

Tables

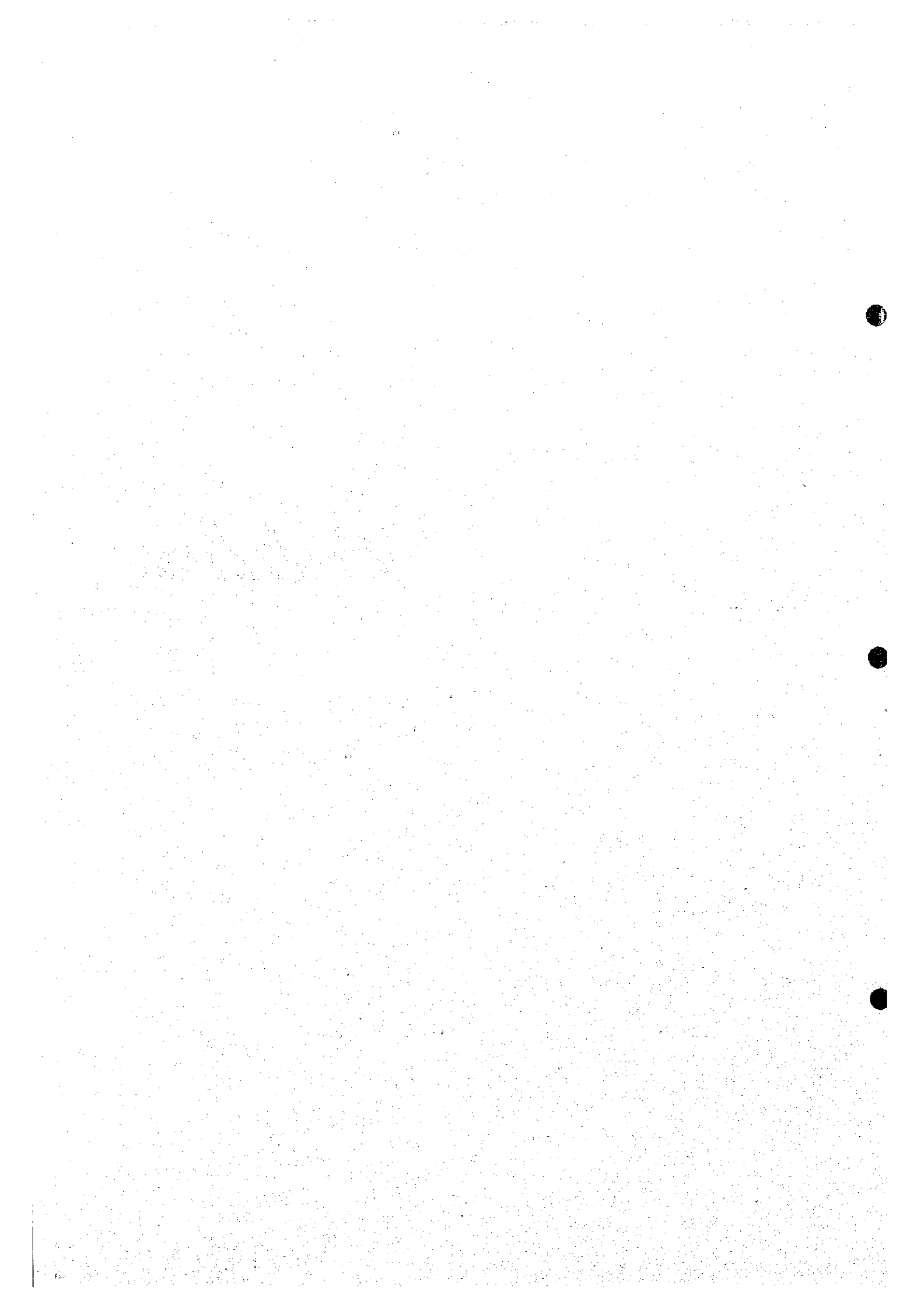


Table 3.1.1 AGRICULTURAL MAIN PRODUCTS IN CHAO PHRAYA RIVER BASIN

(Unit : ha)

Province	Farm Land	Rainy Season Crops (1994/95) June - December										Dry Season Crops (1992) January - May							
		Major Rice				Maize		Soybean		Mungbean		Sorghum		Season Rice			Cassava		
		Harvested Area (ha)	(%)	Production (tons)	Yield (ton/ha)	Harvested Area (ha)	(%)	Harvested Area (ha)	(%)	Harvested Area (ha)	(%)	Harvested Area (ha)	(%)	Harvested Area (ha)	(%)	Production (tons)	Yield (ton/ha)	Harvested Area (ha)	(%)
	21,428,103	8,295,107	39%	18,160,715	2.2	1,351,349	6%	922,705	4%	334,996	2%	167,238	1%	700,671	3%	2,481,528	4.1	1,450,699	7%
Northern (Mountain area)																			
1 Chiang Mai	210,051	83,068	40%	276,762	3.3	4,658	2%	522	0%	368	0%	0	0%	4,253	2%	15,501	3.6	59	0%
2 Lamphun	86,942	23,611	27%	75,976	3.4	1,416	2%	0	0%	137	0%	0	0%	1,550	2%	6,852	4.4	0	0%
3 Lampang	178,638	68,490	38%	208,303	3.0	5,539	2%	6,764	4%	435	0%	0	0%	801	0%	2,229	2.8	553	1%
4 Phayao	133,624	72,727	54%	208,991	2.9	28,462	19%	0	0%	1,410	1%	0	0%	116	0%	439	3.0	565	0%
5 Phrae	101,485	34,929	34%	104,256	3.0	11,783	14%	4,025	4%	1,277	1%	0	0%	112	0%	268	0	0	0%
6 Nan	140,129	26,970	19%	79,242	2.9	39,535	28%	0	0%	15,042	11%	0	0%	629	0%	1,813	2.8	457	0%
7 Tak	151,725	34,993	23%	90,958	2.6	54,107	36%	1,111	1%	6,691	4%	39	0%	1,113	1%	4,377	3.9	336	6%
Sub total	1,022,594	344,790	34%	1,042,488	3.0	145,500	14%	12,425	1%	25,360	2%	39	0%	8,604	1%	31,479	3.7	2,420	0%
Northern (Hilly Area)																			
8 Sukhothai	299,360	116,111	39%	268,213	2.3	12,327	4%	24,958	1%	42,158	14%	18	0%	6,491	2%	27,021	4.2	0	0%
9 Uthairat	195,074	70,800	36%	213,659	3.0	16,093	1%	14,402	7%	5,512	3%	277	0%	10,693	5%	46,915	4.4	222	0%
10 Hissarakul	418,064	177,956	42%	486,279	2.7	35,507	1%	8,114	2%	16,348	4%	0	0%	37,040	9%	172,495	4.4	41,941	10%
11 Kamphaeng Phet	454,437	185,445	41%	563,395	3.0	47,589	10%	68,969	15%	28,769	6%	1,125	0%	29,252	6%	127,279	4.4	56,617	12%
12 Phichit	314,256	196,681	63%	483,205	2.5	14,236	4%	3,691	1%	11,646	3%	250	0%	41,601	12%	194,279	4.7	1,923	1%
13 Phetchaburi	109,919	49,932	45%	133,404	2.7	5,553	3%	6,769	6%	269	0%	0	0%	12,968	12%	52,626	4.1	2,459	2%
14 Nakhon Sawan	651,437	281,510	43%	740,251	2.6	91,242	14%	52,989	8%	27,687	4%	56,024	5%	26,341	4%	122,416	4.6	17,172	3%
15 Phai Phai	214,576	73,279	34%	152,683	2.2	40,968	19%	17,628	8%	13,006	6%	2,569	1%	2,157	1%	10,525	4.9	21,606	11%
Sub total	2,691,011	1,160,759	43%	3,051,496	2.6	263,565	10%	197,463	7%	145,335	5%	60,263	2%	156,546	6%	758,556	4.6	111,950	5%
Central Plains																			
16 Chai Nat	180,325	130,201	72%	423,762	3.6	3,132	2%	5,859	3%	5,111	3%	285	0%	26,146	14%	114,927	4.4	9,973	6%
17 Sing Buri	73,822	51,749	70%	182,595.0	3.5	0	0%	5,597	8%	2,408	3%	0	0%	6,287	9%	28,649	4.6	0	0%
18 Lop Buri	401,684	143,606	36%	309,034.0	2.2	128,004	32%	39,168	10%	17,704	4%	65,151	16%	1,633	0%	6,147	3.8	14,121	4%
19 Suphan Buri	371,497	142,392	38%	529,579.0	3.7	14,137	4%	92,567	25%	601	0%	1,217	0%	75,091	20%	332,674	4.8	6,185	2%
20 Ang Thong	79,418	53,121	67%	153,433.0	2.1	0	0%	3,231	4%	3,511	4%	0	0%	5,264	7%	29,261	4.4	0	0%
21 Aurachaya	118,377	140,153	74%	352,019.0	2.5	0	0%	0	0%	2,035	1%	0	0%	34,250	11%	138,142	4.0	0	0%
22 Saraburi	149,658	62,610	42%	164,285.0	2.6	47,453	25%	6,252	3%	5,367	3%	4,901	3%	4,228	2%	15,487	3.7	2,988	2%
23 Nakhon Pathom	139,425	51,872	37%	231,354.0	4.5	0	0%	17,777	13%	0	0%	0	0%	50,840	36%	224,645	4.4	0	0%
24 Nonthaburi	27,542	11,045	40%	88,647.0	4.9	0	0%	0	0%	0	0%	0	0%	25,766	94%	110,723	4.3	0	0%
25 Pathum Thani	110,374	47,319	43%	200,363.0	4.2	0	0%	0	0%	0	0%	0	0%	37,061	34%	176,270	4.8	0	0%
26 Samut Sakon	37,372	5,874	16%	20,150.0	3.4	0	0%	0	0%	0	0%	0	0%	5,293	14%	21,591	4.1	0	0%
27 Bangkok	41,493	22,126	53%	41,858.0	3.6	0	0%	0	0%	0	0%	0	0%	7,514	18%	24,552	3.3	0	0%
28 Samut Prakan	33,368	9,465	28%	35,267.0	3.7	0	0%	0	0%	0	0%	0	0%	6,543	20%	27,479	4.2	0	0%
Sub total	1,174,265	611,419	52%	2,822,356	3.2	192,726	10%	170,454	9%	36,767	2%	71,567	4%	285,916	15%	1,244,450	4.4	33,967	2%
Total in the Study Area	5,587,871	2,386,980	43%	6,916,340	2.9	601,792	11%	380,342	7%	207,461	4%	131,870	2%	461,065	8%	2,034,485	4.4	181,376	3%

(Source : Crop Year 1994/95)

Table 3.1.2 AGRICULTURAL LAND USE IN CHAO PHRAYA RIVER BASIN (1992 YEAR)

(Unit : ha)

Province	Area	Forest Area	Farm holding land										Total	Other		
			Paddy Land		Under Field (crops)		Under fruit tree and tree crops		Under vegetable and flowers		Grass Land	Housing Area			Idle land	Other
Total	51,311,502	13,495,067	26%	11,013,699	32%	5,247,202	25%	3,335,915	1,410,276	119,954	533,843	531,151	185,319	21,128,193	41%	16,688,242
Northern (Mountain area)																
1 Chiang Mai	2,010,706	1,456,445	72%	198,332	32%	35,223	17%	90,664	12,983	228	10,374	1,212	1,034	210,051	10%	344,210
2 Lamphun	450,588	225,962	50%	44,793	32%	5,768	7%	23,137	4,371	0	5,152	1,720	2	86,942	19%	137,684
3 Lamphang	1,253,395	820,621	65%	90,841	31%	53,074	30%	11,585	2,077	0	8,824	11,051	386	178,638	14%	254,137
4 Phayao	633,506	253,086	40%	91,757	60%	39,964	26%	11,234	3,296	92	5,428	1,755	99	153,624	24%	226,795
5 Huay	653,860	245,883	38%	44,419	44%	40,823	49%	9,115	202	0	5,068	1,917	0	101,485	16%	306,400
6 Nan	1,147,207	458,432	43%	37,830	27%	78,022	56%	13,668	1,015	0	6,234	2,468	892	140,129	12%	518,646
7 Tak	1,639,601	1,213,350	74%	42,610	26%	85,610	57%	0	13,333	1,204	0	6,207	1,697	150,662	9%	275,590
Sub total	7,788,864	4,703,729	60%	450,582	45%	339,284	33%	111,403	37,277	1,524	41,020	26,330	4,110	1,021,531	13%	2,063,554
Northern (Hilly Area)																
8 Sukhothai	659,609	227,548	34%	160,496	54%	107,887	36%	13,828	1,405	0	10,579	2,490	2,604	299,360	45%	132,702
9 Utharadit	783,859	304,943	39%	84,310	43%	73,866	38%	25,132	1,832	0	6,327	3,027	581	195,074	25%	283,841
10 Phitsanulok	1,081,585	246,152	23%	254,472	61%	127,072	30%	15,478	1,575	1,090	12,991	4,901	486	418,064	39%	417,369
11 Kamphaeng Phet	860,741	211,994	25%	215,159	47%	206,802	45%	15,940	1,172	1,558	13,195	1,678	2,932	458,437	53%	190,310
12 Phichit	453,101	0	0%	280,843	82%	43,015	12%	9,869	389	236	8,963	789	147	344,256	26%	108,845
13 Phetchaburi	612,514	220,237	36%	54,383	50%	31,927	29%	15,450	737	975	5,145	887	310	109,814	18%	292,462
14 Nakhon Sawan	959,763	70,103	7%	383,350	59%	223,700	34%	19,291	5,929	3,403	12,898	1,458	1,198	651,437	68%	238,278
15 Ithai Thani	633,825	265,143	39%	100,683	47%	87,881	41%	11,263	1,936	2,478	6,440	2,849	1,047	214,576	32%	193,305
Sub total	6,094,202	1,546,120	25%	1,533,903	57%	902,150	34%	126,321	14,975	9,740	76,338	18,089	9,305	2,691,018	44%	1,857,062
Central Zone																
16 Chai Nat	246,975	698	0%	151,319	84%	16,944	9%	3,120	197	229	4,247	2,026	242	180,325	73%	65,952
17 Sing Buri	82,248	0	0%	61,681	84%	5,833	8%	3,649	164	62	1,962	279	152	73,822	90%	8,426
18 Lop Buri	619,975	20,521	3%	155,604	39%	220,680	55%	8,401	1,158	3,200	6,493	1,576	4,572	401,684	65%	197,770
19 Suphan Buri	535,801	52,815	11%	219,357	59%	118,754	32%	11,661	2,458	3,018	11,762	2,619	1,779	371,407	69%	104,577
20 Ang Thong	96,837	0	0%	64,274	81%	1,351	2%	6,758	1,562	0	3,576	0	1,498	79,418	82%	17,419
21 Aurthaya	255,664	0	0%	174,041	92%	0	0%	5,547	172	81	6,232	1,020	1,281	188,377	74%	67,287
22 Saraburi	337,649	6,672	2%	87,111	46%	69,957	37%	12,580	284	11,995	6,019	651	1,062	189,658	53%	161,318
23 Nakhon Pathom	216,833	0	0%	78,607	56%	26,815	19%	13,895	6,142	0	6,998	2,405	4,564	139,423	64%	77,407
24 Nonhabori	62,230	0	0%	20,065	33%	0	0%	4,939	1,016	0	971	228	323	27,541	44%	34,688
25 Pathum Thani	152,586	0	0%	73,350	66%	0	0%	28,678	939	923	3,078	717	2,689	110,374	72%	42,212
26 Samut Sakhon	87,235	0	0%	18,121	48%	0	0%	14,314	1,660	0	1,287	121	1,869	37,372	43%	49,863
27 Bangkok																
Metropolitan	156,522	0	0%	27,903	67%	330	1%	7,948	3,334	0	873	358	746	41,493	27%	115,029
28 Samut Prakan	100,409	0	0%	15,920	49%	0	0%	8,755	0	0	1,635	0	7,058	33,368	33%	67,041
Sub total	2,970,964	87,706	3%	1,147,353	61%	451,104	25%	132,245	19,086	19,508	55,133	17,000	27,838	1,874,265	63%	1,008,991
Total in the Study Area	16,854,029	6,337,607	38%	3,141,837	56%	1,702,537	30%	369,969	71,339	30,770	172,691	56,442	41,240	5,586,814	33%	4,929,608

(Source : Crop Year 1994/95)

Table 3.1.3 RICE CULTIVATION IN CHAO PHRAYA RIVER BASIN

(Unit : ha)

Province	Farm Land (1992)	Paddy Field (1992)	Major Rice (1992)		Second Rice (1992)		Irrigated Paddy Field		Farm holding	
			Harvested Area	(%)	Harvested Area	(%)		(%)	No. of Farm	Farm Size
Total	21,128,193	11,013,699	8,295,107	75%	700,671	6%	4,589,677	42%	5,143,815	4.1
Northern (Mountain area)										
1 Chiang Mai	210,051	108,332	83,068	77%	4,253	4%	202,464	187%	141,015	1.5
2 Lamphun	86,942	44,793	23,611	53%	1,550	3%	60,429	135%	54,912	1.6
3 Lampang	178,638	90,841	68,490	75%	801	1%	61,746	68%	99,365	1.8
4 Phayao	153,624	91,757	72,727	79%	146	0%	37,354	41%	63,294	2.4
5 Huay	101,485	44,419	34,929	79%	112	0%	66,192	149%	57,634	1.8
6 Nan	140,129	37,830	26,970	71%	629	2%	38,407	102%	63,015	2.2
7 Tak	151,725	42,610	34,995	82%	1,113	3%	25,256	59%	43,521	3.5
Sub-total	1,022,594	460,582	344,790	75%	8,601	2%	491,848	107%	523,256	2.0
Northern (Hilly Area)										
8 Sukhothai	299,360	160,496	116,111	72%	6,491	4%	41,483	28%	70,403	4.3
9 Utharadit	195,074	84,310	70,800	84%	19,693	13%	16,654	20%	52,779	3.7
10 Phitsanulok	418,064	254,472	177,986	70%	37,040	15%	77,588	28%	83,341	5.0
11 Kamphaeng Phet	458,437	215,159	186,445	87%	29,252	14%	74,048	34%	74,133	6.2
12 Phichit	344,256	280,848	196,688	70%	41,601	15%	147,296	52%	54,388	6.3
13 Phetchaburi	109,814	54,385	49,932	92%	12,968	24%	77,742	143%	31,543	3.5
14 Nakhon Sawan	651,437	383,550	289,510	75%	26,344	7%	150,666	39%	107,683	6.0
15 Ithai Thani	214,576	100,683	73,279	73%	2,157	2%	91,400	94%	39,655	5.4
Sub-total	2,691,018	1,533,903	1,160,751	76%	166,545	11%	676,877	41%	513,925	5.2
Central Plain										
16 Chai Nat	180,325	151,319	130,201	86%	26,146	17%	140,009	93%	37,444	4.8
17 Sing Buri	73,822	67,681	51,789.0	84%	6,287	10%	67,840	110%	18,577	4.0
18 Lop Buri	401,684	155,604	143,606.0	92%	1,633	1%	105,779	68%	62,986	6.4
19 Suphan Buri	371,497	219,357	142,392.0	65%	75,091	34%	278,512	127%	69,663	5.3
20 Ang Thong	79,418	64,274	55,128.0	86%	5,264	8%	81,178	126%	21,865	3.6
21 Aurthaya	188,377	174,041	140,153.0	81%	34,250	20%	197,571	114%	35,243	5.3
22 Saraburi	189,658	87,111	62,640.0	72%	4,228	5%	58,632	67%	32,946	5.8
23 Nakhon Pathon	139,425	78,607	51,872.0	66%	50,840	65%	142,318	181%	37,180	3.8
24 Nonthaburi	27,542	20,065	18,085.0	90%	15,766	79%	36,766	183%	9,253	3.0
25 Pathum Thani	110,374	73,350	47,389.0	65%	37,061	51%	110,958	151%	19,240	5.7
26 Samut Sakon	37,372	18,121	5,894.0	33%	5,293	29%	37,696	208%	11,719	3.2
27 Bangkok										
Methropolis	41,493	27,903	22,826.0	82%	7,514	27%	74,864	268%	11,322	3.7
28 Samut Prakan	33,368	15,920	9,465.0	59%	6,543	41%	60,528	380%	7,946	4.2
Sub-total	1,874,265	1,147,353	881,440	77%	275,916	24%	1,392,651	121%	375,384	5.0
Total in the Study Area	5,587,878	3,141,837	2,385,980	76%	451,065	14%	2,561,376	82%	1,412,565	4.0

(Source : Crop Year 1994/95)

Table 3.1.4 MUTUAL RELATIONSHIP BETWEEN RICE YIELD AND INUNDATION

Grouing Stage of Paddy	Condition of Inundation	Type of Water	Inundation Period and Yield Reduction (%)			
			2 days	4days	7days	More Than 7 days
Booting Stage	Submergence	Clean Water	10	20	30	35
		Darty Water	20	50	85	90-100
Heading Stage	Inundate without Ear Portion	Clean Water	10	30	65	90-100
		Darty Water	70	80	85	90-100
Flowering Stage	Submergence	Clean Water	25	45	80	90-100
		Darty Water	30	80	90	90-100
Milk-Ripe Stage	Submergence	Clean Water	15	25	30	70
		Darty Water	5	20	30	30
Yellow-Ripe Stage	Submergence	Clean Water	0	15	20	20

Source : RID Regional Office VII

Table 3.1.5 DEEPWATER AND FLOATING RICE AREAS IN 1992/1993 BY WATER DEPTH

No.	Provinces	Cultivated Area (ha)		Total
		Water Depth < 100 cm	Water Depth > 100 cm	
1	Ayutthaya	33,328	64,123	97,451
2	Nakorn Sawan	59,527	11,593	71,120
3	Phichit	52,136	13,859	65,995
4	Nakorn Nayok	17,686	25,875	43,561
5	Ang Thong	12,326	29,037	41,363
6	Lop Buri	12,793	21,325	34,118
7	Phitsanulok	21,049	8,598	29,647
8	Prachin Buri	5,796	16,243	22,039
9	Chaiyaphoom	2,887	18,986	21,873
10	Shing Buri	9,856	8,917	18,773
11	Ratcha Buri	9,989	3,943	13,932
12	Suphan Buri	7,778	2,456	10,234
13	Sara Buri	4,336	5,278	9,614
14	Chai Nat	4,114	1,917	6,031
15	Nakorn Pathom	3,403	1,233	4,636
16	Uthai Thani	3,369	383	3,752
17	Nongkai	492	3,072	3,564
18	Khon Kaen	327	2,846	3,173
19	Petcha Buri	1,661	1,001	2,662
20	Udon Thani	10	622	632
	Total	262,863	241,307	504,170

Source : Prachin Buri Rice Research Center

* 1/ Estimated Area = No. of families x Ave. cultivated Area/family.

Table 3.1.6 AREA UNDER FLOATING RICE BY IRRIGATION PROJECT

unit : ha

	Total Area (average)			Floating Rice Area			% 1996/97	
	1974-86	1987-91	1992-96	1976	1986/87	1995/96		
Region 7	361,955	372,440	364,215	86,537	104,246	67,120	18	58,485
Don Chedi	22,519	21,556	20,238	720	2,304	1,044	5	1,034
Pho Phraya	42,839	25,713	43,884	13,270	2,562	832	2	758
Borommathat	58,153	57,287	54,648	4,259	4,327	4,033	7	5,766
Chanasutr	73,672	64,066	54,752	6,838	13,913	10,236	19	9,480
Yangmancee	30,490	29,557	28,964	11,802	22,116	21,792	75	18,918
Phak Hai	31,318	30,429	22,280	28,896	31,896	17,024	76	14,848
Bang Bai	16,088	21,130	15,933	8,848	16,497	11,760	74	7,680
Chao Chet B.Y.	27,630	35,821	35,044	11,904	10,632	400	1	0
Phraya Ban Lu	18,350	45,445	50,628	0	0	0	0	0
Phra Phimon	16,194	31,262	33,485	0	0	0	0	0
Phasi Charoen	24,702	10,175	4,359	0	0	0	0	0
Region 8	466,499	424,325	384,130	93,282	124,076	106,091	28	55,508
Khao Kaeo			0	0	0	0		0
Manorom/K.K.	37,222	40,087	40,742	640	0	0	0	0
Chong Kaeo	36,887	37,761	37,849	6,224	6,258	13,120	35	3,385
Khok Katiem	32,456	31,654	32,890	15,268	17,928	15,430	47	16,656
Roeng Rang	28,407	27,137	25,841	3,195	10,597	8,684	34	6,666
Maharaj	73,782	74,785	70,315	35,544	30,331	35,536	51	19,046
Nakhon Luang	42,085	34,786	33,109	20,089	22,060	22,962	69	7,563
Pasak Tai	37,199	32,280	32,337	5,048	4,160	0	0	0
Rangsit Nua	58,310	39,404	22,940	3,764	5,739	1,864	8	2,192
Rangsit Tai	67,915	68,407	65,238	231	0	0	0	0
Khlong Dan	52,236	38,024	22,870	3,280	27,003	8,495	37	0
Total	828,454	796,764	748,345	179,819	228,322	173,211	23	113,993

**Table 3.1.7 CHANGE OF FOREST AREA IN THAILAND
IN PAST 32 YEARS (1961-1993)**

Year	Forest Area in Thailand		
	km2	Rai	%
1961	273,628.50	171,017,812.50	53.33
1973	221,725.00	138,578,125.00	43.21
1976	198,417.00	124,010,625.00	38.67
1978	175,224.00	109,515,000.00	34.15
1982	156,600.00	97,875,000.00	30.52
1985	150,866.00	94,291,349.00	09.40
1988	143,803.00	89,877,182.00	28.03
1989	143,417.00	89,635,625.00	27.95
1991	136,698.00	85,436,284.00	26.64
1993	133,521.00	83,450,623.00	26.02*

Table 3.1.8 REFORESTATION AREA AS OF 1996

PROVINCE	AREA (Rai)
Chai Nat	900.00
Chiang Mai	135,916.39
Chiang Rai	105,713.01
Kamphaeng Phet	24,549.88
Kanchanaburi	23,541.46
Lamphun	15,810.00
Loei	43,074.00
Lampang	83,576.90
Nakhon Ratchasima	64,053.03
Nakhon Sawan	1,359.00
Nan	64,980.12
Phayao	13,355.00
Phetchabun	81,885.35
Phichit	11,777.02
Phitsanulok	46,108.54
Phrae	162,420.00
Ratchaburi	10,691.45
Saraburi	70,069.00
Sukhothai	30,821.44
Suphan Buri	3,528.00
Tak	87,044.83
Uthai Thani	19,670.00
Uttaradit	84,410.93

Table 3.1.9 REFORESTATION PROGRAM IN THE NEXT 5 YEARS (1997-2001)

Program Activity	Unit	1997	1998	1999	2000	2001	Total
1. Planting forest by government in government	Rai	31,700	270,900	265,500	260,500	263,500	3,092,100
1.1 Planting forest following for King's Project	Rai	24,000	62,000	62,000	62,000	65,000	275,000
1.2 Planting forest at the estuary of a river safety	Rai	-	10,000	10,000	10,000	10,000	40,000
1.3 Planting example forest	Rai	3,000	6,000	-	-	-	9,000
1.4 Planting forest for research work and product a seed	Rai	2,200	4,900	4,500	4,500	4,500	20,600
1.5 Planting rattan following for King's project	Rai	2,500	30,000	30,000	25,000	25,000	112,500
1.6 Reforest by natural rule	Rai	-	150,000	150,000	150,000	150,000	600,000
1.7 Planting forest following for King's Majesty Project	Rai	-	-	-	-	-	2,000,000
1.8 Planting forest for Pasak basin project	Rai	-	8,000	9,000	9,000	9,000	35,000
2. Promoting Private individual planting economic forest in owner land.	Rai	831,250	831,250	831,250	831,250	831,250	4,156,250
2.1 Project Promotion planting in economic forest	Rai	531,250	531,250	531,250	531,250	531,250	2,656,250
2.2 Reforestation and production in Agricultural Project	Rai	300,000	300,000	300,000	300,000	300,000	1,500,000

Source : Royal Forest Department

Table 3.1.10 CHANGE OF FISHERY PRODUCTION IN THAILAND (1983-1993)

(Unit) : 1,000 (Tons)

Year	Total	Capture		Culture	
		Marine	Inland	Coastal aquaculture	Freshwater Culture
1983	2,255.4	2,055.2	108.4	44.8	47.0
1984	2,134.8	1,911.5	111.4	61.5	50.4
1985	2,225.2	1,997.2	92.2	60.6	75.2
1986	2,536.3	2,309.5	98.4	39.1	89.3
1987	2,779.1	2,540.0	87.4	61.9	89.8
1988	2,629.7	2,337.2	81.5	108.9	102.1
1989	2,740.0	2,370.5	109.1	168.7	91.7
1990	2,786.4	2,362.2	127.2	193.2	103.8
1991	2,967.7	2,478.6	136.0	230.4	122.7
1992	3,239.8	2,736.4	132.0	229.3	142.1
1993	3,385.1	2,752.5	175.4	295.6	161.6

Note : Fisheries Statistics of Thailand 1993, Fisheries statistics sub division
 Fishery polycy and planning division Department of
 Fisheries, Bangkok, Thailand.

Table 3.1.11 YIELD FROM FRESHWATER CULTURE BY SPECIES (1983-1993)

(Unit) : 1,000 (Tons)

Year	Total	Fish									Giant Fresh water prawn	Others
		Sub- Total Fish	Tila pias	Com- mon- carp	Silver carp	Sepat siam	Catfish	Snake head	Catfish (Swai)	Other fish		
1983	47.0	45.8	12.1	1.9	5.1	9.3	3.0	4.8	6.9	2.7	1.2	0.0
1984	50.4	47.3	7.9	1.2	4.9	11.2	4.6	4.9	8.2	4.4	3.1	0.0
1985	75.3	72.8	15.1	1.5	7.3	16.6	6.4	7.4	13.8	4.7	2.5	0.0
1986	89.3	84.8	18.4	1.9	8.8	16.1	15.8	6.0	12.6	5.2	4.5	0.0
1987	89.8	78.0	17.0	2.1	11.1	14.3	13.9	3.3	11.8	4.5	11.8	0.0
1988	102.1	91.2	18.8	2.5	13.0	14.9	12.6	4.0	20.4	5.0	10.9	0.0
1989	91.7	83.8	21.1	2.0	13.4	13.2	12.4	3.7	13.5	4.5	7.9	0.0
1990	103.8	97.3	22.8	2.1	14.6	12.8	17.9	3.8	13.3	10.0	6.5	0.0
1991	122.7	114.9	28.1	2.5	16.3	13.3	29.1	5.6	14.5	5.5	7.8	0.0
1992	142.1	131.6	43.9	2.3	23.8	13.0	23.8	4.7	14.2	5.9	10.3	0.2
1993	161.6	152.0	54.0	3.1	21.9	15.4	31.1	5.9	12.0	8.6	9.2	0.4

Note : Fisheries Statistics of Thailand 1993, Fisheries statistics sub division
Fishery policy and planning division Department of
Fisheries, Bangkok, Thailand.

Table 3.1.12 LIVESTOCK PRODUCTION IN THE CHAO PHRAYA RIVER BASIN IN 1995

(Unit : number of head)

Province	Number of buffaloes	Number of cattle	Number of swine	Number of chicken	Number of duck
Whole Kingdom	4,181,612	6,822,333	5,369,100	148,783,953	18,896,635
Northern (Mountain Area)					
1 Chiang Mai	69,702	161,114	246,362	5,534,137	138,685
2 Lamphun	12,863	44,945	55,631	1,164,586	16,091
3 Lampang	62,750	150,618	75,797	1,412,856	15,212
4 Phayao	36,980	91,580	51,602	1,314,410	32,205
5 Phrae	33,663	68,525	69,343	1,142,022	10,152
6 Nan	42,489	61,117	68,112	1,212,891	20,683
7 Tak	21,637	155,535	34,480	726,963	19,334
Sab - Total	280,081	733,434	601,327	12,507,865	252,362
Northern (Hilly Area)					
8 Sukhothai	12,896	122,506	56,780	978,835	86,237
9 Uttaradit	20,478	85,567	54,996	2,656,415	35,320
10 Phitsanulok	28,780	108,950	73,967	1,689,639	141,055
11 Kamphaeng Phet	16,781	86,061	60,944	752,635	174,032
12 Phichit	11,911	67,885	58,675	889,317	224,797
13 Phetchaburi	43,656	196,197	71,165	1,964,172	58,965
14 Nakhon Sawan	37,768	186,785	63,128	3,106,563	317,130
15 Uthai Thani	38,591	62,132	44,695	1,106,186	36,529
Sab - Total	210,861	916,083	484,350	13,143,762	1,074,065
Central Place					
16 Chai Nat	10,070	84,917	40,891	543,615	376,754
17 Sing Buri	2,765	23,948	34,639	581,760	130,058
18 Lop Buri	13,754	180,827	85,874	3,259,983	149,465
19 Suphan Buri	19,324	160,709	157,017	3,098,772	645,160
20 Ang Thong	4,463	40,070	33,062	1,720,781	148,952
21 Autthaya	16,677	40,280	40,173	4,083,415	647,260
22 Saraburi	16,373	66,317	90,988	2,944,846	396,873
23 Nakhon Pathom	1,842	41,917	456,585	3,304,481	1,943,107
24 Nonthaburi	601	3,189	2,396	72,746	298,040
25 Pathum Thani	3,057	7,801	15,448	1,132,783	1,132,855
26 Samut Sakhon	26	1,002	4,742	209,676	239,050
27 Bangkok Metropolis	780	5,988	7,103	678,676	919,564
28 Samut Prakan	61	1,109	8,472	406,711	93,426
Sub - Total	89,793	658,074	977,390	22,038,245	7,120,564
Total in the Study Area	580,738	2,307,591	2,063,067	47,689,872	8,446,991

Data: As of January in 1995

Source: Department of Livestock

**Table 3.2.1 (1/2) MAIN IRRIGATION FACILITIES OF RIVERS AND CANALS IN CHAO
PHIRAYA RIVER BASIN
(IN DOWNSTREAM)**

Water Course	Name of Structure	Location (Province)	Structural Features					Retention Level (m MSL)	Flood Level (m MSL)		Design Flow (m ³ /s)
			Type	Number	Width (m)	Height (m)	Sill Elevation (m MSL)		Upper	Lower	
Yom River	Mae Yom Weir	Phrae	Fixed Weir & Rubber Dam	5	68.80	3.50	+178.00	+181.50	+183.75	+183.00	3,000
Nan River	Phitsanulok Diversion Weir (Naresuan Dam)	Phitsanulok	Movable Radial Gate	5	12.50	7.60	+40.20	+47.80	+50.35	+49.75	1,600
Thap Salao River	Thap Salao Diversion Weir	Uthai Thani	Fixed Weir	6 2 2	8.0 9.9 3.0	3.00	+71.00	+74.00	+77.25	+76.40	700
Yom to Nan River (Curtain Canal)	Control Regulator	Phitsanulok	Radial Gate	2	6.0	4.00	+33.975	/1	+37.675	+36.750	85
Yom to Nan River (DR 15.8 Canal)	Control Regulator No. 1	Phitsanulok	/1	/1	/1	/1	/1	/1	/1	/1	60
	Control Regulator No. 2	Phitsanulok	/1	/1	/1	/1	/1	/1	/1	/1	60

Note: /1 Data not available yet.

Table 3.2.1 (2/2) MAIN IRRIGATION FACILITIES OF RIVERS AND CANALS IN CHAO PHRAYA RIVER BASIN (IN UPPER AND MIDDLE STREAM)

Water Course	Name of Structure	Location (Province)	Structural Features				Full Supply Level (m MSL)		Flood Level (m MSL)		Design Flow (m ³ /s)
			Gate			Sill Elevation (m MSL)	Upper	Lower	Upper	Lower	
			Type	Number	Width (m)						
Chao Phraya River	Chao Phraya Dam (Barrage)	Chai Nat	Radial Gate	16	12.50	+9.00	+16.50	+7.50	+18.50	+16.00	3,300.0
			Miter Gate	1	14.00	+9.00					
Suphan River	Phonlatap Head Regulator	Chai Nat	Slide Gate	4	6.50	+7.50	+16.50	+13.90	+19.40	+15.86	320.0
	Ban Thabot Regulator	Chai Nat	Radial Gate	4	6.00	+8.75	+13.50	+9.80	+13.73	+13.68	318.0
	Sam Chook Regulator	Suphan Buri	Slide Gate	2	12.50	+2.50	+9.15	+6.30	+9.52	+9.31	318.0
	Pho Phraya Regulator	Suphan Buri	Slide Gate	2	12.50	+0.20	+6.00	+0.75	+5.91	+5.82	318.0
Noi River	Becoma-that Head Regulator	Cai Nat	Radial Gate	4	6.00	+9.60	+16.00	+15.10	+18.24	+16.20	260.0
	Channasut Regulator	Sing Buri	Radial Gate	4	6.00	+5.72	+11.60	+9.73	+11.84	+11.40	260.0
	Yang Mani Regulator	Sing Buri	Radial Gate	4	6.00	+2.32	+7.74	+6.16	+7.74	+7.30	260.0
	Phak Hai Regulator	Ayutthaya	Radial Gate	3	6.00	+2.00	+3.50	+3.30	+3.50	+3.30	150.0
Chai Nat-Pasak Canal	Manorom Head Regulator	Chai Nat	Radial Gate	6	6.00	+12.80	+16.472	+16.142	+20.00	+16.142	210.0
	Chongkhae Regulator	Chai Nat	Radial Gate	6	6.00	+9.50	+13.390	+13.150	-	-	207.0
	Koke Kathiem Regulator	Lop Buri	Radial Gate	4	6.00	+6.29	+10.79	+10.59	-	-	174.1
	Reong Rand Regulator	Saraburi	Radial Gate	3	6.00	+3.97	+8.53	+8.27	+9.810	+9.810	131.0
Chai Nat-Ayutthaya Canal	Maharaj Head Regulator	Chai Nat	Radial Gate	3	4.00	+11.60	+16.00	+15.50	+18.00	-	75.0
Makamthao-Uthong Canal	Makanthao-Uthong Head Regulator	Chai Nat	Slide Gate	6	1.75	+13.75	+16.10	+15.95	-	-	35.0
Pasak River	Rama VI Barrage	Saraburi	Slide Gate	6	12.50	+0.10	+7.50	-	+9.81	-	Unknown

Table 3.2.2 LIST OF LARGE AND MEDIUM SCALE IRRIGATION PROJECTS

Reg. Office No.	No. of Project	Irrigable Area (ha)	No. of Res. Proj.	Total Cross Storage (MCM)	
(Region No. 1)					
Ping	36	182,600	17	624.4	
(Region No. 2)					
Wang	8	25,872	5	125.7	
Yom	10	41,200	2	20.4	
Nan	23	19,424	7	16.1	
Sub-Total	(41)	(86,496)	(14)	(162.2)	
(Region No. 3)					
Ping	19	72,832	2	13,463.40	
Yom	10	254,440	2	4.8	
Nan*	26	170,496	4	9,062.30	
Upper Pasak	3	8,256	1	18.7	
Sub-Total	(58)	(277,024)	(9)	(22,549.2)	
(Region No. 7)					
Sakae Krang	7	44,800	1	160	The Greater Chao Phraya Project
Suphan River	5	170,240	0	0	
Noi River	4	197,600	0	0	
Bang Ban	1	21,920	0	0	
West Bank	4	209,600	0	0	
Outside of G. Chao Phraya	4	21,200	3	243.1	
Sub-Total	(25)	(665,360)	(4)	(403.1)	
Region No. 8					
Chainat-Pasak Canal	8	139,785	0	0	
Chainat-Ayutthaya Canal	1	67,520	0	0	
South Pasak	2	108,800	0	0	
Nakhon Luang	1	35,200	0	0	
Chiangrak-Khlong Dan	2	132,000	0	0	
East Bank of Chainat-Ayutthaya Canal	8	4,496	7	24.8	
Upper Pasak River	9	25,560	4	17.5	
Sub-Total	(31)	(513,361)	(11)	(42.3)	
(Region No. 9)					
Chiangrak-Khlong Dan	1	81,600	0	0	
Total	192	1,806,441	55	23,781.20	

N.B * Including 4 projects in Phitsanulok Project (Phase I) (total irrigable 111,153 ha)

Table 3.3.1 FLOOD AND OTHER DAMAGE ON AGRICULTURE (1984-1993)

	Type	Damage Area (Rai)										
	Calamity	Rice	Corn	Ground-nuts	Mung-bean	Soy-beans	Sugar cane	Cassava	Other	Vegetable	Fruit	Total
1983/84	Drought	219,203	902,613	12,017	19,053	11,994	496,158	97,871	20,094	9,910	1,475	1,790,418
	Flood	3,985,614	74,545	8,945	45,041	5,623	83,153	89,903	66,666	74,452	65,757	4,499,699
	Other	212	47	-	-	-	-	-	-	-	5	264
	Total	4,205,029	977,205	20,992	64,094	17,617	579,311	187,774	85,760	84,362	67,237	6,290,381
1984/85	Drought	1,252,661	794,638	24,779	40,141	21,236	8,409	376	29,891	363	-	2,172,494
	Flood	660,838	87,115	324	13,961	21,371	-	304	3,296	15,588	2,174	804,868
	Other	180	168,969	-	-	-	-	-	-	-	-	169,149
	Total	1,913,679	1,050,722	25,103	54,102	42,507	8,409	680	33,187	15,951	2,174	3,146,511
1985/86	Drought	419,506	468,230	5,930	2,548	1,181	88,322	545	3,124	261	171	989,818
	Flood	320,848	51,751	2,295	78,581	43,090	8,381	7,294	33,932	9,134	3,001	558,310
	Other	73	-	-	-	295	-	-	-	100	3,276	3,744
	Total	740,427	519,981	8,225	81,129	44,566	96,706	7,839	37,056	9,495	6,448	1,551,872
1986/87	Drought	4,100,984	1,918,240	25,561	23,038	5,947	4,464	22,261	91,047	267	-	6,221,809
	Flood	732,354	41,808	14,330	4,478	28,105	9,067	3,141	17,355	9,300	11,789	874,727
	Other	4,076	-	-	-	-	-	-	-	-	20	4,096
	Total	4,837,414	1,993,048	39,891	27,516	34,052	13,531	25,402	108,402	9,567	11,809	7,100,632
1987/88	Drought	5,388,361	3,024,411	61,480	23,343	466,185	130,309	163,557	2,197,495	42,251	191	11,497,622
	Flood	1,516,351	42,138	8,863	58,448	20,429	68	12,751	83,929	21,180	8,209	1,802,366
	Other	-	-	-	-	-	-	-	-	-	-	0
	Total	6,934,712	3,066,582	70,343	81,791	486,614	130,377	176,308	2,281,424	63,434	8,403	13,299,988
1988/89	Drought	2,259,166	201,609	1,873	6,411	576	-	-	50,685	1,130	-	2,521,450
	Flood	2,777,727	133,755	1,454	94,167	55,752	34,229	76,742	162,029	74,811	256,611	3,667,277
	Other	-	-	-	-	444	-	-	341	-	1,649	2,434
	Total	5,036,893	335,364	3,327	100,578	56,772	34,229	76,742	213,055	75,911	258,260	6,191,161
1989/90	Drought	2,301,832	784,617	7,646	37,941	21,385	11,026	13,770	169,648	7,582	10,748	3,366,195
	Flood	380,703	23,018	811	481	180,246	-	-	11,410	791	265	597,755
	Other	290,014	695	125	12,990	8,191	-	-	49,094	30,223	790,994	1,182,326
	Total	2,972,549	808,330	8,582	51,412	209,822	11,026	13,770	230,182	38,596	802,007	5,146,276
1990/91	Drought	2,981,355	1,713,762	6,257	29,035	84,645	55,010	9,024	171,022	8,297	23,261	5,081,668
	Flood	4,891,219	53,085	4,833	170	22,954	7,336	63,896	109,125	28,205	145,196	5,326,019
	Other	6,711,556	615	32	-	8,219	-	-	1,674	2,272	1,504	6,725,872
	Total	14,584,130	1,767,462	11,122	29,205	115,818	164,739	72,920	281,821	38,774	169,961	17,133,559
1991/92	Drought	1,326,506	1,592,610	22,694	21,593	336,096	164,739	35,771	189,853	8,876	1,316	3,700,054
	Flood	4,224,995	80,428	2,032	9,011	9,059	3,719	43,185	147,569	10,992	18,489	4,549,479
	Other	34,424	54	9	160	308	-	-	1,495	6,274	1,381	44,105
	Total	5,585,925	1,673,092	24,735	30,764	345,463	168,458	78,956	338,917	26,142	21,186	8,293,638
1992/93	Drought	4,612,249	491,758	16,482	25,641	339,748	160,112	73,929	750,727	9,790	224,951	6,705,387
	Flood	1,561,912	44,618	2,952	27,028	19,990	11,716	-	203,799	29,358	72,113	1,973,486
	Other	1,382,361	3,029	-	-	18,445	-	30	1,263	103	18,296	1,423,527
	Total	7,556,522	539,405	19,434	52,669	378,183	171,828	73,959	955,789	39,251	315,360	10,102,400

(Source : DOAE)

Table 3.3.2 RICE CULTIVATION AREA DAMAGED BY FLOOD (1/2)

Region/ Province	Year									
	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93
North-Eastern										(rai)
Nakhon Phanom	394	19,764	3,899	-	18,650	-	-	144,481	173,772	-
Sakon Nakhon	3,059	33,624	-	9,987	46,504	-	13,826	158,436	87,205	-
Nong Khai	49,794	-	3,707	3,020	2,615	3,896	4,438	84,312	72,368	17,068
Udon Thani	12,880	19,388	1,968	12,797	55,049	15,046	27,640	141,860	15,909	53,033
Nong Bua Lam Phu*										
Loei	-	-	-	-	3,596	710	1,756	173	4,332	-
Mukdahan	-	-	-	-	-	-	-	3,612	19,490	-
Yasothon	50,257	-	6,643	-	-	-	23,436	89,087	131,276	33,473
Ubon Ratchathani	36,690	52,081	7,120	-	40,534	636	7,844	62,141	155,120	31,241
Amnat Charoen*										
Kalasin	21,406	1,029	-	16,513	12,599	-	1,200	108,044	125,320	5,373
Khon Kaen	1,965	-	-	616	25,450	49,538	979	85,610	185,610	-
Maha Sarakham	40,268	-	766	-	-	-	1,953	26,138	231,435	-
Roi Et	177,262	-	31,560	-	8,436	-	38,844	156,507	325,070	63,937
Buri Ram	126,337	-	-	45,969	2,414	-	-	16,708	179,047	20,197
Si Sa Ket	107,001	38,004	565	-	33,108	-	-	22,075	59,939	62,731
Surin	68,994	21,532	-	2,608	-	-	3,951	1,940	118,435	32,716
Chaiyaphum	-	5,875	40,880	-	43,657	28,015	-	135,730	219,881	-
Nakhon Ratchasima	302,514	143	-	1,577	181,498	6,292	-	184,667	166,597	-
Northern										
Nakhon Sawan	238,979	-	41,987	-	29,033	235,158	-	9,322	143,165	112,612
Phetchabun	1,358	43,116	19,846	-	135,741	-	1,805	14,146	413,071	23,470
Uthai Thani	129,376	-	-	314	71,278	109,959	-	16,250	-	32,150
Kamphaeng Phet	106,293	-	1,774	14,686	2,707	136,494	4,653	-	158,911	92,873
Tak	4,811	181	805	-	-	19,683	-	-	4,733	9,431
Phichit	1,018	2,524	1,847	-	26,936	-	51,376	-	570,384	-
Phitsanulok	4,740	1,432	23,119	-	31,002	7,925	48,199	12,603	253,187	135,902
Nan	-	2,715	2,777	283	-	-	40	121	-	-
Phrae	-	-	-	-	-	-	-	-	-	10
Lampang	-	-	-	-	762	-	-	-	-	388
Sukhothai	17,319	454	12,714	32,195	47,657	47,707	47,048	14,565	10,193	75,496
Uttaradit	-	-	-	-	3,671	-	25,581	19,498	9,132	29,260
Chiang Mai	29,637	-	-	5,864	67,226	4,639	16,839	6,196	20,306	6,524
Chiang Rai	-	74,207	44,313	2,133	65,879	20,397	23,248	56,430	59,030	369
Mae Hong Son	119	859	2,804	1,027	4,229	-	519	-	3,383	-
Lamphun	334	-	-	192	8,226	-	-	-	893	5,916
Phayao	924	4,041	-	-	29,992	1,818	-	28,729	-	38,636
Central Plain										
Lop Buri	34,377	-	44,428	-	149,769	8,063	523	136,240	54,276	-
Saraburi	31,406	-	4,750	30,561	11,197	747	-	187,740	-	7,811
Chai Nat	30,240	-	-	-	29,042	84,864	12,023	13,100	-	21,124
Nakhon Nayok	105,629	-	1,398	14,056	-	31,527	806	410,805	70,209	-
Nakhon Pathom	41,296	-	-	3,119	-	7,806	-	-	-	5,133
Nonthaburi	8,674	-	-	-	-	-	-	194	-	-
Pathum Thani	164,135	-	-	1,331	715	13,313	-	247,297	-	-

Table 3.3.2 RICE CULTIVATION AREA DAMAGED BY FLOOD (2/2)

Region/ Province	Year									
	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93
Ayutthaya	222,522	-	-	-	406	13,115	-	468,634	-	1,965
Sing Buri	9,556	-	-	-	55,842	15,396	-	49,625	-	2,284
Suphan Buri	402,418	-	-	37,784	25,167	329,546	-	330,197	-	61,324
Ang Thong	110,138	-	-	-	10,224	78,138	2,457	191,160	-	6,363
Bangkok Metropolis	191,996	-	554	-	-	3,442	-	161,695	105	-
Kanchanaburi	36,474	-	7,434	13,978	-	49,387	-	24,910	2,591	14,340
Prachuap Khiri Khan	569	-	-	-	384	-	-	-	2,802	760
Phetchaburi	3,843	-	9,896	-	-	-	16,578	-	4,057	22,127
Ratchaburi	234	-	1,886	6,204	-	12,106	3,144	1,267	204	-
Chachoengsao	358,242	-	-	46,614	-	54,210	-	431,651	27,455	-
Prachin Buri	406,021	-	-	233,999	-	67,011	-	569,751	62,205	-
Sa Kaeo*	-	-	-	-	-	-	-	-	-	-
Samut Sakhon	11,290	-	431	-	-	357	-	-	-	-
Samut Prakan	59,844	-	-	-	-	-	-	-	-	114
Samut Songkhram	-	-	977	-	-	-	-	-	-	25
Chon Buri	107,384	-	-	-	-	17,136	-	25,905	9,342	47,905
Rayong	28,643	-	-	-	135	12,668	-	795	-	3,808
Chanthaburi	3,546	-	-	719	-	100	-	3,150	3,550	-
Trat	-	-	-	305	-	-	-	-	-	-
Southern Region										
Chumphon	-	1,072	-	4,106	1,200	25,309	-	-	10,100	552
Nakhon Si Thammarat	12,776	274,964	-	6,603	119,540	681,658	-	-	-	347,348
Phatthalung	-	24,940	-	22,191	-	85,688	-	4,507	-	-
Songkhla	14,771	-	-	50,455	29,040	261,732	-	-	3,650	89,743
Surat Thani	-	9,828	-	16,246	13,273	117,409	-	-	-	23,204
Krabi	-	-	-	577	-	813	-	-	-	-
Trang	-	13,814	-	21,539	757	27,456	-	-	2,309	-
Phangnga	218	-	-	1,131	190	-	-	-	-	-
Phuket	1,350	-	-	250	-	-	-	-	-	-
Ranong	-	-	-	-	118	31	-	-	-	-
Satun	-	-	-	2,970	-	4,850	-	-	5,079	440
Narathiwat	-	10,243	-	26,919	24,343	15,595	-	-	3,495	1,846
Pattani	53,763	-	-	36,888	54,941	52,066	-	-	2,172	19,285
Yala	-	5,008	-	3,998	21,619	18,275	-	215	4,200	1,605

Note * : No information because they are new provinces in Thailand

Table 3.3.3 AGRICULTURAL FLOOD DAMAGE DATA IN ANG THONG PROVINCE IN 1995

District	Sub-District	Village	Household	Encounter Area		Damage Area		Damage Value		Ask Rescued	
				(Rai)	(Rai)	(Rai)	(Rai)	(Rai)	(Baht)		
Muaeng											
Ang Thong	14	69	3,157	34,415	33,825	67,000,000	6,090,990				
Chaiyo	9	51	2,024	28,540	26,440	72,123,900	3,817,625				
Pha Mok	8	52	1,703	33,787	33,787	73,920,000	4,048,200				
Viset Chaichan	15	124	3,370	53,940	47,330	115,180,000	7,172,425				
Pho Thong	14	94	1,990	17,246	17,246	49,710,000	3,292,675				
Sawaengha	7	60	1,313	13,464	13,464	72,775,000	3,571,220				
Sam Ko	5	28	370	2,964	2,490	7,984,625	521,470				
Total	72	478	13,907	184,356	174,582	458,693,525	28,514,605				

Table 3.3.4 RECENT MAJOR AGRICULTURAL DAMAGE

1) Drought Damage Area

Year/Region	North + Central											Average ha/year
	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97		
Northern	907,449	16,659	121,260	250,223	351,088	249,948	1,363,151	74,659	506	41,822		337,676
Central	224,056	9,962	61,311	143,853	76,798	130,209	341,887	51,311	846	19,763		106,000
Total	1,839,620	403,432	538,591	813,067	592,009	1,072,862	3,245,207	641,789	73,004	278,986		949,857
									North + Central			443,676

2) Flood Damage Area

Year/Region	North + Central											Average ha/year
	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97		
Northern	97,976	140,889	67,537	36,192	281,542	125,283	15,340	515,304	828,558	688,305		279,693
Central	54,200	40,398	3,125	251,268	8,917	8,855	9,968	15,792	336,296	159,807		88,863
Total	288,379	586,764	95,641	852,163	727,917	315,758	143,083	820,432	1,865,088	1,792,387		748,561
									North + Central			368,555

Table 3.3.5 FISHERIES FLOOD DAMAGE BY HURRICANE OLIS IN 1995

Province	Damaged Area		Damage Cost	No. of farmer	No. of fish	No. of shrimp
	Amphur	Rai	Baht	Person	Fry	Fry
Machongsong	4	14.89	40,600	21	11,000	-
Kamphaengphet	4	244.9	380,100	234	292,000	-
Lumphun	4	502.25	343,000	276	494,000	-
Payao	5	1,299.01	17,352,396	1,709	2,054,000	-
Chiengrai	2	300.03	1,898,200	378	2,906,000	-
Nan	8	340.05	3,734,850	585	625,000	-
Nakornsawan	8	5,579.88	121,362,150	3,182	5,012,000	-
Petchaboon	5	2,086.05	3,509,000	1,759	2,331,000	-
Uthaithanee	7	1,028.22	12,495,900	1,151	1,358,000	-
Lampang	5	131.21	694,050	190	206,000	-
Phitsanuloke	8	2,972.80	26,621,970	2,751	4,822,000	-
Tak	5	353.66	752,700	270	397,000	-
Loei	12	1,741.55	10,651,120	1,546	2,002,000	-
Utaradit	9	2,272.18	9,160,350	1,491	2,233,000	-
Prae	7	609.49	4,758,200	695	854,000	-
Pichit	6	11,438.81	42,399,450	7,976	9,788,000	-
Chiengmai	7	700.38	3,576,500	717	909,000	-
Sukhothai	6	3,215.18	5,682,189	1,265	2,217,000	-
Udonthani	1	42	198,100	18	42,000	-
Patumthanee	7	6,897.67	29,404,981	2,065	4,244,000	-
Lopburi	9	4,634.61	36,933,921	2,068	3,879,000	-
Nonthaburi	6	4,369.84	46,587,350	1,445	3,131,000	-
Chonist	6	751.46	11,738,210	616	746,000	-
Sinburi	6	1,034.16	19,465,650	746	1,055,000	-
Angthong	7	1,924.52	14,029,175	859	1,687,000	-
Ayuthaya	16	16,596.64	114,530,925	48,857	10,671,000	3,750,000
Saraburi	9	4,091.88	28,779,400	1,871	3,538,000	-
Nakornnayok	4	13,476	113,604,924	2,707	8,231,000	-
Suponburi	7	47,263.79	133,249,080	4,847	12,326,000	26,963,000
Mukdahan	3	572.1	1,189,700	453	627,000	-
Nongbua-lumpu	2	541.68	1,549,100	858	976,000	-
Ubonratchatani	4	151.48	498,400	65	142,000	-
Arumatcharoen	1	16.68	32,800	12	14,000	-
Sakonakorn	4	453.5	1,224,000	310	454,000	-
Kalasin	5	1,050.92	1,020,750	610	1,098,000	-
Konkaeng	16	4,544.03	24,015,740	3,760	5,024,660	-
Chaiyapum	15	6,979.63	30,442,505	5,754	7,293,000	-
Nakornpanom	7	6,630.25	18,126,090	3,975	6,042,000	-
Nakornratchasima	12	4,562.78	14,604,990	3,115	3,993,000	-
Buriram	11	6,730.67	2,477,336	1,250	1,612,000	-
Mahasarakam	5	2,359.75	12,817,950	1,361	2,186,000	-
Rei Ad	6	3,355.83	3,133,520	890	2,320,000	-
Srisaket	8	1,237.58	5,902,200	490	359,000	-
Surin	10	545.05	2,380,490	615	701,000	-
Nongkay	8	7,390.24	6,794,000	2,591	5,372,000	-
Chanburi	1	776,000	0	-	-	-
Chasoengsao	10	15,892.00	165,865,697	1,594	5,249,000	-
Chonburi	6	4,263.48	20,431,350	396	2,834,000	-
Trat	3	533.29	1,731,070	150	572,000	-
Prachinburi	5	9,764.95	34,541,045	1,652	4,110,000	-
Rayeng	6	1,096.74	12,138,250	662	696,000	-
Sakaew	6	1,096.74	12,138,250	662	696,000	-
Somutprakarn	5	106,481	222,455,160	3,868	723,000	-
Samutsongkarn	1	669	2,972,000	0	-	-
Samutsakorn	2	323.01	1,730,125	47	165,000	-
Kanchanaburi	7	458.45	1,927,090	278	420,000	-
Nakornpathom	7	28,027.21	220,190,300	2,781	7,745,000	19,303,000
Pachupikiekan	5	2,274	14,909,800	330	156,000	-
Petchburi	5	4,134.20	46,047,100	440	632,000	-
Ranong	3	77.88	601,550	169	63,000	-
Satun	2	41.09	1,584,872	86	23,000	-
Kabi	5	42.46	869,400	128	122,000	-
Yala	1	13.12	203,180	22	25,000	-
Ratchaburi	6	1,819.50	17,973,650	186	405,000	2,274,000
Nakornsitammarach	20	7,350.67	148,457,485	5,536	3,885,000	-
Trang	7	983.23	8,229,800	1,801	1,605,000	-
Chumporn	8	1,786.03	41,835,000	2,601	1,311,000	-
Pang-nga	3	373.02	1,015,000	15	47,000	-
Songkhla	12	1,764.72	33,758,826	1,853	1,301,000	-
Surattanee	15	3,823.91	54,695,793	2,138	1,725,000	1,169,000
Pattalung	6	1,657.13	6,022,789	2,190	1,451,000	-
Total	464	377,160.55	2,097,299,644	103,952	172,553,000	53,489,000

Table 4.1.1 CHANGE OF LAKE AND SWAMP WATER AREA

Area	Water Areas in 1969 (km ²)	Water Areas in 1994 and 1995 (km ²)	Remarks
Swampy area in Skhotai North	5.5	0.3	1995 aero-photograph
Swampy area in Skhotai South	2.5	0.2	
Swampy area in Bung Mai	22	22	
Swampy area in Bung Ratchanok	13	1	
Swampy area in Bung Sie Huai	12	0.7	
Bung Boraphet Lake	219.8	219.8	
Total	274.8	244	

Table 4.2.1 CHANGE OF OLD RIVER COURSE AREA

Name of Division	Area of Division (km ²) (1)	Number of ponds in a Model Area (Nos.)	Ratio of pond area for model area (km ² /60km ²) (2)	Total Pond Area (km ²) ((1)x(2))	Number of ponds in a Area (Nos.)
Nakon Sawan North Area	3,000	5	0.4	20	250
Chainat Surrounding Area	660	5	0.3	3.3	55
Ang Tong East Aea	1,040	7	0.7	12.1	121
Total	4,700	17		35.4	426

**Table 4.3.1 AREA OF PADDY FIELD AS FALLOW AREA
IN SLOPING LAND**

Location	Area* (km ²)
Nan River (Eastern Downstream: Sukhothai, Pitsanulok, Pitchit)	1,760
Yom River (Western Downstream: Pitsanulok, Pitchit, Nakhon Sawan)	2,190
Upper Chao Phraya (Nakhon Sawan, Uthai Thani)	1,400
Chainat Pasak (East: Lopburi)	530
Downstream of Pasak Dam (Saraburi)	290
Tha Chin River (East: Suphanburi)	1,260
Total	7,430

* Estimated on the Land Use Map of MOAC

Assuming that about 70% of the above total area is effective for the raise of paddy dike of 10cm, about 5,000km² is possible to be considered in this study.

Table 4.4.1 OCCURRENCE OF OVERFLOW FROM OUTLET

Depth (mm)	300 or more	200 or more
	10 cm raise of Dike Height	Present Dike Height
Nakhon Sawan	8	10
Sukhothai	5	11
Phitchit	7	13
Saraburi	13	17
Suphanburi	1	5
Average	7	11

Table 6.1.1 DRAINAGE AREA OF PADDY FIELD

	Floodplain (km ²) *1	Topography	Drainage Outlet	Water Supply Condition	Existing Drainage Facilities	Present Dominant Land Use *2	Notes
Yom-Nan Basin							
Pitsanulok Irrigation Project	1,440	Moderate Slope	Nan and partly Yom	Irrigation	Gravity System	HYV	
Nan River East	2,960	Moderate Slope	Nan River	Rainfed	Minimal Gravity *4	TV	
Yom River West	2,800	Flat	Yom River	Rainfed	Minimal Gravity	TV	
Nakhon Sawan Area							
Bung Boraphet Basin	1,240	Moderate Slope	Bung Boraphet Lake	Rainfed	Minimal Gravity	TV	
Sakae Krang Basin	970	Moderate Slope	Sakae Krang River	Rainfed	Minimal Gravity	TV	
Chao Phraya Delta							
Chainat-Pasak Canal East	530	Slope	Old Delta & C-P canal *3	Rainfed	Minimal Gravity	TV	
Suphanbun West	970	Slope	Old Delta & M-C canal *3	Rainfed	Minimal Gravity	TV	
Old Delta	7,850	Moderate Slope to Flat	Chao Phraya, Tha Chin, Noi and Lopburi rivers	Irrigation	Gravity System	HYV, DWR, FR	
The East Bank Area	5,050	Flat	Chao Phraya, Ban Pakong, Sea	Irrigation	Pump and Gravity	HYV	
The West Bank Area	2,750	Flat	Chao Phraya, Tha Chin,	Irrigation	Pump and Gravity	HYV	
Tha Chin West	2,440	Flat	Tha Chin and Sea	Irrigation	Gravity System	HYV	
Total	29,000						

* 1 Areas of the floodplain are measured on MOAC land use map

* 2 HYV : High Yield Variety; TV : Traditional Variety which includes DWR(deep water rice) and FR(floating rice)

* 3 C-P canal : Chainat-Pasak Canal; M-U canal : Makamthao-Uthong Irrigation Canal; Flood plains are higher elevation but obstructed by canal dike

* 4 Minimum facilities such as lateral drain along roads using borrow pits and existing natural drainage creeks and rivers

Table 6.1.2 CROPPING CALENDER (RICE IN WET SEASON)

Area	Variety	From	To	Area	Variety	From	To
Yom-Nan Basin and Nakhon Sawan				Chao Phraya Delta			
RID Region 3	HYV	Aug. 5-10	Nov. 15-30	RID Region 7 & 8	HYV	Aug. 5-10	Nov. 15-30
Sukhothai	TV	Jul. 15	Dec. 31		TV	Aug. 1	Jan. 31
Pichit	TV	Aug. 1	Dec. 31	Uthaitanee	HYV	Aug. 1	Dec. 31
Nakhon Sawan	TV	Aug. 15	Dec. 31	Pho Phraya	Fallow	Oct. 1	Nov. 30
				Chainat	HYV	Sep. 15-30	Dec. 31
				Lower Chao Phraya	2-2.5 crops a year		

From : End of transplant or one month after broadcast

To : End of harvest

HYV : High yield variety

TV : Traditional variety including DWR and floating rice

Table 6.3.1 RIVER WATER STAGE HIGHER THAN GROUND HEIGHT

C7A, Anghong, Chao Phraya River Ground height : El. 5.0 m			N7, Pitchit, Nan River Ground height : El. 35.0 m			Y17, Sam Ngam, Pitchit, Yom River Ground height : El. 36.0 m					
Year	From	To	Period	Year	From	To	Period	Year	From	To	Period
1976	Sep. 24	Nov. 19	57 days								
1977	RSLGL										
1978	Sep. 24	Nov. 6	43 days	1978	Sep. 24	Oct. 19	25 days	1978	Aug. 6	Nov. 9	95 days
1979	Sep. 13	Nov. 8	56 days	1979	RSLGL			1979	RSLGL		
1980	RSLGL			NR				1980	Aug. 1	Nov. 11	103 days
1981	RSLGL			1981	Aug. 7	Aug. 21	15 days	NR			
1982	RSLGL			1982	RSLGL			NR			
1983	Oct. 12	Dec. 8	57 days	1983	RSLGL			NR			
1984	RSLGL			1984	RSLGL			NR			
1985	Oct. 22	Nov. 12	21 days	1985	Aug. 28	Sep. 30	34 days	NR			
1986	RSLGL			1986	RSLGL			NR			
1987	Sep. 24	Oct. 22	28 days	1987	RSLGL			NR			
1988	Oct. 19	Nov. 8	20 days	1988	RSLGL			NR			
1989	RSLGL			1989	RSLGL			NR			
1990	RSLGL			1990	RSLGL			1990			
1991	RSLGL			1991	RSLGL			1991			
1992	RSLGL			1992	RSLGL			1992			
1993	RSLGL			1993	RSLGL			1993			
1994	Sep. 17	Oct. 21	34 days	1994	RSLGL			1994	Aug. 16	Oct. 29	75 days
1995	Aug. 20	Nov. 26	97 days	1995	Aug. 13	Oct. 25	71 days	1995	Aug. 16	Nov. 12	88 days
Frequency	9/20			4/17				4/9			

NR : No record RSLGL : River stage lower than ground height of back marsh in the vicinities

Table 6.3.2 (1/3) WATER BALANCE OF PADDY FIELD DURING HIGH RIVER WATER LEVEL

River Water Level Exceeds Ground Height C7A, Ang Thong, Ground height : El. 5.0 m				Maximum Water Level in Paddy Field (-)10cm	
Year	From	To	Period	Block No. 15	Block No. 17
1976	Sep. 24	Nov. 19	57 days	2.8	2.3
1977	RSLGL				
1978	Sep. 24	Nov. 6	43 days	10.9	14.1
1979	Sep. 13	Nov. 8	56 days	11.9	15.5
1980	RSLGL				
1981	RSLGL				
1982	RSLGL				
1983	Oct. 12	Dec. 8	57 days	14.0	8.7
1984	RSLGL				
1985	Oct. 22	Nov. 12	21 days	1.2	2.4
1986	RSLGL				
1987	Sep. 24	Oct. 22	28 days	5.1	2.6
1988	Oct. 19	Nov. 8	20 days	0.1	0.4
1989	RSLGL				
1990	RSLGL				
1991	RSLGL				
1992	RSLGL				
1993	RSLGL				
1994	Sep. 17	Oct. 21	34 days	3.5	1.4
1995	Aug. 20	Nov. 26	97 days	25.2	20.0
Frequency				4/20	3/20

Block No. 15 : Old Delta East

Block No. 17 : Old Delta Center

NR : No record

RSLGL : River stage lower than ground height of back marsh in the vicinity

Frequency : Number of year in which the maximum water level in the paddy field exceeds 10cm from the assumed starting depth (10cm) of the water balance calculation.

Table 6.3.2 (2/3) WATER BALANCE OF PADDY FIELD DURING HIGH RIVER WATER LEVEL

River Water Level Exceeds Ground Height Nan, N7, Pitchit, Ground height : El. 35.0 m				Maximum Water Level in Paddy Field (-)10cm Block No. 10
Year	From	To	Period	
1978	Sep. 24	Oct. 19	25 days	6.1
1979	RSLGL			
NR				
1981	Aug. 7	Aug. 21	15 days	0.0
1982	RSLGL			
1983	RSLGL			
1984	RSLGL			
1985	Aug. 28	Sep. 30	34 days	10.0
1986	RSLGL			
1987	RSLGL			
1988	RSLGL			
1989	RSLGL			
1990	RSLGL			
1991	RSLGL			
1992	RSLGL			
1993	RSLGL			
1994	RSLGL			
1995	Aug. 13	Oct. 23	71 days	22.2
Frequency				2/17

Block No. 10 : Pitsanulok Irrigation Project and Nan river East Old Delta East

NR : No record

RSLGL : River stage lower than ground height of back marsh in the vicinity

Frequency : Number of year in which the maximum water level in the paddy field exceeds 10cm from the assumed starting depth (10cm) of the water balance calculation.

Table 6.3.2 (3/3) WATER BALANCE OF PADDY FIELD DURING HIGH RIVER WATER LEVEL.

River Water Level Exceeds Ground Height Yom, Y17, Pitchit, Ground height : El. 35.0 m				Maximum Water Level in Paddy Field (-) 10cm Block No. 6
Year	From	To	Period	
1978	Aug. 6	Nov. 9	95 days	21.7
1979	RSLGL			
1980	Aug. 1	Nov. 11	103 days	31.0
NR				
NR				
NR				
NR				
NR				
NR				
NR				
NR				
NR				
1990	RSLGL			
1991	RSLGL			
1992	RSLGL			
1993	RSLGL			
1994	Aug. 16	Oct. 29	75 days	11.6
1995	Aug. 16	Nov. 12	88 days	26.5
Frequency				4/9

Block No. 6 : Yom River WestOld Delta Center

NR : No record

RSLGL : River stage lower than ground height of back marsh in the vicinity

Frequency : Number of year in which the maximum water level in the paddy field exceeds 10cm from the assumed starting depth (10cm) of the water balance calculation.

Table 7.2.1 Features of Drainage Area

Study Area	Division of Area	Name of Project Area	Features of the Drainage Area						
			Catchment Area (km ²)	Slope Gradient	Main Drainage Outlet	Drainage Capacity of pump (m ³ /s)	Possibility to receive flood water from Rivers	Flood Damage Magnitude (based on interview)	Main Land Use
Higer Delta	Northern Part surrounded by Thachin and Noi Rivers	Boromathad, Samdhuk, Chanasutr, Yamane and Phak Hai, etc.	1,850	1/4,000	Thachin and Noi Rivers	24	Less Possibility	Not so serious	HYV
	Area surrounded by Noi and Chao Phraya Rivers	Boromathad, Yamane and Phak Hai, Bang Bai	930	1/4,000	Noi and Chao Phraya Rivers	-	Chao Phraya River	Relatively Serious due to overflow from river	HYV, F/R and DWR
	Area surrounded by Chao Phraya and Lop Buri Rivers	Maharat and Khok Katiem	500	1/5,000	Chao Phraya and Lop Buri Rivers	-	Chao Phraya and Lop Buri Rivers	Relatively serious due to overflow from rivers	F/R and DWR
Lower Delta	Area surrounded by Lop Buri and Pasak Rivers	Khok Katiem and Roeng Rang	530	1/5,000	Lop Buri and Pasak Rivers	-	Lop Buri and Pasak Rivers	Serious	F/R and HYV
	East Bank Area	Nakhon Luang, Pasak Tai, Rangsit Nua, Rangsit Tai, Khlong Dan and Phra Ong Chai Ya Nuchit	4,374	1/50,000	Chao Phraya, Nakhon Nayok and Bang Pakon Rivers and Sea	303	Chao Phraya and Pasak Rivers	Serious	HYV and Fruits Tree
	West Bank Area	Chao Ched Bang Yeehon, Phrayahantue, Phrayapimol and Pashicharoen	2,385	1/60,000	Chao Phraya and Thachin Rivers and Sea	140	Chao Phraya and Tha Chin Rivers	Serious	HYV and Fruits Tree

Table 7.2.2 Main Drainage Issues of the Area (Yes* : Yes, but not so severe)

Study Area	Division of Area	Name of Project Area	Main Cause of Flood			Drainage Condition			Main Issue
			Local Rainfall	Water from Upstream Area	Overflow From Rivers	Drainage System	Collection of Water to Outlet	Continuation of Higher Water Level at Outlet	
Higer Delta	Northern Part surrounded by Thachin and Noi Rivers	Boromathad	Yes *	No	No	Fair	Good	Not much	Drainage problem may not be severe in general, but due to water from upstream area, it is serious in the downstream project area.
		Samdhuk	"	Yes *	"	"	"	"	
		Chanasut	"	Yes	"	"	"	"	
		Phak Hai	"	"	"	"	"	"	
	Area surrounded by Noi and Chao Phraya Rivers	Boromathad	Yes *	no	Yes	Fair	Good	Yes	Drainage problem may not be severe in general, but it is very serious when overflow from rivers occurs
		Yamane	"	Yes	"	"	"	"	
		Phak Hai	"	"	"	"	"	"	
		Bang Bai	"	no	"	"	"	"	
		Maharat	Yes *	no	Yes	Fair	Good	Yes	
		Khok Katiem	"	"	"	"	"	"	
Lower Delta	Area surrounded by Chao Phraya and Lop Buri Rivers	Khok Katiem	Yes *	no	Yes	Fair	Good	Yes	Drainage issue is emphasized with the following points: difficulty of collection of inundation water, continuation of higher water level at outlet, overflow from rivers and water from upstream area
		Roeng Rang	"	Yes	"	"	"	"	
		Nakhon Luang	Yes *	No	Yes	Fair	Fair	Yes	
		Pasak Tai	"	"	No	"	"	"	
	East Bank Area	Rangsit Nua	"	Yes*	"	Good	Poor	"	
		Rangsit Tai	"	"	"	"	"	"	
		Khlong Dan	"	Yes	Yes	Poor	"	"	
		Phra Ong Chai Ya	"	"	"	"	"	"	
		Nuchit	"	"	"	"	"	"	
		Chao Ched Bang	Yes *	no	Yes	Fair	Fair	Yes	
West Bank Area	Yeelon	"	Yes*	"	Poor	Poor	"	- do -	
	Phrayahantue	"	"	"	"	"	"		
	Phrayimol	"	"	"	"	"	"		
	Pashicharoen	"	Yes	"	"	"	"		

Table 7.2.3 Conceivable Measures for Drainage System Improvement (yes) : Conceivable but not recommendable

Study Area	Division of Area	Name of Project Area	Possible Conceivable Measure in Individual Project Area						General Consideration
			Channel Improvement	Installation of Pump	Provision of Retarding Basin	Construction of New Channel	Drainage to downstream Area	Heightening of Dike	
Higer Delta	Northern Part surrounded by Thachin and Noi Rivers	Boromathad	yes	no	(yes)	no	no	no	As a whole, drainage channel improvement is one of the conceivable measures and retarding basin is considered by project areas.
		Samdhuk	"	"	"	"	"	"	"
		Chanasut	"	"	"	"	"	"	"
		Phak Hai	"	"	yes	"	"	"	"
	Area surrounded by Noi and Chao Phraya Rivers	Boromathad	yes	no	no	no	no	(yes)	Channel improvement is one of the measures. Heightening of dike along rivers is not recommendable due to adverse influence.
		Yamane	"	"	"	"	yes	"	"
		Phak Hai	"	yes	yes	"	yes	"	"
		Bang Bai	"	"	yes	"	no	"	"
		Maharat	yes	no	yes	no	no	(yes)	"
		Khok Katiem	"	"	"	"	"	"	"
Lower Delta	Area surrounded by Lop Buri and Pasak Rivers	Khok Katiem	yes	no	yes	no	yes	(yes)	"
		Roeng Rang	"	"	"	"	"	"	"
		Nakhon Luang	yes	yes	yes	yes	yes	(yes)	The combination of these conceivable measures are considered, but heightening of dike of Chao Phraya River may not be preferable due to adverse influence to the urban areas.
		Pasak Tai	"	"	"	"	"	"	"
	East Bank Area	Rangsit Nua	"	"	"	"	"	"	"
		Rangsit Tai	"	"	"	"	"	"	"
		Khlong Dan	"	"	"	"	no	"	"
		Phra Ong Chai	"	"	"	"	"	"	"
		Ya Nuchit	"	"	"	"	"	"	"
		Chao Ched	yes	yes	yes	yes	yes	yes	The same conceivable measures to East Bank are considered. Besides, improvement of Tha Chin river to increase the capacity to receive the inundation water is also considered.
West Bank Area	Bang Yeehon	"	"	"	"	"	"	"	
	Phrayahantue	"	"	"	"	"	"	"	
	Phrayapimol	"	"	"	"	"	"	"	
	Pashicharoen	"	"	"	"	no	"	"	

Table 7.3.1 DRAINAGE REGIME OF RANGSIT TAI IRRIGATION PROJECT

No.	Drainage Outlet	Drainage Ability							
		Regulator		Pump		Evaporation		Total	
		m ³ /s	million m ³ /day	m ³ /s	million m ³ /day	m ³ /s	million m ³ /day	m ³ /s	million m ³ /day
1	Chao Phraya River	52.49	1.89	36.00	1.99	88.49	3.88 (10.2%)		
2	Chao Phraya River (through BMA)	16.16	1.40	-	-	16.16	1.4 (3.7%)		
3	Gulf of Thailand (Sea Side Canal)	394.64	4.78	225.00	12.47	619.64	17.25 (45.6%)		
4	Bang Pakhong River	145.73	2.10	84.00	4.66	229.73	6.76 (17.9%)		
	Sub Total								
5	Evaporation							29.29 (77.4%)	8.53 (22.6%)
	Total							(3.4 mm/day)	37.82 (100%)

Note) Evaporation : 3.4 mm/day or 8.53 million m³/day

**Table 7.4.1 WATER BALANCE OF PADDY FIELD DURING
HIGH RIVER WATER LEVEL (Bang Bal Area)**

C7A, Angthong, Chao Phraya River				Inundation Condiiton (Bang Bal: A=98 km2)			
Ground height : El. 5.0 m				Water Balance (mm)	Volume (mil. M3)	Depth (m)	Area (km2)
Year	From	To	Period				
1976	Sep. 24	Nov. 19	57 days	28			
1977	RSLGL						
1978	Sep. 24	Nov. 6	43 days	119*	1.9	0.2	2
1979	Sep. 13	Nov. 8	56 days	119*	1.9	0.2	2
1980	RSLGL						
1981	RSLGL						
1982	RSLGL						
1983	Oct. 12	Dec. 8	57 days	240*	13.7	0.8	45.0
1984	RSLGL						
1985	Oct. 22	Nov. 12	21 days	89			
1986	RSLGL						
1987	Sep. 24	Oct. 22	28 days	69			
1988	Oct. 19	Nov. 8	20 days	120*	20	0.2	2
1989	RSLGL						
1990	RSLGL						
1991	RSLGL						
1992	RSLGL						
1993	RSLGL						
1994	Sep. 17	Oct. 21	34 days	35			35
1995	Aug. 20	Nov. 26	97 days	180*	7.8	0.6	30
Frequen	9/20			5/20			5/20

* : Overflow from the paddy dike with a height of 10 cm.

NR : No record

RSLGL : River stage lower than ground height of back marsh in the vicinity

Table 7.4.2 WATER BALANCE OF EAST BANK AREA (Rangsit Tai Area)

Year	Rangsit Tai (A=925 km ²)			
	Water Balance	Inundation Condition		
		Volume (mil. M3)	Area (km ²)	Depth (m)
1976	172.7	67.2	300.0	0.6
1977	100.0	0.0	0.0	0.0
1978	172.7	67.2	300.0	0.6
1979	100.0	0.0	0.0	0.0
1980	108.5	7.9	15.0	0.3
1981	100.0	0.0	0.0	0.0
1982	100.0	0.0	0.0	0.0
1983	360.3	240.8	580.0	1.0
1984	138.9	36.0	20.0	0.4
1985	104.1	3.8	10.0	0.1
1986	129.8	27.6	20.0	0.4
1987	123.9	22.1	15.0	0.3
1988	129.8	27.6	20.0	0.4
1989	123.9	22.1	15.0	0.3
1990	253.4	141.9	440.0	0.8
1991	100.0	0.0	0.0	0.0
1992	164.6	59.8	300.0	0.6
1993	100.0	0.0	0.0	0.0
1994	100.0	0.0	0.0	0.0
1995	241.3	130.7	420.0	0.8
1996	146.5	43.0	200.0	0.5
Ave.	146.2	42.7	200.0	0.5

Table 7.4.3 WATER BALANCE OF EAST BANK AREA (Khlung Dan Area)

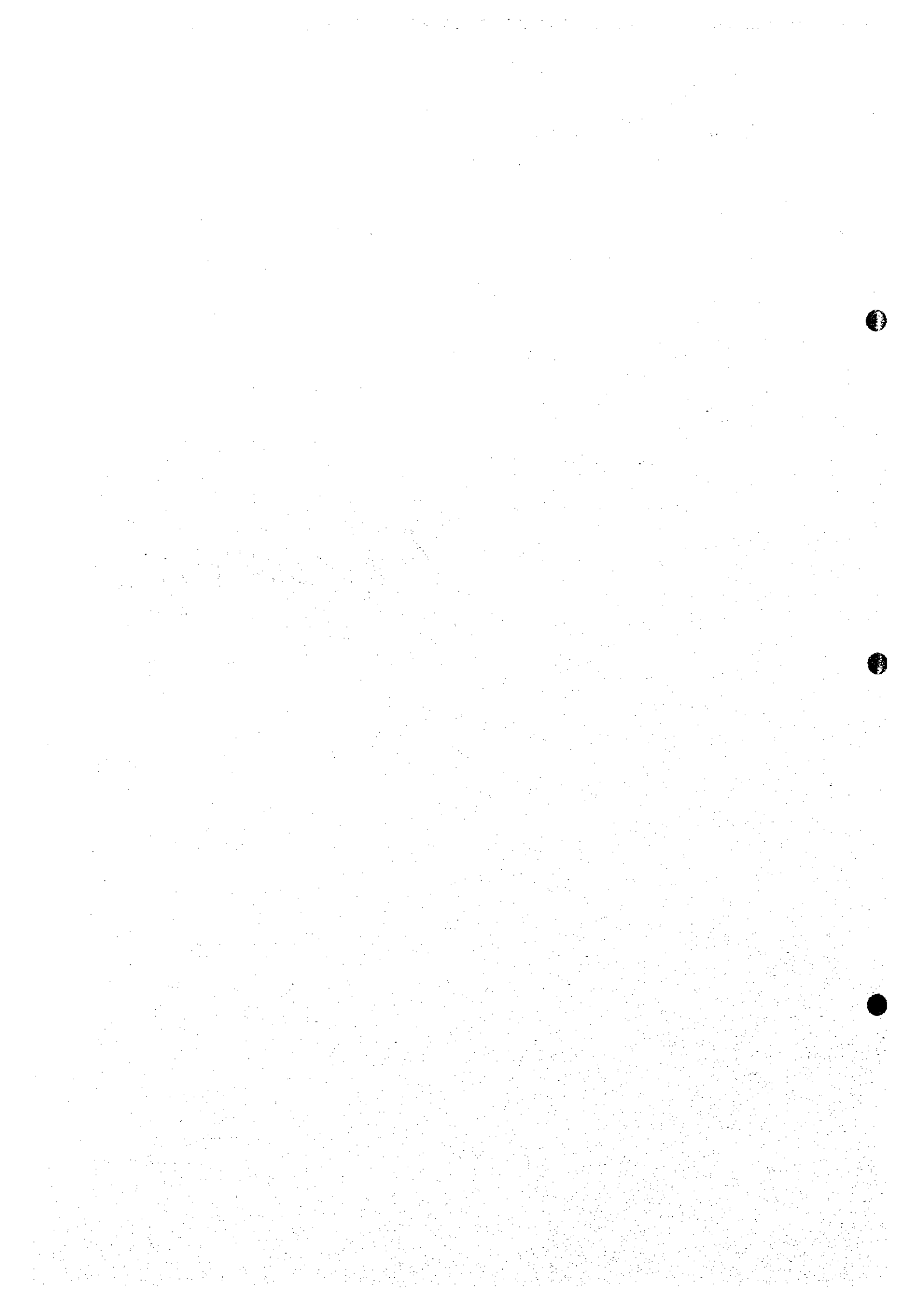
Year	East Bank (Khlung Dan: A=910 km ²)			
	Water Balance	Inundation Condition		
		Volume (mil. M ³)	Area (km ²)	Depth (m)
1976	172.7	66.2	250.0	0.3
1977	100.0	0.0	0.0	0.0
1978	172.7	66.2	250.0	0.3
1979	100.0	0.0	0.0	0.0
1980	108.5	7.7	10.0	0.1
1981	100.0	0.0	0.0	0.0
1982	100.0	0.0	0.0	0.0
1983	360.3	236.9	850.0	0.6
1984	138.9	35.4	200.0	0.2
1985	104.1	3.7	5.0	0.1
1986	129.8	27.1	150.0	0.2
1987	123.9	21.7	130.0	0.2
1988	129.8	27.1	150.0	0.2
1989	123.9	21.7	130.0	0.2
1990	253.4	139.6	550.0	0.5
1991	100.0	0.0	0.0	0.0
1992	164.6	58.8	220.0	0.3
1993	100.0	0.0	0.0	0.0
1994	100.0	0.0	0.0	0.0
1995	241.3	128.6	530.0	0.5
1996	146.5	42.3	200.0	0.3
Ave.	146.2	42.1	200.0	0.3

Table 7.4.4 Priority of Drainage System Improvement

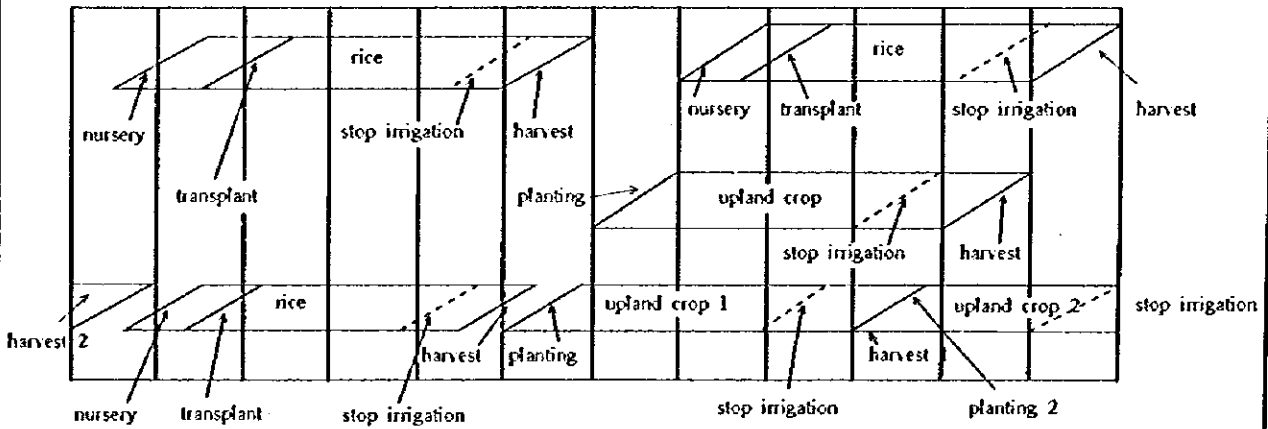
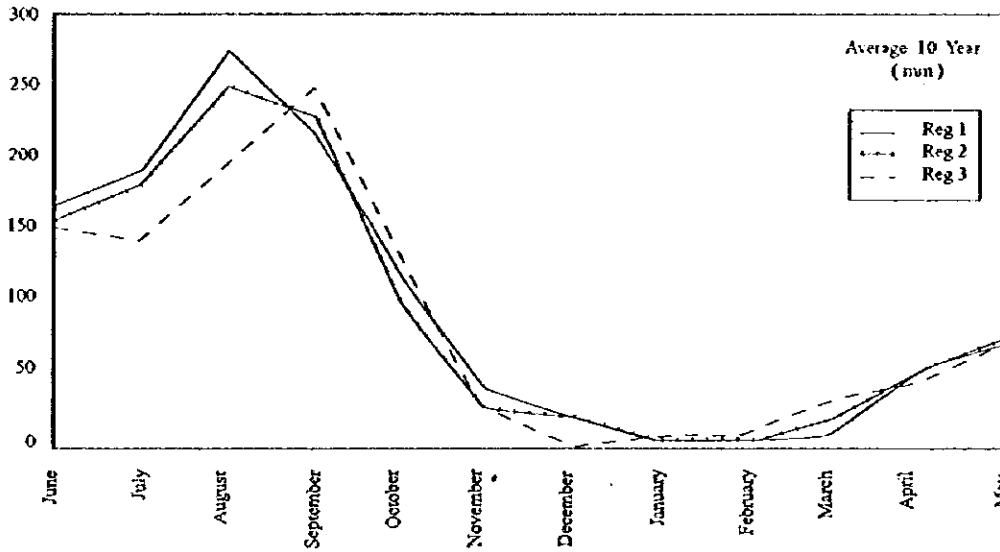
Study Area	Priority	Division of Area	Priority	Name of Project Area	Priority	
Higer Delta	2	Norhtern Part surrounded by Thachin and Noi Rivers	2-4	Boremathad	2-4-4	
				Samdhuk	2-4-3	
				Chanasut	2-4-2	
				Phak Hai	2-4-1	
		Area surrounded by Noi and Chao Phraya Rivers	2-3		Boremathad	2-3-4
					Yamaneo	2-3-3
					Phak Hai	2-3-2
					Bang Bal	2-3-1
		Area surrounded by Chao Phraya and Lop Buri	2-1		Maharat	2-1-2
					Khok Katiem	2-1-2
		Area surrounded by Lop Buri and Pasak Rivers	2-2		Khok Katiem	2-2-2
					Roeng Rang	2-2-1
Lower Delta	1	East Bank Area	1-1	Nakhon Luang	1-1-5	
				Pasak Tai	1-1-6	
				Rangsit Nua	1-1-4	
				Rangsit Tai	1-1-3	
				Khlong Dan	1-1-1	
				Phra Ong Chai Ya Nuchit	1-1-2	
		West Bank Area	1-2		Chao Ched Bang Yeehon	1-2-4
					Phrayahantue	1-2-3
					Phraypimol	1-2-2
					Pashicharoen	1-2-1



Figures



NORTHERN REGION



Upland crop e.g tobacco , groundnut , soybean , garlic , vegetables

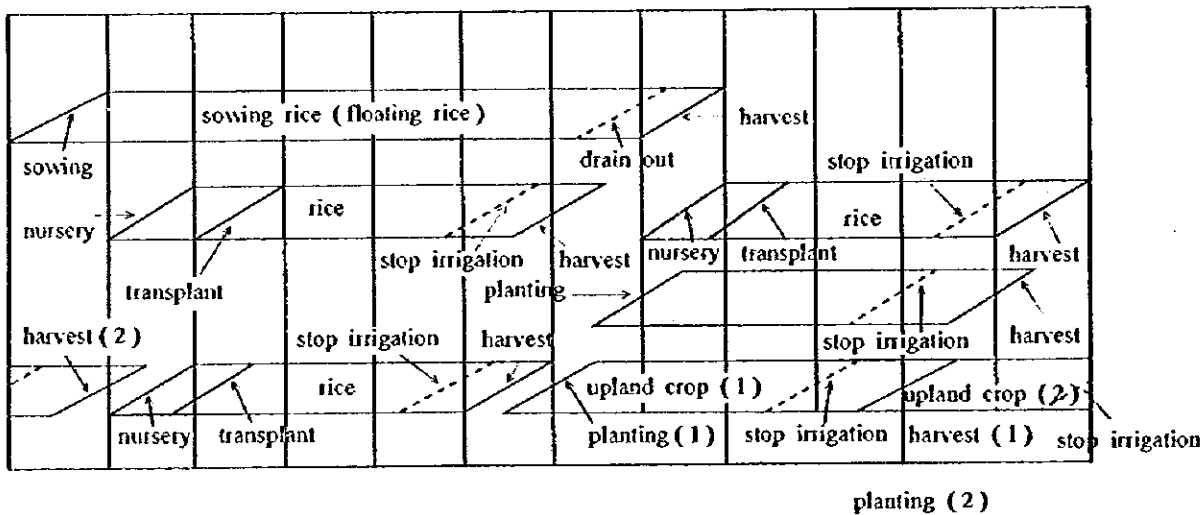
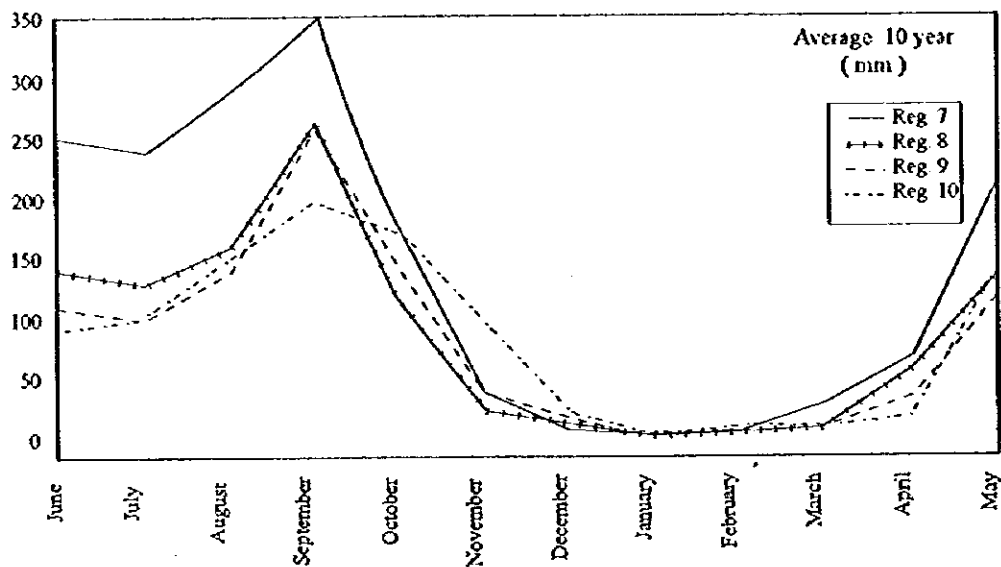
Source : RID O & M

STUDY ON INTEGRATED PLAN FOR FLOOD MITIGATION IN CHAO PHRAYA RIVER BASIN

CTI ENGINEERING CO., LTD AND INA CORPORATION

**Fig. 3.1.1
CROPPING PATTERNS IN IRRIGATION PROJECT (1/2)**

CENTRAL REGION



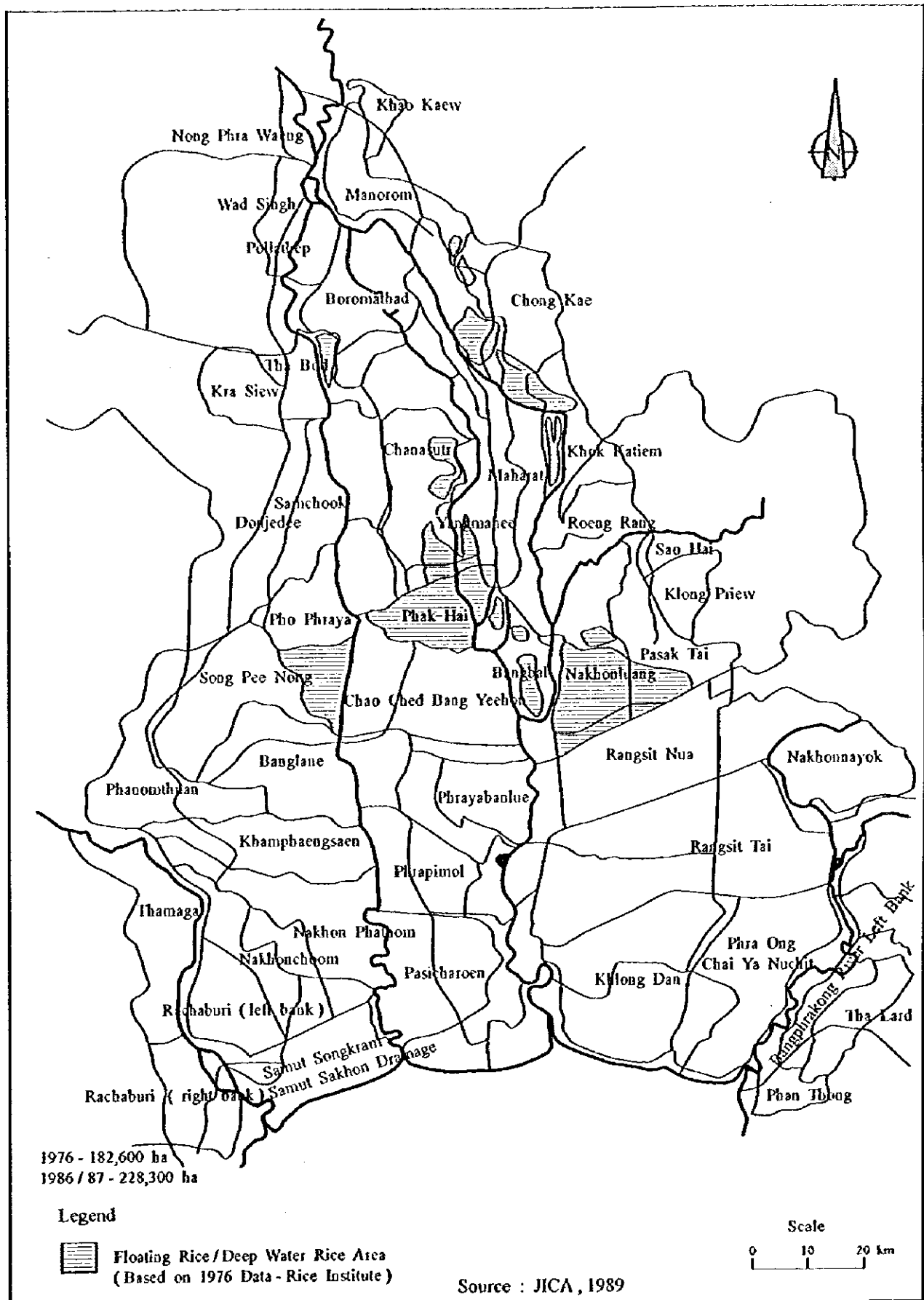
Upland crop e.g groundnut , mungbean , sesame , vegetables

Source : RID O & M

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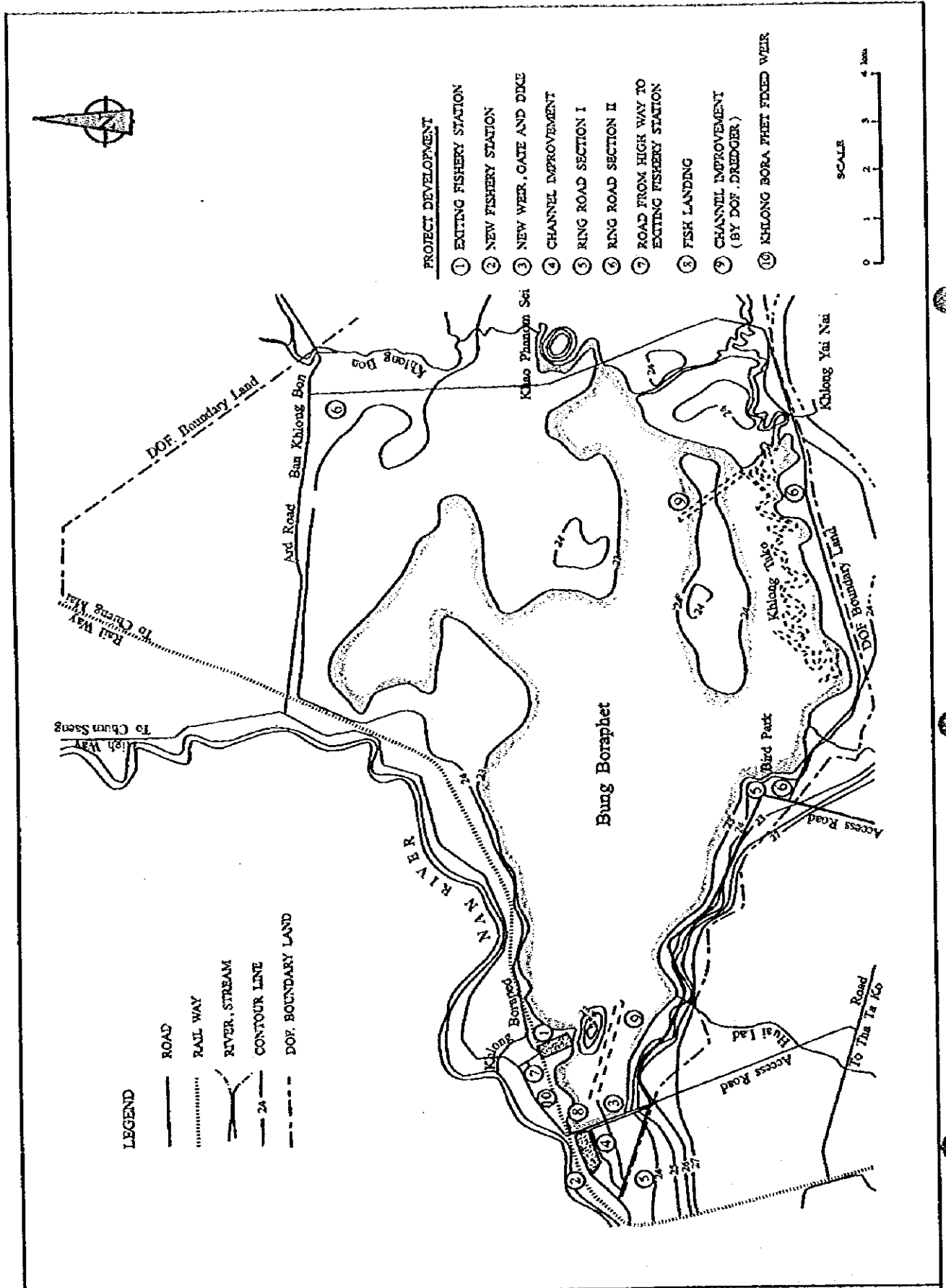
Fig. 3.1.1
CROPPING PATTERNS IN IRRIGATION PROJECT (2/2)



STUDY ON INTEGRATED PLAN FOR FLOOD MITIGATION IN CHAO PHRAYA RIVER BASIN

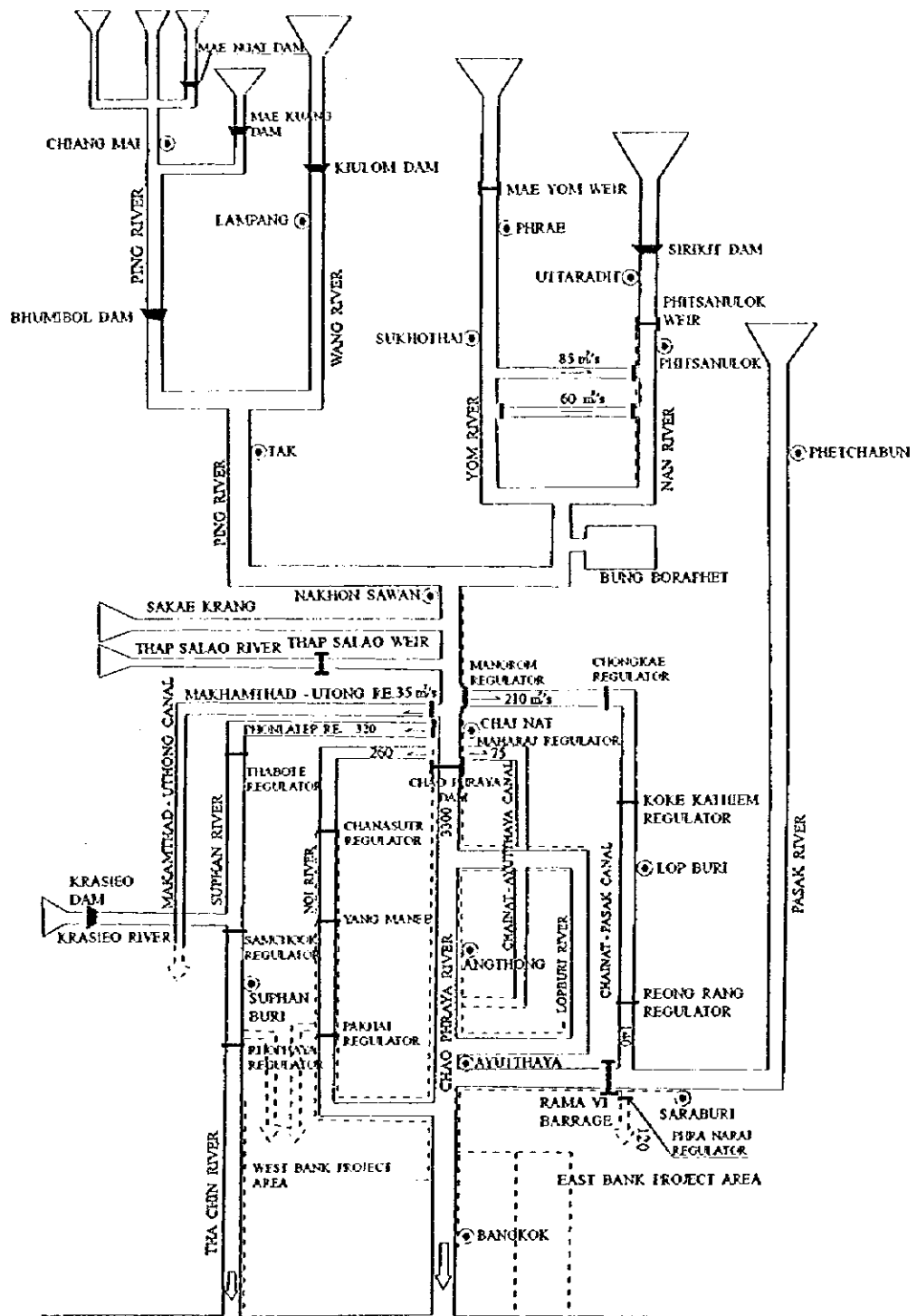
Fig. 3.1.2
DEEP WATER / FLOATING RICE CULTIVATION

CTI ENGINEERING CO., LTD AND INA CORPORATION



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Fig. 3.1.3
 GENERAL LAYOUT OF THE BUNG BORA-PHET PROJECT



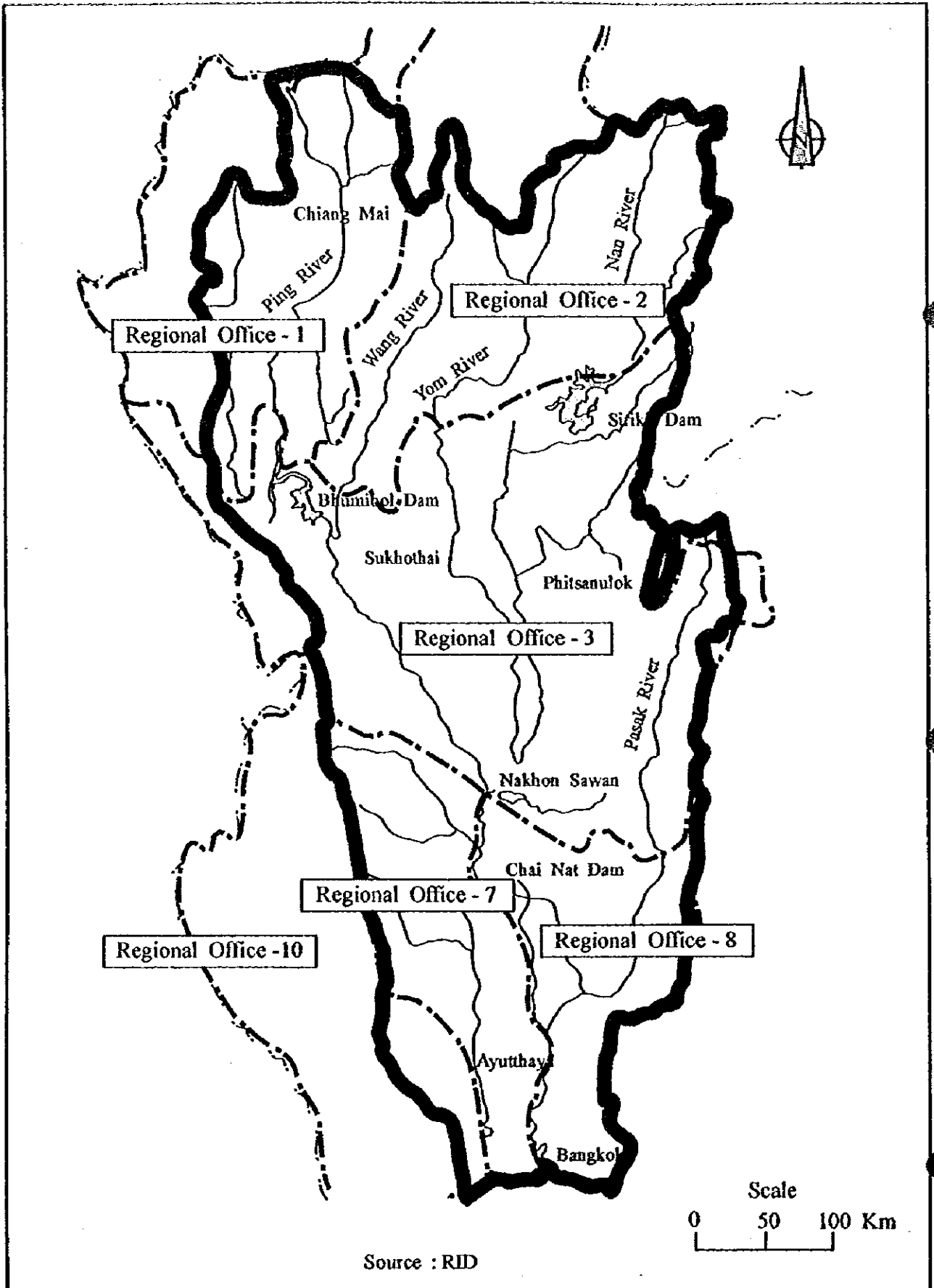
LEGEND

- : EXISTING DAM
- : DIVERSION WEIR OR BARRAGE
- : MAJOR REGULATOR OR GATES
- : FLOOD PROTECTION DIKE OR FORDER

STUDY ON INTEGRATED PLAN FOR FLOOD MITIGATION IN CHAO PHRAYA RIVER BASIN

CII ENGINEERING CO., LTD AND INA CORPORATION

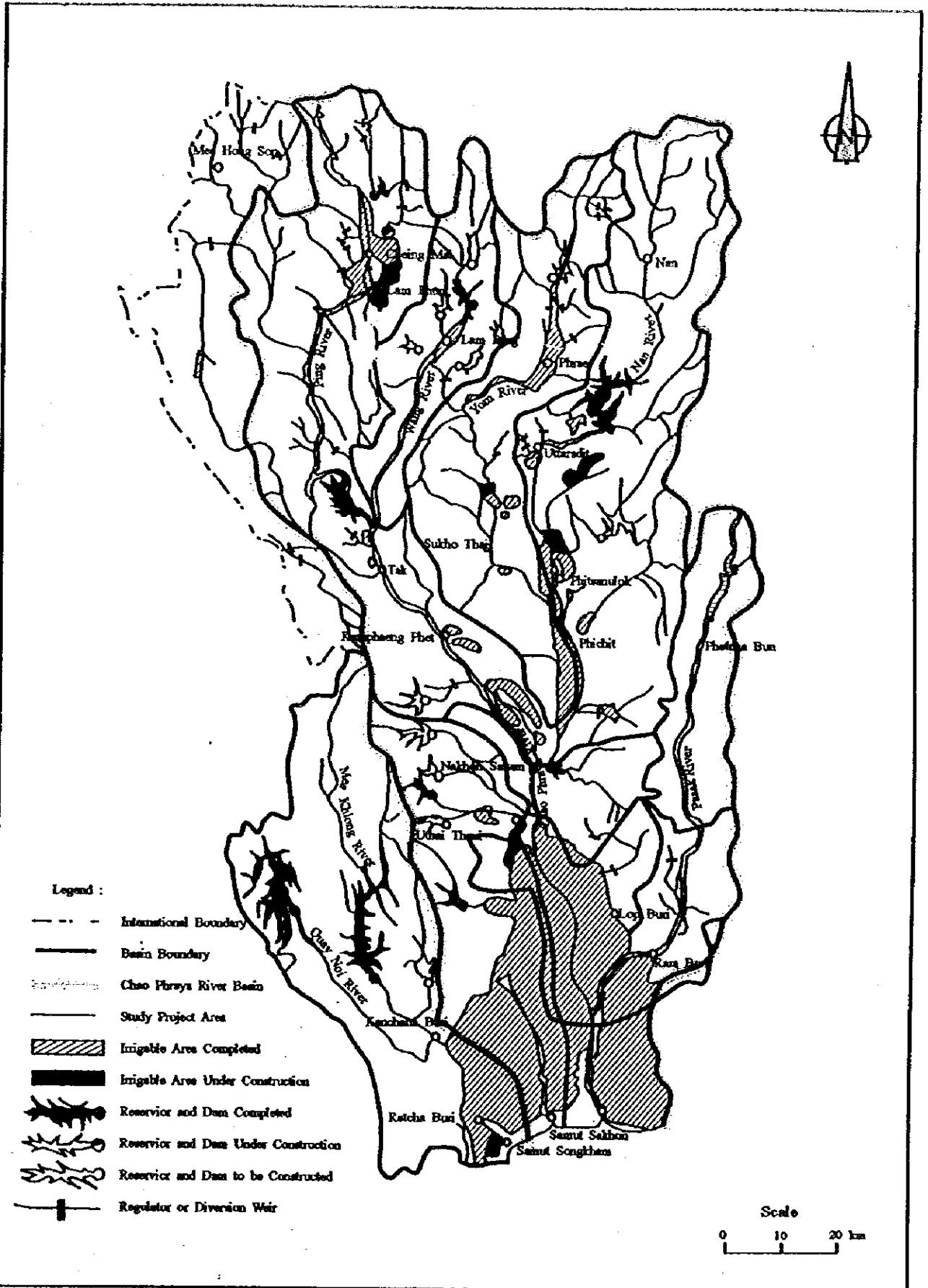
Fig. 3.2.1 CHAO PHRAYA RIVER AND CANAL SYSTEM



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CTI ENGINEERING CO., LTD AND INA CORPORATION

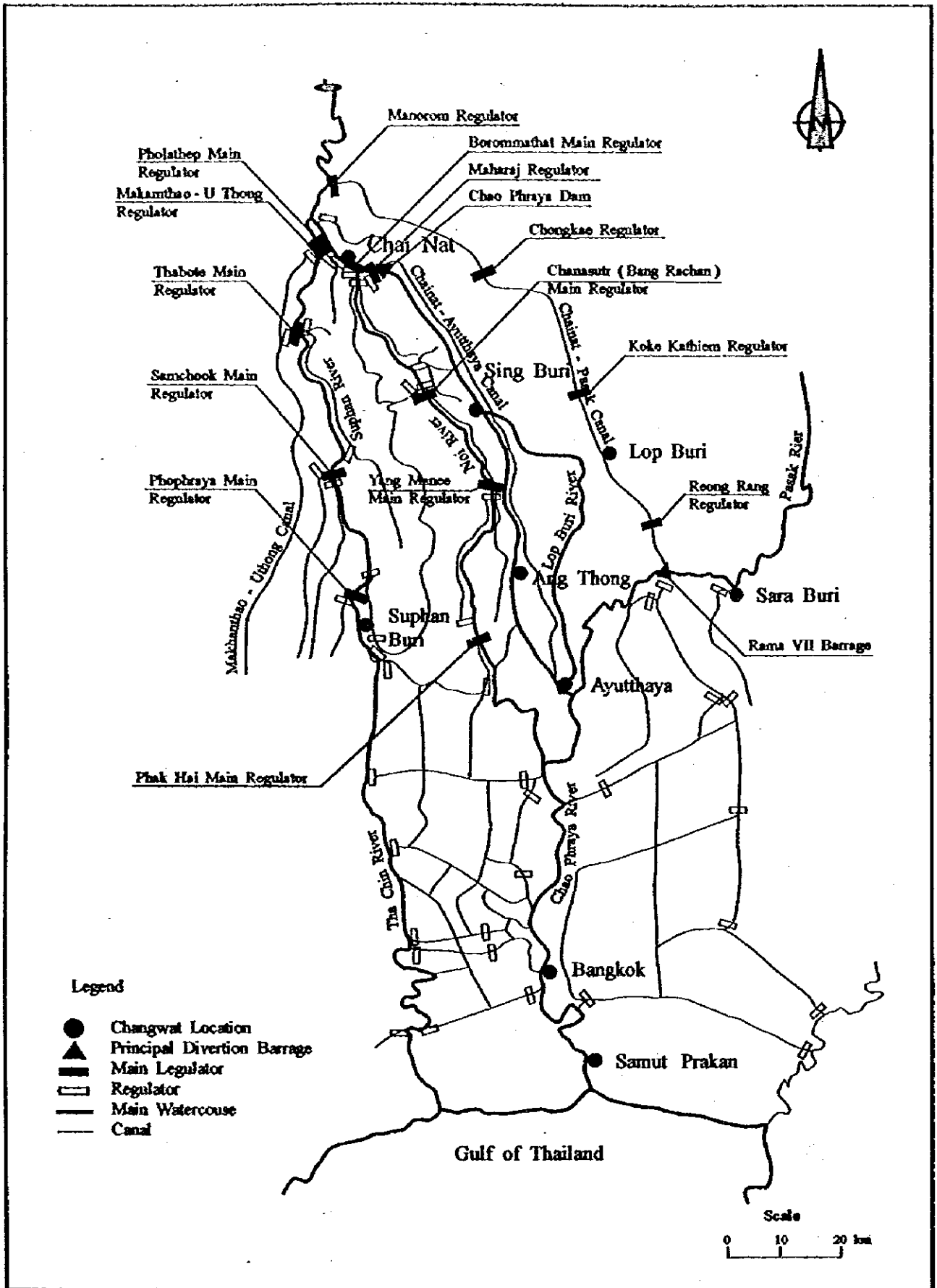
Fig. 3.2.2
RID REGIONAL OFFICE BOUNDARIES



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Fig. 3.2.3
IRRIGATION PROJECTS IN THE BASIN

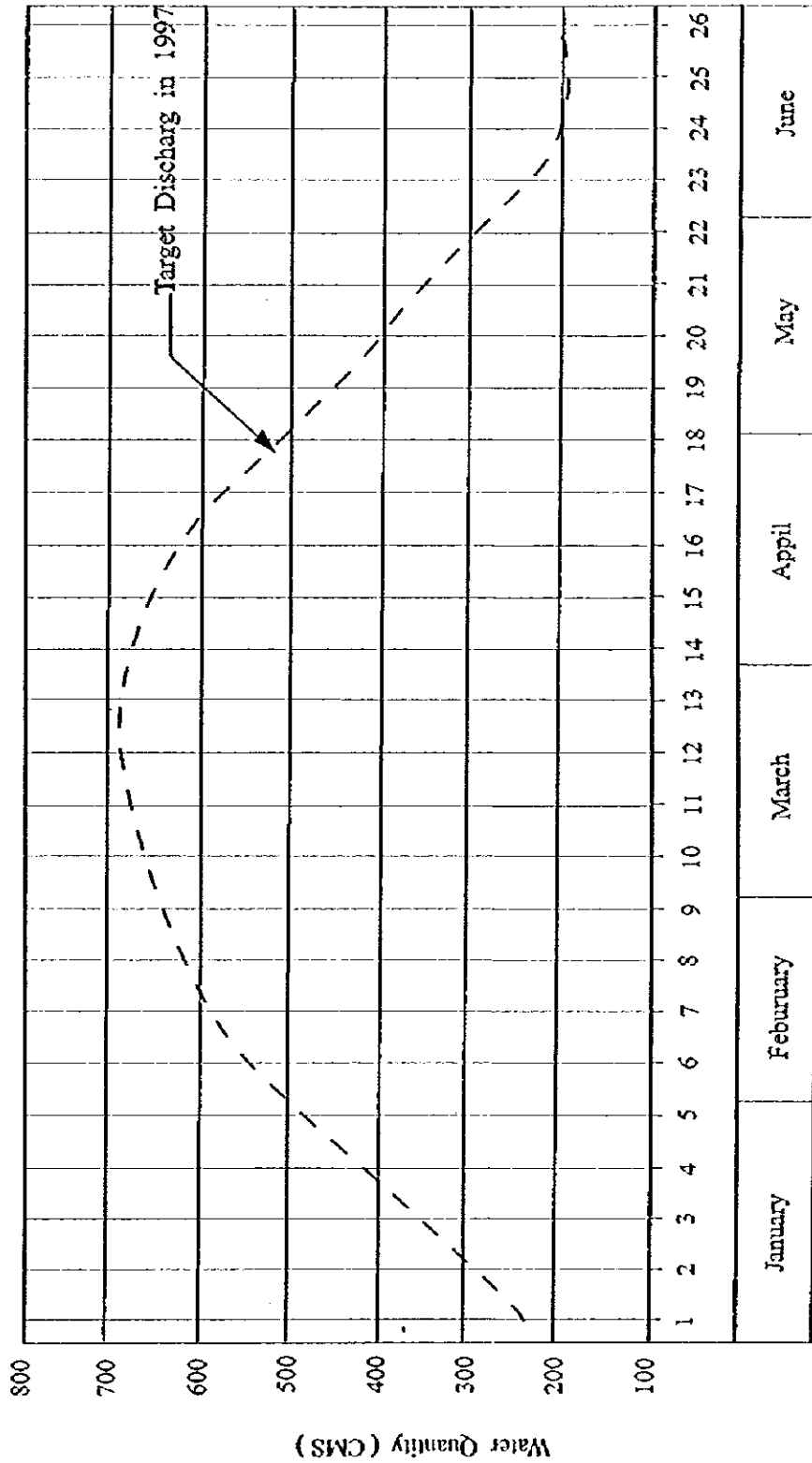


STUDY ON INTEGRATED PLAN FOR FLOOD MITIGATION IN CHAO PHRAYA RIVER BASIN

CTI ENGINEERING CO., LTD AND INA CORPORATION

Fig. 3.2.4 EXISTING MAIN CANAL & REGULATORS IN THE CHAO PHRAYA DELTA

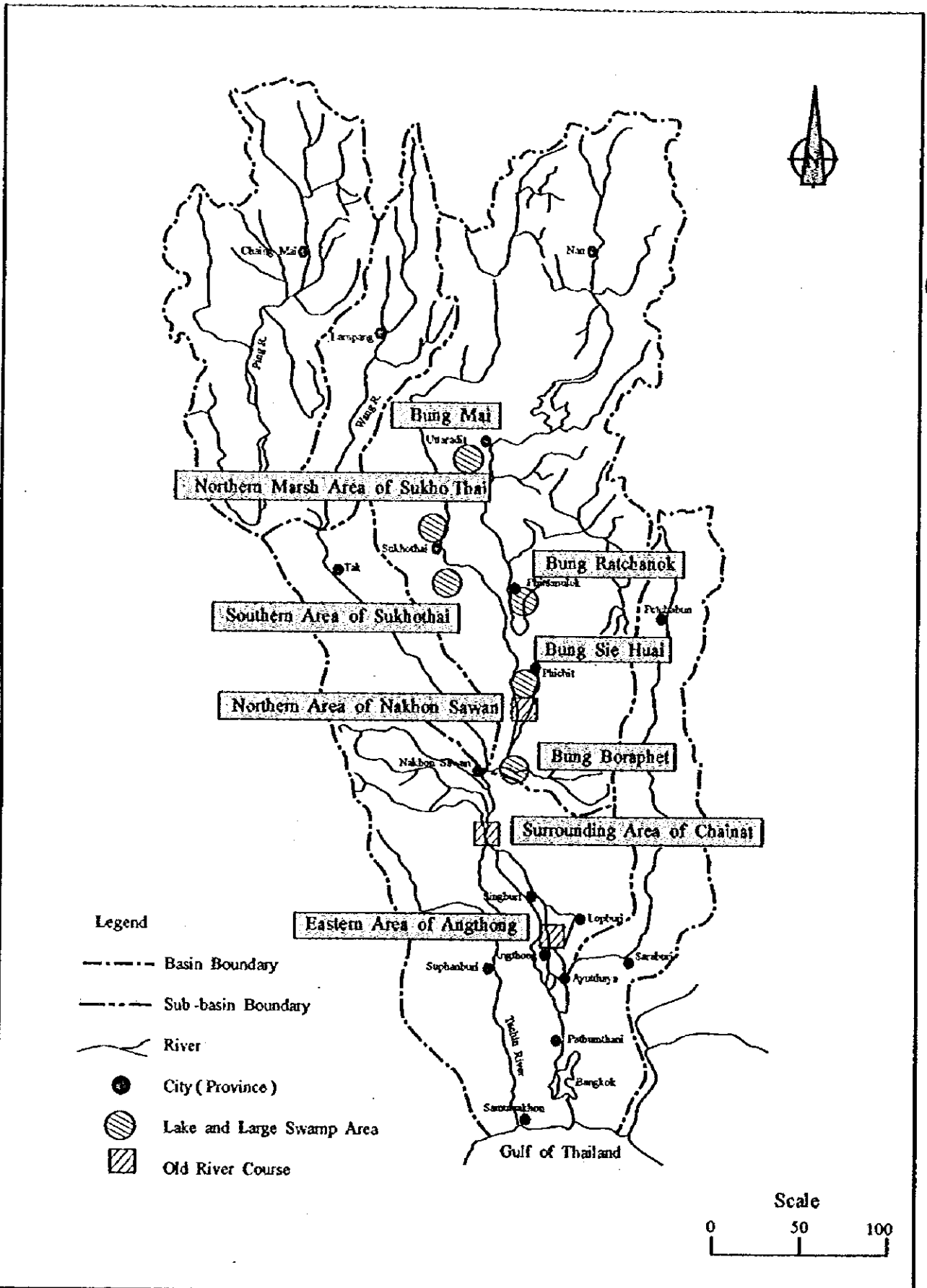
DISCHARGE FROM BHUMBOL AND SIRIKIT DAMS
IN DRY SEASON IN 1997



STUDY ON INTEGRATED PLAN FOR FLOOD
MITIGATION IN CHAO PHRAYA RIVER BASIN

CTI ENGINEERING CO., LTD AND INA CORPORATION

Fig. 3.2.5
PROPOSED IRRIGATION WATER DAMAND
TO BHUMPHOL AND SHIRIKIT DAMS IN
DRY SEASON IN 1997



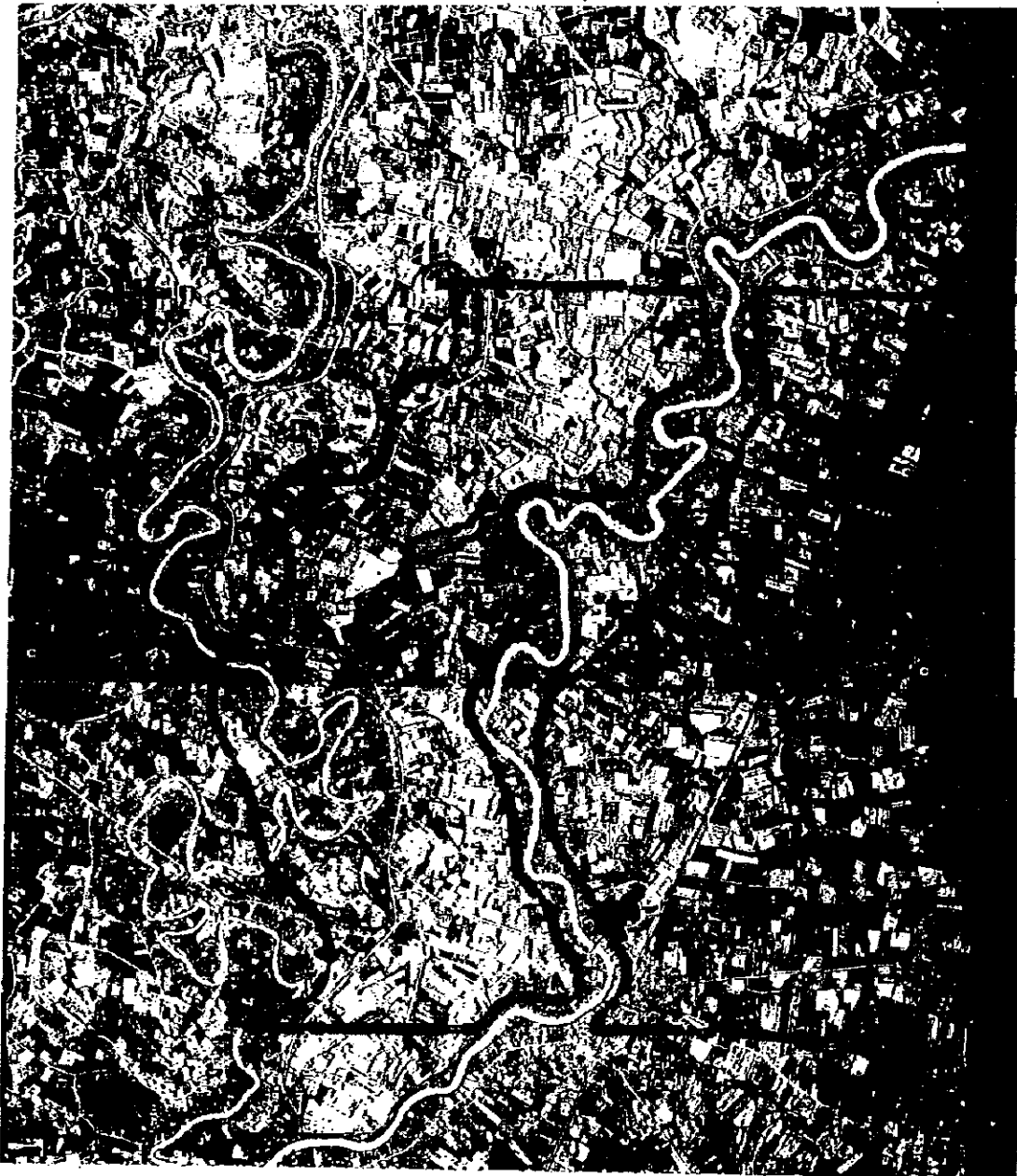
STUDY ON INTEGRATED PLAN FOR FLOOD MITIGATION IN CHAO PHRAYA RIVER BASIN

CTI ENGINEERING CO., LTD AND INA CORPORATION

Fig. 4.1.1 WATER AREA OF LAKE AND LARGE SWAMP

Northern Area of Nakhon Sawan

1995



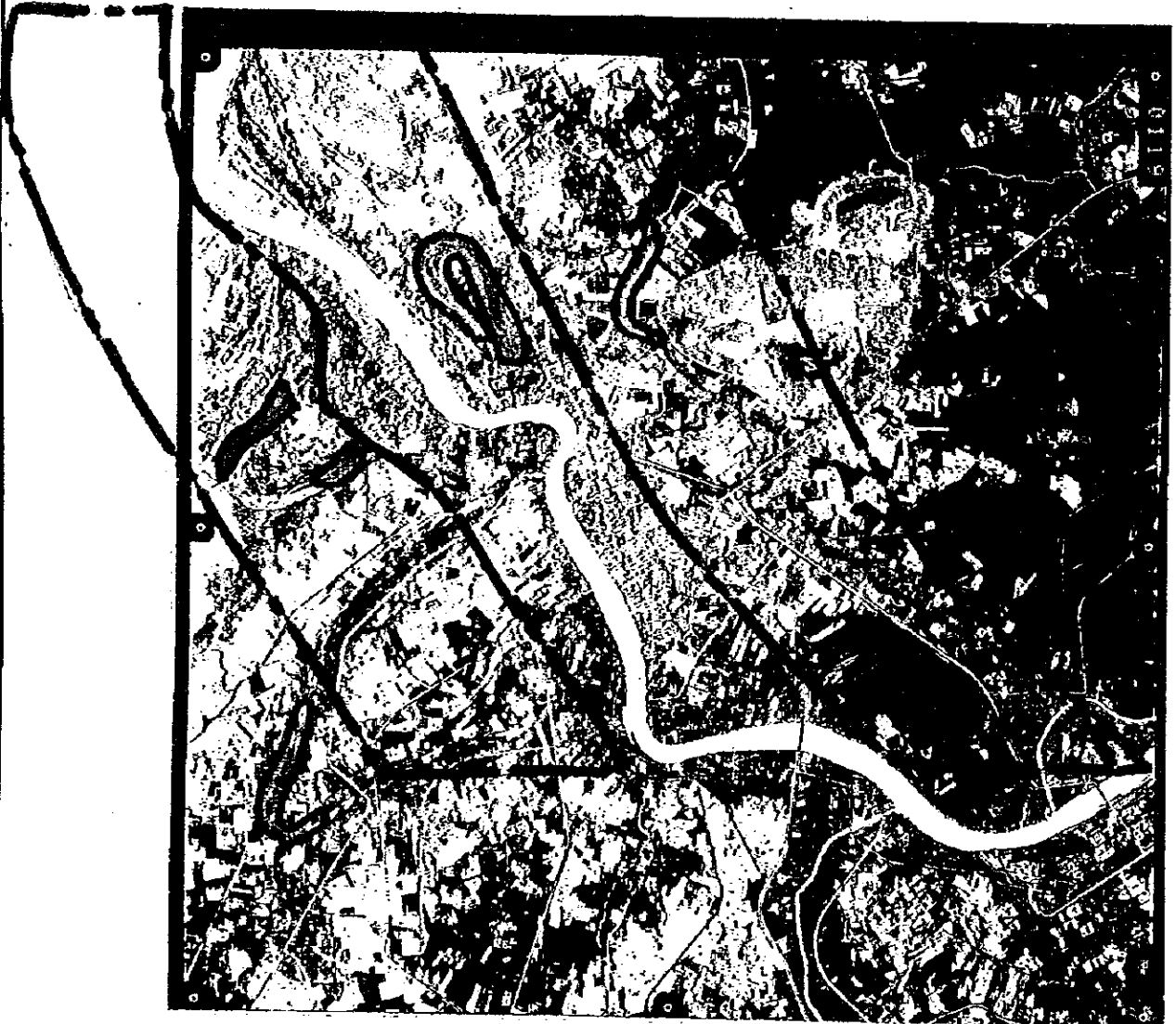
STUDY ON INTEGRATED PLAN FOR FLOOD
MITIGATION IN CHAO PHRAYA RIVER BASIN

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Fig. 4.2.1
WATER AREA OF OLD RIVER COURSE
(1/3)

Surrounding Area of Chainat

1994



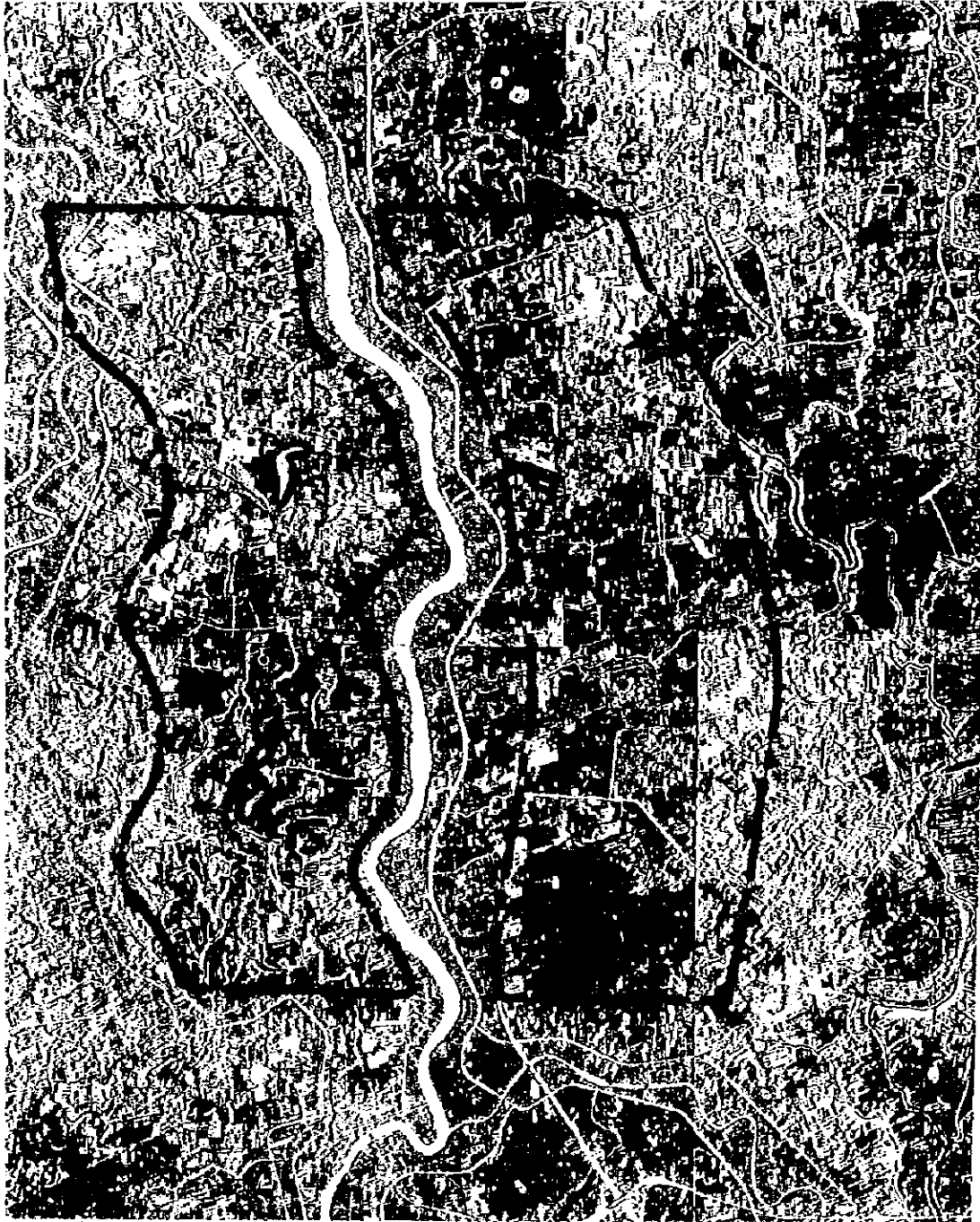
STUDY ON INTEGRATED PLAN FOR FLOOD
MITIGATION IN CHAO PHRAYA RIVER BASIN

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Fig. 4.2.1
WATER AREA OF OLD RIVER COURSE
(2/3)

Eastern Area of Angthong

1994

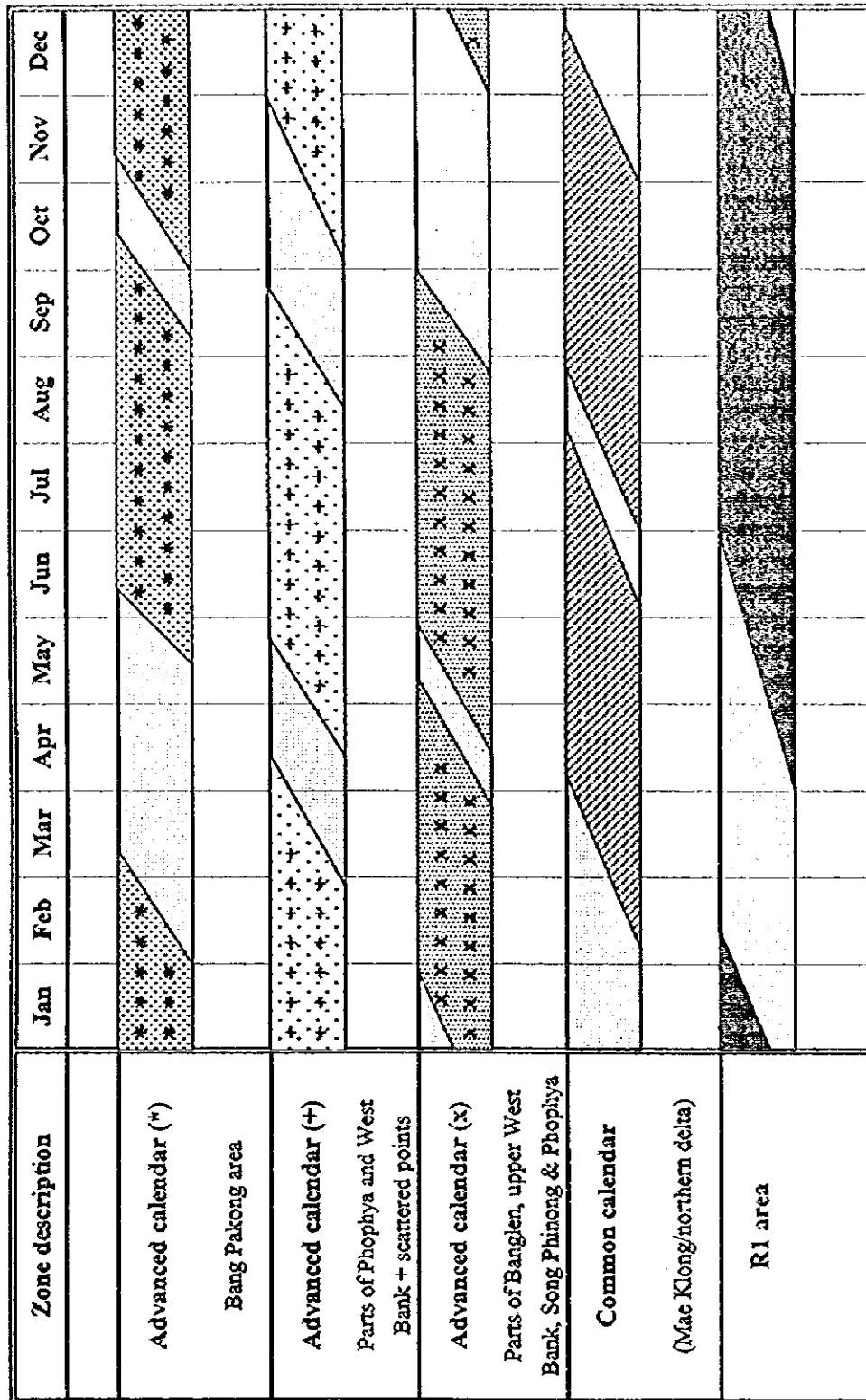


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MITIGATION IN CHAO PHRAYA RIVER BASIN

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Fig. 4.2.1
WATER AREA OF OLD RIVER COURSE
(3/3)

CROPPING PATTERN IN CAO PHRAYA DELTA



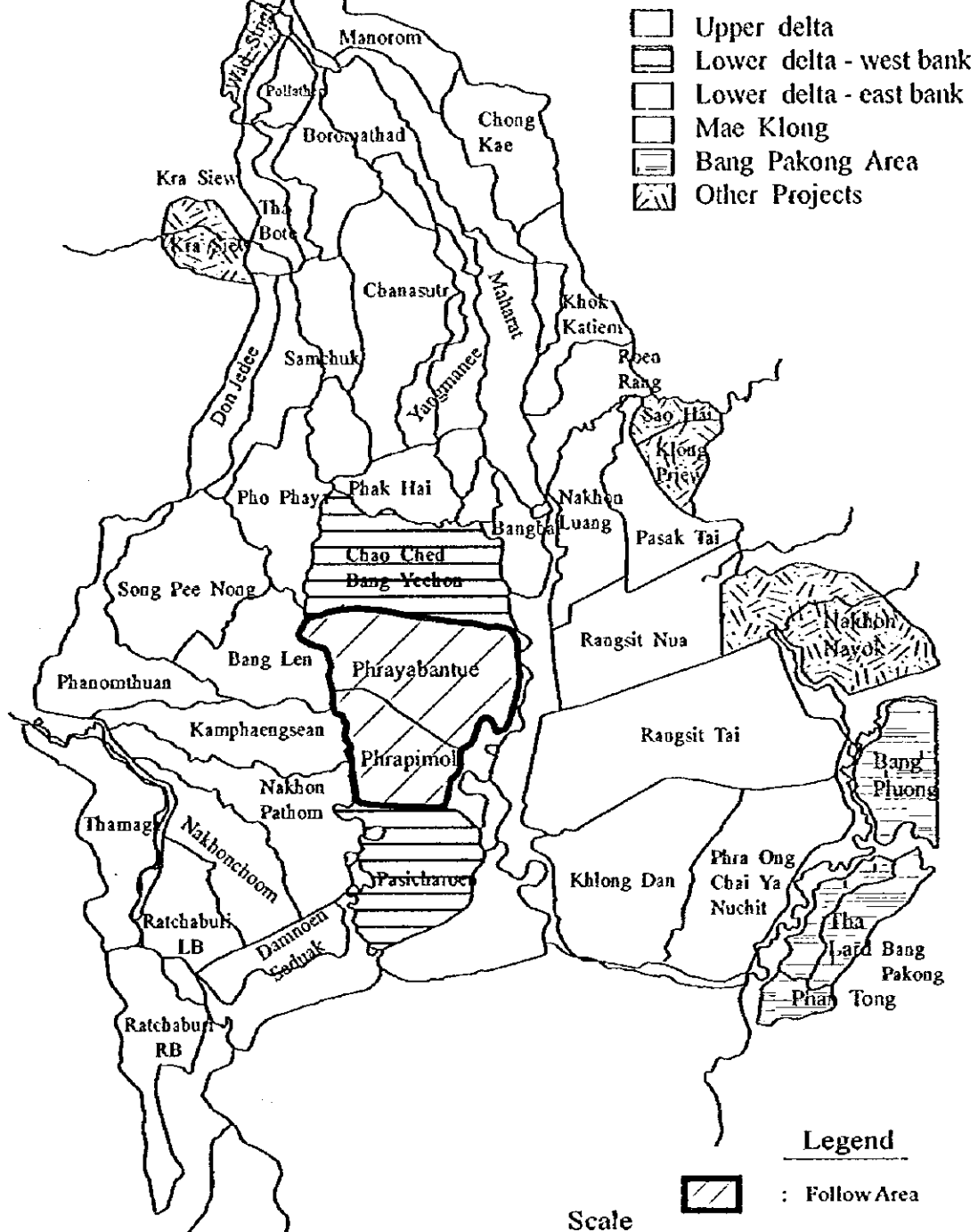
STUDY ON INTEGRATED PLAN FOR FLOOD MITIGATION IN CHAO PHRAYA RIVER BASIN

CTI ENGINEERING CO., LTD AND INA CORPORATION

Fig. 4.3.1
CROPPING PATTERN IN CHAO PHRAYA DELTA



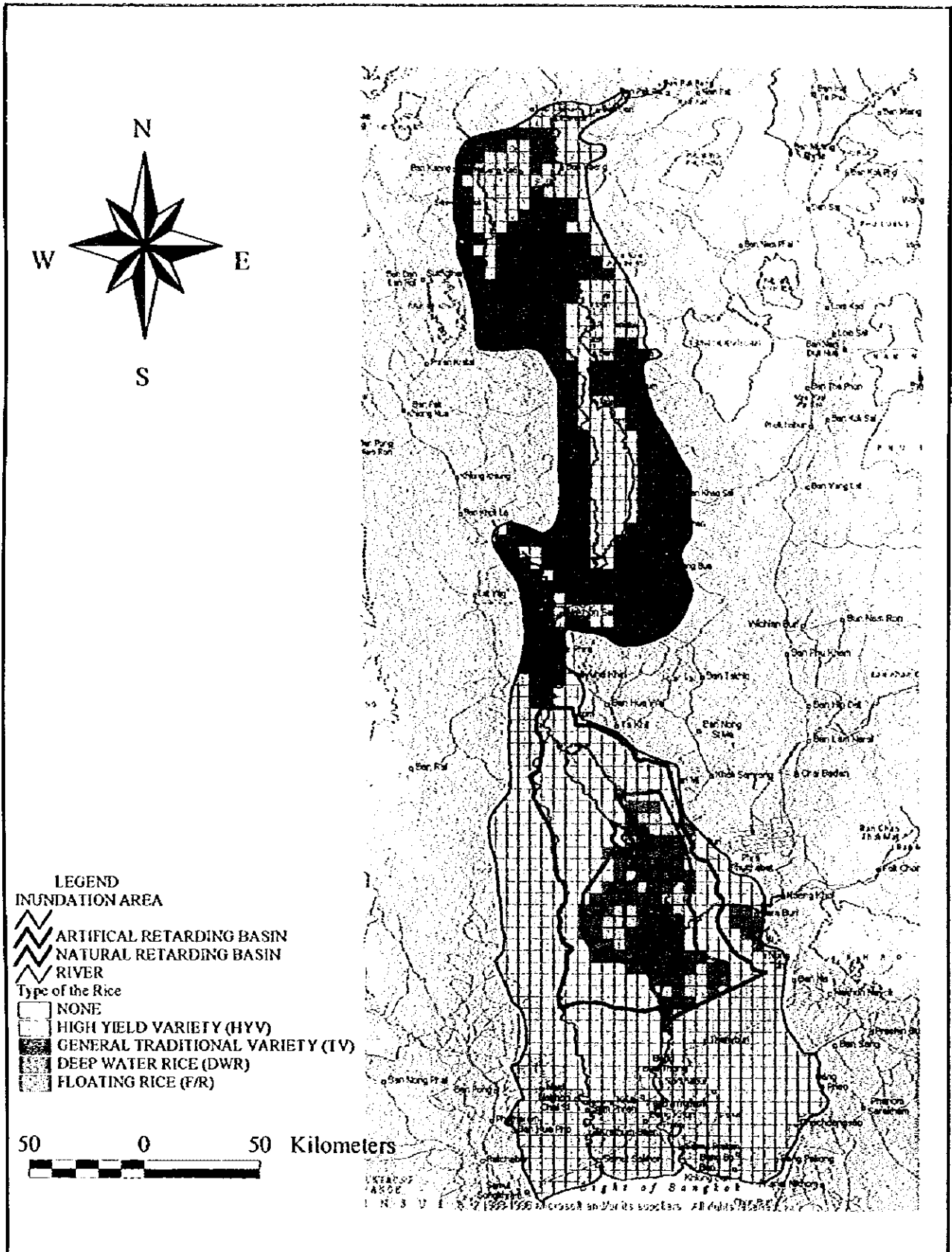
Main zones and irrigation Projects
in the Central Plain of Thailand



STUDY ON INTEGRATED PLAN FOR FLOOD
MITIGATION IN CHAO PHRAYA RIVER BASIN

CTI ENGINEERING CO., LTD AND INA CORPORATION

Fig. 4.3.2
LOCATION OF FALLOW AREA



STUDY ON INTEGRATED PLAN FOR FLOOD MITIGATION IN CHAOPHRAYA RIVER BASIN

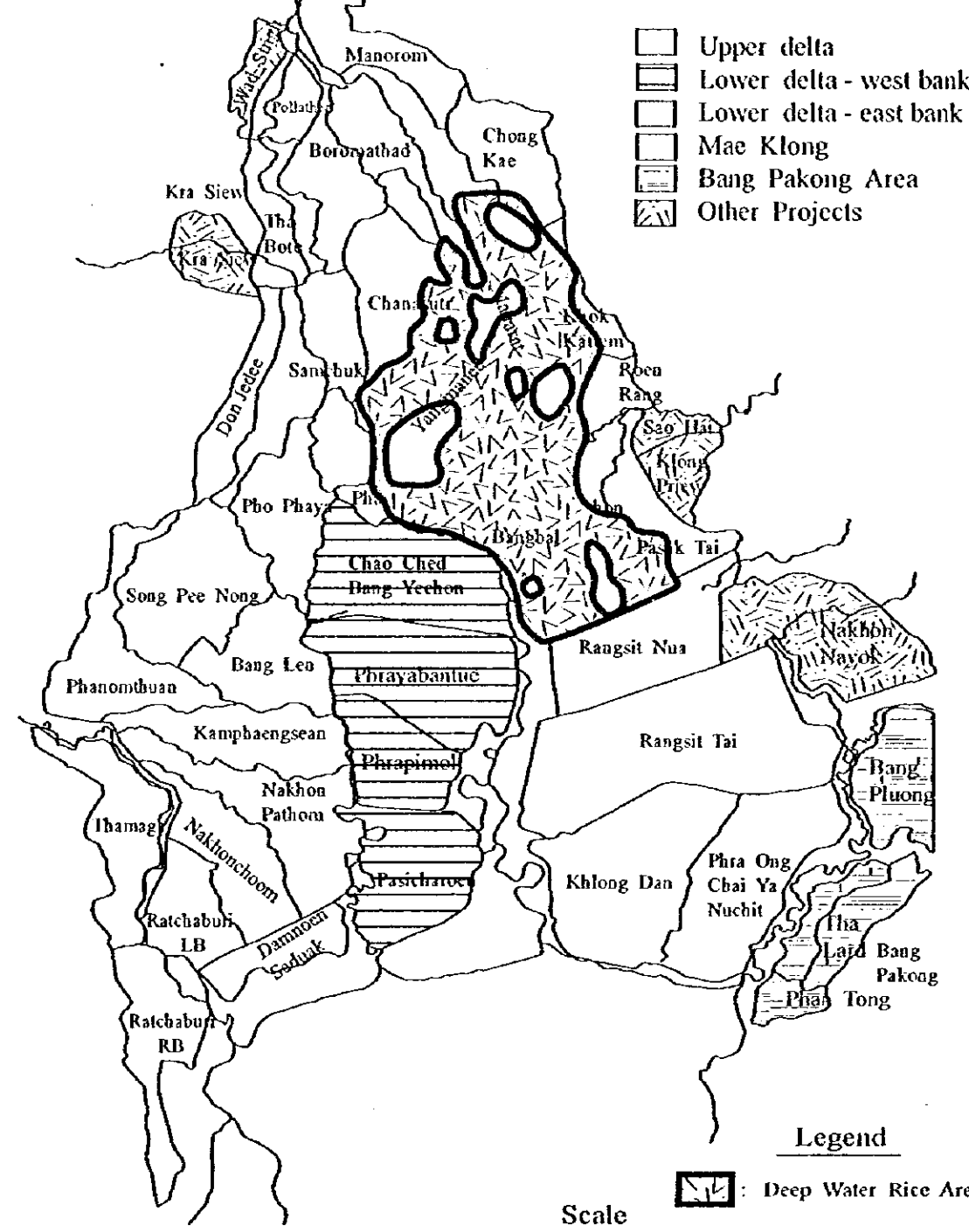
CTI ENGINEERING CO.LTD., & INA CORPORATION

Fig . 4.3.3

PROPOSED RETARDING BASIN



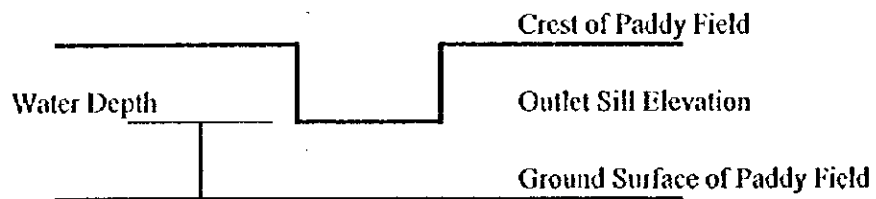
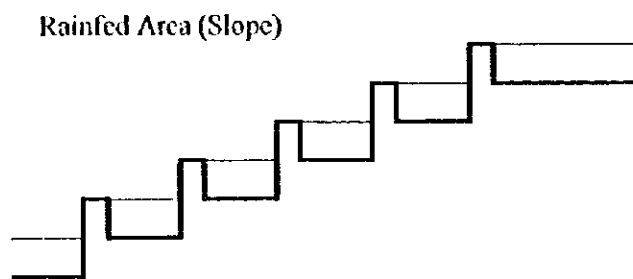
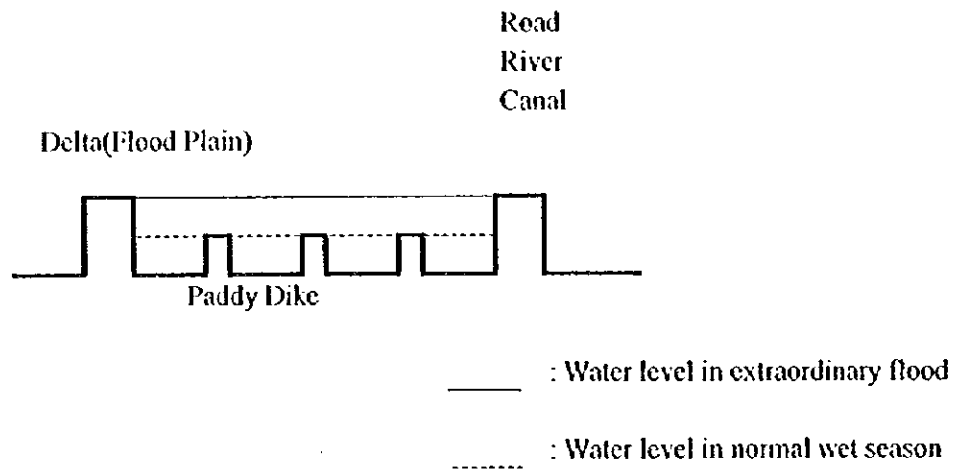
Main zones and irrigation Projects
in the Central Plain of Thailand



Scale 0 15 30Km Source : DORAS , 1996

STUDY ON INTEGRATED PLAN FOR FLOOD MITIGATION IN CHAO PHRAYA RIVER BASIN
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Fig. 4.3.4
LOCATION OF DEEP WATER RICE AREA

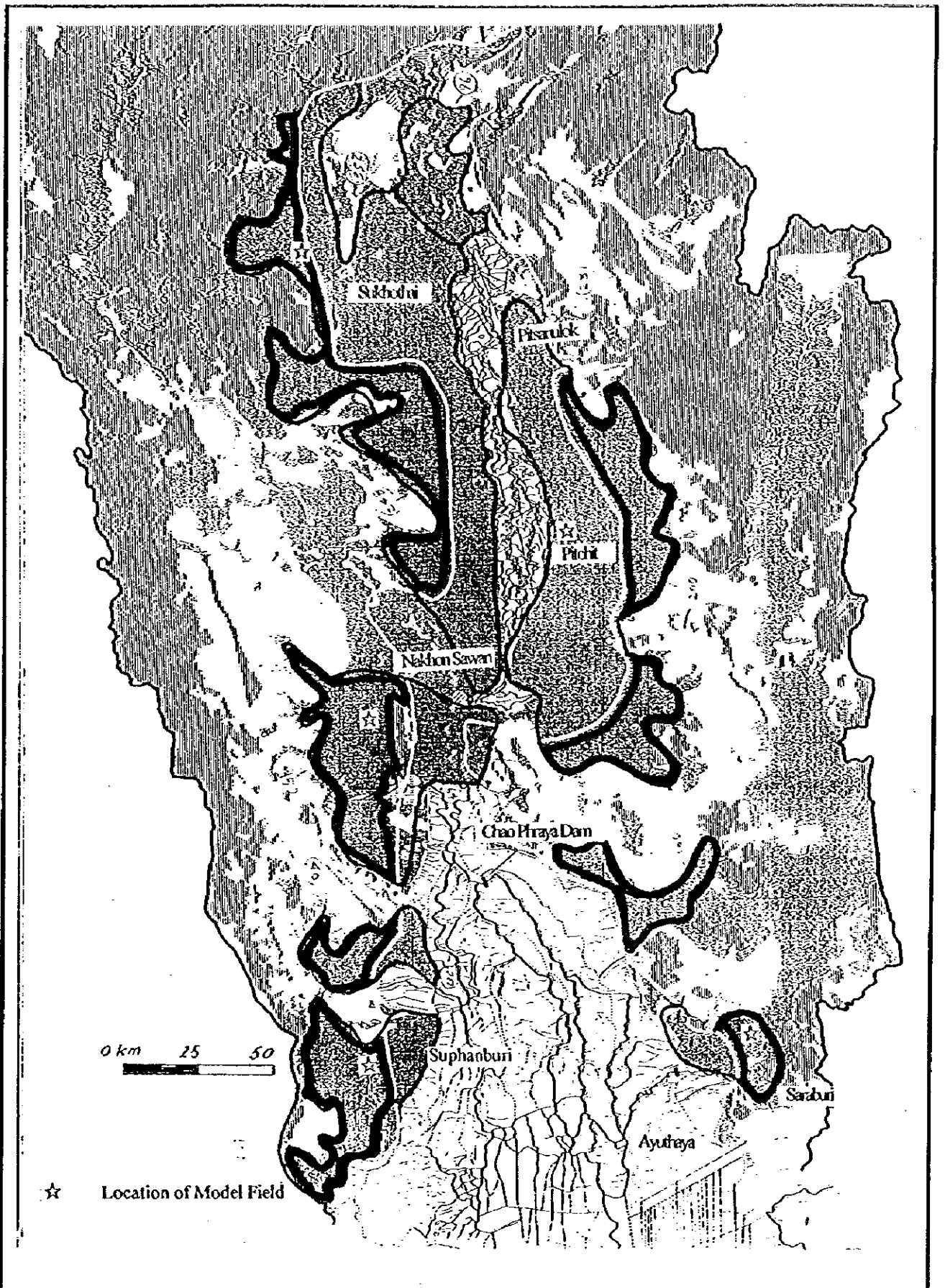


STUDY ON INTEGRATED PLAN FOR FLOOD
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Fig. 4.3.5

MODEL OF RAISING DIKE IN PADDY
FIELD

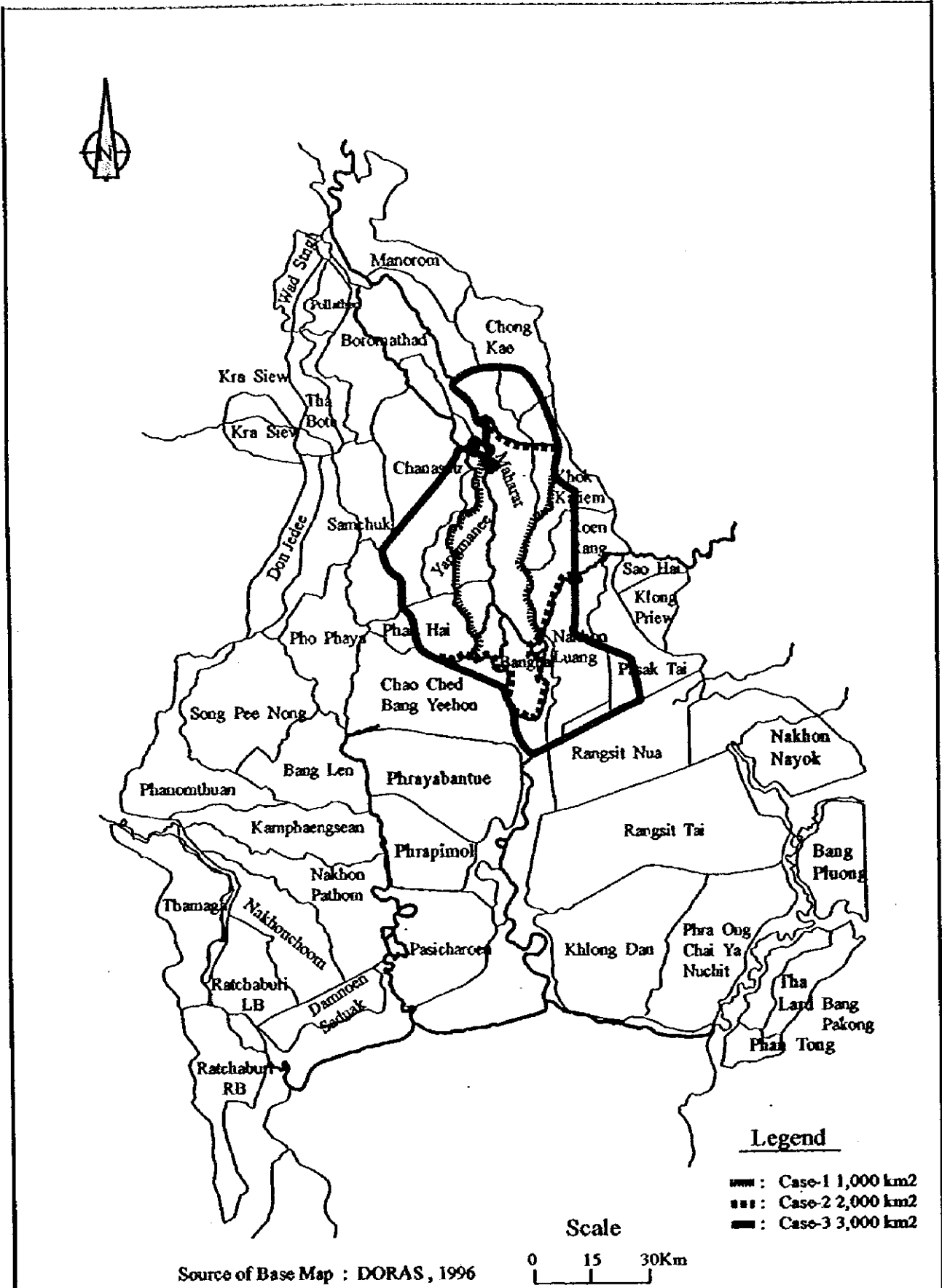


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Fig. 4.3.6

LOCATION OF PADDY FIELD IN SLOPE LAND

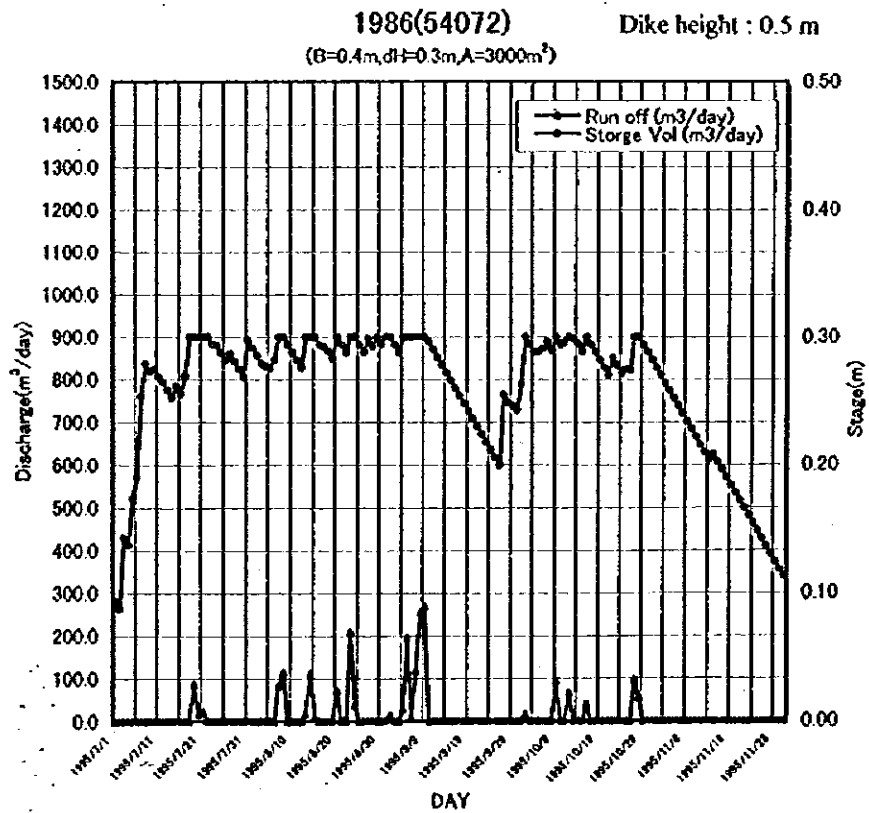
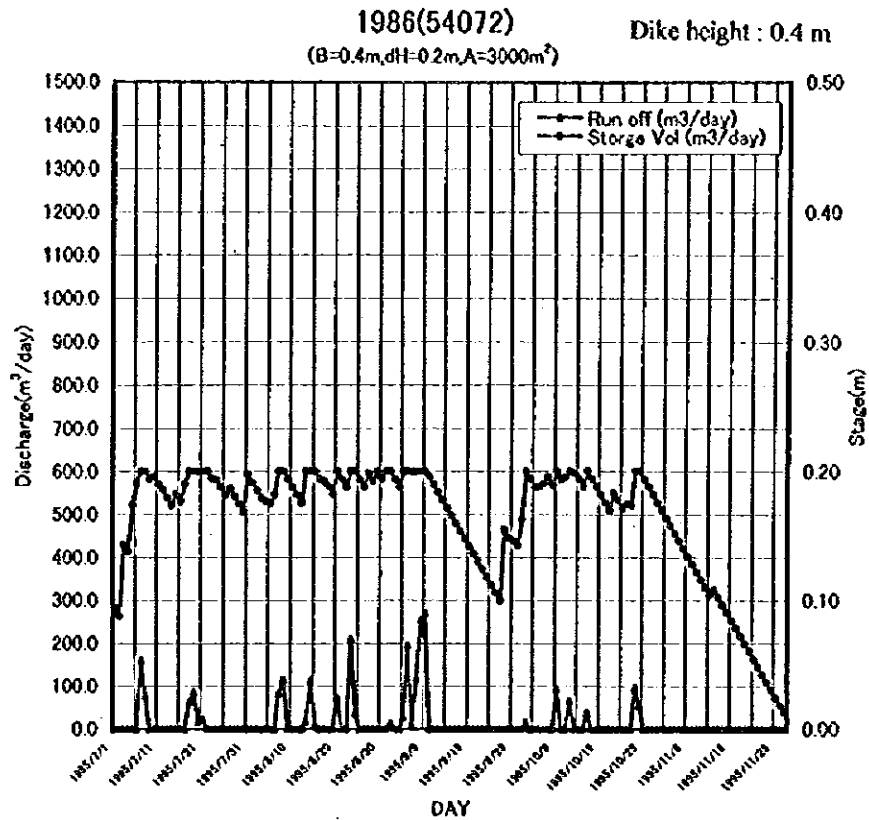


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Fig. 4.4.1

PROPOSED RETARDING BASIN

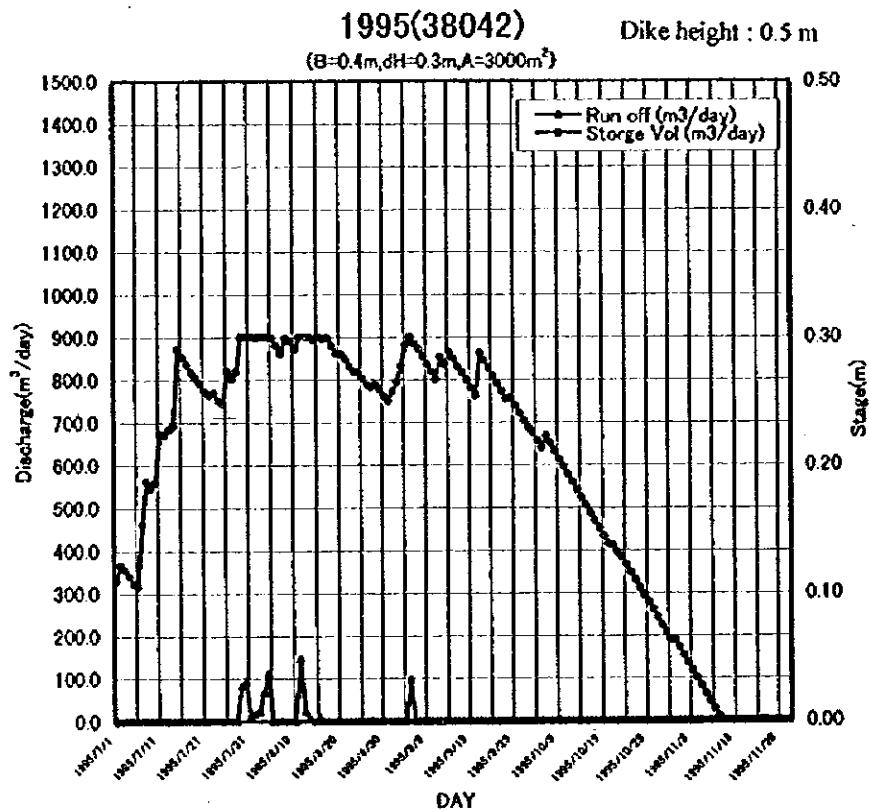
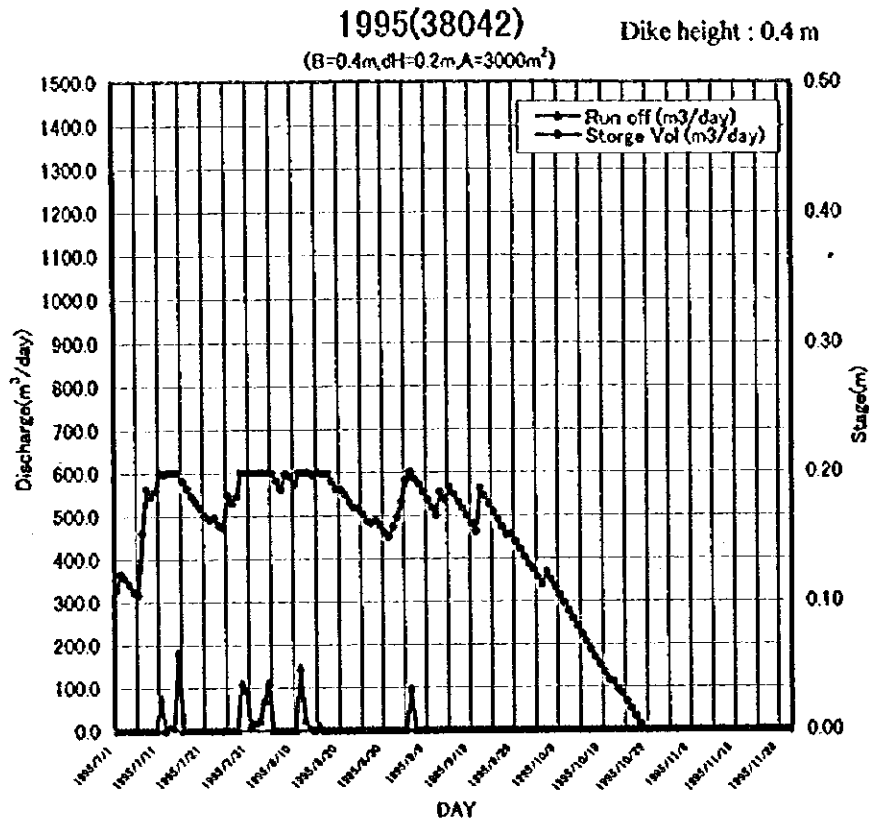


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Fig. 4.4.2 (1/2)

RUNOFF CONDITION FROM UNIT PADDY
FIELD (SARABURI, 1986)

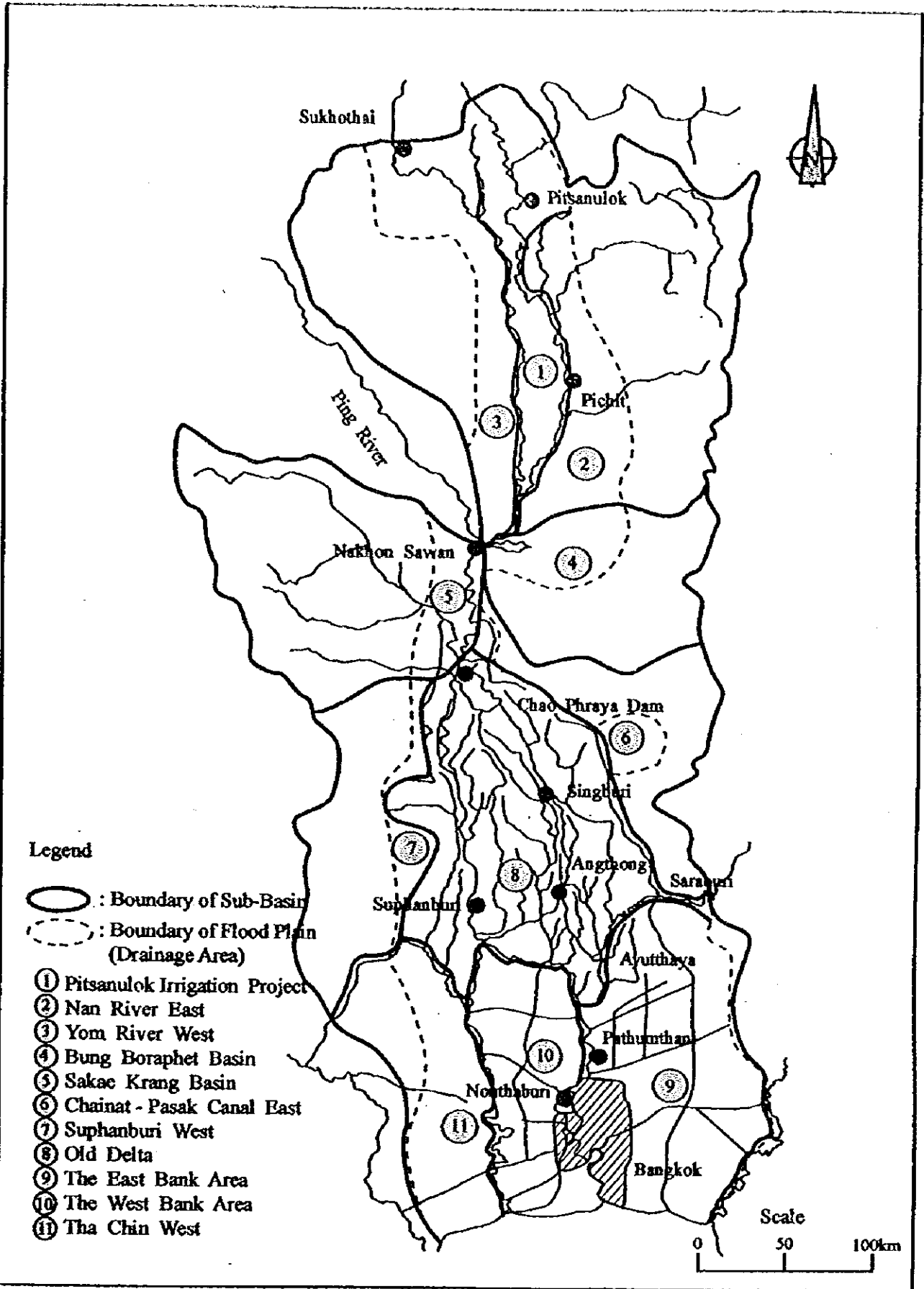


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Fig. 4.4.2 (2/2)

RUNOFF CONDITION FROM UNIT PADDY
FIELD (PITCHIT, 1995)

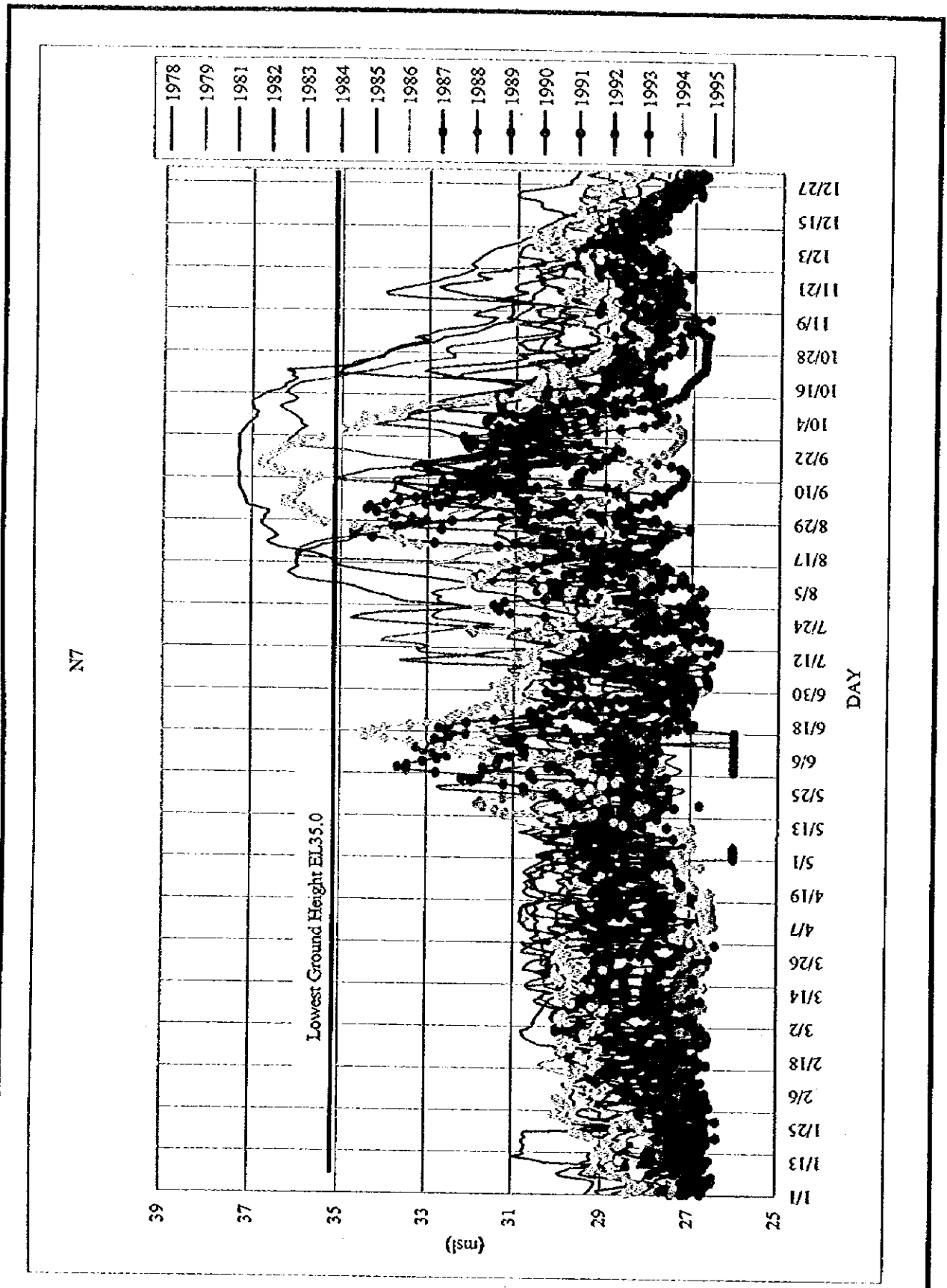


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Fig. 6.1.1

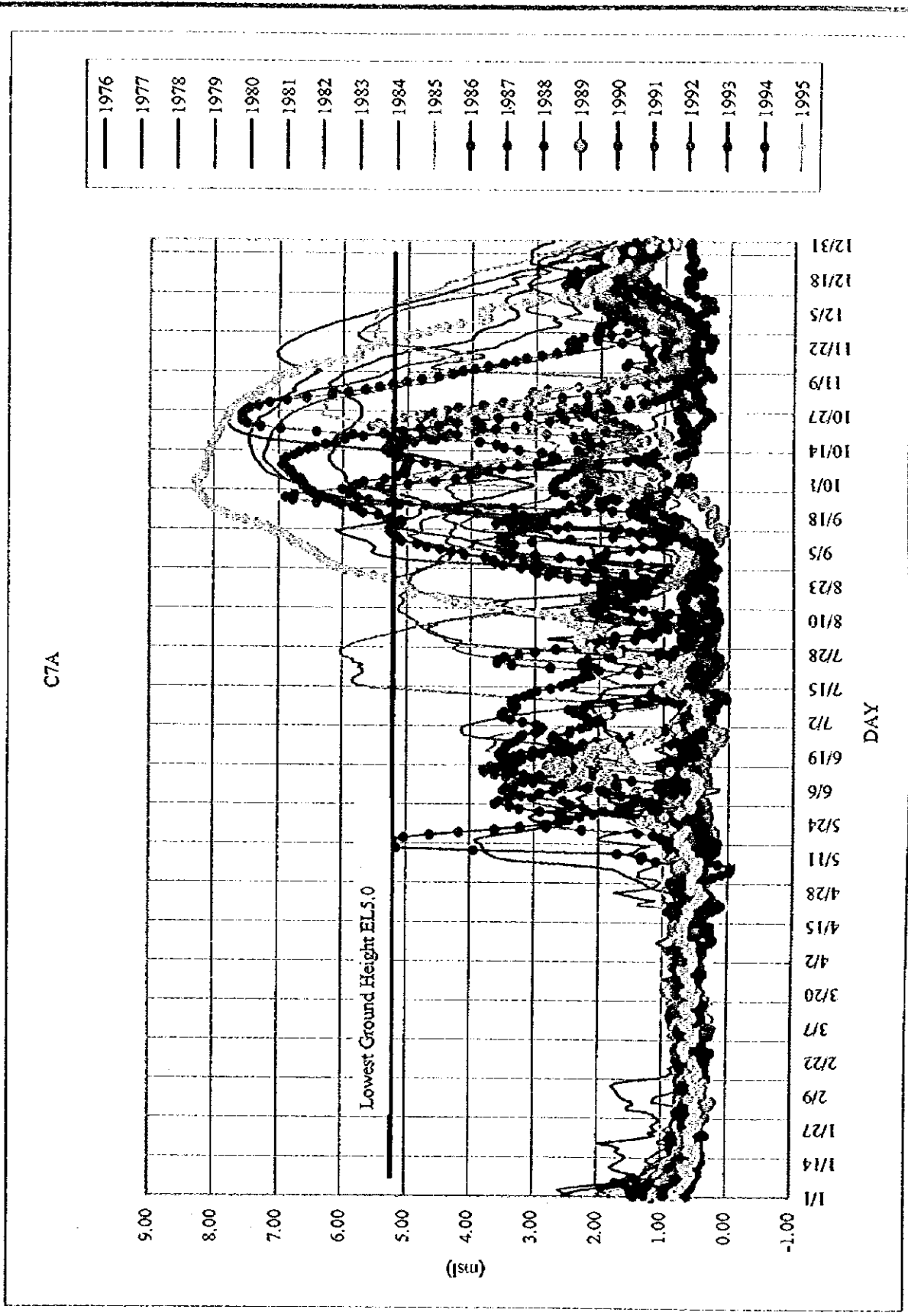
11 DRAINAGE AREAS



N7: NAN RIVER AT PITCHIT

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Fig.6.3.1 (1/3)
 WATER BALANCE OF PADDY FIELD
 DURING HIGH RIVER WATER LEVEL

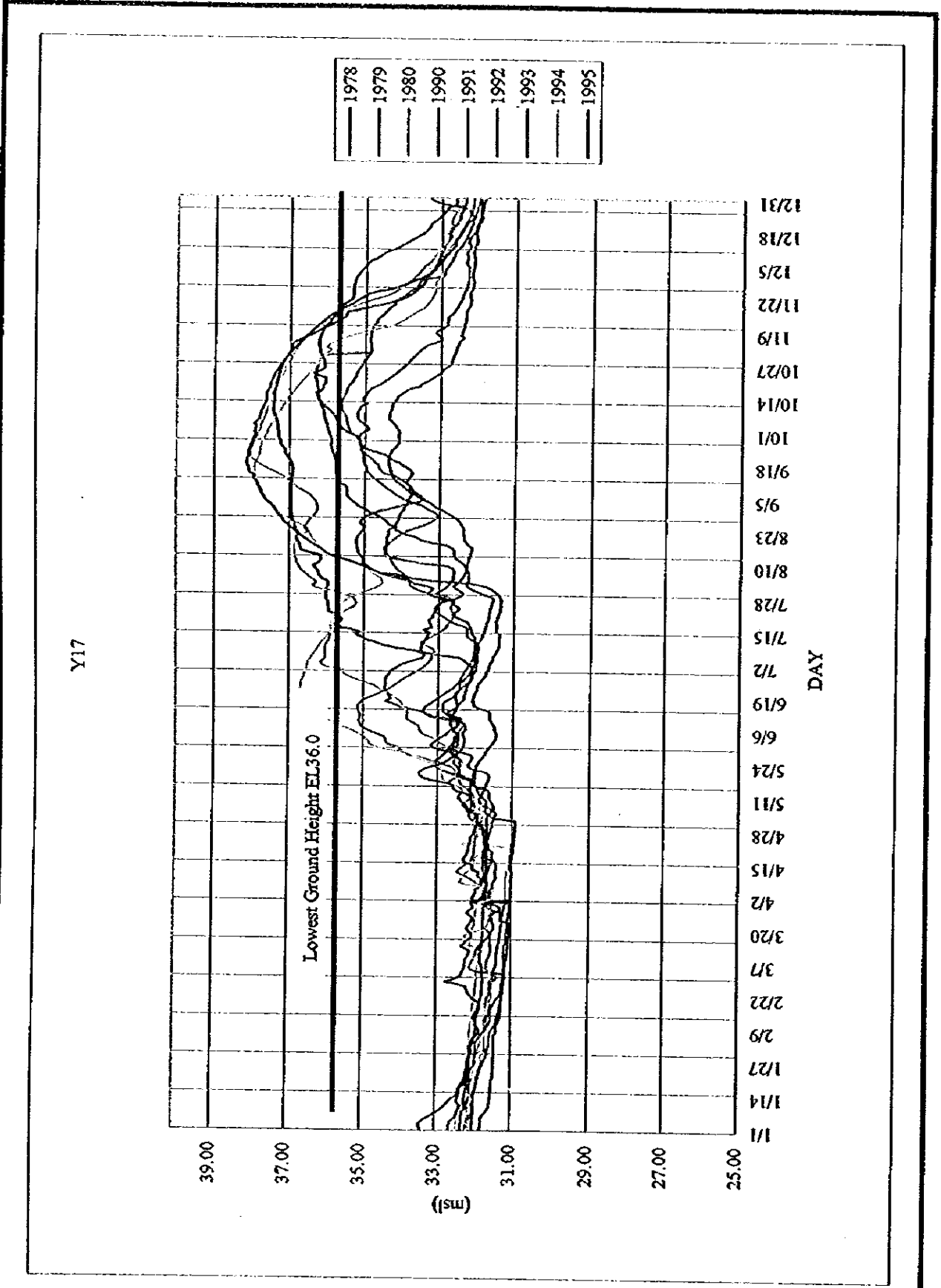


C7A: CHAO PHRAYA RIVER AT ANG THONG

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Fig.6.3.1 (2/3)

WATER BALANCE OF PADDY FIELD
DURING HIGH RIVER WATER LEVEL



Y17:YOM RIVER AT PITCHIT

STUDY ON INTEGRATED PLAN FOR FLOOD
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Fig.6.3.1 (3/3)

WATER BALANCE OF PADDY FIELD
DURING HIGH RIVER WATER LEVEL