

## TABLES



Table 1 HISTORICAL AND PROJECTED POPULATION  
OF THE STUDY AREA

Zone	Demand Center	(Unit: person)				
		Year				
		1981	1986	1991	1996	2001
1	Phanat Nikhom Tha Bun Mi Nong Tamlung	285,100	304,150	318,200	321,150	309,700
1-1	Ban Bung	6,000	6,200	6,300	6,500	6,600
2	Chon Buri (DA)	139,950	154,600	169,550	191,300	216,850
3	-	13,400	14,800	16,100	16,400	15,400
4	Laem Chabang	96,900	112,850	139,950	173,650	222,150
5	Pattaya (DA)	61,250	82,100	106,950	130,950	154,750
6	Huai Yai	17,050	18,350	19,500	20,200	20,050
7	Sattahip (DA)	102,400	113,500	123,200	125,250	120,800
8	Ban Chang	17,000	17,800	18,550	19,050	19,300
9	Map Ta Phut	19,400	25,750	32,000	38,900	48,250
10	Rayong Ban Khai	169,400	188,000	209,050	228,200	249,800
Total		927,850	1,038,100	1,159,350	1,271,550	1,383,650

Source: ESS

Table 2 (1) HISTORICAL AND PROJECTED POPULATION BY ZONE  
(ZONE 1)

Area	Demand Center	Year				
		1981	1986	1991	1996	2001
Urban	Phanat Nikhom	13,500	13,800	14,200	14,500	14,900
	Tha Bun Mi	4,900	5,700	6,200	6,600	6,900
	Nong Tamlung	9,800	10,050	10,300	10,550	10,800
	Ban Bung <sup>/1</sup>	6,000	6,200	6,300	6,500	6,600
	Sub-Total	34,200	35,750	37,000	38,150	39,200
Rural	-	256,900	274,600	287,500	289,500	277,100
Total		291,100	310,350	324,500	327,650	316,300

Note: /1 Classified as sub-zone 1-1.

Source: ESS

Table 2 (2) HISTORICAL AND PROJECTED POPULATION BY ZONE  
(ZONE 2)

Area	Demand Center	Year				
		1981	1986	1991	1996	2001
Urban	Chon Buri (DA)	133,800	148,200	163,100	184,900	210,800
Rural	-	6,150	6,400	6,450	6,400	6,050
Total		139,950	154,600	169,550	191,300	216,850

Source: ESS

Table 2 (3) HISTORICAL AND PROJECTED POPULATION BY ZONE  
(ZONE 3)

Area	Demand Center	Year				
		1981	1986	1991	1996	2001
Rural	-	13,400	14,800	16,100	16,400	15,400

Source: ESS

Table 2 (4) HISTORICAL AND PROJECTED POPULATION BY ZONE  
(ZONE 4)

Area	Demand Center	Year				
		1981	1986	1991	1996	2001
Urban	Laem Chabang (DA)	48,300	59,050	81,350	114,000	166,350
Rural	-	48,600	53,800	58,600	59,650	55,800
Total		96,900	112,850	139,950	173,650	222,150

Source: ESS

Table 2 (5) HISTORICAL AND PROJECTED POPULATION BY ZONE  
(ZONE 5)

Area	Demand Center	Year				
		1981	1986	1991	1996	2001
Urban	Pattaya (DA)	36,500	51,350	67,900	85,800	102,950
Tourist	Pattaya /1	8,800	12,700	19,100	25,000	33,800
	Sub-Total	45,300	64,050	87,000	110,800	136,750
Rural	-	15,950	18,050	19,950	20,150	18,000
Total		61,250	82,100	106,950	130,950	154,750

Note: /1 Refer to Sectoral Report VI. 1 "Socio-Economy"  
3.3.2 "Tourism"

Source: ESS

Table 2 (6) HISTORICAL AND PROJECTED POPULATION BY ZONE  
(ZONE 6)

Area	Demand Center	Year				
		1981	1986	1991	1996	2001
Urban	Huai Yai	13,300	14,100	14,850	15,450	15,850
Rural	-	3,750	4,250	4,650	4,750	4,200
Total		17,050	18,350	19,500	20,200	20,050

Source: ESS

Table 2 (7) HISTORICAL AND PROJECTED POPULATION BY ZONE  
(ZONE 7)

Area	Demand Center	Year				
		1981	1986	1991	1996	2001
Urban	Sattahip (DA)	18,800	21,500	24,400	25,300	25,800
Rural	-	83,600	92,000	98,800	99,950	95,000
Total		102,400	113,500	123,200	125,250	120,800

Source: ESS

Table 2 (8) HISTORICAL AND PROJECTED POPULATION BY ZONE  
(ZONE 8)

Area	Demand Center	Year				
		1981	1986	1991	1996	2001
Urban	Ban Chang	14,400	15,100	15,900	16,500	16,900
Rural	-	2,600	2,700	2,650	2,550	2,400
Total		17,000	17,800	18,550	19,050	19,300

Source: ESS

Table 2 (9) HISTORICAL AND PROJECTED POPULATION BY ZONE  
(ZONE 9)

Area	Demand Center	Year				
		1981	1986	1991	1996	2001
Urban	Map Ta Phut (DA) <sup>/1</sup>	7,400	13,300	19,350	26,300	35,950
Rural	-	12,000	12,450	12,650	12,600	12,300
Total		19,400	25,750	32,000	38,900	48,250

Source: ESS

Table 2 (10) HISTORICAL AND PROJECTED POPULATION BY ZONE  
(ZONE 10)

Area	Demand Center	Year				
		1981	1986	1991	1996	2001
Urban	Rayong (DA)	37,300	42,100	50,750	64,350	83,150
	Ban Khai	5,200	6,100	6,800	7,300	7,700
	Sub-Total	42,500	48,200	57,550	71,650	90,850
Rural	-	126,900	139,800	151,500	156,550	158,950
Total		169,400	188,000	209,050	228,200	249,800

Source: ESS



Table 3 WATER USE IN URBAN AREA

(Unit: lit./d/c.)

Water Use	Quantity
<u>Domestic Uses</u>	
Drinking, kitchen and washbasin use	35
Ablution	40
Laundring	15
Toilet flushing	25
Outside Cleaning	10
Sub-total	125
User Waste	15
Sub-total domestic use	140
Allowance for commerce and light industry	40
Total Urban Use	180

Source: ESS

Table 4 WATER CONSUMPTION PER CAPITA<sup>/1</sup>

Year	Served Population <sup>/2</sup>	Consumed Water (m <sup>3</sup> /d)	Consumed Water per Capita (m <sup>3</sup> /d)
1977	101,318	18,205	0.181
1978	104,210	19,856	0.191
1979	115,055	20,582	0.179
1980	123,143	19,092	0.155
1981	130,755	25,274	0.193
1982	139,991	33,110	0.237
Total	714,472	136,119	0.191

<sup>/1</sup> Based on the data of five water works in the Study Area: Chon Buri, Phanat Nikhom, Ban Bung, Pattaya and Rayong

<sup>/2</sup> Excluding tourists

Source: PWWA

Table 5 UNACCOUNTED LOSS IN DISTRIBUTION  
AND PURIFICATION SYSTEM

Water Works	Year					
	1977	1978	1979	1980	1981	1982
Chon Buri	2.6	41.1	25.0	58.7	55.6	59.0
Ban Bung	16.0	12.9	29.1	37.5	17.8	20.6
Phanat Nikhom	15.0	23.1	30.0	27.5	20.0	16.2
Pattaya	25.0	32.6	17.2	11.5	19.9	13.5
Rayong	12.0	13.3	20.4	16.0	22.5	32.6
Average	14.1	24.6	24.3	27.2	23.7	24.9

Source: Sectoral Report IX "Water Conveyance Engineering"

Table 6 HISTORICAL AND PROJECTED DOMESTIC  
WATER DEMAND OF THE STUDY AREA

Zone	Demand Centre	Year				
		1981	1986	1991	1996	2001
1	{ Phanat Nikhom Tha Bun Mi Nong Tamlung	0.9	2.7	4.3	5.9	7.2
1-1	Ban Bung	0.1	0.2	0.3	0.4	0.4
2	Chon Buri (DA)	11.2	11.4	11.6	16.3	21.3
3	-	n.a.	0.1	0.2	0.3	0.3
4	Laem Chabang (DA)	3.8	4.7	6.4	11.3	17.9
5	Pattaya (DA)	0.9	4.0	7.3	10.2	14.1
6	Huai Yai	0.3	0.4	0.7	0.9	1.0
7	Sattahip (DA)	0	1.4	2.6	3.6	4.4
8	Ban Chang	0.3	0.6	0.8	0.9	1.0
9	Map Ta Phut	0	0.8	1.5	2.6	3.8
10	Rayong (DA) Ban Khai	2.3	3.8	5.4	8.5	11.8
Total		19.8	30.1	41.1	60.9	83.2

Table 7 (1) HISTORICAL AND PROJECTED DOMESTIC WATER DEMAND BY ZONE  
(ZONE 1)

(Unit:  $10^6$  m<sup>3</sup>/yr)

Area	Demand Center	Year				
		1981	1986	1991	1996	2001
Urban	Phanat Nikhom	0.4	0.6	0.7	0.8	0.9
	Tha Bun Mi	0.2	0.2	0.3	0.4	0.4
	Nong Tamlung	0	0.3	0.5	0.5	0.6
	Ban Bung	0.1	0.2	0.3	0.4	0.4
	Sub Total	0.7	1.3	1.8	2.1	2.3
	Rural	0.3	1.6	2.8	4.2	5.3
	Total	1.0	2.9	4.6	6.3	7.6

Note: Ban Bung is treated as sub-zone 1-1.

Table 7 (2) HISTORICAL AND PROJECTED DOMESTIC WATER DEMAND BY ZONE  
(ZONE 2)

(Unit:  $10^6$  m<sup>3</sup>/yr)

Area	Demand Center	Year				
		1981	1986	1991	1996	2001
Urban	Chon Buri (DA)	11.1	11.3	11.5	16.2	21.2
Rural	-	0.1	0.1	0.1	0.1	0.1
	Total	11.2	11.4	11.6	16.3	21.3

TABLE 7 (3) HISTORICAL AND PROJECTED DOMESTIC WATER DEMAND BY ZONE  
(ZONE 3)

(Unit:  $10^6$  m<sup>3</sup>/yr)

Area	Demand Center	Year				
		1981	1986	1991	1996	2001
Rural	-	n.a. <sup>/1</sup>	0.1	0.2	0.3	0.3
	Total	n.a.	0.1	0.2	0.3	0.3

Note : <sup>/1</sup> Past record on population supplied with piped water is not available for this zone independently. It's amount is included in the amount of zone 4.

TABLE 7 (4) HISTORICAL AND PROJECTED DOMESTIC WATER DEMAND BY ZONE  
(ZONE 5)

(Unit:  $10^6$  m<sup>3</sup>/yr)

Area	Demand Center	Year				
		1981	1986	1991	1996	2001
Urban	Laem Chabang (DA)	3.5	4.4	5.8	10.4	16.8
Rural	-	0.3	0.3	0.6	0.9	1.1
	Total	3.8	4.7	6.4	11.3	17.9

Table 7 (5) HISTORICAL AND PROJECTED DOMESTIC WATER DEMAND BY ZONE

(ZONE 5)

(Unit:  $10^6$  m<sup>3</sup>/yr)

Area	Demand Center	Year				
		1981	1986	1991	1996	2001
Urban	Pattaya (DA)	0.9	3.9	7.1	9.9	13.8
Rural	-	0	0.1	0.2	0.3	0.3
Total		0.9	4.0	7.3	10.2	14.1

Table 7 (6) HISTORICAL AND PROJECTED DOMESTIC WATER DEMAND BY ZONE

(ZONE 6)

(Unit:  $10^6$  m<sup>3</sup>/yr)

Area	Demand Center	Year				
		1981	1986	1991	1996	2001
Urban	Huai Yai	0.3	0.4	0.7	0.8	0.9
Rural	-	0	0	0	0.1	0.1
Total		0.3	0.4	0.7	0.9	1.0

Table 7 (7) HISTORICAL AND PROJECTED DOMESTIC WATER DEMAND BY ZONE  
(ZONE 7)

(Unit:  $10^6 \text{ m}^3/\text{yr}$ )

Area	Demand Center	Year				
		1981	1986	1991	1996	2001
Urban	Sattahip (DA)	0	0.9	1.7	2.2	2.6
Rural	-	0	0.5	0.9	1.4	1.8
	Total	0	1.4	2.6	3.6	4.4

Table 7 (8) HISTORICAL AND PROJECTED DOMESTIC WATER DEMAND BY ZONE  
(ZONE 8)

(Unit:  $10^6 \text{ m}^3/\text{yr}$ )

Area	Demand Center	Year				
		1981	1986	1991	1996	2001
Urban	Ban Chang	0.3	0.6	0.8	0.9	1.0
Rural	-	0	0	0	0	0
	Total	0.3	0.6	0.8	0.9	1.0

Table 7 (9) HISTORICAL AND PROJECTED DOMESTIC WATER DEMAND BY ZONE  
(ZONE 9)

(Unit:  $10^6$  m<sup>3</sup>/yr)

Area	Demand Center	Year				
		1981	1986	1991	1996	2001
Urban	Map Ta Phut (DA)	0	0.7	1.4	2.4	3.6
Rural	-	0	0.1	0.1	0.2	0.2
	Total	0	0.8	1.5	2.6	3.8

Table 7 (10) HISTORICAL AND PROJECTED DOMESTIC WATER DEMAND BY ZONE  
(ZONE 10)

(Unit:  $10^6$  m<sup>3</sup>/yr)

Area	Demand Center	Year				
		1981	1986	1991	1996	2001
Urban	Rayong (DA)	2.1	2.8	3.6	5.8	8.4
	Ban Khai	0.1	0.2	0.3	0.4	0.4
	Sub-total	2.2	3.0	3.9	6.2	8.8
	Rural	0.1	0.8	1.5	2.3	3.0
	Total	2.3	3.8	5.4	8.5	11.8



Table 8 INDUSTRIAL WATER DEMAND PROJECTION BY THE TWO STUDIES

(Unit:  $10^6$  m<sup>3</sup>/yr)

Zone No.	Location	Phase I Study (Year 2000)		ESS (Year 2001)	
		Project	Amount	Project	Amount
4	Laem Chabang	Industrial Estate	13.2	Industrial Estate	16.8
		Port	3.6	Port	3.6
7	Sattahip	Soda Ash	10.2	-	-
		Port	7.0	Port	3.5
9	Rayong/ Map Ta Phut	Gas Separation/ Petrochemical	7.8	Gas Separation/ Petrochemical	7.8
		Sponge Iron	1.0	-	-
		Chemical Fertilizer	9.5	Chemical Fertilizer	9.5
		Industrial Estate	9.6	Industrial Estate	10.0
		-	-	Soda Ash	10.2
Total			61.9		61.4

Source: Phase I Study and ESS

Table 9 INDUSTRIAL WATER DEMAND BY ESS

(Unit: 10<sup>6</sup> m<sup>3</sup>/yr)

Zone No.	Location	Project	Year													
			1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1996	2001		
1.	Ban Pa Kong	Power Station	3.0	3.0	3.0	3.0	3.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
4.	Laem Chaban	Industrial Estate	-	-	-	0.7	1.3	2.0	2.3	2.7	3.3	4.8	6.2	12.0		
		Port	-	-	-	-	-	-	-	-	-	-	1.8	3.6		
	Si Racha	Industrial Estate	1.2	1.2	1.2	3.6	3.6	3.6	3.6	3.6	4.8	4.8	4.8	4.8	4.8	4.8
		Power Station	-	-	-	-	-	-	-	-	-	-	3.0	3.0	3.0	3.0
		Sub Total	1.2	1.2	1.2	4.3	4.9	5.6	5.9	6.3	8.1	12.6	15.8	23.4		
7.	Sattahip <sup>/1</sup>	Port	-	-	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
9.	Map Ta Phut/Rayong	Gas Separation/ Petro Chemical	-	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8
		Soda Ash	-	-	-	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
		Fertilizer	2.0	2.0	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5
		Light Industrial Estate	-	-	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	7.5	10.0		
		Sub Total	2.0	9.8	18.8	29.5	30.0	30.5	31.0	31.5	32.0	32.5	35.0	37.5		
		Total	6.2	14.0	26.5	40.3	41.4	45.6	46.4	47.3	49.6	54.6	60.3	70.4		

/1 : Demand of Navy Base is excluded because it has the water resources for exclusive use

Source : ESS

Table 10 AMOUNT OF WATER TO BE SUPPLIED BY  
EXISTING SOURCE FACILITIES

(Unit:  $10^6$  m<sup>3</sup>/yr)

Zone	Reservoir	User	Amount of water to be supplied
1	Ban Bung	TVA Company	0.1
		Chon Buri Sugar Mill	3.3
		Sura Tawan-Ok Brewery Co.	0.2
		Others	0.1
		Sub-total	3.7
3	Ban Phra	Tapioca Industry	1.6
		Others	0.5
		Sub-total	2.1
4	Ban Phra	Sri Maharacha Plywood Co.	0.1
		Thai Oil Refinery	1.8
		Sub-total	1.9
5	Map Prachan	Tapioca Industry	0.7
10	Dok Krai	Other Purpose	1.5
		Total	9.9

Note : Consumer Demand

Source: RID

Table 11 HISTORICAL AND PROJECTED INDUSTRIAL  
WATER DEMAND OF THE STUDY AREA

(Unit:  $10^6 \text{ m}^3/\text{yr}$ )

Zone	Demand Center					
		1981	1986	1991	1996	2001
1	EGAT Thermal Power Station / <u>1</u>	0	3.0	6.0	6.0	6.0
1-1	Ban Bung	3.7	3.7	3.7	3.7	3.7
3	-	2.1	2.1	2.1	2.1	2.1
4	Laem Chabang	1.9	6.8	14.5	17.7	25.3
5	Pattaya	0	0.7	0.7	0.7	0.7
7	Sattahip	0	3.5	3.5	3.5	3.5
9	Map Ta Phut	0	30.0	32.5	35.0	37.5
10	Rayong Ban Khai	1.5	1.5	1.5	1.5	1.5
Total		9.2	51.3	64.5	70.2	80.3

1 : Located at Ban Pakong River

Table 12 HISTORICAL AND PROJECTED TOTAL WATER DEMAND  
OF THE STUDY AREA

(Unit:  $10^6 \text{ m}^3/\text{yr}$ )

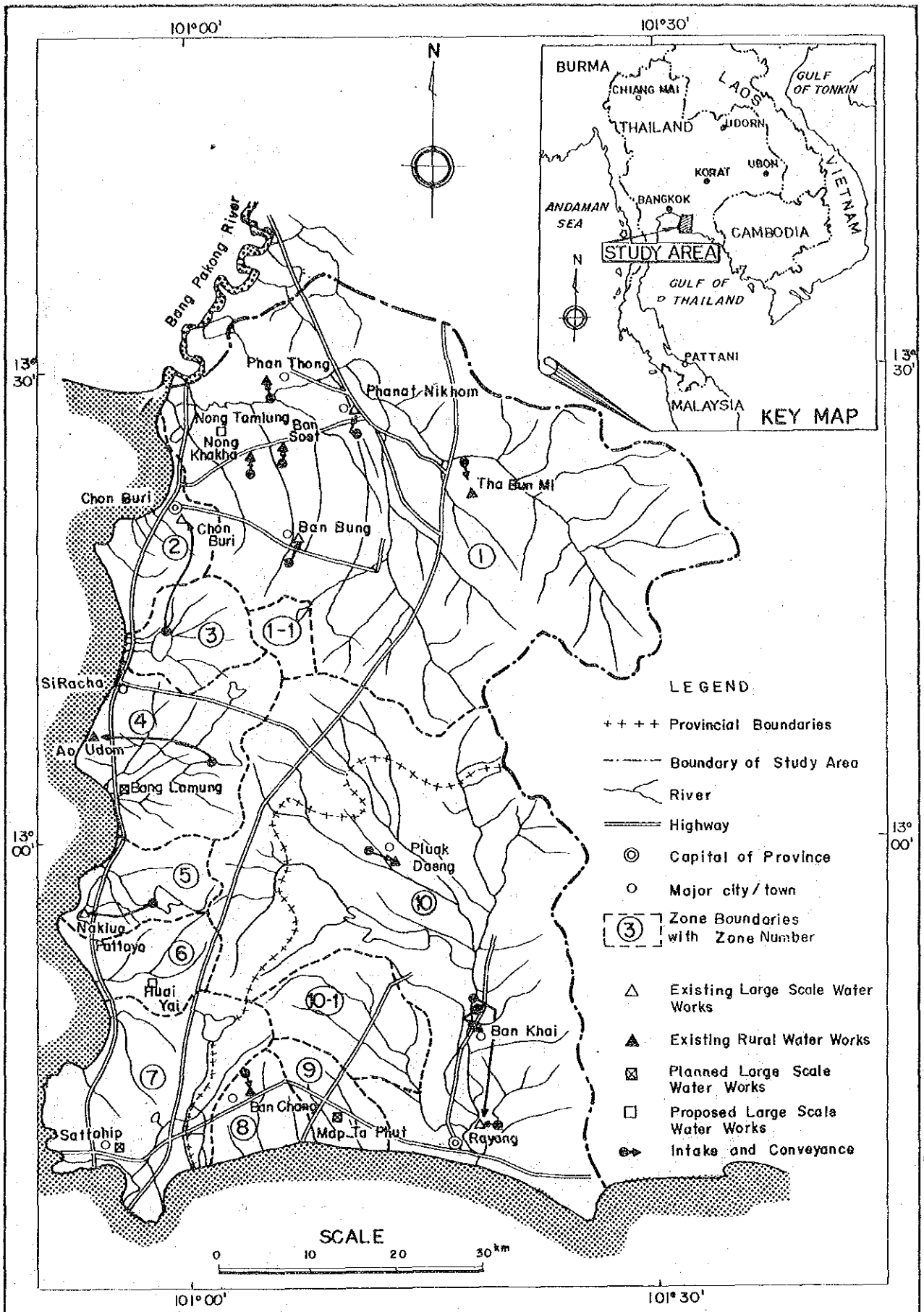
Zone	Purpose	Year				
		1981	1986	1991	1996	2001
1	Domestic	1.0	2.9	4.6	6.3	7.6
	Industrial	3.7	6.7	9.7	9.7	9.7
	Total	4.7	9.6	14.3	16.0	17.3
2	Domestic	11.2	11.4	11.6	16.3	21.3
	Industrial	-	-	-	-	-
	Total	11.2	11.4	11.6	16.3	21.3
3	Domestic	n.a.	0.1	0.2	0.3	0.3
	Industrial	2.1	2.1	2.1	2.1	2.1
	Total	2.1	2.2	2.3	2.4	2.4
4	Domestic	3.8	4.7	6.4	11.3	17.3
	Industrial	1.9	6.8	14.5	17.7	25.3
	Total	5.7	11.5	20.9	29.0	43.2
5	Domestic	0.9	4.0	7.3	10.2	14.1
	Industrial	0	0.7	0.7	0.7	0.7
	Total	0.9	4.7	8.0	10.9	14.8
6	Domestic	0.3	0.4	0.7	0.9	1.0
	Industrial	-	-	-	-	-
	Total	0.3	0.4	0.7	0.9	1.0
7	Domestic	0	1.4	2.6	3.6	4.4
	Industrial	0	3.5	3.5	3.5	3.5
	Total	0	4.9	6.1	7.1	7.9
8	Domestic	0.3	0.6	0.8	0.9	1.0
	Industrial	0	0	0	0	0
	Total	0.3	0.6	0.8	0.9	1.0
9	Domestic	0	0.8	1.5	2.6	3.8
	Industrial	0	30.0	32.5	35.0	37.5
	Total	0	30.8	34.0	37.6	41.3
10	Domestic	2.3	3.8	5.4	8.5	11.8
	Industrial	1.5	1.5	1.5	1.5	1.5
	Total	3.8	5.3	6.9	10.0	13.3
Total	Domestic	19.5	30.1	41.1	60.9	83.2
	Industrial	9.2	51.3	64.5	70.2	80.3
	Total	29.0	81.4	105.6	131.1	163.5



## FIGURES



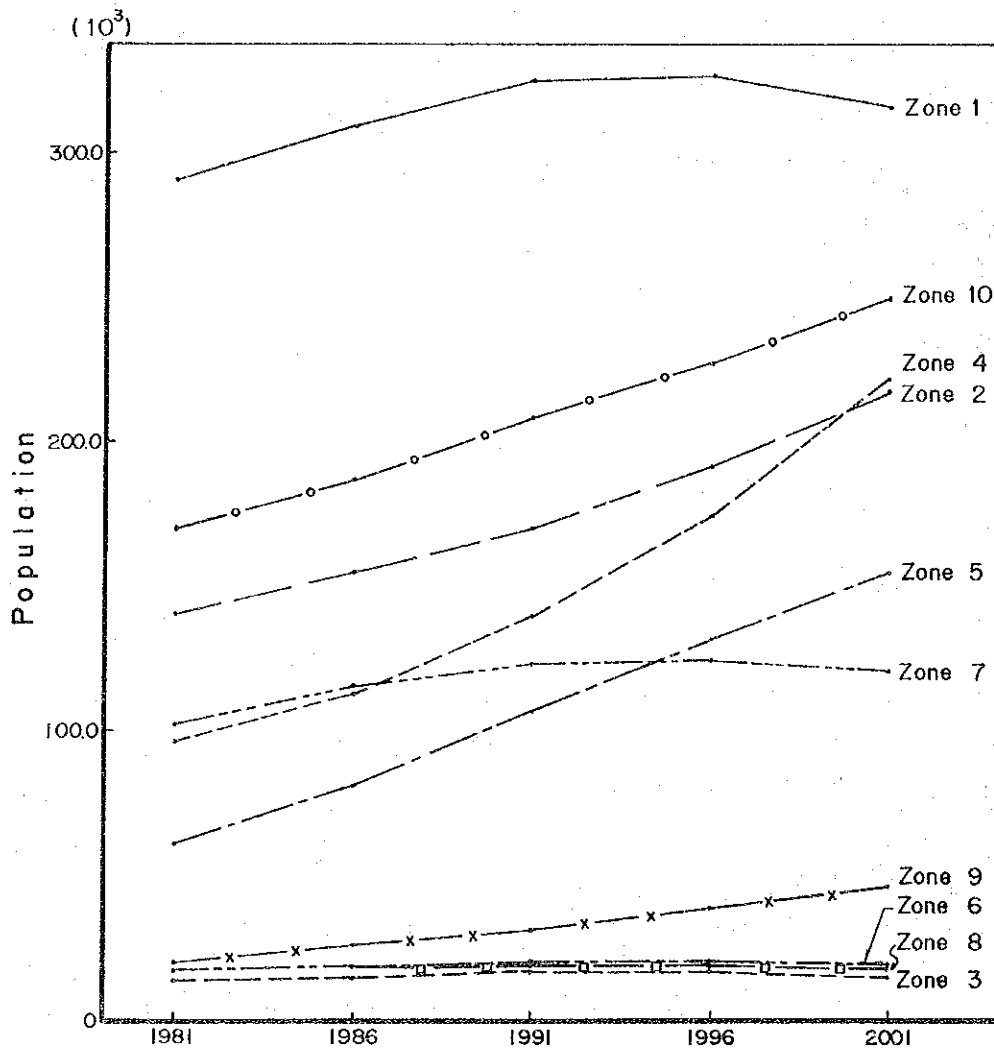
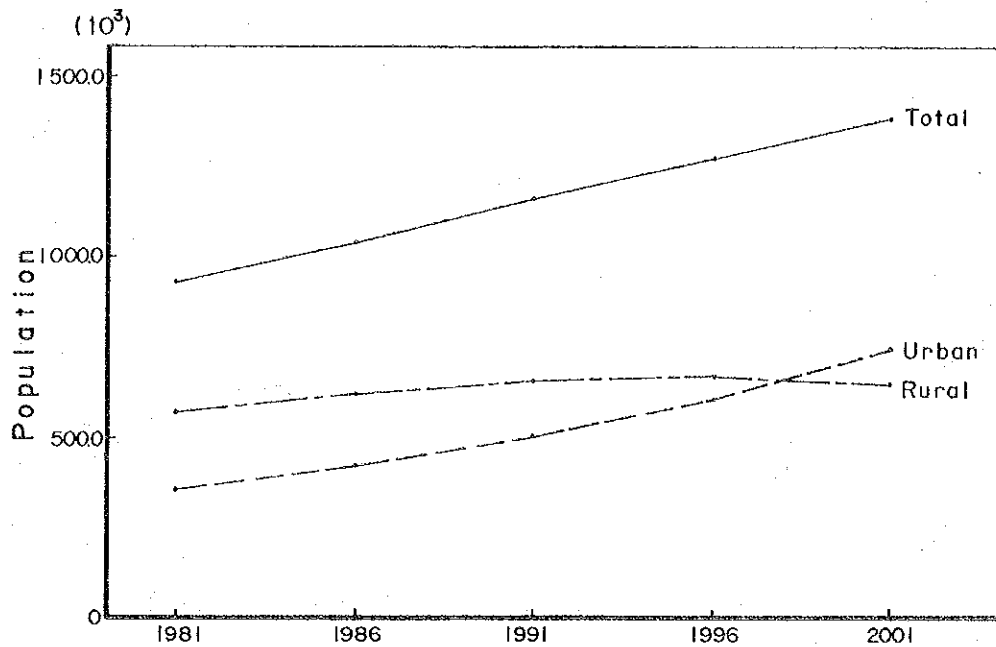




(For Ao Udom, expansion to the large scale water works is being planned in the Fifth Five Year Plan of PWWA.)

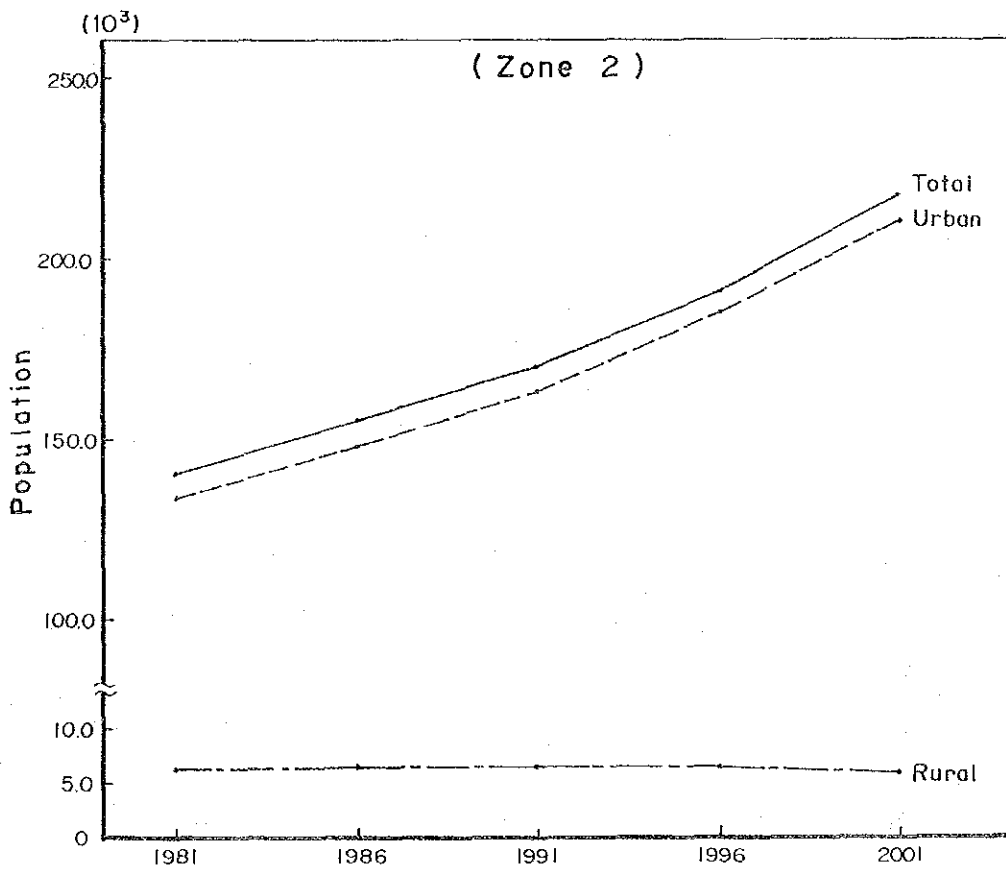
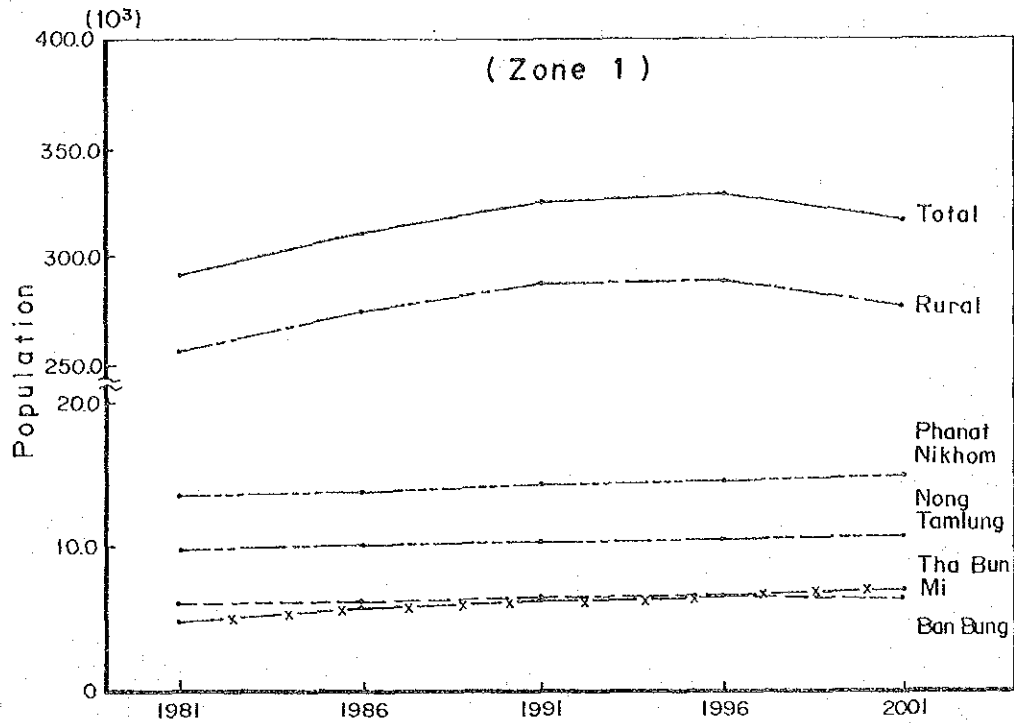
Fig.1 Zoning of Study Area

KINGDOM OF THAILAND  
**THE EAST COAST WATER RESOURCES  
 DEVELOPMENT PROJECT PHASE II**  
 JAPAN INTERNATIONAL COOPERATION AGENCY



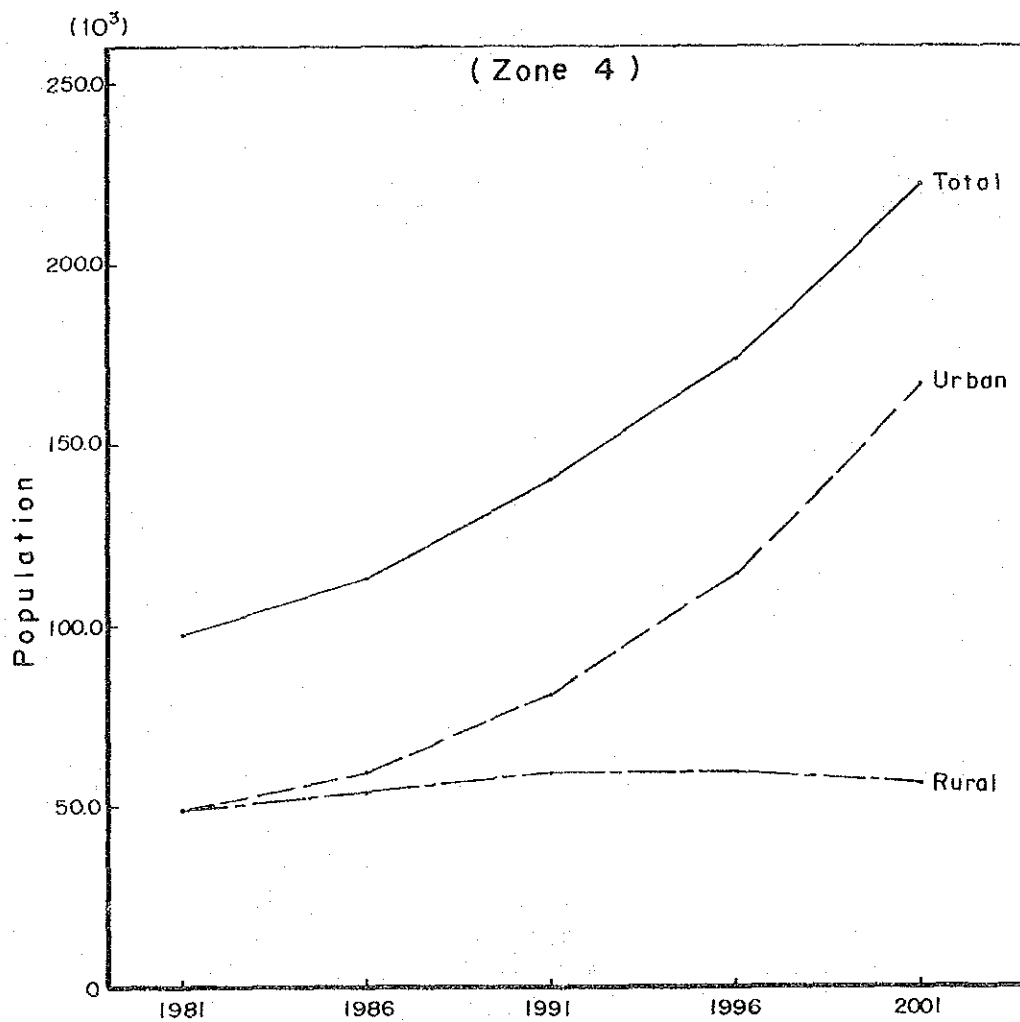
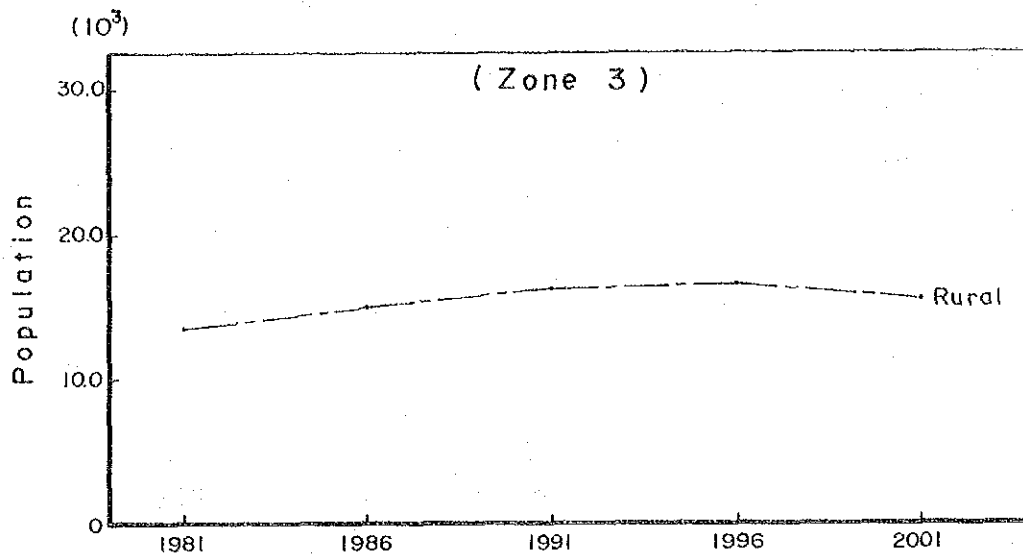
Source : ESS

Fig. 2 Historical and Projected Population of the Study Area



Source : ESS

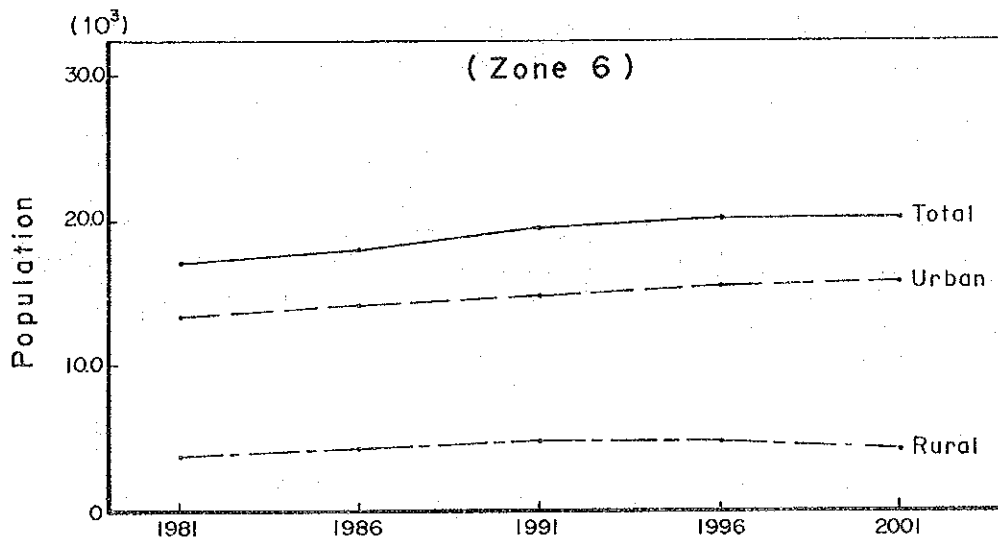
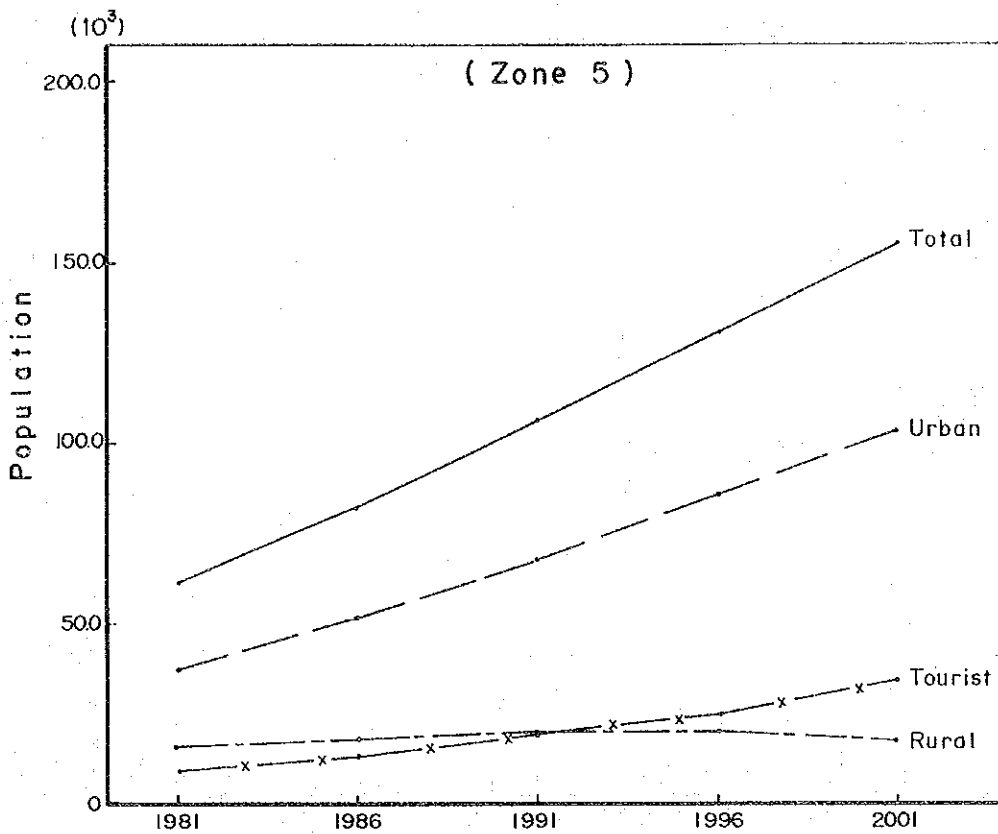
Fig. 3(1) Historical and Projected Population by Zone



Source : ESS

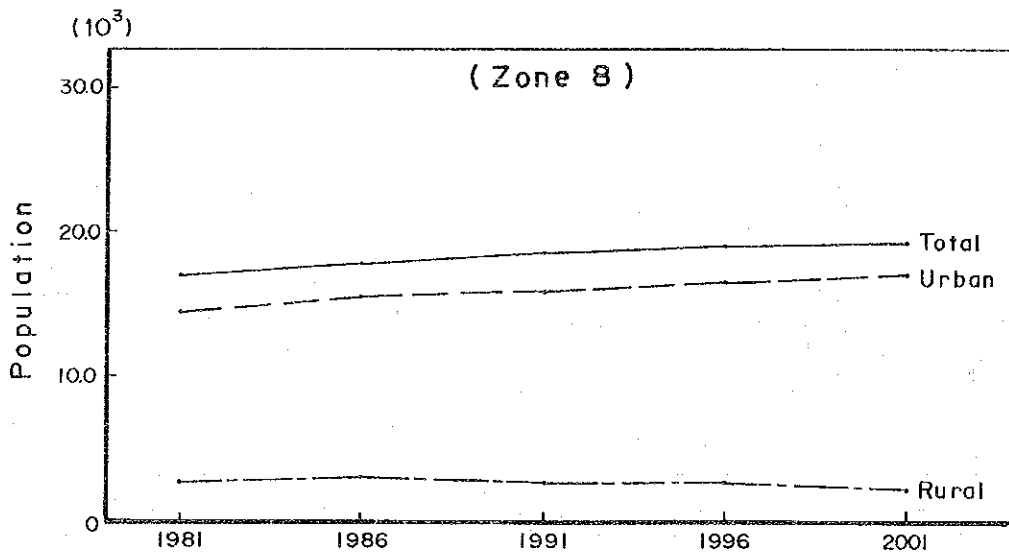
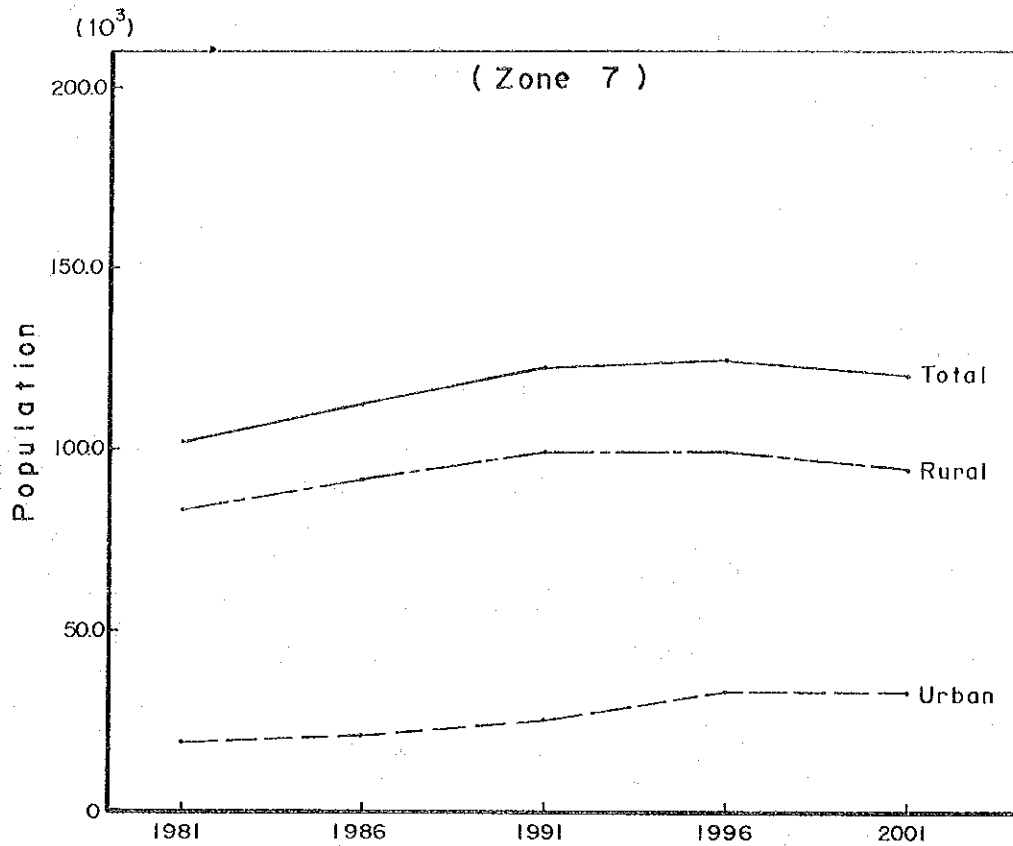
Fig.3(2) Historical and Projected Population by Zone

KINGDOM OF THAILAND  
 THE EAST COAST WATER RESOURCES  
 DEVELOPMENT PROJECT PHASE II  
 JAPAN INTERNATIONAL COOPERATION AGENCY



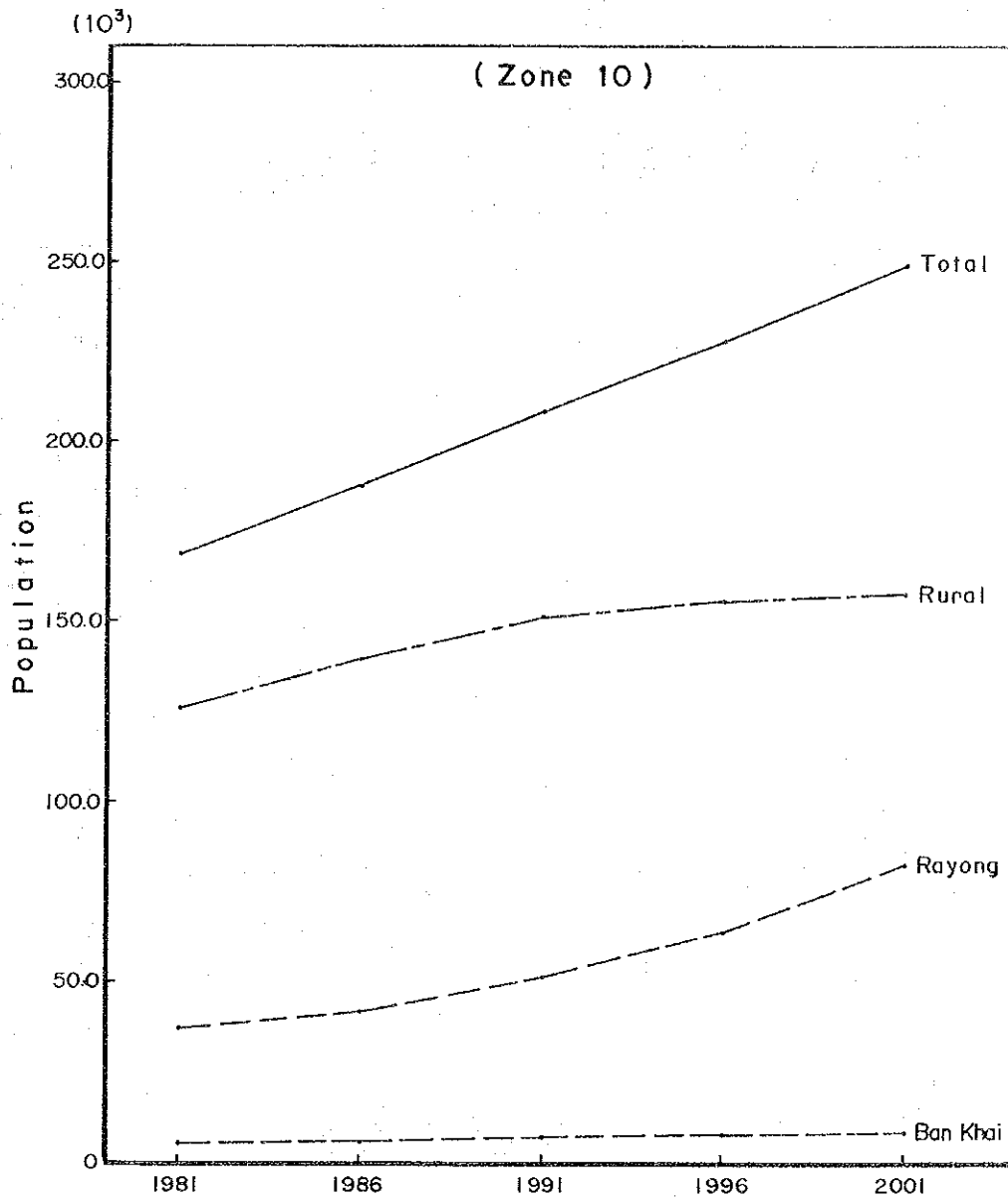
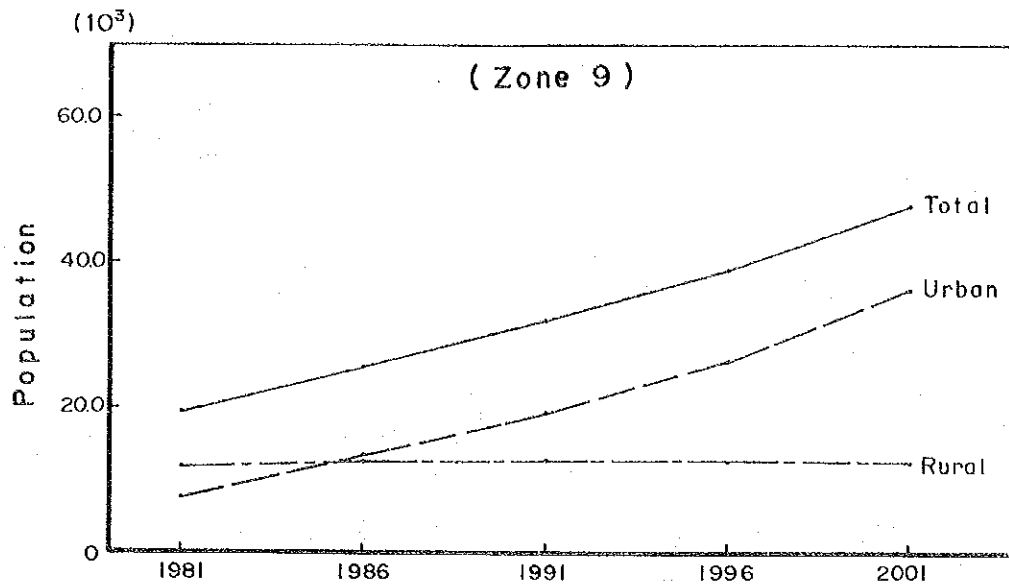
Source : ESS

Fig.3(3) Historical and Projected Population by Zone



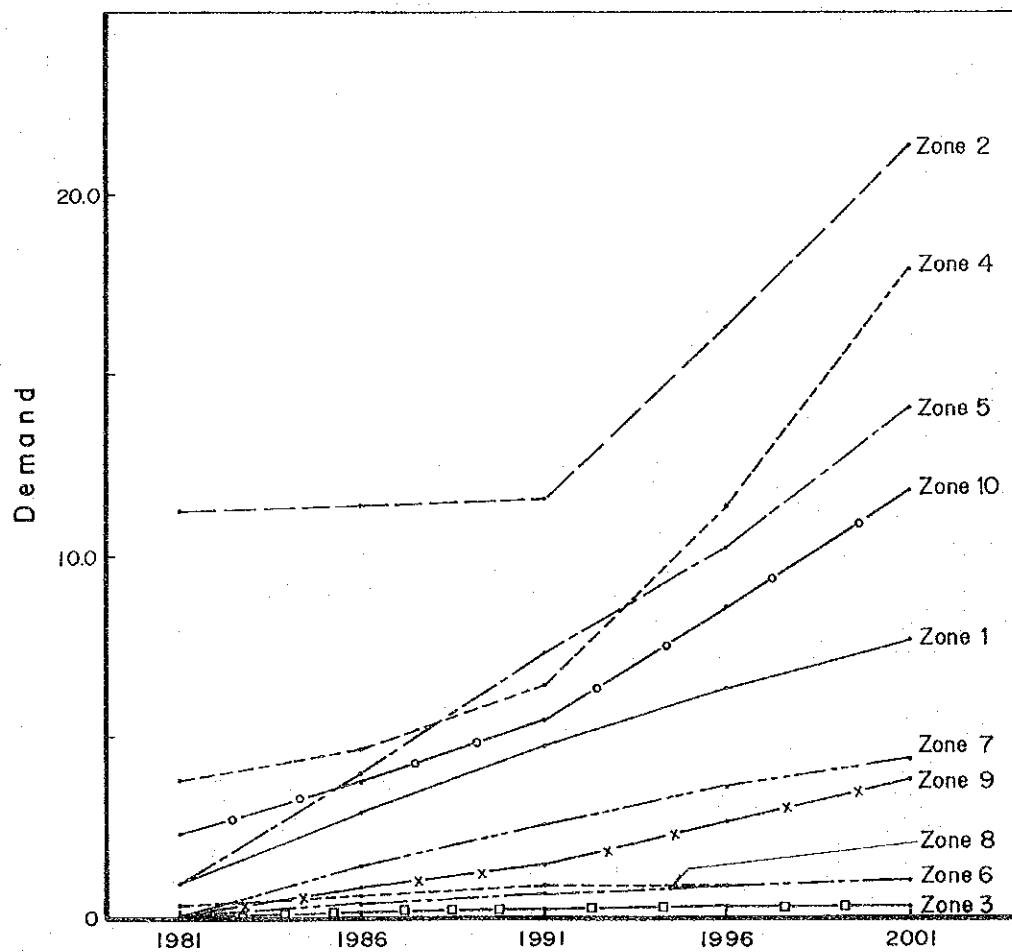
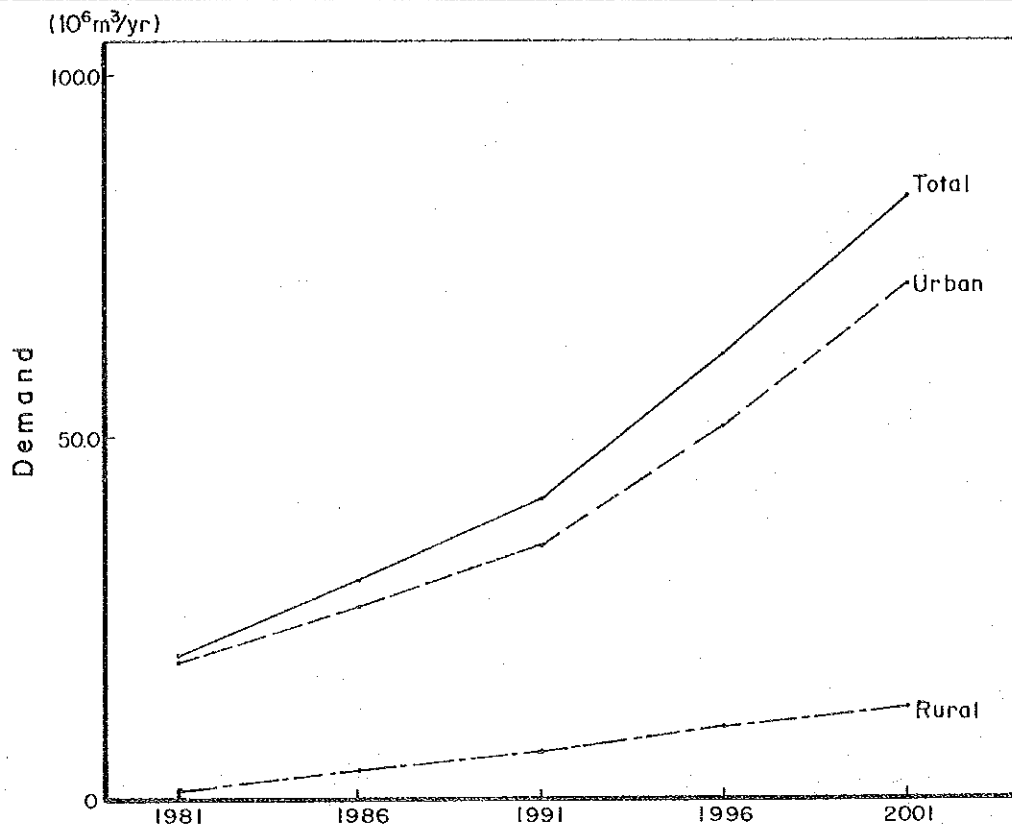
Source : ESS

Fig.3(4) Historical and Projected Population by Zone



Source : ESS

Fig.3(5) Historical and Projected Population by Zone



Note : Zone 1 includes Sub - Zone 1 - 1.

Fig.4 Historical and Projected Domestic Water Demand of the Study Area

KINGDOM OF THAILAND  
 THE EAST COAST WATER RESOURCES  
 DEVELOPMENT PROJECT PHASE II  
 JAPAN INTERNATIONAL COOPERATION AGENCY



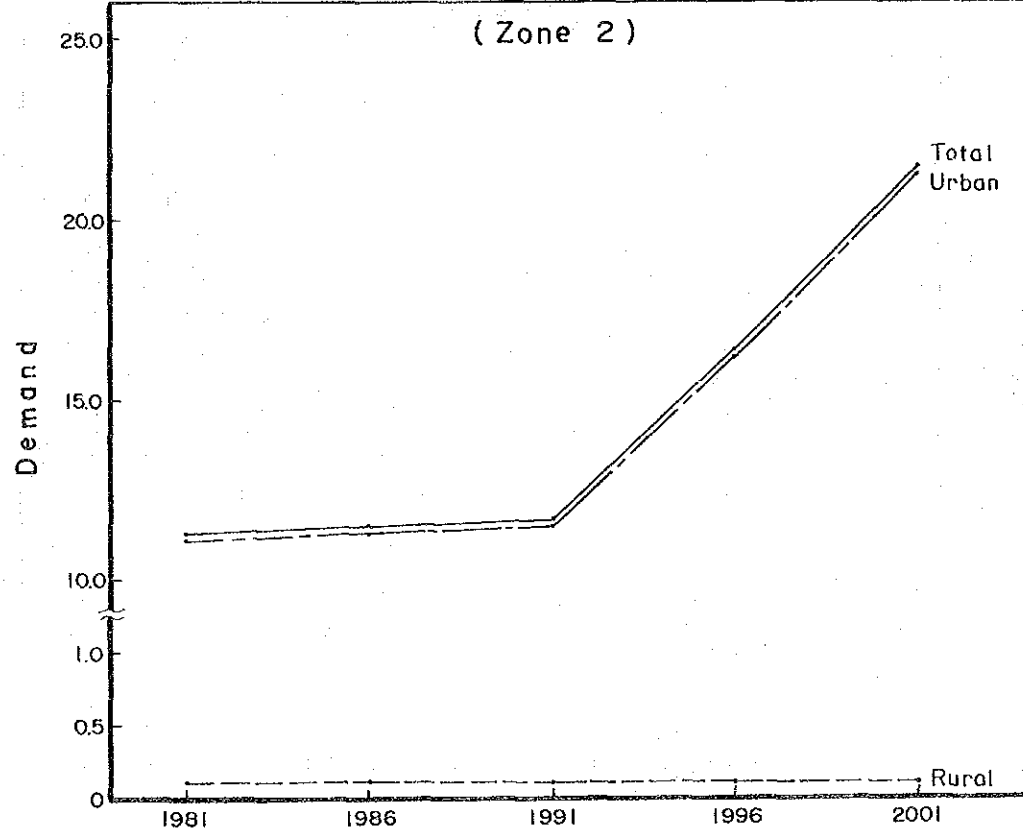
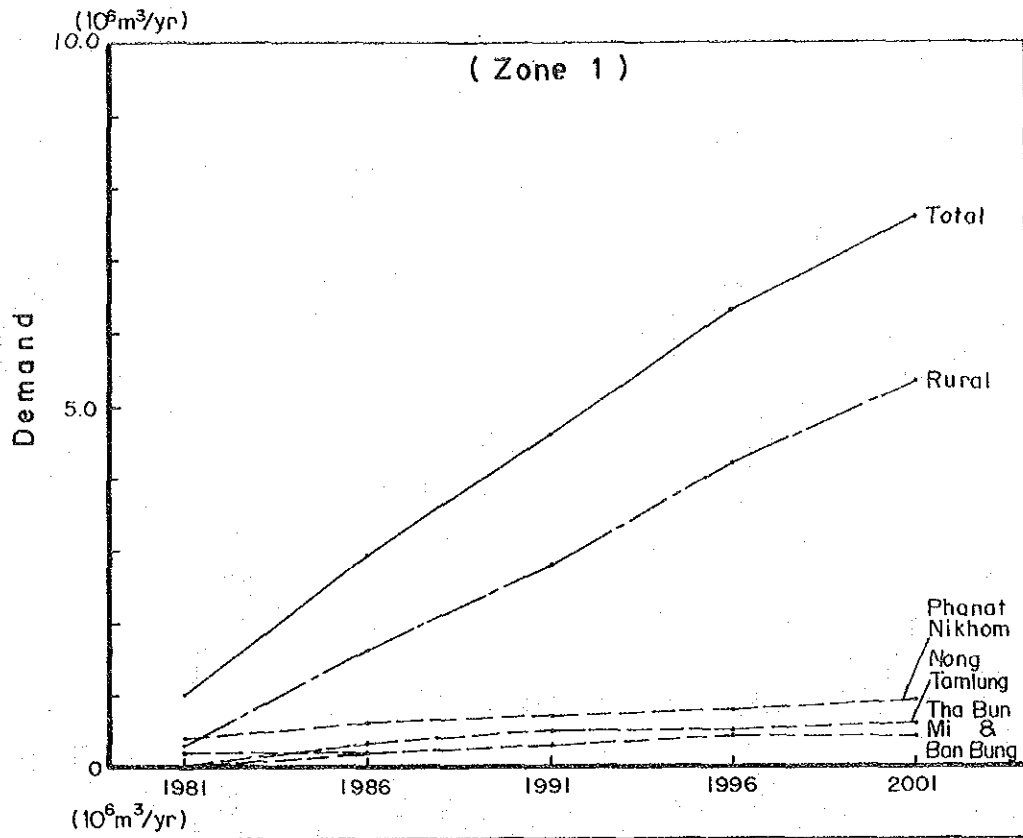


Fig. 5 (1) Historical and Projected Domestic Water Demand by Zone

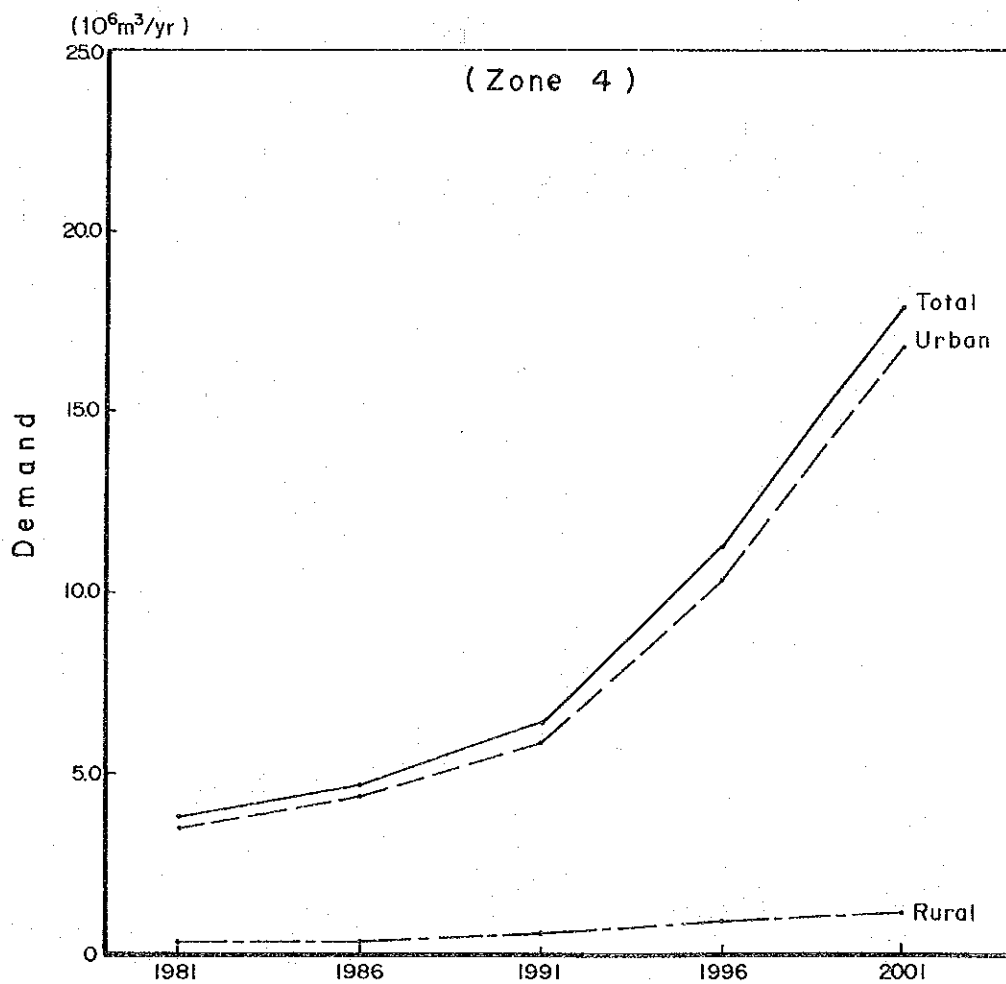
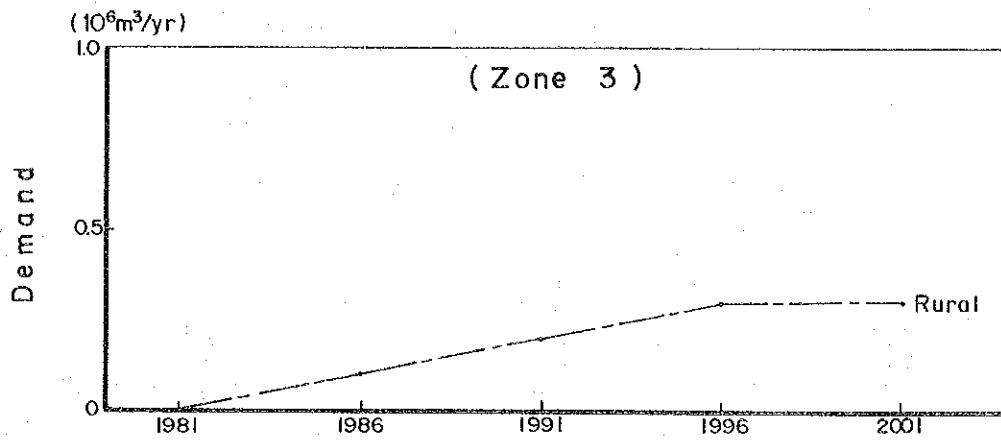


Fig.5(2) Historical and Projected Domestic Water Demand by Zone

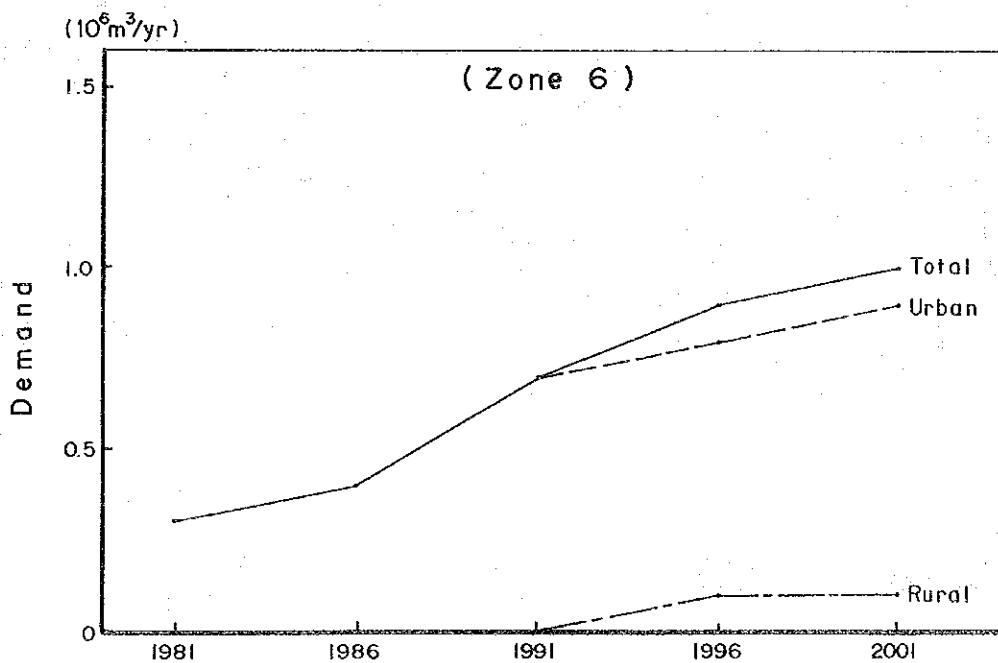
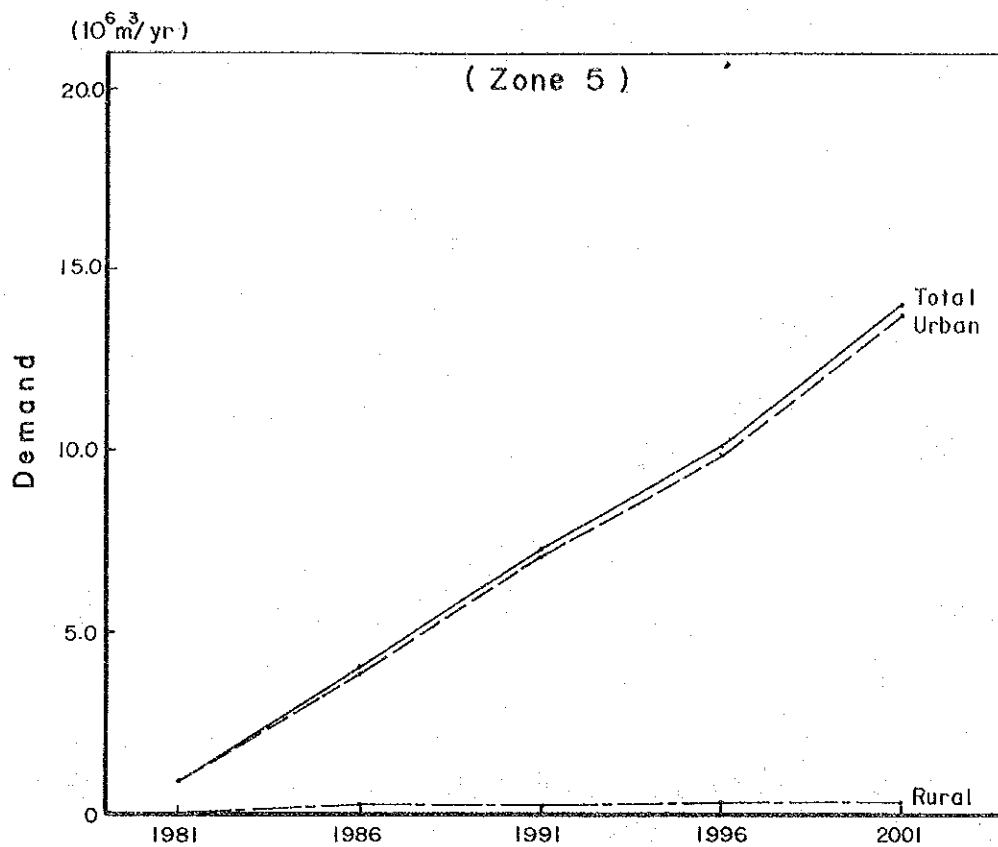


Fig.5(3) Historical and Projected Domestic Water Demand by Zone

KINGDOM OF THAILAND  
 THE EAST COAST WATER RESOURCES  
 DEVELOPMENT PROJECT PHASE II  
 JAPAN INTERNATIONAL COOPERATION AGENCY

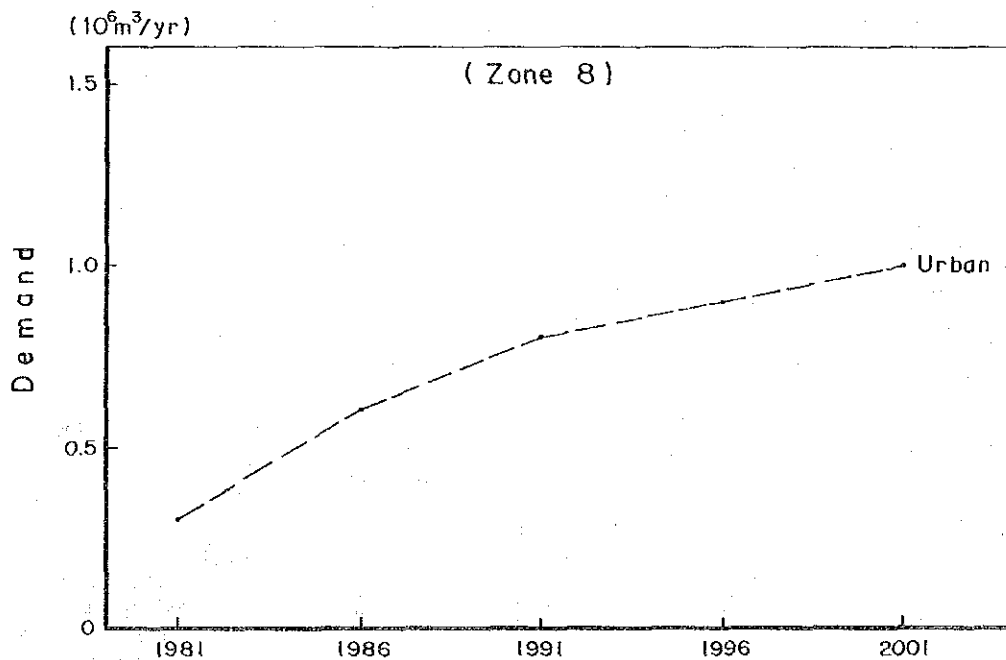
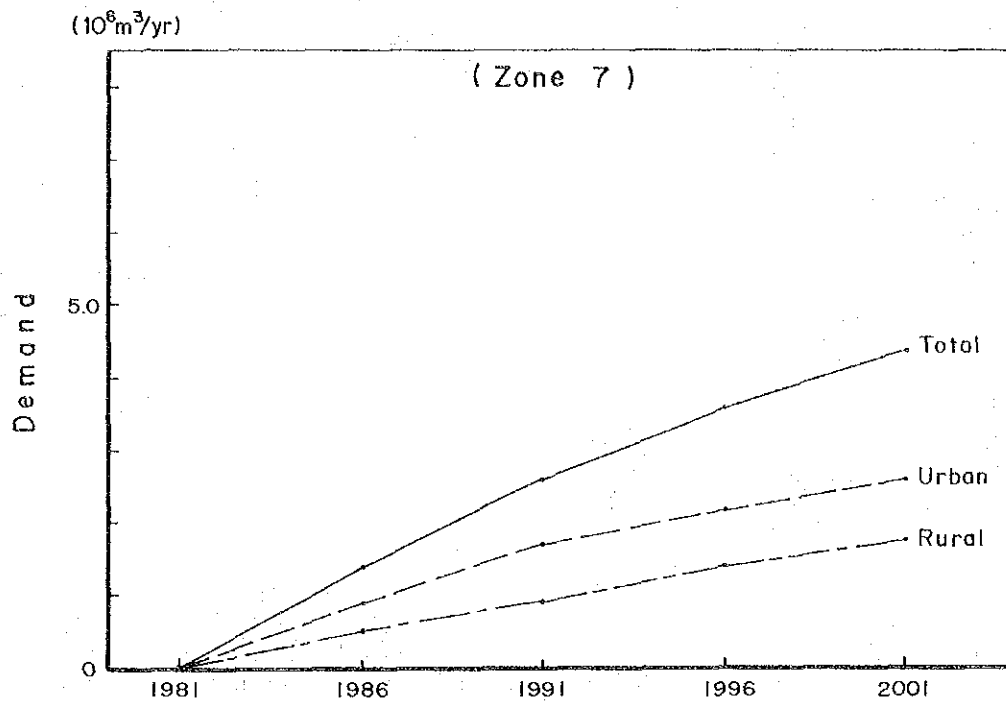


Fig.5(4) Historical and Projected Domestic Water Demand by Zone

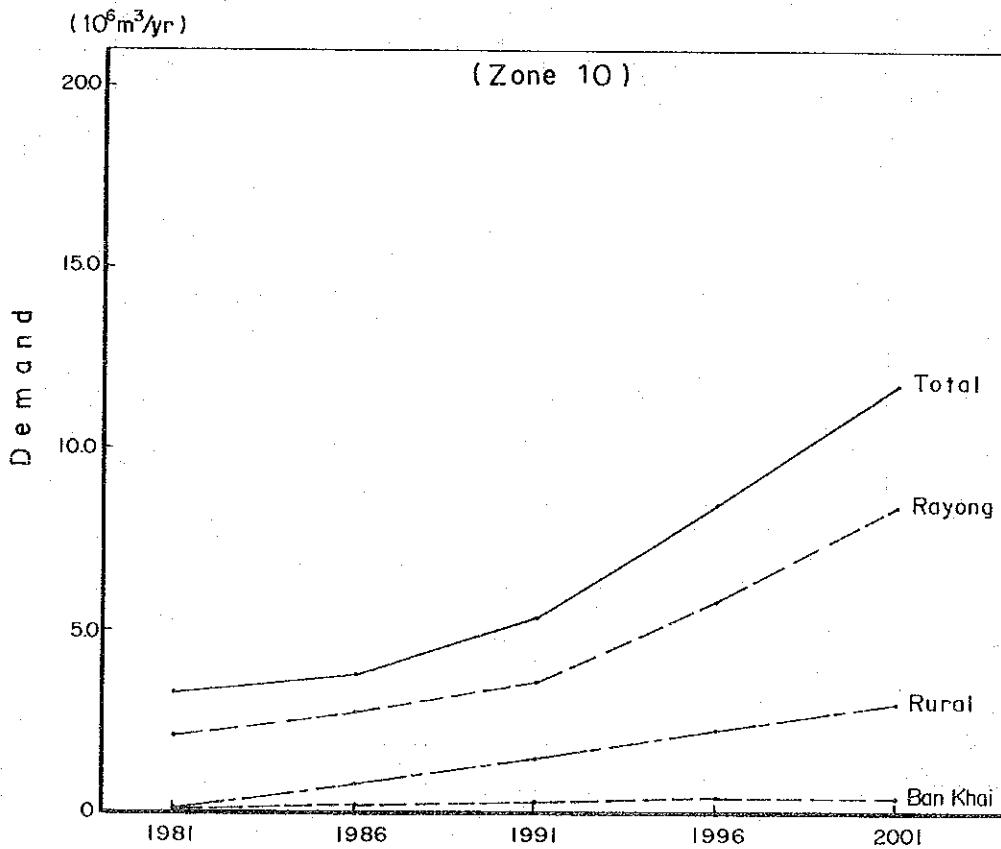
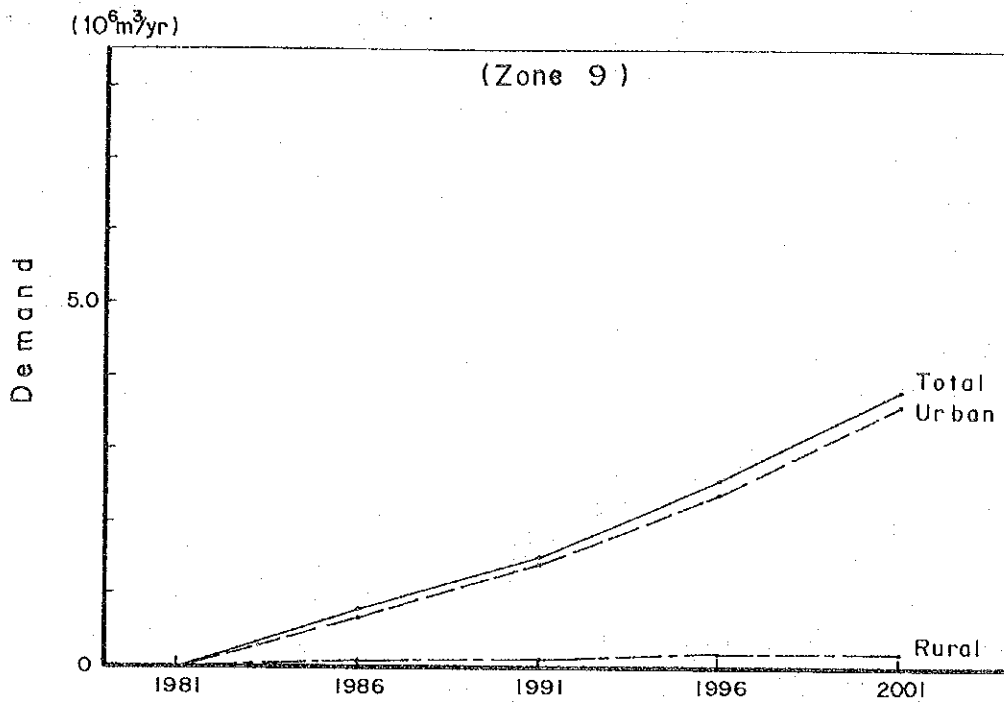


Fig.5(5) Historical and Projected Domestic Water Demand by Zone

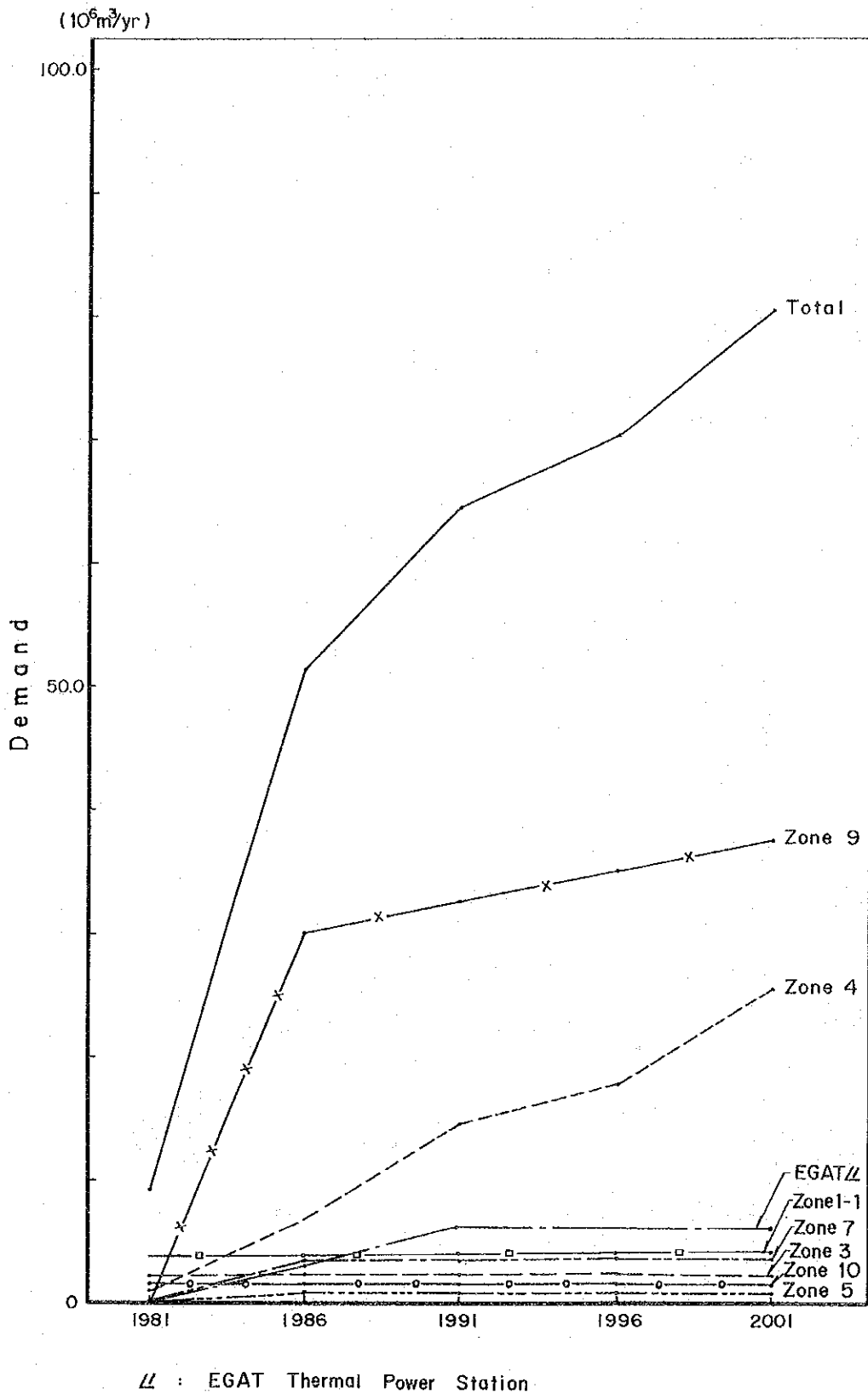


Fig. 6 Historical and Projected Industrial Water Demand of the Study Area

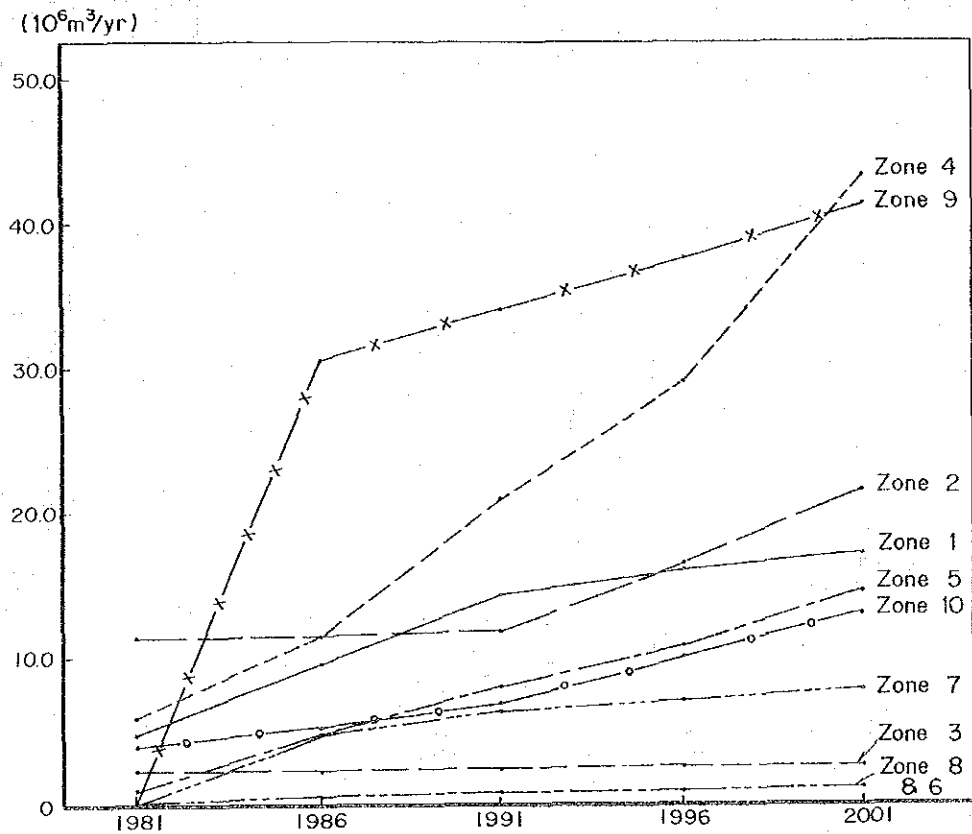
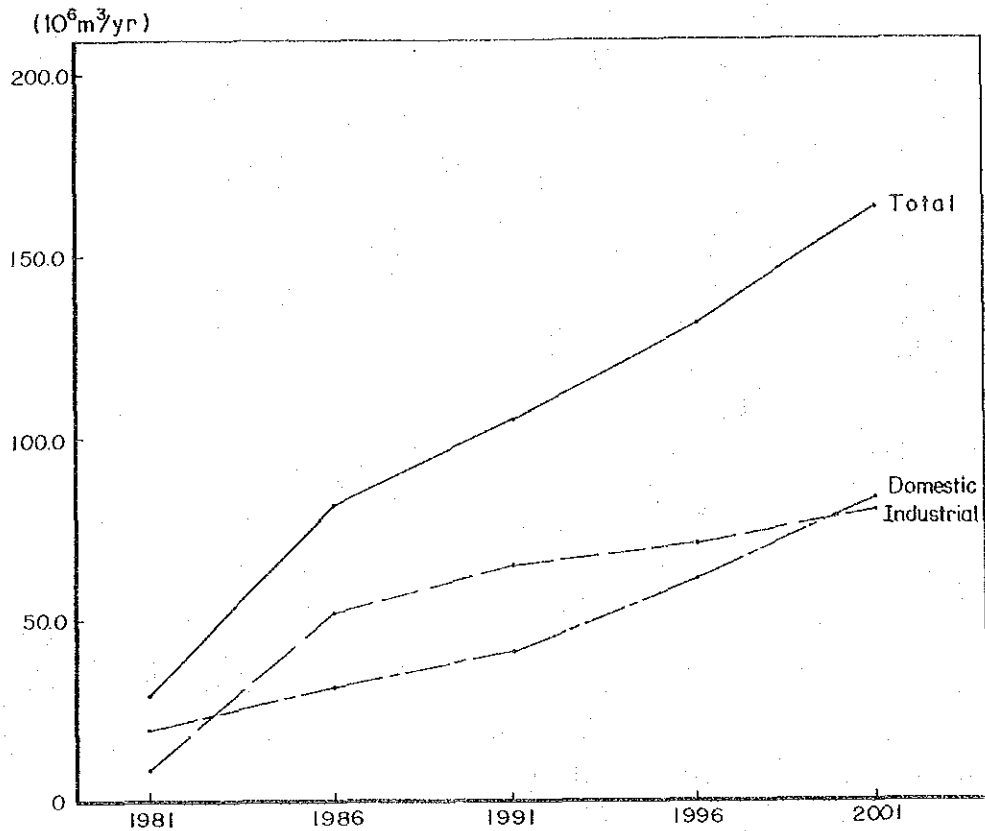


Fig. 7 Historical and Projected Total Water Demand of the Study Area

KINGDOM OF THAILAND  
 THE EAST COAST WATER RESOURCES  
 DEVELOPMENT PROJECT PHASE II  
 JAPAN INTERNATIONAL COOPERATION AGENCY

JICA