	8	0	120
Max.	0	0	0.8	15.5	27.6	10.3	44.7	10.9	100.7	50.3	48.8	0	100.7
1986 Amt.	0	0	T	35	196.3	57.7	21.8	120.3	228.6	128.8	0.2	6.1	794.8
R-day	0	0	0	9	12	17	14	15	13	13	1	3	97
Max.	0	0	T	12.2	110.9	14.8	4.4	58.2	68.2	40.7	0.2	4.3	110.9
1987 Amt.	0	0	26.4	72.6	73.3	169.6	15.6	256.5	229.4	139.5	89.5	0	1072.4
R-day	0	0	5	7	9	20	12	16	18	12	13	0	112
Max.	0	0	19	53.6	31.9	31.2	7.7	51.8	40.9	55	35.9	0	55.0
1988 Amt.	0	0.1	0	69.8	168.5	244.3	180.3	68.4	183.2	414.1	46.4	0	1375.1
R-day	0	1	0	7	16	12	13	17	18	16	6	0	106
Max.	0	0.1	0	35.5	40.3	85.7	39.2	15.4	29.7	155.3	24.7	0	155.3
1989 Amt.	0.7	10.4	36.7	T	133	80.7	59.4	29.6	76.4	360.9	5.7	0	793.5
R-day	2	1	5	0	15	16	14	14	13	18	2	0	100
Max.	0.5	10.4	15.9	T	24.7	25	10	10.7	22.4	50	3.1	0	50.0
1990 Amt.	T	0	2	89.8	221.8	28.5	19	74	175.8	297.5	19.8	0	928.2
R-day	0	0	1	5	19	11	12	11	15	11	3	0	88
Max.	T	0	2	50	58.2	6.6	4.5	32	56.4	86.6	17.8	0	86.6
1991 Amt.	0.5	0	2.4	54.3	40.7	149.9	57.6	160.3	94.6	316.4	15.8	5.7	898.2
R-day	1	0	2	4	10	22	14	21	13	15	1	3	106
Max.	0.5	0	1.9	42	13.6	30.6	13.5	64.5	57.1	96.1	15.8	3.7	96.1
1992 Amt.	7.5	90.9	0	22.7	6.6	75.7	202.1	111.1	234.4	230.8	1.4	63.7	1046.9
R-day	2	3	0	1	4	13	22	11	19	19	1	2	97
Max.	7.4	67.6	0	22.7	3.6	13.9	32.8	38.5	64.2	56.7	1.4	50	67.6
1993 Amt.	0	0	22.9	119.4	133.5	5.7	49.6	71.1	213.3	152.5	0	0	768.0
R-day	0	0	3	4	12	7	9	16	15	15	0	0	81
Max.	0	0	9.7	84.7	36.5	1.9	18.7	51.7	36.8	50.1	0	0	84.7

Table B-6 (cont.) Rainfall data measured at Bhumibol Dam station from Thai Meteorological Department (TMD).

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1994 Amt.	0	0	36.8	74.2	363.1	105.2	71.1	134.1	34.6	118.8	6.4	0	944.3
R-day	0	0	6	4	15	22	18	22	13	12	3	0	115
Max.	0	0	25.5	69.6	65.8	44.5	19.5	56.9	12.4	46.1	4.6	0	69.6
1995 Amt.	T	0	15.8	61.3	177.2	55.5	76.1	117.2	234.5	105.3	28.2	0	871.1
R-day	0	0	1	3	16	6	15	23	18	11	10	0	103
Max.	T	0	15.8	45.7	42.2	19.3	14.4	31.8	63.5	25.2	9.8	0	63.5
1996 Amt.	0	30.6	44	155.6	228.5	250.2	138.6	167.1	375.9	81.2	77.2	T	1548.9
R-day	0	6	2	8	17	17	15	21	22	14	8	0	130
Max.	0	9.9	43.9	77.8	65.9	43.8	27.4	33.2	79.9	21.2	42.2	T	79.9
1997 Amt.	0	0	44.3	74.9	65.4	17.5	90.9	221.5	204.2	63.6	17.3	0	799.6
R-day	0	0	3	7	9	15	19	19	14	9	2	0	97
Max.	0	0	32.4	28.7	48.1	4	28.9	73.6	64	18.8	10.2	0	73.6
1998 Amt.	0	0	0	T	90.1	56.1	84.1	110.8	225.2	153.2	42.1	1.9	763.5
R-day	0	0	0	0	16	9	13	12	12	9	8	1	80
Max.	0	0	0	T	24	29.7	40.2	36.7	73.4	65.9	23.9	1.9	73.4
1999 Amt.	0.9	9.1	2.8	179.1	315.2	60.6	36.1	104.8	178.6	264.4	42.7	6.4	1200.7
R-day	1	2	2	13	22	14	12	17	14	21	9	3	130
Max.	0.9	5.3	2.5	64.8	79	19.2	7.2	45.2	45.3	50.1	14.1	3.5	79.0
2000 Amt.	0	30.8	7.3	178.7	286.4	101.2	19.4	150.2	247.6	324.8	7.4	0	1353.8
R-day	0	2	3	11	14	17	9	12	23	18	2	0	111
Max.	0	19.8	5.4	68.9	105.3	20.3	5	52.9	79.6	91.8	6.2	0	105.3
2001 Amt.	0	0	193.8	0	398.7	30.2	48.8	53.8	150.1	290.3	22.9	12.3	1200.9
R-day	0	0	10	0	21	9	12	14	13	21	1	2	103
Max.	0	0	68.5	0	247.1	11.9	28.5	14.6	27.2	46.1	22.9	7	247.1
2002 Amt.	10.9	1	73.4	81.6	302.5	11.7	27.7	181.2	272.3	126.1	191.4	1.5	1281.3
R-day	2	1	2	5	15	6	16	13	20	9	11	2	102
Max.	6.1	1	72	49.3	101.1	7.5	10.8	70.4	41.5	46.8	57.2	1.2	101.1

Table B-6 (cont.) Rainfall data measured at Bhumibol Dam station from Thai Meteorological Department (TMD).

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
2003 Amt.	0	0.9	73	30	80.3	80.1	93.5	37.9	345.3	41	0	0	782.0
R-day	0	1	9	2	10	17	11	10	19	5	0	0	84
Max.	0	0.9	39.9	25.5	42.3	18.5	20.6	16.9	48.2	24.2	0	0	48.2
2004 Amt.	0	T	0	8.5	286.7	181.7	52.4	34.2	107.6	40.6	7.5	0	719.2
R-day	0	0	0	3	19	20	17	11	15	6	2	0	93
Max.	0	T	0	7.9	90	35.9	9.9	12.8	45.2	39.3	6.1	0	90.0
2005 Amt.	0	0	4.1	103.7	44.4	110.8	40.4	60.2	292.5	134.3	48.7	6.9	846.0
R-day	0	0	2	7	8	18	13	16	20	15	7	4	110
Max.	0	0	3.2	38.6	32.7	29.2	16.5	14.2	65.8	47.6	19.8	5.4	65.8
2006 Amt.	0	2.4	1.4	-	-	-	-	-	-	-	-	-	-
R-day	0	2	1	-	-	-	-	-	-	-	-	-	-
Max.	0	2.2	1.4	-	-	-	-	-	-	-	-	-	-
MEAN Amt.	0.9	8	26.7	69.1	179.1	92	68.9	109.6	210.1	189.4	37.6	5	996.4
MEAN R-day	0.4	0.9	2.6	5	14.3	14.7	14	15.6	16.5	13.5	4.7	1	103.2
EXT. Max.	7.4	67.6	72	84.7	247.1	85.7	44.7	73.6	100.7	155.3	57.2	50	247.1

Table B-7 Rainfall data measured at Umphang station from Thai Meteorological Department (TMD).

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1985 Amt.	34.4	0	105.7	104.5	111.3	215.5	204.6	181.8	293.1	194.1	27	3.3	1475.3
R-day	2	0	4	10	19	29	30	29	25	19	7	1	175
Max.	33.2	0	78.2	30.2	44.3	33.5	21.7	17.1	55.1	65.1	11.5	3.3	78.2
1986 Amt.	0	33.8	0.9	157.3	306.8	194.3	158.6	226.6	249.4	118.8	7.3	1.2	1455.0
R-day	0	2	2	11	21	27	28	30	17	15	3	3	159
Max.	0	21.1	0.6	69	104.6	20	20.4	33.3	61.7	32.4	6	0.7	104.6
1987 Amt.	0	1.6	88.2	169.5	94.4	178.7	112.8	287.7	396.2	85.1	54.7	0	1468.9
R-day	0	1	5	14	13	24	22	27	28	15	13	0	162
Max.	0	1.6	28.3	35.8	37.4	25.5	21.9	44.6	74	37.2	15.6	0	74.0
1988 Amt.	2.2	13.8	32.1	201	394.8	229.7	230.6	212.5	311	308.8	5.1	0	1941.6
R-day	1	3	2	17	25	29	29	29	20	16	3	0	174
Max.	2.2	8.8	31.7	50.1	55.4	28.6	28	24	59.1	75.3	4	0	75.3
1989 Amt.	0.7	12.7	38	23.1	150	184.4	213.4	228	200.6	109.2	5.7	0	1165.8
R-day	2	2	5	2	18	27	23	29	24	15	1	0	148
Max.	0.5	12.2	29.2	20.9	24.6	30.1	51.5	22.3	54.7	47.1	5.7	0	54.7
1990 Amt.	10.2	0	11.1	72.9	268.8	137.3	168.3	154.2	233.6	195.7	37.1	0	1289.2
R-day	2	0	4	10	21	28	28	29	28	18	7	0	175
Max.	7.2	0	6	16.7	69.7	13.8	23.9	17.5	32.2	51.8	17.2	0	69.7
1991 Amt.	2.4	0.3	12.3	44.3	177.8	271.7	205.6	415.9	272.5	148.9	T	6.7	1558.4
R-day	3	1	3	6	11	29	30	30	24	19	0	1	157
Max.	1.6	0.3	11.1	23.1	41.4	23	35.2	67.9	64.7	56	T	6.7	67.9
1992 Amt.	21.6	8.3	0	95.6	96.6	145.3	299.2	277.7	180	159	2.6	47.3	1333.2
R-day	2	2	0	4	15	24	29	29	27	21	1	3	157
Max.	20.5	6.7	0	72	32.1	22.2	46.5	41.1	35.2	36.9	2.6	46	72.0
1993 Amt.	0	0	12.7	62.6	143.9	144.6	157.8	215.7	368.8	47.6	1	0	1154.7
R-day	0	0	4	10	19	25	27	29	25	10	1	0	150
Max.	0	0	11.9	16.5	33.5	37.2	20	23.1	57.3	24	1	0	57.3

Table B-7 (cont.) Rainfall data measured at Umphang station from Thai Meteorological Department (TMD).

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1994 Amt.	0	0	148.9	61.1	271.5	257.3	527.9	256.8	288.7	126.2	36.7	1.5	1976.6
R-day	0	0	11	6	23	29	30	31	27	13	5	1	176
Max.	0	0	51.2	21.8	75.5	47.6	103.9	37.7	74.5	43.1	29.6	1.5	103.9
1995 Amt.	0.1	0	64.3	37.7	89.3	272.2	243.7	363.2	351.1	176.6	3.7	0	1601.9
R-day	1	0	8	6	17	25	30	28	28	17	5	0	165
Max.	0.1	0	27.6	25.8	27.4	47.1	27.5	59.4	88.9	46.4	2	0	88.9
1996 Amt.	0	72.2	0	112.2	208.9	226.6	328.9	209.7	330.5	148.8	38.2	0	1676.0
R-day	0	3	0	13	25	26	24	24	28	17	6	0	166
Max.	0	40.1	0	25.5	50.7	44.8	55.1	43	35.9	25.3	21.4	0	55.1
1997 Amt.	0	0.4	32.8	68.2	135.9	142.4	279.2	328.5	159.5	83	33.3	0	1263.2
R-day	0	1	6	8	14	22	31	30	27	15	6	0	160
Max.	0	0.4	12	55.5	46.2	29	40.4	44.8	17.8	24.7	13.5	0	55.5
1998 Amt.	0	0	0	7.6	141.3	136.4	189.1	222.1	162.5	82.7	37.7	0.5	979.9
R-day	0	0	0	1	18	17	23	28	21	14	7	1	130
Max.	0	0	0	7.6	36.2	62.1	30.5	44.9	34.7	20.7	21.3	0.5	62.1
1999 Amt.	30.4	16.4	29.7	147.9	130.5	180.8	158	268.3	83.9	232.2	43.6	1.4	1323.1
R-day	4	3	4	19	25	25	26	25	21	19	8	2	181
Max.	18.2	14.5	12.8	47	15.7	28.5	22.4	27.1	18.9	74.6	26.7	1	74.6
2000 Amt.	0	31.6	24.4	239.1	311.5	229.1	196.2	245	248.1	368.5	0	2	1895.5
R-day	0	8	5	17	22	28	27	25	25	24	0	1	182
Max.	0	13.5	15.3	46.7	57.8	55.1	48	49.1	30.2	69.5	0	2	69.5
2001 Amt.	29.1	0.8	141.7	43.6	223.2	228.2	189.6	212.6	233.3	145.5	31.8	36.8	1516.2
R-day	3	1	12	5	25	29	26	28	22	19	2	2	174
Max.	24.5	0.8	46.5	18.8	58.3	41	34.7	33.5	69.6	42.3	26.4	36.3	69.6
2002 Amt.	0	8.7	39.4	157.5	270.2	125	177.4	359.2	427.4	104.8	57.2	4.5	1731.3
R-day	0	2	5	11	22	28	28	31	27	12	10	5	181
Max.	0	4.7	26.1	55.4	47.6	21.6	19.6	73.1	51.4	42.1	20.5	2.5	73.1

Table B-7 (cont.) Rainfall data measured at Umphang station from Thai Meteorological Department (TMD).

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
2003 Amt.	11.5	1.5	149.3	62.1	134.6	218	335.6	201.5	288.5	93.6	4.4	0	1500.6
R-day	3	1	13	7	12	27	28	27	27	14	2	0	161
Max.	10	1.5	50.4	26.6	75.9	55.5	48.7	26.4	48	34	3.8	0	75.9
2004 Amt.	3.1	2.1	12.2	80.9	398.4	283.4	137.7	212.4	113.7	9.7	1.3	0	1254.9
R-day	1	2	3	6	25	25	25	28	21	2	1	0	139
Max.	3.1	1.9	12	40.8	124.7	28.9	27.8	33.5	37.2	6.5	1.3	0	124.7
2005 Amt.	0.1	3.3	46.8	94.6	117.2	169.1	275.4	161.9	290.6	41.2	12	20.4	1232.6
R-day	1	2	7	9	16	28	24	27	29	12	6	2	163
Max.	0.1	3.2	31.5	48.5	26	24.1	54.8	23.6	58	11.5	6.9	13.1	58.0
2006 Amt.	0	7.6	136.9	-	-	-	-	-	-	-	-	-	-
R-day	0	2	7	-	-	-	-	-	-	-	-	-	-
Max.	0	7	51	-	-	-	-	-	-	-	-	-	-
MEAN Amt.	6.6	9.8	51.2	97.3	198.9	198.6	228.1	249.6	261.1	141.9	21	6	1470.1
MEAN R-day	1.1	1.6	5	9.1	19.3	26.2	27	28.2	24.8	15.5	4.5	1	163.3
EXT. Max.	33.2	40.1	78.2	72	124.7	62.1	103.9	73.1	88.9	75.3	29.6	46	124.7

TableB-8. Levels of Cd contain in population of Mae Sot District, Tak Province; classified by village (Tak Hospital, 2004).

Village	No. of People	Levels of Cd					
		Normal		Moderate High		High	
		No.	%	No.	%	No.	%
Tambon Phra That Pha Daeng							
Ban Kang Pi Ban	869	820	94.4	42	4.8	7	0.8
Ban Mae Tao Mai	329	249	75.7	51	15.5	29	8.8
Ban Pa Dae	327	272	83.2	38	11.6	17	5.2
Ban Tam Suea	135	132	97.8	3	2.2	0	0.0
Tambon Mae Tao							
Ban Mae Tao Tai	463	411	88.8	43	9.3	9	1.9
Ban Mae Tao Klang	785	727	92.6	45	5.7	13	1.7
Ban Mae Tao Pae	719	564	78.4	10	15.3	45	6.3
Ban Mae Tao Sun Pae	514	454	88.3	45	8.8	15	2.9
Ban Mae Tao Sun Rong Reaun	343	284	82.8	46	13.4	13	3.8
Ban Mae Tao Don Chai	226	191	84.5	31	13.7	4	1.8
Tambon Mae Ku							
Ban Me Ku Noi	1029	982	95.4	44	4.3	3	0.3
Ban Mae Ku Nuea	734	613	83.5	106	14.4	15	2.0
Others*	319	299	93.7	18	5.6	2	0.6
Total	**6802**	**6007**	**88.3**	**623**	**9.2**	**172**	**2.5**

BIOGRAPHY

Miss Piyarat Kaowichakorn was born on February 14, 1982 in Bangkok, Thailand. She graduated from Ammartpanitnukul School in 1999. After that, she entered the Faculty of Science, Kasetsart University. She received a Bachelor's degree in General Science in 2003. Then, she decided to enroll the Master's degree of international program in environmental management, Chulalongkorn University.