

# THE MASTER PLAN STUDY FOR THE DEVELOPMENT OF PHATTHAYA AREA

## *Final Report*

SUMMARY

JUNE 1990



JAPAN INTERNATIONAL COOPERATION AGENCY

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## ERRATA

Page	Line	Wrong	Correct
iii	12	-	ANNEX: STUDY TEAM
15	10	under detailed design or construction	under detail design, <u>construction or partially completed</u>
25	27	<u>game</u> fishing	<u>sports</u> fishing
36	14	Districution	Distribution
36	13, 18	<u>Existing</u> Dev.	<u>Under</u> Dev.
56	5	Touris	Tourist
79	Right bottom	Existing beach rood	Existing beach road
124	13	PCG Budged	PCG Budget
128	17	Concession	Concession <u>Right</u>

\* The Master Plan Study for the Development of Phatthaya Area, Final Report, Summary, June 1990.



**THE KINGDOM OF THAILAND**

**THE MASTER PLAN STUDY  
FOR  
THE DEVELOPMENT OF PHATTHAYA AREA**

**FINAL REPORT**

**SUMMARY**

**JUNE 1990**

**JAPAN INTERNATIONAL COOPERATION AGENCY**

国際協力事業団

21470

## PREFACE

In response to a request from the Government of the Kingdom of Thailand, the Japanese Government decided to conduct a master plan study for the Development of Phatthaya Area and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Kingdom of Thailand a survey team headed by Mr. Teruo Yoshimatsu, Nippon Koei Co., Ltd. composed of members from Nippon Koei Co., Ltd. and Yachiyo Engineering Co., Ltd., on several occasions between June 1989 and March 1990.

The team held discussions with concerned officials of the Government of the Kingdom of Thailand, and conducted field surveys. After the team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

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 team.

June, 1990



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Kensuke Yanagiya

President

Japan International Cooperation Agency





MASTER PLAN STUDY  
FOR  
THE DEVELOPMENT OF PHATTHAYA AREA

Mr. Kensuke Yanagiya  
President  
Japan International Cooperation Agency  
Tokyo, Japan

June 1990

Dear Sir,

Letter of Transmittal

We are pleased to submit herewith the Final Report for the Master Plan Study for the Development of Phatthaya Area. This Report proposes the development framework and integrated development plan toward 2006 for the sound and sustainable growth of the Area and for contributing to the national economy as an internationally well-reputed resort and the center of the Eastern Seaboard region.

The Report presents priority projects and their implementation plan as the solution to the prevailing problems in Phatthaya at present with the target year of 1996. The Report also presents legal, institutional and financial recommendations with a view to bringing the proposed integrated development plan and the priority projects into reality.

The Report comprises :

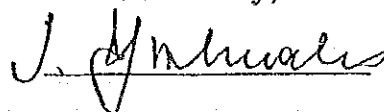
- Main Report (English)
- Summary Report (English)
- Summary Report (Japanese)

The Summary Report briefs the findings, plans and recommendations made in the Study. The Main Report contains full description of the Study results including findings, analyses, projections, plans and recommendations.

The Study Team would like to express sincere gratitude to the personnel of your Agency, Advisory Committee, Ministry of Foreign Affairs, Ministry of Construction, Ministry of Transport and Embassy of Japan to the Kingdom of Thailand, as well as Steering Committee and Working Group for the Study, Office of Eastern Seaboard Development Committee and other officials and personnel concerned, for their assistance.

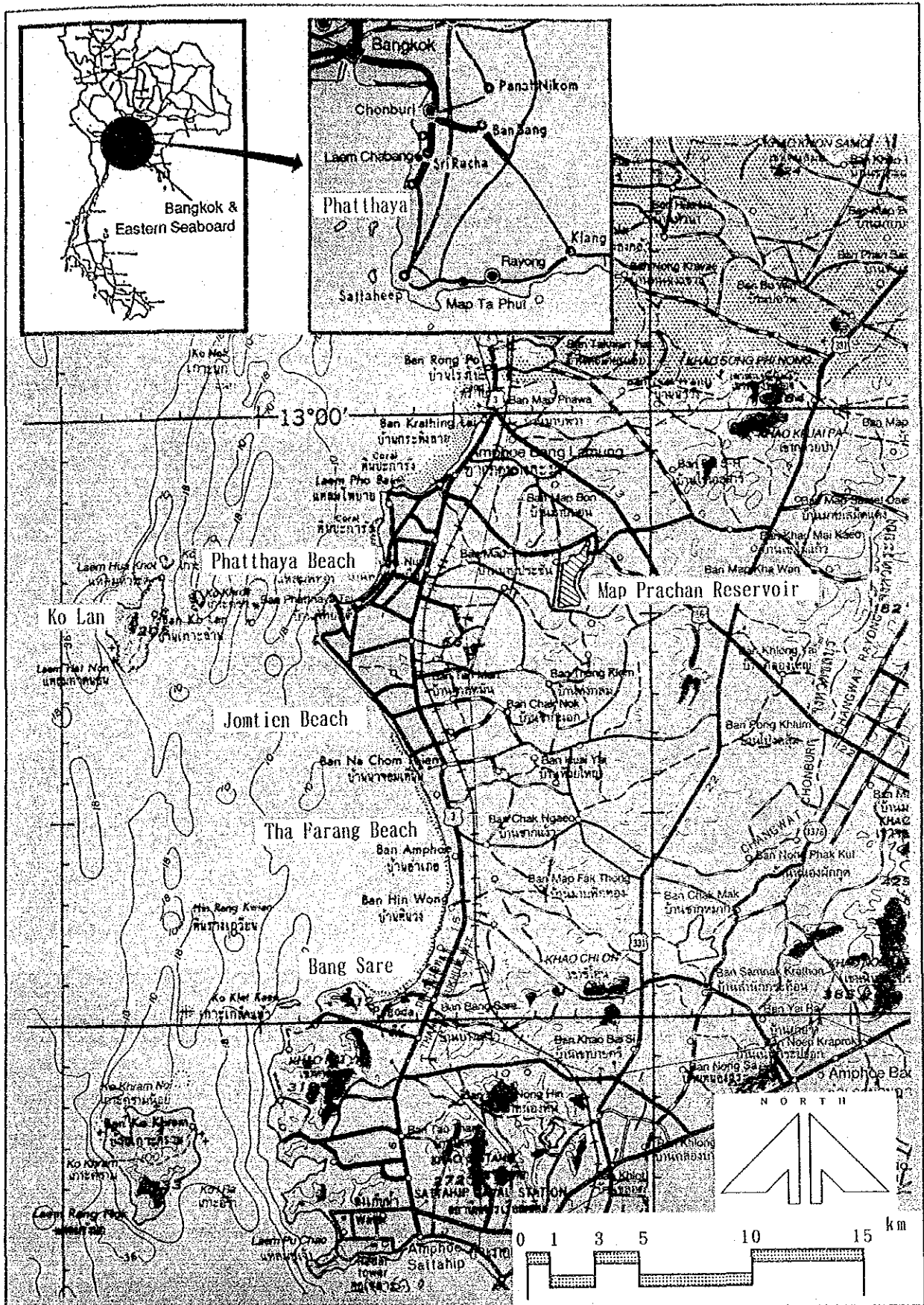
The Study Team sincerely hopes that the Study results will contribute to the development and public welfare of the Phatthaya Area as well as to the enhancement of the national economy of Thailand.

Yours sincerely,



Teruo YOSHIMATSU  
Team Leader





THE MASTER PLAN STUDY FOR  
THE DEVELOPMENT OF PHATHAYA AREA

Study Area

(Area covering Phathaya Municipality including Ko Lan  
and its southern coastal area down to Bang Sare)

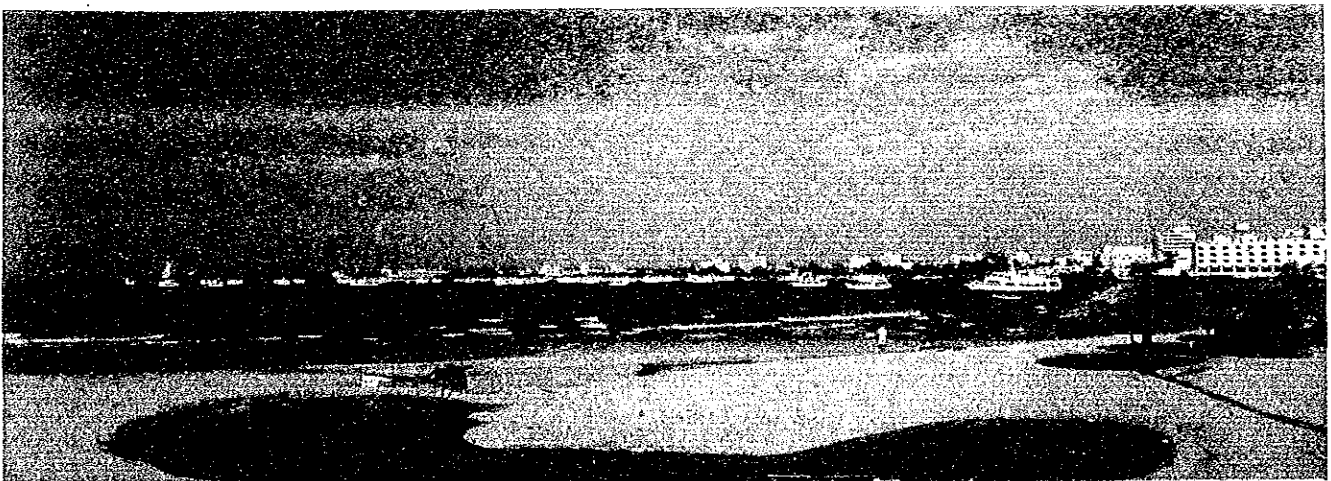




A View of Study Area (From Phatthaya hill)

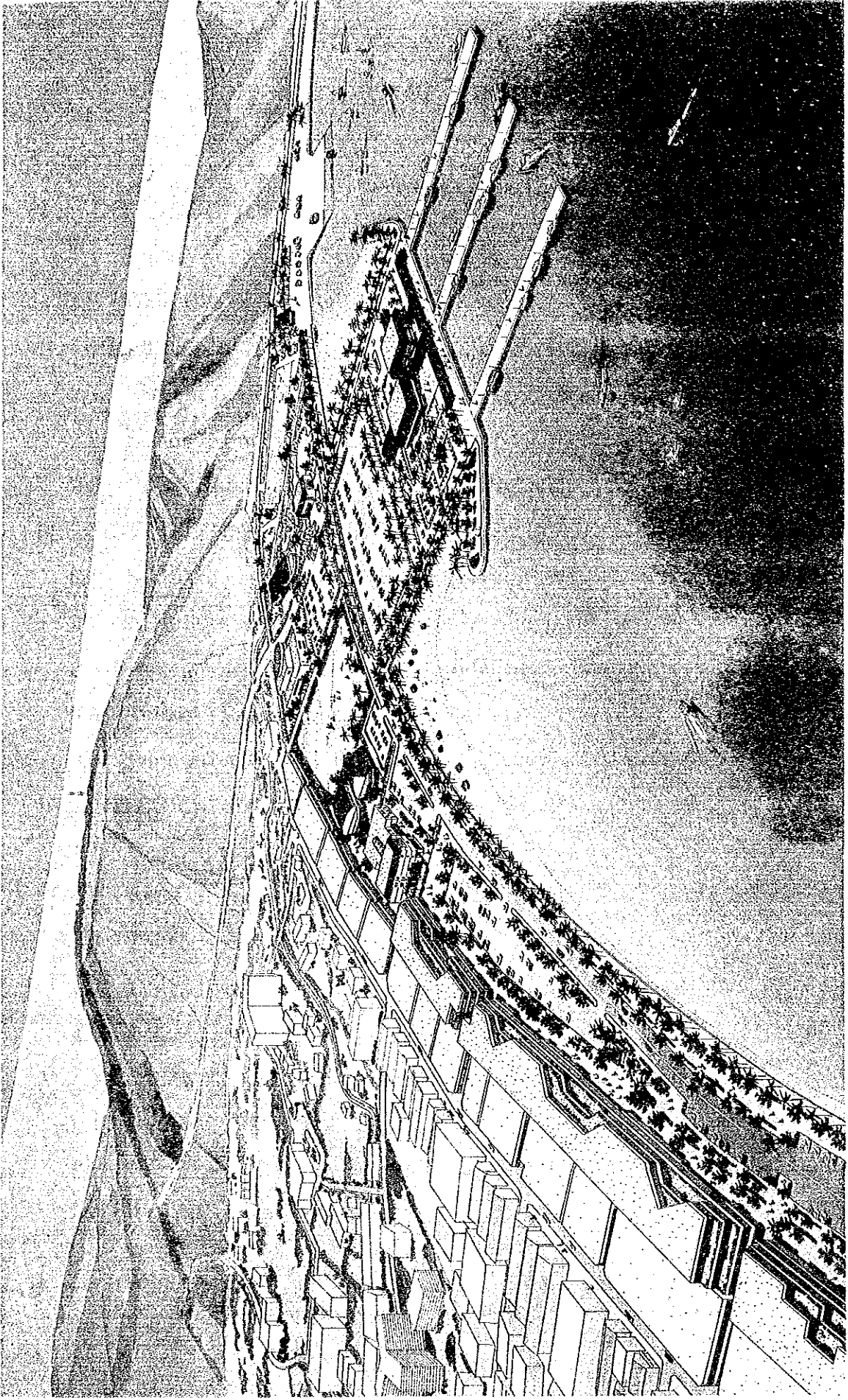


Phatthaya Beach



Water Contamination is serious in southern part of Phatthaya Beach





Development of South Phatthaya Land Reclamation





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## ABBREVIATIONS

### Governmental Offices and Agencies

CAT	:	Communication Authority of Thailand
DOH	:	Department of Highway
DOLA	:	Department of Local Administration
DTCP	:	Department of Town and Country Planning
EGAT	:	Electricity Generating Authority of Thailand
HOD/HD	:	Harbour Department
IEAT	:	Industrial Estate Authority of Thailand
LD	:	Land Department
MOAC	:	Ministry of Agriculture and Cooperatives
MOC	:	Ministry of Communications
MOF	:	Ministry of Finance
MOI/MOINT	:	Ministry of Interior
MOIND	:	Ministry of Industry
NEA	:	National Energy Administration
NEB	:	National Environmental Board
NESDB	:	National Economic and Social Development Board
NHA	:	National Housing Authority
OESB	:	Office of Eastern Seaboard
PCH/PCG	:	Phatthaya City Hall
PEA	:	Provincial Electricity Authority
PWA	:	Provincial Waterworks Authority
PWD	:	Public Work Department
RID	:	Royal Irrigation Department
RTG	:	Royal Thai Government
TAT	:	Tourism Authority of Thailand
TOT	:	Telephone Organization of Thailand
JICA	:	Japan International Cooperation Agency

## Others

BMA	:	Bangkok Metropolitan Area Bangkok Metropolitan Administration
BMR	:	Bangkok Metropolitan Region
ESB	:	Eastern Seaboard Development Committee
APCA	:	Administration of Phatthaya City Act

## Abbreviation of Measurements

Length	mm	:	millimeter
	cm	:	centimeter
	m	:	metre
	km	:	kilometer
Area	sq cm	:	square centimeter
	sq m	:	square metre
	sq km	:	square kilometer
	km <sup>2</sup>	:	square kilometer
Volume	l	:	liter
	cu m	:	cubic metre
	MCM	:	million cubic metre
Weight	mg	:	Milligram
	kg	:	Kilogram
	T	:	Tonne (metric ton)
Time	s	:	second
	min	:	minute
	h	:	hour
	d	:	day
	y	:	year



### Derived measures

m <sup>3</sup> /s	:	cubic metre per second
cu m/s	:	cubic metre per second
cu m/h	:	cubic metre per hour
cu m/d	:	cubic metre per day
MCM/y	:	million cubic metre per year
lcd	:	litre per capita per day
mg/l	:	milligram / liter (ppm)
%	:	per cent

### Others

BOD	:	Biochemical Oxygen Demand
RBC	:	Rotating Biological Contactor
O&M	:	Operation and Maintenance
F/S	:	Feasibility Study
D/D	:	Detailed Design
HWL	:	high water level
LWL	:	low water level
MSL	:	mean sea level
AMSL	:	above mean sea level
v	:	volume
q	:	discharge

### Electrical measures

V	:	volt
A	:	ampere
Hz	:	hertz (cycle)
W	:	watt
kW	:	kilowatt
MW	:	megawatt
GW	:	gigawatt
kWh	:	kilowatt hour
kVA	:	kilovolt ampere
MVA	:	megavolt ampere



## I. INTRODUCTION

### 1.1 Background of the Study

Phatthaya is the second biggest tourist destination in Thailand only next to Bangkok. In 1987, 1,417 thousand tourists visited Phatthaya out of which 1,012 thousand were from overseas. Phatthaya also has come before the footlight as the center of the growing ESB region for commercial and business activities as well as for residential development. Its development has been accelerated in these years as the development of Laem Chabang and Map Tha Phut were set on their ways. However, due to the lack of proper regulation and guidance for land development and use and inadequate provision of infrastructures, problems including water shortage, water pollution, traffic congestion and disorderly land development arose and are becoming acute.

In 1978, JICA (Japan International Cooperation Agency) conducted Phatthaya Tourism Development Master Plan and Feasibility Study ("Previous JICA Study"). Many projects and measures proposed by the Previous JICA Study, however, are yet to be implemented. After 10 years, various problems arose and development environment has significantly changed. New roles and functions including the role as multifunctional area and regional center of ESB region are added for the Phatthaya Area as well.

Considering the above, the Government of Thailand reached the conclusion that a master plan study should be conducted for the development of Phatthaya Area and made a request to the Government of Japan for the Study. In response to the request, the Government of Japan dispatched a JICA preliminary study team and agreed on the Scope of Work on the Study on December 20th, 1988. The Master Plan Study for the Development of Phatthaya Area started, accordingly, in June 1989 and Final Report of the Study is submitted hereupon, in June 1990 in due compliance with the set schedule.

## 1.2 Objective and Study Area

### 1) Objective of the Study

The objective of the Study is: "to formulate a master plan (target year 2006) for the development of Phatthaya Area with a view to promoting social and economic development of the Area, considering the radical development in recent years."

### 2) Study Area

Study Area is defined basically as "the area of Phatthaya City including Ko Lan and its southern coastal area down to Bang Sare" as defined by the Scope of Work.

However, from the viewpoint of improving unbalanced distribution of economic activities, particularly the excessive concentration of activities in the coastal area, a need has arisen to look into areas outside the Study Area as defined by the Scope Work, especially the hinterland area of Phatthaya.

Considering this situation, the Study Team has dealt with development issues outside the Study Area flexibly and to the extent possible. In the event that analysis was made for an area outside the Study Area, the area for analysis was determined considering direct influence of Phatthaya and also needs and characteristics of each sector.

## II. PHATTHAYA TODAY

### 2.1 Present Land Use

The total area of the Phatthaya City is 53.4 km<sup>2</sup> or 32,330 rai. Areas by land use classification in 1987 are shown in Table 2.1.1. As shown in the table, "Rural and Agricultural Area" is the biggest among all. The agricultural areas are mostly unused and part of which may be already committed for sale.

There exist many private investment activities from Phatthaya City to Bang Sare. Especially construction of hotels, condominiums and so on, spreads along the seaboard. Consequently a great change of land use in some areas took place in recent years. Disorderly land development has been in progress; urban sprawl has rapidly progressed.

Generally speaking, in the inland area, east of Sukhumvit Road, housing estates and condominiums are under construction within about 1 km from Sukhumvit road but the areas further east of Sukhumvit Road still remain mostly as open-space or rural and agricultural areas.

Table 2.1.1 LAND USE OF PHATTHAYA CITY IN 1987

No.	Classification of Land Use	Area (Rai)	Share (%)
1	Residential Area	3,466.9	10.72
2	Commercial Area	1,725.0	5.33
3	Institutional Area	145.6	0.45
4	Industrial Area	167.5	0.52
5	Warehouse	65.6	0.20
6	Religious Area	464.9	1.44
7	Infrastructure Area	---	---
8	Recreation Area	12.5	0.04
9	Cattle Area	45.9	0.14
10	Road	1,084.5	3.36
11	School	251.3	0.78
12	River & Canal	236.3	0.73
13	Rural & Agricultural area	24,297.2	75.16
14	Others	365.6	1.13
Total		32,328.8	100.00

Source: Survey Division, DTCP.

## 2.2 Socio-Economic Conditions

According to a survey conducted in 1987 by DTCP, commercial and service establishments numbered 2,249 in total. The total number of employments in Phatthaya is estimated to be about 50,000 in 1989.

The tourism sector has been the mainstay of the Phatthaya's economy, providing job opportunities and bringing about income to the area. Phatthaya is the most important marine tourism destination in Thailand. In spite of the development of other marine resort areas such as Hua-hin, Cha-am, Phuket and Samui, the short distance from Bangkok, good access and variety of the activities of Phatthaya are the big advantages to keep it as the top beach resort area. The number of guest arrivals has been increasing both for foreign and Thai tourists as shown below:

(Unit: 10<sup>3</sup>)

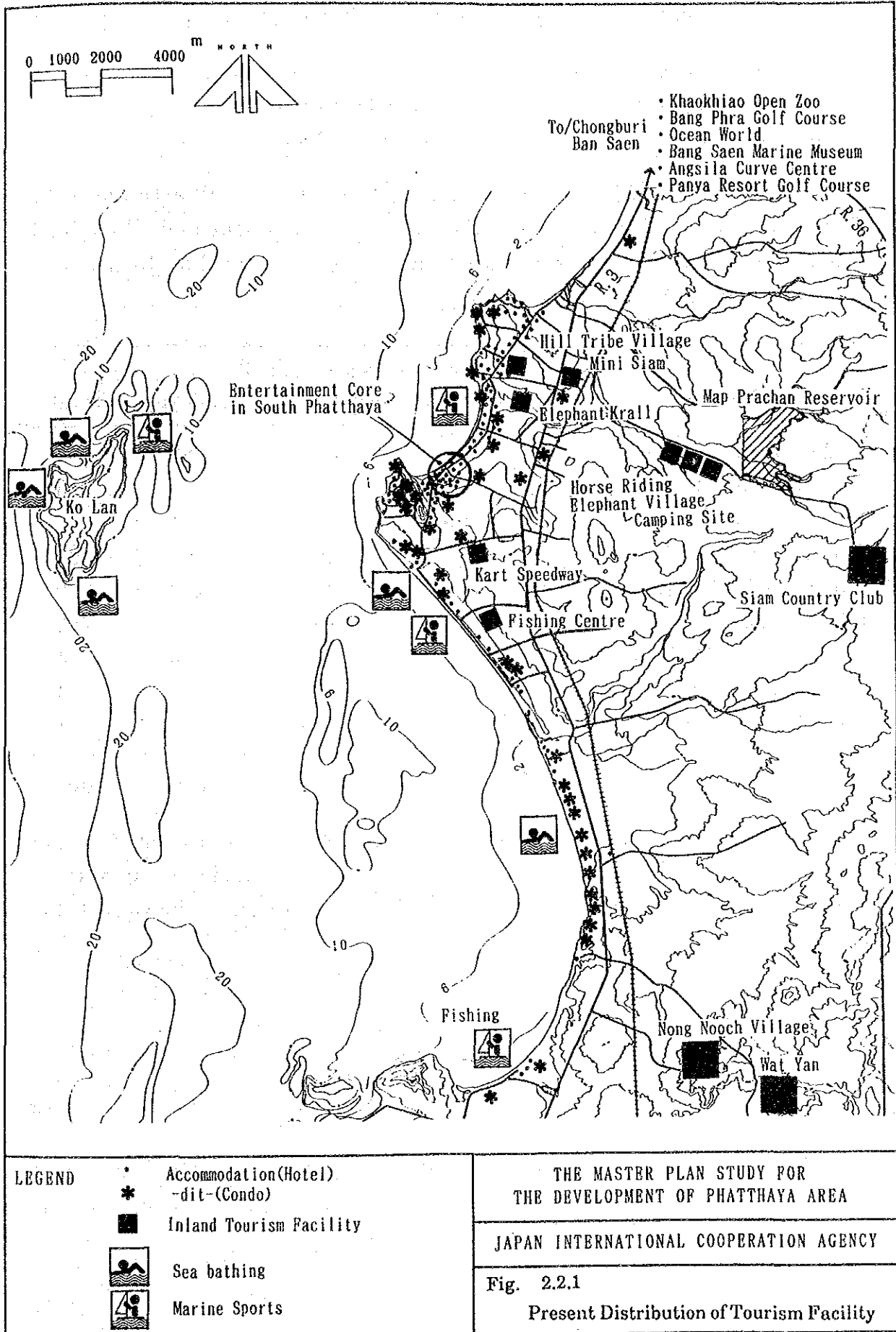
Year	Thai	Foreign	Total	Increase (%)
1982	150	450	600	-
1983	162	432	594	-1.0
1984	211	471	682	15.0
1985	234	562	796	16.7
1986	300	684	934	17.3
1987	405	1,012	1,417	51.7
82-87 (%/yr)	22.0	17.6	18.8	-

Source : TAT

The number of hotel rooms in Phatthaya kept increasing at the annual rate of 8.1 percent from 7,642 in 1982 to 11,262 in 1987 following the increase of tourists visiting Phatthaya. The annual average occupancy rate of hotel rooms in Phatthaya ranged between 48% and 53% in 1982-85 period and rose to 62% in 1987. Average length of stay was about 4 days.

Location of the tourism facility in Phatthaya is shown in Fig. 2.2.1.

The official population registered in Phatthaya City numbers 53,454 in 1989. The population growth rate was 4.8% per year between 1982 and 1989. The Study Team was informed, however, that the real number of population far exceeds the registered population.



Present population outside Phatthaya City is as follows:

- Tha Farang Beach Area  
and Bang Sare : 19,164 (in 1988)
- Hinterland Area : 65,516 (in 1988)

The Phatthaya City is being administered by the Phatthaya City Government with the assistance of the Central Government and Chon Buri Provincial Government. Organization and staffing of the Phatthaya City Government as of 1989 is as shown below:

Division	Civil Servants	Permanent Employees	Temporary Employees	Total
Undersecretary Office	48	60	29	137
Technical and Planning Division	13	-	-	13
Finance Division	30	4	11	45
Public Work Division	51	46	97	194
Public Health Division	28	109	223	360
Education Division	231	19	-	250
Social Welfare Division	4	-	-	4
Ko Lan Sub-district	4	-	-	4
Inner-Inspection Unit	1	-	-	1
<b>Total</b>	<b>410</b>	<b>238</b>	<b>360</b>	<b>1,008</b>

The power and responsibilities for the development and operation and maintenance of the infrastructures and utilities are distributed among various State Authorities, Central Government Department and PCG as shown in Table 2.2.1.



Table 2.2.1 RESPONSIBILITY AND POWER FOR INFRASTRUCTURES AND UTILITIES

Fields	Planning	Design	Construction (Budget)	Operation & Maintenance
1. Water Supply				
1.1 Dam/Reservoir	RID	RID	RID	RID
1.2 Conveyance pipeline (Dam to treatment plant)	PWD	PWD	PWD	PWD
1.3 Treatment plant	PWA/PWD	PWA/PWD	PWA/PWD	PWA/PWD
1.4 Distribution pipeline	PWA	PWA	PWA	PWA
2. Sewerage	PWD/PCG	PWD/PCG	PWD/PCG	PCG
3. Drainage	PWD/PCG	PWD/PCG	PWD/PCG	PCG
4. Solid waste	PCG	PCG	PCG	PCG
5. Road in the City	PCG/DOH PWD	PCG/DOH PWD	PCG/DOH	PCG/DOH
6. Jetty	HD/PCG PWD	PWD/HD	PWD/PCG	PWD/PCG
7. Electricity				
7.1 Power station	EGAT	EGAT	EGAT	EGAT
7.2 Transmission line (Power st. to sub-st.)	EGAT	EGAT	EGAT	EGAT
7.3 Sub-station	EGAT/PEA	EGAT/PEA	EGAT/PEA	EGAT/PEA
7.4 Distribution lines in the City	PEA	PEA	PEA	PEA
8. Telecommunication	TOT/CAT	TOT/CAT	TOT/CAT	TOT/CAT
9. Park	PCG	PCG	PCG	PCG
10. Low cost housing	NHA	NHA	NHA	NHA

## 2.3 Prevailing Urban Environmental Problems

Urban environment together with natural environment form an attractive area of Phatthaya area. Unfortunately both environments have been degraded rapidly and any visitors may observe the differences every year. Tourism growth has brought about fast urbanization in Phatthaya accompanied by pollution problem generated by human activities.

Degradation of the environment of Phatthaya has reached critical stage, water pollution in particular. The situation was publicized in authoritative publication overseas and Phatthaya is now losing the fame of first grade international resort. The visitors clearly recognize this problem, according to the tourism market survey conducted by this Study. In reality, it is reported that business in South Phatthaya declined in 1989. Major problems are listed below.

### 1) Water supply

Shortage of public water supply in Phatthaya area and lack of natural groundwater strata result in exploitation of shallow-well water regardless of its quality. Raw water of poor to moderate quality is carried by trucks and sold at 40-50 Baht/m<sup>3</sup>.

### 2) Wastewater and drainage system

Toilet waste in each household is handled by septic tank - seepage pit unit while other wastewater generated is discharged through public drains either natural or sewer pipe. Secondary treatment for wastewater is provided by major establishments. All natural drains and sewers discharge into the sea as their only ultimate disposal, thus polluting marine ecosystem.

Lack of or inadequate proper drainage systems are known to all existing communities within the Study Area. Filling of lowland which used to serve as retarding basin always leads to floodings in the surrounded area. The case will be worse in urban area where drainage sewers are not yet provided.

### 3) Water Quality

#### Sea Water Quality

It is apparent that sea waters in the vicinity of Ko Lan were all complied with NEB standard. Sub-standard sea waters in terms of suspended solids and total coliform were found along the coastline of the mainland of Phatthaya.

Large amount of total coliform indicated the pollution caused by human activity.

#### Drains

Major drains serving as receivers of household waste are in bad conditions. Other natural drains give indication of being contaminated by human activities.

#### Shallow Wells

Shallow wells utilized by local people within the vicinity of downstream of the existing solid waste dumping site are heavily contaminated, and unsuitable at all for household use.

The existing solid waste site also pose a threat, on public health point of view, to the proposed RID's Huai Chak Nok Reservoir as the solid site is located at the reservoir's catchment boundary.

The shallow wells being used as water supply for Phatthaya Slaughter House is not hygienic. Water quality of the shallow well at Haad Samae, Ko Lan is not complied with the proposed water quality standard either.

#### 4) Solid Waste

Existing Phatthaya solid waste dumping site poses severe health problems to nearby communities. Groundwater has been contaminated after the site has been dumped by solid waste in 1982.

Suction tankers provided by Phatthaya City to empty septage (in septic tank) are inadequate and there are tankers "illegally" operated by private sector.

Disposal of septage are by haphazard. No disposal sites are designated and the septage is frequently spread over ground of plantation areas without retaining pond provided.

#### 5) Coastal Erosion

As a result of intensive development near the coast, construction has encroached on to the beaches at some locations in Phatthaya, Jomtien and Tha Farang. Wave-reflecting structures such as sea walls and terraces constructed at these locations are now causing a continuous loss of beach sand and recession of the shoreline near the structures.

If construction encroachment is not controlled effectively, the beaches - the very features on which a popular sea resort depends - will be lost irrevocably.

#### 6) Public Facilities

##### a) Slaughter House

Present condition of slaughter house which belong to the Phatthaya city is unhygienic and improperly managed. No treatment system is provided for wastewater generated from slaughtering process, which eventually being discharged into the adjacent private land. The buildings are more than 10 years old, yet there is no piped water supply. Water is drawn from shallow wells within the premises regardless of contamination caused by slaughtered waste.

##### b) Market

Existing market in Na Klua is posing a deteriorating seafront environment which is designated to be public recreation area.

#### 7) Air Pollution & Noise

Air pollution and noise are not a major threat in the Study Area, at least at present. Major sources of air pollution and noise are from road vehicles which also generate noise nuisance, particularly motor-bikes. Sensitivity to air and noise pollution varies widely from person to person and some tourists may regard it very unpleasant situation.

### III. DEVELOPMENT FRAMEWORK

#### 3.1 Status of Previous JICA Study

Among the projects and measures proposed by the previous JICA Study conducted in 1978 and 1979, some were materialized but many still remain to be implemented. Most of the causes, however, are rather external including the change of economic and social environment and policy with regard to the Phatthaya area than internal defects and unsuitableness of the proposals. These which have been implemented are given below. The rest has not been materialized up to now.

##### 1) Implemented Projects and Measures

###### (1) Physical Projects

###### ① Tourism Projects

Eleven tourism projects were materialized by the private sector, though locations are different from the previous proposals.

###### ② Transport Projects

- Beach Promenade (public)
- Upgrading of Sukhumvit highway to a 4 lane road (public)
- Terminal facilities for public bus (public)
- Utilization of railroad as a tourists transportation (operating for pack-tour at weekend) (public)
- Utilization of U-tapao military airport for civil aviation (public)
- Airline offices (undertaken by travel agents) (private)
- Roads in Ko Lan; Paved road between Ban Ko Lan and Ta-Van beach was constructed in 1986 by Phatthaya City Government.
- Traffic control system; One way system was introduced in 1985.

###### ③ Infrastructure Projects

- Sewage treatment for Phatthaya City (partially implemented) (public)

④ Education Project

- Hotel training school in Ban-Saen (public)

⑤ Sea Surface Use Demarcation

- Swimming areas in front of Royal Cliff Hotel and Phatthaya Palace Hotel are designated by buoy all year round. In peak season, 7 zones in Phatthaya beach, 3 zones in Jomtien beach and 2 zones in Ta Van beach of Ko Lan are set by Phatthaya City Government.

(2) Institutional and Legal Measures

- Reorganization of Tourism Organization of Thailand to TAT (public)
- Establishment of tourist police station (public)
- Establishment of tourist information office (public)
- Restriction of street vendors on road and beach (public)
- Zoning of sea area for various activities (public)

2) Causes of Non-implementation

There existed and still are existing various causes of non-implementation of the projects proposed by the previous JICA Study.

- a. Because of the lack of enough finance, the Central Government could not distribute any budget for the implementation of the projects.
- b. Because of the local administrative status of Phatthaya, which was not yet a municipality but only a sanitary district, the Central Government did not pay enough attention to the financial and institutional supports for the implementation of the proposed projects.
- c. Until 1982, tourism was not yet considered as a major foreign currency earning industry compared with other industry such as rice export in Thailand. Major allocation of the budget for public investment to Phatthaya area in the past was not made for tourism but for agriculture.
- d. Previous JICA Study was mainly oriented to tourism development and the priority of proposed projects were placed accordingly.

- e. Plans proposed by the Previous JICA Study were not duly integrated into the authorized National and Regional Plans.
- f. Rise of land price and change of land use by rapid urbanization prevented the acquisition of land for public use and infrastructure development.
- g. Demarcation of responsibilities among authorities concerned was not clearly identified for the previous proposals.
- h. Sectionalism among authorities was the one of major constraints against the coordination required in the interministerial projects.
- i. Lack of capable staff for the planning work in the local administration body.
- j. Weak financial basis of Phatthaya City Government.
- k. Lack of social consciousness of the people for the implementation of the projects.
- l. Political considerations sometimes overrode technical and socio-economic requirements.

### 3.2 Advantages and Constraints for Development

#### 1) Advantages

Phatthaya is endowed with a number of advantages for development. The advantages Phatthaya possesses have been working in favor of Phatthaya in the last decade, resulting in its rapid growth. The followings are the major advantages of Phatthaya.

##### (1) Good Access both to Domestic and International Tourism Markets

Phatthaya is located about 150 km from Bangkok to the south. On land Phatthaya is connected with Bangkok by four-lane national highway Route 3. There is frequent passenger bus service between Phatthaya and Bangkok along Route 3 at reasonable price.

Phatthaya has good access for foreign tourists via Dong Muang International Airport in Bangkok. U-Tapao airport, located about 35 km

from Phatthaya, basically serving as a military airfield, is increasingly used for civil chartered flights.

(2) Rich Tourism Resources

Phatthaya's attractiveness is characterized by a variety of tourism resources: from natural beauty to urban amenity. As natural beauty, Phatthaya has nice beaches in Ko Lan, about 10 km offshore, and Jomtien Beach and Tha Farang Beach extending from south of Phatthaya Hill down to Bang Sare as well as Phatthaya beach though this beach has been degraded these years.

A variety of urban amenities and opportunities for shopping, dining and sightseeing are all at hand for tourists.

(3) Well-Established Accommodation Facilities and Service Industry

Phatthaya provides a variety of accommodation facilities from luxurious five-star hotels to economical bungalows and is able to meet various needs of tourists. Tourists have wide choices for accommodation depending on their income level and preference.

(4) Existing Accumulation of Urban Facilities

Phatthaya is not just a marine resort but a well urbanized area with municipality status. Urban and infrastructure facilities including electricity and telecommunication are already in place for supporting economic activities in ESB region.

(5) Availability of Hinterland Area

Phatthaya has a spacious hinterland suitable for development, although development in the hinterland, so far, has been limited to some touristic attractions only.

(6) Good Location in Eastern Seaboard

Phatthaya is located in a good position to serve as the regional business and commercial center in Eastern Seaboard region. Laem Chabang is at about 20 km or 10~15 minutes car ride from Phatthaya along Route 3.



Phatthaya is connected to Map Ta Phut, about 50 km to southeast, by Route 36 and it is about 40 minutes by car.

## 2) Constraints

### (1) Limited Water Resources

Water resources for the Phatthaya area is not abundant. Though potable water is supplied from Map Prachan reservoir currently, water supply falls short of demand. Deficit is met by purchasing water from private water vendors. To solve the water shortage problem, development of four additional reservoirs and the water transmission pipeline from Laem Chabang to Phatthaya are either under detailed design or construction in the Phatthaya area.

### (2) Environmental Constraints

Deterioration of environment in Phatthaya has reached critical stage by now. The cause of deterioration is the inadequate infrastructure development that can not support the rapid urbanization by private investments. Problems include :

- Sea water contamination
- Insufficient road system and congestion
- Urban sprawl
- Noise pollution

### (3) Legal, Institutional and Financial Constraints

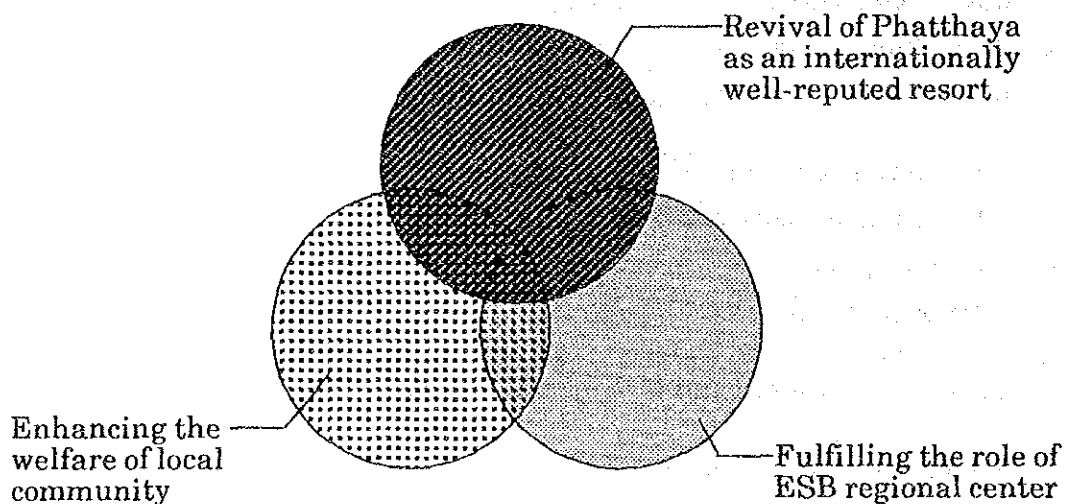
Though not peculiar to Phatthaya, it has been suffering legal and institutional as well as financial constraints. Manpower strength of the City administration is rather weak to manage the internationally well-known resort city of Phatthaya with more than 1.6 million tourists in a year although it may be sufficient for administering a medium size town with 50,000 population. City budget is also very limited to develop the required infrastructure and to maintain and operate the facilities. Legal framework should also be reinforced so that present problems including water pollution can be remedied promptly and strict law enforcement is guaranteed.

### 3.3 Development Objectives and Guidelines

Phatthaya has been playing a vital role in the national economic growth as an international resort of good repute. With the sharp rise of tourists and associated large investment by the private sector and inability of the public sector investment to meet the infrastructure requirement together with inadequate control of land use, disorderly land development and various urban problems have become serious, which now threaten the fame of Phatthaya.

As the development of ESB region has gone into orbit with the initiation of Laem Chabang and Map Tha Phut projects, a regional core for supporting their activities is required to be established. Phatthaya, with its locational advantage and already established urban structure, is expected to assume the role of regional center.

Under these circumstances, it is essential to work out proper development guidelines with the following development objectives.



The following guidelines are prepared in this context.

#### 1) Multi-Function City/ESB Regional Center

To exploit the locational advantages of closeness to the Bangkok Capital region and the central location of the ESB region as well as existing accumulation of urban facilities and manpower, Phatthaya area should be developed aiming at creating a multi-function urbanized area by adding or strengthening the functions of business, commerce, event-holding, service and information exchange as well as upgrading of the present tourism and resort function for international tourists.

2) Orderly Land Use

Orderly development of the Study Area is essential for the promotion of the efficient land use of the Study Area. General Plan prepared by DTCP in 1988 covers only the municipal area of Phatthaya and Bang Sare area is covered by Sanitary District Development Plan. Ko Lan and Tha Farang areas are presently not designated as a city planning area. In order to lead the development of the area, it is required to prepare the General Plans and Specific Plans for strict implementation of the detailed designation of land use.

3) Acceleration of Infrastructure Development

To prevent or at least alleviate the existing urban problems caused mainly by the gap between the public investment on infrastructure facilities and aggressive investment by the private sector, public investment on infrastructure should be accelerated. Private investment should be regulated and administered by the Government so that they should comply with the development schedule of the public sector.

4) Balanced development of the Study Area

To avoid the over-concentration of urban and tourism activities and associated urban problems including pollution in the coastal strip of the Study Area, development should be expanded to the inland area where land is available at relatively lower prices. Public sector should develop infrastructure facilities including road, water supply and other utilities according to a well-structured land use plan, in order to invite the private investment on tourism and various amenity facilities.

5) Conservation of Natural Environment

In order to provide agreeable environment for the visitors as well as residents, environmental problems including water pollution and traffic congestion which are conspicuous particularly in the Phatthaya City area should be solved or at least alleviated by enhancing necessary infrastructure and reinforcing monitoring as well as enforcing laws and regulations more strictly. Precious natural environment in the Tha Farang-Bang Sare area and Ko Lan including forest, wildlife and corals should be conserved duly by applying strict land use control and building permit.

6) Safety and Security

To provide more comfortable environment for the tourists and residents, measures should be taken for preventing natural disaster including

flooding and reducing accidents induced by land and marine traffic. Security should be strengthened by reinforcing police manpower and activities, considering the large number of non-resident population and seasonal migrants.

### 3.4 Tourism Framework

#### 1) Tourism Growth Alternatives

Concerning the future growth prospect of Phatthaya, a number of alternative scenarios could be formulated under two different assumptions. One assumption is that actions to be taken by Phatthaya City and the Thai government are limited like until now (Case I). The other assumption assumes that Phatthaya City and the Thai government should take timely and drastic measures to solve the current problems of Phatthaya and create an agreeable environment and amenity (Case II).

##### Case I

This case assumes that the actions taken by the government are to a moderate extent and do not contribute sufficiently to solving the problems of Phatthaya. As a result, problems of Phatthaya, especially environmental conditions, deteriorate and start to override the attractiveness of Phatthaya so far appreciated by tourists. Judging from the information obtained by the tourism market survey for Phatthaya conducted by this Study and recent business trend in South Phatthaya, it is likely that the number of tourists stops growing or even start declining in this case.

##### Case II

While Case I is rather a pessimistic possibility for Phatthaya, there is also another possibility for constant and healthy growth of Phatthaya area in the coming years. This possibility would be realized provided that Phatthaya City and the Thai Government take quick and fundamental measures in an effort to improve deficiencies of infrastructure facilities and enhance attractiveness of Phatthaya from the viewpoints of ensuring constant and healthy growth of Phatthaya in the long-run. In the event that infrastructures are sufficiently provided and new elements of tourism and business and commercial resources suited to the needs arising from tourist and business opportunities are added to Phatthaya, the number of tourists visiting Phatthaya is likely to keep rising up to 2006.

Considering the positive and fundamental actions being taken and expected to be taken by the Thai authorities concerned with the infrastructure development and environmental conservation, Case I is discarded and Case II is adopted.

Two alternative projections are made under Case II based on the past trend of tourist growth as shown below :

Item	Case II-1	Case II-2
Past period applied		
Thai	1982-87	1982-87
Foreign	1982-86	1982-87
Average annual increase		
Thai	51,000	51,000
Foreign	45,000	112,000
Total	96,000	163,000
Number of guest arrivals in 2006 (10 <sup>3</sup> )		
Thai	1,374	1,374
Foreign	1,867	3,140
Total	3,241	4,514
Annual growth rate from 1987 (%/year)	4.5	6.3

In both cases, Thai tourists were assumed to increase constantly by 51,000 a year based on the record between 1982 and 1987. This is based on the assumption of rising income level in the coming decades and increased appreciation of touristic activities among Thai people.

Two alternatives were assumed for foreign tourists. In Case II-1, 1982-86 period was applied to derive average annual increase of 45,000. The basic assumption is that the growth between 1982 and 1986 was normal and big jump in 1987 was an unusual phenomenon and unlikely to take place again. The derived number of guest arrivals in 2006 is 3,241 thousand.

In Case II-2, 1982-87 period was applied to derive average annual increase of 112,000. The number of guest arrivals in 2006 were derived to be 4,514 thousand in this case.

## 2) Selected Framework

The two alternatives are checked against the availability of the two most relevant resources, i.e., land and water.

In Case II-1, area additionally required to accommodate 3,241 thousand tourists amounts to 130 ha in 2006, about a half (45%) of the land available in Jomtien's coastal area where, it is assumed that expansion of hotel accommodation will take place. In Case II-2, about 225 ha or as much as 78% of the available land needs to be developed to accommodate 4,514 thousand tourists.

The water supply and demand balance derived shows that in Case II-1 and Case II-2, water supply capacity falls short of water demand after 1997 and 1995 respectively. Water diversion from other river basin (e.g., Nong Kho reservoir) will become necessary to meet increasing demand.

In the long-run, it would be easier to secure water required for diversion from Nong Kho reservoir in Case II-1 than in Case II-2, since required amount of water to be diverted is less in volume.

Considering these, Case II-1 is adopted as the tourist framework for the Study as shown in Fig. 3.4.1.

### 3.5 Population Growth Framework

The population in the Phatthaya City in 2006 was estimated based on the projection of employment and the "employed-population/total-population ratio". The employment in the Phatthaya City in 2006 was estimated for tourist related industries, non-tourist related industries and Eastern Seaboard Development related industries as follows.

- tourist-related industries	:	60,000
- non-tourist-related industries:	:	30,200
- Eastern Seaboard Development related industries	:	5,000

Employments in tourist-related industries amounting to 60,000 was derived under the following assumptions.

- Present number of tourist-related employments : 29,800  
     including (employment in service sector) : (28,000)  
                     (employment in transport sector) : (1,800)
- Average annual growth rate : 4.2%/year  
     (equivalent to growth rate of guest arrivals  
     from 1,611 thousand in 1989 to 3,241 thousand in 2006)

Employment in non-tourist related industries was assumed to grow independently of the tourism growth. The employment in 2006 was estimated under the following assumptions.

- Present number of non-tourist related employment : 20,200
- Average annual growth rate : 2.4%/year  
     (half the growth rate of registered population  
     between 1982 and 1989)

Employments in Phatthaya to be generated by regional development in the Eastern Seaboard Area was estimated by Eastern Seaboard Study to be 5,000 in 2001. This figure was adopted in the Study for the year 2006.

Population in Phatthaya in 2006 was estimated based on the projected employment explained above and the employed-population/total population ratio of 0.493.

$$(60,000 + 30,200 + 5,000) / 0.493 = 193,100$$

As planning framework, total population of the Study Area excluding Tha Farang and Bang Sare is set at 200,000 in 2006.

Population in Tha Farang and Bang Sare is assumed to increase only slightly in the study period. The population in these areas is assumed to be 20,000 in 2006.

Population of Ko Lan is at present 1,600 and set at 1,800 and 2,000 for the year of 1996 and 2006. The population growth of Ko Lan is estimated to be much lower than that of Phatthaya City as a whole because of resources constraints, in particular water.

Total population of the Study Area in 2006 is, therefore, set at 220,000.

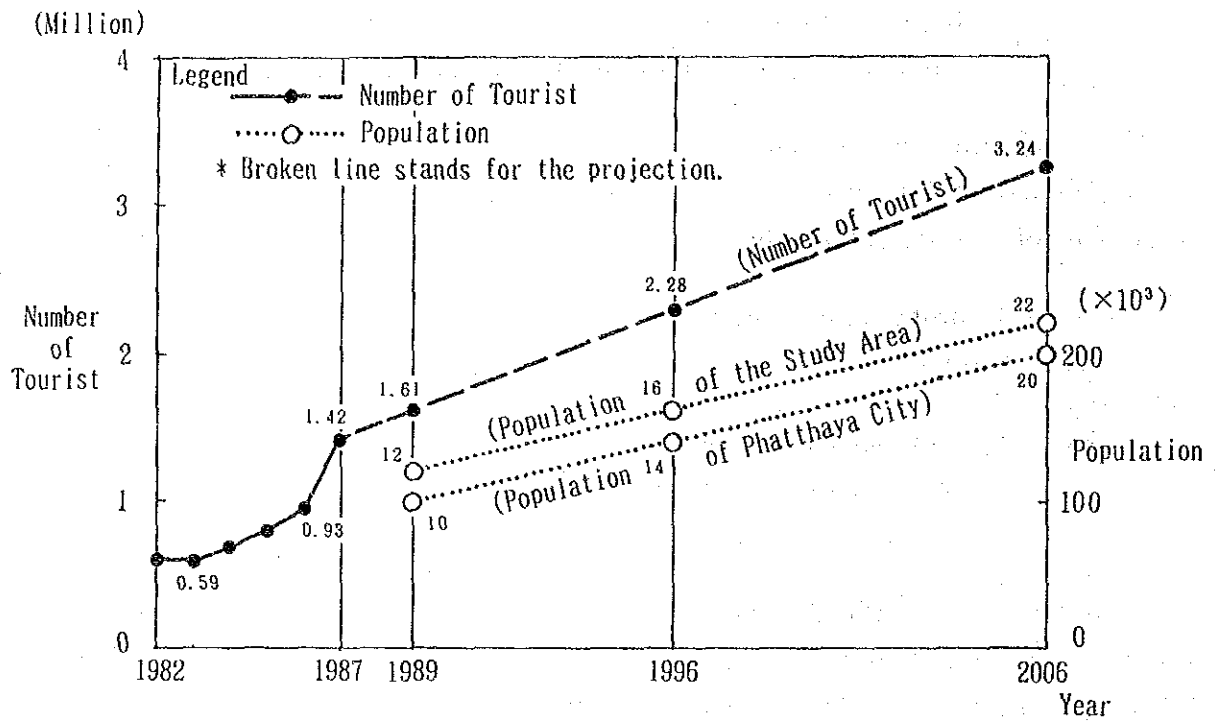


Fig. 3.4.1 Setting Up of Framework



## IV. INTEGRATED DEVELOPMENT PLAN

### 4.1 General

Integrated Development Plan for Phatthaya is formulated aiming at a sound and sustainable growth of the area and contributing to the national economy as well. Land use and sea use plans are worked out in line with the proposed development framework and long-list projects are identified in this chapter.

### 4.2 Land Use and Sea Use Plans

#### 1) Land Use Plan

Five distinctive courses of development are conceived in terms of land use in the Study Area as follows :

- ① Maximum Use of Existing Facilities
- ② Selective Use of Natural Attraction
- ③ Improvement of Infrastructure
- ④ Conservation of Natural Resources
- ⑤ Restrained Use of Unused Resources

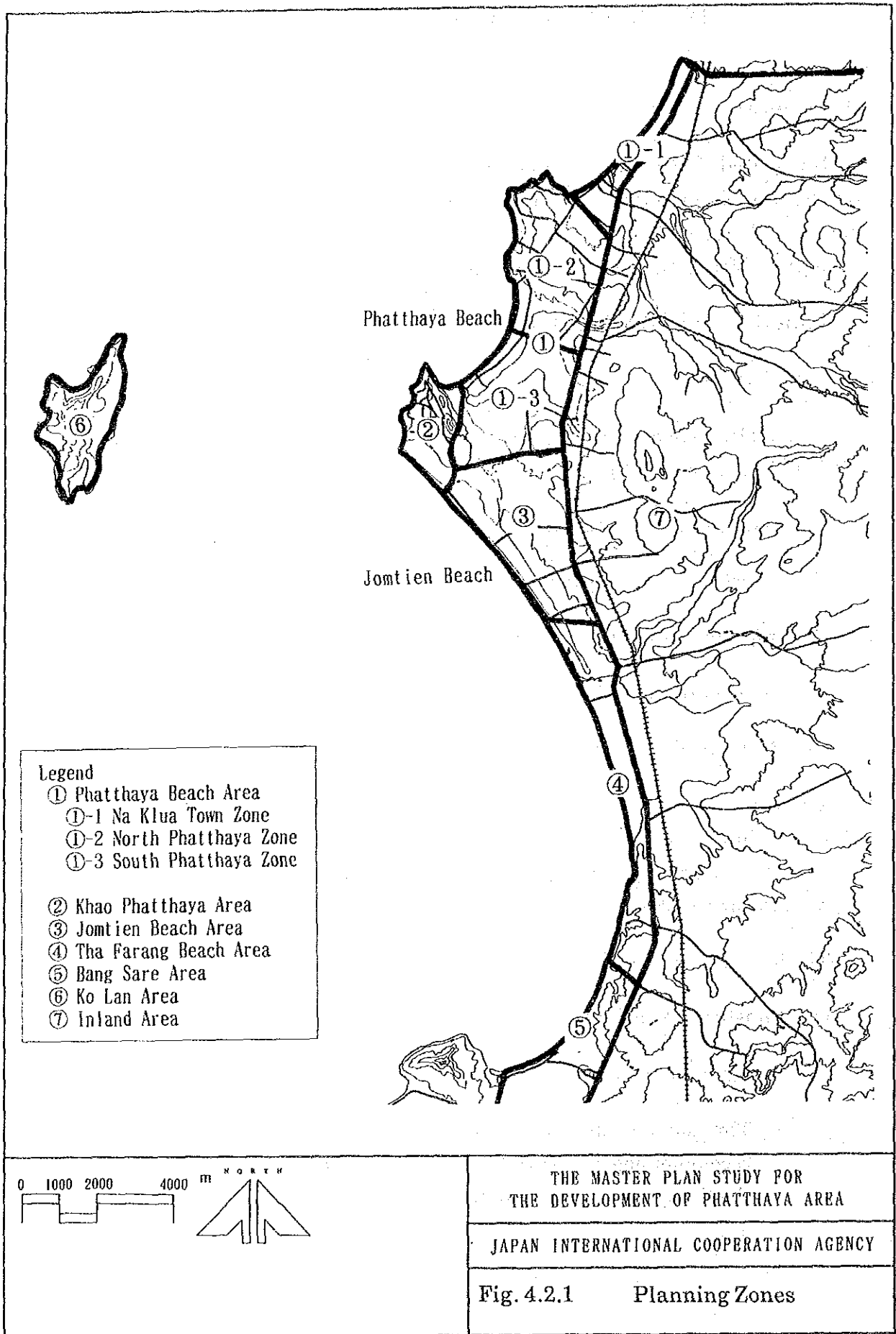
The Study Area is divided into 7 zones as shown in Fig. 4.2.1 considering their characteristics of the geographical and topographical conditions, vegetation, present land use and socioeconomic conditions. Future land use plan toward 2006 is worked out based on the above distinctive courses.

The basic strategies of land use for each zone is given hereunder :

#### (1) Phatthaya Beach area

##### \* Na Klua town zone

The tourism development is being expanded to this zone. It is recommended to restrict further development in this zone to protect the living environment of the local community.



\* North Phatthaya zone and South Phatthaya zone

Environment is relatively well maintained in the North Phatthaya zone and it is suitable for long stay family resort. The development in the zone shall be directed to create the pleasant environment and conserve it for the family resort.

The South Phatthaya zone is the most well-known area of Phatthaya. Downtown atmosphere and entertainments attract many tourists and invite to this zone. It is recommended to guide those entertainment industries to a desirable condition and to develop tourism related industries.

(2) Khao Phatthaya area

This area has the best environment in Phatthaya with high class resort facilities and good access. The deluxe hotels are also being used to accommodate the international events and the participants.

(3) Jomtien area

The basic direction of the development is to create the attractive natural and urban environment in this area. The urban control measure for building height, style, colour, signboard, etc., improvement of beach road, the "Visitors Centre" and the others will create a new tourism core in addition to Phatthaya Beach.

(4) Tha Farang Beach area

Direction of tourism development in this area is to restrict further development and preserve the nature as a tourism resource.

(5) Bang Sare area

Bang Sare has been developed as the fishermen's town and is renowned as a base of game fishing. Tourism potential of this area will be "marine leisure base", such as marina as well as the base of the game fishing boats.

(6) Ko Lan

Ko Lan will be developed as a day-trip beach resort area. Because of the shortage of water resource on this island, the overnight facilities shall be restricted.

(7) Inland area

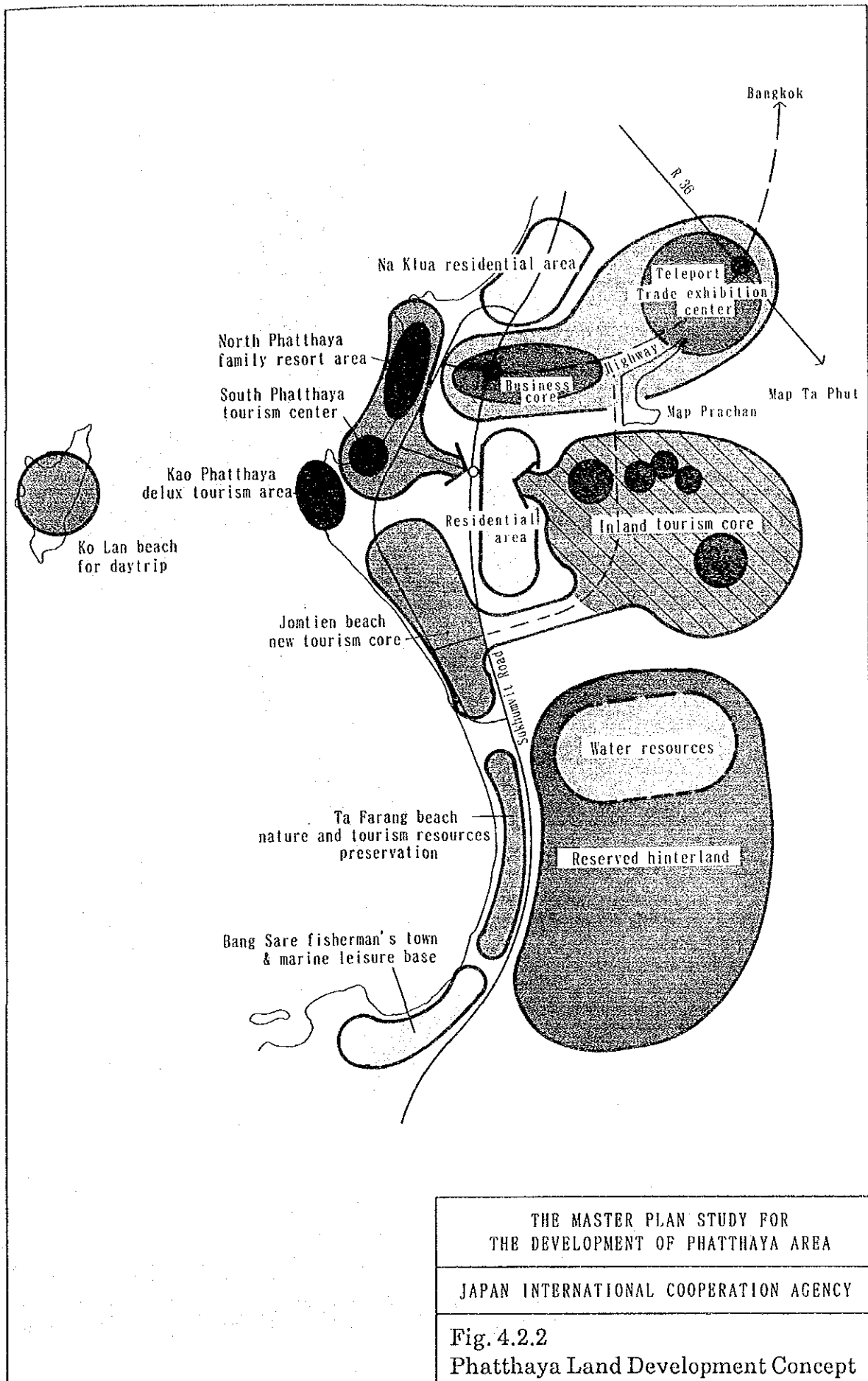
North part of the inland area will be developed for new requirements of the tourism and urban functions. Land use for business, events (trade fair), new town and tourism development will be proposed because of relatively lower land price. On the other hand, the south of inland area will be preserved for the water resources conservation and the future development.

Based on the above strategies, future land development concept and land use plan are formulated as shown in Fig. 4.2.2 and Fig. 4.2.3.

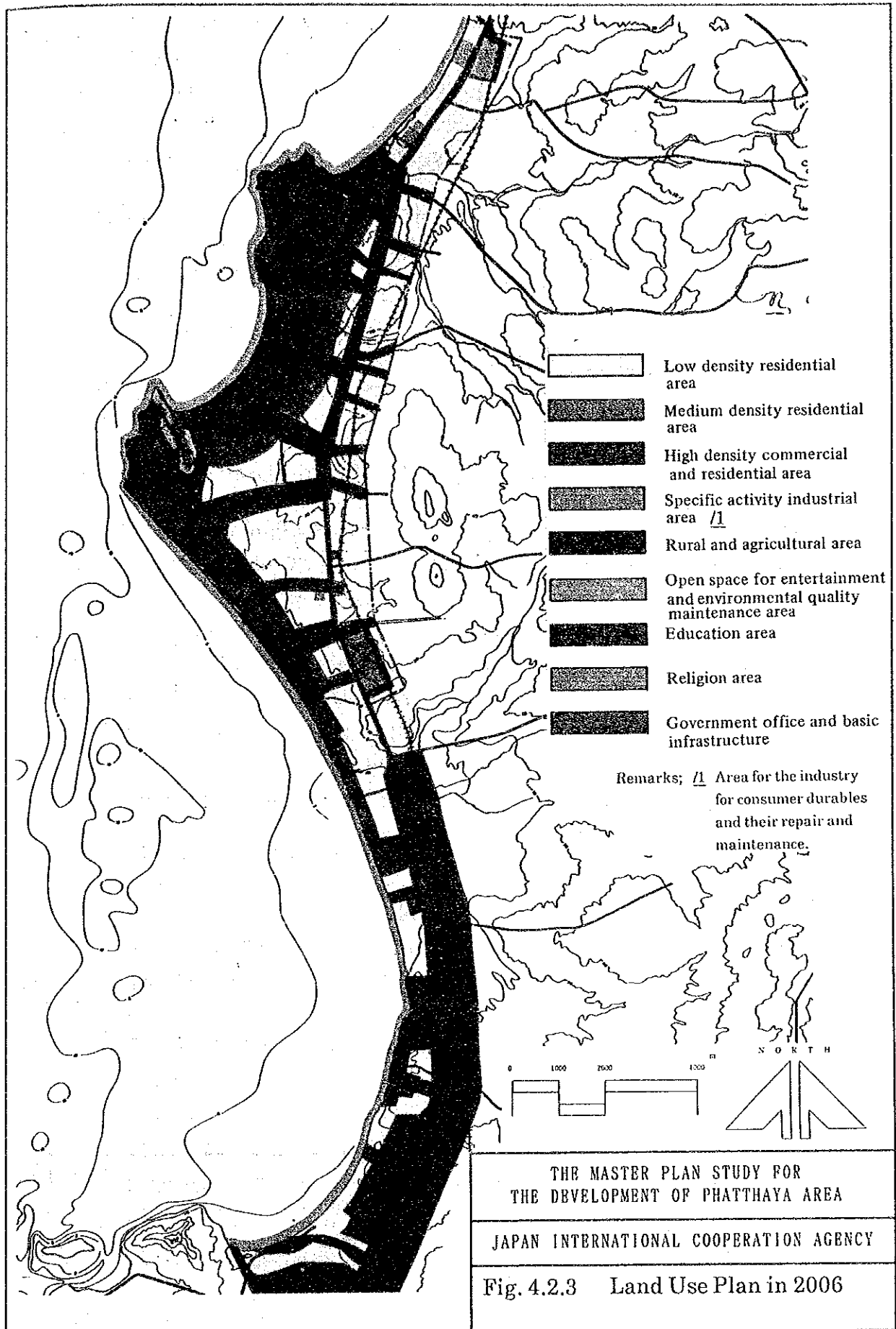
2) Beach and Sea Use

Beach and sea use toward 2006 are worked out to serve the following objectives :

- To improve Phatthaya's beaches and nearshore sea areas so that its image as a sea resort attractive to visitors is restored and enhanced. Achievement of this objective requires effective planning and development control, corrective action where beach and sea deterioration has already taken place and positive measures to prevent similar conditions occurring in areas which are now being developed.
- To cater for existing excursion vessels and also encourage the development of Phatthaya as a small passenger port for regional sea transport. This requires the provision of suitable marine facilities for berthing and mooring of excursion vessels, a terminal for jetfoil/hydrofoil or other fast passenger service to Bangkok and other regional ports, and the allocation of offshore moorings (or a potential marine terminal site) for cruise ships and the larger passenger vessels if they come to Phatthaya.











- To improve operating conditions for the local fishing industry so that productivity may rise and pollution is minimized. This requires extension of existing piers to deeper water so that vessel berthing and movement are not tidally restricted, and provision of improved facilities for fuel supply and waste disposal.

The future beach and sea use plans are shown in Fig. 4.2.4 and Table 4.2.1.

### 4.3 Tourism Promotion

#### 1) Promotional Measures

The following measures should be taken in order to further promote the tourism of Phatthaya.

##### (1) Increase the Choices of Tourism Attractions

At present, night entertainment is only the after dark tourism attraction in Phatthaya. To give more varied choices for the tourists and visitors, the opportunities for concerts, ballets, operas, and other cultural and artistic gatherings should be arranged and offered.

In Phatthaya, Nong Nooch Village, Mini Siam, Phatthaya Circuit, Elephant Farm and the like are operated by the private enterprises.

This type of resources will contribute to the further development of the tourism in Phatthaya by increasing the number of visitors during the low season of the marine oriented tourism.

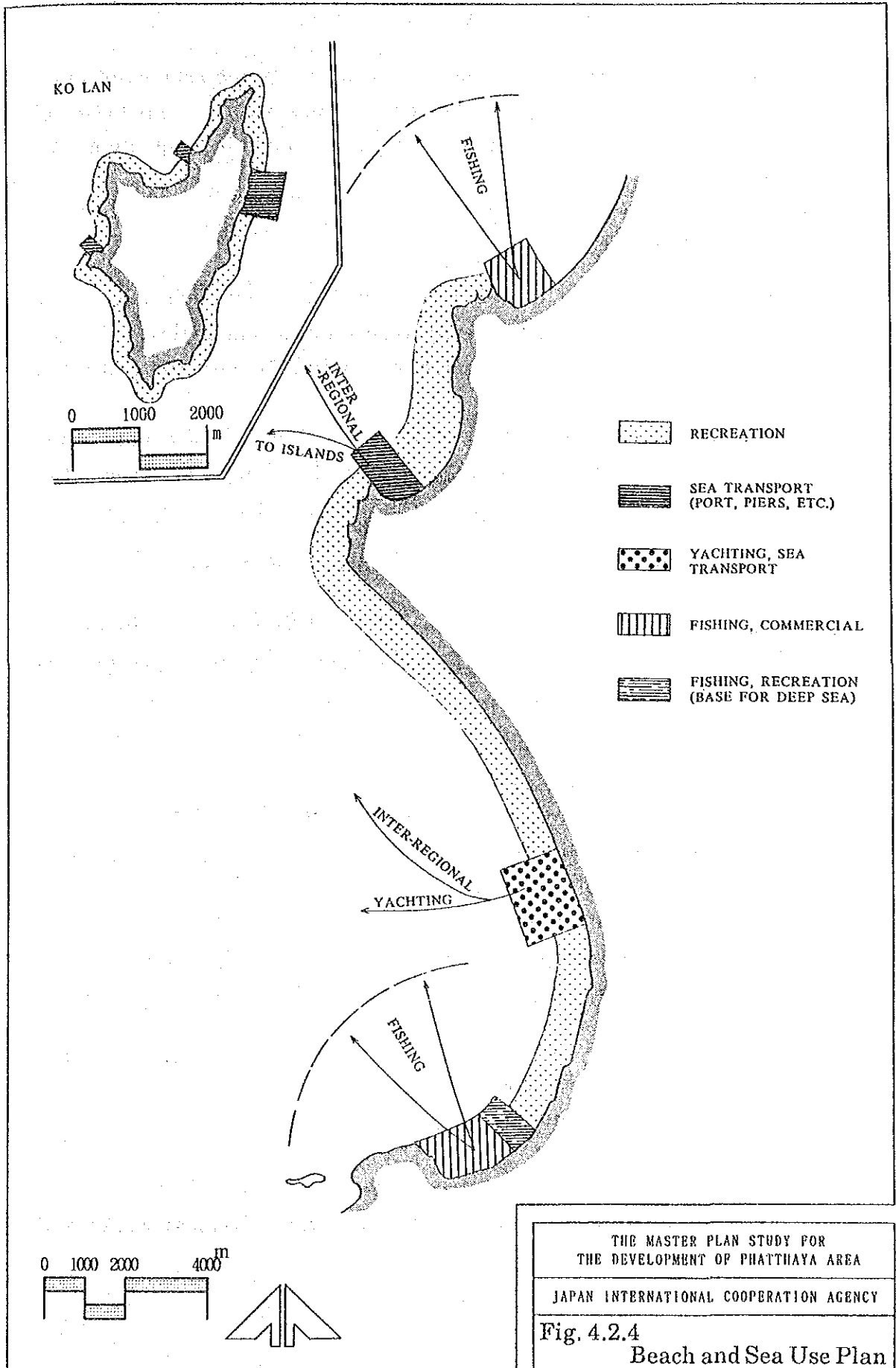
##### (2) Promotion of the Conventions and Events

At present, Phatthaya is the third popular convention place in Thailand after Bangkok and Chiang Mai. In order to further promote the conventions and events, it is proposed to establish the Execution Committee for conventions for Phatthaya with permanent staff. The duty of the committee is to make promotional arrangements to invite the visitors, arrange the finance source and coordinate the conventions and events.

For advertising to the international market, cooperation with the existing "Association of Incentive and Conventions of Thailand" should be sought.

Table 4.2.1 BEACH AND SEA USE PLAN

	Beach Location	Description	Action required
I	Phatthaya beach	Extensive over-development, existing promenade was built by encroaching beyond natural shoreline, coastal erosion now occurring.	Restore and widen beach by placing sand fill to replace sand lost by erosion, thus protecting the coastline and providing better beach for recreation. Improve promenade and facilities as buffer zone.
	Jomtien beach (at South end only)	Coastal road encroaches on shoreline, narrow and eroding beach.	Remove existing sea wall and re-align coastal road to arrest further coastal erosion.
II	Jomtien beach (north and central sections)	North end of beach is sited well. Road is set back sufficient distance from shoreline. Trees, shrubs and bushes provide shade and shelter, and plant roots prevent erosion.  Central section less satisfactory	Prohibit construction of any sea walls or other structures. Maintain existing vegetation and ensure that any small facilities (changing rooms, kiosks etc) are sited between vegetation and set back from shoreline. Improve central section in similar manner, as far as possible.
	Ta Van beach, Ko Lan	Random development of shops and kiosks on sea shore, likely to spread.	Do not permit any new structures seaward of existing building line. Space in front of buildings to be utilized for portable facilities only (sun shelters, deck chairs, etc.)
	Wong Amat beach (main beach north of Phatthaya headland)	Recently constructed properties have boundary walls which reflect waves and cause erosion	Remove existing sea walls which encroach on to beach, and prohibit further such construction.
III	Beaches between Jomtien and Bang Sare	Mainly undeveloped (except Ambassador City Hotel)	Control all new developments to maintain buffer zone. Remove offending terrace at Ambassador City and restore sand lost by erosion.
	Beaches near Laem Phatthaya	Beaches developed in a satisfactory manner with adequate buffer zone	Continue present policy
	Ko Lan beaches (except Ta Van)	Small-scale development only	Control all new developments to preserve natural beach line.



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Fig. 4.2.4  
Beach and Sea Use Plan

(3) Reinforcement of Information Function

Computer on-line system is proposed to be set up for rendering more effective and quicker service to the visitors. Reservation and ticketing of transportation, hotel, conventions and events should be made by means of the system.

(4) Security Improvement

Providing security for the visitors as well as safety against traffic accidents is a prerequisite to any resort place, particularly for the international tourists who do not have familiarity with the place and country.

Reinforcement of the police force of the Police, Tourist Police and Marine Police and their stronger coordination as well as direct involvement of the local administration of Phatthaya should be made.

(5) Establishment of "Phatthaya School of Tourism and Business"

It is proposed that the "Phatthaya School of Tourism and Business" should be set up in Phatthaya providing the following programs and training courses :

① Middle management course

- General view of the tourism industry
- Hotel and restaurant management
- Travel agent management
- Tourism development planning
- Marketing and promotion
- Accounting and general affairs
- Trading and commerce

② Staff training course

- Secretarial technique
- Computer technique
- Service technique
- First aid
- Maintenance technique for electricity, mechanical works and carpentry

- ③ Business management course
  - Economics and commercial affairs
  - Business administration
  - Tourism marketing and promotion
  - Personnel management
  - Accounting
  - Computer application
  
- ④ Basic training course
  - Language
  - Psychology
  - Socio - economy
  - Art, culture and history
  - Environment management

For the graduates, official certificates should be issued to guarantee their qualifications.

(6) Establishment of "Human Resource Data Bank"

In order to promote the recruitment of the qualified staff for the tourism industry in Phatthaya, it is proposed that the "Human Resource Data Bank" should be established. The qualifications of the graduates of the proposed "Phatthaya School of Tourism and Business" should be filed in this computerized system.

2) Tourism Facilities

To accommodate the increasing number of tourists and visitors, capacities of hotels and condominiums should be expanded as shown in Table 4.3.1. To give more variety to the resort facilities, particularly inland - type ones, tourist facilities which are desirable to be constructed are shown in Table 4.3.2.

Table 4.3.1 FUTURE DISTRIBUTION OF ACCOMMODATION BY REGION

(Rooms, Units)

	Phatthaya	Naklua	Khao Phatthaya	Jomtien	Sattahip (Tha Farang)	Others	Total
Present Distribution (1989)							
Hotel & Bungalow	10,410	2,504	1,839	1,076	3,296	56	19,181
Condominium (Units)	69	361	639	194	205	-	1,468
	Total	3,004	2,514	7,367	4,656	556	30,746
Future Distribution in 2006							
Hotel & Bungalow	Existing (10,410)	(2,504)	(1,839)	(1,076)	(3,296)	(56)	(19,181)
	Existing Dev. (1,468)	(-)	(425)	(2,891)	(1,360)	(500)	(6,665)
	Additional Dev. (750)	(500)	(250)	(3,400)	(-)	(-)	(4,900)
	Total	1,368	3,310	1,672	1,163	-	10,551
Condominium	Existing (69)	(361)	(639)	(194)	(205)	(-)	(1,468)
	Existing Dev. (2,969)	(1,007)	(2,671)	(1,478)	(958)	(-)	(9,083)

Table 4.3.2 DESIRABLE INLAND TOURISM FACILITIES

Type	Name of Facility	Facility Contents	Visitor	Remarks
① Family Type	a. Bird park	<ul style="list-style-type: none"> <li>• Large Scale bird cage</li> <li>• Bird theater</li> <li>• Rapacious bird's cage</li> <li>• Flying mammals</li> </ul>	<ul style="list-style-type: none"> <li>• Family tourist</li> <li>• Student</li> <li>• A part of foreigner</li> </ul>	
	b. Fruit garden	<ul style="list-style-type: none"> <li>• Self picking of tropical fruit</li> <li>• Spot sale of fruit</li> </ul>	<ul style="list-style-type: none"> <li>• Foreigner</li> <li>• Domestic</li> <li>• Family and group tourist</li> </ul>	
	c. Botanical garden	<ul style="list-style-type: none"> <li>• Large scale orchid garden</li> <li>• Cultivate and display precious pieces</li> <li>• Spot sale of orchid</li> <li>• Tropical forest garden</li> </ul>	<ul style="list-style-type: none"> <li>• Foreigner</li> <li>• Student</li> </ul>	
② Sports Type	d. Athletic complex	<ul style="list-style-type: none"> <li>• Multi purpose ground</li> <li>• Tennis court complex</li> <li>• Pool</li> <li>• Archery</li> <li>• Field Athletic</li> <li>• Picnic trail/picnic park</li> <li>• Jogging course</li> <li>• Others</li> </ul>	<ul style="list-style-type: none"> <li>• Student</li> <li>• Foreigner (economy class)</li> <li>• Domestic</li> </ul>	Cooperation with existing Panarak Park is needed.
	e. Health center	<ul style="list-style-type: none"> <li>• Kursaal</li> <li>• Athletic gym</li> <li>• Medical center</li> <li>• Aged people's sports complex</li> </ul>	<ul style="list-style-type: none"> <li>• Foreigner (economy class)</li> <li>• Domestic</li> </ul>	
	f. Sky sports	<ul style="list-style-type: none"> <li>• Hot balloon</li> <li>• Glider</li> <li>• Hang glider</li> <li>• Paraglider etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Foreigner</li> </ul>	Cooperation with existing horse-riding and/or elephant garden is needed.

#### 4.4 Long-list Projects

##### 1) Long-list Projects Identified

The long-list projects identified in compliance with the development guidelines for meeting the requirements of the Integrated Development of Phatthaya Area are shown in Tables 4.4.1 - 4.4.8 and in Fig.4.4.1 and their implementation schedules are given in Table 4.4.9.



Table 4.4.1 LONG - LIST PROJECTS ( 1/8 )

Waterfront Improvements

Name of Projects	Location	Outline
① South Phatthaya Land Reclamation	South Part of Phatthaya Bay	<ul style="list-style-type: none"> <li>• The purpose of this project is to provide additional land for development, control pollution and improve appearance of waterfront.</li> <li>• Reclaimed area 19 ha, (including piers), overall length 1,900m, width varies - maximum 180m.</li> <li>• Facilities ..... Commercial facility (restaurants and shops) Urban amenity (parks, concert hall, etc.) Event facility (event hall, event square) Infrastructure (roads, car parking, etc.)</li> </ul>
② Tourist Port	South Phatthaya	<ul style="list-style-type: none"> <li>• The purpose of this project is to provide embarkation, disembarkation and other associated facilities for excursion boats and other small vessels.</li> <li>• 3 piers each 130m long, total number of berths : 30, Reclaimed area (4 ha.) for passenger terminals, port buildings, approach road, etc.</li> <li>• Jetboil/hydrofoil berth provide a direct marine transportation from Bangkok. Berth length is 40 m.</li> </ul>
③ Phatthaya Beach Restoration	North and Central parts of Phatthaya Bay	<ul style="list-style-type: none"> <li>• The purpose of this project is to arrest coastal erosion and provide a upgraded recreation beach.</li> <li>• Beach widened by nourishment of sand from offshore or inland source. Overall length 2,700m, width 50m.</li> <li>• Beach promenade improvements are also proposed in order to provide a safety and comfortable pedestrian mall.</li> </ul>
④ Piers in Ko Lan Island		
- Ta Van Pier	- West Coast, Ko Lan	<ul style="list-style-type: none"> <li>• Embarkation/disembarkation facilities for boat passengers, 292m long pier.</li> </ul>
- Ban Ko Lan Pier Extension	- East Coast, Ko Lan	<ul style="list-style-type: none"> <li>• Embarkation/ disembarkation facilities for boat passengers, 50m long pier extension.</li> </ul>
- Tien Pier	- West Coast, Ko Lan	<ul style="list-style-type: none"> <li>• Embarkation / disembarkation facilities for boat passengers, 200m long pier.</li> </ul>
⑤ Na Klua Fishing Pier Extension	Offshore of Na Klua Village	<ul style="list-style-type: none"> <li>• The purpose of 300m long pier extension project is to permit berthing under all tidal conditions.</li> </ul>
⑥ Jomtien Beach Development	Jomtien Beach	<ul style="list-style-type: none"> <li>• The purpose of this project is to protect Jomtien beach from the deterioration by disorderly development.</li> <li>- Restoration of Beach Road</li> <li>- Introduction of Beach Center</li> <li>- Car Parking Development</li> <li>- Well Regulated Introduction of New Accommodation and Commercial Facility.</li> <li>- Introduction of Theme Park.</li> </ul>

Table. 4.4.2 Long - List Projects (2/8)

Sewerage

Name of Projects	Location	Outline
① Na Klua Sewerage Project	<ul style="list-style-type: none"> <li>- Na Klua area</li> <li>- Treatment works is sited at the reclaimed land in the south corner of Bang Lamung Bay.</li> </ul>	<ul style="list-style-type: none"> <li>- Pipeline 23.1 km (diameter 150 - 600mm)</li> <li>- 11 Pump stations.</li> <li>- Treatment plant capacity : 15,000 cum/d</li> </ul>
② Jomtien Sewerage Project	<ul style="list-style-type: none"> <li>- Jomtien and Khao Phatthaya area within south boundary of the city</li> <li>- The site of treatment works is identified at Wat Boon road</li> </ul>	<ul style="list-style-type: none"> <li>- Pipeline 28.9km (diameter 150 - 700mm)</li> <li>- 11 Pump stations.</li> <li>- Treatment plant capacity : 20,000 cum/d</li> </ul>
③ Phatthaya Town Sewerage Expansion Project	<ul style="list-style-type: none"> <li>- Phatthaya town area</li> <li>- Inland site or reclaimed site for a new treatment works</li> </ul>	<ul style="list-style-type: none"> <li>- Pipeline : 23.7 km (diameter 150 - 800 mm)</li> <li>- Pump station : <ul style="list-style-type: none"> <li>· Five new pump stations</li> <li>· Five pump stations to be expanded and reequipped</li> <li>· Five pump stations to be reequipped.</li> </ul> </li> <li>- Treatment station capacity : 26,000 cum/d</li> </ul>
④ Tha Farang Beach Sewerage Project	<ul style="list-style-type: none"> <li>- Tha Farang beach area</li> </ul>	<ul style="list-style-type: none"> <li>- Pipeline : 9.1km (main collection sewer)</li> <li>- Pump station</li> <li>- Treatment plant capacity 5,000 cum/d</li> </ul>
⑤ Bang Sare Sewerage Projects	<ul style="list-style-type: none"> <li>- Densely developed water - front area</li> </ul>	<ul style="list-style-type: none"> <li>- Basic modified combined system</li> <li>- Treatment plant capacity : 1,750 cum/d</li> <li>- Pump station</li> </ul>

Table. 4.4.3 Long - List Projects (3/8)

Name of Projects	Location	Outline
① South Phatthaya Box Culvert Construction	Central - South Phatthaya area	<ul style="list-style-type: none"> <li>- Construction of new box culvert along South Phatthaya road and Phatthaya 3 road</li> <li>- <math>2.5 \text{ m}^W \times 2.0 \text{ m}^H \times 2</math>, Length : 3 Km.</li> </ul>
② Phatthaya Canal Improvement	South Phatthaya area	<ul style="list-style-type: none"> <li>- Improvement of Phatthaya river from the aesthetic viewpoint.</li> <li>- River section will be improved to <math>7.5 \sim 5.7 \text{ m}^W \times 1.8 \text{ m}^D</math>, Length 1.0 Km.</li> </ul>
③ Puk Plub Canal Improvement	South Na Klua area	<ul style="list-style-type: none"> <li>- Improvement of Puk Plub river</li> <li>- River section will be improved to <math>6.5 \sim 4.7 \text{ m}^W \times 1.8 \text{ m}^D</math>, Total length 0.5 Km.</li> <li>- Box culvert (<math>2.0 \text{ m}^W \times 1.5 \text{ m}^H \times 3</math>, Length of 50 m) will be installed at the road crossing part.</li> </ul>
④ Jomtiem Area Box Culvert Construction and Open Channel Construction	Jomtiem area	<ul style="list-style-type: none"> <li>- Construction of box culverts under the existing roads</li> <li>- Construction of open channel in the hinter-land</li> </ul>

Table. 4.4.4 Long - List Projects (4/8)

Name of Projects	Location	Outline
① Improvement and Extension of Existing Service Network	- Phatthaya, Na klua town and Jomtien	<ul style="list-style-type: none"> <li>- Upgrading and additional pipelines for existing distribution facilities</li> <li>- Total length of distribution main : 129 Km</li> </ul>
② Raw Water Transmission Facilities	- Ban Huay Fao -- Existing treatment plant	<ul style="list-style-type: none"> <li>- Construction of pipeline and related facilities from Nong Kho to treatment facilities</li> <li>- Total length 27.7 Km</li> </ul>
③ Raw Water Pump Station	- Ban Nong Kwat	<ul style="list-style-type: none"> <li>- Construction of pump station on the route of raw water transmission pipeline</li> <li>- Total capacity <math>55 \text{ cum/min} \times 66 \text{ m head}</math></li> </ul>
④ Water Treatment Plant	- Site of existing treatment plant	<ul style="list-style-type: none"> <li>- Construction of new treatment plant</li> <li>- Total capacity : 79,000 cum/d</li> </ul>
⑤ Establishment of Water Supply System	- Tha Farang beach, Bang Sare and Inland area - Ko Lan	<ul style="list-style-type: none"> <li>- Construction of new distribution facilities</li> <li>- Total length of distribution main : 69 Km</li> <li>- Construction of new distribution facilities</li> <li>- Total length of distribution main : 6.8 Km</li> <li>- Construction of 3 service reservoirs with the total capacity of <math>6,700 \text{ m}^3</math></li> </ul>

Solid waste disposal  
 Table 4.4.5 LONG - LIST PROJECTS ( 5/8 )

Name of Projects	Location	Outline																				
① Provision of New Sanitary Landfill Site	Inland area (Outside the planned reservoir and upstream)	- Amount of solid waste disposed of : 1,658,000 m <sup>3</sup> - Area : 21.6 ha - Excavation, leachate treatment facility, liner, equipment etc.																				
② Improvement of Existing Disposal Site	Present disposal site	- Drainage - Water supply to the houses in the vicinity																				
③ Installation of Maintenance Facilities	Near the center of the city	- Garage, shelter and carpark, rest and shower rooms, office, carwash and drainage																				
④ Procurement of Collection Vehicle		<table border="1"> <thead> <tr> <th>Area</th> <th colspan="2">Phatthaya</th> <th colspan="2">Jomtien, Bang Sare</th> </tr> <tr> <th>Vehicle</th> <th>11.4m<sup>3</sup> Side loader</th> <th>10m<sup>3</sup> Compactor</th> <th>11.4m<sup>3</sup> Side loader</th> <th>7.4m<sup>3</sup> Side loader</th> </tr> </thead> <tbody> <tr> <td>1996</td> <td>26</td> <td>—</td> <td>2</td> <td>1</td> </tr> <tr> <td>2006</td> <td>32</td> <td>6</td> <td>3</td> <td>1</td> </tr> </tbody> </table>	Area	Phatthaya		Jomtien, Bang Sare		Vehicle	11.4m <sup>3</sup> Side loader	10m <sup>3</sup> Compactor	11.4m <sup>3</sup> Side loader	7.4m <sup>3</sup> Side loader	1996	26	—	2	1	2006	32	6	3	1
Area	Phatthaya		Jomtien, Bang Sare																			
Vehicle	11.4m <sup>3</sup> Side loader	10m <sup>3</sup> Compactor	11.4m <sup>3</sup> Side loader	7.4m <sup>3</sup> Side loader																		
1996	26	—	2	1																		
2006	32	6	3	1																		
⑤ Provision of Incinerator in Ko Lan	Ko Lan	Provide an incinerator with the capacity of 0.5 ton/hour																				

Road  
 Table 4.4.6 LONG - LIST PROJECTS ( 6/8 )

Name of Projects	Location	Outline
① Phatthaya 2 Road Windenning	Central Phatthaya ~ South Phatthaya	Windenning to 4 lane road, Total length : 1,655 m, Tender was already called.
② Phatthaya 3 Road Construction	① North Phatthaya ~ Central Phatthaya ② Central Phatthaya ~ South Phatthaya ③ South Phatthaya ~ Mountain Road ④ Mountain Road ~ Reclamation Area ⑤ Soi 17	① Construction of new 4 lane road, Total length : 1,900 m ② Windenning to 4 lane road. Total Length : 1,750 m ③ Construction of new 4 lane road, Total length : 1,500 m ④ Windenning to 4 lane road, Total length : 800 m ⑤ Windenning to 4 lane road, Total length : 1,400 m
③ Jomtien 2 Road Construction	Thapphaya - Wat Boon	New construction of 4 lane road, Total length : 1,900 m (Jomtien 2 Road south of Wat Boon Road need not to be constructed as a 6 - lane road for the time being.)

Table 4.4.7 LONG - LIST PROJECTS ( 7/8 )

Road

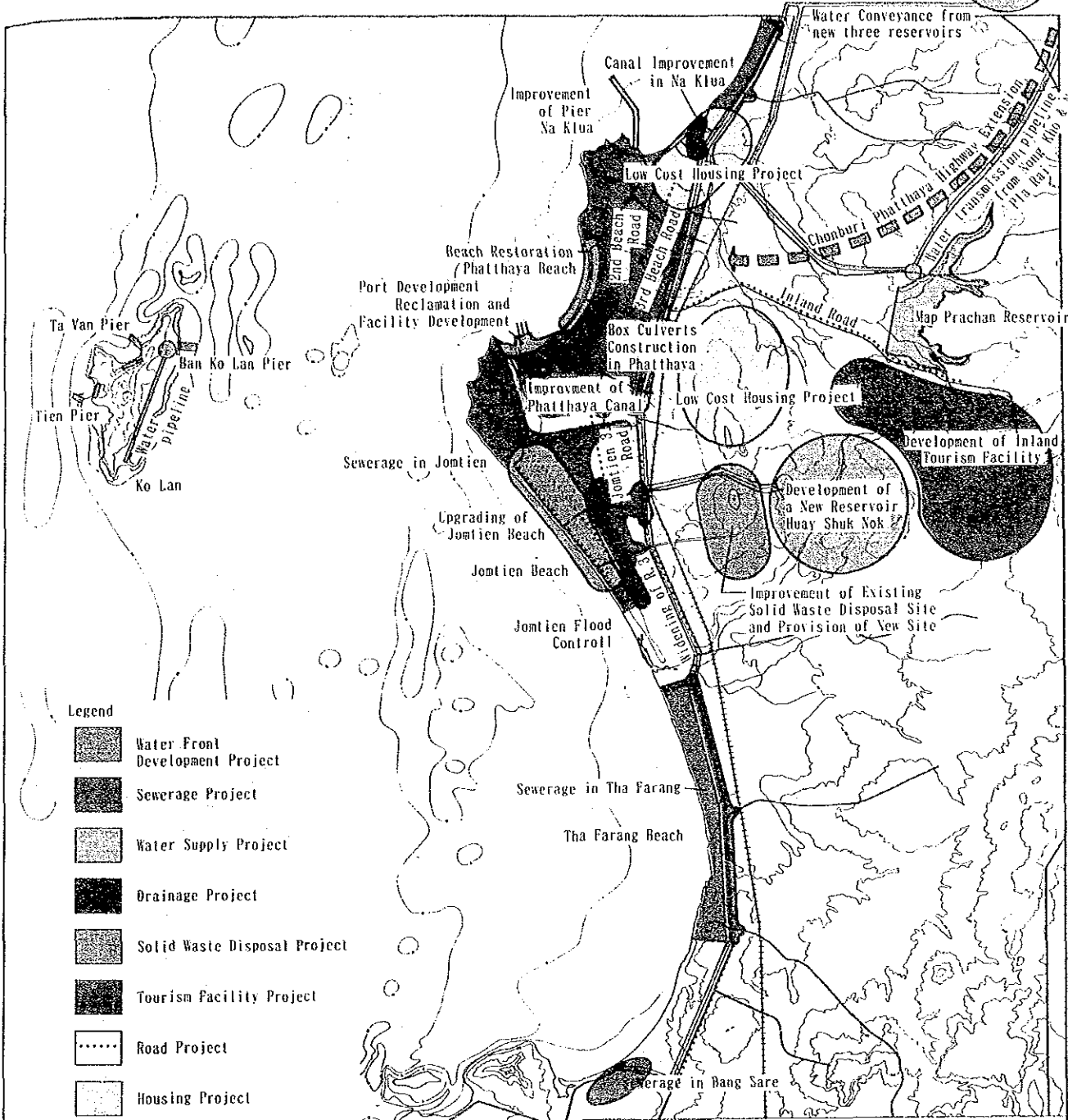
Name of Projects	Location	Outline
④ Other Roads		
· Jomtien Beach Road	Along Jomtien Beach to Chaiyapruk Road.	Widening to 10m, width, Total length : 3,110 m This project is under 1987 plan of Phatthaya City.
· Sukhumvit Road	Phatthaya - Rayong	Widening to 4 lane road, This project is under 1990 plan of DOH.
· Chonburi - Phatthaya new Highway	① Laem Chabang - Route 36, ② Route 36 - North Phatthaya	① Widening to 4 lane road, Total length : 17,400 m ② New construction of 4 lane road, Total length : 7,000 m
· Thapphaya Road	Phatthaya 2 - Jomtien 2	Widening to 4 lane road, Total length : 2,500 m
· Jomtien 2 Road	Thapphaya - Wat Boon	New construction of 4 lane road, Total length : 1,900 m
· Jomtien 3 Road	Theppasit - Wat Boon	New construction of 4 lane road, Total length : 2,100 m
· Wat Boon Road	Jomtien Beach - Sukhumvit Road	Widening to 4 lane road, Total length : 2,200 m
⑤ Intersection Improvements	① Sukhumvit - North Phatthaya ② Sukhumvit - Central Phatthaya ③ Sukhumvit - South Phatthaya ④ Sukhumvit - Wat Boon ⑤ Sukhumvit - Chaiyapruk ⑥ Phatthaya 2 - Central Phatthaya ⑦ Phatthaya 2 - South Phatthaya ⑧ Phatthaya 3 - Central Phatthaya ⑨ Phatthaya 3 - South Phatthaya ⑩ Phatthaya 3 - Thapphaya	① Flyover and signal installation ② Signal installation and geometric improvement ③ Signal installation and geometric improvement, flyover for second stage. ④ do. ⑤ do. ⑥ Channelization and signal adjustment. ⑦ do. ⑧ Signal installation. ⑨ do. ⑩ do.

Table 4.4.8 LONG - LIST PROJECTS ( 8/8 )

Housing Project

Name of Projects	Location	Outline
<p>Low Cost Housing Development Project</p>	<p>Site A is along the new Chonburi - Phatthaya highway in the distance of 5 ~ 10km from the center of the city.</p> <p>Site B is 2 ~ 3km east of Sukhumvit road and approximately 1km further inland from the existing local road.</p>	<p>64 ha. (400 rai) including housing and relevant facilities should be developed for 4,300 units during the year 1989 - 1996.</p> <p>94 ha. (587.5 rai) including housing and relevant facilities should be developed for 6,300 units during the year 1997 - 2006.</p> <p>The half of housing are to be sold and the other half will be rented.</p>

Huay Sapan Reservoir  
 Nong Klong Dong Reservoir  
 Huay Khun Jit Reservoir



THE MASTER PLAN STUDY FOR  
 THE DEVELOPMENT OF PHATTHAYA AREA

JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. 4.4.1 Long-list Projects





Table 4.4.9 TIME TABLE OF DEVELOPMENT

Year	Tourist Arrivals Projection (million tourists)	Long - List Projects								Land Use	
		Waterfront Improvement	Tourism Facilities	Sewerage	Rainwater Drainage	Water Supply	Solid Waste	Road	Urban Facility & Others		
1990	1.6	<ul style="list-style-type: none"> <li>Tourist port is partially commenced</li> <li>Two excursion boat piers</li> <li>Car parking</li> <li>Operation build, etc./5</li> <li>Ta Van Pier</li> <li>Phatthaya beach restoration</li> </ul>		<ul style="list-style-type: none"> <li>Regulations for septic tank/leaching pit</li> <li>Jomtien 1st phase sewerage /1</li> <li>Na Klua 1st phase sewerage /1</li> <li>Phatthaya town 1st phase sewerage expansion</li> <li>Street drainage improvement in Phatthaya town &amp; Na Klua</li> </ul>	<ul style="list-style-type: none"> <li>Phatthaya Canal Improvement</li> <li>Phatthaya Town Box Culvert</li> <li>Puk Plub Canal Improvement</li> <li>Jomtien drainage channel construction</li> </ul>		<ul style="list-style-type: none"> <li>New four reservoirs are constructed. /2</li> <li>Improvement &amp; construction of distribution facility</li> <li>Pipeline</li> <li>Booster pump</li> <li>Distribution reservoir at Khao Phatthaya</li> </ul>		<ul style="list-style-type: none"> <li>Phatthaya 2 widening /3</li> <li>Jomtien beach road restoration /3</li> <li>Sukhmit road widening (Phatthaya - Rayong) /4</li> <li>Phatthaya 3 road</li> </ul>	<ul style="list-style-type: none"> <li>Slaughter house is constructed by PCG</li> <li>Slum improvement</li> </ul>	<ul style="list-style-type: none"> <li>Jomtien beach renewed by beach road restoration</li> <li>Tourism core in phatthaya is developed - 1st</li> <li>Phatthaya beach by beach nourishment restoration and projects</li> <li>Tourism core in phatthaya is developed - 2nd</li> </ul>
1996	2.3	<ul style="list-style-type: none"> <li>Tourist port is implemented</li> <li>One excursion boat pier</li> <li>Terminal build.</li> <li>Boat yard</li> <li>Jetfoil pier etc.</li> </ul>	<ul style="list-style-type: none"> <li>Reclaimed land</li> <li>Commercial build.</li> <li>Event hall</li> <li>Park</li> <li>Library, etc.</li> <li>Restoration of Jomtien beach</li> <li>Inland Tourism Facilities</li> </ul>	<ul style="list-style-type: none"> <li>Phatthaya town 2nd phase sewerage</li> <li>Ta Farang Sewerage</li> <li>Bang Sare sewerage</li> <li>Jomtien 2nd phase sewerage</li> <li>Na Klua 2nd phase sewerage</li> </ul>		<ul style="list-style-type: none"> <li>Transmission pipeline from Nong Kho res.</li> <li>Treatment plant expansion (Map Prachan)</li> <li>Pump station (1st phase)</li> <li>Improvement of distribution facility - 2nd phase</li> <li>Pump station (2nd phase)</li> <li>Treatment plant expansion</li> <li>Construction of distribution facility in Ko Lan</li> <li>Improvement of distribution facility</li> <li>Treatment plant expansion</li> <li>Pump station</li> </ul>	<ul style="list-style-type: none"> <li>Sanitary landfill site</li> <li>Incineration facility in Ko Lan</li> <li>Extension of sanitary landfill site</li> </ul>	<ul style="list-style-type: none"> <li>Chonburi - Phatthaya highway extension</li> <li>Thapphaya road widening</li> <li>Jomtien 2 road</li> <li>Jomtien 3 road</li> <li>Wat Boon road</li> <li>Na Klua Soi 2</li> <li>Pornprapamitr road</li> <li>Sawangtah road</li> <li>Chairpornvithi road</li> <li>Chirapruk 1 &amp; 2 roads</li> </ul>	<ul style="list-style-type: none"> <li>Low cost housing is developed</li> <li>Slum improvement</li> <li>Tourism vocational school is introduced</li> <li>Na Klua market is improved</li> </ul>	<ul style="list-style-type: none"> <li>Jomtien beach upgraded as the new tourism core</li> <li>Inland area is developed as the new tourism core</li> <li>Business core, exhibition core, teleport, etc. are developed in inland area along Chonburi - Phatthaya highway extension</li> </ul>	
2000		<ul style="list-style-type: none"> <li>Ban Ko Lan pier extension</li> <li>Na Klua fishing pier</li> <li>Tien pier in Ko Lan</li> </ul>									
2006	3.2										

Legend

- ◀ Short-list projects
- ◁ Long-list projects & other relevant projects
- ◀◀ Committed projects
- ◻ Public projects
- ◻ Private sector projects

- Remarks :
- /1 Projects already committed by PWD
  - /2 Projects already committed by PWA
  - /3 Projects already committed by PCG
  - /4 Projects already committed by DOH
  - /5 Projects already committed by TAT

# TIME TABLE OF DEVELOPMENT

List Projects							Land Use	Environmental Improvement
⊙ Tourism Facilities	⊙ Sewerage	⊙ Rainwater Drainage	⊙ Water Supply	⊙ Solid Waste	⊙ Road	⊙ Urban Facility & Others		
	<ul style="list-style-type: none"> <li>Regulations for septic tank/teaching pit</li> <li>Jomtien 1st phase sewerage /1</li> <li>Na Klua 1st phase sewerage /1</li> <li>Phatthaya town 1st phase sewerage expansion</li> <li>Street drainage improvement in Phatthaya town &amp; Na Klua</li> </ul>	<ul style="list-style-type: none"> <li>Phatthaya Canal Improvement</li> <li>Phatthaya Town Box Culvert</li> <li>Puk Plub Canal Improvement</li> <li>Jomtien drainage channel construction</li> </ul>	<ul style="list-style-type: none"> <li>New four reservoirs are constructed. /2</li> <li>Improvement &amp; construction of distribution facility</li> <li>Pipeline</li> <li>Booster pump</li> <li>Distribution reservoir at Khao Phatthaya</li> </ul>	<ul style="list-style-type: none"> <li>Sanitary landfill site</li> <li>Incineration facility in Ko Lan</li> </ul>	<ul style="list-style-type: none"> <li>Phatthaya 2 widening /3</li> <li>Jomtien beach road restoration /3</li> <li>Sukhmvit road widening (Phatthaya - Rayong) /4</li> <li>Phatthaya 3 road</li> </ul>	<ul style="list-style-type: none"> <li>Slaughter house is constructed by PCG</li> <li>Slum improvement</li> </ul>	<ul style="list-style-type: none"> <li>Jomtien beach is renewed by beach road restoration</li> <li>Tourism core in south phatthaya is developed - 1st phase</li> <li>Phatthaya beach is restored by beach nourishment, road restoration and other projects</li> <li>Tourism core in south phatthaya is developed - 2nd phase</li> </ul>	<ul style="list-style-type: none"> <li>Congestion in Jomtien beach road is improved</li> <li>Solid waste can be disposed of entirely by sanitary disposal facilities</li> <li>Congestion of sea use can be improved</li> <li>Sea water quality in Phatthaya beach is improved</li> <li>Water shortage is improved.</li> <li>Flood problems are improved</li> <li>Water supply capacity meets demand</li> <li>Housing problems are improved</li> </ul>
<ul style="list-style-type: none"> <li>Reclaimed land</li> <li>Commercial build.</li> <li>Event hall</li> <li>Park</li> <li>Library, etc.</li> </ul>	<ul style="list-style-type: none"> <li>Phatthaya town 2nd phase sewerage</li> <li>Ta Farang Sewerage</li> <li>Bang Sare sewerage</li> <li>Jomtien 2nd phase sewerage</li> <li>Na Klua 2nd phase sewerage</li> </ul>		<ul style="list-style-type: none"> <li>Improvement of distribution facility - 2nd phase</li> <li>Pump station (2nd phase)</li> <li>Treatment plant expansion</li> <li>Construction of distribution facility in Ko Lan</li> <li>Improvement of distribution facility</li> <li>Treatment plant expansion</li> <li>Pump station</li> </ul>	<ul style="list-style-type: none"> <li>Transmission pipeline from Nong Kho res.</li> <li>Treatment plant expansion (Map Prachan)</li> <li>Pump station (1st phase)</li> <li>Extension of sanitary landfill site</li> </ul>	<ul style="list-style-type: none"> <li>Chonburi - Phatthaya highway extension</li> <li>Thapphaya road widening</li> <li>Jomtien 2 road</li> <li>Jomtien 3 road</li> <li>Wat Boon road</li> <li>Na Klua Soi 2</li> <li>Pornprapamitr road</li> <li>Sawangtah road</li> <li>Chairpornvithi road</li> <li>Chiraprak 1 &amp; 2 roads</li> </ul>	<ul style="list-style-type: none"> <li>Low cost housing is developed</li> <li>Slum improvement</li> <li>Tourism vocational school is introduced</li> <li>Na Klua market is improved</li> </ul>	<ul style="list-style-type: none"> <li>Jomtien beach is upgraded as the new tourism core</li> <li>Inland area is developed as the new tourism area</li> <li>Business core, trade exhibition core teleport, etc. are developed in inland area along Chonburi - Phatthaya highway extension</li> </ul>	<ul style="list-style-type: none"> <li>Car parking problem is improved in Jomtien beach</li> <li>Inland area is developed as the new tourism area</li> <li>Sea water contamination in Ban Sare is improved.</li> <li>North Phatthaya &amp; inland area grows up to the business core - New City function</li> </ul>

Remarks : /1 Projects already committed by PWD  
 /2 Projects already committed by PWA  
 /3 Projects already committed by PCG  
 /4 Projects already committed by DOH  
 /5 Projects already committed by TAT



## 2) Effects of Long-list Projects

Beneficial effects to be realized by materializing the long-list projects including short-list ones are tabulated hereunder. It should be noted that figures for 1989 are mostly estimated ones and these for 1996 and 2006 mean "in or before" these years.

### (1) South Phatthaya Land Reclamation

- ① About 19 ha of precious coastal land will be created by reclamation, which is in short supply in Phatthaya.
- ② Environmental conditions will be upgraded by collecting all the sewage from the buildings on the reclaimed land including that from the existing illegal buildings and by filling up the polluted mud on the seabed.
- ③ Introduction of the cultural and artistic facilities, new commercial buildings and sea and land transport facilities will activate the tourism industry.

Beneficial Effects		1996
Reinforcing social service	Park	32,400 m <sup>2</sup>
Enhancing of culture and arts	Indoor/outdoor facilities	51,600 m <sup>2</sup>
Strengthening commerce	Commercial(profitable) facilities	62,900 m <sup>2</sup>
	Car parking	8,900 m <sup>2</sup>

### (2) Tourist Port

- ① Piers will be provided for the excursion boats playing between Phatthaya and Ko Lan, assuring safe and more convenient embarkation and disembarkation for the passengers.
- ② Service for the tourists and visitors will further be upgraded by providing terminal building, car park and bus terminal.

Beneficial Effects	1989	2006
Number of excursion boat passengers (persons/day)/ <u>1</u>	2,300	5,200
Round trips (trips/year)	420,000	960,000

Remarks; 1: Peak daily total.

### (3) Phatthaya Beach Restoration

- ① The existing Phatthaya beach with the marginal width of 10 to 15 meters or less depending on the tidal conditions will be widened to 50 m, providing comfortable beach space for the visitors.
- ② Coastal erosion will be alleviated and environmental condition will be upgraded by filling up the polluted mud on the seabed.

Beneficial Effects	1996	2006
Beach Area (ha)	13.5 (50 m x 2,700 m)	13.5
Visitors (persons/day) / <u>1</u>	55,000	78,000

Remarks; 1: Including day trippers.

### (4) Piers in Ko Lan

Three piers will be constructed in Ko Lan at three distinct locations, two on the west coast will assure the safe and convenient embarkation and disembarkation of the visitors to the island.

In addition, the noise of the longtail boat utilized to transfer the passenger from the tourism boat to the beach will be eliminated so that the calm and silent beach shall be recovered.

One pier on the east shall serve for the commodity transportation in order to upgrade the life level of the local people.

(5) Na Klua Fishing Pier Extension

The existing Na Klua pier will be extended in order to permit all fishing vessels to berth at all states of the tide.

Beneficial Effects	2006
Berth depth	Deeper than 1 m at the lowest low tide

(6) Jomtien Beach Development

In order to accommodate the increasing number of visitors to Jomtien, a Beach Center will be established providing car park as well as bus terminal and commercial facilities.

Beneficial Effects	2006
Parking lot (cars)	2,000

(7) Sewerage

- ① Area and population served by sewerage system will largely be increased.
- ② BOD load discharged will sharply be reduced. Ninety percent of the total waste solid could be eliminated by the sewage treatment plants. Sea water quality is expected to be much improved.

- Population served by sewerage system

<u>Area</u>	<u>1989</u>	<u>1996</u>	<u>2006</u>
Na Klua	-	44,300	56,200
Phatthaya town / <u>1</u>	8,000 / <u>2</u>	51,700	79,500
Jomtien / <u>3</u>	-	24,200	43,300
Tha Farang	-	-	8,000
Bang Sare	-	-	12,500
Total	8,000	120,200	199,500

Remarks /1. Exclusive for Ko Lan  
/2. Population served by existing sewerage system  
/3. Area within the Phatthaya City boundary

- BOD load discharged into water bodies including the rivers and the sea.

<u>Area</u>	<u>Comparison</u>	<u>1989</u>	<u>1996</u>	<u>2006</u>
Na Klua	①	1,200	200	270
	②	1,200	2,000	2,700
Phatthaya town	①	1,500*	550	800
	②	1,500*	3,160	5,660
Jomtien	①	100	200	420
	②	100	2,000	4,200
Tha Farang	①	-	460	100
	②	-	460	1,000
Bang Sare	①	240	290	35
	②	240	290	350
Total	①	3,040	1,700	1,625
	②	3,040	7,910	13,910
Rate of eliminated load	$(1 - \frac{①}{②})\%$	-	78.5	88.3

Remarks ① : With projects condition

② : Without projects condition

unit : Kg/day for average day flow during peak tourist season.

\* : Including the effect of existing sewerage and these under construction.

#### (8) Rainwater Drainage

Drainage area will be widened and the protection level will be raised against floods of 5 year return period.



Beneficial effects	Area	1996
Incremental drainage area (km <sup>2</sup> )	Na Klua	2.6
	Phatthaya town	12.1
	Jomtien	12.5
	Total	27.2
Improvement of protection level in the existing city area (km <sup>2</sup> )	Na Klua	0.14
	Phatthaya town	1.32
	Jomtien	1.20
	Total	2.66
Creating new safety zone in the lower area (km <sup>2</sup> )	Na Klua	0.79
	Phatthaya town	1.55
	Jomtien	4.38
	Total	6.72

Remarks 1. At present, drainage facilities are partially equipped, however, in general, drainage condition is still in low level.

#### (9) Water Supply

- ① Service area will be expanded and more people will be provided with hygienic piped water.
- ② More stable supply will be ensured during dry period and drought by constructing additional raw water reservoirs and the transmission pipeline.

Beneficial effects	Area	1989	1996	2006
Increase of Population served by piped water	Na Klua*	24,900	38,600	56,500
	Phatthaya town	26,000	46,500	77,400
	Jomtien	5,300	15,500	33,300
	Tha Farang and Bang Sare	-	8,200	12,400
	Total	56,200	108,800	179,600
Improvement of Service ratio (%)	Na Klua*	49	64	77
	Phatthaya town	49	64	77
	Jomtien	49	64	77
	Tha Farang and Bang Sare	-	42	62
	Total	42	62	76
Widening of Service Area (km <sup>2</sup> )	Na Klua*	8.8	12.0	12.5
	Phatthaya town	8.4	14.6	16.0
	Jomtien	6.3	8.8	16.8
	Tha Farang and Bang Sare	-	4.2	9.2
	Total	23.5	39.6	54.5

Remarks \* : Figures for Ban Rong Po and Nong Preo which are located outside the Phatthaya City, are included in those of Na Klua.

#### (10) Solid Waste Disposal

- ① Total population of the Study Area will be provided with collection service.
- ② Sanitary disposal systems of sanitary landfill and incineration will be adopted instead of present open dumping.

- Disposal quantity and population served

Area	Quantity, Service for	1989	1996	2006
Phatthaya*	Population (10 <sup>3</sup> )	100	140	200
	Tourist (10 <sup>3</sup> /y)	1,609	2,281	3,241
	Quantity (ton/d)	107	172	289
Tha Farang and Bang Sare	Population (10 <sup>3</sup> )	19	20	20
	Quantity (ton/d)	13	17	21
Total quantity disposed of (ton/d)		120	189	310

Remarks \* Including Na Klua, Phatthaya town and Jomtien.

(11) Road

Through the upgrading of the road network including intersection improvement, traffic congestion will be much improved.

Area	Improvement Indices	2006		Improvement (%)
		Without Improvement	With Improvement	
Study Area	- Trips accommodated	21,765	25,265	16
	- Average distance	7.12 km	7.62 km	7
	- Average travel time	12.1 min.	11.2 min.	7
	- Average speed	35.7 km/h	40.8 km/h	14

(12) Housing

Housing project will accommodate all low income families and half of medium income families by 2006.

- Number of families accommodated.

Income Group	1989~1996	1997~2006	1989~2006
Medium income family	2,100	2,700	4,800
Low income family	2,200	3,600	5,800
<b>Total</b>	<b>4,300</b>	<b>6,300</b>	<b>10,600</b>

## 4.5 Selection of Short - list Projects

Among the long - list projects selected for the Integrated Development for Phatthaya, short - list projects having higher priority for implementation are selected by means of the evaluation criteria given in Table 4.5.1

Table 4.5.1 EVALUATION CRITERIA

	<u>Marking</u>	<u>Aspects to be assessed</u>
1. Environmental Quality Control Effect	1 = Negative effect. 2 = Neutral effect or 3 = Positive effect	<ul style="list-style-type: none"> <li>- Marine, nearshore and estuary water quality control</li> <li>- Water quality control for drains and rivers</li> <li>- Groundwater quality control</li> <li>- Air quality, noise and odor control</li> <li>- Soil conservation/erosion control</li> <li>- Forest conservation</li> <li>- Wildlife conservation</li> </ul>
2. Amenity Improvement Effect	1 = Negative effect. 2 = Neutral effect or 3 = Positive effect	<ul style="list-style-type: none"> <li>- Improvement of natural and urban beauties (beaches, shores, rivers, estuaries, appearance of city, etc.)</li> <li>- Increase of open space/green space</li> <li>- Preservation of historical or cultural valuables</li> <li>- Increase of comfortable environment, amenities and convenience for visitors</li> </ul>
3. National/Regional Development Effect	1 = Low impact 2 = Medium impact or 3 = High impact	<ul style="list-style-type: none"> <li>- Enhancement of tourism sector development</li> <li>- Increase of output in production in industries, particularly tourism-supporting industries and service industries for ESB region</li> <li>- Foreign exchange earnings/savings</li> <li>- Employment generation</li> <li>- Population re-distribution</li> <li>- Land enhancement</li> <li>- Reduction of disaster damage</li> </ul>
4. Social Well-being Effect	1 = Low impact, 2 = Medium impact or 3 = High impact	<ul style="list-style-type: none"> <li>- Public health and safety</li> <li>- Educational opportunities</li> <li>- Cultural and recreation opportunities</li> <li>- Income distribution</li> <li>- Increase of emergency preparedness</li> <li>- Alleviation of urban nuisance</li> </ul>
5. Practicability and Urgency of Implementation	1 = Difficult/Negative 2 = Neutral or 3 = Easy/Positive	<ul style="list-style-type: none"> <li>- Land acquisition</li> <li>- Institutional practicability</li> <li>- Funding/budget allocation</li> <li>- Legal proceedings</li> <li>- Coordination and cooperation</li> <li>- Technical practicability</li> <li>- Resource availability</li> <li>- Urgency</li> </ul>

## V. RECOMMENDATIONS ON PLAN IMPLEMENTATION

### 5.1 General

Recommendations are made with regard to institutional, financial and legal settings with a view to modifying the present settings so that the Integrated Development Plan for the Phatthaya Area proposed in the Study become practicable and can be brought into reality. Implementation plan including institutional, financial and legal recommendations for the priority projects is given in Chapter VII and in this chapter recommendations are made for the Integrated Development Plan with middle range and long range perspective with the target year of 2006.

It is intended that recommendations are confined to these having direct relevance to Phatthaya. The institutional and financial as well as legal issues, however, are national in nature, involving the central and local administrations as well as private entities. The recommendation ought to, therefore, affect the overall settings. It should also be noted that the recommendations are of preliminary nature prepared based on a sectoral study of the Master Plan Study for the Development of Phatthaya Area.

Detailed study and examination, therefore, should be conducted by the Thai Government and people concerned for each issue. Level of appropriate decentralization and autonomy of the local governments including PCG should also be decided as a part of the Government policies. For the purpose of the Master Plan, it is assumed that the Government policy is to further promote decentralization in the country in principle.

### 5.2 Institutional, Financial and Legal Aspects

#### 5.2.1 Institutional

- (1) Clear Demarcation of Duties and Powers between PCG and Central Government.

#### Recommendation

Demarcation of duties/responsibilities and powers between PCG, the Central Government and State Authorities should clearly be defined and

agreed among these concerned, particularly in the field of the development, operation and maintenance of the infrastructure facilities.

One possible distribution of duties may be as follows:

<u>Field</u>	<u>Development</u>	<u>Operation/Maintenance</u>
◦ Water supply	Central	Central
◦ Electricity	Central	Central
◦ Telecommunication	Central	Central
◦ Sewerage	Central	PCG
◦ Drainage	Central	PCG
◦ Solid waste	PCG or Central	PCG

- (2) Upgrading of Coordination and Cooperation between PCG and the Central Government Regional Offices

Recommendation

With a view to more effective and efficient planning and implementation as well as operation and maintenance of infrastructure facilities, stronger coordination and cooperation among PCG, regional offices of the State Authorities and the Central Government should be promoted. It may be advisable that:

- i) PCG should be authorized to confer with the regional offices on the infrastructure development particularly during planning and budget preparation stages ;
- ii) PCG should be authorized to give instructions to the regional offices with regard to certain matters which would not accompany direct expenditure.

- (3) Strengthening of PCG staff

Recommendation

Aiming at fulfilling the role of international tourist city and the business center of Eastern Seaboard region, PCG staff should sharply be reinforced. The present system for determining the number of civil servants which is based on the size of registered population should be

revised so that actual number of residents as well as number of tourists can be taken into account.

(4) Reinforcement of Police Strength and PCG's Authority

Recommendation

Strength of the police including Tourist and Marine Polices should sharply be enhanced based on the actual population and number of tourists visiting Phatthaya. The police in charge of Phatthaya should directly belong to the City and should be under the direct supervision of the City Manager. They should receive their salary from the City, though they may be appointed and transferred by the Police Departments.

(5) Enhancement of Self-government of Phatthaya City

Recommendation

At the national level, necessity and appropriateness of the enhancement and promotion of self-government of the Phatthaya City should be examined from institutional, financial and legal viewpoints. In particular:

- i) The appropriate level of the control by the Central and Provincial Governments should be examined;
- ii) The current composition of the City Council members, i.e., nine by election and eight by appointment by the Minister for Interior should also be examined.

(6) Amendment of City Manager System

Recommendation

As short-range measures to make the city manager system to function more effectively, the following amendments may be advisable:

- i) Enhancement of the power of the City Manager including personnel authority;



- ii) Clearer definition and demarcation of the responsibilities between the Mayor and the City Manager;
- iii) Modification of the screening and appointment procedure of City Manager including establishing a Search Committee to find and propose the candidates of City Manager;
- iv) Changing the name of City Manger which is up to now called "Palad Muang (Permanent Undersecretary)" to Nayok Muang (Governor or Director) and to change the name of the presently called Mayor to Council Chairman;
- v) Extending the term of the Mayor from the current 2 years to the same as City Manager, i.e., 4 years;
- vi) Increasing the authority of the City Manager with regard to the expenditure.

It may be advisable to establish an ad-hoc committee in order to examine the suitability of the city manager system and assess the necessity of reform including replacing it by another system.

#### (7) Organizational Reform of PCG

##### Recommendation

The organizational structure of the Phatthaya City should be revised so that an office called "Office of Permanent Undersecretary" is set up under the supervision of the City Manager. The Permanent Undersecretary should be a permanent official and his status should be equivalent to the Municipal Permanent Undersecretary. He should be the direct supervisor of all the divisions and should screen the administrative matters for the consideration of the City Manager.

#### 5.2.2 Financial

##### 1) Upgrading of the Existing Financial Facilities

###### (1) Reassessment of the Revenue Requirement of the Phatthaya City

##### Recommendation

Based on the demarcation of the duties and powers for the administration of Phatthaya, the revenue requirement for the City should be reassessed. The necessity and degree of enhancing the autonomous revenues as well as its measures should also be examined. DOLA of MOI, Revenue and Excise Department of MOF and PCG as well as other departments and agencies concerned should be involved for the reassessment.

- (2) Enhancement of the Total and Autonomous Revenues of the Phatthaya City

Recommendation

The current level of the total revenues of the City which is 147.2 million bahts in 1988 seems not sufficient considering the huge requirement for the infrastructure development. The amount and the share of the autonomous revenues which is 39.9 million bahts or about 27% of the total also seems low to take prompt actions against swiftly degrading conditions of the environment.

- (3) Examination of Locally-Levied Taxes

Recommendation

The locally-levied taxes, particularly the house and land tax which is the biggest tax revenue item among all the taxes, should be examined including tax exemption and reduction clause and reflecting the actual market value of the land appurtenant to the house. Taxation rates of the local development tax should also be examined.

- (4) Examination of Surcharge Taxes

Recommendation

Phatthaya City is legally authorized to add a surcharge of up to 10% to such national taxes as business tax, gambling tax and liquor tax. To enhance the financial base of the City, it is recommended to increase the surcharge rate.

(5) Examination of the Allocation Rule of Shared Tax

Recommendation

It may be advisable that the present allocation rule by which the Phatthaya City receives one twelfth of the total collected in the Chonburi Province of the vehicle tax which is a shared tax, should be examined from the viewpoints of the contribution of each local government to the tax generation as well as the revenue requirements.

(6) Examination of Collection Fee for Tax Collection

Recommendation

Surcharge taxes are collected by the local representative of the Revenue and Excise Department, MOF and 5% of them is deducted for covering collection expenses. It may be advisable that whether or not the present collection fee is appropriate compared with the actual expenses should be examined.

(7) Improvement of Tax Collection Rate

Recommendation

In order to improve the current low level of tax collection rate, it is advisable that various countermeasures should be taken including:

- Strengthening of tax map and property registration systems;
- Reinforcing the competent personnel of PCG for collecting locally-levied taxes as well as preparing collection manuals and necessary equipments;
- Ensuring stronger coordination among the departments and divisions of the Central Government and PCG for tax collection.

(8) Augmentation of the Central Government Grants for Subsidy

Recommendation

It is advisable that the special grant given from the Central Government to be used for supplementing the development expenditure of the Phatthaya City should substantially be increased from the current 30 to 40 million bahts level, considering the urgent need for the public sector

investment on infrastructure development as well as the contribution of the Phatthaya City to tax revenue of the Central Government.

It is also advisable that the general grant should be increased by increasing per head grant from the current 60 bahts taking into account the various factors including inflation and by being based on the actual population rather than the current registered population basis.

(9) Examination of the Levels of the Fees for Utilities

Recommendation

It is advisable that the sewerage service fee should be established and collected from the beneficiaries or people and entities. The level of the fee should be determined, taking into account an appropriate level of cost recovery and the principle of beneficiary-to-pay. The sewerage fee may be collected as a surcharge of water charge. The level of the solid waste and nightsoil collection fees, which is at present far below the level to meet operation and maintenance costs, should also be examined.

(10) Flexible Use of Income Receiving Facilities

Recommendation

According to APCA, besides the tax and grant revenues, Phatthaya City may receive:

- incomes from commercial undertakings of Phatthaya City;
- incomes from the sale of bonds after the approval of MOI and MOF has been obtained and ordinance thereof has been enacted;
- loans after the approval of MOI and also that of MOF in case of foreign loan;
- incomes from properties of the State or State enterprises which engage in the business for the profits in Phatthaya City.

It may be advisable to use these financial facilities flexibly particularly from the viewpoint of tourism promotion and strengthening the business function of the City as the center of ESB region, taking into account the feasibility of the undertakings, repayability of loans and bonds as well as the management capacity of the City.

## 2) Introducing New Financial Facilities

### (1) Allocation of Income Taxes

#### Recommendation

Corporate and income taxes are national taxes and are not allocated to the local governments including PCG. In order to enhance the revenue base, it may be advisable to allocate a portion of the collected revenues to the local governments based on the tax generation and the needs of the local communities.

### (2) Introduction of Environment Conservation Tax

#### Recommendation

In order to upgrade promptly the environmental conditions of Phatthaya, it is recommended to introduce an Environment Conservation Tax having the characteristics that:

- The collected tax revenue should be used for improving the environmental conditions of Phatthaya including water quality and sanitary conditions;
- This tax should be a local tax applicable only to Phatthaya, the PCG being tax collector and receiver of the revenues as well;
- This tax should be an indirect tax, private enterprises being direct tax payers who lay the equivalent sum on the users of facilities and consumers;
- This tax is imposed for a specified period during which the purpose of the tax should be attained.

### (3) Introduction of Property Tax

#### Recommendation

The present house and land tax is based on the rental value of the buildings and the land appurtenant to the buildings. In order to directly reflect the enhanced value of the real estate of Phatthaya on the City's finance, it may be advisable to introduce the property tax system,