

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)


NATIONAL ECONOMIC AND
SOCIAL DEVELOPMENT BOARD (NESDB)
OF THE KINGDOM OF THAILAND

WESTERN SEABOARD
REGIONAL DEVELOPMENT
MASTER PLAN

FINAL REPORT

EXECUTIVE SUMMARY

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Western seaboard regional development master plan final report : executive summary.

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REGIONAL DEVELOPMENT
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LIST OF REPORTS

(This Volume is indicated by)

Executive Summary

- Volume 1 Main Report
- Volume 2 Social Environment
- Volume 3 Macroeconomic Perspective
- Volume 4 Spatial Development and Land Use
- Volume 5 Rural and Urban Development
- Volume 6 Agricultural Development
- Volume 7 Industrial Development
- Volume 8 Tourism Development
- Volume 9 Infrastructure Development
- Volume 10 Institutional Development



Currency Equivalents

US\$ 1 = 25 Baht

1 Baht = US\$ 0.04

(As of Mid 1996)

PREFACE

In response to a request from the Government of the Kingdom of Thailand, the Government of Japan decided to conduct a study on the Western Seaboard Regional Development Master Plan Study and entrusted the study to the Japan International Cooperation Agency (JICA).

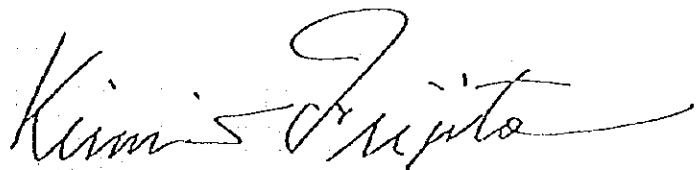
JICA composed a study team headed by Mr. Hajime Koizumi, Nippon Koei Co., Ltd. and sent the study team to Thailand several times between February 1996 and March 1997.

The study team had a series of discussions with the officials concerned of the Government of the Kingdom of Thailand, and conducted necessary surveys at the study area. Through further studies in Japan, the present report was prepared.

I hope that this report will contribute to the promotion of the plan and to the enhancement of friendly relations between Thailand and Japan.

I wish to express my sincere appreciation to the officials concerned of the Government of the Kingdom of Thailand for their close cooperation extended to the study team.

June, 1997



President
Japan International Cooperation Agency

June, 1997

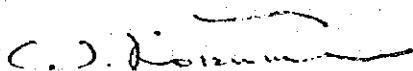
Mr. Kimio Fujita
President
Japan International Cooperation Agency (JICA)
Tokyo, Japan

Letter of Transmittal

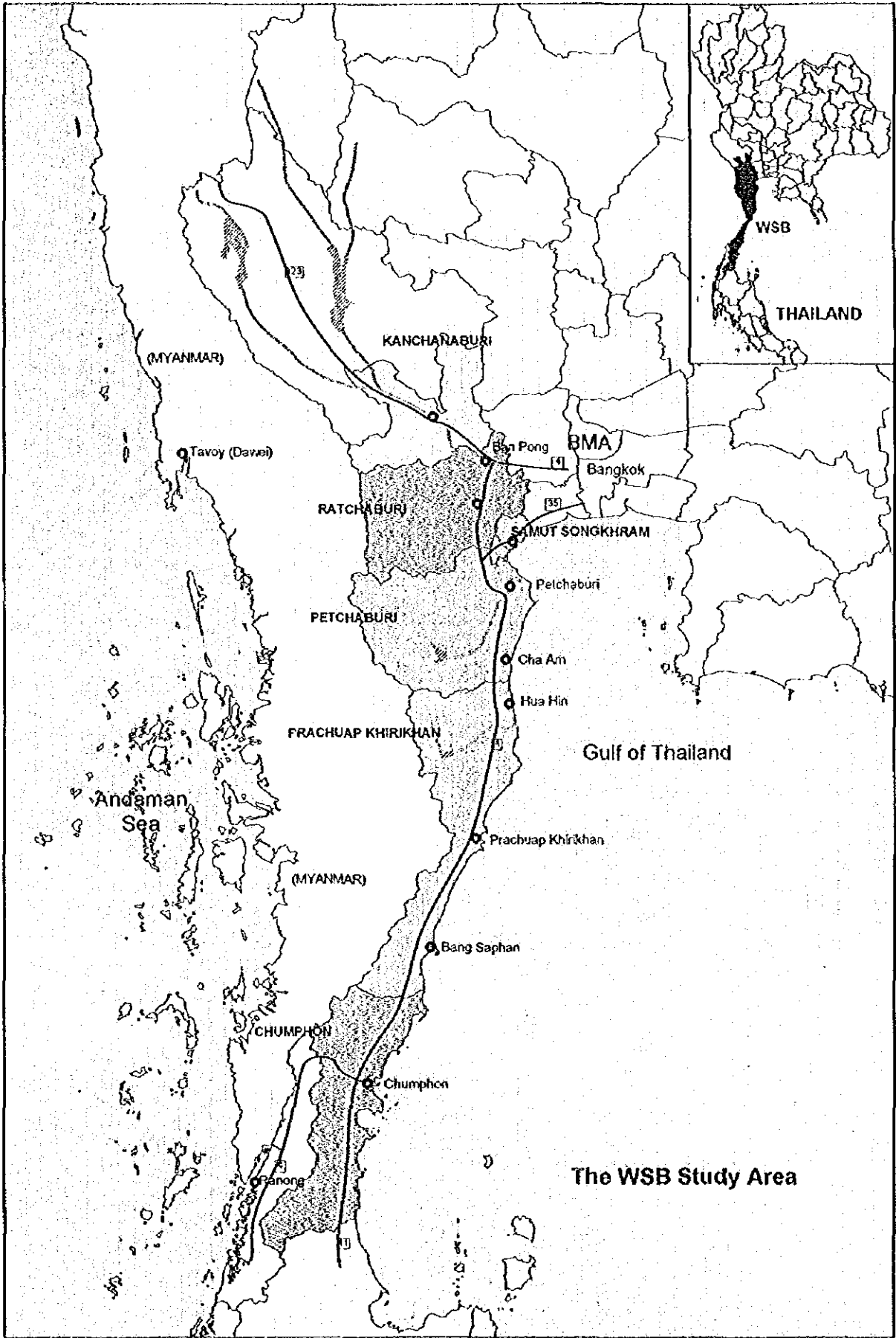
It is with great pleasure that we submit to you the Final Report of the Western Seaboard Regional Development Master Plan Study completed by our Study Team composed of experts from Nippon Koei Co., Ltd. and PADECO Co., Ltd., with cooperative efforts of NESDB and other Thai parties concerned. The Final Report presents the results of all investigations, analysis, planning, and studies undertaken for the integrated development of the Western Seaboard (WSB) region.

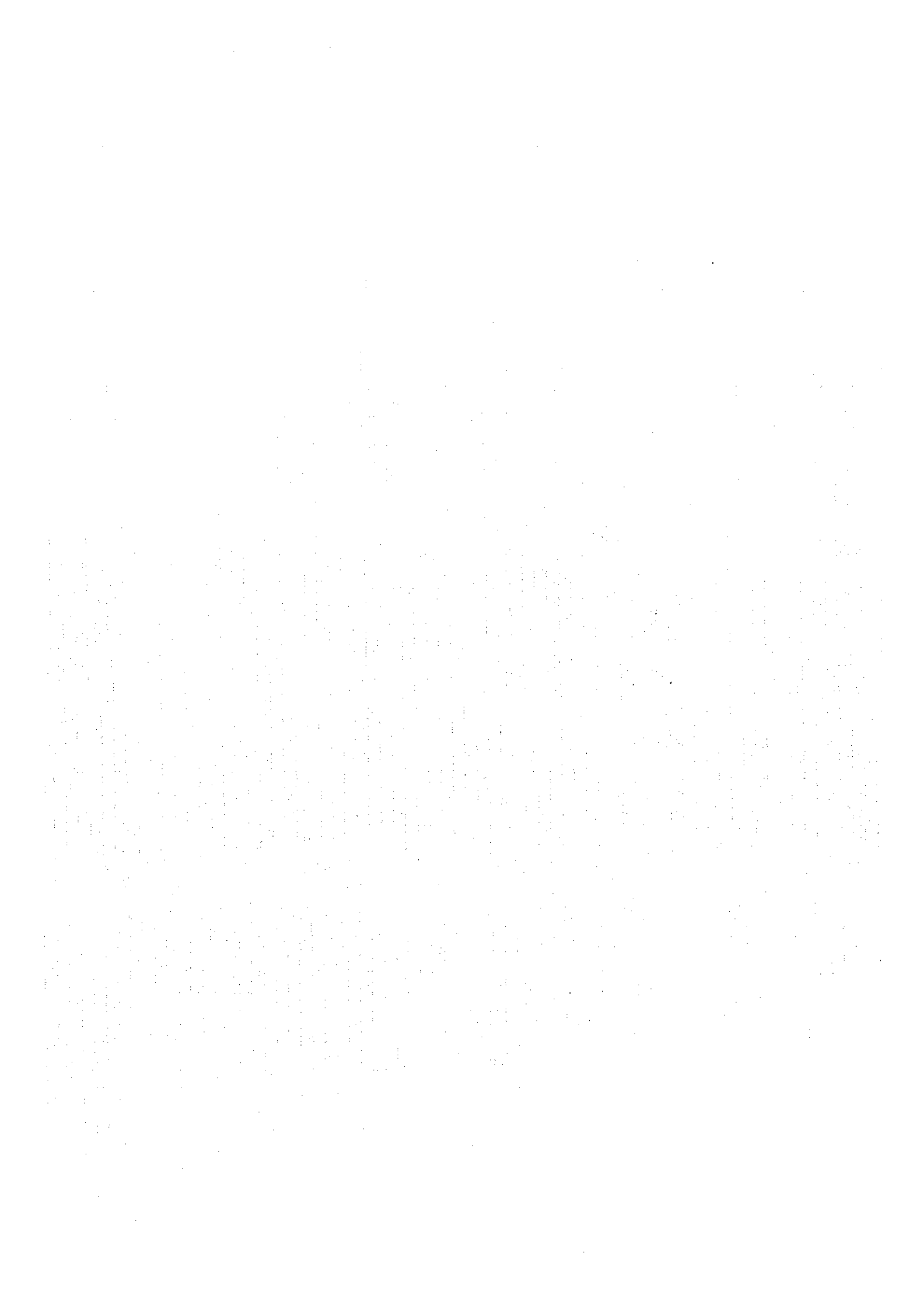
The WSB region is full of dreams and potentials for development. The WSB could become a leading region of Thailand, socially and economically, if adequate supportive measures are taken as proposed in this master plan study. Our Study Team hopes that the proposed master plan will be referred to in implementing the 8th National Economic and Social Development Plan (1997-2001) and the subsequent 9th and 10th Plans, and that it will guide the formulation and implementation of provincial and village (tambon) development plans in the WSB region.

Our Study Team would like to take this opportunity to express its heartfelt gratitude for the kind assistance and cooperation extended by the NESDB management team and counterpart experts, as well as by all other parties concerned, during the period of our study in Thailand from February 1996 to March 1997. Thanks to their excellent cooperation, our study has been completed efficiently and successfully.



Hajime Koizumi
Study Team Leader



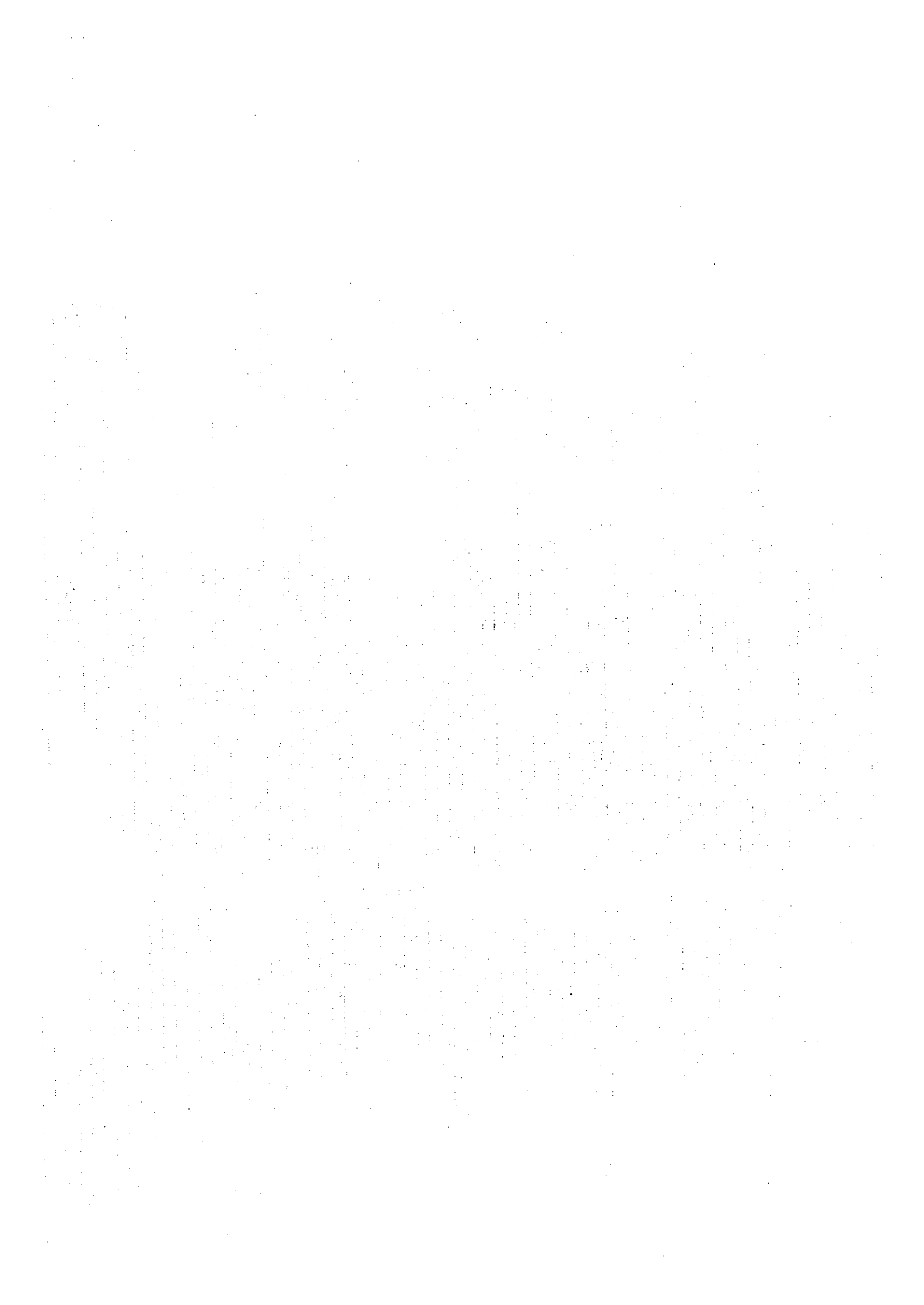


EXECUTIVE SUMMARY

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1 WESTERN SEABOARD (WSB) REGION

The Western Seaboard (WSB) region extends to the west of the Bangkok Metropolitan Area (BMA) and the Gulf of Thailand, covering six provinces; i.e., Kanchanaburi, Ratchaburi, Saniut Songkhram, Petchaburi, Prachuap Khirikhan, and Chumphon. The WSB region has a land area of about 43,700 km², corresponding to about 8.5 per cent of the national land area.

The WSB region had a population of about 2.9 million in 1994, which accounted for 5.2 per cent of the national population. The labor force was estimated at 1.63 million. The WSB employment structure has been predominantly agricultural, with nearly 51 per cent of the labor force being employed in the agriculture sector.

Social Indicators

Economic Indicators

	WSB	Kingdom		WSB	Kingdom
Population Density (prs/km ²)	70	115	GDP : Agriculture (%)	19.3	10.2
Population over 60 (%)	9.5	6.8	Manufacturing (%)	23.3	28.2
Urban Population (%)	11.8	17.6	Services (%)	41.2	43.2
Infant Mortality Rate (‰)	8.4	7.4	GDP Growth Rate (1981-94)	6.3	8.2
Medical Doctors/Population	1/7,440	1/4,295	Per Capita GDP (Baht)	48,610	61,335
Employment in Agriculture (%)	50.9	50.3	Ratio (%)	(79.3)	(100.0)
Educational Level of Workers (%)			DOH Roads (km/km ²)	0.06	0.10
Elementary level	60	54	Per Capita Electricity Consumption (kWh)	840	1,058
University level	2.8	5.1	Telephone Lines (per 100 prs)	3.4	5.9

The WSB's social and economic indicators are in general less favorable than the national average; e.g., the infant mortality rate is high, the number of medical personnel is less, urbanization is less advanced, and the educational level of employed persons is low.¹ Per capita GDP in the WSB region is about 79 per cent of the national average.²

Industrialization is in progress in the WSB. The contribution of the industrial sector to the regional economy increased from 21.1 per cent in 1981 to 37.3 per cent in 1994. Industrialization is notable in the Upper WSB, as well as in the Bang Saphan area where a deep-sea port has been newly opened.

¹ Refer to Volume 1, Chapter 2 and Volume 2

² Refer to Volume 3, Chapter 2 and Volume 3

2 OBJECTIVES AND STRATEGY

2.1 Objectives of WSB Development

The following objectives have been established for development of the WSB region in line with the national development policies (e.g., Thailand Vision 2020, the 8th National Economic and Social Development Plan, national spatial framework), as well as in view of the constraints and potentials of the WSB region:¹

- (1) To enhance the quality of life of the people in the WSB region, through enhancement of household incomes, and attainment of education and other social sector development, as well as improvement of social infrastructure;
- (2) To improve and maintain amenities in the region, so that people in the WSB can enjoy a healthy and pleasant life in their respective communities, and to enhance the quality of the environment by assuring environmentally sound and sustainable development; and
- (3) To further improve social and economic infrastructure to enhance regional production and prosperity, as well as the quality of life and amenity in the region.

2.2 WSB Development Strategy

Focuses of the WSB regional development plan have been put on some fundamental factors that are to be strategically addressed. These factors are:¹

- (1) Socially-oriented regional development: The policy to put more emphasis on the social and human aspects of development should be followed.
- (2) Globalization policy: Free trade and globalization under the AFTA and WTO agreements should be addressed.
- (3) Subregional and interregional cooperation: Regional prosperity through promotion of intraregional, interregional, and subregional linkages should be pursued.
- (4) Promotion of decentralization: Decentralization should be strategically addressed in formulating development plans.
- (5) Technological advancement: The WSB development plan should be formulated to facilitate and promote the advancement and accumulation of technologies.

¹ Refer to Volume 1, Chapter 2

3 DEVELOPMENT FRAMEWORKS

3.1 Social and Human Development Scenario

A fundamental social change is planned to shift the WSB from a region with net out-migration (as at present) to one with net in-migration. A wider range of opportunities for socio-cultural and human development will be provided for the increasing number of in-migrants.

A holistic approach to social and human development is adopted to ensure that opportunities are available for all related activities involved in realizing social and human development. These opportunities are tabulated herein.¹

10 Opportunities to be Provided for Social and Human Development

- (1) Health services
- (2) Education and training
- (3) Housing
- (4) Transportation
- (5) Amenities
- (6) Social infrastructure
- (7) Productive use of non-work time
- (8) Job and wage
- (9) Access to decision-making
- (10) Social-friendly environment

3.2 Macroeconomic Scenario

Three development alternatives have been evaluated; i.e., (i) trend growth, (ii) moderate growth; and (iii) accelerated growth. Based on the results of the evaluation, it has been recommended that the WSB regional development plan be formulated in line with the Moderate Growth scenario.²

Socio-economic Targets under Moderate Growth Scenario

Population Growth:	1% per annum	GDP Growth:	9.2 %
Employment:		Agriculture	2.4 %
Agriculture	-361,000 workers	Manufacturing	11.2 %
Industry	+466,000 workers	Services	9.2 %
Social Impact:		Per Capita GDP:	182,040 Baht
Moderate in-migration and/or		Ratio to national	98%
return of workers to the WSB		average	

The most likely macroeconomic scenario, as well as social and human development scenario, envisages the economic and social standards of the WSB region catching up with the level of the national average by 2011.

¹ Refer to Volume 1, Section 3.1 and Volume 2

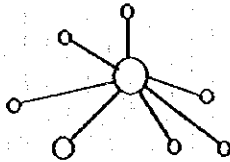
² Refer to Volume 1, Section 3.2 and Volume 3

3.3 Spatial Development Framework

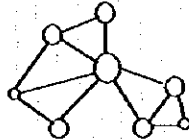
(1) Regional Development Pattern

Based on an evaluation of three regional development models, a "Multiple Access Model" is proposed for the WSB regional development plan. The Multiple Access Model is ideal for the WSB to promote linkages of areas and regions, as well as linkages among economic sectors.¹

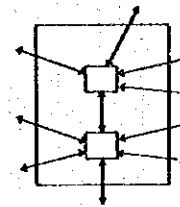
Growth Pole Model



Regional Network Model

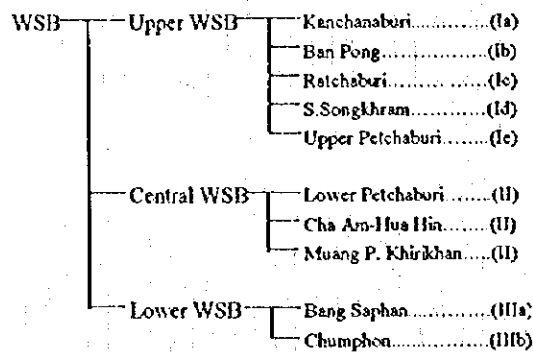


Multiple Access Model



(2) Macro Zoning

The WSB region is composed of geographic areas that are clearly different from each other, agro-ecologically, morphologically, or otherwise. The WSB may be subdivided into the following zones:²

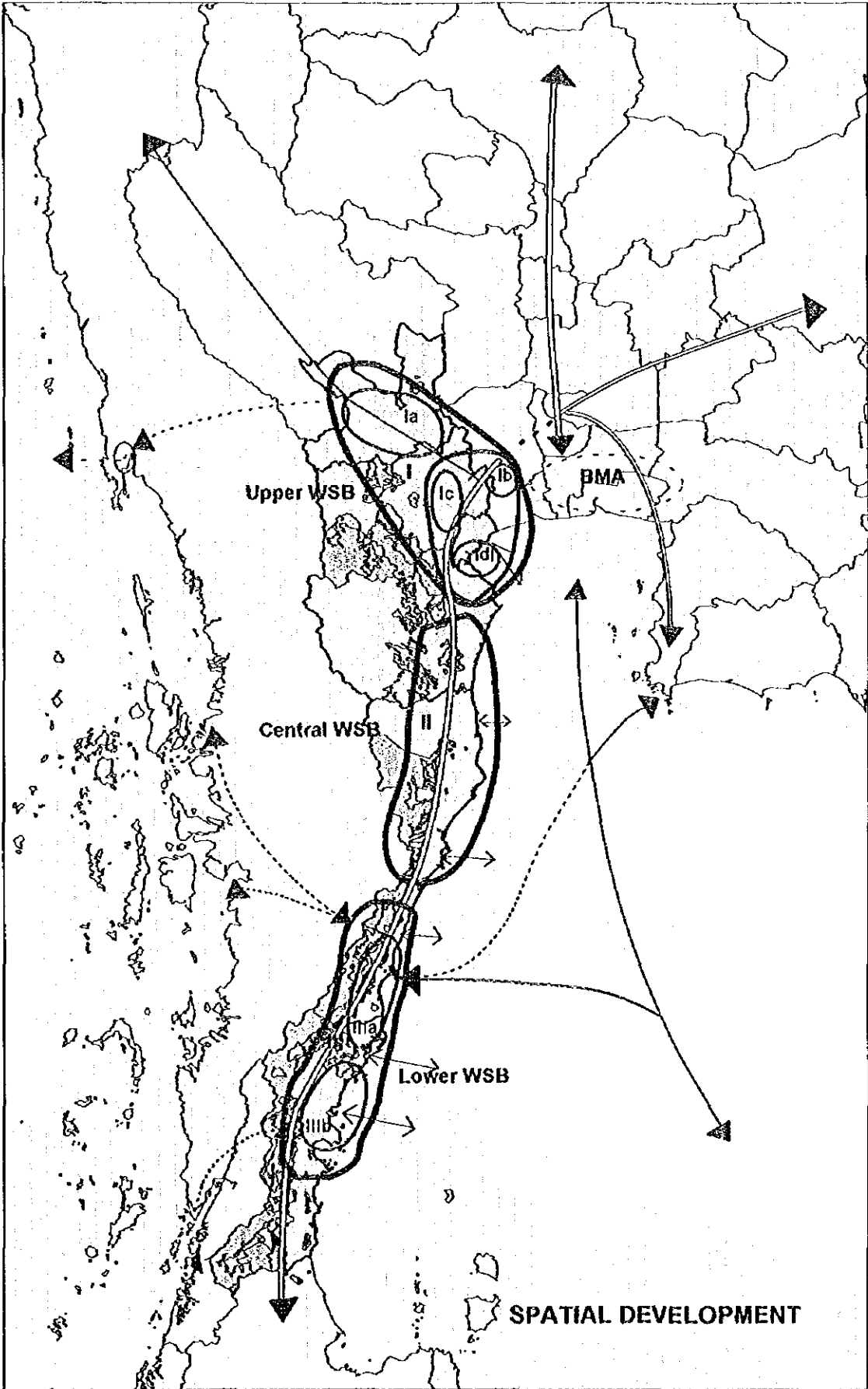


(3) Spatial Development Structure

The proposed spatial development structure of the WSB regional development plan is illustrated on the following page:

¹ Refer to Volume 1, Section 3.3

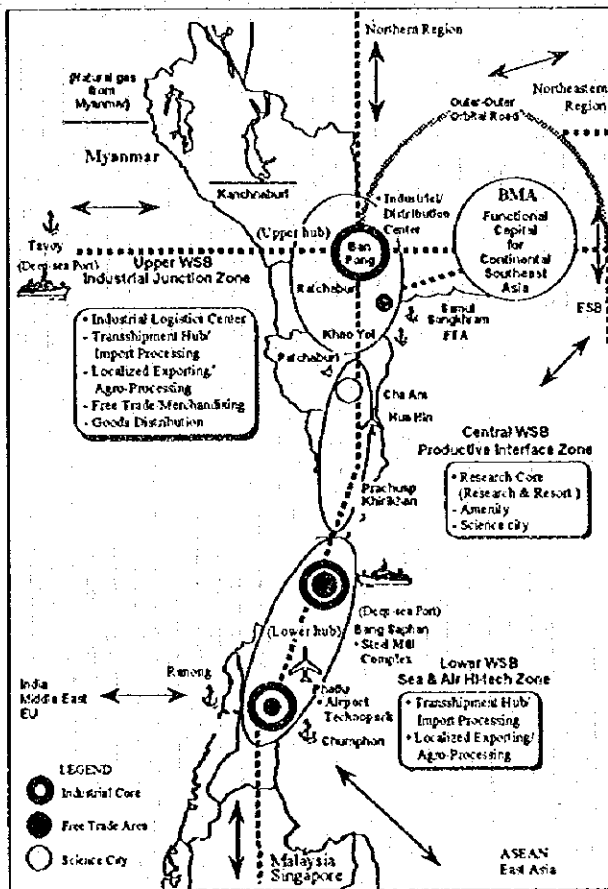
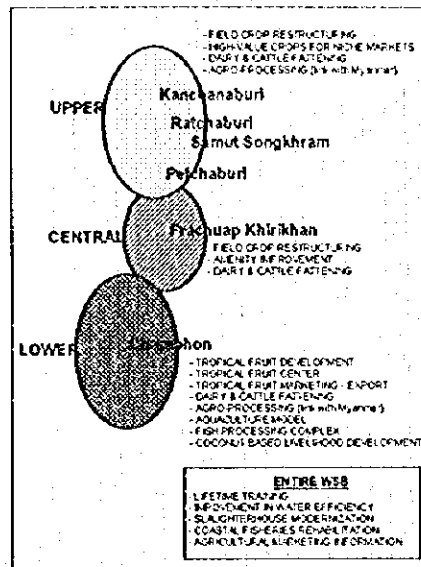
² Refer to Volume 1, Section 3.4



(4) Zoning by Sector

The Upper WSB is located relatively close to the BMA. The cultivable land is widely covered by the Greater Mae Klong irrigation scheme and water is available for year-round farming. Agriculture in the Upper WSB will be restructured so that high-value crops are cultivated for niche markets in the BMA and for export. For industrial development, the Upper WSB is characterized as an "industrial junction zone" linking the WSB with the BMA and other regions. It will receive industrial spillover from the BMA.

The Central WSB has favorable amenities, and tourism sites have already been developed (i.e., Cha Am and Hua Hin). This zone has less fertile soils and agricultural potential is rather limited. Manufacturing industry will not be actively promoted in the Central WSB, except for "knowledge-based industry" for research and development.



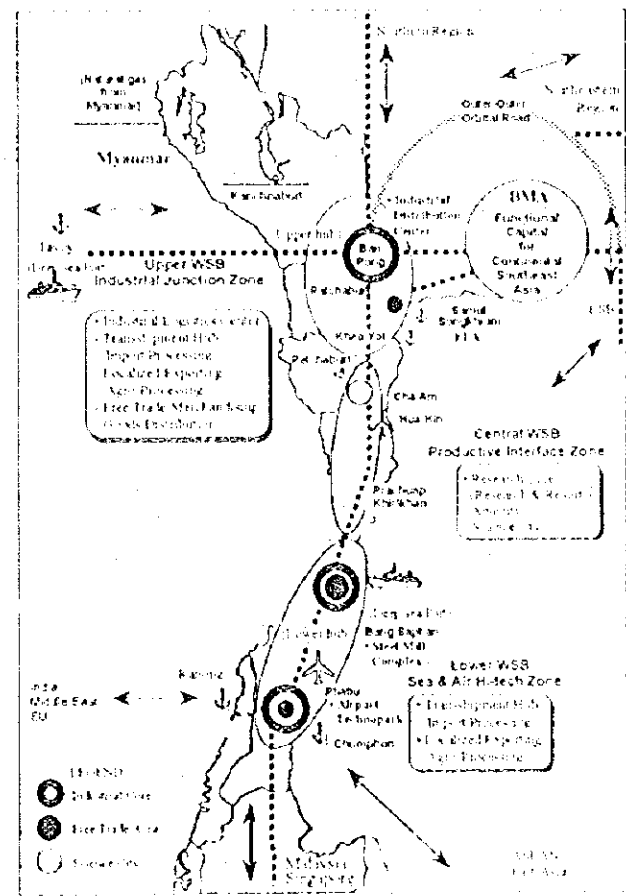
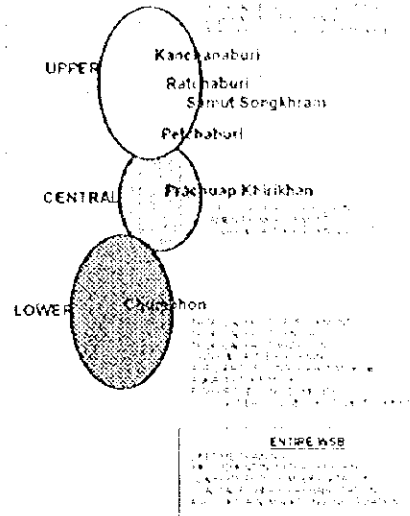
The Lower WSB has better agro-climate and soils, particularly for cultivation of tropical fruit and tree crops. It is expected that the Lower WSB would become a "fruit country".

In the northern part of the Lower WSB, the Bang Saphan area is being developed. This area would be further developed as a core for industrial development in the WSB. Another industrial core is expected to develop at Pathu where a regional airport is under construction.

(4) Zoning by Sector

The Upper WSB is located relatively close to the BMA. The cultivable land is widely covered by the Greater Mae Klong irrigation scheme and water is available for year-round farming. Agriculture in the Upper WSB will be restructured so that high-value crops are cultivated for niche markets in the BMA and for export. For industrial development, the Upper WSB is characterized as an "industrial junction zone" linking the WSB with the BMA and other regions. It will receive industrial spillover from the BMA.

The Central WSB has favorable amenities, and tourism sites have already been developed (i.e., Cha Am and Hua Hin). This zone has less fertile soils and agricultural potential is rather limited. Manufacturing industry will not be actively promoted in the Central WSB, except for "knowledge-based industry" for research and development.



The Lower WSB has better agro-climate and soils, particularly for cultivation of tropical fruit and tree crops. It is expected that the Lower WSB would become a "fruit country".

In the northern part of the Lower WSB, the Bang Saphan area is being developed. This area would be further developed as a core for industrial development in the WSB. Another industrial core is expected to develop at Pathiu where a regional airport is under construction.

3.4 Land Use Framework

Current land use in the Study Area has been mapped out through remote sensing of satellite images and a GIS. The hectareage of current land use is summarized as tabulated below.¹

Current Land Use

	Area (1,000 ha)	Share (%)
Designated Forest area	1,116	41.7
Paddy	185	6.9
Upland crops	1,032	38.6
Fruit and tree crops	264	9.9
Others	77	2.9
Total	2,674	100.0

Land for agricultural use accounts for nearly 55 per cent of the Study Area or about 1.4 million ha. The grassland has been sharply reduced to a minimum level, and the current land use map makes it clear that the expansion of land for cultivation is no longer viable.

A land use plan in the WSB region has been prepared, referring to the land use policy guidelines and the general objectives of the WSB regional development plan.² Major criteria proposed for the land use plan are summarized below.

Planned Land Use

	Area (1,000 ha)	Share (%)
Forest conservation	931	34.8
Forest plantation	139	5.2
Irrigated paddy	149	5.6
Intensive upland crops	480	18.0
Fruit and tree crops	402	15.0
Multi-story farming	335	12.5
Others	238	8.9
Total	2,674	100.0

- (i) The existing forest area shall be protected.
- (ii) The area suitable for upland crops or rainfed paddy shall be used as much as possible for intensive upland crop cultivation.
- (iii) The area suitable for fruit and tree crops shall continue to be used for fruit and tree crops except for the existing sugar cane area which is to be converted to intensive upland crops.

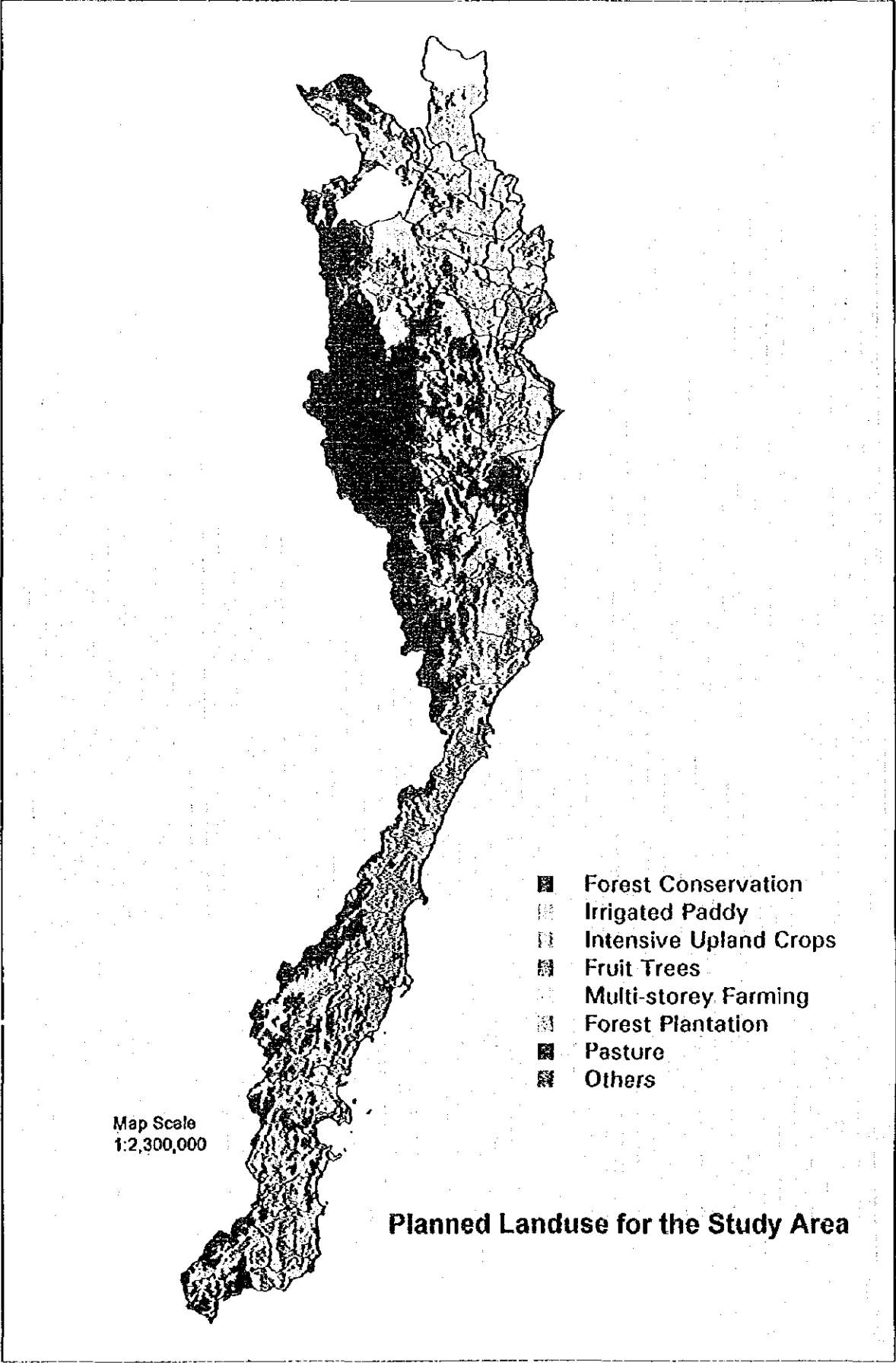
Land requirements for urban and industrial use have been separately estimated by zone, as tabulated herein.

Urban/ Industrial Land Use in 2011

	Urban Use (ha)	Industrial (ha)
Upper WSB	4,960	1,200
Central WSB	1,380	300
Lower WSB	2,980	1,400
Total	9,320	2,900

¹ Refer to Volume 1, Section 3.5 and Volume 4, Chapter 2

² Refer to Volume 1, Section 3.5 and Volume 4, Chapter 3



4

DEVELOPMENT SCENARIO WITH PHASING

The WSB regional development plan has been programmed for realization in steps, as the resource base and financial capacity expand and as related institutional development takes place over time. The programming period has been broadly divided into three phases: Phase I up to 2001 (the end of the 8th Plan), Phase II for 2002-2006 (the 9th Plan period), and Phase III for 2007-2011 (the 10th Plan period).

Characteristics of each phase by the major economic sector is summarized below.¹

	Phase I (1997 - 2001)	Phase II (2002 - 2006)	Phase III (2007 - 2011)
AGRICULTURE			
Structure	Restructuring	Accelerated Restructuring	Sustainable Growth
Resources	Improved Efficiency	Optimization	Sustainable Use
Management	Agriculture	Advanced Agriculture	Agriculture and Off-farm Activities
GRAP (Billion Baht)	1994 27.2	GRAP 31.3	38.5 44.3
Productivity (Thousand Baht per worker)	33	50	73 97
INDUSTRY			
Stage	Segmentation (Localization)	Core Formation (Globalization)	Regional Integration (Glocalization)
Pattern	Pirpoint development	Area development	Network development
Governance	Partnership promotion	Decentralization	Further decentralization
GRMP (Billion Baht)	1994 32.56	GRMP 81.96	130.86 208.54
Productivity (Thousand Baht per worker)	138 1994	220	297 390

¹ Refer to Volume 1, Section 8.5

During Phase I, pinpoint development will continue at several development centers in the WSB, including ongoing industrial development at Bang Saphan and electric power development at Ratchaburi. In parallel, area development in the Upper, Central, and Lower WSB will be facilitated through implementation of "Development Initiatives" proposed in this Master Plan. At the same time, linkages within the region and with other regions, as well as linkages among the economic sectors and linkages between rural and urban areas will be formulated. Partnership between the public and private sectors and between the government and non-government organizations will also be promoted during Phase I.

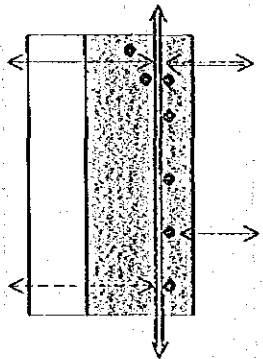
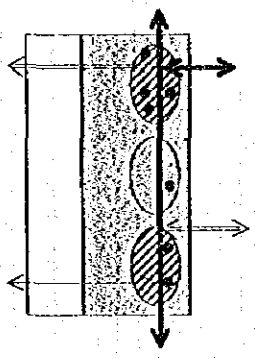
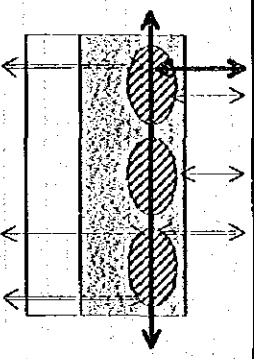
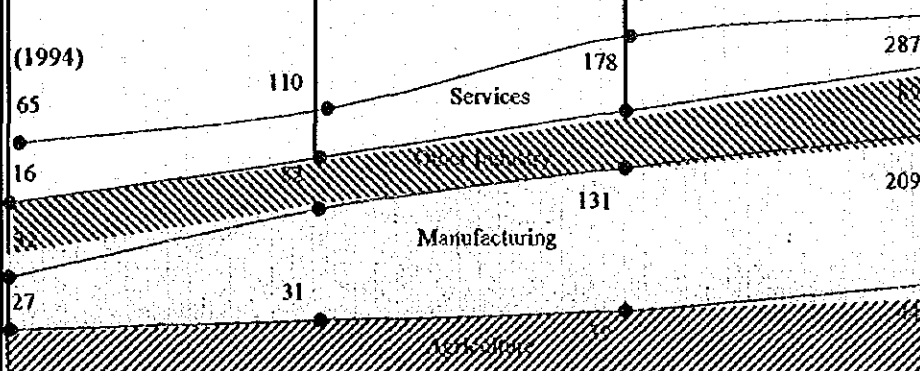
A high growth is expected in industry (14.0 per cent per annum) with investments in the Bang Saphan and Ratchaburi areas, along with a steady growth in agriculture (2.0 per cent) and services (8.0 per cent).

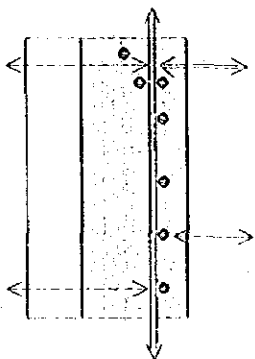
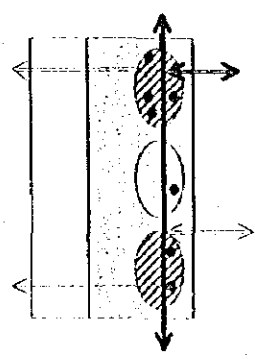
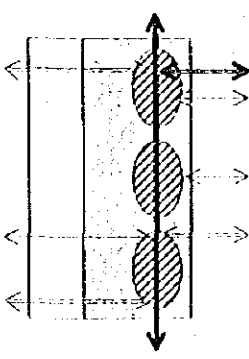
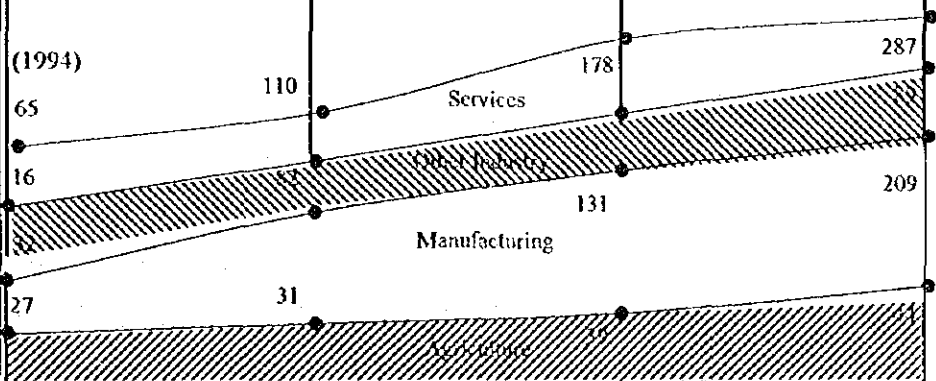
During Phase II, area development will be carried out in the Upper, Central, and Lower WSB, together with expansion of the development area around the core development centers. Area-wise and sector-wise linkages, as well as public-private partnerships, will be further promoted during Phase II. Decentralization will also be promoted strategically with a stronger commitment.

Overall high growth is expected in agriculture (2.5 per cent), industry (10.0 per cent), and services (10.0 per cent) during Phase II.

During Phase III, area development should lead to network development, particularly in the Upper and Lower WSB. Linkages within the region and linkages among regions and subregions will be consolidated in line with decentralization to be further promoted during this period. The free trade regime under the AFTA and WTO agreements will be diffused into each region and each sector, and the WSB region is expected to make use of such a regime in promoting overall regional development.

Sustainable growth is to be attained during Phase III, and it is expected that the average per capita GDP in the WSB region will reach the national average by 2011.

	Phase I (1997 - 2001)	Phase II (2002 - 2006)	Phase III (2007 - 2011)																									
POLICIES																												
Pattern	Pinpoint development and preparation for area development	Area development	Network development																									
Linkages	Formation of linkages	Promotion of linkages	Consolidation of linkages																									
Governance	Partnership promotion	Decentralization promotion	Further decentralization																									
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GRP (Billion Baht)	 <table border="1"> <caption>GRP Components (Billion Baht)</caption> <thead> <tr> <th>Year</th> <th>Agriculture</th> <th>Manufacturing</th> <th>Services</th> <th>Total GRP</th> </tr> </thead> <tbody> <tr> <td>1994</td> <td>22</td> <td>16</td> <td>27</td> <td>65</td> </tr> <tr> <td>2001</td> <td>2</td> <td>31</td> <td>77</td> <td>110</td> </tr> <tr> <td>2006</td> <td>2</td> <td>131</td> <td>45</td> <td>178</td> </tr> <tr> <td>2011</td> <td>11</td> <td>209</td> <td>67</td> <td>287</td> </tr> </tbody> </table>			Year	Agriculture	Manufacturing	Services	Total GRP	1994	22	16	27	65	2001	2	31	77	110	2006	2	131	45	178	2011	11	209	67	287
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GROWTH	Partly Rapid Growth (Agriculture 2.0%) (Industry 14.0%) (Services 8.0%)	Overall High Growth (2.5%) (10.0%) (10.0%)	Sustainable Growth (3.0%) (8.5%) (10.0%)																									
INVESTMENT (Indicative)	\$3,500 million	\$5,000 million	\$4,000 million																									
EVENT (Free Trade Regime)		↑ AFTA	↑ WTO																									

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2011	13	29	209	287																								
GROWTH	Partly Rapid Growth (Agriculture 2.0%) (Industry 14.0%) (Services 8.0%)	Overall High Growth (2.5%) (10.0%) (10.0%)	Sustainable Growth (3.0%) (8.5%) (10.0%)																									
INVESTMENT (Indicative)	\$3,500 million	\$5,000 million	\$4,000 million																									
EVENT (Free Trade Regime)		↑ [AFTA]	↑ [WTO]																									

5**SOCIAL, RURAL, AND URBAN DEVELOPMENT**

5.1 Social Development

Social development in the WSB region will be attained not only through improvement of social services but also by means of economic development. A holistic approach has been adopted for social and human development to minimize social and environmental costs and maximize social benefits. Several strategies have been proposed for social development of the WSB region, including:

- (1) Social development should keep pace with economic development, since job and wage opportunities largely determine the social structure and low incomes are at the root of most social problem.
- (2) A holistic approach is adopted to ensure that opportunities will be available for all the interrelated activities contributing to social and human development.
- (3) Active private sector involvement is expected in providing social services.
- (4) Local participation and decentralization should be promoted and the local governance system should be improved.

Several development programs have been formulated and proposed for implementation in the social, education, and public health subsectors.¹

5.2 Rural Development

The WSB region is predominantly rural with a limited number of urban centers that are all relatively small. The rural population accounted for 69 per cent of the regional total in 1995. Rural development of the WSB will aim at solving social problems in dominant rural areas through a focused approach. Considering the extensive area of the region, problem areas have been broadly identified representing typical problem complexes found in the region. Pilot projects have been proposed, one for each typical problem complex so that they may be replicated in other areas with similar problem complexes.² Pilot projects will be implemented in:

- (1) Five problem amphoes in Kanchanaburi, Petchaburi, Prachuap Khirikhan, and Chumphon provinces.
- (2) Two amphoes facing emerging economic opportunities in Kanchanaburi and Chumphon provinces.

¹ Refer to Volume 1, Chapter 4 and Volume 2

² Refer to Volume 1, Section 5.1 and Volume 5, Chapter 1

5.3 Urban Development

Urbanization in the WSB region has not been remarkable, but is steadily progressing. With the proposed industrialization, a share of urban population (in municipalities and sanitary districts) is forecast to increase from 31 per cent in 1995 to 50 per cent of the total population of the WSB in 2011.

Projected Urban Population

	(Thousands; %)			
	1995	2001	2006	2011
WSB Regional Population	3,091	3,060	3,234	3,433
Urban Population	949	1,200	1,400	1,725
Share of Urban Population	30.7%	39.2%	43.3%	50.2%

A program approach, rather than a project approach, is proposed for urban development in the WSB, as the scale of urban facilities is relatively small. At the same time, some core urban centers will be networked under combined efforts in urban development and economic sector development. Likewise, it has been proposed to improve urban facilities in local urban centers.

Several urban development programs have been put forward, including urban cluster development in the Upper WSB, urban social infrastructure and amenity development programs, and development of specific cities as a science city, industrial city, and trade/merchandise city.¹

¹ Refer to Volume 1, Section 5.2 and Volume 5, Chapter 2

6 SECTOR PROJECTS/PROGRAMS

6.1 Agriculture

To attain the development target in the agriculture sector (an average annual growth rate of 2.4 per cent in 1997-2011), restructuring programs will be implemented more strategically in the WSB region. Strategies proposed for agricultural restructuring will include:

- (1) Improvement of efficiency/productivity rather than expansion of areas;
- (2) Application of more optimum land use, including a shift to cultivation of high value crops;
- (3) Application of free trade regime in the agriculture sector; and
- (4) Strengthening of research/extension services and development of human resources.

A dozen projects/programs have been proposed for implementation in the agriculture, livestock, and agricultural marketing subsectors.¹

6.2 Fisheries

Since the WSB region has a coastline of about 560 km along the Gulf of Thailand, the fisheries subsector is an important component of the regional development plan. Due to overfishing and resultant depletion of marine resources in the Gulf, combined with ocean enclosure under the UN Law of the Sea Convention, the fisheries subsector is at a turning point at present. Restructuring is also required for fisheries development in the WSB.²

Three fisheries development programs are proposed; i.e., (i) rehabilitation of coastal resources for small-scale fisheries, which aims at formulating a model for coastal fisheries rehabilitation; (ii) an aquaculture model for environmentally sustainable aquaculture (particularly shrimp farming); and (iii) a fish processing industrial complex in the Lower WSB.

¹ Refer to Volume 1, Section 6.1 and Volume 6, Chapter 1

² Refer to Volume 1, Section 6.2 and Volume 6, Chapter 2

6.3 Industry

The industrial sector, particularly the manufacturing sector, is expected to play a leading role in the WSB regional development plan (a target growth rate over 11.2 per cent is forecast during the plan period). The location of prospective industries in the WSB has been planned and evaluated by category of industries. As shown in the table, high growth is expected in basic metal and fabricated metal/machinery, as well as in the chemical industry. To attain such a high growth rate, several projects/programs have been formulated, together with a dozen subprograms.¹

Value Added in Manufacturing
(Million Baht, %)

Industrial Classification	1994	2011			Growth Rate	
		Exsting	New	Total	Exsting	Total
31. Food, beverage, tobacco	14,837	34,007	22,592	56,599	5.0	8.2
32. Textile, apparel, leather	3,509	10,210	5,287	15,497	6.5	9.1
33. Wood, wood products	735	1,386	2,594	3,980	3.8	10.4
34. Paper, printing, publishing	5,692	16,663	3,078	19,741	6.5	7.6
35. Chemicals, rubber, plastic	988	4,703	5,574	10,277	9.6	14.8
36. Non-metallic	2,923	9,232	5,419	14,651	7.0	9.9
37. Basic metal	279	3,000	44,816	47,816	15.0	35.3
38. Fabricated metal, machinery	361	1,117	26,983	28,100	6.9	29.2
39. Others	3,123	8,014	3,860	11,874	5.7	8.2
Total	32,451	88,332	120,203	208,535	6.1	11.6

6.4 Tourism

The WSB has a number of tourism centers and spots, and tourists to the region numbered over 2.6 million in 1994. The total number of tourists to the WSB will double by 2011. To attract an increased number of tourists, several programs are proposed, including a zone-wise development program, an amenity preservation program, tourism-related infrastructure improvement, lodging facility upgrading, and information services promotion.²

6.5 Services

The trade subsector is most significant in development of the service sector in the WSB, and trade-related improvement programs are proposed in association with the agricultural and industrial sector programs. Introduction of free trade areas (FTAs) and distribution centers are proposed in relation to the proposed industrial development plans.

¹ Refer to Volume 1, Section 6.3 and Volume 7

² Refer to Volume 1, Section 6.4 and Volume 8

7**RESOURCES MANAGEMENT AND INFRASTRUCTURE**

7.1 Resources Management and the Environment

The environment in the WSB region has been relatively well maintained, but soils and water are being degraded. With accelerated urbanization and industrialization contemplated in the WSB, utmost care should be taken to assure environment-friendly regional development during the plan period. In this context, several projects/programs have been proposed, including promotion of organic farming, reforestation, waste water treatment, solid waste management, an environmental research/training center, and promotion of environmental advocacy.¹

7.2 Water Resources

Water resources are relatively abundant in the Upper and Lower WSB, but they are not utilized effectively and efficiently in these subregions. On the other hand, water resources are scarce in the Central WSB, and a critical water shortage is envisaged by 2011. Based on an assessment of current and future water demand and the supply situation in each subregion, more effective and efficient utilization of available water is proposed. Further development of multipurpose reservoirs is also proposed in the Upper, Central, and Lower WSB for flood control, industrial and municipal water supply, and expansion of the irrigated area. Measures for flood control and salinity control are also proposed for further study.²

7.3 Energy and Power

The WSB region is expected to assume a role as a power supply center for the whole Kingdom, with the existing hydropower (total installed capacity of 1,036 MW) and the planned thermal power stations (5,300 MW by 2001 and additional 4,100 MW by 2006). The power supply in each province is networked to the national grid. Proposed programs for further development in the WSB region will include demand side management, as well as dissemination of an energy saving cooking stove and energy substitution for ceramic and lime industries, which are using fuelwoods at present.³

¹ Refer to Volume 1, Section 7.1 and Volume 9, Chapter 1

² Refer to Volume 1, Section 7.2 and Volume 9, Chapter 2

³ Refer to Volume 1, Section 7.3 and Volume 9, Chapter 3

7.4 Telecommunications

Though telecommunications system in the WSB have been improved in recent years, the number of telephone lines in the region is only 3.4 lines per 100 population. Compared with the BMA (35 lines per 100 persons), the current level is quite low in the WSB. It is expected that the telecommunications master plan will be implemented as programmed with more emphasis on line expansion in rural areas. Additionally, some programs have been proposed for application of information technologies in education, medical care, agriculture, and tourism promotion.¹

7.5 Transportation

Further development of transportation by road, railway, water, and by air is indispensable to satisfy the high growth of traffic demand associated with the rapid industrialization and urbanization envisaged for the WSB region. A better transportation network is also required to strategically attain regional prosperity through promotion of linkages and partnership.

Thirty-eight projects/programs have been identified and proposed for implementation in the transportation sector to promote socially-oriented regional development and to support agriculture, industry, and trade sector development in the WSB region.²

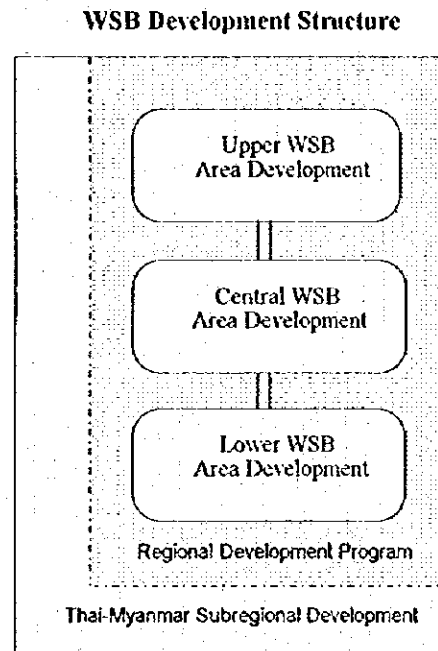
¹ Refer to Volume 1, Section 7.4 and Volume 9, Chapter 4

² Refer to Volume 1, Section 7.5 and Volume 9, Chapter 5

8 REGIONAL DEVELOPMENT STRUCTURE

8.1 Regional Development Structure

The WSB regional development plan has been formulated by integrating the sectoral development plans within frameworks for balanced regional development. The sectoral development plans are classified into: (i) regional projects/programs which cover the whole WSB region; (ii) area development projects/programs which are directed to specific areas, and (iii) subregional projects which will promote subregional cooperation between the WSB region and Myanmar. The WSB regional development plan is also structured by development arteries running north to south and east to west through the WSB region. The structure of the regional development plan is illustrated in the figure to the right.¹



8.2 Regional Projects/Programs

A total of 38 projects/programs which cover the whole WSB region have been proposed for implementation in respective sectors. The total investment in these projects/programs will amount to about \$2,400 million (60 billion Baht) during the plan period (15 years), or about \$160 million (4 billion Baht) a year on an average. Attention has been paid to the high-priority implementation of socially-oriented and human-centered development programs.²

¹ Refer to Volume 1, Section 8.1

² Refer to Volume 1, Section 8.2

8.3 Area Development Projects/Programs

Projects/programs to be directed to specific areas have been planned so that they can be implemented in an integrated form as far as possible.¹

- Upper WSB Area: 25 projects/programs are proposed with a total amount of investment estimated at about \$2,800 million (70 billion Baht) in 15 years
- Central WSB Area: 19 projects/programs are identified and proposed with a total amount of investment estimated at about \$2,600 million (65 billion Baht)
- Lower WSB Area: 25 projects/programs are proposed with a total amount of investment estimated at about \$1,200 million (30 billion Baht)

8.4 Subregional Projects/Programs

Since a multiple access model is applied for regional planning and since all provinces, except for Samut Songkhram, border on Myanmar, promotion of subregional cooperation with Myanmar side of the Isthmus plays a significant role in the WSB regional development plan. This role will include, but not be limited to: (i) improving access to and from the WSB; (ii) increasing trade through such access; (iii) exchanging resources and basic information; (iv) disseminating traditional and modern technologies; and (v) conserving the environment for mutual benefits.²

Several subregional cooperation projects/programs are proposed, including development of a Kanchanaburi-Tavoy corridor in the Upper WSB.

¹ Refer to Volume I, Section 8.3

² Refer to Volume I, Section 8.4

9 PRIORITY PROJECTS/PROGRAMS

9.1 Projects/Programs to be Considered under the 8th Plan

Based on the proposed development phasing for balanced regional development, 80 projects/programs have been identified as recommendable for incorporation into the 8th Plan for full-scale implementation or at least for execution of initial preparatory works. Investments in these projects/programs will require about \$3,500 million (87.5 billion Baht).¹

Investment in Projects Identified through This Study

Phase	Plan (Period)	Investment Amount	
		(\$ million)	(Billion Baht)
Phase I	8th Plan (1997-2001)	3,500	(87.5)
Phase II	9th Plan (2002-2006)	5,000	(125.0)
Phase III	10th Plan (2007-2011)	4,000	(100.0)

Investment in socially-oriented and human-centered projects/programs are not necessarily limited to investment in the social, education, and public health sectors, but are earmarked for other sectors, such as the rural/urban, agriculture, industry, environment, energy, and transportation sectors. For Phase I, the aggregate amount of investment in social and human oriented projects and in the environment will represent over 20 per cent of total investment during this period.

The macroeconomic scenario for moderate growth, assuming an incremental capital/output ratio (ICOR) of about 4, entails total capital requirements amounting to \$15,400 million (385 billion Baht) during Phase I. Accordingly, the estimated cost of projects/programs proposed for Phase I would amount to about 22 per cent of expected investment requirements. If the private sector estimate for participation is assumed to be about 30 per cent of the project/program cost, the public sector investment component would amount to about \$2,400 million (60 billion Baht) over five years, or about 12 billion Baht annually.

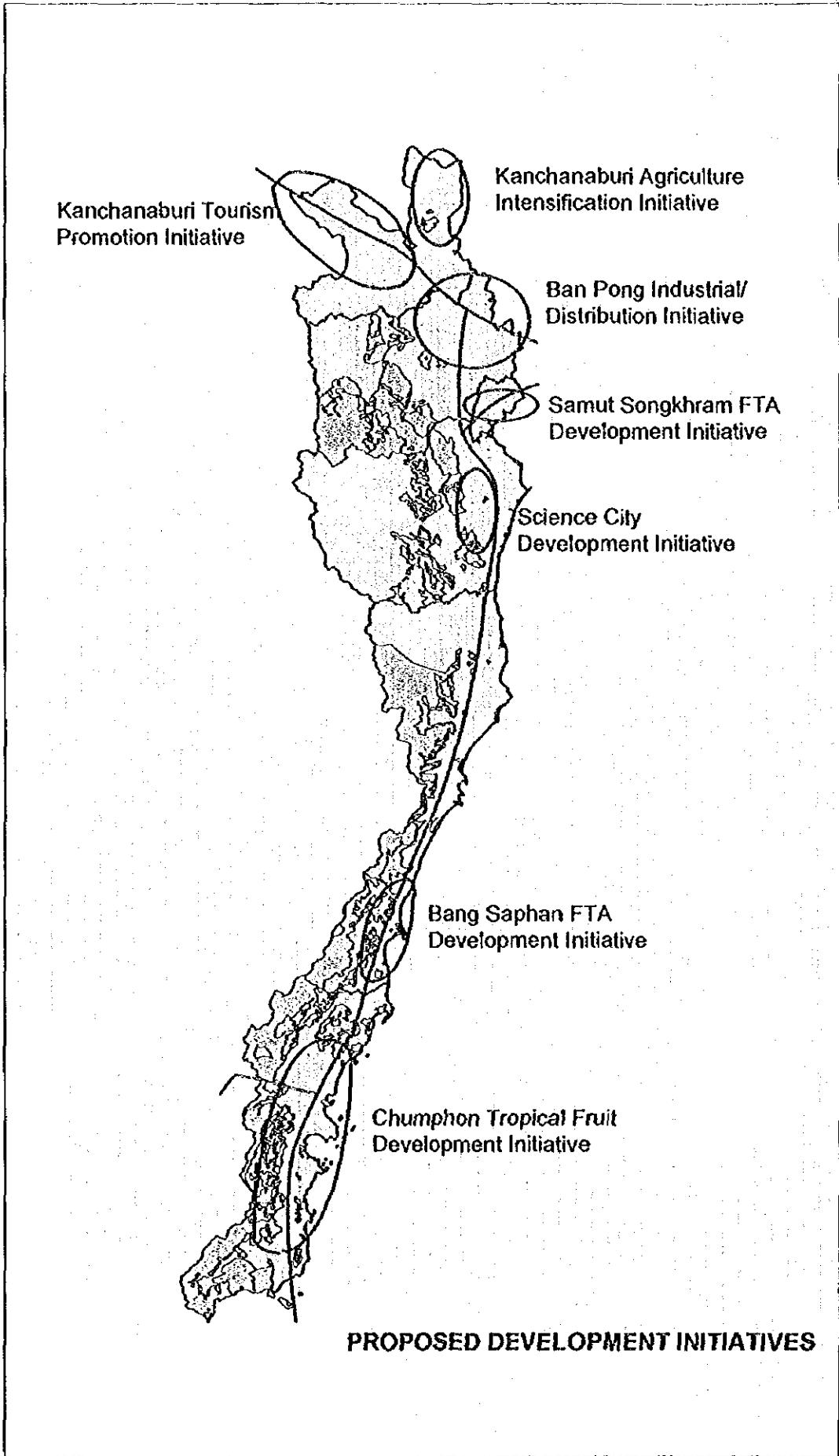
¹ Refer to Volume 1, Section 9.1

9.2 Development Initiatives

A number of projects/programs proposed for area development can be integrated and jointly promoted for implementation as "Development Initiatives". Seven development initiatives are recommended for implementation during the 8th Plan period; these development initiatives are listed below.¹

- (1) **Kanchanaburi Tourism Promotion Initiative**
Since the Kanchanaburi area offers an excellent environment for eco-tourism, it is proposed to improve existing facilities and enhance amenities in this area.
- (2) **Kanchanaburi Agricultural Intensification Initiative**
An irrigated area of the Greater Mae Klong irrigation scheme will be selected (in Phanom Thuan district) as a model for agricultural intensification, including programs for crop restructuring and production of high value crops.
- (3) **Ban Pong Industrial/Distribution Development Initiative**
Since the Upper WSB is expected to function as an "industrial logistic center", it is proposed to develop an industrial/distribution center in Ban Pong. The center will incorporate an industrial estate, a distribution center, a truck terminal, an inland clearance depot, and an R&D-testing center.
- (4) **Samut Songkhram Free Trade Area Development Initiative**
Part of the abandoned shrimp fields in Samut Songkhram province will be developed as a free trade area (FTA) to serve as industrial estate, warehousing, exhibition, merchandising, and business/financial activities. It is proposed that this FTA is completed before the AFTA agreement comes into full force.
- (5) **Science City Development Initiative**
A science city is proposed to be set up in Petchaburi province as a "center of excellence". It is expected that existing laboratories and R&D institutes be relocated to the new science city.
- (6) **Bang Saphan Free Trade Area Development Initiative**
Bang Saphan deep-sea port, a steel complex, and an industrial estate will be integrated and developed as the Bang Saphan FTA.
- (7) **Chumphon Tropical Fruit Development Initiative**
Chumphon province is developed as a "fruit country" by extending a line of credit and marketing support, as well as by establishing a tropical fruit research center, for the production and marketing of tropical fruit of the region.

¹ Refer to Volume 1, Section 9.2



Investment in the proposed seven development initiatives has been preliminarily estimated as tabulated below.

Budget for Development Initiatives

Initiative	Phase I	Phase II	Phase III
1) Kanchanaburi Tourism Promotion	14 (8)	19 (8)	10 (8)
2) Kanchanaburi Agricultural Intensification	15 (5)	- (-)	- (-)
3) Ban Pong Industrial/Distribution	1 (-)	268 (190)	- (-)
4) Samut Songkhram FTA	600 (450)	200 (150)	- (-)
5) Petchaburi Science City	640 (430)	1,064 (760)	540 (450)
6) Bang Saphan FTA	155 (115)	130 (100)	180 (112)
7) Chumphon Tropical Fruit	75 (62)	119 (112)	- (-)
Total	1,500 (1,070)	1,800 (1,320)	730 (570)

Note: Figures in () indicate the amount of investment by the private sector

It is worth noting that the Kanchanaburi - Tavoy corridor development plan proposed as a Thai-Myanmar subregional cooperation program could also be counted as one of the development initiatives to be implemented in Phase I.

10 INSTITUTIONAL ARRANGEMENTS AND RECOMMENDED ACTIONS

10.1 Institutional Arrangements

The management system for development of the WSB region should be established capitalizing as much as possible on the existing development administration and introducing some modifications and new elements. As early reforms, the incorporation of tambon councils into local administrations may be accelerated and more TAOs established. At the provincial level, the annual plan of each province may be compiled by the Provincial Office. At the central level, the WSB Development Committee should be supported by a permanent management office.

For the management of the WSB regional development plan, three alternative systems have been evaluated. As the most realistic system at least in the immediate future, a hybrid model combining a Project Management Unit (PMU) as the government entity and a development corporation with private sector contribution is recommended. The PMU may be called the WSB Development Management Office, and the development corporation may be called the WSB Development Corporation.¹

10.2 Recommended Actions

As a result of this Study, a number of proposals have been presented for regional development of the WSB and various recommendations have been put forward. To ensure effective and efficient execution of the proposed WSB regional development plan, it is expected that the recommended measures will be implemented by the responsible agencies and institutions. Recommendations to 50 agencies and institutions concerned with the WSB regional development plan are presented in Volume I (Main Report), Chapter 11.

¹ Refer to Volume 1, Chapter 10 and Volume 10

**Annex: Proposed Projects/Programs and
Indicative Investment Schedule**

(\$ Million)					
No.	Project/Program	Agency	Phase-I	Phase-II	Phase-III
	[Social]		<u>4</u>	<u>2</u>	<u>2</u>
SS1	Social Monitoring and Evaluation	NESDB	1	2	2
SS2	Local Governance System Improvement	MOI	2		
SS3	Social Partnership Promotion	MOI, BOI	1		
	[Education]		<u>13</u>	<u>25</u>	
ED1	Experimental Schools and Curriculum Revision	MOE	1	10	
ED2	High-technology Universities	MOUA	5	10	
ED3	Industry-based Training Center	MOL	5		
ED4	Computer Availability Expansion	MOE	2	5	
	[Health]		<u>30</u>	<u>7</u>	<u>4</u>
PH1	Medical Research Laboratory with Hospital	MOPH	20		
PH2	Regional Occupational Health Center	MOPH, MOL	2	4	4
PH3	Emergency Medical Service Upgrading	MOPH, PHO	2	3	
PH4	Integrated HIV/AIDS Control	MOPH, PHO	5		
PH5	Health Promotion Upgrading	MOPH, PHO	1		
	[Rural/Urban]		<u>678</u>	<u>1,149</u>	<u>645</u>
RD1	Rural Development Models	NRDC, ARD	30	80	100
UD1	Upper WSB Urban Cluster	DTCP	5	2	
UD2	Specific City Plans	NESDB, etc.	640	1,064	540
UD3	Urban Social Infrastructure	Local	1.5		
UD4	Urban Amenity Improvement	Local	1	3	5
UD5	Institutional Strengthening	MOI	0.5		
	[Agriculture/Fisheries]		<u>232</u>	<u>266</u>	<u>110</u>
AG1	Field Crops Restructuring	MOAC, BAAC	20	20	40
AG2	High-value Crops for Niche Markets	MOAC, BAAC	30		
AG3	Tropical Fruit Improvement	MOAC, BAAC	62	114	
AG4	Tropical Fruit Center	MOAC	13	6	
AG5	Cattle Fattening	MOAC, BAAC	5	10	15
AG6	Dairy Production Promotion	MOAC, BAAC	5	10	10
AG7	Slaughterhouse Modernization	MOI, MOAC	10	13	
AG8	Agro-processing Promotion	MOAC, MOC	10	10	10
AG9	Water Application Efficiency Improvement	MOAC, RID	10	10	15
AG10	Coconut-based Livelihood	MOAC	5	10	10
AG11	Agricultural Marketing Information	MOAC, MOC	10	13	
AG12	Farmers' Lifetime Training	MOAC	10	10	10
AF1	Coastal Fisheries Rehabilitation	OEA, DOF	10	10	
AF2	Aquaculture Model	DOF	12		
AF3	Fish Processing Industrial Complex	DOF	20	30	
	[Industry]		<u>764</u>	<u>662</u>	<u>180</u>
ID1	Free Trade Areas (FTAs)	MOI, IEAT	753	342.5	180
ID2	Strategic Industrial Estates	MOI, IEAT	-	284	-
ID3	Rural-industrial Community Model	MOI	3.5	3.5	
ID4	Quality/Productivity Enhancement	MOI	6.5		
ID5	Industrial R&D Promotion	MOI	-	32	-
ID6	New Investment Promotion	MOI, BOI	0.5	-	-
	[Tourism]		<u>60</u>	<u>51</u>	<u>40</u>
TO1	Zone-wise Development	MOSIE, TAT	1	1	
TO2	Amenity Preservation Program	OEPP, TAT	6.5	3.5	
TO3	Tourism Related Infrastructure	DOH, etc.	10	6	
TO4	Lodging Facility Upgrading	BOI	40	40	40
TO5	Tourism Information Service Promotion	Local, TAT	2		

No.	Project/Program	Agency	Phase-I	Phase-II	Phase-III
	[Resource Management/Environment]		204	317	100
EV1	Organic Farming	DA, etc.	6	10	
EV2	Reforestation Program	RFD	3	32	
EV3	Domestic Waste Water Treatment	OEPP	96	160	100
EV4	Solid Waste Management	OEPP	96	35	
EV5	Environmental Research Center	DEQP	3	80	
	[Water Resources]		123	122	140
WR1	Irrigated Agriculture Intensification	RID	120	120	120
WR2	Improvement of Water Management	RID		1	20
WR3	Multipurpose Reservoir Development	RID	2		
WR4	Salinity Control	RID		1	
WR5	Flood Control and Drainage Improvement	RID	1		
	[Energy/Power/Telecom.]		37	283	7
EP1	Cooking Stove Dissemination	PDA	3		
EP2	Energy Substitution (Ceramic/Lime)	DEDP	5	5	
EP3	Demand Side Management	EGAT	1.5	2	2
EP4	Partially Insulated Cable Promotion	PFA	5	55	
EP5	Kra Hydropower	EGAT		200	
TL1	Telecommunications Expansion	TOT	20	20	5
TL2	Teleport Promotion	TOT/CAT	0.5		
TL3	Agricultural Information System	TOT	0.5		
TL4	Medical Information System	MOPH	0.5	1	
TL5	Tourism Information System	TAT	0.5		
TL6	Information Highway for Education	MOE, PTD	0.5		
	[Transport]		1,355	2,116	2,772
RP1	Industry-Supporting Roads	DOH	47	68	
RP2	Ratchaburi-Provincial Capital Links	DOH	0.5	20	40
RP3	Pathiu-Route 4 and Pathiu-Bang Saphan	DOH	15	70	
RP4	Scenic Coastal Road	DOH		20	20
RP5	Secondary/ Feeder Roads	DOH	240	240	240
RP6A	Urban Ring/Bypass Roads	DOH		25	25
RP6B	Urban Roads	Local	10	10	10
RP7	Rural Roads	PWD	25	25	25
RP8	Upgraded Road Maintenance	DOH	140	140	140
RP9	Outer-Outer Orbital Route	DOH	5	300	500
RP10	North-South Links	DOH	600	700	1,000
RP11	Chumpon-Ranong Links	DOH	1	100	50
RP12	Subregional Links with Myanmar	DOH	2	140	
RT1	Intercity and Rural Bus Transport	LTD	5	5	5
RT2	Truck Terminals	LTD		16	
RT3	Road Safety	HPD	5	5	5
WT1	Prachuap Deep-sea Port Extension	HD, IEAT	81	21	21
WT2	Chumphon Feeder Port	HD	1	25	
WT3	Ban Laem/Feeder Port	HD			10
WT4	Samut Songkhram Feeder Port	HD		10	
WT5	Gulf Navigation Promotion	HD	100	90	80
WT6	Mae Klong River Navigation	HD		30	
WT7	Hua Hin/Cha Am Tourist Pier	HD		2.5	
WT8	Tavoy/Dawei Deep-sea Port	(MPA)	1		
WT9	Ranong/Phangnga Port	HD		1	
RW1	Southern Line Railway Improvement	SRT	25	2	
RW2	Southern Line-Northern Line Link	SRT			500
RW3	Bangkok-Songkhram-Pak Tho Link	SRT			
RW4	Spur Lines to Industrial Estates	SRT			51
RW5	Freight Transport Improvement	SRT	50	50	50
RW6	Tourist Train to Hua Hin/Cha Am	SRT	-	-	-
RW7	Thai-Myanmar Railway	SRT	-	-	-
AT1	Marketing of Pathiu Airport	DOA	1	-	-
AT2	Hua Hin Airport Expansion	DOA	-	-	-
AT4	Subregional Air Linkages	DOA	-	-	-
	TOTAL		3,500	5,000	4,000

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