

Chapter 2 URBAN DEVELOPMENT

2.1 Overview

(1) General Characteristics of the WSB Region

The total population of the WSB Region was 3.09 million in 1995, with the region's population having increased at an annual average growth rate of 1.46 per cent between 1990 and 1995. Among the six provinces in the region, Ratchaburi province has the largest population (798,076 in 1995) and Samut Songkhram province has the smallest (206,979). Table 5.2.1 shows the shares of population and area size of each province in the WSB region. As seen in the table, Kanchanaburi (whole area) and Ratchaburi provinces each account for nearly one quarter of the total WSB population, while at the other extreme, Samut Songkhram province contributes only 6.7 per cent to the total population of the region. Petchaburi, Prachuap Khirikhan, and Chumphon provinces have approximately similar shares of about 14 per cent of the total regional population. Samut Songkhram province has the highest population density of any WSB province with 497 persons per km². Ratchaburi province has a higher population density (154 persons per km²) than the national average (116 persons per km²), while the other provinces are significantly below the national average.

Table 5.2.1 Population and Area Size by Province in the WSB Region

Province	Population (1995)	Share (%)	Area Size (km ²)	Share (%)	Density (per km ²)
Kanchanaburi (Whole)	744,933	24.1	19,483.2	43.5	38.2
Ratchaburi	798,076	25.8	5,196.5	11.6	153.6
Samut Songkhram	206,979	6.7	416.7	0.9	496.7
Petchaburi	447,094	14.5	6,225.1	13.9	71.8
Prachuap Khirikhan	461,016	14.9	7,319.4	16.3	63.0
Chumphon	432,867	14.0	6,185.0	13.8	70.0
WSB Region	3,090,965	100.0	44,825.8	100.0	69.0
Whole Kingdom	59,400,382	---	513,115.0	---	115.8

Source: National Statistical Office

The general characteristics of each province are briefly summarized below.

Kanchanaburi Province

Kanchanaburi province, with an area of 19,483.2 km², is the third largest province in Thailand after Nakhon Ratchasima and Chiang Mai. Kanchanaburi is divided into 11 amphoes (districts), 2 king amphoes (minor districts), 96 tambons (subdistricts), and 844 mubans (villages). Local administration in Kanchanaburi province consisted of one muang municipality, one tambon municipality, and 25 sanitary amphoes (sukapibans) in 1995. The provincial population increased from 620,033 in 1985 to 744,933 in 1995, implying an average annual growth rate of 1.85 per cent, which was higher than the national average of 1.38 per cent per annum during the period. A comparison of population growth by tambon in the province between 1992 and 1995 is shown in Figure 5.2.1.

The Study Area does not cover the entire land area of Kanchanaburi province, but is limited to the lowland area of five amphoes (districts): Muang Kanchanaburi, Tha Maka, Tha Muang, Phanom Thuan, and Huai Kra Chao Amphoes. These areas are more densely populated compared with other amphoes of the province. Kanchanaburi province was designated under the 7th Economic and Social Development Plan as a center of tourism, business, trading, agro-industries, and productive-industries, which could be linked with Ratchaburi and other provinces in the WSB region.

Ratchaburi Province

Ratchaburi province has a total land area of 5,196.5 km². The provincial population increased from 648,022 in 1985 to 798,076 in 1995, implying an average annual growth rate of 1.55 per cent, which is slightly higher than the average annual population growth rate in the WSB during the period (1.46 per cent per annum) as well as the national annual average growth rate. The province is divided into nine amphoes, 107 tambons, and 895 mubans. Local administration consists of three muang municipalities and 20 sanitary districts. A comparison of population growth by tambon in the province is shown in Figure 5.2.2.

Ratchaburi was designated as the industrial investment center of the WSB region in the 7th Economic and Social Development Plan. Industry is the leading sector in the provincial economy followed by the agricultural, wholesale, and retail sectors. The Damnoen Saduak floating market is the major tourism attraction in this province. Located only 100 km from Bangkok, Ratchaburi appears to be a suitable location for accommodating, in part, an extension of the BMA. The Electricity Generating Authority

of Thailand (EGAT) is promoting the establishment a large power station using natural gas imported from Myanmar and pipelined to the power plant station at Pikulthoung Tambon, Muang Ratchaburi district.

Samut Songkhram Province

Samut Songkhram province, with an area of 416.7 km², is the smallest but the most densely populated province in the WSB region. Samut Songkhram is divided into three amphoes, 36 tambons, and 282 mubans. Local administration in the province consists of one muang municipality, one tambon municipality, and three sanitary districts. The provincial population increased from 203,418 in 1985 to 206,979 in 1995, i.e., at an average annual growth rate of only 0.17 per cent, which was the lowest population growth rate in the WSB region during the period. Comparison of population growth by tambon in Samut Songkram is shown in Figure 5.2.3.

Land use in Samut Songkram can be divided into two categories: the upper part of the province is a dry plain area, while the lower part (nearly one-third of the total provincial land area) consists of swampy land, including an abandoned shrimp field and salt field. Route 35, a national highway that provides a main artery from the BMA to the Central and Lower WSB (and points farther south), runs through the center of the province.

Petchaburi Province

Petchaburi province has an area of 6,225.1 km². The provincial population increased from 410,578 in 1985 to 447,096 in 1995, indicating an average annual growth rate of 0.86 per cent, which was the second-lowest provincial growth rate in the WSB during this period. Petchaburi is divided into eight amphoes, one king amphoe, 92 tambons, and 634 mubans. Local administration in the province consists of one muang municipality, one tambon municipality, and nine sanitary districts. A comparison of population growth by tambon in the province is shown in Figure 5.2.4.

Access to Petchaburi is possible by three major modes of transportation, i.e., by road through two national highways, the Phetchakasem Highway (Route 4) and the Thonburi-Pak Thor Highway (Route 35), by railway via the southern route of the State Railway of Thailand, and by air via Hua Hin airport. In addition, the province is located in Zone 3 of the Board of Investment's promotion scheme, and investments in manufacturing industries have been increasing recently along the national highways, particularly in the northern part of the province.

Petchaburi province also has high potential to become the educational center of the Western region. The province has four vocational colleges (Petchaburi Technical College, Petchaburi Province Vocational College, Petchaburi Agricultural College, and Petchaburi business school) and two undergraduate colleges (Petchaburi Teacher College and Phra Jom Glaw Nurse College). A Rajabhat Institute is also located in Petchaburi.

Prachuap Khirikhan Province

Prachuap Khirikhan province has a total land area of 7,319.4 km² with a population of 400,668 in 1985 and 461,016 in 1995, implying an average annual population growth rate of 1.41 per cent, which was nearly equal to the average growth rate of the WSB region. This province is divided into seven amphoes, 45 tambons, and 364 mubans. Local administration in the province consists of one muang municipality, one tambon municipality, and 13 sanitary districts. A comparison of population growth by tambon district in the province is shown in Figure 5.2.5.

Under the 7th Economic and Social Development Plan, the province aimed at promotion of agriculture and tourism industry. A number of agriculture-related industries such as pineapple and coconut processing have been developed in the province.

More recently, in 1994 a steel complex was established in Bang Saphan, together with the Prachuap deep-sea port. The Bang Saphan area is expected to be a core of "foot-tight" industries.

Chumphon Province

Chumphon province has an area of 6,185.0 km², and it is divided into eight amphoes, 69 tambons, and 648 mubans. Local administration consists of one muang municipality, one tambon municipality, and 12 sanitary districts. The provincial population increased from 355,834 in 1985 to 432,867 in 1995, implying an average annual growth rate of 1.98 per cent, which was the highest growth rate in the WSB during the period. A comparison of population growth by tambon district in the province is shown in Figure 5.2.6.

About 42 per cent of the provincial land area is occupied by farmland, with forest land limited to 20 per cent of the total area. Gross Provincial Product is dominated by the

agricultural sector, which accounts for 45 per cent of Gross Provincial Product (GPP). Industrialization has not yet been promoted in the province, and consequently the industrial sector accounted for only 4 per cent of GPP.

(2) Urbanization

For analysis of the spatial distribution of urban population concentration in the WSB region, urban population has been defined as the population within the boundaries of muang and tambon municipalities or sanitary districts in each amphoe.¹ There are three types of municipality with the following concepts of an urbanized area (urban center):

(i) Nakhon Municipality: A settlement with 50,000 or more inhabitants with a population density of not less than 3,000 inhabitants per km².

(ii) Muang Municipality: A settlement with 10,000 or more inhabitants with a population density of not less than 3,000 inhabitants per km². A place of the provincial administration will be incorporated as a muang municipality regardless of the above requirements.

(iii) Tambon Municipality: A settlement that has been designated as a tambon municipality without specific numerical criteria as required for nakhon and muang municipalities.

Sanitary districts are another kind of population concentration area. A sanitary district must contain (i) an amphoe headquarters, and (ii) a population no less than 1,500 persons or 100 dwelling units in an area of at least 5 km². All areas not falling under any of the above classifications are considered rural areas.

The total urban population (municipalities + sanitary districts) in the WSB region increased from 778,151 in 1985 to 948,729 in 1995. The urban population accounted for 29.1 per cent of the total WSB population in 1985, with this proportion increasing to 30.7 per cent in 1995. The WSB urban population growth rate has been relatively slow over the past decade, i.e., 1.94 per cent per annum in 1985-90 and 2.06 per cent in 1990-95, which is not much higher than the population growth rate for the entire WSB

¹There is no official definition of urban area in Thailand. By official definition, "a municipality is a local government administrative area operated within a province area which is the area set up by the Central Administration System."

(1.45 per cent per annum in 1985-90 and 1.46 per cent per annum in 1990-95) and that of the nation (1.68 per cent per annum in 1985-90 and 1.08 per cent per annum in 1990-95).

The extent of urbanization varies widely among provinces. Petchaburi has the highest proportion of its population concentrated in urban areas in the WSB, 37.3 per cent, while Chumphon has the lowest, 22.5 per cent. Interestingly, however, the most rapid urban growth rate in the WSB in 1990-1995 was in Chumphon province, 9.48 per cent per annum, which was four times higher than the WSB average urban growth rate of 2.06 percent per annum in 1985-1995. Chumphon also has the highest urban population density in the WSB, 1,079 population per km² in 1995. The significant rise in urbanization in recent years in Chumphon is likely attributable to increased business and commercial activities in the province.

The Table 5.2.2 shows average annual population growth rates in provincial and urban population between 1985 and 1995.

Table 5.2.2 Average Annual Growth Rates during 1985 to 1995 in Provincial and urban population and urban population density in 1995

Province	Average Annual Growth				Share of Urban to Total Pop (%)	Urban Pop. Density (person/km ²)
	Total Population (%)		Urban Population (%)			
	1985-90	1990-95	1985-90	1990-95	1995	1995
Kanchanaburi	2.39%	1.32%	4.42%	2.59%	27.5%	976.0
Ratchaburi	1.03%	2.08%	1.48%	1.38%	32.4%	897.9
Samut Songkhram	0.30%	0.05%	0.64%	0.33%	24.1%	1,998.2
Petchaburi	0.83%	0.88%	0.62%	0.44%	37.3%	348.3
Prachuap Khirikhan	1.17%	1.65%	1.02%	1.27%	37.1%	845.7
Chumphon	2.25%	1.71%	4.37%	9.48%	22.5%	1,078.6
WSB Region	1.45%	1.46%	1.94%	2.06%	30.7%	733.0
Kingdom	1.68%	1.08%	---	---	---	---

Note: Urban Definition: Municipalities plus Sanitary Districts

2.2 Urban System in the WSB Region

(1) Distribution of Urban Centers

The Government of Thailand has officially designated twelve cities as regional growth centers: three are in Northeastern region, three in the Northern region, four in the

Southern region, one in the Eastern region, and one in the Western region. The designated regional growth center in the Western (and WSB) region is Ratchaburi. Regional growth centers such as Ratchaburi are expected to play a major role in fostering more balanced regional development in the Kingdom. A broad characterization of these designated regional growth centers is presented in the following table:

Table 5.2.3 Classification of 12 Core Cities

Characterization	Urban Center
1.1. Urban centers with a high level of urban functions and good basic services; the production structure is based mainly on industry.	•Phuket (South) •Ratchaburi (West)
2.2. Urban regional centers with a very high level of urban functions and basic social services; the main activities are in the tertiary sector.	•Hat Yai (South) •Songkla (South) •Chonburi (East) •Chiang Mai (North) •Nakhon Ratchasima (Northeast)
3.3. Rural regional centers with some urban functions and a sufficient level of basic services; the production structure is based on agriculture and services.	•Khon Kaen (North) •Udon Thani (North)
4.4. Rural centers with low level of urban functions and basic services; production structure is based on the primary sector.	•Surat Thani (South)
5.5. Urbanized town with adequate urban functions but still lack of basic social services; the production sector is mainly commerce.	•Phitsanulok •Nakon Sawan

In the WSB region, the administrative areas of all municipalities and sanitary districts (urbanized area) cover 1,294.3 km², which accounts for only 2.9 per cent of the total land area of the WSB (44,825.7 km²). The largest urbanized area by province is 478.6 km², which covers 7.7 per cent of the land area of Petchaburi province, the largest share of urbanized area to total provincial area in the WSB. The lowest shares of urbanized area to total provincial are found in Kanchanaburi (1.1 per cent) and Chumphon (1.5 per cent) provinces.

There are 27 urban centers (two municipalities and 25 sanitary districts) in Kanchanaburi, 23 urban centers (three municipalities and 20 sanitary districts) in Ratchaburi, five urban centers (two municipalities and three sanitary districts) in Samut Songkhram, 11 urban centers (two municipalities and nine sanitary districts) in Petchaburi, 15 urban centers (two municipalities and 13 sanitary districts) in Prachuap Khirikhan, and 14 urban centers (two municipalities and 12 sanitary districts) in Chumphon. Urban centers in the WSB region are classified by urban population size as follows:

Table 5.2.4 Urban Population in the WSB Region, 1993

Range of Urban Population Size	Number of Urban Places
Below 3,000	16
3,000 - 4,999	24
5,000 - 6,999	9
7,000 - 9,999	15
10,000 -19,000	20
20,000 -39,000	9
40,000 and over	2
Total	95

Among the 13 muang and tambon municipalities in the WSB Region, the largest urban settlement (excluding the sprawl condition found in the outer part of municipal boundaries) is Muang Ratchaburi, which had a population of 46,492 in 1993. The smallest urban settlement is Tambon Amphawa (6,754 in 1993) in Samut Songkhram province, as indicated below.

Table 5.2.5 Municipal Population Classified by Size and Percentage Share in Each Amphoe in 1995

Municipality	Municipal Population	Amphoe Population	% to Amphoe Population	Density 1995 (per km ²)
1. Muang Ratchaburi	46,492	184,799	25.2%	5,343.9
2. Muang Kanchanaburi	40,906	151,096	27.1%	4,465.7
3. Tambon Hua Hin	39,934	69,540	57.4%	2,780.9
4. Muang Samut Songkhram	35,559	105,600	33.7%	4,444.9
5. Muang Phetchaburi	33,875	118,601	28.6%	6,273.2
6. Tambon Cha Am	25,871	61,893	41.8%	235.2
7. Muang Ban Pong	25,108	158,243	15.9%	8,628.2
8. Muang Prachuap Khirikhan	17,743	84,439	21.0%	659.6
9. Muang Chumphon	33,905	138,119	24.6%	1,606.9
10. Tambon Tha Rua Phra Taen	13,504	130,597	10.3%	1,860.1
11. Muang Photharam	13,038	129,836	10.0%	5,014.6
12. Tambon Lang Suan	9,970	67,489	14.8%	985.2
13. Tambon Amphawa	6,754	63,628	10.6%	2,701.6

Municipality Ban Pong in Ratchaburi province had the highest population density, 7,778.0 person per km² in 1995, while Municipality Cha Am in Petchaburi had the lowest density, 235.2 person per km², a consequence of the large area of the Cha Am administrative boundary (110 km², which is more than 5 to 10 times larger than that of the other municipalities). The average municipal area and density in the WSB region was 17.6 km² and 1,496 persons per km², respectively. About 17.6 per cent or 1,294.3 km² of the total urban area in the WSB consisted of municipal areas.

The distribution of urban centers in the WSB region is characterized by weak urban agglomeration (population concentration) phenomena, a result of the weak population

pressure from rural areas and weak socioeconomic activities in urban centers. The distribution of urban centers by urban population is different from the distribution of the total regional population. In this context, it should be noted that when considering the concentration of population, the urban area is a more relevant indicator than the total population in any amphoe or province, which includes a larger rural population dispersed throughout the area.

The smallest administrative unit in Thailand is the tambon, a type of community unit. Changes in tambon population reflect changes of urban population. The following table shows population distribution by tambon. In addition, Figure 5.2.7 shows the changes in the population size of the ten most populated tambons of the WSB region between 1992 and 1995.

Table 5.2.6 Population Distribution by Tambon in the WSB Region

Range of Tambon Population Size	Kanchanaburi Province				Ratchaburi Province				Samut Songkhram Prov.				Phetchaburi Province			
	92	95	92	95	92	95	92	95	92	95	92	95	92	95	92	95
25,000 and Over	1	2	1.0%	2.0%	1	2	1.0%	1.9%	1	0	2.8%	0.0%	0	1	0.0%	1.1%
15,000 - 25,000	5	5	5.1%	5.0%	4	4	3.8%	3.8%	0	0	0.0%	0.0%	5	4	5.4%	4.3%
10,000 - 15,000	12	9	12.2%	9.0%	18	16	17.3%	15.4%	2	1	5.6%	2.9%	1	1	1.1%	1.1%
7,500 - 10,000	19	19	19.4%	19.0%	18	21	17.3%	20.2%	2	4	5.6%	11.4%	2	4	2.2%	4.3%
5,000 - 7,500	31	35	31.6%	35.0%	22	24	21.2%	23.1%	11	10	30.6%	28.6%	20	17	21.7%	18.3%
5,000 and less	30	30	30.6%	30.0%	41	37	39.4%	35.6%	20	20	55.6%	57.1%	64	66	69.6%	71.0%
No. of Tambon	98	100	100%	100%	104	104	100%	100%	36	35	100%	100%	92	93	100%	100%

Range of Tambon Population Size	Prachuap Khiri K. Province				Chumphon Province				WSB Region			
	92	95	92	95	92	95	92	95	92	95	92	95
25,000 and Over	2	2	4.3%	4.1%	0	0	0.0%	0.0%	5	7	1.1%	1.6%
15,000 - 25,000	2	1	4.3%	2.0%	1	2	1.5%	2.9%	17	16	3.8%	3.5%
10,000 - 15,000	11	11	23.9%	22.4%	6	6	8.8%	8.6%	50	44	11.3%	9.8%
7,500 - 10,000	16	19	34.8%	38.8%	10	10	14.7%	14.3%	67	77	15.1%	17.1%
5,000 - 7,500	10	8	21.7%	16.3%	22	22	32.4%	31.4%	116	116	26.1%	25.7%
5,000 and less	5	8	10.9%	16.3%	29	30	42.6%	42.9%	189	191	42.6%	42.4%
Number of Tambons	46	49	100%	100%	68	70	100%	100%	444	451	100%	100%

Source: JICA Study Team

(2) Urbanization Potential

The WSB urban population growth rate (2.0 per cent per annum in 1985-1995) is slightly higher than the corresponding national average. The higher population growth in the WSB region is largely attributable to internal migration flow to the principal urban centers. In 1985, about 29.1 per cent of the WSB population lived in urban areas (i.e., municipalities and sanitary districts) and 70.9 per cent in rural areas. The proportion of

urban population in the WSB increased slightly to 30.7 per cent in 1995, indicating that urbanization in the region has not accelerated during the last ten years.

The share of urban population and the average annual growth rate of urban population by province in 1985-1995 are tabulated below:

Table 5.2.7 Share of Urban Population and Average Annual Growth Rate between 1985 and 1995

Province	1995 Urban Population	Share of Urban Population	Average Annual Growth Rate (1985-95)
Kanchanaburi	204,793	21.6%	3.50%
Ratchaburi	258,933	27.3%	1.43%
Samut Songkhram	49,975	5.3%	0.48%
Petchaburi	166,677	17.6%	0.53%
Prachuap Khirikhan	171,130	18.0%	1.14%
Chumphon	97,221	10.2%	6.89%
WSB Region	948,729	100.0%	2.00%

Urban population growth patterns of amphoe units (i.e., municipalities and sanitary districts in amphoes) have been analyzed to assess the level of "urbanization" potential in the WSB region. The following criteria of urban population growth patterns have been applied:

Potential I: Amphoe having higher (than the average) total population growth rate and higher (than the average) urban population growth rate (1985-1995)

WSB total population growth rate \geq 1.46 percent per annum

WSB urban population growth rate \geq 2.0 percent per annum

Potential II: Amphoe having lower (than the average) total population growth rate and higher (than the average) urban population growth rate (1985-1995)

WSB total population growth rate \leq 1.46 percent per annum

WSB urban population growth rate \geq 2.0 percent per annum

Potential III: Amphoe having higher (than the average) total population growth rate and lower (than the average) urban population growth rate (1985-1995)

WSB total population growth rate \geq 1.46 percent per annum

WSB urban population growth rate \leq 2.0 percent per annum

Potential IV: Amphoe having lower (than the average) total population growth rate and lower (than the average) urban population growth rate (1985-1995)

WSB total population growth rate ≤ 1.46 percent per annum

WSB urban population growth rate ≤ 2.0 percent per annum

The results of the evaluation by province are summarized below.

Table 5.2.8 Classification of Urbanization Potential by Amphoe Urban Area

Units: Urban areas in Amphoe unit.

Province	Potential I Total ≤ 1.46p.a Urban ≤ 2.00p.a.	Potential II Total ≤ 1.46p.a Urban ≤ 2.00p.a.	Potential III Total ≤ 1.46p.a Urban ≤ 2.00p.a.	Potential IV Total ≤ 1.46p.a Urban ≤ 2.00p.a.
Kanchanaburi	1.Thong Pha Phum	Muang Tha Maka Tha Muang	Sai Yok Si Sawat Sangkhla Buri	Bo Phloi Phanom Thuan Lao Khwan
Ratchaburi		Photharam	Chom Bung Ban Pong Pak Tho	Muang Damnoen Saduak Bang Phac Wat Phleng
Samut Songkhram				Muang Am Phawa Bang Khonthi
Petchaburi	Cha-Am			Muang Khao Yoi Tha Yang Ban Lad Ban Laem
Prachuap Khirikhan	Muang Hua Hin		Bang Saphan Noi	Kui Buri Thap Sakae Bang Saphan Pran Buri
Chumphon	Muang Tha Sae Pa Thiu Sawee	Lang Suan	Pha To La Mac Thung Tako	
WSB Region	8	5	10	19

(3) Urban Infrastructure

Existing conditions of various urban infrastructure and services have been surveyed for 13 municipalities (eight muang and five tambon) in the WSB region. Results are summarized below for urban transportation, water supply, sewerage, solid waste management, and power supply.

Urban transportation

The regional road network in the WSB is relatively well developed, linking most urban centers effectively. However, the lack of direct links between some of major urban centers suggests that the road development in the WSB has concentrated so far on providing access rather than offering alternatives to serve various needs. This has resulted in concentration of traffic along major arteries and in/around major urban centers. Also, inter-city highways pass through urbanized areas of most urban centers, causing congestion and increased traffic accidents.

In Thailand as a whole, motorization is rapidly progressing, but the development of associated urban facilities has not kept pace with such a progress. Presence of large vehicles, such as garbage collection trucks in narrow urban streets, mixture of traffic for various purposes and of different travel speeds, and a lack of parking spaces are typically observed in many WSB urban centers.

Water supply

Seven out of 13 municipalities in the WSB were found to have sufficiently clean water for drinking. Ratchaburi, Photharam, and Hua Hin municipalities have relatively low service ratios (50-70 per cent) as their service areas cover the areas outside the municipalities with limited water sources. The lowest ratio of access to clean water, 20 per cent, is observed in Amphawa. More than half of the municipalities noted inefficient distribution networks or inadequate water treatment plant capacity as problems.

Water supply for Kanchanaburi and Tarua Phratan takes the Khwai Yai river as a source with a production capacity of 15,360 m³/day. A progressive water tariff is applied with the water rate ranging from 45 Baht per m³ for smallest users to 10 Baht per m³ for largest users. Works on a long-term water supply expansion project started in 1992.

The three municipalities in Ratchaburi are served by separate water supply systems: Ban Pong with the 17,280 m³/day capacity based on the Mae Klong river and groundwater, Ratchaburi with 18,000 m³/day on the Mae Klong river, and Phataram with 3,600 m³/day on the Mae Klong river and groundwater. Samut Songkhram municipality is served by groundwater with a 11,520 m³/day capacity. Amphawa is also served by groundwater.

The Petchaburi Provincial Waterworks serve Petchaburi municipality and Ban Laem areas, with a production capacity of 12,720 m³/day. Expansion of supply capacity is planned. The Cha Am Municipal Waterworks has a production capacity of

3,600 m³/day. Water supply for Prachuap Khirikhan and Hua Hin suffers shortages. In Chumphon, the Provincial Waterworks take water from the Tatako canal to supply a capacity of 13,200 m³/day. Lang Suan is served by water from the Lang Suan river with a 1,920 m³/day capacity.

Sewerage

The majority of the 13 municipalities in the WSB rely on septic tanks. Sewerage system connections are provided to only 50 to 70 per cent of households in most municipalities. Wastewater treatment facilities are currently operational in Petchaburi and Hua Hin municipalities. Construction of domestic wastewater treatment facilities has been studied for Ban Pong and Patharan in Ratchaburi, and municipalities in Prachuap Khirikhan and Chumphon.

Due to discharge mainly of domestic sewage and partly of industrial wastewater, water quality in major rivers in the WSB has been deteriorating. Water pollution is particularly serious in the lower reaches of the Mae Klong river due to discharges of wastewater from households, and commercial and industrial establishments. Levels of dissolved oxygen (DO) are in the order of 5.0 mg/l in the lower Mae Klong river, while they are around 6.5 mg/l in the upstream of Kanchanaburi.

Solid waste management

Household and street garbage collections are made once a week in most municipalities. Since garbage is typically collected from only 50 to 80 per cent of all generators, uncollected garbage causes environmental degradation in public canals, klongs, and rivers. Photharam municipality has the most serious problem collecting garbage, with only 20 per cent of all generators receiving services. Tarua Phratan and Amphawa municipalities have solid waste incinerators in their communities.

The disposal of solid waste generated from households, and commercial/industrial establishments into open dumps is a standard practice in the WSB. Sanitary conditions of the dumping sites are generally poor. Feasibility studies of sanitary landfill will be commenced shortly for some municipalities in the WSB.

Electricity supply

All households in the municipalities are supplied with electricity by the Provincial Electricity Authority of Thailand (PEA). The electrification rate in the municipalities is 100 per cent. However, supply reliability is a problem. According to a survey conducted as part of the Study, 37 per cent of existing industrial enterprises complained

that the quality of electricity supply was poor and there were too many brownouts and outages. Use of base wires for transmission through forest and fruit tree areas in the WSB is a factor for higher brownout/outage rates due to lightening and tree overgrowth. Effects of salt and winds on electric poles are also serious in the WSB, a region with a long coastline.

(4) Characterization and Priority for Major Urban Centers

NESDB has classified urban centers in the Kingdom by the different aspects of their development conditions and potentials as included in the *National Urban Development Policy Framework: Final Report*. The results of the NESDB classification and an explanation are summarized below. In the WSB region, Ratchaburi has been classified as Level 2 (an urban regional growth center), Kanchanaburi and Samut Songkhram as Level 3 (community urban growth centers with average potential), and Prachuap Khirikhan as Level 4 (a community urban growth center with slightly below average potential). Other urban centers in the WSB region have been classified as Level 6 (urban centers with the lowest potential).

Table 5.2.9 Classification of Urban Centers in Thailand

Level	Characteristics	Urban Centers
1	Urban regional growth center, most developed urban center in the region.	All the cities in the BMA, Chon Buri, Saraburi, Phuket, Songkla, Khon Kaen, Nakhon Ratchasima, and Chiang Mai
2	Urban regional growth center, high, rather than extraordinary economic potential	Rayong, Chachoengsao, Ratchaburi, Ayutthaya, Nakhon Sawan, and Phitsanulok
3	Community urban growth center with average potential.	Kanchanaburi, Samut Songkhram, Surat Thani, Udon Thani, Ubon Ratchathani, and Lamphun.
4	Community urban growth center with slightly below average potential	Prachuap Khirikhan, Lop Buri, Prachin Buri, Nakhon Si, Thammarat, Yala, Narathiwat, Nong Khai, Buri Ram, Surin, Lam Pang, Chiang Rai, Tak, and Kamphaeng Phet
5	Urban center with below average potential.	Nakhon Nayok, Sakhon Nakhon, Roi Et, Maha Sarakham, and Uttaradit
6	Urban center with lowest potential	All other urban centers

Source: NESDB

Provincial cities in the WSB region have been characterized and their priority preliminarily identified based on the NESDB classification of urban centers as well based on regional characteristics and development needs; the results are summarized below.

Table 5.2.10 Characterization and Priority of Major Urban Centers

Provincial City	Characterization and Priority
Kanchanaburi	<ul style="list-style-type: none"> • Community urban growth center, Kanchanaburi was designated in the 7th National Plan as a center for tourism, business, trading, agro-industries, and productive industries linking with Ratchaburi and other provinces. • Water resources, forests, mineral resources, agriculture, raw materials, and natural tourism attractions are available. • Due to its proximity to Bangkok, this center is suitable for the development extended from the BMA. • Close to the borders with Myanmar, this center has more advantages for Myanmar-related investment than other areas. The development of its hinterlands is the key.
Ratchaburi	<ul style="list-style-type: none"> • A regional center with multiple functions, Ratchaburi Province was designated as the industrial investment center of Western Region in the (previous) 7th National Plan. • Industry is the driving force of this urban center. The pulp industry and dairy farming have long been the largest-scale industries of the Western Region. A newly established electrical power plant station is located at Muang Ratchaburi District. • Damoen Saduak floating market is a major international tourist attraction in this area. • A Rajabhat Institute is located in this center and there will be a faculty of Agriculture at Silapakor University in 1997. Also, a Western Regional University will be established in the near future. Higher education facilities will be expanded in this center. • There are rapid, convenient highway connections between the Southern and Western regions and this center is only 100 km away from the BMR. • Ratchaburi will become a strategic location between the Southern region and the Northern and Northeastern regions after the outer ring road of the BMR is completed.
Samut Songkhram	<ul style="list-style-type: none"> • A community urban growth center, an alternative site for an amusement park, and an industrial and science park to be relocated from the BMA. • A strategic location between the BMA and WSB Region with Route 35. • Priority is development of abandoned shrimp farms and better water management.
Petchaburi	<ul style="list-style-type: none"> • This center is located in the junction connecting the Southern region and other regions of the Kingdom. • Petchaburi is located in Zone 3 of the Board of Investment's promotion areas. • Presently, Petchaburi is the educational center of the WSB Region. Four vocational colleges and two undergraduate colleges are available and two other educational facilities are planned. A future "University Town."
Prachuap Khirikhan	<ul style="list-style-type: none"> • In the 7th National Plan, the province put emphasis on the agriculture and tourism industry. • The livestock industry is one of the province's leading economic sectors. • An important iron and steel factory is located at Bang Saphan. • The priority is to upgrade tourism facilities and develop livestock-related industries. A strong linkage with the iron and steel industry is important. A furniture and timber industry using bark of coconut trees has potential to develop in this center.
Chumphon	<ul style="list-style-type: none"> • The province is located in Zone 3 of the Board of Investment promotion area. • A new airport will generate new development potential in this area. • The center is located at the gateway to Phuket and the Southern Region. Priority includes urban infrastructure to serve agro-related industries, marketing, further industrialization, and future tourism. The new airport is key factor in the development of this center.

(5) Urban Planning and Management

The country's Town Planning Act, enacted in 1975, aims at urban development for "public health, comfort, convenience, order, landscape, utilization of property, public security and peace, improvement of economy, society and environment, valuable place in art, architecture and history, etc." The Town Planning Act requires general and specific plans. A general plan includes plans and regulations that function as guidelines for urban development and preservation, while a specific plan includes plans and programs for urban development and preservation in specified areas. The Town Planning Act sets out (i) the formulation of a plan and related implementation and compensation; (ii) the authority, responsibility, and procedures for enforcement; and (iii) items to be determined in the plan, committee approval, public inspection, and the calculation method for compensation.

City Plans for all cities and municipalities (about 140) in Thailand are formulated by the Department of Town and Country Planning (DTCP) under the Ministry of Interior. Urban planning and management for other municipalities and towns is coordinated between planning agencies (such as Departments of Town and Country Planning) and local execution offices (such as provincial, amphoe, tambon, and especially municipality offices).

The following table shows jurisdiction and planning area specified by DTCP for the existing 13 municipalities in the WSB. As shown clearly, the town planning boundaries are much larger than the municipality areas. The planning areas might be too large for urban planning purposes because they include large agricultural fields within their boundaries. On the other hand, the municipality areas are too small to control existing urbanized land use and to guide future urbanization. Urbanized areas are expanding outside of municipality boundaries, with sanitary districts created in adjacent areas.

Table 5.2.11 Comparative Area: Municipality Area and DTCP Planning Area

Province	Municipality	Units: hectares	
		Municipality Area	Planning Area
Ratchaburi	Muang Ratchaburi M	870	3,802.56
	Ban Pong TM	291	4,453.44
	Photharam TM	260	1,250.88
Kanchanaburi	Muang Kanchanaburi M	916	6,932.32
	Tharua Phra Tan TM	726	1,763.10
Petchaburi	Muang Petchaburi M	540	6,428.80
	Cha-Am TM	11,000	12,152.32
Samut Songkhram	Muang Samut Songkhram	800	4,789.76
	Am Phawa TM	250	1,774.30
Prachuap Khirikhan	Muang Prachuap M	2,690	7,660.48
	Hua Hin TM	1,436	9,162.24
Chumphon	Muang Chumphon M	2,110	15,085.92
	Langsuan TM	1,012	2,570.08

(6) Major Constraints on Urban Development in the WSB region

Through a review of historical trends and the current situation of urbanization in the WSB, major constraints on urban development in the region have been identified as summarized below:

No development of a regional urban core as a cluster in the WSB region

Since the WSB is rather sparsely populated and industries have not been developed on a large scale, a large urban center has not yet been developed in the region. The largest city (Ratchaburi) has an urban population of less than 50,000; there is as yet no regional urban core in the WSB region. In the future, however, selected urban cores will have to be developed in a cluster in order to promote investment in the region and to foster decentralization of political, economical, and social activities.

Lack of investment and job opportunities in local urban centers

With limited public and private investment in the WSB's urban areas, local urban centers have not been well developed in the region and therefore job and income opportunities are limited. Since urban development and investment opportunities interact, it is necessary to strategically combine urban development and sector development policies to improve job and income opportunities in the WSB urban areas.

Ineffective decentralization and local budgeting system for urban development

At present, there is no proper institution to promote regional urban cores and local urban centers. Urban planning is executed principally at the central level, in organizations such as DTCP, provincial offices have neither the authority nor the budget to adequately promote urban development. Although residents and local authorities participate in public hearings concerning land use zoning, they do not promote urban development programs. Fine-grained, efficient urban planning cannot be expected under the current system of institutional and budgetary arrangements.

Insufficient urban infrastructure development

The majority of municipalities in the WSB region have access to water supply, but some municipalities have a low water service ratio (less than 20 per cent). The sewage system has not been developed in most municipalities except along main streets, and septic tanks are commonly used even in urban centers. Garbage or solid waste disposal services require considerable improvement, as the collection rate is low and the collection cycle is long. A survey of the six provincial offices in the WSB revealed that the improvement of social infrastructure in urban areas is of prime importance to make urban life more attractive to the residents. Greater public-sector investment will be required to improve urban infrastructure.

Insufficient urban amenities

Urban amenities have not been well developed in any urban center in the WSB region. To implement a socially-oriented regional development plan, and to make urban life more attractive, urban amenities should be strategically improved in each urban center. Public participation and coordination between public and private sector entities are required in the planning and improvement of urban amenities.

Lack of urban development guidelines

DTCP has been responsible for land use planning in urban and suburban areas, but the areas planned by DTCP and the areas of each municipality are different in scale. For instance, since the area planned by DTCP is 2 to 15 times larger than the area of a typical municipality, effective urban plans have not yet been worked out for the development of municipality areas. Further, there have been no guidelines yet issued for urban planning

and development. It is recommended that such urban development guidelines be formulated and issued to promote efficient urban planning and development.

(7) Problem Structure and Key Development Issues

As explained in the foregoing sections, urban development in the WSB region faces various constraints. Major constraints and their relations are illustrated as a problem structure diagram presented in Figure 5.2.8. Key development issues are listed below.

- (i) lack of integrated and coordinated urban development practices;
- (ii) enlargement of the disparity in various public and private service activities between major provincial areas and other local urban communities;
- (iii) lack of social development support services in local urban areas;
- (iv) lack of employment opportunities in local urban areas;
- (v) inefficient urban development management;
- (vi) spreading urban settlement areas;
- (vii) increasing traffic congestion, accidents, and air pollution at major provincial urban areas;
- (viii) deteriorating urban living environment;
- (ix) uncontrolled land use practice; and
- (x) increasing financial burdens on various public services.

2.3 Urban Planning

(1) Review of Urban Development Policy

The Thai government's policy for urban development has been historically centered on two major issues, i.e., (i) how to alleviate the urbanization pressure on the BMA, and (ii) how to encourage the growth of regional urban centers to prevent out-migration to the BMA. These policy issues remain chief concerns at the moment, as the concentration of political, economic, cultural, and social activities in the BMA is still progressing. Various approaches, however, have been taken to address these policy issues from the viewpoint of urban development; the approaches taken in each of the National Development Plans are briefly reviewed below:

Fourth Plan Period (1977-81): The concept of a regional urban development plan emerged in the Fourth Plan, which applied three major directions for urban planning, i.e., (i) control of land use within cities, (ii) development of urban infrastructure, and (iii) urban development as a component of regional development.

Fifth Plan Period (1982-86): The specific area development and regional development approach were introduced. Five provinces were defined as major regional centers for development, and six other regional cities were identified as the areas to initiate regional development. Likewise, ten provinces were defined as secondary areas for regional development. The development of the Eastern Seaboard (ESB) was initiated and promoted during this period.

Sixth Plan Period (1987-91): As urban problems in the BMA were growing worse, three additional provinces were designated as regional development centers. The concept of "metropolis" was applied in urban planning and specific area development.

Seventh Plan Period (1992-96): A regional network approach was adopted in urban and regional development, and urban clusters were formulated in various regions. In the BMA, the Metropolitan Regional Structure Planning Study was conducted, and the concept of "Multipolitan" development was proposed, dividing the BMA into four subsystems, i.e., the Greater Bangkok region, the ESB region, the WSB region, and the Upper Central region. The WSB region covered a part of the Sing Buri-Hua Hin multipolitan sub-system. Various plans were formulated during this period, but little action was followed to implement the proposed plan and programs.

Eighth Plan Period (1997-01): The Eighth Plan is proposing to apply an "area development approach" for regional and urban cluster development. The area development approach is to integrate urban and rural development to enhance the quality of life in both urban and rural areas. In parallel with the formulation of the Eighth Plan, a nationwide spatial development framework has been formulated by NESDB, and various systems of "cities and regions" have been proposed.

(2) Basic Considerations in WSB Urban Planning

The well-crafted area development approach adopted in the Eighth Plan is considered to be reasonably applicable for urban planning in the WSB. The urban development plan will be formulated by referring to each macro-zone identified in the WSB region (Refer

to Volume 1, Section 3.4 and Volume 4, Chapter 1). The WSB region is proposed to be divided into four macro-zones for planning purposes, as follows:

- (i) Kanchanaburi zone;
- (ii) Upper WSB zone (Ban Pong, Ratchaburi, Samut Songkhram, and Upper Petchaburi sub-zones);
- (iii) Central WSB zone (Lower Petchaburi, Upper Prachuap Khirikhan);
- (iv) Lower WSB zone (Lower Prachuap Khirikhan, Chumphon).

The spatial development structure proposed for the WSB regional development (Refer to Volume 1, Chapter 3.4) will be followed, in general, in the area development approach for the WSB urban development. In this spatial structure, a "multiple access model" has been adopted for the regional development pattern, and this proposed model will be referred to in formulating the plan for development of major urban centers in the WSB region.

In the spatial development plan proposed in Volume 1, Chapter 3.4, however, the network and clusters for urban development remain to be further developed, and the roles and networks of each zone need to be further studied from the viewpoint of urban development.

Several core zones are identifiable in the WSB region. For instance, some urban centers in Kanchanaburi, Prachuap Khirikhan, and Chumphon will become centers for agricultural products and agro-processing. Some urban centers in Ratchaburi and Bang Saphan will become centers for industrial development. Other urban centers in Kanchanaburi and Petchaburi will be centers for knowledge-based industry and tourism activities. In Samut Songkhram, a free trade area is proposed, which will help create an urban center with multiple functions. Urban development in the region is planned so that the functions of each urban center will interact to create a functionally integrated network of settlements.

(3) Urban Population Projection and Urban Land Use Demand in the WSB

According to Industrial Development study presented in Volume 7, Table 7.5.11, total manufacturing employment in the WSB region is projected to be 372,000, 440,000, and 535,000 in 2001, 2006, and 2011, respectively. This implies an increase of 137,000, 205,000, and 300,000 employees compared with the region's 235,000 manufacturing employment in 1994.

Urban population changes in municipality and sanitary districts in the WSB region have been projected according the following assumptions:

- (i) Increase/decrease of agricultural employment would occur at the outside of the urban center areas (municipality and sanitary district jurisdictions),
- (ii) Increase in manufacturing and service sector employment would occur at the urban centers and their surrounding areas and 50 per cent of this employment would be counted as part of the urban population increase within the municipality and sanitary district areas.
- (iii) Increase in other industrial employment such as construction and mining sectors, would occur at the outside of the urban center areas.
- (iv) One manufacturing sector job would generate 0.47, 0.76, and 1.07 service sector jobs in 2001, 2006, and 2011, respectively. These coefficients were derived from the WSB Moderate Growth Scenario (Refer to Volume 3, Table 3.3.2).
- (v) One job in the manufacturing and service sector employment would support 1.5 other family members (i.e., a 2.5 person increase per employment),
- (vi) Housing land demand by the generated urban population is assumed at 100 m² per person (population density of 100 persons/hectare - medium-high density). Referring to the WSB urban population density, the highest municipality density in the 13 existing municipalities in the region was the 86 persons per hectare at Ban Pong Municipality, and the average was 34 persons per hectare in 1995 (refer to Table 5.2.5).
- (vii) Land demand for public utilities such as roads, parks, and commercial and public facilities was calculated at the rate of 20 per cent of the housing land demand size.
- (viii) Land demand for urban-type factory sites by new industries was derived from the estimate in Industrial Sector Report (Refer to Volume 7, Table 7.5.14).
- (ix) The share of the total urban land demand by sub-area, i.e., Upper, Central, and Lower WSB regions, was defined on the basis of the share of workers in 2011 (referring to Volume 7, Table 7.5.19).

The results of projections of urban population and land demand for urban land use are summarized in Table 5.2.12.

(4) Role of Major Urban Centers

Urban development linkages have been studied from the standpoint of five sectors; i.e., agriculture, industry, tourism, culture and science, and trade and commerce, as shown in Figures 5.2.9 to 5.2.14. The "zonal characteristics" and the "roles of major urban centers" are noted as summarized below. It is generally planned that urban centers in the region will serve multiple functions.

① Urban Development Linkages with the Agricultural Sector

(Upper and Central WSB Region; See Figure 5.2.9)

(i) Zonal Characteristics

- To promote a shift to high value-added agriculture
- To induce crops for niche-markets
- To strengthen the linkage with hinterland agriculture and livestock farming
- To improve fishery-related industries and port facilities

(ii) Major Roles of Urban Centers/Clusters

Cluster A: Upper Central WSB region: Kanchanaburi City, Ratchaburi City, Samut Songkhram City, and Petchaburi City.

- To develop livestock farm and fish pond cultivation
- To develop agro-processing (canned, bottled goods)
- To support development of local centers for agricultural activities

Cluster B: Central WSB region: Prachuap Khirikhan City and major local cities (Pran Buri, Kui Buri, Thap Sakae, and Bang Saphan Cities)

- To develop livestock and dairy farm products
- To create local centers for agricultural activities
- To improve marketing services

② Urban Development Linkages with the Agricultural Sector

(Lower WSB region; see Figure 5.2.10)

(i) Zonal Characteristics

- To promote a "fruits country"
- To promote livestock and dairy production

(ii) Major Roles of Urban Centers/Clusters

Cluster A: Chumphon City, Tha Sae City, and Pathiu City

- To support livestock farming and other agricultural activity
- To develop agro-processing (canned, bottled goods)
- To support development of local centers for agricultural activities,

Cluster B: Local major cities (Ban Sawi, Thung Tako, Lang Suan, La Mae, Na Sak, and Pha To Cities)

- To support development of a "fruits country"
- To support livestock and dairy farm development
- To create local centers for dairy activities.

③ Urban Development Linkages with the Industrial Sector

(See Figure 5.2.11)

Upper WSB Zone

(i) Zonal Characteristics

- To accommodate spillover industries from the BMA
- To strengthen the connections and activities/actions of industrial development with the BMA, especially for supporting industries

(ii) Major Roles of Urban Centers/Clusters

Cluster A: Kanchanaburi City and Ban Pong City

- To strengthen agro-related and consumer-oriented processing industries (canned, bottled goods, etc.)

Cluster B: Ratchaburi City, Samut Songkram City, and Khao Yoi City

- Small and medium industry promotion
- Metal working and machinery industry development (transportation-machinery industry)
- Free Trade Area in Samut Songkhram area

Lower WSB Zone

(i) Zonal Characteristics

- New industrial growth area with a new Free Trade Area (access by sea and air)
- To strengthen export-oriented agro-processing industry (canned, bottled goods)

(ii) Major Roles of Urban Center/Cluster

Cluster C: Bang Saphan City and Chumphon City

- Heavy industry and steel-based industry
- Agro-processing industry promotion (export-oriented)

④ Urban Development Linkages with the Tourism Sector

(See Figure 5.2.12)

Upper WSB Zone

(i) Zonal Characteristics

- To strengthen the linkage between mountain resort and beach resort areas
- To preserve natural and cultural heritage for sustainable tourism development

(ii) Major Roles of Urban Center/Cluster

Cluster A: Kanchanaburi City, Ratchaburi City, and Samut Songkhram City

- Beautification of the city, tourist spots, and access roads with careful environment assessment
- To improve tourism facilities in key local towns for resort and leisure activities (e.g., resthouses, hotels)

Central WSB Zone

(i) Zonal Characteristics

- To strengthen the linkages between mountain resort and beach resort areas
- To preserve natural and cultural heritage for sustainable tourism development

(ii) Major Roles of Urban Center/Cluster

Cluster B: Petchaburi City, Cha Am City, Hua Hin City, Kaeng Krachan National Park area, Khao Sam Roi Yot National Park area, Pran Buri Dam area, and Prachuap Khirikhan City

- To develop highland resort facilities and to strengthen the linkages between highland resort and beach resort areas.
- To provide meeting, seminar, and conference facilities in an amenity zone

⑤ Urban Development Linkages with the Trade and Commerce Sector

(Source: Figure 5.2.13)

Upper WSB Zone

(i) Zonal Characteristics

- To strengthen and induce connections and activities in international trade
- To promote warehousing and retail/wholesale activities
- To create small- and intermediate-scale commercial industries to support local commercial activities
- To improve transportation infrastructure including establishment of a distribution center

(ii) Major Roles of Urban Center/Cluster

Cluster A: Ratchaburi City and Samut Songkhram

- To strengthen the connection of trade activities with the BMA (information/marketing center, supporting industries and commerce)
- To enhance urban functions and services with effective land use controls for the Free Trade Area

Lower WSB Zone

(i) Zonal Characteristics

- To induce connections and activities in international trade and merchandising
- To promote warehousing and retail/wholesale activities
- To create small and intermediate-scale commercial industries to support local commercial activities
- To improve transportation infrastructure including establishment of a distribution center

(ii) Major Roles of Urban Center/Cluster

Cluster B: Bang Saphan City, Chumphon City, Tha Sae City, and Pathiu City

- To develop border trade and commerce activities for a Free Trade Area
- To create local centers for product distribution and storage.

⑥ Urban Development Linkages with the Culture/Science Sector

(See Figure 5.2.14)

Central WSB Zone

(i) Zonal Characteristic

- To strengthen and/or induce culture, science, and technology (R&D function) for the development of knowledge-based industries in an amenity zone

(ii) Major Roles of Urban Centers/Clusters

Cluster A: Ratchaburi City, a part of Samut Songkhram area and Petchaburi City.

- To strengthen education and R&D functions in the existing academic institutions and promote knowledge-based industries
- To develop experimental high-technology and knowledge-based industries.

Cluster B: Petchaburi City, Hua Hin City, and Kaeng Krachan National Park area.

- To induce a new science city (incorporating R&D, science, and technology research centers)
- To promote training, seminar, and conference activities

2.4 Proposed Urban Development Prospects

(1) Objectives

Through a review of historical trends and the current situation of urbanization in the WSB region, major constraints on urban development have been identified as follows:

- (i) Lack of development of regional urban cores as a cluster in the WSB;
- (ii) Lack of investment and job opportunities in local urban centers;
- (iii) Ineffective decentralization and local budgeting system for urban development;
- (iv) Insufficient urban infrastructure development;
- (v) Insufficient urban amenities; and
- (vi) Lack of urban development guidelines.

In line with the WSB regional development objectives and with reference to social and economic scenarios proposed for the WSB region, the objectives for urban development for the WSB are proposed as presented below:

- (i) To develop selected urban cores in order to promote investment in the WSB and to foster decentralization in political, economic, and social activities;
- (ii) To create a socially acceptable and attractive living area in urban zones and to enhance the quality of social amenities and social services in urban areas;
- (iii) To support such economic activities as agriculture, industry (including knowledge-based industry), tourism and trade, and thereby ensure the creation of opportunities for better jobs and incomes for residents in the WSB urban areas; and
- (iv) To promote a participatory approach for planning and implementation of urban development in the WSB for executing urban planning principally at the local level.

The objectives are related, and somewhat similar to, the objectives for the social sector and rural development. They have been combined as common objectives to create attractive places to live in the WSB region.

(2) Strategies

To attain the objectives for urban development in the WSB region, several strategies are proposed, as set out below:

Promotion of core urban centers

It would not be strategic to promote urban development in every urban/municipality center in the WSB region. Rather, it is more practical to selectively plan and implement certain core urban centers in line with the proposed social and economic development projects and programs.

Combined efforts in urban development and economic sector development

Combined efforts are required for both urban development and economic sector development. The roles of major urban centers should be defined in the light of development in various economic sectors in each zone of the WSB region.

Urban facilities in local urban centers

Amenities in local urban centers will have to be planned and implemented with greater public initiative and involvement. The development of local urban centers will be strategically promoted along with rural development, and these centers will be networked with the major urban cores through improvement of transport and communication services.

Making opportunities available for housing

Providing more opportunities for housing will become particularly important when industrialization is accelerated in the WSB region. It might be necessary to work out a new system of institutional and financial arrangements to make opportunities available for housing in the WSB urban sector.

A program approach, rather than a project approach

It would not be effective to only implement a few specific projects in few specific locations. More efficiently, similar types of improvements in several urban centers should be integrated in a package of programs for improvement, to be programmed for implementation on a regional basis.

(3) Development Projects/Programs and Support Measures

Since it is expected that, coupled with industrialization in the WSB region, urbanization will be accelerated in the region in the future, several urban development projects are recommended for implementation as an integral part of the WSB regional development programs.

The most important issues for urban centers in this region is how to obtain a "fair" share of development benefits from the BMA, while at the same time regulating the growth of the BMA. Considering that Bangkok's population concentration occurred due to the

wealth of job opportunities in the metropolis, the creation of job opportunities in local urban centers is a top priority for achieving a more balanced population distribution in the country.

Therefore, local urban centers must meet present and future urban development requirements to help address the problem of population concentration in the BMA. Since it is expected that urbanization will accelerate in the WSB region in the future, several urban development projects have been recommended for execution as an integral part of the WSB regional development program. The following projects/ programs are strongly recommended to proceed to strengthen urban development in the WSB region.

Upper WSB Urban Cluster Development

Since the WSB region is rather sparsely populated and industries have not been developed on a larger scale, selected urban cores should be developed as a urban cluster in order to promote investment in the region and to foster decentralization of political, economical, and social activities.

In the Upper WSB region, there are several urban centers (e.g., Ratchaburi, Ban Pong, Samut Songkhram, Khao Yoi) which can be proposed to be developed as a cluster. While a comprehensive land use plan and network formulation in the Upper WSB region has not been worked out yet, it is recommended to review the land use plans prepared for specific urban centers, such as Ban Pong, Ratchaburi, Kao Yoi, and Samut Songkhram, and to formulate a comprehensive plan for cluster development in this zone. In preparing this cluster development plan, it is also suggested that urban development guidelines, including rules, regulations and other legal frameworks for urban development and city planning be formulated.

Specific City Plan and Implementation Programs

Since urban development and investment opportunities by other sectors interact, it is necessary to strategically combine urban development and sector development policies to improve job and income opportunities in the WSB urban areas. Therefore, it is proposed to plan some new urban developments in the WSB region in relation to expected development in other sectors. These developments would include;

- (i) Industrial Logistics Center to support industrial core and distribution function at Bang Pong area in Ratchaburi province (this proposal is further discussed in Volume 7, Appendix III).

- (ii) A Trade/ Merchandise Plaza in Samut Songkhram to support and promote the development of a Free Trade Area (FTA) (this proposal is further discussed in Volume 7, Appendix IV).
- (iii) A Science City in Petchaburi to promote knowledge-based industry in the WSB region (this proposal is further discussed in this Volume, Appendix III to Chapter 2).
- (iv) An Industrial City in Bang Saphan to support an ongoing industrial complex and industrial estate development as a core development project (this proposal is separately discussed in the reports of the JICA-sponsored Bang Saphan Industrial Estate Development Project).

All of these plans are recommended for implementation from the viewpoint of urban development in the WSB region.

Urban Social Infrastructure Improvement Program

Sewage and solid waste disposal are two major items of urban infrastructure to be improved in the WSB to make urban development in the region environmentally sound and sustainable, and to make its urban centers more attractive places in which to live. Regarding sewage improvement, it is proposed to formulate a plan to improve the sewage systems in the six provincial capitals. Regarding solid waste disposal, it is proposed to study the possibility of developing a medium-scale compost near the proposed Science City to serve the Petchaburi, Cha Am, and Hua Hin amenity zone cluster in the Central WSB region.

Urban Amenity Improvement Program

To implement a socially-oriented regional development plan, and to make urban life more attractive, a program approach is to be applied for the planning and budgeting of improvements of urban amenities. It is proposed first to work out a plan specifying what urban amenities should be incorporated into the program and how each should be implemented in each province. For instance, the construction of sports stadiums and parks proposed under the social sector development program would be incorporated as one subprogram of the urban amenity improvement program. Public participation and

coordination between public- and private-sector entities are required in the planning and improvement of urban amenities.

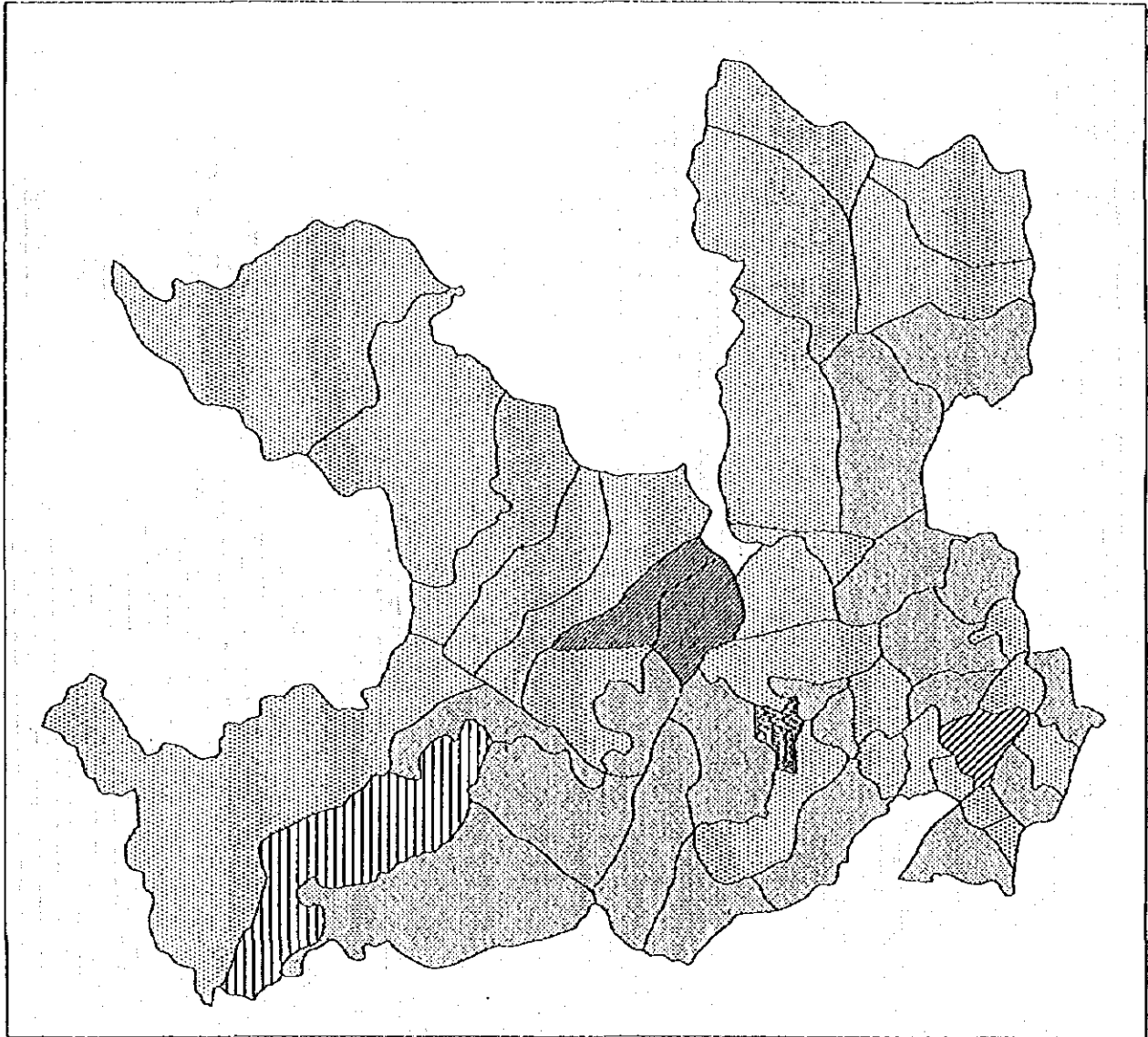
Setting Urban Development Guidelines

DTCP has been responsible for land use planning in urban and suburban areas, but the area planned by DTCP and the area of each municipality are different in scale. Effective urban plans have not yet been worked out for the development of municipality areas through land use zoning regulations or land readjustment program. It is first necessary to set up general guidelines for urban planning and development. It is recommended, therefore, that such urban development guidelines be formulated and issued to promote efficient urban planning and development.

Institutional Strengthening for Urban Development

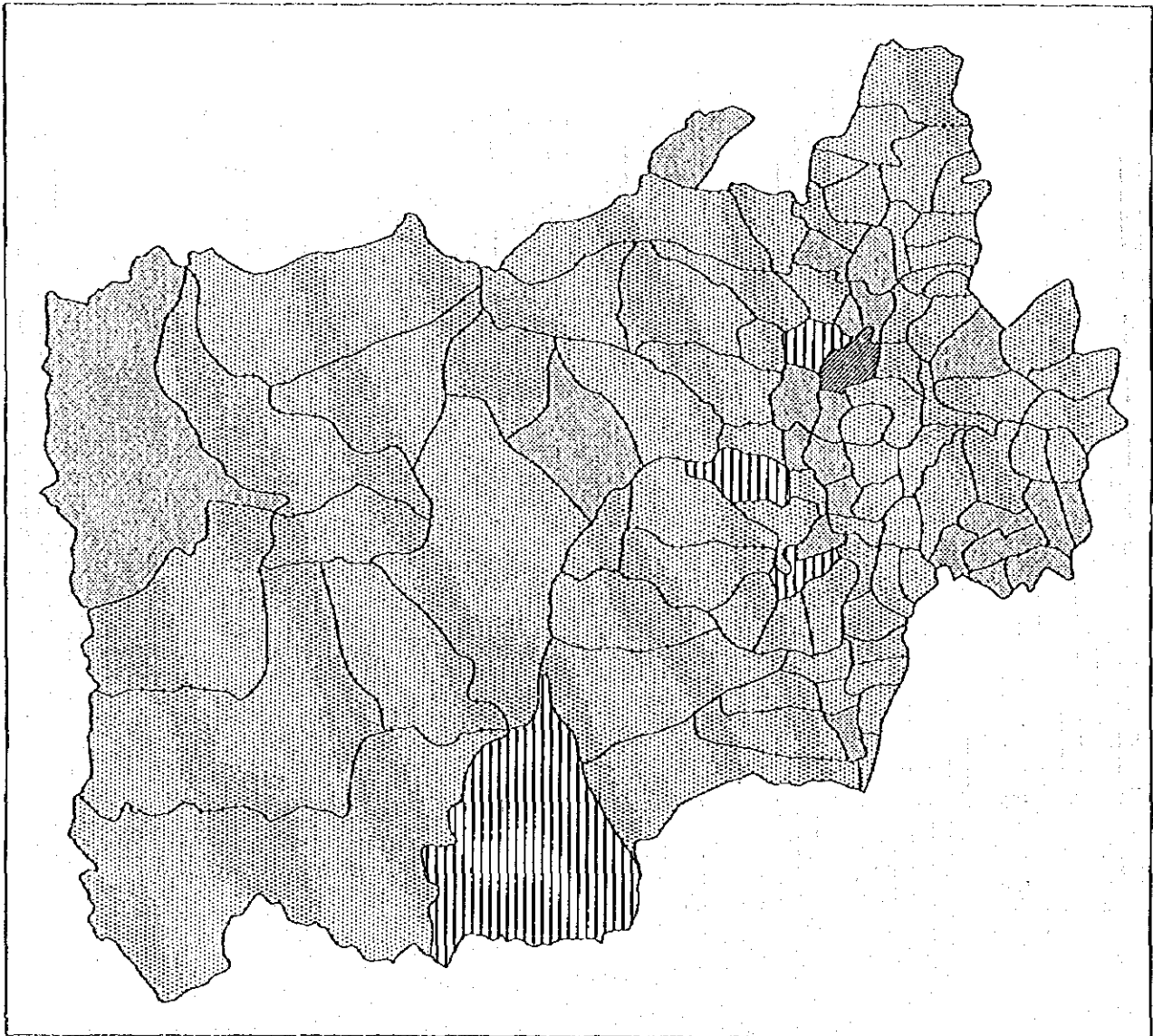
It is recommended that the Ministry of Interior study reorganization and strengthening of the institutional framework for urban development. DTCP of the Ministry of Interior is in charge of urban planning, but the Department is not responsible for monitoring of urban and housing development, nor for implementation of urban development plans. One possible way of strengthening the institutional setting for urban development would be to reorganize DTCP as a public corporation responsible not only for planning but also for implementation of urban and housing development projects. The proposed urban development corporation would work with public and private financing institutions to analyze credits/loans for project implementation. The functions of the proposed corporation should be decentralized largely to its regional offices.

Figure 5.2.1 Kanchanaburi Province: Average Annual Population Growth by Tambon 1992-95



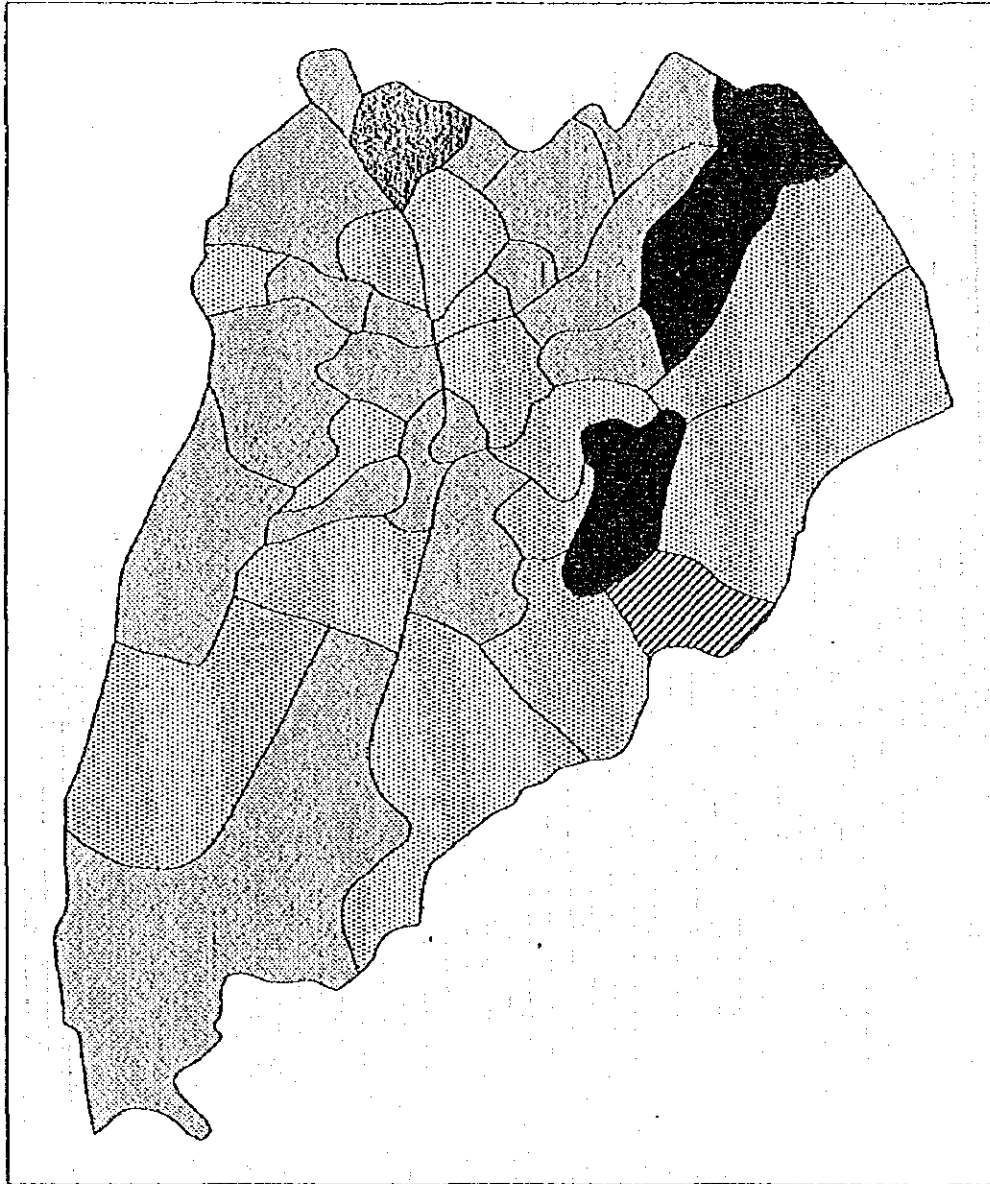
Rank of Annual Population Growth Rate	
Very Depressed (less than -10%)	(0)
Depressed (-10% to -3%)	(1)
Slightly Depressed (-3% to 0%)	(19)
Faint Growth (0% to 3%)	(25)
Fair Growth (3% to 6%)	(1)
Higher Growth (6% to 10%)	(1)
Strong Growth (10% and over)	(2)

Figure 5.2.2 Ratchaburi Province: Average Annual Population Growth by Tambon 1992-95



Rank of Annual Population Growth Rate	
■	Very Depressed (less than -10%) (0)
▣	Depressed (-10% to -3%) (0)
▤	Slightly Depressed (-3% to 0%) (22)
▥	Faint Growth (0% to 3%) (74)
▧	Fair Growth (3% to 6%) (4)
▨	Higher Growth (6% to 10%) (0)
▩	Strong Growth (10% and over) (1)

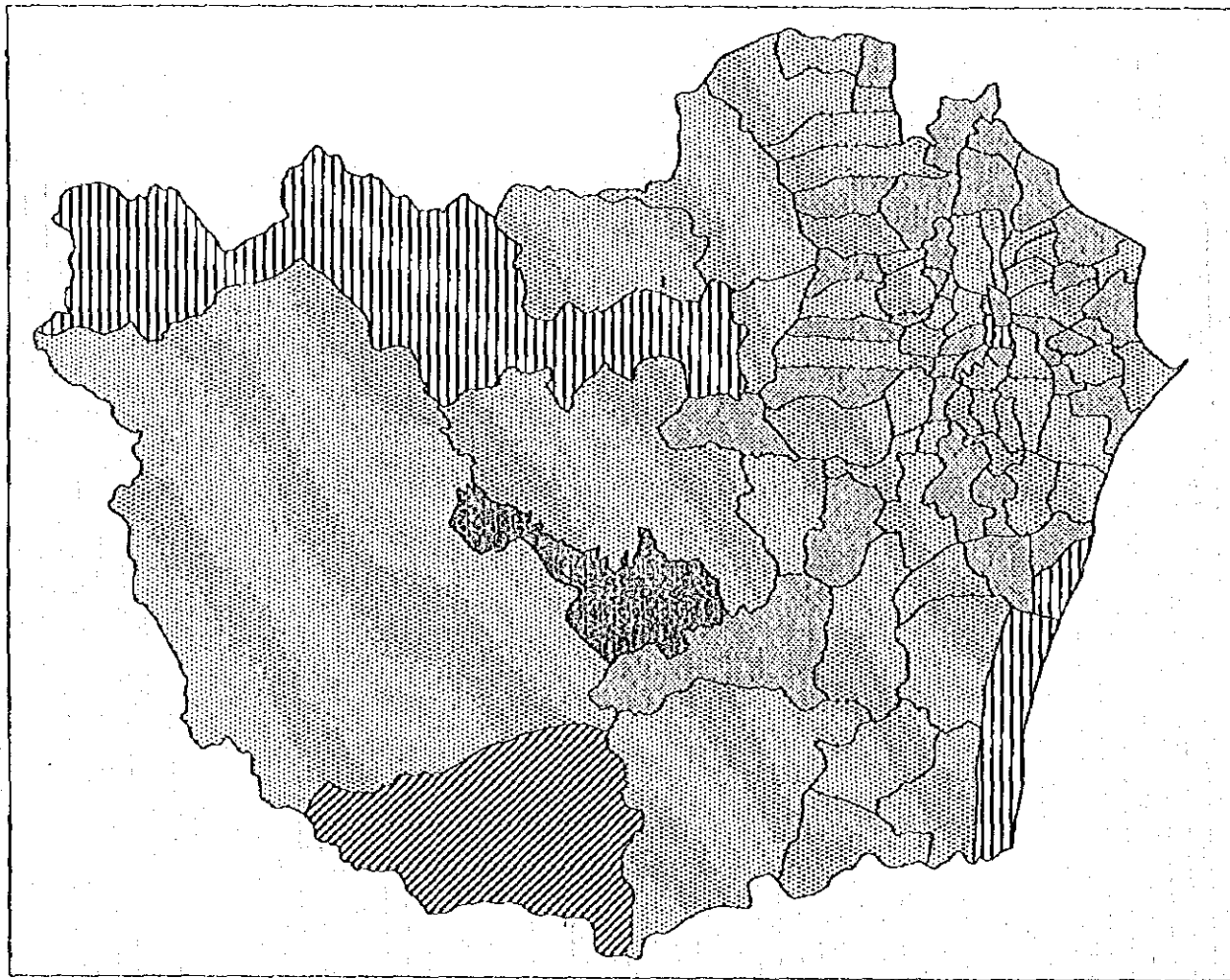
Figure 5.2.3 Samut Songkhram Province: Average Annual Population Growth by Tambon 1992-95



Rank of Annual Population Growth Rate

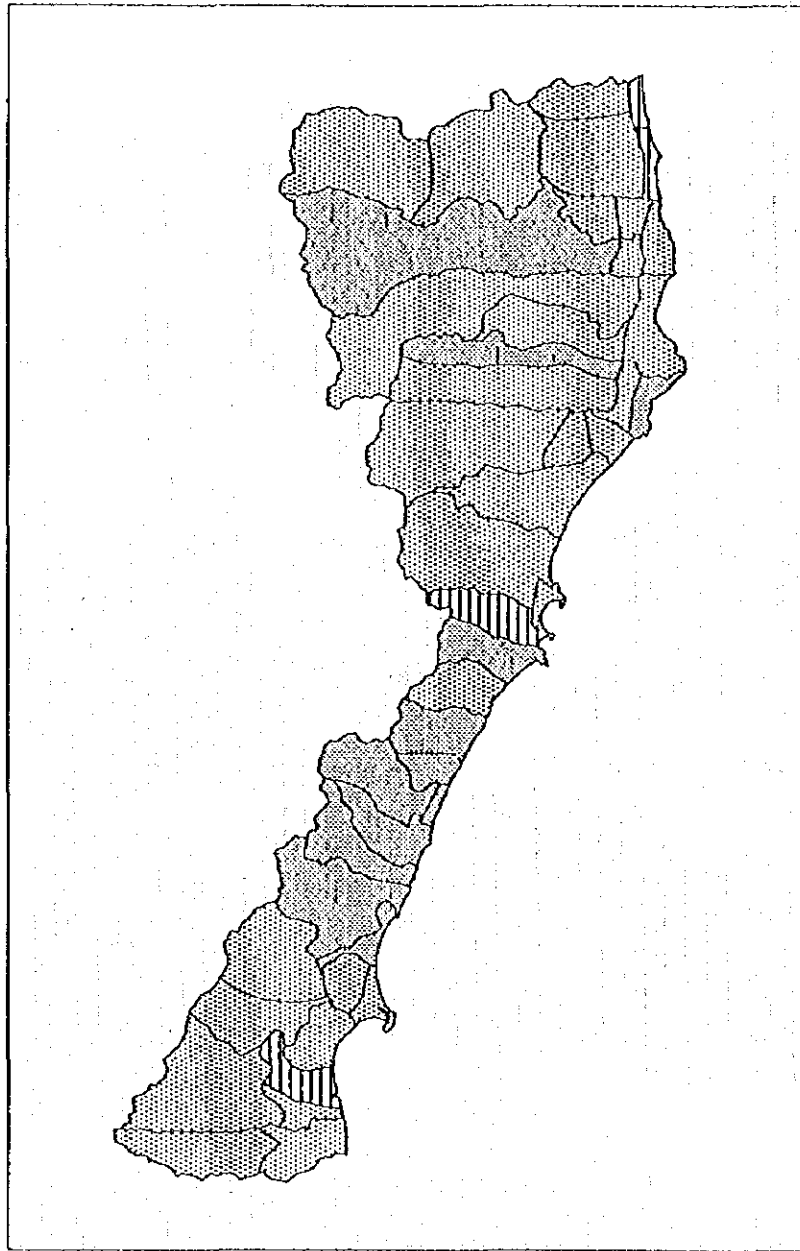
■	Very Depressed (less than -10%)	(2)
▤	Depressed (-10% to -3%)	(1)
▥	Slightly Depressed (-3% to 0%)	(18)
▦	Faint Growth (0% to 3%)	(14)
▧	Fair Growth (3% to 6%)	(0)
▨	Higher Growth (6% to 10%)	(1)
▩	Strong Growth (10% and over)	(0)

Figure 5.2.4 Petchaburi Province: Average Annual Population Growth by Tambon 1992-95



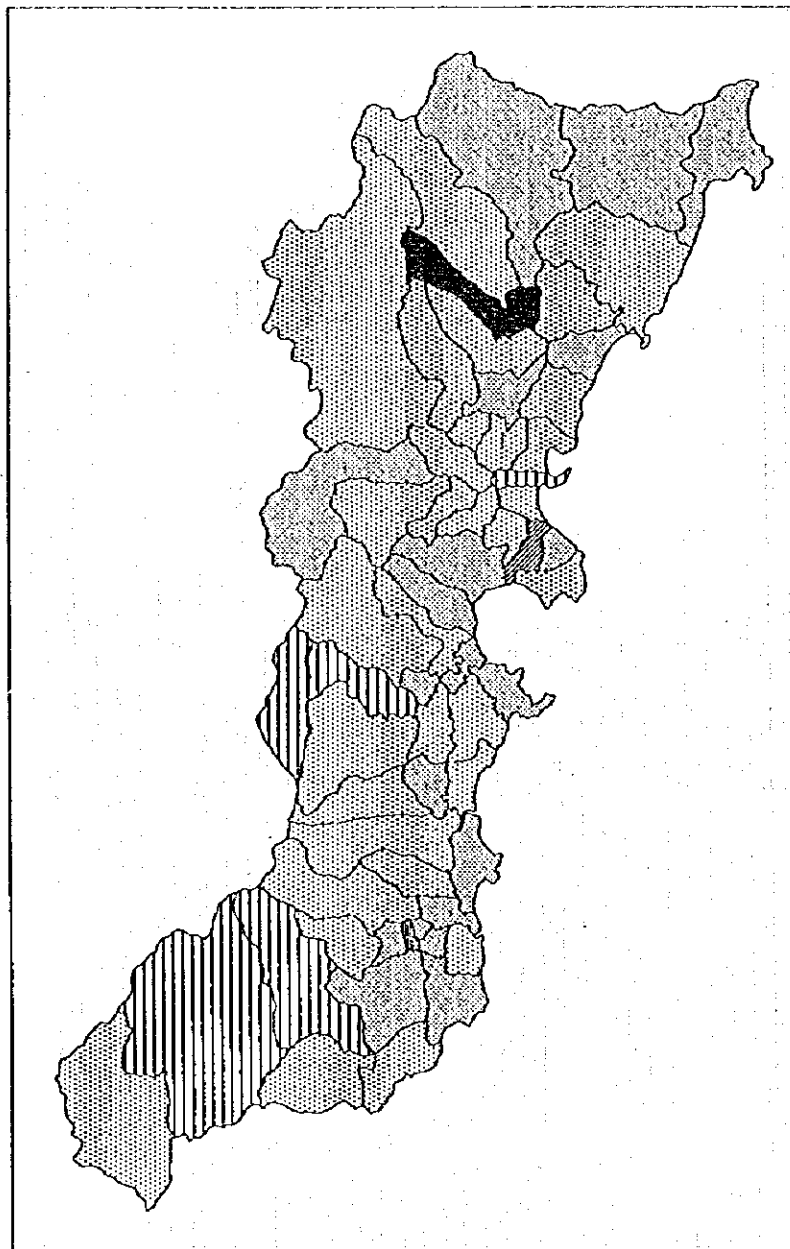
Rank of Annual Population Growth Rate	
■	Very Depressed (less than -10%) (0)
▣	Depressed (-10% to -3%) (1)
▤	Slightly Depressed (-3% to 0%) (34)
▥	Faint Growth (0% to 3%) (52)
▦	Fair Growth (3% to 6%) (5)
▧	Higher Growth (6% to 10%) (1)
▨	Strong Growth (10% and over) (0)

Figure 5.2.5 Prachuap Khiri Khan Province: Average Annual Population Growth by Tambon 1992-95



Rank of Annual Population Growth Rate	
Very Depressed (less than -10%)	(0)
Depressed (-10% to -3%)	(0)
Slightly Depressed (-3% to 0%)	(12)
Faint Growth (0% to 3%)	(29)
Fair Growth (3% to 6%)	(4)
Higher Growth (6% to 10%)	(0)
Strong Growth (10% and over)	(0)

Figure 5.2.6 Chumphon Province: Average Annual Population Growth by Tambon 1992-95



Rank of Annual Population Growth Rate	
■	Very Depressed (less than -10%) (1)
▣	Depressed (-10% to -3%) (1)
▤	Slightly Depressed (-3% to 0%) (20)
▥	Faint Growth (0% to 3%) (32)
▦	Fair Growth (3% to 6%) (5)
▧	Higher Growth (6% to 10%) (0)
▨	Strong Growth (10% and over) (1)

Figure 5.2.7 Change of Top 10 Tambon Population Size by Province and the WSB Region between 1992 and 1995

Tamb.	Kanchanaburi Province					Ratchaburi Province				
	Rank	Name	1992	Name	1995	Changes	Name	1992	Name	1995
1	Lad Ya	32,111	Lad Ya	32,337	226	Na Maung	48,759	Na Maung	46,492	-2,267
2	Ban Nea	17,821	Pak Frake	27,160	12,065	Ban Pong	24,392	Ban Pong	26,472	2,080
3	Nong Prea	16,058	Ban Nea	17,194	-627	Chom Bung	18,201	Photharam*2	18,986	7,316
4	Tha Maung	16,001	Nong Prea	16,363	305	Ta Pha	16,756	Kao Phub Pla	17,771	1,746
5	Nong Lu	15,327	Tha Maung	15,651	-350	Kao Phub Pla	16,025	Chom Bung	17,027	-1,174
6	Pak Frake	15,095	Nong Lu	15,381	54	Don Knoy	14,429	Ta Pha	16,857	101
7	Bo Phloi	14,486	Tha Maka	15,281	2,677	Krub Yai	13,172	Don Knoy	14,757	328
8	Panom Taun	13,626	Bo Phloi	13,931	-555	Pak Rad	12,375	Krub Yai	13,211	39
9	Tha Kum An	12,709	Ta Ka Nun	12,840	389	Tung Luang	11,757	Pak Rad	13,049	674
10	Tha Maka	12,604	Tha Kum An	12,613	-96	Jay Dee Huk	11,743	Jay Dee Huk	12,657	914
	Ta Ka Nun	12,451	Panom Taun*1	7,841	-5,785	Photharam	11,670	Tung Luang	11,929	172

*1: Panom Taun (Phanom Thuan Amphoe) was divided into New Tambons *2:

Tamb.	Samut Songkram Province					Phetchaburi Province				
	Rank	Name	1992	Name	1995	Changes	Name	1992	Name	1995
1	Mao Klong	35,859	Lad Yai	12,041	679	Tha Yang	24,250	Cha-Am	26,233	2,238
2	Lad Yai	11,362	Bang Khun Tak	9,955	-278	Cha-Am	23,997	Tha Yang	23,929	-321
3	Bang Khun Tak	10,233	Ploy Pong Pang	9,048	35	Ban Laem	17,867	Ban Laem	17,797	-70
4	Ploy Pong Pang	9,013	Lam Yai	7,842	102	Klong Kra Sa	17,048	Klong Kra Sa	17,030	-18
5	Lam Yai	7,740	Kra Dung Nga	7,813	473	Tarab	16,920	Tarab	16,843	-75
6	Kra Dung Nga	7,340	Bang Keaw	7,398	186	Tha Mai Reak	8,272	Tha Koy	11,836	176
7	Bang Keaw	7,212	Ban Prok	7,224	513	Kao Yai	7,809	Tha Mai Reak	8,536	264
8	Amphawa	6,896	Bang Chong	6,822	502	Bang Khun S	7,452	Kao Yai	8,199	390
9	Ban Prok	6,711	Wat Fra Doo	6,333	-14	Khal Yoi	7,412	Ban Mo	7,575	775
10	Wat Fra Doo	6,347	Bang Ja Kreng	6,214	1,449	Bang Krok	7,254	Khao Yoi	7,570	770
	Bang Chong	6,320	Amphawa	6,754	-142	Tha Koy	11,660	Bang Khun S	7,352	-100
	Bang Ja Kreng	4,765	Mao Klong	4,795	-31,074	Ban Mo	6,800	Bang Krok	7,138	-116

*3: Tambon Klong Kon was demolished in 1995

*4:

Tamb.	Prachaup Khiri K. Province					Chumphon Province				
	Rank	Name	1992	Name	1995	Changes	Name	1992	Name	1995
1	Kao Noi	30,090	Hua-Hin	31,407	3,631	Ta Ta Pao	15,026	Ta Ta Pao	15,546	520
2	Hua Hin	27,776	Kao Noi	30,141	51	Pak Nam	12,524	Ta Yang	15,233	5,307
3	Ow Noi	23,009	Ow Noi	23,194	185	Tha Sao	11,591	Pak Nam	12,500	-24
4	Rai Kao	19,271	Kao Luk	14,317	2,286	Sahul	10,566	Tha Sao	11,618	27
5	Thap Sakao	14,586	Thap Sakao	14,014	-572	Lamae	10,563	Lamae	11,329	765
6	Klong Wan	13,139	Ron Tong	13,239	219	Wung Pi	10,528	Bang Mak	11,017	660
7	Prachap Khiri	13,118	Prachap Khiri K.	13,138	20	Bang Mak	10,357	Wung Pi	10,753	225
8	Ron Tong	13,020	Klong Wan	13,138	-1	Ta Yang	9,926	Na Suk	10,410	583
9	Kao Luk	12,031	Rai Kao*5	12,281	6,990	Na Suk	9,827	Tak Dad	9,837	112
10	Pak Nam Pran	11,355	Pak Nam Pran	11,485	130	Tak Dad	9,725	Na Tung	9,603	1,403
	Na Tung	8,400	Sahul*6	5,916	-4,650					0

*5: Rai Kao was divided into the New Amphoe

*6: Sahul Tambon (Tha Sao Amphoe) was divided into New Tambons

Tamb.	Western Seaboard Region				
	Rank	Name	1992	Name	1995
1	Na Maung	48,759	Na Maung	46,492	-2,267
2	Mao Klong	35,869	Lad Ya	32,337	226
3	Lad Ya	32,111	Hua-Hin	31,407	3,631
4	Kao Noi	30,090	Kao Noi	30,141	51
5	Hua Hin	27,776	Pak Frake	27,160	12,065
6	Ban Pong	24,392	Ban Pong	26,472	2,080
7	Tha Yang	24,250	Cha-Am	26,233	2,238
8	Cha-Am	23,997	Tha Yang	23,929	-321
9	Ow Noi	23,009	Ow Noi	23,194	185
10	Rai Kao	19,271	Photharam	18,986	7,316
	Pak Frake	15,095	Rai Kao	12,281	
	Photharam	11,670	Mao Klong	4,795	

Figure 5.2.8 Preliminary Analysis of Problem Structure Regarding Urban Development

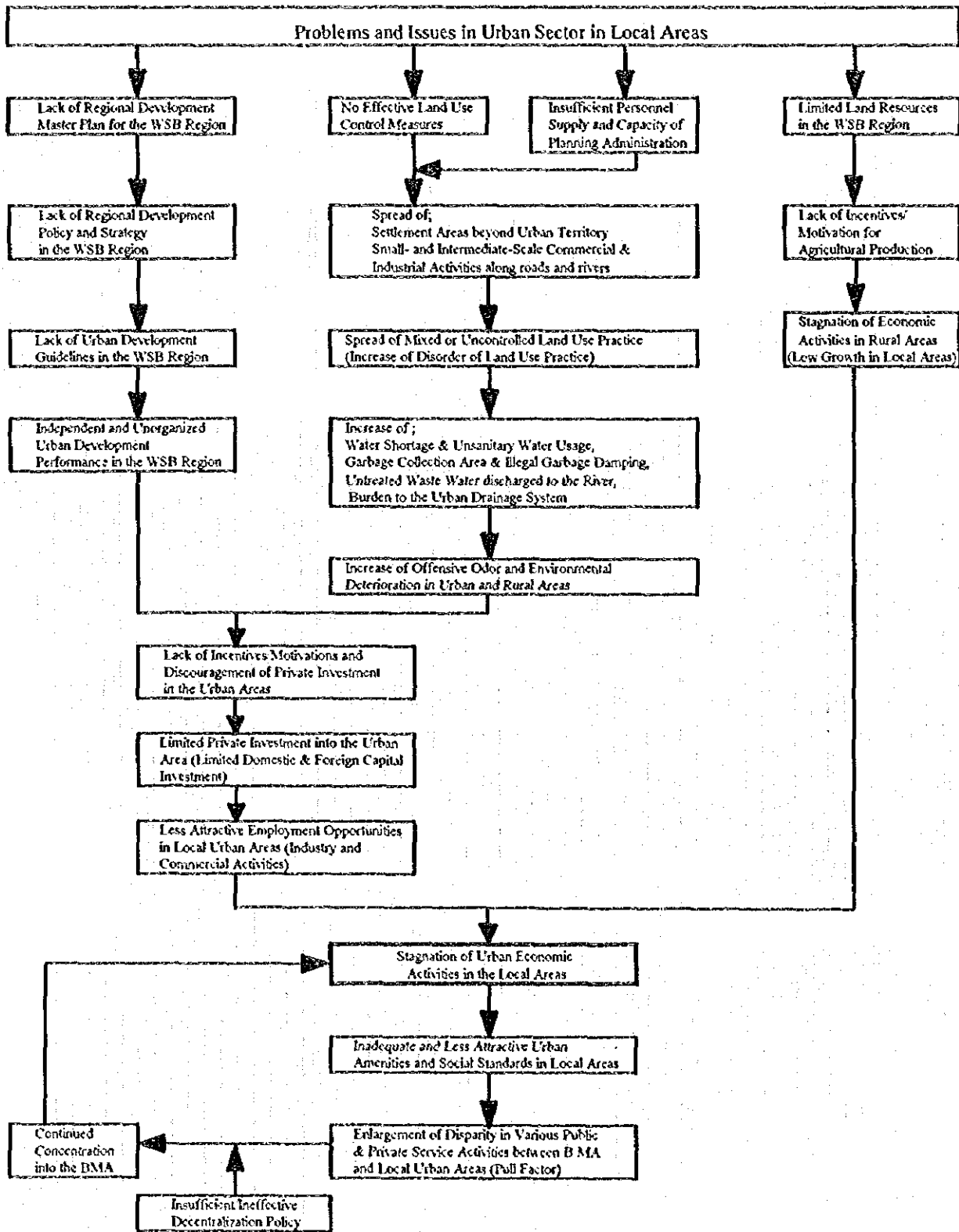
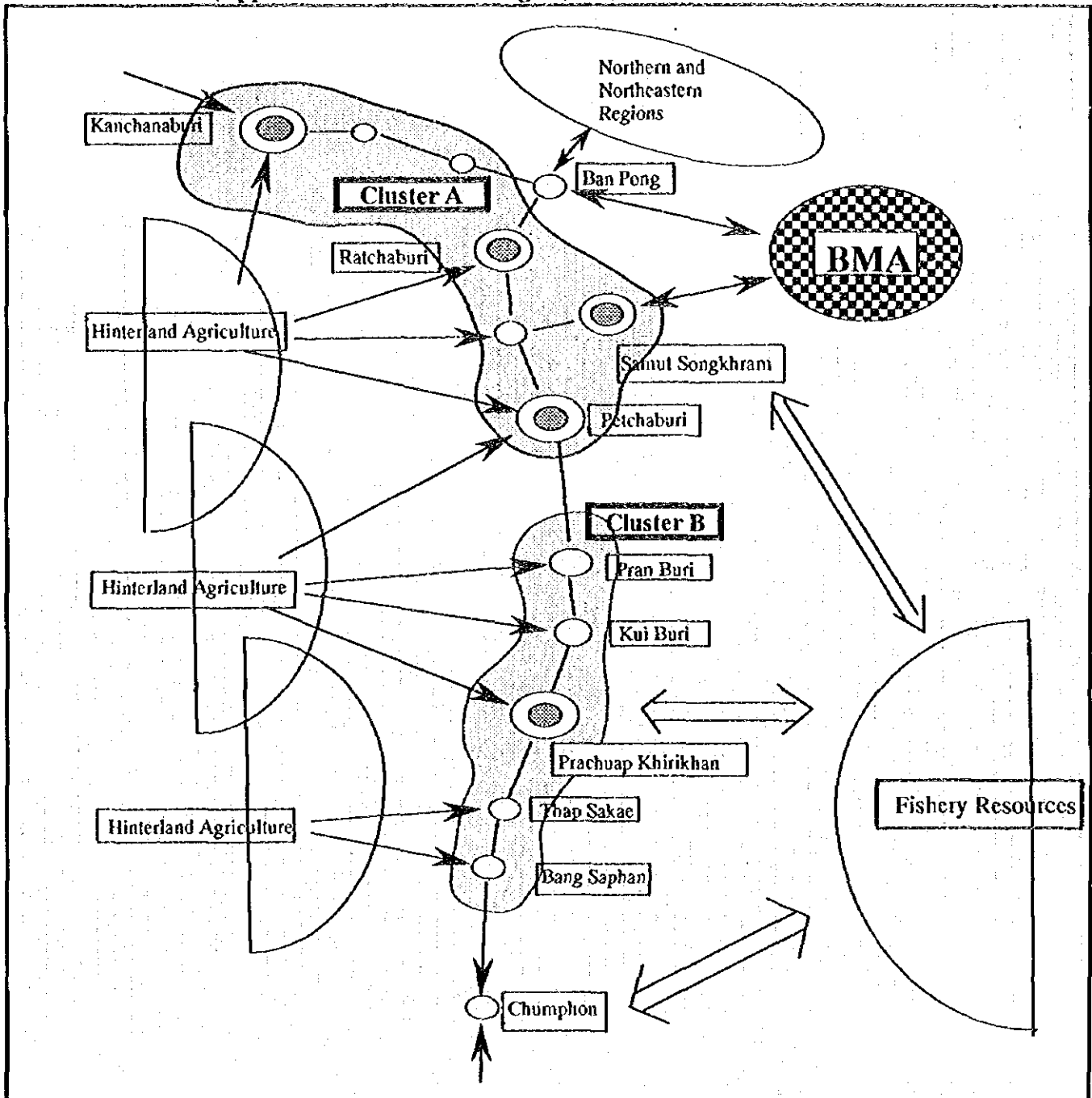


Figure 5.2.9 Urban Development Linkages (Network) with the Agricultural Sector (Upper and Central WSB Region)



ZONAL CHARACTERISTICS

- *To promote a shift to high-value agriculture.
- *To induce crops for niche markets.
- *To strengthen linkages with hinterland agriculture and livestock farming.
- *To improve fish-related industries and port facilities.

MAJOR ROLES OF URBAN CENTERS/ CLUSTERS

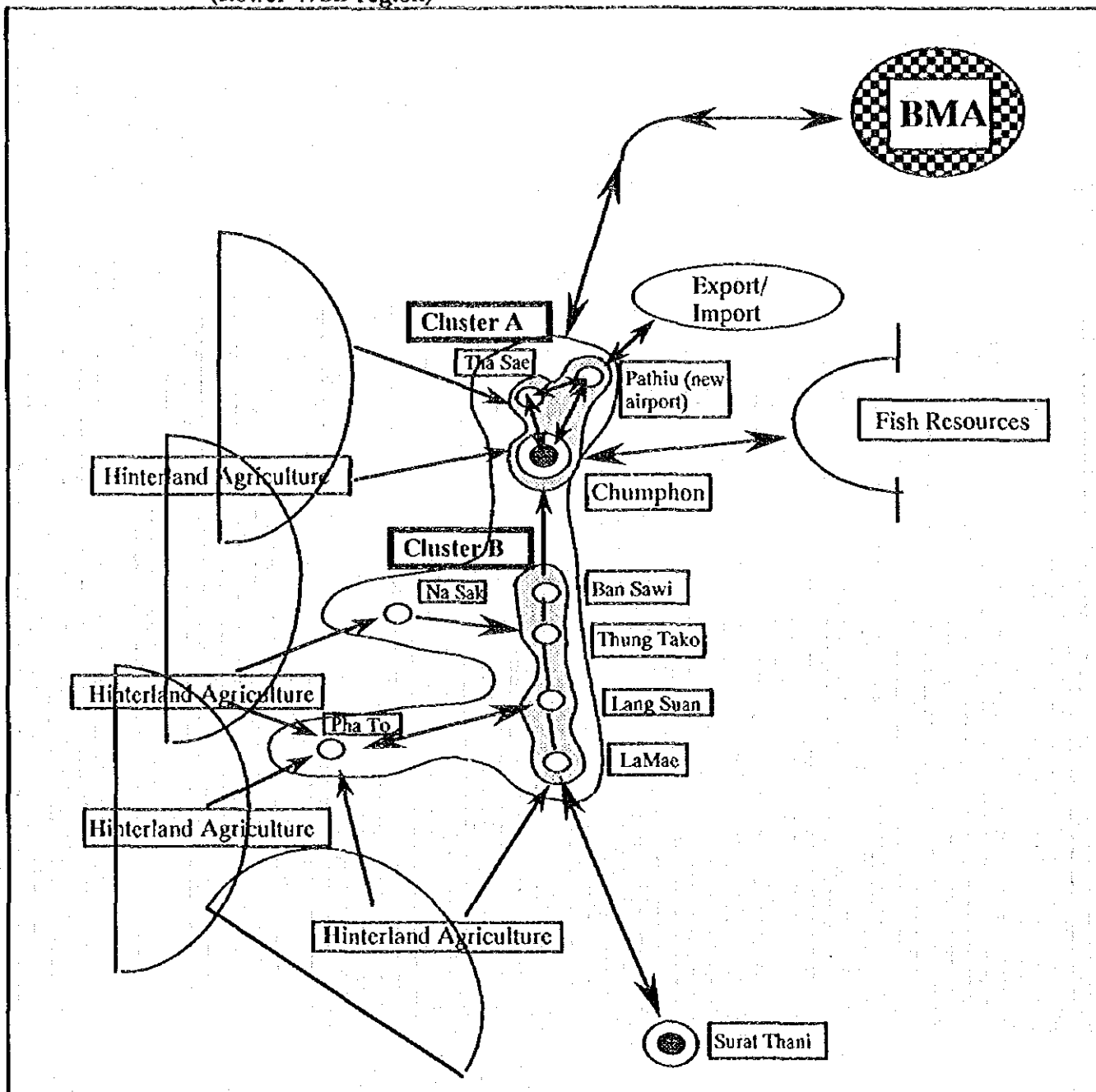
Cluster A:

- *To develop livestock farm and fish pond cultivation.
- *To develop agro-processing (canned, bottled goods).
- *To support development of local centers for agricultural activities.

Cluster B:

- *To develop livestock and dairy farm products.
- *To create local centers for agricultural activities.
- *To improve marketing services.

Figure 5.2.10 Urban Development Linkages (Network) with the Agricultural Sector (Lower WSB region)



ZONAL CHARACTERISTICS

- *To promote a "fruits country."
- *To promote livestock and dairy production.
- *To strengthen linkages with hinterland agriculture and fish-pond cultivation.
- *To improve fish-related industries and port facilities.

MAJOR ROLES OF URBAN CENTER/CLUSTERS

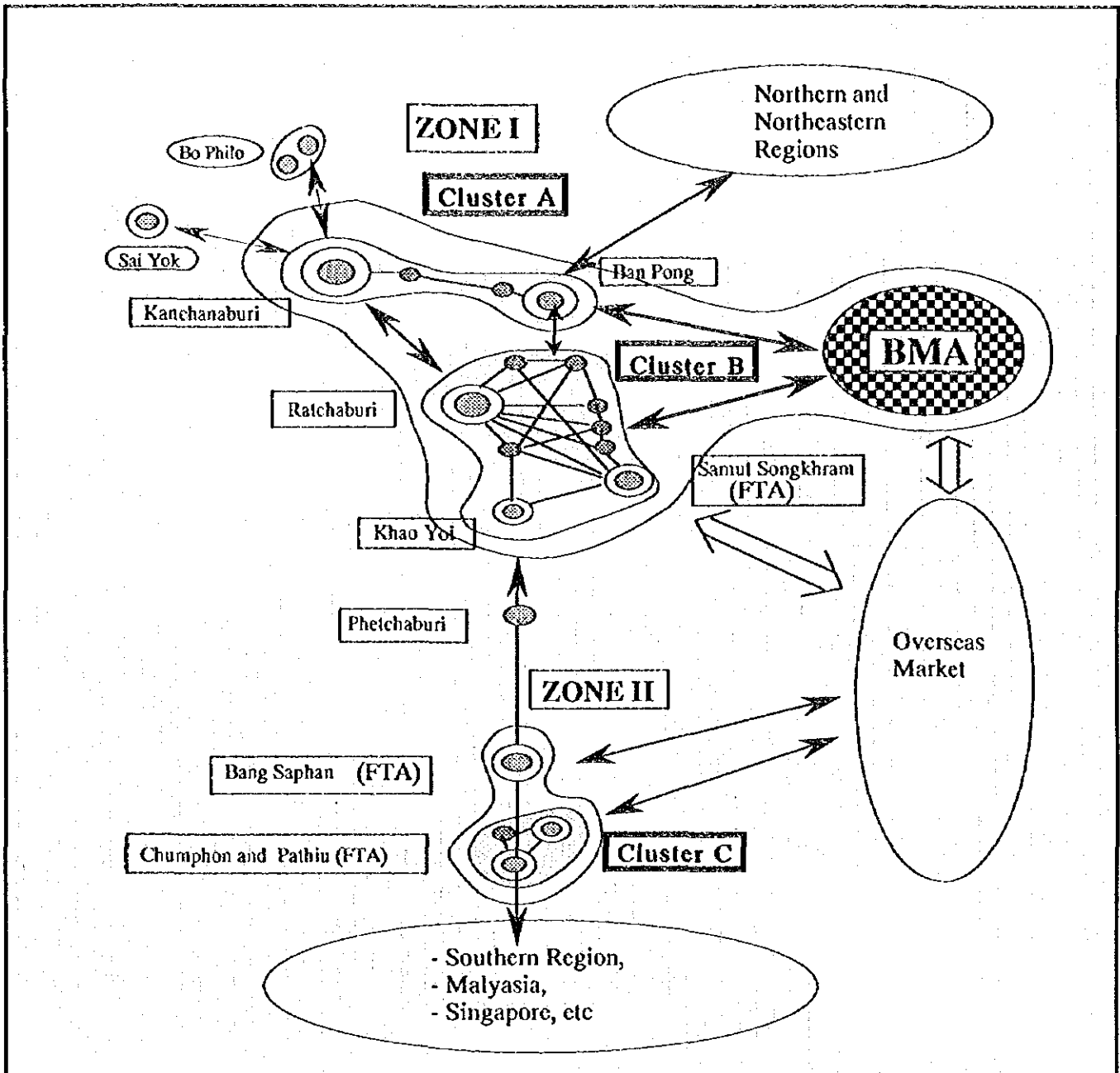
Cluster A:

- *To support livestock farming and other agricultural activities.
- *To develop agro-processing (canned, bottled goods)
- *To support development of local centers for agricultural activities.

Cluster B:

- *To support development of a "fruits country."
- *To support livestock and dairy farm development.
- *To create local centers for agricultural activities.

Figure 5.2.11 Urban Development Linkages (Network) with the Industry Sector



ZONAL CHARACTERISTICS

Zone I:

- *Alternative sites for spillover industries from BMA.
- *To strengthen the connections and activities/actions of industrial development with BMA, especially for supporting industries.

Zone II

- *New industrial growth area with a new FTA (by sea & air).
- *To strengthen export-oriented agro-processing industry (canned, bottles goods).

MAJOR ROLES OF URBAN CENTERS/CLUSTERS

Cluster A:

- *To strengthen agro-related and consumer-oriented processing industries (canned, bottled goods, etc).

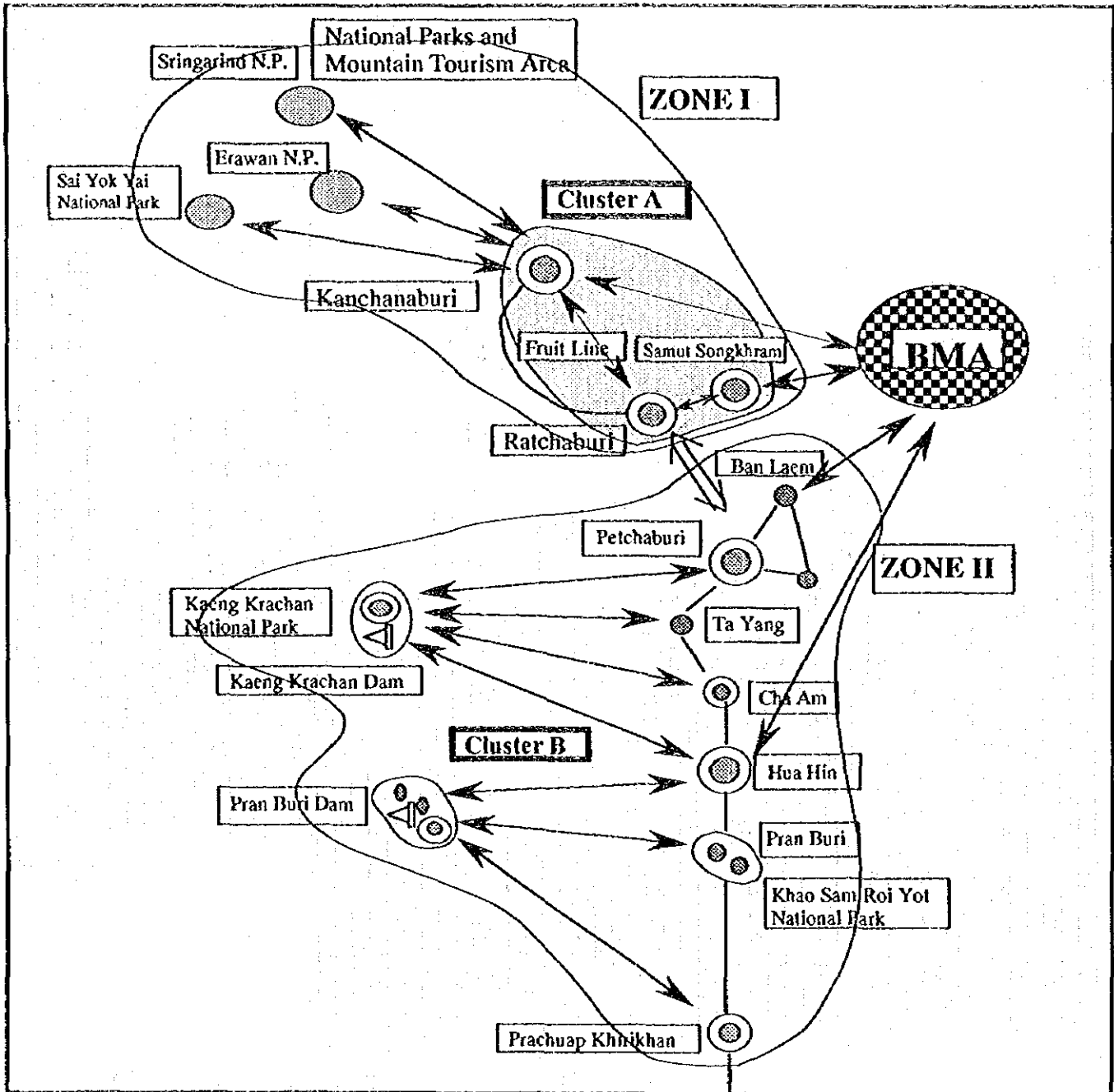
Cluster B:

- *Small and medium industry promotion
- *Metal working and machinery industry development (transportation-machinery industry).

Cluster C:

- *Heavy industry and steel-based industry.
- *Agro-processing industry promotion (export-oriented).

Figure 5.2.12 Urban Development Linkages (Network) with the Tourism Sector



ZONAL CHARACTERISTICS

- *To strengthen linkages between mountain resort and beach resort areas.
- *To preserve natural and cultural heritage for sustainable tourism development.

MAJOR ROLES OF URBAN CENTERS/CLUSTERS

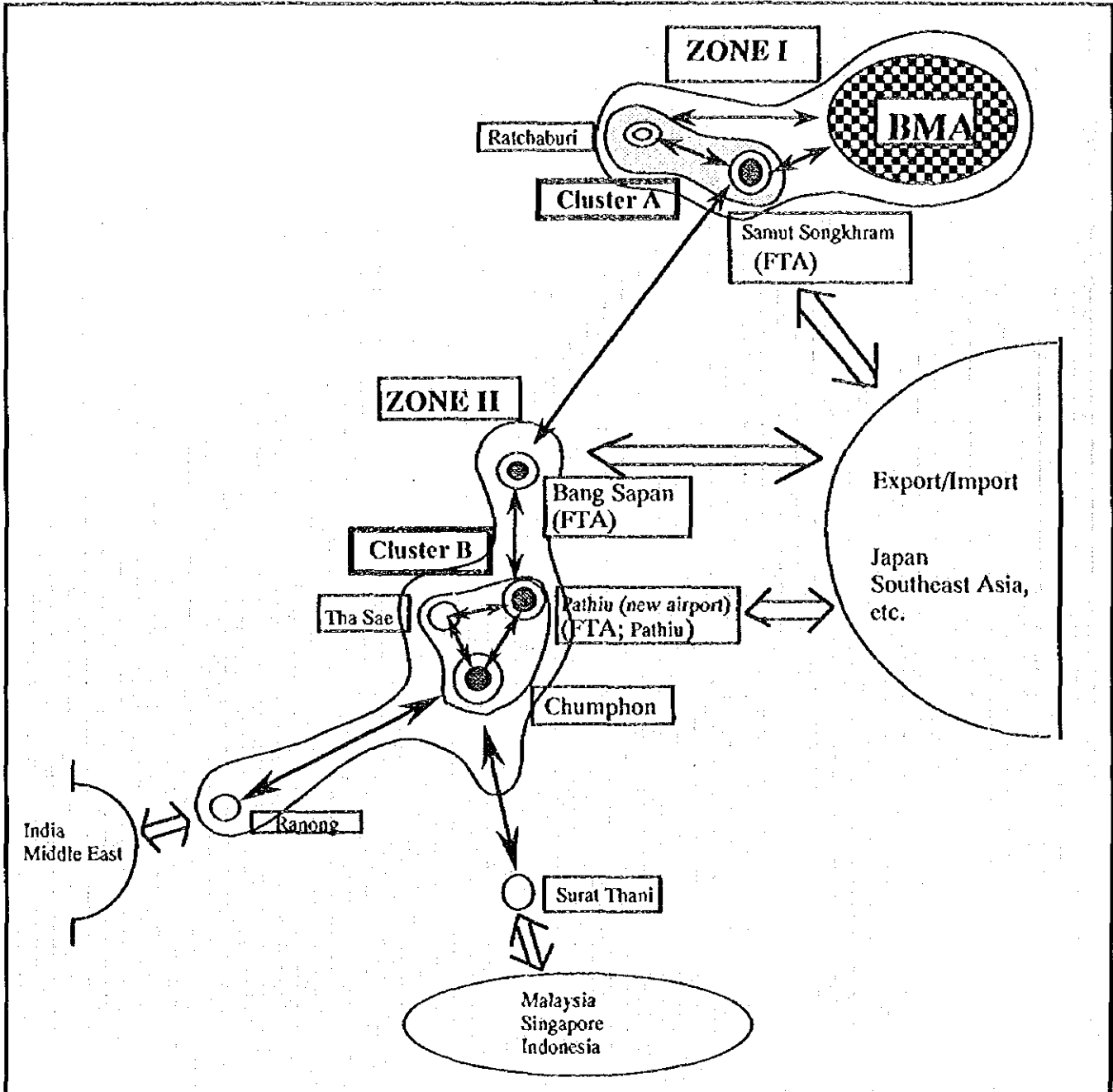
Cluster A:

- *To produce eco-tourism in national parks.
- * Beautification of the city, tourist spots, and access roads with careful environment assessment.
- *To improve tourism facilities in local key towns for resort and leisure activities (resthouses, hotels, etc.).

Cluster B:

- *To develop highland resort facilities and to strengthen linkages between highland resort and beach resort areas.
- *To facilitate development of meeting, seminar, and conference space in an amenity zone.

Figure 5.2.13 Urban Development Linkages (Network) with the Industrial Trade and Commerce Sector (Lower WSB Region)



ZONAL CHARACTERISTICS

- *To strengthen and induce connections and activities in international trade and merchandise.
- *To promote warehousing and retail/wholesale activities.
- *To create small- and intermediate-scale commerce industries to support local commercial activities.
- *To improve transportation infrastructure including establishment of a distribution center.

MAJOR ROLES OF URBAN CENTERS/CLUSTERS

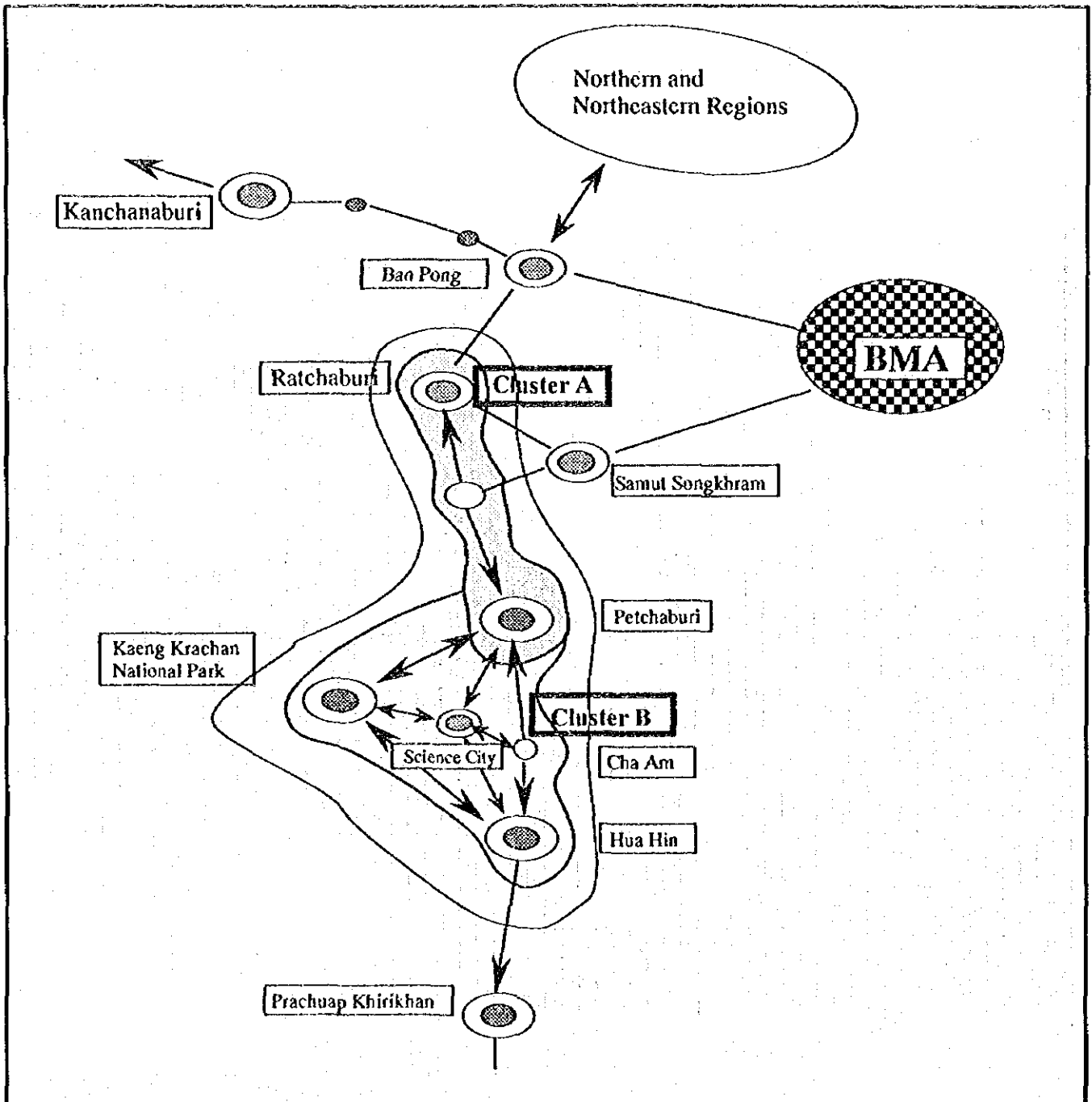
Cluster A:

- *To strengthen the connection of trade activities with the BMA (information/marketing center, supporting industries and commerce).
- *To enhance urban functions and services with effective land use control for the FTA.

Cluster B:

- *To develop border trade and commercial activities for the FTA.
- *To create local centers for product distribution and storage.

Figure 5.2.14 Urban Development Linkages (Network) with the Cultures and Science Sectors



ZONAL CHARACTERISTICS

*To strengthen and/or induce the culture, science, and technology (R&D function) for the development of knowledge-based industries in amenity zone.

MAJOR ROLES OF URBAN CENTERS/CLUSTERS

Cluster A:

*To facilitate education and R&D functions in the existing academic institutions and promote knowledge-based industries.
 *To develop experimental high-tech and knowledge-based industries.

Cluster B:

*To induce new science city (e.g. R&D, science, technology research centers).
 *To facilitate training, seminar, and conference activities.

APPENDIX I To Chapter 2

PROFILE OF PROPOSED PROJECTS/PROGRAMS

Appendix I to Chapter 2

Profiles of Proposed Projects/Programs

UD1	Upper WSB Urban Cluster Development.....	A1-1
UD2	Specific City Plan and Implementation.....	A1-2
UD3	Urban Social Infrastructure Improvement.....	A1-3
UD4	Urban Amenity Improvement	A1-4
UD5	Institutional Strengthening for Urban Development	A1-5

Project No. UD 1

- | | | |
|----|---------------|---|
| 1. | PROJECT TITLE | <u>Upper WSB Urban Cluster Development</u> |
| 2. | LOCATION | Lower Kanchanaburi, Ratchaburi and Samut Songkhram provinces |
| 3. | AGENCY | DTCP and Local governments |
| 4. | OBJECTIVES | To promote complementary development of urban centers in the Upper WSB in order (i) to support industrial activities within the urban centers, (ii) to facilitate complementary rural activities in their hinterlands, and (iii) to guide more orderly land use avoiding unnecessary land conversion. |
| 5. | PHASING | Phase I for comprehensive land use planning with networking of the urban centers and formulation of projects to improve urban facilities; continual implementation of urban facilities improvement project during Phase II through Phase III |

6. DESCRIPTION

The WSB region generally lacks major urban centers. In the Central and Lower WSB, only a few small urban centers exist along the narrow strip of land so that complementary development of urban centers is not expected. In the Upper WSB, however, several small urban centers, including Ratchaburi, Ban Pong, Samut Songkhram, and Khao Yoi can be developed as a cluster in line with a regional network approach to urbanization. This area is also undergoing rapid changes due to industrialization and spill-over urbanization proceeding from the BMA.

The larger urban centers in the Upper WSB will be taken as a cluster for complementary development. A comprehensive land use plan will be prepared for these urban centers and their respective rural hinterlands. Urban facilities to be improved to strengthen their respective functions will be identified as well as infrastructure to improve links between them. The existing land use plans of some urban centers will be reviewed from the viewpoint of the clustering and functional division. This program will also serve to establish a model for urban development and city planning.

- | | | |
|----|------------------------------|---|
| 7. | RELATION WITH OTHER PROJECTS | ID3 (Industrial core and satellite)
ID4 (Inland depot)
RP2 (Ratchaburi-provincial capital link)
RP6 (Urban roads)
RP9 (Outer-outer orbital route)
RT2 (Truck terminal) |
| 8. | COST (APPROX.) | Phase I = \$5.0 million
Phase II = \$2.0 million |

Project No. UD 2

- | | | |
|----|---------------|---|
| 1. | PROJECT TITLE | <u>Specific City Plan and Implementation</u> |
| 2. | LOCATION | Science City in Petchaburi
Industrial City in Bang Saphan |
| 3. | AGENCY | NESDB for study of Science City
IEAT for study of Industrial City
Private sector for joint implementation |
| 4. | OBJECTIVES | (1) To promote technology-based industry and R&D activities in Science City
(2) To improve social environment and to support Bang Saphan industrial area development
(3) To promote decentralization from the BMA |
| 5. | PHASING | Phase I, Phase II, and Phase III |
| 6. | DESCRIPTION | |

Urban centers in the WSB region have not been well developed, but numerous projects/programs are proposed to be implemented in the region. To support realization of the "area development initiatives" as core programs in the selected areas, it is proposed to plan and implement some new urban development in the WSB region. In the light of the proposed "area development initiatives", it is planned to develop the following urban centers:

(1) Science City in Petchaburi:

A science city is proposed to be constructed in Petchaburi as a center for research and development, laboratories, and human resource development facilities, relocating the existing research centers and laboratories from the BMA and inviting new investment in research and laboratory facilities. Further, developments such as a high-technology university, research hospital, and environmental research center will be integrated, together with development of urban infrastructure and amenities.

(2) Industrial City in Bang Saphan:

To support the steel complex and industrial estate development in Bang Saphan, a study is separately being undertaken to develop a new industrial city in this area. The proposed development of the industrial city is considered to be indispensable for further development of the Bang Saphan area, including expansion of Bang Saphan (Prachuap) deep-sea port.

- | | | |
|----|------------------------------|---|
| 7. | RELATION WITH OTHER PROJECTS | TR1 (Free Trade Area development)
ID3 (Industrial core and satellite)
ID6 (Industrial R&D promotion)
SS3 (High-technology university)
PH1 (Research hospital)
TL2 (Teleport promotion) |
| 8. | COST (APPROX.) | Science City: Phase I = \$640 million
Phase II = \$1,064 million
Phase III = \$536 million |

Project No. UD 3

- | | | |
|----|------------------------------|---|
| 1. | PROJECT TITLE | <u>Urban Social Infrastructure Improvement</u> |
| 2. | LOCATION | Selected urban centers in the WSB |
| 3. | AGENCY | Local governments, and Provincial Water Authorities |
| 4. | OBJECTIVES | (1) To improve social infrastructure in urban areas, particularly water supply, sewerage, and solid waste management as a basic condition for urban amenity upgrading; and
(2) To establish standards for urban social infrastructure in the WSB |
| 5. | PHASING | Phase I for comprehensive planning for major urban centers and prioritization for implementation. |
| 6. | DESCRIPTION | <p>In the WSB region, urban sewage is discharged to the sea either directly or through nearby rivers, and solid waste disposal is not handled properly. As the WSB development program proceeds, water supply capacity needs to be expanded continuously. This program will improve social infrastructure in major urban centers as the basic condition for urban amenity upgrading, and establish standards for their improvement applicable to other urban centers as well.</p> <p>For the sewerage improvement, a plan will be prepared for the six provincial capitals for subsequent implementation as a program in one package. In the sewerage improvement planning, water supply expansion will be duly reflected. For solid waste management, appropriate disposal measures will be identified for different urban centers, including landfills and a medium-scale compost plant for the productive amenity zone of the Central WSB.</p> |
| 7. | RELATION WITH OTHER PROJECTS | EV3 (Waste water treatment)
EV4 (Solid waste management)
RP6 (Urban roads)
RT1 (Intercity and rural bus transport) |
| 8. | COST (APPROX.) | Phase I = \$1.5 million |

Project No. UD 4

1. PROJECT TITLE Urban Amenity Improvement
2. LOCATION Selected urban centers in the WSB
3. AGENCY Local governments
4. OBJECTIVES (1) To improve the overall quality of urban environment through provision of various urban amenities, and
(2) To contribute to minimizing or even reversing the out-migration pattern of people in the WSB
5. PHASING Phase I for program formulation and initial implementation in tourism development areas; continual implementation during Phase II through Phase III.

6. DESCRIPTION

An important component of the WSB development vision and strategy is to establish or improve certain service functions and urban amenities that would complement those available in the BMA. This would serve first to reduce the ongoing out-migration from the region and to attract more investors. Improvement of urban amenities should be carefully programmed for different urban centers and various types of amenity facilities.

A program approach is to be applied to step-wise improvement of urban amenities in different urban centers. Subprograms should be formulated by province. Components of subprograms will vary for different province, and may include sports stadiums, recreation parks, museums, concert halls and other socio-cultural facilities.

7. RELATION WITH OTHER PROJECTS

8. COST (APPROX.) Phase I = \$1 million
 Phase II = \$3 million
 Phase III = \$5 million

Project No. UD 5

- | | | |
|----|---------------|--|
| 1. | PROJECT TITLE | <u>Institutional Strengthening for Urban Development</u> |
| 2. | LOCATION | Not specific |
| 3. | AGENCY | Ministry of Interior, DTCP |
| 4. | OBJECTIVES | To improve the effectiveness of urban development based on planning through institutional restructuring, integrating planning and plan implementation functions. |
| 5. | PHASING | Phase I for formulation of institutional restructuring measures and legislative actions, followed by trial implementation; Further improvement and implementation after Phase II |

6. DESCRIPTION

At present, the Department of Town and Country Planning (DTCP) of the Ministry of Interior is in charge of urban planning. DTCP, however, is not responsible for monitoring of urban and housing development, nor for implementation of urban development plans. Thus, urban development plans prepared by DTCP are not effective in guiding urban development.

DTCP may be reorganized as a public corporation responsible not only for planning but also for implementation of some urban and housing development projects. Other measures for institutional restructuring related to urban development and planning may also be taken, including regulatory measures for urban land use control. A plan for the institutional restructuring will be prepared and necessary legislative actions taken during Phase I. The new institutional setup may be further modified subsequent to trial implementation, also during Phase I.

- | | | |
|----|------------------------------|---|
| 7. | RELATION WITH OTHER PROJECTS | UD1 (Upper WSB urban cluster development) |
| 8. | COST (APPROX.) | Phase I = \$0.5 million |

APPENDIX II To Chapter 2

**UPPER WSB
URBAN CLUSTER DEVELOPMENT**

UPPER WSB URBAN CLUSTER DEVELOPMENT

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5. RECOMMEND ACTIONS.....	A2-11

Upper WSB Urban Cluster Development

1. Background

1.1 Trend of Urbanization in the Upper WSB

The total urban (i.e., municipality + sanitary district) population of the WSB region increased from 778,151 in 1985 to 948,729 in 1995. The urban population accounted for 30.7 per cent of the total WSB population in 1995, up slightly from 29.1 per cent in 1985. The growth of the urban population has been relatively slow, i.e., 1.94 per cent per annum between 1985 and 1990 and 2.06 per cent between 1990 and 1995. Thus, urbanization in the WSB region has not been so remarkable, but is steadily progressing.

Of all the WSB provinces, Petchaburi has the highest proportion concentrated in urban areas, 37.3 per cent. Kanchanaburi has a 27.5 per cent urban population concentration ratio, having a larger rural hinterland. Ratchaburi has a 32.4 per cent urban population ratio concentrated mainly along the major highways. Samut Songkhram has the second lowest urban population ratio, 24.1 per cent of total population, but it has the highest urban population density, 20.0 persons per hectare.

Among the 13 muang and tambon municipalities in the WSB region, the largest urban center (excluding the "sprawl" areas outside the official municipal boundaries) is Muang Ratchaburi, which had a population of 46,492 in 1993. The smallest urban center is Tambon Amphora (6,754 in 1993) in Samut Songkhram province. Municipality Ban Pong in Ratchaburi province has the highest population density, or 77.8 persons per hectare in 1995.

The distribution of urban centers in the WSB region is generally characterized by weak urban agglomeration (population concentration). The Upper WSB, located within a radius of about 100 km from the BMA, is a receiving area of the spillover from the BMA occurring along major roads radiating from the BMA. The spillover area covers Ratchaburi province, Samut Songkhram province, and the northern part of Petchaburi province (up to Amphore Khao Yoi).

Table A2-1 Growth Rates of Provincial and Urban Population

	Average Annual Growth				Share of Urban to Total Pop(%)	Urban Pop. Density (persons/ha)
	Total Population (%)		Urban Population (%)			
Province	1985-90	1990-95	1985-90	1990-95	1995	1995
Kanchanaburi	2.39	1.32	4.42	2.59	27.5	9.76
Ratchaburi	1.03	2.08	1.48	1.38	32.4	8.98
Samut Songkhram	0.30	0.05	0.61	0.33	24.1	19.98
Petchaburi	0.83	0.88	0.62	0.44	37.3	3.48
Prachuap Khirikhan	1.17	1.65	1.02	1.27	37.1	8.46
Chumphon	2.25	1.71	4.37	9.48	22.5	10.79
WSB Region	1.45	1.46	1.94	2.06	30.7	7.33
Kingdom	1.64	1.08	-----	-----	-----	-----

Note: Urban Definition: Municipalities plus Sanitary Districts

Source: Study Team

1.2 Projected Urbanization in the Upper WSB

Based on an estimate of employment in the manufacturing sector, the total urban population, defined here as combined population of all the municipalities and the sanitary districts in the WSB, is forecast to increase from 948,000 in 1994 to 1,725,000 in 2011, with a corresponding increase in the urbanization ratio from 30 per cent in 1994 to 50 per cent in 2011. According to this forecast, the total urban population in the Upper WSB will increase from 677,000 in 1994 to 821,000 in 2001, 943,000 in 2006, and 1,083,000 in 2011.

According to this Study's industrial sector forecast, nearly 77,000 new jobs will be generated in new industries in the Upper WSB region, out of 144,000 workers in this sector. Additional urban land use has been calculated on the basis of employment in the manufacturing sector in the Upper WSB and in the WSB. The results are summarized in Table A2-2 below.

Table A2-2 Urban Population Projection for the Upper WSB Region

Units: persons, hectares

	1994	2001	2006	2011
Projected Total WSB Population	2,896,000 (existing)	3,060,000 (projected)	3,234,000 (projected)	3,433,000 (projected)
Total Urban Population in the WSB region*1	948,000	1,200,000	1,400,000	1,725,000
Share of Urban Pop. to Total WSB Pop.	32.7%	39.2%	43.3%	50.2%
Urban Pop. Increase in the WSB region	-----	252,000	452,000	777,000
Urban Pop. in the Upper WSB region*2	677,000	821,000	943,000	1,083,000
Urban Pop. Increase in the Upper WSB	-----	144,000	266,000	406,000
Additional Urban Land Use Demand in the WSB region	-----	3,030.0 ha	5,429.5 ha	9,324.8 ha
of which Upper WSB region	-----	1,612.0 ha	2,888.5 ha	4,960.8 ha
of which Central WSB region	-----	448.4 ha	803.6 ha	1,380.1 ha
of which Lower WSB region	-----	969.6 ha	1,737.4 ha	2,983.9 ha

Note: *1 -Urban Population includes the population of Municipalities and Sanitary Districts.

:*2 -Urban Population of Upper WSB region based on the population of Ratchaburi, Samut Songkhram, and Petchaburi provinces; the annual growth rate was assumed to be 2.8 per cent during the forecast period (1994-2011).

Source: Study Team

1.3 Characterization of Urban Centers in the Upper WSB

(1) Position of the Upper WSB

The Upper WSB is located at the crossroads between north-south and east-west arteries, and it is a receiving area of spillover from the BMA. It has a comparatively more diversified industrial structure and urban agglomeration.

According to the strategic industrial location proposed by the WSB master plan, the Upper WSB is expected to accommodate only less than 60 per cent of employment opportunities to be generated by new industries, while it contains at present close to 80 per cent of manufacturing employment. The implication is that the Upper WSB will aim at deepening of its industrial structure with establishment of selected key industries such as motor vehicles, electronics, and high value-added processing of agro-products. At the same time, more service functions including higher order services, complementary to those in the BMA, should locate in the Upper WSB, as well as various amenities.

These industries, services, and amenities should be located in the Upper WSB in such a way that the observed urban sprawl may be transformed into a more orderly land use pattern for efficient production and service delivery and a better quality of life for residents in both the Upper WSB and the BMA. This may be attained by clarifying the functional division among larger urban centers in the Upper WSB and selectively

strengthening designated functions through land use planning and control, and infrastructure improvement.

(2) Characterization of the Upper WSB

The Upper WSB may be characterized in two major ways, reflecting its position clarified above. First, the Upper WSB may be characterized as a subregional industrial junction. As access is improved not only from/to neighboring regions by improved road/highway links but also from other countries including Myanmar, new types of industries would find it convenient to locate in the Upper WSB. These may include import processing industries, gateway-oriented industries, and distribution-processing activities.

Second, the Upper WSB may be characterized as integral part of the Greater BMA as a functional capital of continental Southeast Asia. For this, higher order service functions would be required such as higher education, quality health services, research and development, and various forms of financing as well as efficient administration. Various amenities would constitute another important attribute of the functional capital.

Encompassing all the functions related to industrial development, the Upper WSB may be developed into an industrial logistics center. Key facilities and functions of the center should be concentrated in a few selected areas for efficient service provision. Ban Pong seems to be a logical place to develop an industrial core and distribution function. Samut Songkhram, with this large area of abandoned shrimp fields in close vicinity of the BMA, is expected to play the role of a sub-business center supplementing the primary business center function of the BMA, and also to serve a primary wholesaling function for communities just outside of the BMA, including Kanchanaburi, Ratchaburi, and Khao Yoi. These urban centers will serve collectively transshipment, import processing, localized export/agro-processing, free trade/merchandising, and distribution functions.

There are several small urban centers in the Upper WSB, including Ratchaburi, Ban Pong, Samut Songkhram, and Khao Yoi that can be developed as a cluster in line with the regional network approach to urbanization. The basic premise of the regional network approach is that cities and towns within a region or subregion are members of a cluster of urban centers or industrial zones. These centers interact with each other, as well as with their hinterlands (rural areas), to realize a totality that is more than the sum of its parts.

The agglomeration of industries in such areas would accelerate and contribute to the promotion of urban functions and amenities in the region. Therefore, satellite industrial centers would be developed mainly in the Upper WSB to attract spillover industries from the BMA. Together with this strategy, subregional linkages with Myanmar, among others, will be strategically promoted in this area so that the Upper WSB can function as a gateway to the countries located to the west of the region (e.g., India).

The characterization and development priority of major urban centers in the Upper WSB region is summarized in Table A2-3 below.

Table A2-3 Characterization and Priority of Major Urban Centers

Provincial City	Characterization and Priority
Kanchanaburi	<ul style="list-style-type: none"> • A community urban growth center, Kanchanaburi was designated in the 7th National Plan as a center for tourism, business, trading, agro-industries, and productive industries linking with Ratchaburi and other provinces. • Water resources, forests, mineral resources, agriculture, raw materials, and natural tourism attractions are available. • Due to its proximity to Bangkok, this center is suitable for development based on spillover from the BMA. • Close to the border with Myanmar, this center offers more advantages for Myanmar-related investments than other areas. The development of its hinterlands is the key to attracting such investments.
Ratchaburi	<ul style="list-style-type: none"> • A regional center with multiple functions, Ratchaburi was designated as the industrial investment center of Western Region in the 7th National Plan. • Industry is the driving force of this urban center. The terminal of the natural gas pipeline from Myanmar is scheduled for completion in 1998, together with installation of EGAT and JPP power plants. • Since Ban Pong is located at the crossroads of north-south and east-west arteries, it offers a suitable site for location of inland-type industries and for development of an inland clearance depot or distribution center. • Damnoen Saduak floating market is a major international tourist attraction in this area. • A Rajabhat Institute is located in this center and there will be a faculty of Agriculture at Silpakorn University in 1997. Also, a Western Regional University will be established in the near future. • There are rapid, convenient highway connections between the Southern and Western regions and this center is only 100 km away from the BMR. • Ratchaburi will become a strategic location between the Southern region and the Northern and Northeastern regions after the outer ring road of the BMR is completed.
Samut Songkhram	<ul style="list-style-type: none"> • A community urban growth center, an alternative site for an amusement park, and an industrial site with a free trade area (FTA) to be developed. • A strategic location between the BMA and WSB region with Route 35. • A priority is the development of abandoned shrimp farms and better water management.

Provincial City	Characterization and Priority
Petchaburi	<ul style="list-style-type: none"> • This center is located in the junction connecting the Southern region and other regions of the Kingdom. • Petchaburi is located in Zone 3 of the Board of Investment's promotional zoning, the most favored zone. • Petchaburi is the educational center of the WSB region. Four vocational colleges (Petchaburi Technical Collage, Petchaburi Provincial Vocational College, Petchaburi Agricultural College, and Petchaburi business school) and two undergraduate colleges (Petchaburi Teachers College and Phra Jom Glaw Nursing College) are available and two other educational facilities are planned. A Rajabhat Institute is also located in Petchaburi. It is a future "University Town."

Source: Study Team

Since a comprehensive land use and network formation plan in the Upper WSB has not been worked out yet, it is proposed to formulate an overall urban development plan in and around this cluster. It is recommended to review the land use plan prepared for specific urban centers, such as Ratchaburi, and to formulate a comprehensive plan for cluster development in this area.

2. *Urban Cluster Development*

2.1 *Basic Concept and Objectives*

Several urban centers in the Upper WSB such as Ratchaburi, Ban Pong, Samut Songkhram, and Khao Yoi can be developed as a cluster. Such an aggregation of urban centers will induce more dynamic activities than may be attainable by only a single urban center.

The Upper WSB Urban Cluster Development aims to promote complementary development of urban centers in the Upper WSB. More specific objectives include the following:

- (i) To support comprehensive industrial activities and social activities within the urban centers by establishing stronger industrial and social linkages among urban centers in this area;
- (ii) To promote linkages between urban and rural activities by facilitating complementary rural activities in their hinterlands; and
- (iii) To guide more orderly land use in this area.

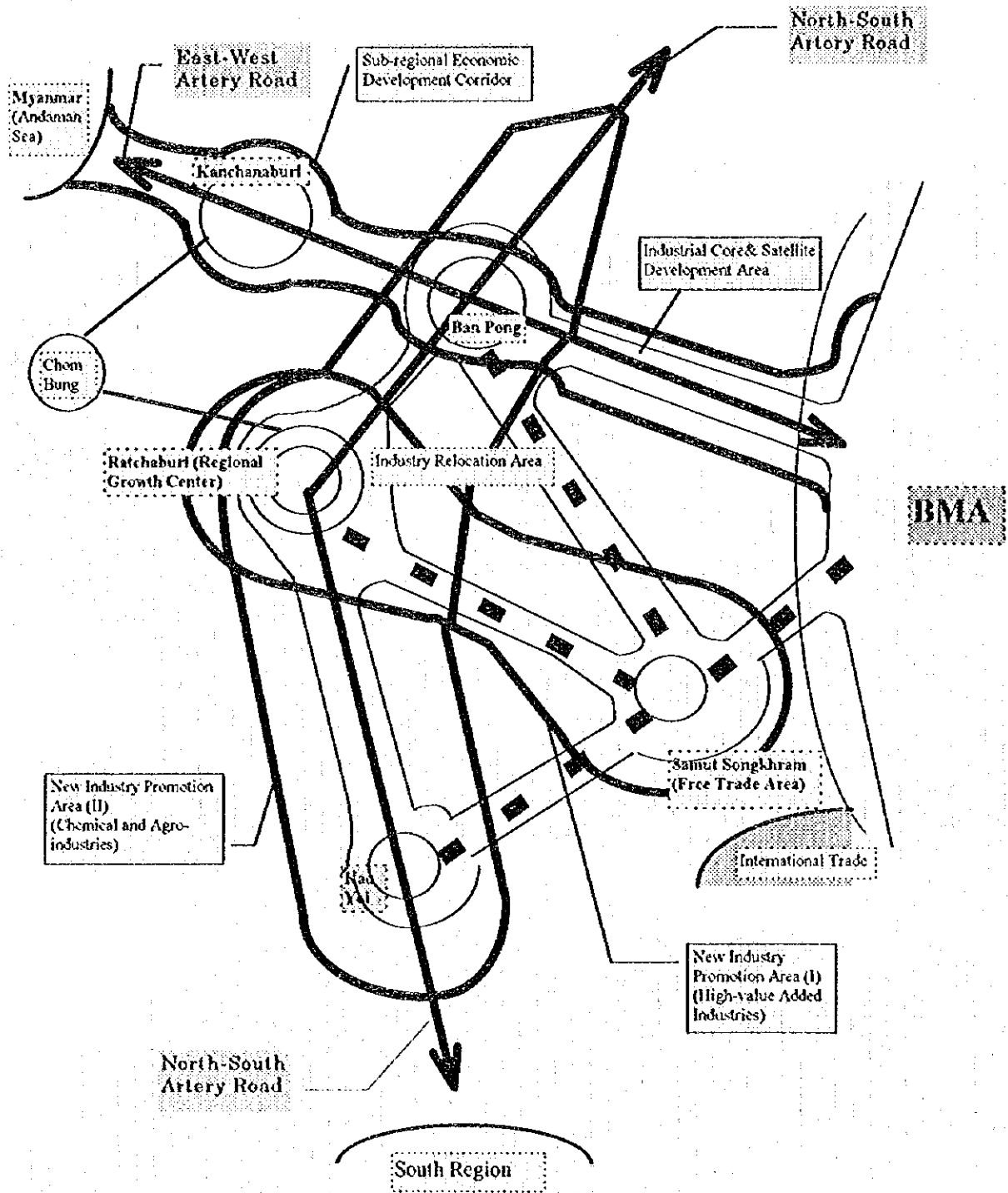
2.2 Characteristics

The major urban centers in the Upper WSB should be taken as a cluster for complementary development, and a coherent land use plan should be prepared first for these urban centers and their respective rural hinterlands as a whole. Urban facilities to strengthen their respective functions should be identified together with infrastructure to be improved with promotion of linkages among them. The existing land use plans of urban centers in the cluster should be reviewed from the viewpoint of clustering and functional division. The major characteristics and roles of this program are described below.

- (i) To prepare a conceptual land use plan based on a review from the viewpoint of clustering and functional division;
- (ii) To identify urban facilities to be improved,
- (iii) To identify infrastructure required to improve linkages among respective urban centers; and
- (iv) To establish a model for city planning and urban development in the major centers in this area.

A conceptual urban cluster structure in the Upper WSB is proposed as illustrated in Figure A2-1.

Figure A2-1 Urban Cluster Structure and Linkage in the Upper WSB Region



2.3 Spatial Development Framework

This Study has proposed a macro-zoning scheme for development of the Upper WSB as set out below.

(i) Kanchanaburi Eco-Tourism and Agro-Industrial Zone

The Kanchanaburi Eco-Tourism and Agro-Industrial Zone will have a well-developed transport artery for access to and from the BMA as well as to Myanmar. The major urban center in the zone is the Kanchanaburi urban area. If and when the Tavoy (Dawei)-Kanchanaburi Corridor is opened, the zone will serve as a gateway to Myanmar and further to South Asia and the Middle East. Eco-tourism and livestock (cattle fattening), as well as cultivation of vegetables and flowers for niche markets in the BMA, will be promoted in this zone.

(ii) Ban Pong Industrial/Distribution Zone

The Ban Pong Industrial/Distribution Zone is located at the crossroads of north-south and east-west arteries, and at the point closest to the BMA. The major urban center in the zone is the Ban Pong urban area. It is proposed to develop an industrial logistics center or around Ban Pong.

(iii) Ratchaburi Administrative and Industrial Zone

The Ratchaburi Administrative and Industrial Zone is located in the center of the Upper WSB and will serve as a growth pole in the subregion. The major urban center in the zone is the Ratchaburi urban area.

(iv) Samut Songkhram Free Trade and Aquacultural Zone

It is proposed that the Samut Songkhram Free Trade and Aquacultural Zone utilize land previously used as shrimp fields and now mostly abandoned. The major urban center in the zone is the Samut Songkhram urban area. A part of this area will be reserved for protection and rehabilitation of mangrove and for aquaculture. In another part of Samut Songkhram, it is proposed to develop a free trade area (FTA) where processing industry, warehouses, a retail/wholesale center, as well as an exhibition and sports complex are envisaged.

(v) Upper Petchaburi Industrial Zone

The Upper Petchaburi Industrial Zone will encompass a relatively small area where an industrial estate could be developed near the junction of Routes 4 and 35. The major urban center in the zone is the Khao Yoi urban area, where construction of an industrial estate is already underway. This zone, though located in Petchaburi province, will be involved in the Upper WSB subregion.

2.4 Proposed Study

The Upper WSB Urban Cluster Development will encompass projects and programs in various related sectors (e.g., the industrial, housing, and road sectors). Most of them involve the development of urban land. Implementation of the proposed projects and programs would involve various agencies and the private sector. To facilitate coordination among them, a conceptual land use plan should be prepared based upon a review of existing plans from the viewpoint of clustering and functional division as previously discussed in this paper. The conceptual land use plan should be followed by a comprehensive urban land use development plan.

In preparing the conceptual land use plan, it is suggested to work out appropriate development guidelines, covering rules, regulations, and other aspects of the legal framework for urban development.

3. Project Assessment

3.1 Estimated Cost

Cost estimates for formulating a comprehensive urban cluster development plan and programs are summarized in Table A2-4 below.

Table A2-1 Cost Estimate of Urban Cluster Development Study

Units: US\$ million

Urban Cluster Development Program	Phase I (1997-2001)	Phase II (2002-2006)	Phase III (2007-2011)
(1) Conceptual Regional Land Use Development Plan (Upper WSB)	2.0	-----	-----
(2) Comprehensive Urban Land Use Development Plan (8 specified urban centers)	3.0 (3 urban centers)	2.0 (2 urban centers)	-----
Total Cost by Phase	5.0	2.0	-----

Source: Study Team

3.2 Observations

Two major observations are set out below:

- (i) Characteristics of Urban Cluster Development are totally dependent on development projects and programs in other sectors to be carried out in and around urban centers. To prepare a conceptual land use plan and identify urban facilities to be improved, a comprehensive physical land use plan for the Upper WSB should be prepared first in cooperation with concerned sector agencies.
- (ii) Following the comprehensive physical land use plan for the Upper WSB, development plans and activities that may change the proposed structure should be minimized and controlled in order to avoid a mismatch of urban development guidelines and land use. Careful review of urban development plans in respective urban centers is essential to see if any element of the regional development framework may be modified.

4. Recommend Actions

The following actions are recommended:

- (i) It is recommended that the Department of Town And Country Planning (DTCP) initiate the proposed study on the conceptual regional land use plan in the Upper WSB.
- (ii) The Urban Cluster Development requires comprehensive land use planning, which in turn requires the redefinition of planning units and organizations since many

elements of the proposed sectoral development plans will be carried out outside of existing urban administrative boundaries. The present administrative machinery may not be adequate to meet the requirements of effective land use planning. Therefore, it is important to specify a certain organizational unit with responsibility for effective land use planning and zoning, which are key elements necessary for the overall success of the urban cluster development program.

- (iii) It is recommended that the Ministry of Interior study the reorganization and strengthening of the institutional framework for urban development. DTCP of the Ministry of Interior, in charge of urban planning, is not responsible for the monitoring of urban and housing development, nor for the implementation of urban development plans. One possible way of strengthening the institutional setting for urban development would be to reorganize DTCP as a public corporation responsible not only for planning but also for implementation of urban and housing development projects. The proposed corporation would work with public and private financing institutions to analyze credits/loans for project implementation. The functions of the proposed corporation should be largely decentralized as a regional office.