# 4.2 STRUCTURING REGIONAL DEVELOPMENT SYSTEM

## 4.2.1 Concept of Regional Development System

Decentralization of Bangkok is a basic policy for the national economic and social development in Thailand as described repeatedly. The existing scenario to tackle this aim can be appreciated and contains the following strategies:

- Development of Bangkok Metropolis and its vicinity based on restructure of the industries' allocation system.
- 2) Specific development of the Eastern Seaboard for an industrial complex in order to alleviate the concentration of investments in Bangkok Metropolis.
- 3) Encouragement of regional urban growth so as to equally distribute development benefits to the rural areas.

The strategy of 1) is necessary to solve the problems held by a metropolis itself, and a concrete development plan within more than a 50 kilometer radius area should be established as soon as possible.

The strategy of 2) is expected to become an effective countermeasure against too much concentration of investment in Bangkok Metropolis. However, it seems that it will take decades to contribute to the decentralization of population and to change the human settlement pattern. Because the human settlement cannot be realized until a various urban activities system, supporting industrial and living sectors is well-developed, a sufficient time should be provided for achievement of such an urban system, including social and cultural functions and amenities.

As the most effective measure, the policy of 3) should be strongly promoted. There are three reasons why this policy is significant, as well as effective. One is the existing structure that most migrants into Bangkok Metropolis, about more than 40 percent of them, are from regional areas far from Bangkok. Another is the characteristic of step-migration as examined in section 2.2.2. The other is that some major regional centers have steadily been endowed with comprehensive capability as regional economic centers.

Basically it might be conceivable that concentration on Bangkok is a phenomenon caused by the difference in income between Bangkok and the other regions.

However, nowadays some facts actually have revealed that this theory is not necessarily correct.

First, the difference of disposable income has become slight between Bangkok and the other regions because of high expenditure for housing in Bangkok, even if the differential in terms of per capita income is still large.

Second, the agglomeration economy in Bangkok Metropolis has not been necessarily beneficial, but a decrease of productivity has emerged. At the same time, a social problem of the gap between the wealthy and the poor has become serious due to an imbalanced goods and money distribution system in the metropolitan area.

These phenomena seem to decrease dominant advantage of Bangkok Metropolis. Simultaneously this will contribute to enlarge a possi-bility of accelerating growth of the regional urban centers, if the regional urban centers can deliberately utilize those potentials so as to activate urban activities under a well coordinated relationship between the centers' hierarchy and hinterland (we say, "regional development system").

An appropriate structure with urban centers and their hinterlands can become a basis for facilitating effective regional economic growth, and it is an ideal that the urban services can be received with minimum time and transportation costs at any place within its hinterland.

The formation process of the regional development system is conceiv- able as shown in Figure 4.2 and as follows:

First Stage: Encouragement of the growth pole centers planned in the Fifth Five-Year Development Plan is the first step in tackling the regional development. It should be given high priority not only to strengthen the industrial and economic basis in some strategic regional growth poles with high potentiality for urban developments, but also to incorporate their hinterlands' activities into the major structures of regional economic development. To enable to orderly form these economic development systems, concentration of investments into these growth poles is indispensable until establishment of their self-sustaining growth system. In the South, only Hat Yai/Songkhla is designated to be the regional growth center. But it can be evaluated that Phuket and Surat Thani have an urban potential and locational significance sufficient to meet with the policy of the regional growth pole. In this sense, a dualistic regional structure is strategically conceivable as shown in Fig. 4.3.

One is "three growth ploles" structure proposed based on a national strategic view-point that it is necessary to create a system to govern goods distribution and economic management functions.

Another is "axes and ladder" structure which emerges inevitably from historical change of regional structure in the South. This structure aims at functionally combining intraregional socio-economic activities.

Second Stage: After formation of regional economic development systems centering on major growth poles, the lower order cities should be developed in order to form subregional economic unit system. The second-generation growth centers in the Fifth Five-Year Development Plan will play a major role in forming these subregional systems. Taking into account the long term scheme of the South, in addition to Surat Thani and Phuket, a few major centers such as Nakhorn Si Thammarat, Trang and Yala should be designated as second-generation growth centers.

Third Stage: Centers to supplement the secondary order centers at the lower level and to contribute to local consumption and productive activities should be facilitated. The unit formed at this level is easy to manage administratively and possible to provide the service necessary for the residents' daily activities. Furthermore, at this stage, the lower order community units at muban - tambon - amphoe levels should be incorporated in an orderly settlement system, so as to support the above subregional economic unit system.

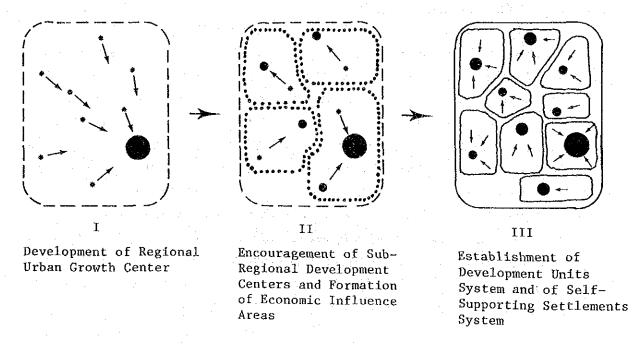


Fig. 4.2 STEPWISE DEVELOPMENT PROGRAM OF REGIONAL DEVELOPMENT SYSTEM

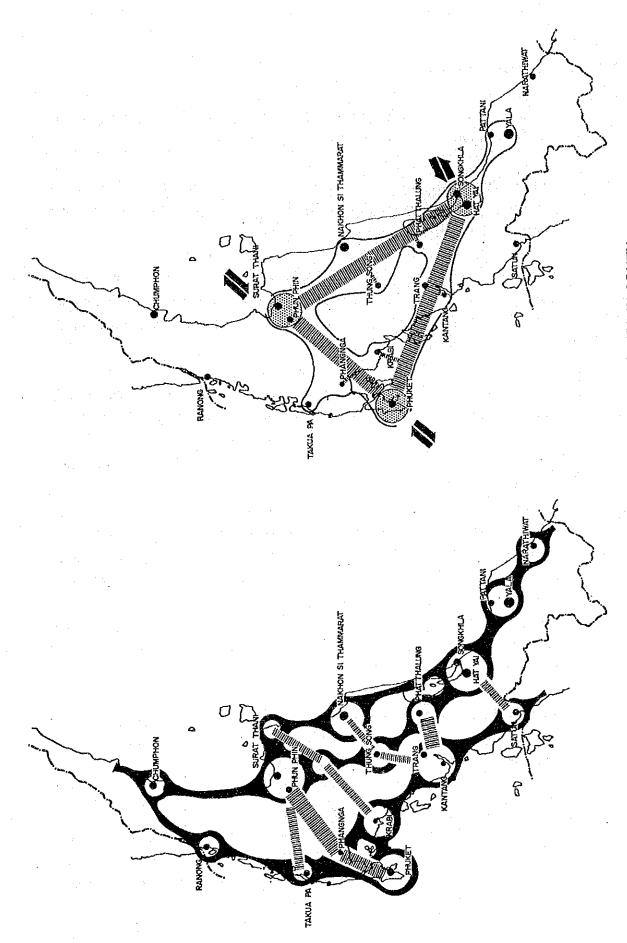


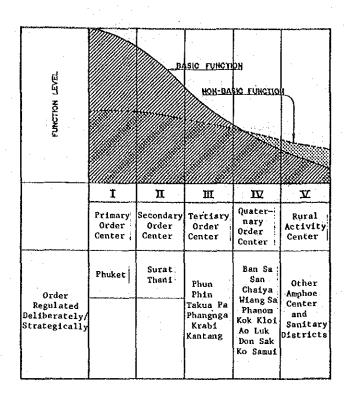
Fig. 4.3 CONCEPTUAL REGIONAL STRUCTURE IN SOUTH

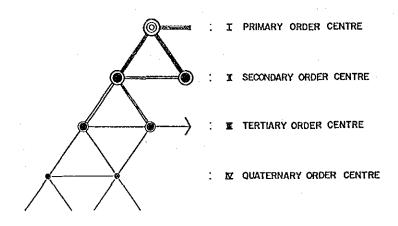
# 4.2.2 Regional Development Structure in Upper South

Based on the above discussion, we propose an ordering system for the centers' hierarchy related to the regional development structure as follows.

- Primary Order Center (POC): this center should be developed in order to function as a primary center serving the various activities within the whole region. In the Upper South, Phuket is worthy to be ranked at this order.
- Secondary Order Centers (SOC): this center, say, Surat Thani in the Upper South, should be developed in order to function as a main center serving for its subregional economic influence area. In this subregion, an economic self-supporting system should be established.
- Tertiary Order center (TOD): this center, following the secondary order center, should be developed in order to function as a center serving its industrial and living unit. Most of all residents' daily activities should be satisfied within this unit. In the Upper South, Takua Pa, Phangnga, Krabi, Kantang and Phun Phin are to be designated at this order.
- Quartenary Order Center (QOC): in order to supplement the functions of Tertiary Order Center, this center should be strategically strengthened and expected to function, not only as a fundamental center of community activities, but also as a service center for rural production and distribution. Major amphoe center or the intermediate centers at significant locations are to be incorporated into this center level: Ban Na San, Chaiya, Wiang Sa, Phanom, Khok Kloi, Ao Luk, Dan Sak and Ko Samui.
- Rural Acitivity Center (Other Settlement Center): the community of amphoe functions as a basic unit for living, social, productive activities. The lower order settlement units such as muban and tambon should be structured orderly within this amphoe unit. All the centers of amphoe, at least, are situated at this center level.

It is another important concept in this ordering system that the level of functions are to be developed in accordance with level of centers; i.e., the POC and SOC should have the facilities at a higher level of basic functions. The concept is as shown in Figure 4.4.





## CLASSIFICATION OF CONNECTORS

: MAJOR ARTERIAL CONNECTOR
: ARTERIAL CONNECTOR
: REGIONAL CONNECTOR
: LOCAL CONNECTOR

Fig. 4.4 CENTER ORDERING AND COMMUNICATION SYSTEM

As for a communication system between these centers, it is a basic idea that a communication between higher order centers should have a higher level linkage in response to the degree of the center levels as shown in the same figure.

Regarding the subregional development structure the Upper South is basically composed of four areas of economic influence centering on Surat Thani, Phuket, Krabi and Takua Pa with the following planning issues:

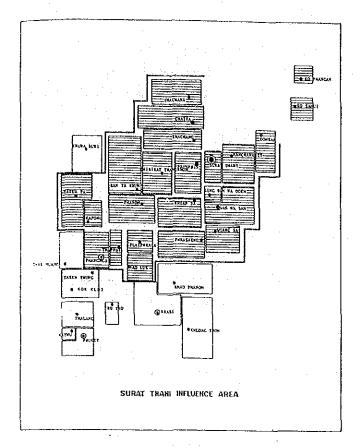
- Surat Thani Influential Area with a wide variety of agricultural and industrial activities;
- Phuket Influential Area with international activities supported by agricultural, mining, industrial commercial and tourism activities;
- Krabi Influential Area with vast agricultural potential areas and energy resources; and
- Takua Pa Influential Area with an issue to rehabilitate the mining lands as well as activities toward establishment of a new industrial structure.

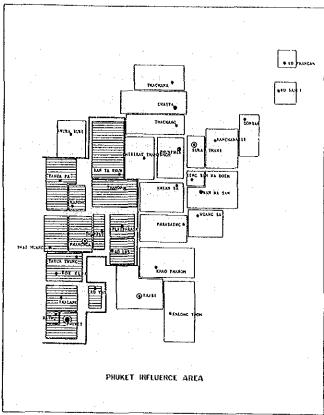
This composition of four subregions is derived from the following considerations and analysis.

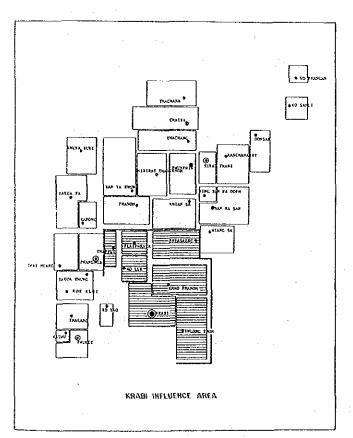
The most effective criteria to identify the economic territory of major urban centers is to know the extent of area covered by two hours travel by car, for the following reasons:

- a) One-day goods collection/distribution is possible within this extent. According to a result of the field survey carried out in this study, average loading and waiting time of trucks is about four hours. It will make an one-day transport activity by adding this four hours to the round trip time of four hours.
- b) This extent indicates an appropriate business area that salesmen can definitely govern, according to a result of the hearing from cardealers.

Figure 4.5 shows the area covered with two hours travel from Phuket and Surat Thani. As shown in these figures, these two centers cannot cover all the Upper South, but the northern part of Takua Pa and Krabi and its adjacent areas remain outside of those territories. Actually the economic activities in these areas seem to depend rather on Takua Pa or Krabi than Phuket and Surat Thani as understood from the results of







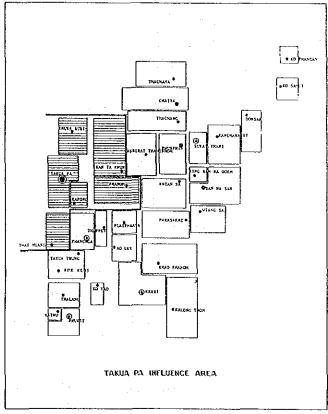


Fig. 4.5 COMPOSITION OF ECONOMIC INFLUENCE AREAS OF MAJOR URBAN CENTERS IN UPPER SOUTH

the questionnaire survey which asked amphoe officers what amphoe is most related to their amphoe in socio-economic activities as shown in Figure 4.6. Hence, two subregional economic units can be recognized in the Upper South, such as Takua Pa and Krabi.

## 4.2.3 Settlement System in Upper South

In the structure of human settlement system, the center of amphoe seems to play a role as a significant settlement center to support socio-economic activities in the rural hinterland. An emphasis, therefore, should be given to encouragement of this center in a regional planning. Especially eight intermediate centers ranked at quaternary order centers will function to combine the rural socio- economy with the urban one.

A human settlement system with center hierarchy and its hinterland in the Upper South is proposed as shown in Figures 4.7 and 4.8, and 4.9 based on the preceding and following studies:

- Existing structure of the settlement system at the lower level is composed of the minimum social unit of a village (muban) with an average population of 600 to 900, the neighbourhood unit of tambon with an average population of 4,000 to 6,000, and the community unit of amphoe with around a 20,000 to 30,000 population as shown in Figure 4.10.
- i) Muban Center: Mainly social facilities such as a temple and a meeting plaza are located here. But the function as a center is not definite.
- ii) Tambon Center: Primary school, agricultural office, temple, shop providing daily commodities, simple gas station and the tambon administrative office are located here and this center functions as a rural community center.
- iii) Amphoe Center: Generally various facilities necessary for daily lives plus administrative offices are located at this center. This center provides all types of services, but not at a high level, for rural people, and it is generally composed of the following facilities:

Administration: Amphone Office, Agricultural Office, Land Development Office, Police Station, Post and Telegraph Office, etc.

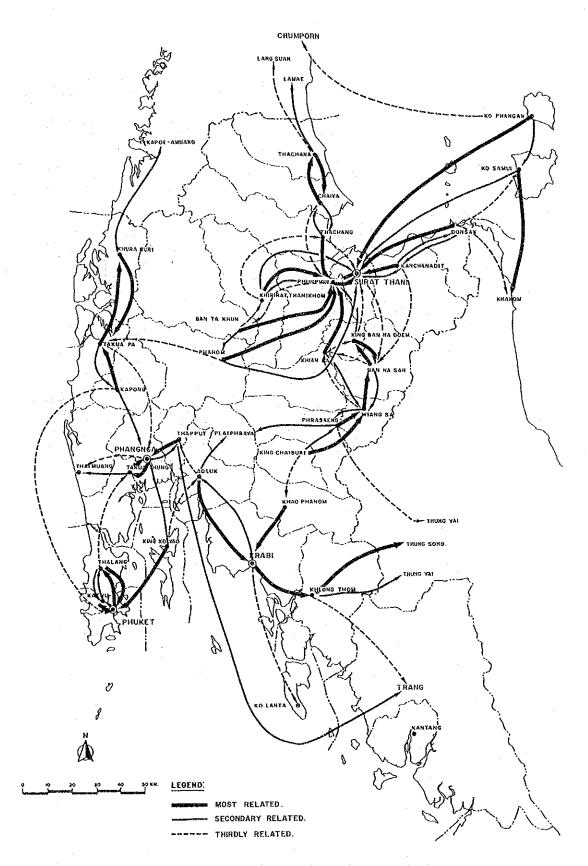


Fig. 4.6 SOCIO-ECONOMIC RELATIONSHIP BETWEEN DISTRICTS (BASED ON THE QUESTIONNAIRE SURVEY)

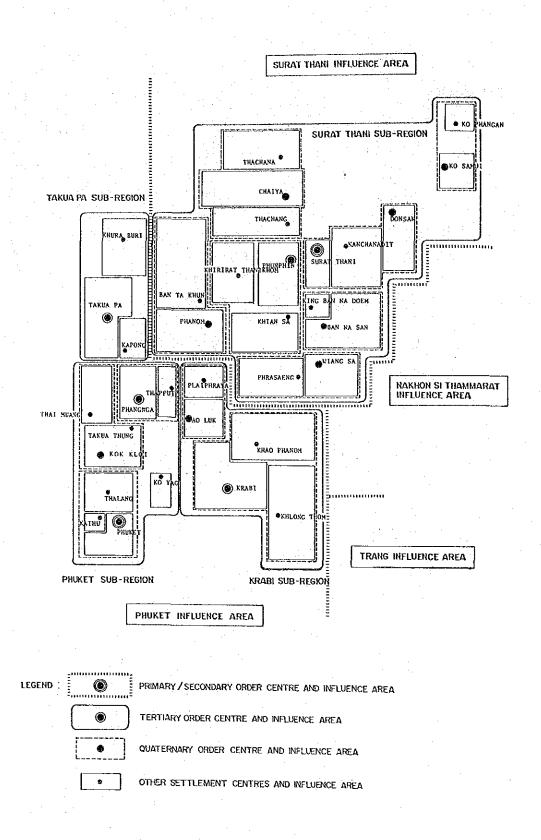


Fig. 4.7 SETTLEMENT HIERARCHY SYSTEM IN UPPER SOUTH

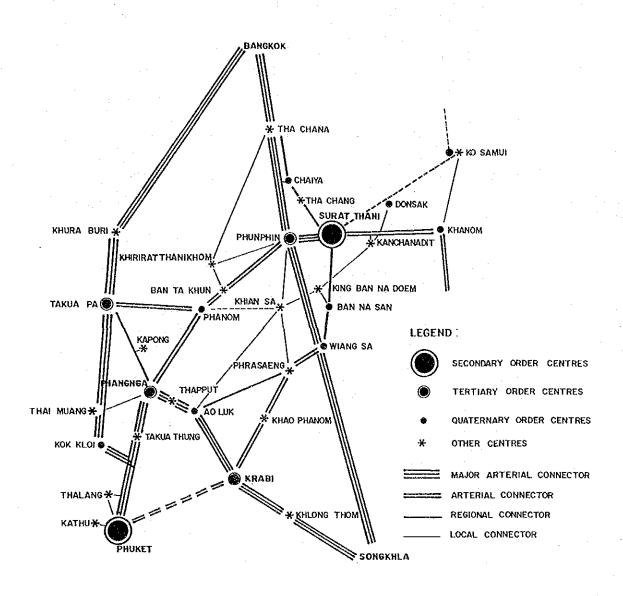


Fig. 4.8 STRUCTURE OF COMMUNICATION NETWORK

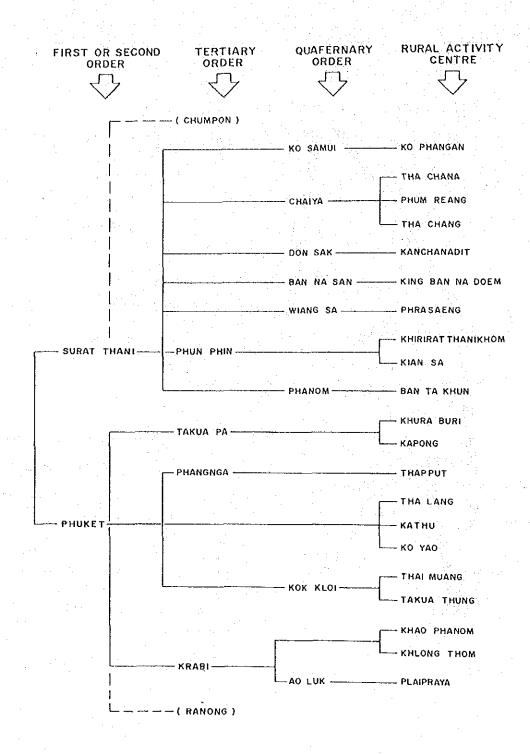


Fig. 4.9 COMPOSITION OF CENTER HIERARCHY

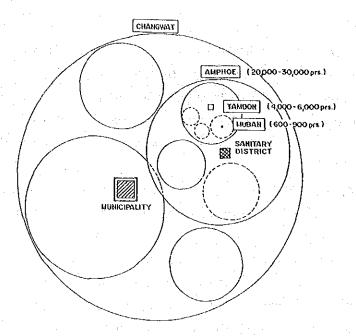


Fig. 4.10 SETTLEMENT AND CENTER HIERARCHY SYSTEM

Medical:

Hospital with 10 to 30 beds or Health Care Center

Education:

Primary School, Lower Secondary School

Social Education:

Public Library (not all)

Recreation:

Movie Theater, Public Park (not all)

Commercial:

Local Market, Gas Station, Durable Goods Shop, Tailor,

Barber, Motor Shop, Gold Dealer (not all), etc.

The population distribution pattern in 2000 is assumed as shown in Figure 4.11. Large settlements in 2000 are the areas centering on Surat Thani Urban Center, or Surat Thani Metropolitan Area, and Phuket and Krabi Areas. The service centers supporting development of the Central Lowland such as Wiang Sa, Phrasaeng, Ao Luk are assumed to experience comparatively large population increase. As a whole, the growth rate of urban population, during coming two decades is assumed to be 5.7 percent per annum, while that of rural population is two percent per annum.

Guideline of settlement centers development: Settlement centers classified into four categories should developed so as to foster their own particular functions in response to their order level. For that purpose, it should be the first consideration that what kind of endowments of each center should be highlighted for the future development, and the next is that what urban functions should be intentionally strengthened in respose to the level of center. Figure 4.12 shows our proposal of development strategies as a guideline based on the above considerations.

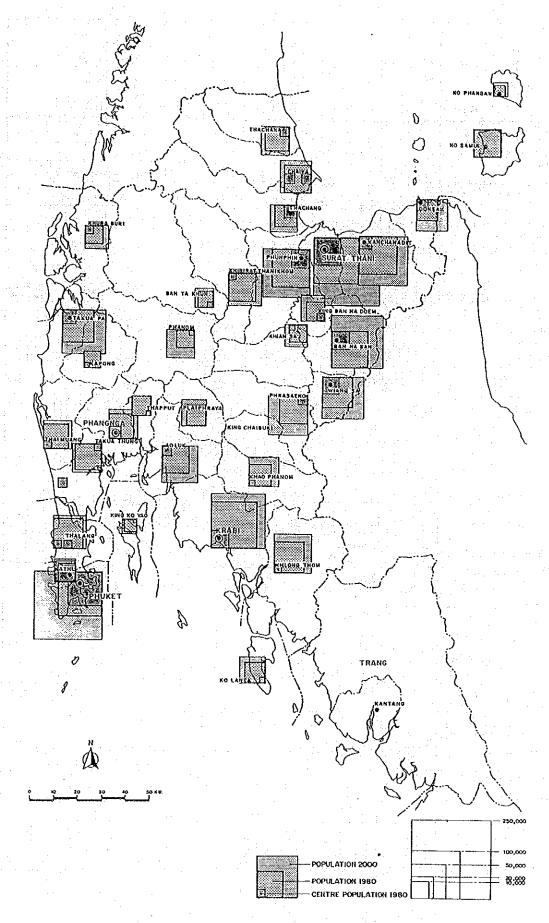


Fig. 4.11 POPULATION DISTRIBUTION PATTERN (1980-2000)

Fig. 4.12 DEVELOPMENT STRATEGY OF URBAN CENTERS BY CENTRALITY ORDER

|                      | ******                           | Š  | <b>-</b>     |        |             | pekseterak<br> |                        |        |            | DISTRICT                     | <b>-</b>              | ×        |       |         |            |               |                      | DISTRICT               |       |        |          | - Hyk J                  |         |          |
|----------------------|----------------------------------|--|--------------|--------|-------------|----------------|------------------------|--------|------------|------------------------------|-----------------------|----------|-------|---------|------------|---------------|----------------------|------------------------|-------|--------|----------|--------------------------|---------|----------|
| ]<br> <br> <br> <br> |                                  | REMARKS  | MUNICIPALITY | =      | =           | •              |                        | ;<br>; | 3          | SANITARY D                   | MINICIPALIT           | 1        |       | 1       | *          | B             | •                    | SANITARY               | *     | ŧ      |          | ±                        | Ť       | 1        |
|                      | 2                                | НТИОМ - СВОМТН<br>1 (%)<br>( 2000 (1980 )          | 5.0          | 5.0    | 6.0         | 6.0            | 0.                     | . 0.4  | 4.0        | 6.0                          | 4,5                   | 4.5      | 5.5   | 4.0     | 6,0        | 4.0           | 5.5                  | 0,4                    | 5.5   | 1      | 4.0      | 6.0                      | 0.4     | 0,4      |
| MOITA CINA BOIL      | ANICAL                           | SOOO POPULATION<br>ESTIMATION (THOUSAND)           | 180,2        | 248.1  | 145.8       | 5.8            | 138.5                  | 105.4  | 103,4      |                              | 20.0                  | 16,4     | 42.4  | 28.0    | 72.2       | 42.9          | 49.6                 | 23.0                   | 35.8  | 0 10   | 7.2      | 12.5                     | 12.3    | 13.4     |
| 011                  | 5                                | EXISTING POPULATION (0861)                         | 6.79         | 93.5   | 45.1        | 36.0           | 63.2                   | 48.1   | 47.2       | 15,6                         | 8 3                   | 6,8      | 14.6  | 12.8    | 22,5       | 9.61          | 16.8                 | 10,5                   | 12.3  | 0.3    | 5.5      | 3.9                      | 5.6     | 6.1      |
|                      |                                  | V MOLTART ZEMINISA<br>YRATIJIM                     |              |        |             |                |                        |        |            |                              |                       |          |       |         |            |               |                      |                        |       |        |          |                          |         |          |
| ۽                    | 9                                | SERVICES<br>SERVICES                               |              |        |             |                |                        |        |            |                              |                       |          |       |         |            |               |                      |                        |       |        |          |                          |         |          |
| FNCOUPAGED           | 9                                | EDUCATIONAL / CULTURAL.                            |              |        |             |                |                        |        |            |                              |                       |          |       |         |            |               |                      |                        |       |        |          |                          |         |          |
|                      |                                  | REDICAL/SOCIAL WELFARE                             |              |        |             |                |                        |        |            |                              |                       |          |       |         |            |               |                      |                        |       |        |          |                          |         |          |
| 1 a                  | ٥                                | OTHER URBAN SERVICE<br>(INFORMATION/HOTEL ETC)     |              |        |             |                |                        |        |            |                              |                       |          |       |         |            |               |                      |                        |       |        |          |                          |         |          |
| 0                    |                                  | CONSTRUCTION BUSINESS                              |              |        |             |                |                        |        |            |                              |                       |          |       |         |            |               |                      | . :                    |       |        |          |                          |         |          |
| SWOITCHILL           | 2                                | ВРИКІИЕ \ FINANCING                                |              |        |             |                |                        |        |            |                              |                       |          |       |         |            |               |                      |                        |       |        |          |                          |         |          |
|                      | - 1                              | тваизговт визгиезя                                 |              |        |             |                |                        |        |            |                              |                       |          |       |         |            |               |                      |                        |       |        |          |                          |         |          |
| NV GOIT              | 4020                             | WHOLESALING/TRADING                                |              |        |             |                |                        |        |            |                              |                       |          |       |         |            |               |                      |                        |       |        |          |                          |         |          |
|                      |                                  | <b>ЗЕВ</b> ЛІСЕ ІИВПЗІВЬ                           |              |        |             |                |                        |        |            |                              |                       |          |       |         |            |               |                      |                        |       |        |          |                          |         |          |
|                      |                                  | CONSUMPTION / RETAIL                               |              |        |             |                |                        |        |            |                              |                       |          |       |         |            |               |                      |                        |       |        |          |                          |         |          |
| BE                   | MENT                             | VAST AND FERTILE<br>HINTERLAND<br>(AGRO-PRODUCTS)  |              |        |             |                |                        |        | •          |                              |                       |          |       |         |            |               |                      |                        |       |        |          |                          |         |          |
| ADVANTAGE TO BE      | ELOP!                            | AIR-COMMUNICATION FOR INTERNATIONAL LINKAGE        |              |        |             |                |                        |        |            |                              |                       |          |       |         |            |               |                      | Ĺ                      |       |        | _        |                          |         |          |
| PAF                  | N DEV                            | иоттаринимор-438                                   |              |        |             |                |                        |        |            |                              |                       |          |       |         |            |               |                      |                        |       |        |          |                          |         |          |
| ADVA                 | URBAI                            | OVERLAND<br>RANSPORTHON (MAJOR<br>TRANSPORT MODE ) |              |        |             | <b>**</b>      |                        |        |            |                              |                       |          |       |         |            |               |                      |                        |       |        |          |                          |         |          |
|                      |                                  | STRREGIC LOCATION<br>FOR EAST BOUND<br>TRIANIO     |              | !      |             |                |                        |        |            |                              |                       |          |       |         |            |               |                      |                        |       |        |          |                          |         |          |
| GEOPOLITICAL         | : USE                            | STRATEGIC LOCATION<br>FOR WESTBOUND<br>TRADING     |              |        |             |                |                        |        |            |                              |                       |          |       |         |            |               |                      |                        |       |        |          |                          |         |          |
| GEO                  | MAD                              | соиместюм мітн вкк                                 |              |        |             |                |                        |        |            |                              |                       |          |       |         |            |               |                      |                        |       |        |          |                          |         |          |
|                      |                                  | OF URBAN   |              |        | *           | *              |                        |        |            | *                            | *                     | *        | *     | *       |            |               | *                    | *                      | *     | *      | *        | *                        | *       | *        |
|                      |                                  | OF U   | ורא          |        |             | HAN            | SI                     |        |            | Z.                           | Ą                     | 48       |       | 9       | SONG       | LUNG          | SAN                  | ENG                    | SA    |        | ō        | <br> -<br> -<br> -<br> - |         | _        |
|                      |                                  | NAME   | SONGKHLA     | HAT YA | PHUKET      | SURAT THAN     | NAKHON SI<br>THAMMARAT | TRANG  | YALA       | PHUN PHIN                    | ТАКОА                 | PHANGNGA | KRABI | KANTANG | THUNG SONG | PHATTALUNG    | BAN NA               | CHAIYA /<br>PHUM RIENG | WIANG | PHANOM | אסא ארסו | AO LUK                   | DON SAK | KO SAMUI |
|                      | CENTRALITY<br>ORDER<br>I PRIMARY |  |              |        | I SECONDARY |                |                        |        | M TERTIARY | ( ONLY STUDY<br>AREA AND ITS | RELEVANT<br>CENTRES ) |          |       |         |            | IX QUATERNARY | (ONLY STUDY<br>AREA) |                        |       |        |          | •                        |         |          |

NOTES: I THE CENTRES WITHIN THE STUDY AREA ARE GIVEN \*

MODERATELY ENCOURAGED

3 THE EXISTING POPULATION OF SANITARY DISTRICT INDICATES THE 1982 POPULATION BY DEPT. OF LOCAL ADMINISTRATION AND EXISTING MUNICIPAL POPULATION BY NATION POPULATION AND HOUSING CENSUS, 1980 ENCOURAGED

# 5. SURAT THANI/PHUKET URBAN STRUCTURE PLANS

# 5.1 GENERAL STRATEGIES AND DEVELOPMENT FRAMEWORK

In order to take a step toward a formation of regional development system, firstly metropolitan area developments centering or Phuket and Surat Thani should be structured with emphasis on integrating the related areas/urban centers so that these two centers can contribute to whole regional development, and secondarily urban developments in Phuket and Surat Thani themselves are planned in consideration of their urban growth potentials.

### 5.1.1 Surat Thani Urban Structure

### 1) Surat Thani Metropolitan Area Development

The Surat Thani Metropolitan Area was set up to be the area covered by one hour travel time by car in consideration of the locational conditions and the influencial distance of residents' daily behavior and commuting.

Within a 30 minutes travel distance from the center of Surat Thani, there are Phun Phin with a high growth potential for commercial activities and Kanchanadit which is one of oldest settlement centers. Within a one hour travel distance, Tha Chana, Chaiya and Tha Chang, all of which function as agricultural and fishery products centers, are located in the northen area along Provincial Highway Route 4112. Ban Na San well-known for fruit shipping, Ban Na Doem as mining center, Wiang Sa as a center for agricultural products and gypsum shipping and Khian Sa as a timber distribution center are located in the southern part. Furthermore, located in the eastern part is Don Sak where fishery is remarkably active. The above characteristics are schematically shown in Figure 5.1.

The total population of this area is about 459,300 in 1980, of which the urban population (municipal population) is around 52,800 equivalent to 11.5 percent of the total and the population of rural centers of sanitary districts is estimated at about 67,800 or 14.8 percent of the total. This area will have the population of 755,000 in 2000.

Figure 5.2 shows the conceptual development structure in the Surat Thani Metropolitan Area. The following considerations are given to this structure:

- i) Basically the existing characteristics and urban potential owned by each center will be mobilized more in the future;
- ii) The north-south corridor along National Highway Route 41 is planned to be developed as an axis for agro-based industrial promotion. While the east-west corridor along National Highway Route 401 from Don Sak to Phun Phin is developed as an axis for modern industrial promotion.

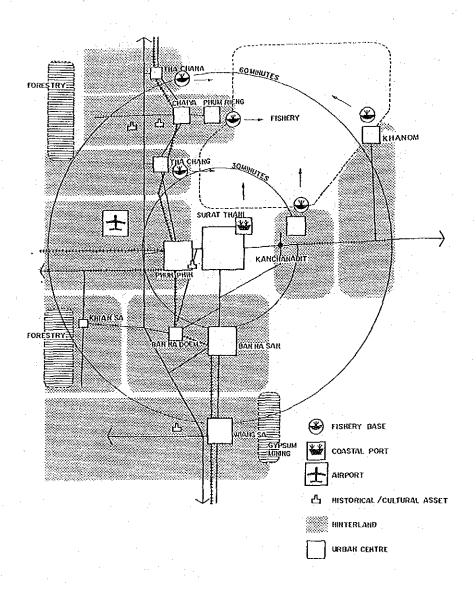


Fig. 5.1 EXISTING STRUCTURE OF SURAT THANI METROPOLITAN AREA

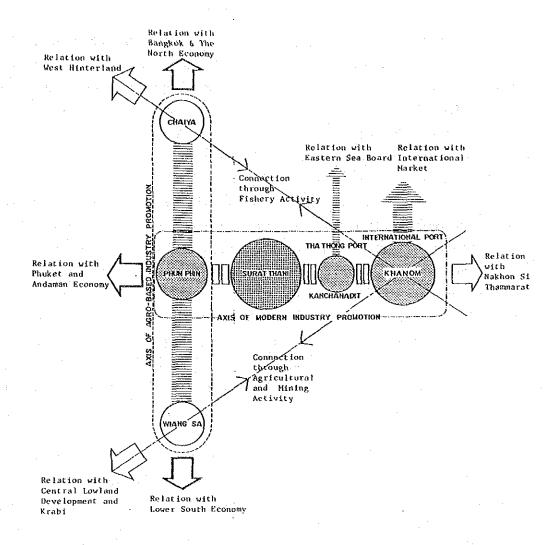


Fig. 5.2 STRUCTURE OF SURAT THANI METROPOLITAN AREA DEVELOPMENT

- Major centers on the north-south corridor are Chaiya where an agricultural products center with distribution, processing and research functions and fish farming stations is to be developed as a core for a large northern hinterland and Wiang Sa which is to function as a major service center for the Central Lowland Development as well as for agricultural products distribution. Furthermore, the coastal zone extending from Tha Chang to Tha Chana through Phum Reang should be intensively developed for fishery activities such as improve- ment as a fishery port, local market facilities and some other relevant facilities. At the same time the traditional textile industry in Phum Reang should be encouraged as a precious tradition by giving some administration support.
- iv) In the east-west industrial corridor, the major targets are to develop the maritime facilities such as the deep scaport of Khanom and its supporting zone, the coastal port of The Thong and its supporting zone and the Phun Phin industrial complex compos-

ed of an industrial estate, a truck terminal, a wholesaling and warehouse business estate and some types of logistic stations. This industrial corridor is developed to fully mobilize the urban potential of Surat Thani and Phun Phin in response to progress of industrialization.

## 2) Surat Thani Urban Area Development Strategy

The existing urbanized area of Surat Thani is still within a less than 10 kilometer radius area. However, the future urbanization structure should be planned in the extent of more than a 15 kilometer radius areas because of its high potential for urbanization and of relations with Phun Phin, Tha Thong Port and Khanom.

Than Thong Port is located eight kilometers away from the central area of Surat Thani. This distance of eight kilometers is evaluated to be an adequate distance for location of such a port function. It, simultaneously, has a sufficient space/land capacity for industrial locations and effective relationship with the commercial functions in the central business area.

Phun Phin is an important transportation node to connect the urban activities with the railway as well as with National Highway Route 41. Moreover, the commercial accumulation in Phun Phin is comparatively large. Then, this area should functionally be unified with the Surat Thani as an economic entirety. The distance between Surat Thani and Phun Phin is about 12 kilometers or 15 minutes by vehicle.

Khanom is also one of the important cores of development. The corridor between Surat Thani and Khanom through Kanchanadit has a high development potential because of its convenient link with Nakhon Si Thammarat with which the economic relationship will become stronger through goods flow movement.

From an urban structure planning viewpoint, it can be recognized that the following four development directions are existing in the Surat Thani Urban Area:

- Phun Phin Surat Thani Corridor: Housing, manufacturing factories, regional public service facilities and goods distribution facilities are suitable for location, because of good accessibility.
- ii) Tha Tong Port Surat Thani Corridor: Manufacturing factories and goods distribution facilities related to the port activities are suitable for location.

- iii) Surat Thani Khanom Corridor: At present, a few fish process- ing factories, rubber plantations and limestone quarry sites are located along this corridor. The developments of housing, agro-based processing, and some facilities related to international trading activities such as warehouses and a distribution center are expected to be located in this corridor.
- iv) Surat Thani Ban Na San Corridor: Various commercial activities have been taking place in this corridor through Route 4009. Ban Na San has functioned as a collection and distribution center of rambutan. Hence, Surat Thani has been a big market as well as a center of shipping for the products of Ban Na San.

Nowadays, there are some construction plans of agricultural processing factories such as rubber processing. Therefore, this corridor should be emphasized for future developments.

In the inner urban area of Surat Thani, the following movements of development, which can be seen as recent activities, should be taken into account in planning physical structure.

- Urban sprawl toward the western and southern area of the municipality;
- Building rush for the purpose of commerce and amusement in large-scale at the southern side of the central busy area;
- The bus terminal with a local market under construction on the opposite side of the existing terminal;
- Formation of a public/administrative service zone.
- 3) Major Planning Issues

The following are major planning issues in Surat Thani Urban Area.

- i) To form a functional urban transportation system:
- Development of a system to enable separation of interregional traffic from inner urban traffic.

- Adjustment of the public transportation system between interregional bus and innercity transportation modes, or the relocation of the interregional bus terminal outside of the central area.
- ii) Functional allocation of ports and their supporting areas:
  - Adding to the newly developed deep seaport at Khanom. Ports are to be located at three locations: Khanom, Tha Thong and Ban Don. The following functional allocation system can be proposed:

|           | Existing   | Future  |
|-----------|--|---|
| Khanom    |  | — International trading use   |
|           |  | <ul> <li>Industrial use for capital intensive industries</li> </ul> |
| Tha Thong | (Oil depot)  | <ul> <li>Coastal shipping use</li> </ul>                            |
|           |  | <ul> <li>Feeder port of Khanom Port</li> </ul>                      |
|           |  | <ul> <li>Fishery industry use</li> </ul>                            |
|           |  | <ul> <li>Passenger for Ko Samui and Ko Phangan</li> </ul>           |
| Ban Don   | - Fishery use                                      | - Fishery use partially   |
|           | <ul> <li>Passenger use for<br/>Ko Samui</li> </ul> | <ul> <li>Community linkage</li> </ul>                               |

- Redevelopment of the adjacent area of Ban Don Port for the sake of more orderly recreational, commercial and transport activities.
- iii) Housing development program includes the following:
  - Improvement of the low income people's residential area,
  - Preparation of new housing land to be incorporated into the future structure in a proper manner,
  - Establishment of some regulations/standards for housing development executed by the private sector in order to sustain financially the development of required public service facilities as well as to create an appropriate living environment.

- Development of an urban utilities system
- A deliberate housing development program by the public sector.
- iv) Development of industrial zone and goods distribution center in accordance with the industrialization program. Phun Phin should function as a major goods distribution and industrial center, taking into account its particular geopolitical location.
- v) Development of a social, cultural, medical and higher educational facilities system is necessary for Surat Thani to function as a secondary order center. Especially, a vocational center will be necessary for development toward the future.

#### 5.1.2 Phuket Urban Structure

1) Phuket Metropolitan Area Development

Phuket Metropolitan Area does not mean a physical urban area, but means a conceptual idea to unify the various urban functions located around Phangnga Bay centering on Phuket and Krabi urban cores. Phuket Metropolitan Area, herewith, is assumed to be composed of Phuket Island, Kok Kloi, Takua Thung, Phangnga, Thup Put, Ao Luk and Krabi. The time distance between Phuket and Krabi is more than two hours by car. We expect that these centers, forming a ring, are encouraged to grow through effects of interaction by strenghtening of mutual linkage.

The population of this area is about 320,400 as of 1980 and estimated at about 541,700 in 2000. The urban population (municipal) is about 66,500, and that of rural centers such as sanitary districts is estimated at about 35,500 as of 1980, and the share of urban population including sanitary districts is 32 percent.

Observing the existing structure as shown in Figure 5.3, it is notable that various potentials exist in this ring corridor, i.e., Phuket with comprehensive urban functions as well as agricultural, mining and tourism industrial activities; Kok Koli which is rapidly growing as a transportation node; Takua Thung with rubber and fishery products; Phangnga which functions as a service center for agricultural and tin mining activities; Thup Put with a high potential for paddy production despite that the suitable land facing Phangnga Bay is scarece; Ao Luk which can be expected to become a large center in accordance with the development of oil palm plantations in the Central Lowland; and Krabi which has a coastal port and industrial development potential related to mining resources. Furthermore, tourism resources are scattered at many places facing Phangnga Bay.

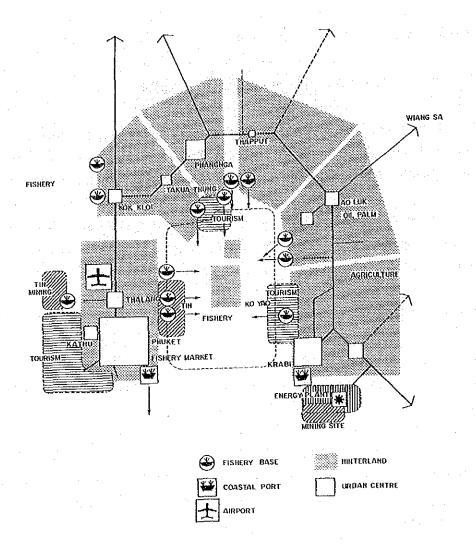


Fig. 5.3 EXISTING STRUCTURE (PHUKET-PHANGNGA-KRABI)

To utilize the above industrial characteristics and potentials, it is necessary above all to encourage a mutual linkage by developments of transportation facilities, an efficient goods transport system and intermediate service centers. Figure 5.4 schematically shows the future desirable relationship between those centers. Basic policies are as follows:

- i) For efficient overland transport of local products, two inter- mediate centers to play a role of distribution are necessary, i.e., Kok Kloi between Phuket and Phangnga and Ao Luk between Phangnga and Krabi.
- ii) National Highway Route 4 functions as a stem of overland transportation. In addition to this, some feeder roads for the seaside fishery and inland agricultural areas should be developed. This network structure contributes to making an easy and efficient transport of local products.

- iii) A sea transportation system will be organized: the deep seaport of Phuket, scheduled to open, is to become a major port for international trade, while Krabi Port will act as its feeder port. A strong relationship between Phuket and Krabi through sea transportation is desired in order to encourage more the urban activities in Krabi. Ferry transport system between those two cities is recommended for development in this regard.
- iv) The fishery industry in Phangnga Bay should be promoted. The relevant facilities such as the fishery port, market and cold storages are to be improved or developed in the areas of Phuket, Phangnga, Ao Luk and Krabi. A fish farming stations are to be developed more around Phangnga Bay.
- v) Integration of tourism assets around Phangnga Bay should be given more attractiveness by establishing itinerary routes. This will contribute to the strengthening of the economic unification of the Phangnga Bay Area.
- vi) A new challenging attempt is to develop in the Krabi Adjacent Area, i.e., oil refinery with the capacity of 60,000 barrels per day for the requirements of the South. This together with the existing electricity generating plant, will form an integrated energy center.
- vii) Industrialization of Phuket should be given priority to utilize the chance that a trigger for industrialization emerges; i.e., deep sea port, international airport, high urban potential and attractive amenities. The industrial estate next to the inter- national airport and the port supporting zone are necessary for development. Along with them, the Phuket Urban Center should be developed as a primary order center in the South.

#### 2) Phuket Urban Area Development Strategy

The most noteworthy characteristics of the Phuket Urban Area stand for accumulation of financial functions consisting of seven major banks on a large scale and six other banks. This function will be a basis of Phuket Development. Generally, the commercial services in the Phuket Urban Area looks very active.

It is a key urban potential that there are various activities such as handicraft, machinery, car repairing and other small-scale industries in the busy area, because such an intermediate technology for manu-facturing will be an important supporting resource for future industrialization. The following social/cultural facilities located in the busy area and vicinity are noteworthy as the basic function of Phuket:

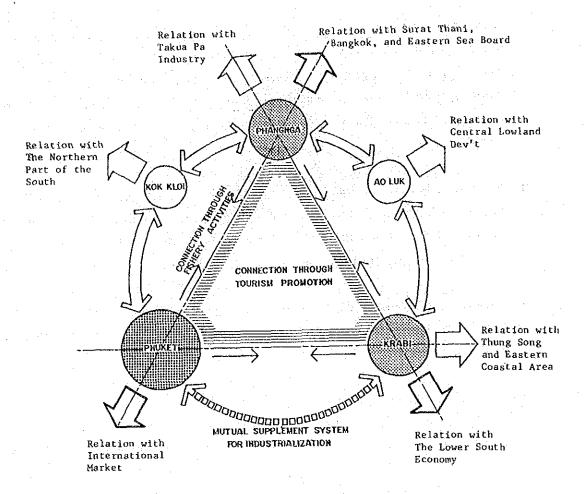


Fig. 5.4 CONCEPTUAL STRUCTURE OF PHANGNGA BAY AREA

- High grade educational facilities (Vocational/Teachers);
- Academic research institutes and laboratories (Marine biological research center/Mineral resources center);
- Large-scale recreation zone (partially completed);
- Active central commercial area; and
- New housing development in highland areas in the northern part of the central area.
  - In considering the urban structure in Phuket, several major functions/areas should be taken into account as elements of the comprehensive structure:
- Khlong Thachin Port Area and its vicinity as a fishery port, a domestic port, and industrial zone;

- The corridor area between the project location of Phuket Deep Seaport and the central area is potential area for transport and distribution activities;
- Newly developed area in the western part of the central area for housing and a new commercial center;
- The areas reclaimed and being reclaimed in the southern part of the central area for recreational and housing zones;
- The central commercial area with a wide regional service function;
- The northern hill land area for recreational and housing zones; and
- The corridor area of Route 402 is a potential area for transport-related service and agro-based industries.
- 3) Major Planning Issues

The following are major planning issues for Phuket Urban Development.

- i) Development of urban utility system is strongly desired to be established:
- Draingage system;
- Garbage disposal system; and
- Water supply system.

Among them, the ensuring of potable water is especially one of the most crucial urban problems. Great attention should be given to the establishment of a perpetual water supply system to cope with the increase of water demand.

- ii) Concerning the transportation system, important issues are:
  - Development of a trunk road linking the deep seaport with many parts of the South;
  - The road network system supporting port activities;

- Development of public transportation terminals, including those of bus and railway introduced in the future.
- iii) Relocation of warehouses and the facilities of cargo into the vicinity of the central area in order to encourage the distribution function as well as to reform the central busy area.
- iv) Measures to supply the housing land required in correspondence to the expanding urbanization are necessary to be prepared. A housing complex as new town is conceivable to be one of effective measures in the Phuket Urban Area.
- v) In terms of new urban landuse, the lands after tin mining should be effectively utilized in consideration of flood protection. The lands especially in the south-west part of the city will be subject to housing use.
- vi) The policy to encourage the small-medium scale industries is important because they basically sustain industrialization. In terms of this policy the following are taken into account:
  - Facilities consolidation program;
  - Skill/technology development program;
  - Financial supporting program for their modernization, and
  - Other administrative incentives.

From a physical planning point of view, an industrial estate development to consolidate them is effective to realize the above policies.

- vii) Creation of attractiveness as an "international city" is important. In this connection, an attractive central commercial district should be formed for intensive tourism development. Besides the above, establishment of an international conference hall is worthy to be taken into consider- ation from a planning point of view.
- viii) Taking into account the characteristics of research and administrative functions of Phuket, higher educational facilities such as "graduate university" is recommended in order to strengthen the functions as a primary order center in the South. Also, the large-scale hospital with technology for specific medical treatment is suitable for this

city if the geopolitical significance and urban potentials of Phuket are taken into account.

## 5.1.3 Urban Development Framework

Based on the projection of urbanization examined in Chapter 3, a development framework of urban areas was summarized as shown in Table 5.1. This table summarizes the framework of work places, landuse, housing, educational facilities, water and telecommunications.

### 5.2 PROJECT AND PHASING

The study of this section focuses on project justification especially for Surat Thani and Phuket Urban Developments which are the most significant in the urban sector under our master plan, based on the strategies discussed in the preceding section.

### 5.2.1 Surat Thani Urban Development

#### 1) Urbanized Area Requirement

Landuse requirement for urbanization in 2000 will be about 5,000 hectares including Phun Phin Area to accommodate about 167,000 people's urban activities, compared with about 700 hectares of existing municipal area with about 36,000 population.

Obviously the present municipal area is too small to accommodate the anticipated urban activities so that establishment of joint local administration is necessary to comprehensively promote forthcoming urbanization in a proper manner. Taking into account the urban potentials, Phun Phin Area should be incorporated into Surat Thani Urban Development Planning Area.

#### 2) Major Structure Building

Streets Network: Arterial streets to form a main physical structure are classified into the following two categories: Major arterial streets to play a role of interregional communications and the secondary arterial streets, for intra-urban transportation, of which the interval is desirable to be two to three kilometers generally. Highways of Route 41 and Route 401 which is East-West Link in part, are to be major arterial streets in the urban area and the urban structure is composed of these stems and their feeders with a ladder pattern as shown in Figure 5.5.

Table 5.1 DEVELOPMENT FRAMEWORK IN URBAN AREAS

|  |          | Urban <u>1</u> /<br>in the<br>Study Area | Surat<br>Thani | Phang-<br>Nga | Phuket       | Krabi      |
|--|----------|--|----------------|---------------|--------------|------------|
| . No. of Work Pla  |          |  | nd person      | s) 2/         |              | ,          |
| - Total  |          | 392.8                                    | 149.3          | 19.0          | 158.4        | 66.1       |
|  | :        | 5.3                                      | 3.0            | 0.5           | 0.4          | 1.4        |
| - Agriculture  | •        | J.J                                      | 5.0            | _             | <b>=</b>     |            |
| - Mining   | :        | 110 1                                    | 55.9           | 7.6           | 38.5         | 17.1       |
| <ul><li>Manufacturing</li><li>Services</li></ul>   |          | 119.1<br>268.4                           | 90.4           | 10.9          | 119.5        | 47.6       |
|  |          |  |                |               |              |            |
| . Landuse Require  | ments    |  |                |               | 244          | 1.160      |
| - Total  | ;        | 10,760                                   | 5,090          | 1,070         | 3,440        | 1,160      |
| - Industrial   | :        | 1,230                                    | 550            | 80            | 360          | 240        |
| - Commercial   | :        | 920                                      | 300            | 60            | 400          | 160        |
| - Residential  | :        | 5,670                                    | 2,710          | 610           | 1,820        | 530        |
| - Public Service   |          |  | 1 500          | . 200         | 9(0          | 220        |
| and  | :        | 2,940                                    | 1,530          | 320           | 860          | 230.       |
| Open Space   |          | <u> </u>                                 |                | · · ·         |              |            |
| Housing Require  | ments    | 1980-2000                                | (thousand      | units)        |              |            |
| - Total .  | :        | 67.7                                     | 28.7           | 5.5           | 26.4         | 7.2        |
| - Supply by Priva  | te       |  |                |               |              |            |
| Sector   | 2 .      | 42.7                                     | 15.6           | 3.8           | 17.6         | 4.8        |
| - Supply by Public   | С        |  |                |               | •            |            |
| Sector   | :        | 16.3                                     | 8.4            | 0.8           | 5.8          | 1.3        |
| - Rebuilding   | :        | 8.7                                      | 4.7            | 0.9           | 3.0          | 1.1        |
| . Educational Fac  | ilitie   | es Requirem                              | ents 1980      | -2000         |              |            |
| -1 Elementary Scho   |          |  |                |               | 00)          |            |
| - No. of Classroom   | ms :     | 1,537                                    | 688            | 199           | - 573        | 157        |
| - No. of Teachers  | :        | 1,750                                    | 780            | 140           | 650          | 180        |
| - No. of Facilitie   | es :     | 96 .                                     | 43             | 7             | 36           | 10         |
| -2 Lower Secondary   | Schoo    | ol (Enrollm                              | ent Ratio      | : 63% in      | 2000)        |            |
| - No. of Classroom   |          | 1,360                                    | 720            | 155           | 190          | 295        |
| - No. of Teachers  |          |  | 1,512          | 326           | 399          | 620        |
| -3 Upper Secondary   |          |  |                |               |              |            |
| - No. of Classroom   |          | 970                                      | 531            | 129           | 132          | 180        |
| - No. of Teachers  | :        | 2.037                                    | 1,115          | 271           | 273          | 378        |
| - No. of Facilitie   |          | 97                                       | 52             | 12            | 13           | 20         |
| as Secondary Schoo   |          |  |                |               | 1.7          | 20         |
| . Water Demand 20  | 00 (t)   | ougand m3/                               | day)           |               |              | ·          |
| - Total  | • (1     | 138,5                                    | 62.3 3/        | 10.0          | 48.0         | 18.2       |
| - For Residents, a   |          | 2  | 02.0 3/        | 10.0          | 70.0         | 10.2       |
| Services Use   |          | 85.1                                     | 39.5           | 6.5           | 29.9         | 9.2        |
| - For Tourists Us  |          | 7.1                                      | 2.8            | 0.5           | 4.3          | 9.2        |
| - For Industrial   |          | 46.3                                     | 20.0           | 3.5           | 13.8         | 9.0        |
| Tolocomunicati   | on 200   | 30 (+h                                   | <u> </u>       |               | <del> </del> |            |
| <ul> <li>Telecommunication</li> <li>No. of lines</li> </ul>  | <u> </u> |  |                | 2 6           | 14.6         |            |
| - For Residential  | 1100*    | 37.7                                     | 15.3           | 2.6           | 14.9         | 4.9        |
| and the second of the second o |          | 16.5                                     | 7.0            | 1.5           | 6.2          | 1.8        |
| - Par business   |          |  |                |               |              |            |
| <ul> <li>For business us</li> <li>For Public use</li> </ul>  | e :      | 17.4<br>3.8                              | 6.8<br>1.5     | 0.8           | 7.2<br>1.5   | 2.6<br>0.5 |

Urban Area means the existing municipalities Surat Thani Province: Surat Thani and Ban Na San, Phangnga Province: Phangnga and Takua Pa

Source: The Team

<sup>2/</sup> No of work places is equivalent to No. of employments to be engaged

<sup>3/</sup> Including the requirement of Phun Phin central area

<sup>4/</sup> Including the amount used by the oil refinary plant

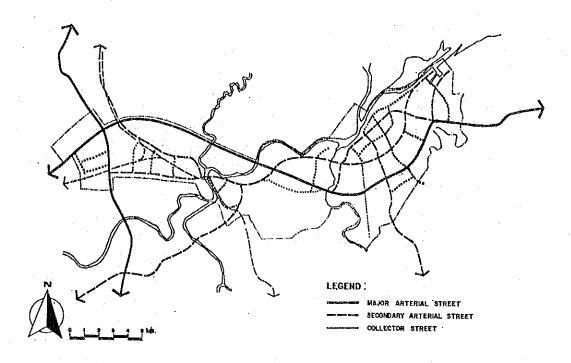


Fig. 5.5 PROPOSED STREET NETWORK SYSTEM IN SURAT THANI URBAN AREA

Water Supply System: Evidently, exisiting water supply capacity is not sufficient to meet the future demand. Two options of capacity enlargement are conceivable: one is to improve the existing equipment and pipe lines to meet the future demand and another is to develop a new system for the newly expanded areas to generate additional demand with maintaining the existing system. The latter is proposed because of its lower cost and easier execution.

The proposal is that an additional intake and purification facility located aside Phum Duang River and major trunk distribution pipelines with two directions to the proposed industrial estate at Phun Phin Junction and to Surat Thani Urban Center as shown in Figure 5.6. The existing facility located at Phun Phin is utilized for the supply of Phun Phin Town Area.

Drainage System: At present, no serious problem of flooding occures in the existing urban areas of Surat Thani and Phun Phin, however, a deliberate expansion of urban landuse is necessary because of low ground level of this area. Basically, except in the area adjacent to the airport, Tapi River will function as a main drainage canal, and, an additional main open canal for drainage will be necessary aligning in parallel with the Bypass Route 401 between the existing builtup and the newly urbanized areas as shown in Figure 5.6.

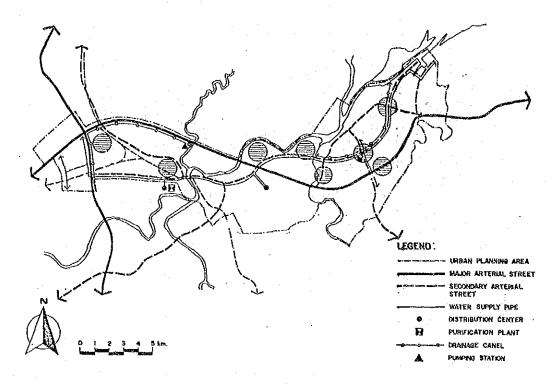


Fig. 5.6 MAJOR INFRASTRUCTURE DEVELOPMENT IN SURAT THANI URBAN AREA

Housing and Urban Services Development: A development standard of housing and urban services is proposed in accordance with size of community unit as shown in Table 5.2. We worked out the neighbour-hood unit as Housing Development Unit (HDU) of which physical and landuse compositions are as shown in Figure 5.7.

According to the development framework, the population increases of about 80,000 and 35,000, are assumed in Surat Thani and Phun Phin Urban Areas respectively by the year 2000. Interpreting these into physical requirements, five HDUs in Surat Thani and two to three HDUs in Phun Phin are required to be developed, and the allocation of these units are proposed in consideration of the trend and potential of urban expansion as shown in Figure 5.6.

Other Urban Projects: Several urban development projects are identified to strengthen the necessary urban functions and services as shown in Figure 5.8.

#### 3) Development Phasing

We propose a process of developing spatial structure to be divided into three phases as shown in Figure 5.9. Development strategy at each phase is identified as follows:

Table 5.2 PUBLIC SERVICE FACILITIES DEVELOPMENT STANDARD BY UNIT

|   | ·   | A STATE OF THE PARTY OF THE PAR |   |  |  |  |
|---|---|--|---|--|--|--|
|   | t<br>Community Unit   | 2<br>Neighbourhood Unit<br>(Sub-District Unit)   | ]<br>District Unit  | 4<br>Urban Unit  |  |  |
| Size Population                           | 3,000 - 3,500 prs   | 15,000 - 18,000 prs  | 50,000 - 60,000 prs   | 150,000 - 200,000 prs  |  |  |
| Unit Family                               | 606 - 700   | 3,000 - 3,600  | 10,000 - 12,000   | 30,000 - 40,000  |  |  |
| Structure                                 |   | (Community Unit) x 5   | (Reighbourhood Unit) x 3  | (District Unit) x 3  |  |  |
| Education<br>Facilities<br>System         | - Kindergarten : 1<br>- Elementary School : 1<br>(18 class x 22 prs)                      | - Kindergarten : 5<br>- Elementary School : 5<br>- Secondary School : 1<br>(24 class x 40 prs)   | - Kindgarten : 15<br>- Elementary School : 15<br>- Secondary School : 3<br>- Vocational College : 0.5<br>(One location in 2 District<br>Units)    | - Kindergarten : 45<br>- Elementary School : 45<br>- Secondary School : 10<br>- Vocational College : 2<br>- Other Higher Education : 1 |  |  |
| Health Service<br>Infrastructure          |   | - Health Center : 5<br>- Hospital (vith 30 beds) : 1   | - Realth Center: 15 - Hospital(with 30 beds): 3 - Ceneral Hospital(with 100 beds): 1  | Health Center: 45 - Nospital (with 30 beds): 4 - General Mospital: 3 - Specific Medical Treatment Center: 1                            |  |  |
| Commercial                                | - General Shops : 0.5ha<br>- Local Narket : 1<br>- Bus Terminal : 1                       | - General Shops : 2,5-3,0ha<br>- Local Harket : 5<br>- Shopping Center : 1<br>- Bank<br>- Bus Terminal : 5<br>- Inter-Required Bus Stop : 1  | - General Shops : 10ha - 12ha<br>- Local Market : 15<br>- Shopping Center : 3<br>- Banks, Wholesalers, Business<br>- Inter-regional Bus Terminal: | - Formation of Central<br>Commercial and Business<br>District/Commercial Complex   |  |  |
| Recreational/<br>Religious<br>Facilities  | - Play Lot(O.16ha) : 1<br>- Wat : 1   | - Play Lot : 5 - Mat : 5 - Neighbourhood Park(lha): l (with religious Facilities and multipurpose open space)  | - Play Lot : 15<br>- Wat : 15<br>- Neighbourhood Park : 3<br>- Sports Center : 1,   | Large-Scale Town Park<br>(Bistorical/Natural/Others)   |  |  |
| Administra-<br>tive Service<br>and Others | - Post & Telegraph Office - Police Post - Administrative Infor- matico - Public Telephone | - Police Station<br>- Five Station<br>- Telephone Station<br>- Public Library<br>- Administrative Office   | - Public Library(High Grade)<br>- Corrounity Center   | - City Hall<br>- Government Office   |  |  |

First Phase (up to 1991): Basically emphasis is given on overcoming the existing infrastructure deficiencies and positively developing the projects to strengthen urban economic base.

Second Phase (1992 to 2000): Emphasis is placed mainly on the social infrastructure developments including housing, environmental/urban amenity developments as well as on the major infrastructure and urban economic base developments subsequent to achievements in the first phase.

Third Phase (Beyond 2000): In this phase, most of required urban functions will be developed to stimulate the agglomeration-based economy. Efficiency of activities will be highly required at this stage.

The projects/programs in urban sector in each phase are proposed as shown in Table 5.3.

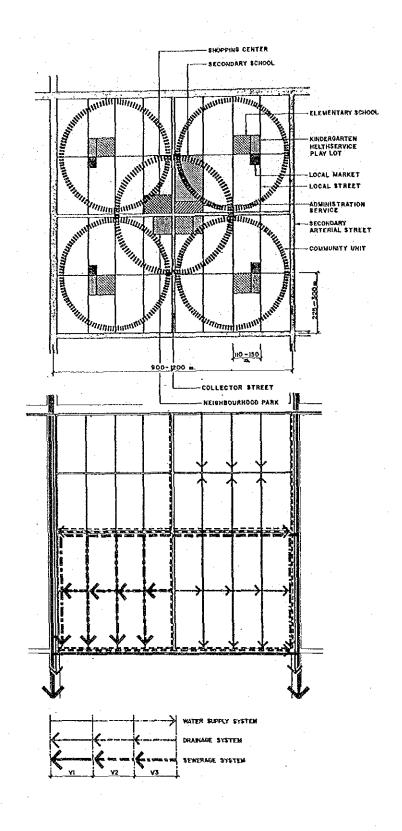


Fig. 5.7 CONCEPTUAL MODEL STRUCTURE OF HOUSING DEVELOPMENT UNIT

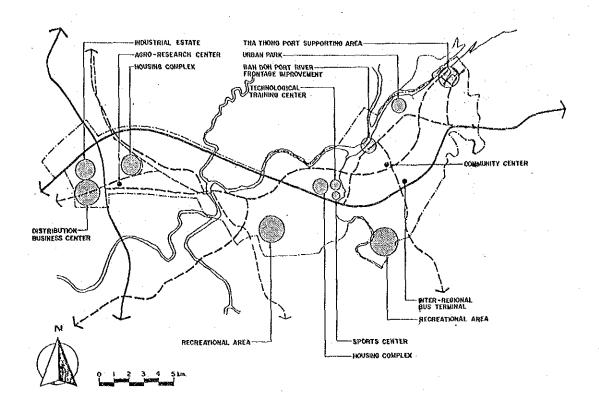


Fig. 5.8 URBAN PROJECTS LOCATIONS IN SURAT THANI URBAN AREA

## 4) Spatial Structure Plan in Surat Thani Urban Area

Integrating the urban development framework and considerations of planning studies mentioned in the preceding sections, a structure plan with linear "ladder" pattern is mapped out as shown in Figure 5.10. By this plan we propose that firstly the urban planning area where urban development projects are furnished should be delineated by the authority. The proposed plan, herewith, may be still controversial and should be amended through discussions with the authorities concerned.

# 5.2.2 Phuket Urban Development

# Urbanized Area Requirement

Landuse requirement for urbanization in 2000 will be more than 3,400 hectares to accommodate about 146,000 people's urban activities, compared with about 1,200 hectares of the present municipal area with 45,000 population.

The urbanized area will expand to be the area three times as large as that of present. The structure plan, therefore, should cover the anticipated urbanization area and its

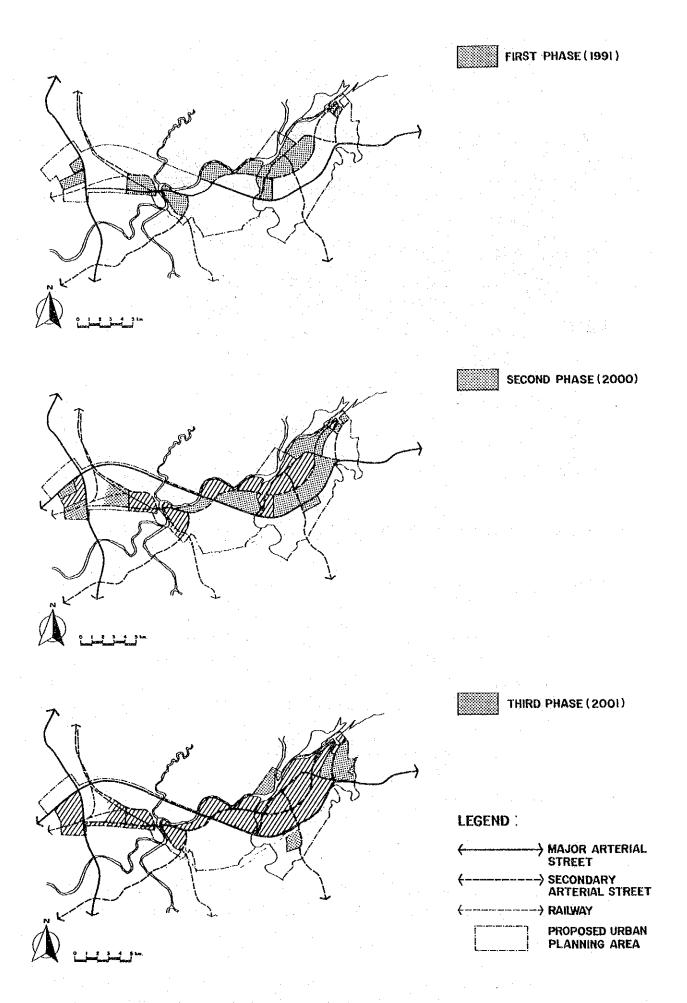


Fig. 5.9 DEVELOPMENT PHASING IN SURAT THANI URBAN AREA

Table 5.3 URBAN DEVELOPMENT PROJECTS/PROGRAMS IN SURAT THANI

|       | Projects/Programs  | Outline  |
|-------|--|--|
| (1)   | FIRST PHASE ( - 1991)  |  |
|       | Industrial Estate at Phun<br>Phin Junction   | - Project area: 190 ha (1,200 rai) to accommodate assembling/processing types of manufactures.   |
| A.12  | Infrastructure improvement<br>in Industrial Promotion Zone<br>located between Phun Phin<br>and Surat Thani | - Urban/industrial utilities development should firstly be carried out.  |
|       | Developments of Tha Thong<br>Port and its Supporting Area  | - Project area: around 100 ha to accommodate fishery related facilities and processing activities.   |
| A. 14 | Distribution Business Center<br>Development  | - Project area: 40 ha as a truck terminal and goods logistic bases facilities.   |
| A.15  | Technical Training Center  | - Facility with functions of vocational education to those of lower secondary school graduates and over, industrial/business information of markets, technologies and R & D. |
| B.11  | Water Supply System Development  | - Main pipe line: 32 km, with two distribution centers.  |
| B.12  | Drainage System Development  | - Open canal: 18 km, with one pumping station.   |
| в.13  | Upgrading Telecommunication<br>Development Program   | <ul> <li>Main system with a capacity of lines<br/>sufficient toward 2000 and distribution<br/>lines.</li> </ul>  |
| B.14  | Secondary Arterial Streets<br>Development/Improvements   | - New construction : 14 km Improvement : 29 km   |
| C.11  | Housing and Residential Area<br>Developments Including<br>Public Services                                  | <ul> <li>Three housing development units including<br/>housing complex with 2,400 units.</li> </ul>  |
| C.12  | Slum Upgrading Program   | - 2,000 families.  |
| E.11  | Interregional Bus Terminal and Local Market Development  | (cont <sup>†</sup> d)  |

Note: Projects/Programs are classified into five categories as indicated on the project number: A, Urban Economic Base Development; B, Major Infrastructure Development; C, Housing Development; D, Environmental /Urban Amenity Development and E, Transport System Development.

- D.22 Recreational Zone Development
- D.23 Chaiya Historical Parks Development

D.21 Ban Don Port Area River-

Frontage Development

- Mainly including hill areas with park, rest-places, sports facilities.

- Community port facilities and river-

urban amenity.

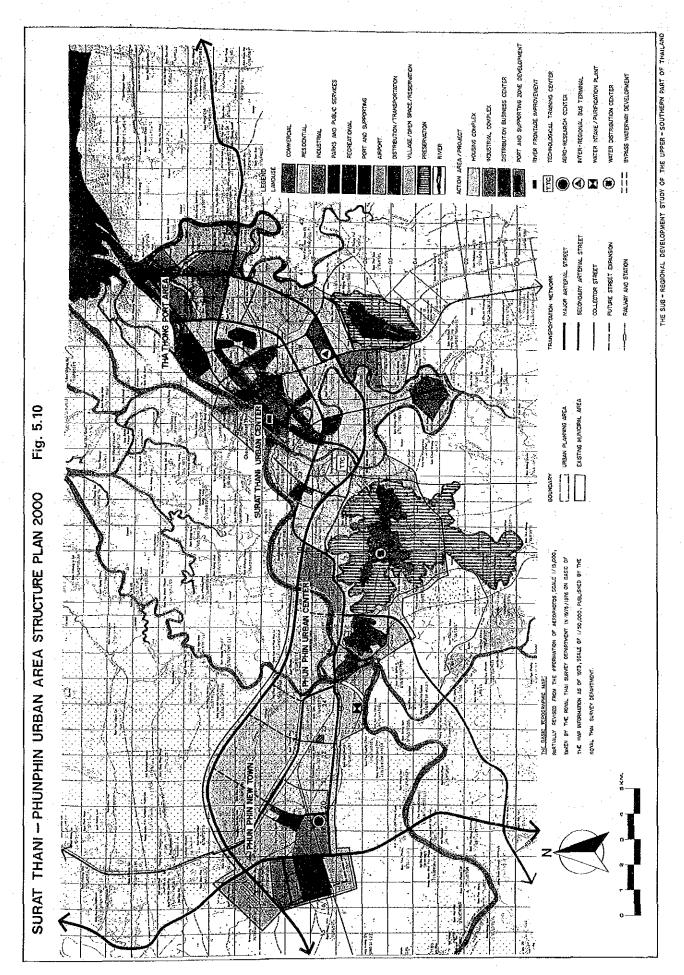
side park development for upgrading

- Two project areas: one is the area of 10 ha centering on "Wat Suan Mukapalaram" and another is the area with "Phra Barom Dhat".

(cont'd)

#### (III) THIRD PHASE (Beyond 2000)

- A.31 Industrial Promotion Zones and Estates Expansion/ Development
- Subsequent to Phase II.
- A.32 Distribution Business Center Development
- Subsequent to Phase II.
- A.33 Central Commercial Area Re-Development
- Based on a policy of intensification of central commercial zone.
- A.34 Comprehensive Commercial Subcenter Developments
- Aside the bypass Route 401.
- B.31 Secondary Arterial and Lower Order Streets Improvements
- Accompanying with expansion of urbanization areas.
- B.32 Urban Utilities Developments
- ditto
- C.31 Housing and Residential Area Development Including Public Services
- Corresponding to further urbanization, including "new town" at Phun Phin junction with multi-urban functions.
- D.31 Promotion of Urban Beautification Program and its Relavant Facilities Development
- Swerage/Solid waste treatments system and greenings.
- E.31 Railway Station Plaza Developments
- 4 to 5 stations timely to the construction of railway between Phun Phin and the proposed deep seaport.



related surroundings over the existing municipal boundary.

# 2) Major Structure Building

Streets Network: The National Highway Route 402 running through the airport and bypass, to the project site of deep seaport, being a part of East-West Link, is a major arterial street, and the outer ring road enclosing the central district and linking Khlong Thacin Fishery Port and several urban functions forms one part of secondary arterial streets network as shown in Figure 5.11.

Water Supply System: A general idea of Phuket Water Supply System Development is studied in detail in Water Resource Development Sector. The existing system maintained by using the reservoirs after tin mining is likely to be changed drastically in near future to cope with increase of demand by developing a new pipeline system from water reservoirs such as Bang Wat Dam in the short run and other possible dams in the medium/long run. A distribution system with radial pattern centering on the new distribution center with the pumping station located at the eastern area of the town can be proposed in the future as shown in Figure 5.12.

Drainage System: Flooding is a serious problem to be solved as soon as possible. A major reason of flooding is supposed that a great deal of intensive rainfalls in the surrounding mountainous area is easy to instantly pour into the urban area. Generally, three kinds of countermeasures against this flooding are conceivable as follows:

- i) Betterment/Improvement of the existing rivers and canals by increasing their width and depth;
- ii) Development of a new drainage system with diversion canals and several pumping stations; and
- iii) Development/maintenance of retarding reservoirs.

Application of i) will face some difficulties because of their location in the built-up areas. The measure of iii) should naturally be undertaken with a care of effective utilization of existing reservoirs. We propose the idea to develop a new system based on the above as follows:

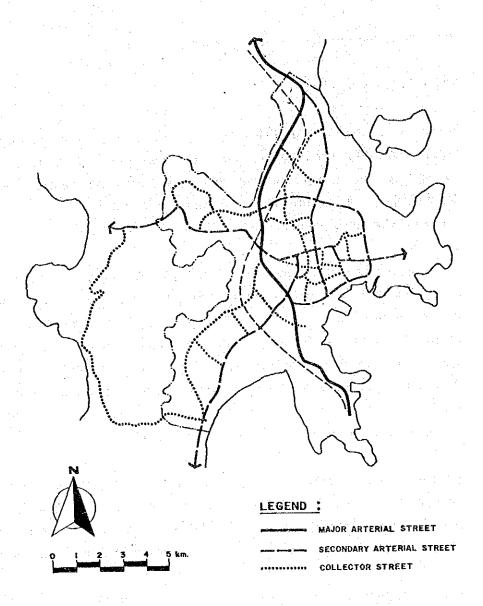


Fig. 5.11 PROPOSED STREET NETWORK SYSTEM

- To separate the urban area drainage system from that in the mountainous area.
- To prepare a diversion canal to drain out the water from mountains directly to the western sea.
- To develop two canals and three pumping stations besides enlargement of draining capacities of the existing canals in the urban area as schematically shown in Figure 5.13.

Housing and Urban Services Development: According to our framework, the population increase of about 41,200 by 1991 and about 100,700 by 2000 are assumed. This

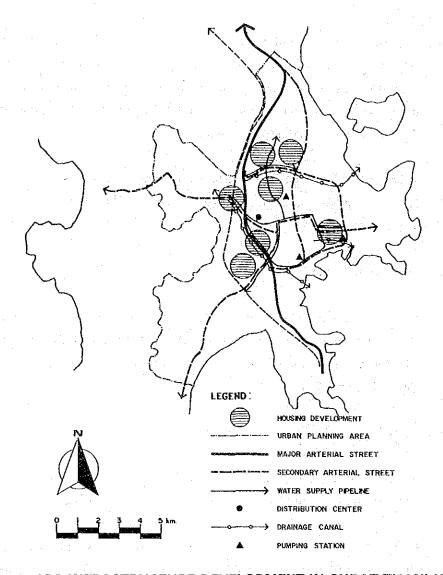


Fig. 5.12 MAJOR INFRASTRUCTURE DEVELOPMENT IN SURAT THANI URBAN AREA

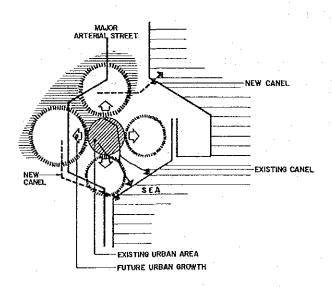


Fig. 5.13 CONCEPT ON DRAINAGE SYSTEM DEVELOPMENT IN PHUKET URBAN AREA

means that three "Housing Development Units (HDU)" by 1991 and seven HDUs by 2000 are required to be additionally developed. The area inside the ring road has a large potential to be developed soon, while the areas outside it are necessary to be developed carefully and gradually toward 2000. The proposed development pattern is "ring and ladder" as shown in Figure 5.2.

Other Urban Projects: Several urban development projects other than the above are identified under a policy that Phuket should strenghen its urban functions as shown in Figure 5.14.

## 3) Development Phasing

Except some particular considerations, a basic strategy of development phasing in Phuket Urban Sector is mostly same as that in Surat Thani. Table 5.4 shows the projects/programs proposed in each phase, and the growth pattern is schematically shown in Figure 5.15.

## 4) Spatial Structure Plan in Phuket Urban Area

Figure 5.16 shows a comprehensive spatial structure plan in Phuket Urban Area in 2000, including Phuket Municipality and its adjacent areas.

In this plan we especially stress that a wide variety of urban functions such as commercial, industrial, distributional, educational, recreational and tourism functions should be structured into an appropriate zoning and infrastructure network systems for the future expansion.

Like the Surat Thani Urban Structure Plan, this plan may be still controversial and subject to revision under discussions with authorities concerned.

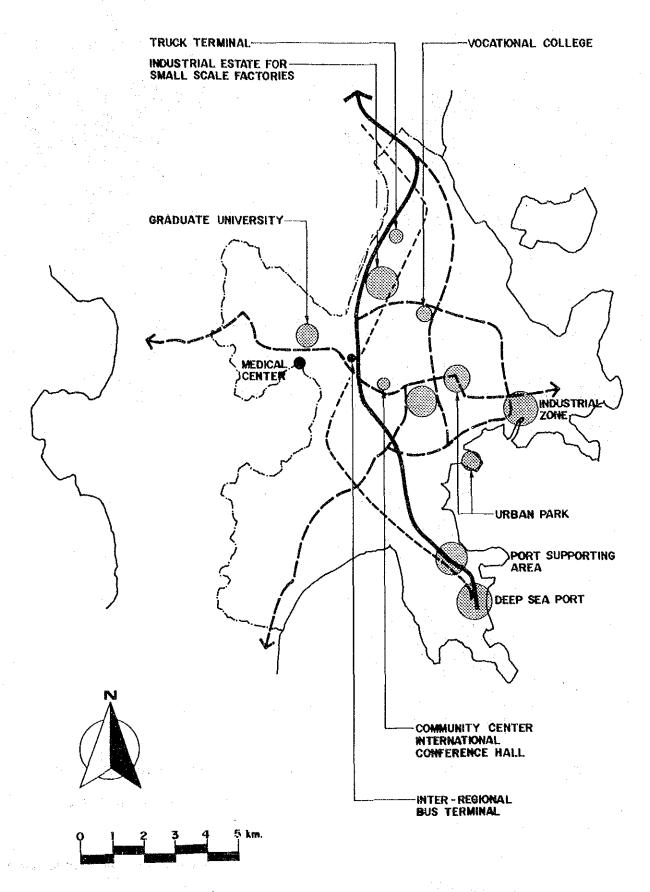


Fig. 5.14 URBAN PROJECTS LOCATIONS IN PHUKET URBAN AREA

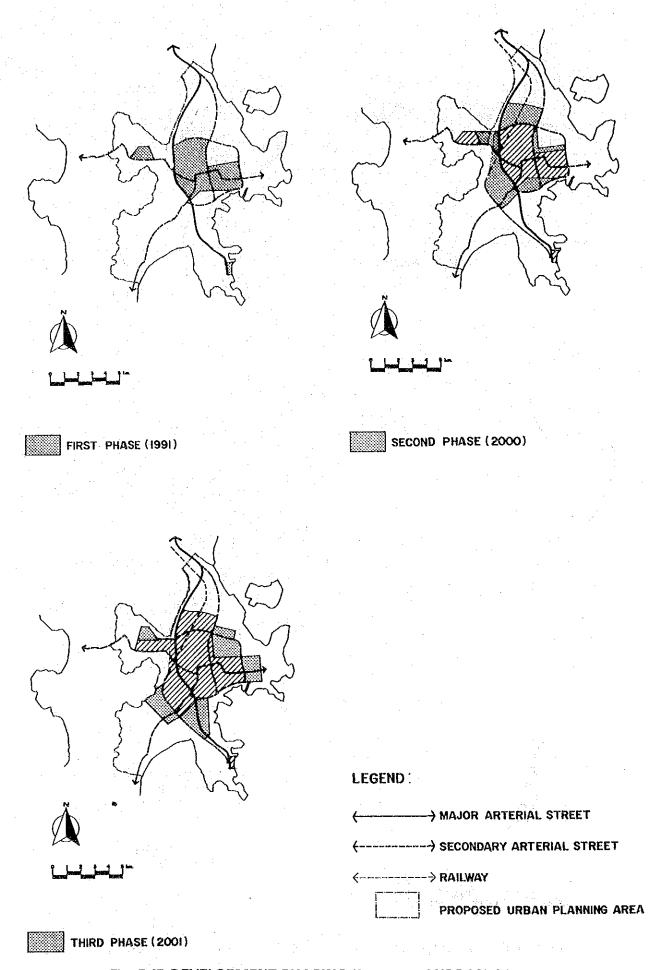


Fig. 5.15 DEVELOPMENT PHASING IN PHUKET URBAN AREA

# Table 5.4 URBAN DEVELOPMENT PROJECTS/PROGRAMS IN PHUKET

|   | <del></del> |  |  |
|---|-------------|--|--|
|   |             | Projects/Programs  | Outline  |
|   | (1)         | FIRST PHASE ( - 1991)  |  |
|   | A.11        | Deep Seaport Supporting Area<br>Development  | - Project area: 100 ha to accommodate warehouses and distribution businesses.  |
|   | A.12        | Industrial Promotion Zone<br>Infrastructure Development                            | - Around 70 ha including the Khlong<br>Tachin Port Supporting Area.  |
|   | A.13        | Industrial Complex Develop-<br>ment for Small/Medium Scale<br>Factories            | - Project àrea: 15 ha to help small-<br>scale industries make their operation<br>efficient.  |
|   | A.14        | Goods Distribution Center<br>Development   | - Project area: 30 ha to accommodate warehouses complex and truck terminal.  |
|   | A.15        | Specific Tourism Promotion<br>Zone Development (Patong,<br>Karon and Kata Beaches) | <ul> <li>Infrastructure and tourism facilities<br/>development including institution<br/>building for development.</li> </ul>                          |
| - | B.11        | Water Supply System Development  | - Utilization of Bang Wat Dam with water<br>pipe line of 33 km and a distribution<br>center and further study of Phuket<br>water resource development. |
|   | B.12        | Drainage System Development  | - Open canal, 13 km with three pumping stations.   |
|   | в.13        | Solid Waste Treatment System<br>Development  | - Collection system and incineration plant.  |
|   | B.14        | Major Arterial Street<br>Development   | - Bypass Route 402 (on-going).   |
|   | B.15        | Outer Ring Road Development<br>as a Part of Secondary<br>Arterial Streets.         | - About 12 km length.  |
|   | B.16        | Improvement Program of Other<br>Secondary Arterial Streets                         | - Total length of about 33 km.   |
|   | C.11        | Housing and Residential Area<br>Development Including Public<br>Services           | - Three housing development units including housing complex with about 1,000 units.  |
|   | C.12        | Slum Upgrading Program   | - 500 families (cont'd)  |

Note: Projects/Programs are classified into five categories as indicated on the project number: A, Urban Economic Base Development; B, Major Infrastructure Development; C, Housing Development; D, Environmental/ Urban Amenity Development and E, Transportation System Development.

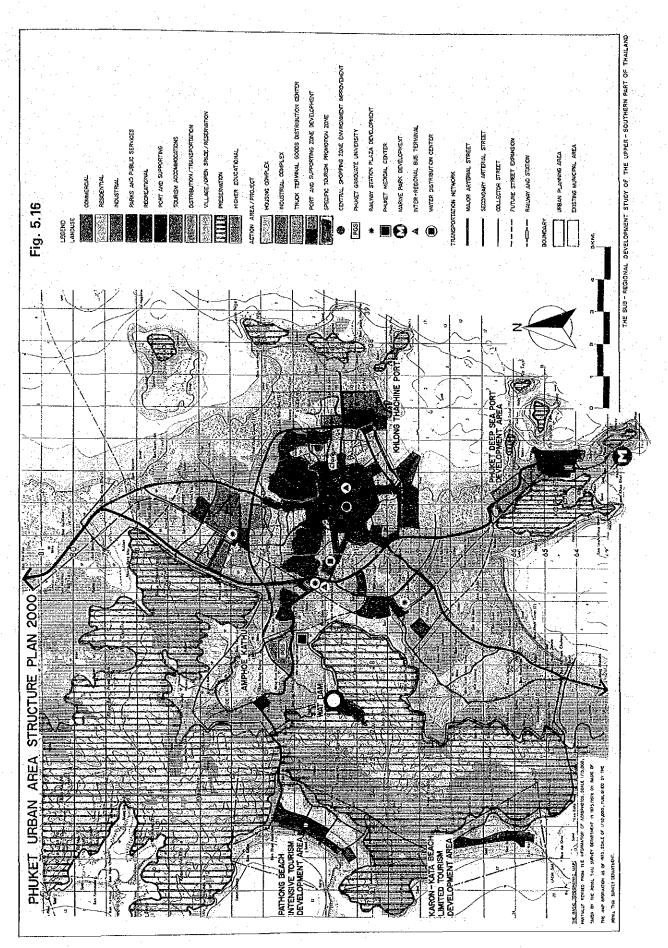
|         | Projects/Programs  | Outline  |
|---------|--|--|
| D.11    | Central Shopping Zone Envi-<br>ronment Improvement<br>(Thalang Road)     | - Streets and traditional archetectures<br>Improvement.                            |
|         | (Thaiang Road)   |  |
| D.12    | Phuket University or Graduate<br>School Development                      | - In Kathu district with the project area of about 150 ha.                         |
| E.11    | Interregional Busterminal Improvement/Development                        |  |
| · · · · |  |  |
| (II)    | SECOND PHASE (1992 - 2000)   |  |
| A.21    | Deep Seaport Supporting Area<br>Development                              | - Subsequent to Phase I .  |
| A.22    | Industrial Promotion Zone<br>Infrastructure Development                  | - Project area: Around 120 ha  |
| A.23    | Industrial Estate Development  | - Near the airport with the project area of 100 ha, including R&D complex.         |
| A.24    | Distribution Business Center<br>Development                              | - Subsequent to Phase I .  |
| A.25    | Subcenter Development  | - Western part of the city.  |
| B.21    | Drainage System Development  | - Subsequent to Phase I.   |
| B.22    | Secondary Arterial Streets<br>Development                                | - Subsequent to Phase I .  |
| C.21    | Housing and Residential Area<br>Development including Public<br>Services | - Four housing development units includi housing complex with 4,000 units.         |
| 4       |  |  |
| C.22    | Slum Upgrading Program   | - 1,000 families.  |
| D.21    | Phuket Medical Center<br>Development                                     | - With a rehabilitation center and specific medical treatment technologies         |
|         | International Conference<br>Hall Development                             | - With full functions.   |
| E.21    | Railway Station Plaza<br>Development                                     | - Three station plazas with feeder trans-<br>portation terminal in the urban area. |

(cont'd)

# (III) THIRD PHASE (Beyond 2000)

- A.31 Industrial and Tourism
  Promotion Zones and Industrial Estates Expansion/
  Development
- Subsequent to Phase II.
- A.32 Central Business District Re-development
- To intensify the landuse in limitted commercial area.
- B.31 Secondary Arterial Street and Lower Order Streets Improvement/Development
- ditto
- B.32 Urban Utilities Development
- Accompaning with expansion of urbanization area.
- C.31 Housing and Residential Area Development Including Public Services
- ditto
- D.31 Enrichment of Phuket Medical Center/University or Graduate School/International Conference Hall
- D.32 Promotion of Urban Beautification Program and Related Facilities Development





#### 5.3 COST AND BENEFIT

#### 5.3.1 Cost Estimates

The total cumulative project cost at 1983 price is estimated at about 5.3 billion baht in Surat Thani Urban Sector and about 6.1 billion baht, including the specific national projects, in Phuket Urban Sector during the period between 1987 and 2000 as shown in Tables 5.5 and 5.6, respectively. Share of public expenditure will be 64 and 71 percents of the total costs in Surat Thani and Phuket, respectively, since contributions of private sector are assumed to be as large as possible especially in the field of urban economic base development in line with the strategy to effectively utilize the private activities.

The public expenditures during the period of the Sixth National Plan are assumed to be about 1.43 billion baht or 42 percents of the total in Surat Thani and about 1.38 billion baht or 32 percent in Phuket.

## 5.3.2 Benefit Study

#### 1) Benefit Component

All the benefits potentially derived from the projects can not be estimated because of their intangible nature. The projects proposed in this urban sector would affect improvement/development of urban socio-economic activitiese as a whole. In this section, therefore, each benefit from each project will not be analyzed separately, rather the integrated benefits resulted from a package of all urban development projects will be examined from a macro viewpoint. The main benefits including indirect ones are considered as follows:

Incremental economic land value will be derived from the comprehensive urban development to stimulate economic activities since an increase in the aggregate productivity of space will pro-portionally be reflected in the rise of land prices through the market mechanism. This means the increase of economic assets in urban sector.

Rise of productive efficiency will be attained by the improvement of physical and social infrastructures mainly through (1) reduction of transport cost and (2) the value of effective labor added by creating skilled/educated labors.

Table 5.5 URBAN DEVELOPMENT COST ESTIMATES (SURAT THANI) 1/

| ce                         |                      | ate                 | 392   | ı                                      | 795                         | 8   | ı                                    | 1,200 |                         | 38             | 64                      |
|----------------------------|----------------------|---------------------|---|--|-----------------------------|---|--------------------------------------|-------|-------------------------|----------------|-------------------------|
| 3 price                    |                      | Private             | (1)   |  | 1                           |   |                                      |       |                         |                |                         |
| ot at 198                  | 92 - 2000            | Public              | 348   | 253                                    | 1,327                       | 10  |                                      | 1,947 |                         | 62             | 28                      |
| Unit: million baht at 1983 | 1992                 | Sub-<br>Total       | 07/   | 253                                    | 2,122                       | 32  | 1                                    | 3,147 |                         | 100            | 09                      |
| Unit: mi                   |                      | Private             | 193   | 1                                      | 468                         | 10  | 10                                   | 681   |                         | 32             | 36                      |
|                            | 87 - 1991            | Public              | 256   | 169                                    | 955                         | 38  | 15                                   | 1,433 |                         | 89             | 42                      |
|                            | 1987                 | Sub-<br>Total       | 677   | 169                                    | 1,423                       | 48  | 25                                   | 2,114 |                         | 100            | 70                      |
|                            |                      | Private             | 585   | I                                      | 1,263                       | 23  | 10                                   | 1,881 |                         | 36             | 100                     |
|                            | Total                | Public              | 709   | 422                                    | 2,282                       | 57  | 15                                   | 3,380 |                         | 64.            | 100                     |
|                            |                      | Grand<br>Total      | 1,189   | 422                                    | 3,545                       | 80  | 25                                   | 5,261 |                         | 100            | 100                     |
|                            | out the sense of the | FROJECIS CALEGORIES | A. Urban Economic Base Development $\frac{2}{}$ | B. Major Infrastructure<br>Development | C. Housing Development $3/$ | D. Environmental/Urban<br>Amenity Development | E. Transportation System Development | Total | Percent Composition (%) | Public/Private | (1987–1991)/(1992–2000) |

Note: 1/ Including Phun Phin Urban Development.

The costs of the industrial estates development proposed in the sector of Industrial Development are excluded but those of the industrial promotion zone infrastructure development are included.

Including costs of residential infrastructure, urban utilities distribution, social facilities, but excluding the costs of individual houses, except housing complex development. 3/

Source: The Team

Table 5.6 URBAN DEVELOPMENT COST ESTIMATES (PHUKET)

| 9)  |             |                | , |  |  |                           |   |   |   |                  |                         |                |                         |
|---|-------------|----------------|---|--|--|---------------------------|---|---|---|------------------|-------------------------|----------------|-------------------------|
| at 1983 price   |             | Private        |   | 145                                      | <b>I</b>                               | 800                       | 15  | (100)   | 14                                      | 974 (1,074)      | · · · ·                 | 35 (26)        | (60)                    |
|   | 1992 - 2000 | Public         |   | 59                                       | 265                                    | 1,309                     | 15  | (1,200)                                       | 26                                      | 1,780 (2,980)    |                         | 65 (74)        | 59<br>(68)              |
| : million baht  | ř.          | Sub-<br>Total  |   | 310                                      | 265                                    | 2,109                     | 30  | (1,300)                                       | 07                                      | 2,754 (4,054)    |                         | 100            | (66)                    |
| Unit:   |             | Private        |   | 221                                      | i.                                     | 414                       | 01  | (09)  | 7                                       | 652<br>(712)     |                         | 34 (34)        | (40)                    |
|   | 9.1         | Ē              |   |  |  |                           |   |   |   |                  | . "                     |                |                         |
|   | 1987 – 1991 | Public         |   | 211                                      | 177                                    | 834                       | 10  | (140)   | 7                                       | 1,239 (1,379)    |                         | 99)            | 41 (32)                 |
|   | I           | Sub-<br>Total  |   | 432                                      | 177                                    | 1,248                     | 20  | (200)   | 14                                      | 1,891 (2,091)    |                         | 100            | 41 (34)                 |
| -<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>- |             | Private        |   | 366                                      | · I                                    | 1,214                     | 25  | (160)   | 21                                      | 1,626            |                         | 35 (29)        | 100 (100)               |
| -, -;!  | Total       | Public         |   | 376                                      | 277                                    | 2,143                     | 25  | (1,340)                                       | 33                                      | 3,019 (4,359)    | :<br> -<br> -<br> -     | 65<br>(71)     | 100 (100)               |
|   |             | Grand<br>Total |   | 742                                      | 442                                    | 3,357                     | 50  | (1,500)                                       | 54                                      | 4,645<br>(6,145) |                         | 100)           | 100 (100)               |
|   |             | PROJECTS       |   | A. Urban Economic Base<br>Development 1/ | B. Major Infrastructure<br>Development | C. Housing Development 2/ | D. Environmental/Urban<br>Amenity Development | D'. Specific National Projects $\frac{3}{}$ / | E. Transportation System<br>Development | Total 4/         | Percent Composition (%) | Public/Private | (1987–1991)/(1992–2000) |

Note: 1/ The costs of Industrial Estates are excluded.

- Including costs of residential infrastructure, urban utilities distribution, social facilities, but excluding the costs of individual houses except housing complex development.
- Only building costs of three kinds of projects excluding both equipment and the costs for functional operation. ر ا
- Specific National Projects. The figure in parenthesis indicates the cost including D'. 4

Source: The Team

Increase of urban income will be expected due to the transformation of employment from the lower income sectors to higher income sectors or from the agricultural to the manufacturing and the services sectors through urbanization.

Elimination of reduction of the property damage, the disruption to transportation and the obstruction to business activities will be attained by the drainage and flood control improvement.

Increase of earnings generated by the increases in number of tourists and their expenditure, which improvement of urban amenities will induce.

Improvement of hygiene and up-grading of standard of living can be attained by urban utilities and environmental developments, of which benefits, however, are difficult to be quantified.

#### 2) Benefit Account

It can be said that the incremental economic land value is likely to imply the whole amount of benefits from urban development projects, although this quantification is too difficult to be done due to the lack of reliable data on land prices, despite that a general observation suggests that the unit cost of the land with well-developed utilities and infrastructure is assumed to be about 1,000 to 1,500 baht square meters higher than that without them in the surrounding urbanized area. Unfortunately, the existing land price data in 1981 issued by Department of Land (DOL) does not necessarily indicate actually the assessed prices because DOL assessment of Phuket Urban Area seems to be extremely underestimated, compared with that of Surat Thani.

Other economic benefits somehow quantifiable are estimated as shown in Table 5.7, however, it should be noted that all the counted benefits are not resulted directly from but more or less related with the urban sectors' projects.

# 3) Economic Evaluation (Referential Use)

Evaluating all the urban development projects from the economic feasibility point of view does not necessarily seem meaningful, because not a few projects belong to the kind of those which city itself ought to furnish despite that they are not feasible economic- ally. Therefore, this evaluation is just a tentative trial as an attempt to justify urban projects as a package.

Table 5.7 SUMMARY OF ECONOMIC BENEFIT RELATED TO URBAN SECTOR

Unit: Million baht at 1983 price

|  |   | Surat Thani |       | Phuket |       |
|--|---|-------------|-------|--------|-------|
|  |   | 1991        | 2000  | 1991   | 2000  |
| Increase of Urban Income Caused by<br>Sectoral Transformation of Employees | • | 2,567       | 4,903 | 3,072  | 6,050 |
| <ul> <li>Increase of Skilled/Educated Labors'<br/>Activities</li> </ul>    | : | 255         | 338   | 299    | 452   |
| - Increase of Tourists' Economic Activities                                | : | 131         | 272   | 211    | 444   |
| - Flood Control  | : | 59          | 68    | 198    | 288   |
| Total  | : | 2,982       | 5,581 | 3,780  | 7,174 |

Source: The Team

As mentioned in the preceding section, the estimated benefits are not directly resulted from, but related with urban projects. According-ly, it is extremely difficult to indentify what degree such physical projects will contribute to generating those benefits. Hence, we set up several cases/assumptions regarding the relative magnitude of contribution by urban sectors' development projects to the total benefits, except the benefit from the flood control, which is regard- ed as a direct benefit. As shown in Table 5.8, if the relative contribution of urban projects is assumed to be 20 percent which seems to be generally reasonable, IRRs are 19 percent and 24 percent, and B/C ratios, in the case of the discount rate at 12 percent per annum, are 1.33 and 1.53 in Surat Thani and Phuket package developments, respectively.

Table 5.8 TENTATIVE ECONOMIC JUSTIFICATION OF URBAN DEVELOPMENT PROJECTS IN SURAT THANK AND PHUKET

Unit: %

| Relative Contri-                                | IR                            | R.                          |      | B/C *1                        |                             |  |  |
|---|-------------------------------|-----------------------------|------|-------------------------------|-----------------------------|--|--|
| bution of Urban<br>Projects to<br>Total Benefit | Surat Thani<br>Urban Projects | Phuket *2<br>Urban Projects |      | Surat Thani<br>Urban Projects | Phuket *2<br>Urban Projects |  |  |
| 10%   | 4                             | 7                           |      | 0.67                          | 0.76                        |  |  |
| 15%   | 13                            | 16                          | -    | 1.00                          | 1.14                        |  |  |
| 20%   | 19                            | 24                          |      | 1.33                          | 1.53                        |  |  |
| 25%   | 25                            | 30                          |      | 1.66                          | 1.91                        |  |  |
| 30%   | 30                            | 35                          | 3. T | 2.00                          | 2.30                        |  |  |

Source: The Team

\*1 Assumed discount rate: 12 percent per annum. Note:

\*2 The project cost including specific national projects is applied.

# 6. CONDITIONS FOR IMPLEMENTATION

# 6.1 INSTITUTIONAL IMPROVEMENT

# 6.1.1 Urban Planning and Promotion of Plan

There are a number of approaches to urban planning administration depending on characteristics of countries. However, the following three targets seem substantial and common:

- to deliberately form an urban structure including streets and utilities to meet the requirements of urban growth.
- to control disorderly development and simultaneously to promote appropriate landuse. In this regard industrial landuse is some-times a crucial issue, because of environmental conflicts between industrial and residential uses.
- to secure necessary space for public facilities.

The following prerequisites or concepts are necessary in order to establish an effective urban planning system and policy with the above targets.

- Required is a concept that the private right, which must be deserved inviolable, is sometimes subject to being inhibited for public benefits.
- Necessary is a consensus that those who get the benefits from public developments should bear cost in proportion to the magnitude of their benefits except social welfare.
- Indispensable is some madatories such as standards/criteria, ordinances and acts to make development administration effective.
- Important is to foster planning and management capabilities of local administrators to adjust the conflicts between private and public benefits at local level.

As for promotion of plan, there are four kinds of issues to be tackled as follows:

 Staff Upgrading: Plans like this need many administrative staff with speciality in different fields and those who can look over the whole program and make recommendations effective for political decisions. It is important also that the staff members involved understand fully the characteristics of the region concerned.

2) Effective Financial Arrangement: At present, municipal and provincial financial bases are so weak that they can not sufficiently bear the cost for actions under their resposibility of execution. However, the financial responsibility for urban developments, must be shared among central, provincial or municipal governments in response to the characteristics and magnitude of project and its benefits. In case of national project, since beneficiaries must be the people of the country, the central government should bear the cost to recover negative impacts, if occurs at local level. At the same time, the local governments desirably shares part of its development cost in response to the magnitude of benefits through close coordination between the central and local governments. In case of municipal project, the central government also has a great responsibility to subsidize it because the nation itself depends on the local socio-economic activities.

In order to form a proper system to allocate cost between the central and local governments, two major issues should be solved, i.e., one is to strengthen local government financial base and the other is to decentralize some dicision making powers on the local governments. As a reference for this discussion, a Japanese financial allocation system for major urban development projects is shown in Table 6.1. This system has experienced to bring about the following administrative impacts or effects:

- Standardization of quality and equitable distribution of urban development projects;
- Intensification of coordination between the central and local administrations; and
- Fostering of planning and administrative capabilities of local officials through the competition among different local administrations for capturing specific national subsidies.
- 3) Mobilization of the Private Sector: In order to make this plan successful it is inevitable to mobilize the power of the private sector. Possible good examples include inducing developers of the private sector to housing projects, private manufacturers to the development of industrial estates and private enterprises to management of the new distribution facilities. In these cases, an attention should be paid to the fact that the final objective of a private enterprise is to pursue profit. Rights and duties of the private sector should be expressed clearly for example in "Development Brief".

Table 6.1 FINANCIAL ALLOCATION SYSTEM FOR URBAN DEVELOPMENT PROJECTS
(IN CASE OF JAPAN)

| Major Urban Development Projects                | Proporti              | on of Cost Si            | ared by: |
|---|-----------------------|--------------------------|----------|
| najor orban beveropment Projects                | Central<br>Government | Provincial<br>Government |          |
| - Promotion of Urban Planning                   | 1/3                   | 2/3                      | or 2/3   |
| - Waste Disposal/Treatment<br>Development       | 1/4                   | mark .                   | 3/4      |
| - Urban Renewal                                 |                       |                          |          |
| Planning Study Project Construction             | 1/3<br>1/3            | 2/3                      | 2/3      |
| - Urban Park Development                        |                       |                          |          |
| . Land Acquisition                              | 1/3                   | 2/3                      | or 2/3   |
| Facility Construction                           | 1/2                   | 1/2                      | or 1/2   |
| Specific Area Project Technical Assessment/     | 5.5/10                | 4.5/10                   |          |
| Supervision                                     | 10/10                 |                          | -        |
| - Historical Assets Preservation                |                       |                          |          |
| Historical Town and Green                       |                       |                          |          |
| Space Development                               | 4/5                   | 1/5                      | or 1/5   |
| · Historical Facilities                         | 1/2                   | 1/2                      | or 1/2   |
| ' Green Space Preservation                      | 2/3                   | 1/3                      | or 1/3   |
| - Public Sewerage System Developme              | ent                   |                          |          |
| Planning of Comprehensive                       |                       |                          |          |
| Sewerage Basin System                           | 1/3                   | 2/3                      | :        |
| <ul> <li>Urban Sewerage System</li> </ul>       | 2/5                   | 3/5                      | or 3/5   |
| * Public Sewerage System                        | 2/3                   | 1/3                      | or 1/3   |
| ' Specific Development                          | 10/10                 |                          |          |
| - Housing Area and Street Developm              | ient                  |                          |          |
| · Land Consolidation                            | 1/2-2/3               | 1/3-1/2                  | 1/3-1/2  |
| ' Urban Arterial Streets                        | 2/2                   | 1 /2                     | 1/3      |
| Improvement                                     | 2/3                   | 1/3                      | 1/3      |
| ' Urban Secondary Streets Improvement           | 1/2                   | 1/2                      | 1/2      |
| * Specific Urban Streets                        | •                     | •                        | •        |
| Development                                     | 2/8-8/10              | 1/2-2/10                 | 1/3-2/10 |
| Railway Elevation Project                       | 2/3                   | 1/3                      | 1/3      |
| Flyover Development                             | 2/3                   | 1/3                      | 1/3      |
| Urban Area Improvement                          | 2/3                   |                          | 1/3      |
| <ul> <li>Pedestrial Foot Development</li> </ul> | 1/2                   | 1/2                      | 1/3      |
| <ul> <li>New Transportation System</li> </ul>   |                       | . 10                     | 1.40     |
| Development                                     | 2/3                   | 1/3                      | 1/3      |
| Technical Assessment/                           |                       |                          | •        |
| Supervision of Planning                         | 10/10                 |                          | 2/2      |
| <ul> <li>Transportation Survey/Study</li> </ul> | 1/3                   | 2/3                      | 2/3      |

Note: 1) Specific projects and specific areas are regulated in most of project categories. In these cases, upward adjustment is made on the ratio of cost allocation of the central government.

Source: Japanese Ministry of Construction

<sup>2)</sup> Specific areas are generally the provinces or the municipalities where natural conditions are comparatively severe or where some national strategic projects are promoted such as international airport areas, intensive industrial development towns and so on.

4) Establishment of Regional Urban Development Authority: It is recommended to explore the possibility of organizing an agency responsible for project implementation of regional urban development, say, "Regional Development Authority of Thailand (RDAT)" with participation of private capital and the national government fund.

Since urban development itself is a comprehensive one, a wide variety of authorities concerned should be responsible for its execution under a proper coordination. Especially an overall development project of large scale will sometimes take much time to make necessary administrative arrangement under the present system, and the local governments which should substantially take care of that project can not bear the allotted responsibility because of financial as well as administrative weakness. Actually there seems to be a lot of constraints for project implementation of overall regional urban developments.

A basic purpose of the authority proposed above is to overcome those constraints and it will function as a body to promote and accept the external and internal finances as well as to effectively mobilize piecemeal private investments into an entire urban development.

With same purpose, for a reference, the Japanese Government established "Japan Regional Development Corporation (JRDC)" in 1974 by reorganizing "Coal Mining Area Development Corporation (MADC)" established in 1962. In the end of the 1950s most of coal mining activities were stagnating to be closed in Japan because of energy revolution, hence regional economic restoration after mining was a serious political issue especially in regions. This was a background of establishment of MADC. In the 1970s when Japan had experienced the rapid growth of national economy, regions had required more comprehensive infrastructure developments including urban sector to catch opportunities of industrialization. JRDC sprang from this background with purposes to promote balanced national development by encouraging relocation of the industry and population from metropolitan areas to outlying areas and to develop new communities and industrial estates with financial support system for factory relocation. The capital of about 310 million US dollars is wholly owned by the Japanese Government, and the annual budget of 475 million US dollars is financed by the fund available from the people's deposit accumulated in the government related financial authorities of post offices, social insurance and so on.

JRDC's activity in terms of regional urban development has concentrated on implementation of only large-scale complex development with the area of more than 300 hectares, however, unfortunately it is true that the following problems are faced by

#### JRDC at present:

- The criterion of project area of 300 hectares is so high that few local governments may not justify the project application in terms of implementation possibility because of difficulty of land acquisition and budget constraint;
- The fundamental function of JRDC is no more than a real-estate enterprise to make the project feasible; and
- Over-supply of lands for industrial and housing locations has occured nowadays in real estate market in the regions, or as a whole, regional industrialization has not proceeded so rapidly as the plan projected.

Taking into account the above Japanese experience, several attentions should be paid to establishment of such an authority like RDAT as follows:

- Interrelaionship between the existing other executing authorities such as National Housing Authority, Industrial Estate Authority of Thailand, Public Works Department and so on should be made definite in terms of allocation of responsibility for project implementation;
- Execution standard or criteria of projects should be made clear under a discussion of authorities concerned in consideration of the above;
- A government subsidizing system is necessary to operate the projects because financial return may not be high in large part of urban developments, if the basic function of RDAT is based on entrepreneurship;
- Financial resources should be ensured by international loans as well as by collecting capitals from private sector; and
- Staff upgrading program is necessary.

# 6.1.2 Administrative Improvement

Five kinds of administrative and institutional arrangements in terms of urban planning and execution are necessary to be undertaken as follows:

1) Joint Coordination of Local Administrations: The urban development involves five kinds of administrative bodies, i.e., central, provincial, municipal, amphoe and sanitary district administrations. A proper coordination/relationship virtically and holizontally between those administrative bodies is indispensable to execute projects.

Water supply, drainage, solid waste disposal/treatment, medical and fire fighting systems developments, for example, should be planned and implemented jointly by concerned local governments in a system of inter-local administrative collaboration with an objective to make efficient and economical implementations and operations. In this connection, it is recommended to establish an ad hoc body participated by local governments concerned. This body can be assisted by the central government's subsidy as well as subscriptions of beneficial local governments and this functions are:

- Adjustment of the plan and interests between the related administrative bodies;
- Jointly making recommendation, suggestion or claim to the central government regarding the development policies;
- Consensus building for development policies and project implementation; and
- Strengthening to support the approved national project through preparation of land or adjustment of residents' interests.
- 2) Land Management: In order to prevent the obstacle of unreasonable increase of land price, some institutional countermeasures are necessary to be established in line with an urban development plan. It seems to be one of them to freeze the land price or to prohibit any transaction of land titles within authorized project area.

Concerning land preparation for public use, an effective measure is desired with definite guidelines or criteria. In this regard, the following measures are recommended to be applied:

A regulation is established so that medium or large scale housing development must provide the land of, say, 10 percent of the project area for public service facilities such as elementary school, health center, parks and utilities. This regulation is based on a benefit theory of betterment levy and popular in a number of advanced countries. Criteria of public land preparation should be decided depending on the scale of project.

- Exemption or reduction of taxation is introduced as an incentive for landowners to sell their lands to public authorities for a public purpose in order to enable easier public land acquisition.
- Application of so-called "Land Readjustment System". This system is popular in Japan and effective to acquire a necessary public land along with improvement of urbanized area. This is undertaken as one of urban development actions, however, actually it is very difficult to successfully undertake this project without a large amount of government subsidies. Major purpose of this system is to let landowners submit their parts of lands equivalent to the value of benefits they receive from the environmental, economic and physical betterment. The land submitted by owners is exchanged and adjusted into the public use land in their area so as to form a planned urban area. Since the project involves restriction of ownership rights and the compulsion in collective submission of small land percels and determination of location and form of individual land properties, thoughtful rules should be prepared with detailed stipulations regarding the executors, execution procedure, method of property appraisal, cost sharing and so on.

Many experiences suggest that this system is easier to be undertaken in regional area than metropolitan area, and in developing area than economically stagnating area.

In order to apply this system in an effective way, the following conditions are required at least:

- A definite land ownership and land tenure relationships in the project area.
- Strong administrative capability to adjust a complicated relationship of residents' rights into a orderly structure.

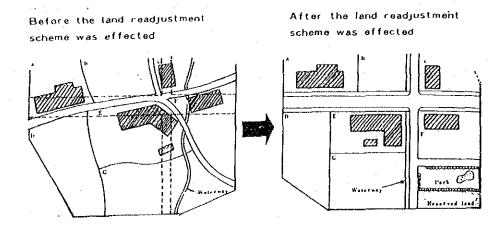


Fig. 6.1 LAND RE-ADJUSTMENT SYSTEM

Development Control: Two ways, generally, are conceivable to undertake development control, i.e., one is to govern individual development activities by administrative mandatories such as regulations or acts, which is a normative way, and another is to guide spontaneous activities into a planned form by intentional developments of urban infrastructures, which is a behavioral way. For instance, a location of industrial factory is subject to some fore-seeable conditions of tax incentives, land price, transportation condition with convenience of transport of raw materials and products, and existence of available utilities. By preparing some of those conditions intentionally, an industrial location can be induced and controlled more and less.

We propose that these two ways are simultaneously applied in order to ensure an effective development control. The followings are recommended to be examined as soon as possible in terms of establishment of control system:

- Designation of the urbanization promotion area given high priority of urban infrastructures and utilities developments, and the urbanization restriction area given low priority of them;
- Designation of four zones in the urbanization promotion: resodential zone with high
  priority of social services facilities development, commercial zone with intensity commercial landuse, industrial zone with promotion incentives for industrial locations,
  relocations and expansion, and specific development zone to accommodate some
  specific projects such as tourism, port supporting activities and industrial estate
  development;
- Designation of action areas given the highest priority;
- Other regulations in relation to urban area formation such as housing and residential area development standard, industrial relocation program, setback system and so on.

Needless to say, land management and environmental preservation as mentioned in the preceding and the following paragraphs will be functionally linked with these designations of zones.

- 4) Environmental Preservation: We think that the plan must not cause environmental destruction and the following items should be institutionalized and put into effect.
- To make environmental assessment before construction of factory;

- To make installation of pollution control equipment as a requirement in every factory;
- To carry out environment patrols;
- To establish punishment rules for violation of the environmental standard; and
- To encourage the factories which produce pollution in their operation to move into an estate complex.
- 5) Monitoring System: Every project has some impact on the activities of enterprises and other projects and it is important to assess whether a project has positive effects/influences on economic activities in the region at each step. In case that a project is appraised to have positive effects, it should be more encouraged so as to maximize its regional benefit, and on the contrary, a negative effects should be minimized along with desired direction of development. We propose that the monitoring system is established at the committee level, organized by the members with the technical and specialized knowledge of their various kinds of expertise.

#### 6.2 STRENGTHENING OF LOCAL FINANCE CAPABILITY

It seems that the financial base of local government is extremely weak with local resources being insufficient to finance even minimum required developments of which responsibility should be taken by itself. The local government portion of expenditure for projects should be enlarged so that the local government can undertake necessary developments based on its decision, as mentioned in the Fifth National Economic and Social Development Plan.

The study in this section examines on way of strengthning municipal financial capability, with a focus on Surat Thani and Phuket.

#### 6.2.1 Present Conditions

Current fiscal balance sheets of Surat Thani and Phuket Municipalities are shown in Tables 6.2 and 6.3, respectively.

#### 1) Revenue

The municipal revenue is classified roughly into three categories: (1) "tax revenue"

Table 6.2 LOCAL GOVERNMENT FISCAL STATEMENT (MUN. SURAT THANI) Unit: 1,000 Baht

1980 1981 1978 1979 1977 28,323 25,041 27,806 12,837 18,791 REVENUE 13,394 16,687 15,367 11,188 1. REGULAR REVENUE 8,631 8,074 11,122 9,866 13,655 5,615 1.1 Tax Revenue - Local Levied Tax 1,439 1,565 1,887 9,866 13,655 7,114 4,675 2,681 - Surcharge Tax 2,121 1,834 1,495 - Shared Tax 3,528 3,032 4,245 3,016 3,114 1.2 Non-Tax Revenue 842 713 735 754 648 - Fees, Fives & Permits 2,793 2,190 2,360 3,532 2,368 - Others 11,647 11,118 12,107 SPECIAL REVENUE 2,322 3,306 2. 11,647 9,179 2,979 3,657 2.1 Subsidies 2,322 1,672 6,451 6,488 968 1,631 - General - Education 1,354 1,348 1,985 5,196 2,691 - Spacial 1,939 327 8,450 2.2 Others 1,939 - Reserves 327 8,450 - Loans 20,532 22,130 24,350 17,072 EXPENDITURE 11,062 16,933 19,720 15,724 REGULAR EXPENDITURE 9,176 12,458 1.1 Administration Exp. 7,430 8,609 9,622 11,761 13,719 7,750 9,313 5,309 - Salaries and Wages : 4,373 4.822 281 - Payment on Loan 134 235 - Others 4,032 4,011 4,406 2,923 3,552 1.2 Maintanance Exp. 489 480 688 833 379 4,484 5,168 1.3 Investment Exp. 5,622 1,367 3,360 - Equipment 384 480 276 839 632 - Land & Construction: 983 4,990 4,004 4,892 2,521 SPECIAL EXPENDITURE 4,808 4,631 1,885 4,614 5,196

Source: Phuket Municipality

Table 6.3 LOCAL GOVERNMENT FISCAL STATEMENT (MUN. PHUKET)

Unit: 1,000 Baht

| and the second s |            |        |        | Unit:          | 1,000 Bal          | nt     |
|--|------------|--------|--------|----------------|--------------------|--------|
|  |            | 1977   | 1978   | 1979           | 1980               | 1981   |
| REVENUE  |            | 37,511 | 32,543 | 43,598         | 49,602             | 44,175 |
| 1. REGULAR REVENUE   | ;          | 22,506 | 26,691 | 28,097         | 29,124             | 34,401 |
| 1.1 Tax Revenue  | :          | 15,228 | 18,346 | 19,661         | 22,952             | 28,170 |
| - Local Levied Tax   | :          | 3,147  | 3,855  | 4,153          |                    |        |
| - Surcharge Tax  | :          | 8,200  | 10,149 | 11,289         | 22,952             | 28,170 |
| - Shared Tax   | :          | 3,881  | 4,342  | 4,219          |                    |        |
| 1,2 Non-Tax Revenue  | ;          | 7,278  | 8,345  | 8,436          | 6,172              | 6,231  |
| - Fees, Fives &<br>Permits   | : _        | 1,099  | 1,266  | 1,488          | 1,619              | 1,309  |
| - Others   | ;          | 6,179  | 6,179  | 6,948          | 4,553              | 4,922  |
| 2. SPECIAL REVENUE   | <b>:</b> , | 15,006 | 5,854  | 15,501         | 20,479             | 9,774  |
| 2.1 Subsidies  |            | 14,706 | 5,817  | 12,906         | 19,534             | 9,774  |
| - General  | :          | 1,211  | 2,072  | 2,135          | 8,093              | 8,952  |
| - Education  | :          | 2,578  | 3,213  | 4,245          | 11,441             | 822    |
| - Spacial  | :          | 10,917 | 532    | 6,526          | ~ <b>,</b> , , , , |        |
| 2.2 Others   | :          | 300    | 3,7    | 2,595          | 945                | -      |
| - Reserves   | :          | 300    | 37     | 2,595          | 945                |        |
| - Loans  | :          |        |        | <del>-</del>   | -                  | -      |
|  |            |        |        |                |                    |        |
| EXPENDITURE  | :          | 37,534 | 27,627 | 41,004         | 48,230             | 42,852 |
| 1. REGULAR EXPENDITURE   | :          | 23,620 | 27,059 | 33,026         | 35,845             | 42,030 |
| 1.1 Administration Exp.  | :          | 16,996 | 18,791 | 23,030         | 24,701             | 29,072 |
| - Salaries and Wages   |            | 8,458  | 9,074  | 11,548         | 14,789             | 18,121 |
| - Payment on Loan  | :          | 500    | 500    | 500            | 500                | 500    |
| - Others   | :          | 8,038  | 9,217  | 10,982         | 9,412              | 10,451 |
| 1.2 Maintanance Exp.   | :          | 1,326  | 1,342  | 1,390          | 1,484              | 1,330  |
| 1.3 Investment Exp.  | :          | 5,298  | 6,926  | 8,606          | 9,660              | 11,628 |
| - Equipment  | :          | 1,231  | 1,088  | 1,085          | 2,439              | 2,019  |
| - Land & Construction  | 1:         | 4,067  | 5,838  | 7,521          | 7,221              | 9,609  |
| 2. SPECIAL EXPENDITURE   | :          | 13,917 | 568    | 7,869<br>(109) | 12,386             | 822    |

Source: Phuket Municipality

which consists of local levied tax, surcharge tax and shared tax. (2) "non-tax revenue" and (3) "subsidies" from the central government. Besides the above, there are temporary revenue resources of loan from "Municipal Development Fund (MDF)" and "reserved fund" which deposit the annual financial surplus of municipalities.

- Generally, amount of municipal revenue does not seem sufficient. In 1981, the total revenue in Phuket Municipality amounted to about 44.2 million baht or about 1,000 baht in per capita, while it amounted to 27.8 million baht or 750 baht in per capita in Surat Thani.
- Annual growth rate of revenue is not necessarily constant but fluctuating and rather decreasing in real prices in both municipalities as shown in Table 6.4.
- As to the composition of revenue, the tax revenue shares a large portion of 64 percent in Phuket and 50 percent in Surat Thani in 1981, and these shares tend to increase. The share of "local levied tax" to the tax revenue is around 20 percent in both municipalities. On the other hand, "subsidies" from the central government consist of "general", "education" and "special" subsidies. The amount of general subsidies is allocated in proportion to the number of population at the level of 180 baht per capita, and that of special subsidies is not constant but depends on projects.

Table 6.4 ANNUAL GROWTH RATE OF REVENUE

Unit: Percent p.a.

|         | Surat 7 | Γhani | Phuk    | et   |
|---------|---------|-------|---------|------|
|         | Nominal | Real  | Nominal | Real |
| 1977/78 | 46.4    | 34.8  | 13.2    | 20.1 |
| 1978/79 | 50.7    | 35.1  | 34.0    | 20.1 |
| 1979/80 | 11.6    | 24.1  | 13.8    | 2.3  |
| 1980/81 | 11.1    | 1.9   | 10.9    | 18.3 |

Source: Municipalities of Surat Thani and Phuket

#### 2) Expenditure

- The expenditure consists of "regular expenditure" including administration, maintenance and investment expenditures, and "special expenditure" allocated to projects executions. It is regulated that amount of expenditure should be 97 percent

of revenue.

The ratio of regular expenditure to the total, in which the large number indicates a tight affordability of budget, is extremely large and also annually fluctuating as shown in Table 6.5. This shows that municipal budget is in a tight situation and that a long/medium term expenditure program for project implementation is difficult to be established within this situation.

Table 6.5 INDICATOR OF BUDGETARY AFFORDABILITY \*1

|      | Phuket | Surat Thani |
|------|--------|-------------|
| 1977 | 0.63   | 0.83        |
| 1978 | 0.98   | 0.73        |
| 1979 | 0.80   | 0.77        |
| 1980 | 0.74   | 0.76        |
| 1981 | 0.98   | 0.81        |

Note: \*1 Regular Expenditure/Total Expenditure

Source: Municipalities of Phuket and Surat Thani

# 6.2.2 Measures to Improve Local Government Financial Base

As for strengthening of local financial base, two complementary studies were commissioned by Ministry of Interior in cooporation with the five project cities development. Examining their study results, we recommend the following measures for strengthning the administrative and financial capacity of the local governments.

# 1) Improvement of Local Tax Levy System

As recommended by other relevant studies, it is crucial to improve the minicipalities' efficiency in assessing and collecting the main source of local taxation and to establish a "property taxation system" by developing a more efficient collection system and use of up-to-date records and valuations. The following actions are recommended to be positively promoted:

to develop/update tax maps and tax rolls for municipalities;

- to legislate the increase of ceilings for fees, fines and permits levied by municipalities by 50 percent, which is considered to be the maximum amount realistically achievable; and
- to train capability of personnel responsible for property appraisal and evaluation, and fees/tax collecting.

# 2) Expansion/Modification of Municipal Development Fund (MDF)

The MDF increases significance of the role in financing municipal projects, if MDF's financial viability is more ensured by expansion of the fund and by modification of its function. Some additional sources with low interest should be sought and the central government should encourage use of fund with subsidy so that this fund can have a kind of banking function similar to that for Bank for Agriculture and Agricultual Cooperatives. At the same time, it is indispensable to enlarge municipal financial capability for getting out of the potential debt.

#### 3) Introduction of Urban Planning Tax

It is recommended to examine a possibility to introduce a new taxation, namely "urban planning tax" as one of local tax related with property tax. Although the existing land development tax seems to be one of betterment levies, this is not the taxation to impose on those who get benefits from urban betterment itself from the viewpoint of the theory of betterment levy.

This new taxation aims at facilitating various necessary urban planning and development based on the beneficiaries' contributions. In the Japanese case, this urban planning tax is imposed on owners of real estates of buildings and lands located in the urbanization promotion area delineated by the City Planning Act in proportion to the amount of property value. The rate of urban planning tax is assessed at 0.3 percent of valued amount of property, compared with 1.4 percent in the case of property tax.

If the examination reveals that a similar taxation system is effective in Thailand, the following points should be paid special attention:

Urban development plan should be legally legislated because this taxation is related with the urban planning itself. The area where beneficiaries will occure due to urban developments should be defined;

- An appropriate levy rate and criteria should be carefully examined; and
- A definite system for property assessment/efficient tax collection is important to be developed as well.

#### 4) Establishment of Municipal Enterprises

An entrepreneurship is recommended to be positively fostered in local governments in order to respond to various needs of urban developments. It seems to be one of effective measures not only for facilitating urban developments but also for fostering the personnel capability to provide the local governments with opportunities to embark in profitable undertakings. Housing, for example, will be increasingly demanded. Parking space will be important to be provided in the central business district. Amusement facilities for tourists will be required. These projects can expect sufficient financial return and some of them will be profitable if they are operated in a proper manner. In this regard, municipal enterprises are recommended to be encouraged to undertake these projects possibly being financed by MDF, central government's subsidy and commercial banks.

#### 5) Flexibility in Municipal Boundary Setting

The extent of municipal area is related with the amount of municipal revenue, because local government revenue depends remarkably on property and land development taxes. On the other hand, the existing municipal areas especially in Phuket and Surat Thani, are quite small and equivalent only to the central business districts, so the actual urbanized areas have exceeded over the municipal areas. Since urban developments to be undertaken within the municipal areas should be related and linked with the whole actually urbanized area so as to make them effective, rigid and narrow municipal boundaries cause an imbalance that the development expenditure within municipal area is subject to being surcharged, compared with amount of revenue.

It is desirable that the municipal area covers the whole area urbanized or to be urbanized in future in order not only to make urban developments financially viable at the local level, but also to strengthen the municipal fiscal base.

# 6.2.3 Prospect on Municipal Financial Capability

This study examines the municipal financial capabilities to bear capital expenditure for project implementation in future, by forecasting financial capability.

# 1) Premises of Estimation

The assumed conditions in the cases of "with" and "without" are summarized in Table 6.6. Major points in the case of "with" are:

- The amount of local levied tax will be two times as much as the case of "without" by the year 2000 due to improvement of assessment of collection system.
- The rate of fee/fines/permits will be improved to be two times as much as the case of "without" by 1991 and 2.5 times by 2000.
- Growth rates of the expenditure for administration will be restricted at two percent per annum.

Furthermore, as a major purpose of this analysis to foresee capabilities of capital expenditure, We set up two more cases of "with loan" and "without loan". This loan is a sort of modified MDF for municipal projects as proposed in the preceding section of 2) of 6.2.2. Loan conditions are assumed as follows:

- Amount of loan payment does not exceed over 30 percent of revenue each year.
- Account of debt services is covered by "special expenditure" and independent from "regular expenditure".
- A certain amount of loan is accepted every year from the year at which liable capability occurs in the municipal budget and invested to necessary project implementation.
- Loan conditions are: interest rate of five percent per annum, grace period of three years and payback period of 10 years.

Accordingly, four cases are assumed as shown in Table 6.7.

# Table 6.6 PREMISES OF ESTIMATION OF MUNICIPAL FINANCIAL BASE (WITH/WITHOUT)

| With    |         | - The amount of Local Levied Tax: 1.44 times and 2.0 times as much as that of trend projection in 1991 and 2000 respectively The amount of surcharge and shared taxes: increase at 5% p.a. in response to the national economic growth. | - Rates of Fee, Fines and Permits will increase up to 2 times and 2.5 times as much as that at present in 1991 and 2000 respectively. | - Same as "Without"  | - Increase at 2% p.a.                               | - Same as "Without"                       | - Same as "Without"  | - Same as "Without"  |
|---------|---------|---|---|--|---|---|--|--|
| Without |         | Trend Projection as follows:  | increase by 2% p.a.   | Increase by 5.5% p.a. equivalent to GDP growth rate under the trend projection in macro framework for the Study Area | ection as follows:<br>$n_{12} = 0.0182 \times -25.$ | r, Y <sub>2</sub> = thous<br>e at 3.5 p.a | Stowin fale of per capita our Increase at 6.0 p.a. equivalent to the growth rate of urban population | Subtracting above expenditures from the amount equivalent to 97% of revenue. |
|         | REVENUE | - Tax Revenue   | - Non-Tax Revenue :   | - Subsidies  | ENPENDITURE - Administration :                      | - Maintenance ;                           | - Regular Investment<br>Expenditure  | - Special Expenditure ;  |

Table 6.7 ASSUMED CASES OF MUNICIPAL FINANCIAL CAPABILITY ANALYSIS

| CASE   |   | AI          | AII             | BI          | BII             |
|--|---|-------------|-----------------|-------------|-----------------|
| Improvement of Local Tax *1 Levy System (For Analysis of Capable Financial Base) |   | (A)         | with            | (B          | ) without       |
| Utilization of Loan<br>(For Analysis of Capable<br>Capital Expenditure)          | 1 | (I)<br>with | (II)<br>without | (I)<br>with | (II)<br>without |

Note:

\*1 Definitions of "with" and "without" are shown in Table 6.6.

# 2) Estimation of Future Revenue and Expenditure

The results of estimation of future revenue and expenditure in Surat Thani and Phuket Municipalities are summarized in Tables 6.8 and 6.9 at 1980 price. The amount of revenue in Surat Thani Municipality in 2000 is assumed to be around 78 million baht under the case of "with" and 66 million baht under that of "without" while that of Phuket will be 108 million baht under the case of "with" and 75 million baht under the case of "without". This means that the project to improve the local tax levy system will give a remarkable impact on the municipal revenue. The increase rates would reach 18 percent in Surat Thani and 44 percent in Phuket.

# 3) Capability to Bear Capital Expenditure

Capabilities of capital expenditure for municipal projects up to 2000 were examined by case as shown in Table 6.7. The outcomes are summarized in Table 6.10. In Surat Thani Municipality, about 638 million baht at 1980 price can be invested at maximum or in the case of AI under which an improvement of local tax levy system and an utilization of loans are assumed and about 437 million baht in the case of BII of "without". The difference between these two cases amount to about 200 million baht.

On the other hand, in Phuket Municipality, the maximum possible capital expenditure is assumed at about 788 million baht at 1980 price during 1981 to 2000, and the difference between this case and the case of "without" reaches about 370 million baht.

Table 6.8 MUNICIPAL FINANCES PROJECTION IN SURAT THANI

|                         |    |      |          |         |      | Un   | Unit: mil | million Baht | a<br>T         | 1980 price |      |
|-------------------------|----|------|----------|---------|------|------|-----------|--------------|----------------|------------|------|
|                         |    |      |          | Without |      |      |           |              | With           |            |      |
|                         | l  | 1981 | 1986     | 1991    | 1996 | 2000 | 1981      | 1986         | 1991           | 1996       | 2000 |
| 1. REVENUE              | •• | 25.6 | 30.9     | 40.4    | 53.0 | 65.9 | 25.6      | 31.2         | 42.2           | 58.3       | 77.8 |
| 1.1 Tax Revenue         | •• | 12.5 | 16.8     | 22.6    | 30.4 | 38.5 | 12.5      | 16.8         | 23.7           | 34.7       | 49.2 |
| 1.2 Non-Tax Revenue     | •• | 2.8  | 3.1      | 3.4     | С    | 4.1  | 2.8       | 3.4          | 4.1            | 4.8        | 5.3  |
| 1.3 Subsidies           | •• | 8.4  | 11.0     | 14.4    | 18.8 | 23.3 | 8.4       | 11.0         | 14.4           | 18.8       | 23.3 |
| 1,4 Reserves/Loans      | •• | 1.8  |          |         |      |      | 1.8       |              |                |            |      |
| 2. EXPENDITURE          | •• | 22.3 | 30.0     | 39.2    | 51.4 | 63.9 | 22.3      | 30.3         | 40.9           | 56.6       | 75.5 |
| 2.1 Regular Expenditure | •• | 13.4 | 15.4     | 18.2    | 21.6 | 24.7 | 13.4      | 14.8         | 16.4           | 18.2       | 20.2 |
| - Administration        | •• | 12.6 | 14.5     | 17.1    | 20.3 | 23.2 | 12.6      | 13.9         | 15.3           | 16.9       | 18.7 |
| - Maintenance           | •• | 0.8  | 6.0      | 1.1     | 1.3  | 1.5  | 0.8       | 6.0          | H .            | 1.3        | 1.5  |
| 2.2 Capital Expenditure | •• | 0.6  | 14.6     | 21.0    | 29.8 | 39.7 | 0.6       | 15.4         | 24.5           | 38.4       | 55.3 |
| - Regular               | ** | 8.4  | 6.3      | 8.4     | 11.2 | 14.1 | 4.8       | 6.3          | 8.4            | 11.2       | 14.1 |
| - Special               | •• | 4.2  | ω.<br>3. | 12.6    | 18.6 | 25.1 | 4.2       | . T. 6       | 16.1           | 27.2       | 41.2 |
| 3. SURPLUS              | •• | 3.3  | 6.0      | 1.2     | 1.6  | 9.   | 3.3       | 6-0          | <del>ا</del> ا | 1.7        | 2.3  |
|                         |    |      | ٠        | :       |      |      |           |              |                |            |      |

Source: The Team

Table 6.9 MUNICIPAL FINANCES PROJECTION IN PHUKET

|                         | .   |      |       |         |      |      | Unit |      | million Baht | at 1980 | price |
|-------------------------|-----|------|-------|---------|------|------|------|------|--------------|---------|-------|
|                         |     |      |       | Without |      |      |      |      | With         |         |       |
|                         |     | 1981 | 1986  | 1991    | 9661 | 2000 | 1981 | 1986 | 1991         | 1996    | 2000  |
|                         |     |      | 1 - 1 |         |      |      |      |      |              |         |       |
| REVENUE                 | ••  | 40.5 | 47.4  | 55.0    | 65.3 | 75.1 | 40.5 | 51.7 | 67.0         | 86.8    | 108.0 |
| 1.1 Tax Revenue         | ••  | 25.8 | 28.4  | 32.7    | 37.6 | 42.0 | 25.8 | 33.2 | 43.3         | 57.2    | 72.4  |
| 1.2 Non-Tax Revenue     | ••  | 5.7  | 6.3   | 7.0     | 7.7  | Θ    | 5.7  | 8.9  | 8.4          | 9.6     | 10.8  |
| 1.3 Subsidies           | *,* | 0.0  | 11.7  | 15.3    | 20.0 | 24.8 | 9.0  | 11.7 | 15.3         | 20.0    | 24.8  |
| 2. EXPENDITURE          | ••  | 39.3 | 46.0  | 53.4    | 63.3 | 72.8 | 39.3 | 50.1 | 65.0         | 84.2    | 104.8 |
| 2.1 Regular Expenditure | ••  | 27.9 | 30.2  | 33.2    | 36.5 | 39.5 | 27.9 | 30.9 | 34.3         | 38.0    | 42.1  |
| - Administration        | ••  | 26.7 | 28.7  | 31.4    | 34.4 | 37.0 | 26.7 | 29.4 | 32.5         | 35.9    | 39.6  |
| - Maintenance           | ••  | 1.2  | 1.5   | 1.8     | 2.1  | 2.5  | 1.2  | 1.5  | 1.8          | 2.1     | 2.5   |
| 2.2 Capital Expenditure | •:  | 11.5 | 15.8  | 20.2    | 26.8 | 33.3 | 11.5 | 19.2 | 30.7         | 46.2    | 62.7  |
| - Regular               | ••  | 10.7 | 14.3  | 15.8    | 17:4 | 22.0 | 10.7 | 14.3 | 15.8         | 17.4    | 22.0  |
| - Special               | ••  | 0.8  | 1.5   | 4.4     | 4.6  | 11.3 | 0.8  | 6.4  | 14.9         | 28.8    | 40.7  |
| 3. <u>SURPLUS</u>       | ••  | :    |       |         | ·    |      |      |      |              |         |       |
|                         |     |      |       |         |      |      |      |      |              |         |       |
|                         |     |      |       |         |      |      |      |      |              |         | :     |

Source: The Team

Table 6.10 CAPABILITY OF CAPITAL EXPENDITURE BY CASE

|  | . i.                                  | :              |               | Uni        | Unit : million         | on Baht     | Baht at 1980 price | price    |
|--|---------------------------------------|----------------|---------------|------------|------------------------|-------------|--------------------|----------|
|  |                                       | Surat          | Surat Thani   |            |                        | Ph          | Phuket             |          |
| CASE   | AI                                    | AII            | BI            | BII        | AI                     | AII         | BI                 | BII      |
| Tunnational of tood for Conton                         | <b>,</b>                              | <b>.</b>       | . i           | I          | <b>,</b>               | <b>&gt;</b> |                    | -        |
|  | 4                                     | 4              | I .           |            | 4                      | 4           |                    | i.       |
| - Utilization of Loan                                  | <b>×</b> , ,                          | 1              | ×             | 1          | ×                      | 1           | ×                  | 7.<br>1  |
| SHECT  |                                       |                |               |            |                        |             |                    |          |
|  |                                       |                |               |            |                        |             |                    |          |
| (1) Ceiling of Maximum Loan Repayment                  | 23.3                                  | i              | 20.0          | ì          | 32.4                   | 1           | 22.5               | ì        |
| (2) Annual Capable Liabilities from Loan (1986 - 2000) | 16.2                                  | I              | 13.9          | 1 .        | 22.5                   | . 1         | 16.2               | l,       |
| (3) Cumulative Capital Investment from                 | 275.4                                 | 1              | 236.3         | 1 ·        | 382.5                  | <br>I       | 275.4              | 1        |
|  | \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ | •              |               |            |                        | 1           |                    | ÷        |
| Investment from Annual Budget                          |                                       |                |               |            |                        |             | ٠                  |          |
| (4) Cumulative Expenditure                             | 537.2                                 | 537.2 436.8    | 436.8         | 436.8      | 648.4                  | 648.4       | 418.3              | 418.3    |
| (1961 - 2000)  | (146.9)                               | (144.9)        | (124.2)       | (7.471)    | (1.0/1)                | (1.0/1)     | (93.0)             | (6.06)   |
| (5) Repayment of Loan                                  | 175.0 (29.5)                          | I<br>·         | 150<br>(25.3) | . **.<br>1 | 243.0 (41.0)           | 1           | 1/5.0 (29.5)       | <b>1</b> |
|  |                                       |                | ·             |            |                        |             |                    |          |
| Capable Capital Investment (1981 - 2000)               | 637.6                                 | 537.2          | 523.1         | 436.8      | 787.9                  | 648.4       | 518.7              | 418.3    |
| (3) + (4) - (5)  | (179.6)                               | (142.9)(155.4) | (155.4)       | (124.2)    | (309.0) (176.1)(189.3) | (176.1)     | (189.3)            | (93.6)   |
|  |                                       | . • !          |               |            |                        |             |                    |          |

Note: The number in parenthesis shows the present value discounted by 12 percent per annum.

Source: The Team

Furthermore, it can be said that the effects caused by utilization of "loans" are remarkably large because about 100 million baht in Surat Thani and about 140 million baht in Phuket can be created as a newly additional financial resource during the period 1986 to 2000, even with subtructing the expenditure for loan repayment.

# 4) Implications of Municipal Finances for Projects Implementation

Regarding Surat Thani Municipality the maximum amount of capital investment is assumed to be about 638 million baht at 1980 price during the period between 1981 to 2000 even in the case that all proposed measures are undertaken. On the other hand, the total amount of urban development cost required to achieve the target is assumed to be about 4,062 million baht, of which 2,610 million baht at 1980 price is the cost that public sector should share even if private sector is mobilized as much as possible. Accordingly the municipality can cover only 24.4 percent of the required costs.

On the other hand, Phuket Municipality will have the financial capability of at maximum about 788 million baht at 1980 price which can cover 23.4 percent of the total project costs to be financed by the public sector as shown in Table 6.11. Needless to say, there are two ways to cover this deficit: one is to readjust the project components toward reduction and another is to reinforce the projects through increased subsidies from the central government.

Table 6.11 VIABILITY OF MUNICIPAL FINANCES TO PROJECTS IMPLEMENTATION

Unit: Million baht at 1980 price

|  | Surat Thani      | Phuket<br>Municipality |
|--|------------------|------------------------|
| (A) Maximum Capability of Financial Supply by Municipality | Municipality 638 | 788                    |
| (B) Project Costs Required in Urban *1 Sector              | 2,610            | 3,366                  |
| (C) Percent of Municipal Financial Contribution: (A)/(B)   | 24.4             | 23.4                   |

Source: The Team

Note: \*1 The costs estimated at 1983 prices in Tables 5.5 and 5.6 are converted into the costs at 1980 price.

# 6.3 IMMEDIATE ACTIONS TO BE TAKEN

The following is a summary of immediate actions to be taken in urben development sector derived from the results of our study.

#### 6.3.1 Administration and Institution

- 1) Designation of Specific Development Cities
- Phuket and Surat Thani should be designated as specific development cities following Songkhla/Hat Yai designated in the Fifth National Economic and Social Development Plan: Phuket as a regional growth center with international function and Surat Thani as a second generation grwoth center with industrial and interregional distribution function.
- Special considerations should be given to these two specific development cities as follows:
- i) Designation of Industrial Promotion Zone (by BOI);
- ii) Priority area of national development projects for encouragement of regional economic bases and for strengthening R & D function to explore various possibility of effective utilization of natural resources in terms of agriculture, fishery, forestry, mining and new biotechnology; and
- iii) Specific subsidies allocated for urban infrastructure developments and for planning and technical/engineering studies undertakn by local as well as the central governments.
- 2) Authorization of the Urban Structure Plan
- After the proposed urban structure plans are appraised and amended by authorities concerned including local governments, the followings should be authorized, by the central government, in the form of an official instruction in the short-run and a definit act in the medium-run:
- i) Plans of major infrastructure and spatial structure in Phuket and Surat Thani Urban Areas aiming at the features in the year 2000;

- ii) Area Definition of the urbanization promotion area given with high priority of urban infrastructure developments and the urbanization restriction area (or preservation area) without any urban development project;
- iii) In the urbanization promotion area, designation of four kinds of zones: residential zone with high priority of social service facilities developments, commercial zone with intensive commercial landuse, industrial zone with promotion incentives of industrial activites and locations, and specific development zone to accommodate requied specific projects;
- iv) Designation of special industrial promotion district within industrial zone to develop an industrial complex/estate with specifications as follows:
- The highest priority area of infrastructure and utilities developments to support industrial activities;
- Tax incentives linked with BOI privilege to the factories located or relocated;
- Restriction of landuses other than industrial purpose and prohibition of transaction of land titles into other purposes.
- v) Stipulation of development criteria/standards of housing area development and incentives to private sector's actions in accordance with the scale of development.
- 3) Strengthening Local Government Financial Base
- For the sake of improvement of local tax levy system, the followings should be undertaken with great effort:
- i) Developments of an assessment system of property tax as well as of tax maps and rolls in line with existing programmes.
- ii) Examination of application of a new taxation named "urban planning tax" in relation with the urban development plans authorized through the precedure as mentioned in the preceding section of 6.2.2.
- iii) Promotion of training programme of the local officials in charge of local tax assessment and levy.

- In order to enable a necessary and timely public investment for urban developments, it is recommended to establish a banking function to finance, at low interest rate, the local government projects by utilizing and modifying the Municipal Development Fund (MDF) or by establishing a new organization, in either way, with an aim at diversifying its financial sources including external ones.
- Encouragement of local government enterprise not only to enlarge financial resources but also to effeciently take part in necessary developments.

# 6.3.2 Surat Thani Urban Development Actions

The following actions are recommended in Surat Thani Urban Area in the short and medium run.

#### 1) Water Supply System Development

The preparation of detail design and financing is immediately necessary, however, prior to this action the adjustment in division of responsibilities should be made between the Provincial Water Works Authorities (PWA) and the municipality. The municipality cannot fully develop the system within its capability because the development of water resource should be planned and implemented keeping in mind the varying and extensive use of water and, at the same time, PWA will not be able to develop and maintain a feeder distribution system in the whole town areas because of a limitation of personnel and finance. Table 6.12 shows one model for recommended division of responsibilities between two bodies.

#### 2) Industrial Estate at Phun Phin Junction

A feasibility study and engineering design should be initiated, and administrative and urban planning authorization should be made by authorities concerned in line with the recommendations as mentioned in the industrial development sector.

# 3) Ditribution Business Center at Phun Phin Junction

As an effective transport function attached to the industrial estate, feasibility of a truck terminal and warehouses compelx is recommended to be studied at first stage under a coordination between Ministry of Communication, Surat Thani Provincial Government and Surat Thani Municipality. This kind of project in Surat Thani Area might be more feasible than that in Hat Yai Area because of its more advantagous

Table 6.12 RECOMMENDED DIVISION OF RESPONSIBILITIES BETWEEN PWA AND LOCAL GOVERNMENTS FOR WATER SUPPLY DEVELOPMENT

|   | - <del></del> | PWA  | Municipality/<br>Local Governments             |
|---|---------------|--|--|
| Cost for Planning/<br>Engineering Studies | •             | 8/10   | 2/10   |
| Facility Development                      | :             | <ul> <li>Intake Facility</li> <li>Major System/ Facility</li> <li>Purification Plants</li> <li>Industrial Water<br/>Supply Facility/<br/>System</li> </ul> | - Secondary<br>Distribution<br>System/Facility |
| Maintenance                               | :             | to correspond to the   | developed facilities                           |
| Levy of charge from users                 | :             |  | directly<br>responsible                        |
| Return System                             | :             | to correspond to the   | development cost sharing                       |

location of transportation.

#### 4) Tha Thong Port Supporting Area Development

The immediate hinterland of the Tha Thong Port is recommended to be developed as an intensive industrial zone mainly for fishery processing factories and a fishery market, which is recommended to be relocated from Ban Don. For this purpose, the dredging work of canal and developments of roads and utilities are important actions. A feasibility study including operation and management system should be embarked by the Provincial Government under a coordination with central government agencies concerned.

#### 5) Areal Prioritization in Telecommunication Development

It is recommended to give higher priority on industrial and commercial zones in carrying out the existing development programme of Telephone Organization of Thailand.

#### 6) Housing Complex Development

Subsequent to the existing housing development plan of 300 units (1984 to 1986) by National Housing Authority (NHA), a large scale housing complex project to construct 2,000 units is recommended to be planned in consideration of effective mobilization of private sector's activities as follows:

- Planning is to be initated and led by NHA;
- Land for the project is to be acquired as a whole under a coordination with private sector and divided into the NHA Project Area and the private secoter's one;
- NHA Project is to aim at provision of houses for middle/low income families (4,000 to 9,000 baht/family/month) with density of six to eight units a rai and the private sector project for high/middle income families (mroe than 7,000 baht/family/month) with that of five units a rai;
- The development cost of infrastructure and utilities is to be shared between NHA and private sector in correspondence to the areas, not units; and
- Provision of Business Tax Incentives to the private sector to promote participation to this joint project.

#### 7) Interregional Bus Terminal Development

The areas along the Bypass Route 401 is endowed with great potentials of urbanization. Without any deliberation of a proper landuse, these areas will easily allow a disordery landuse pattern making it difficult to secure the public land necessary for future urban activites. As a guide for planned urban expansion, commercial subcenters including interregional bus terminal, local market and business/commercial functions are recommended to be developed with a cooperation of private sector's investment. The provincial and municipal governments must, however, be responsible for this project.

#### 6.3.3 Phuket Urban Development Actions

#### 1) Water Resources and Supply System Development

The water supply/distribution system development should be carried out by utilizing the Bang Wat Dam as soon as possible, after a necessary adjustment between PWA and the municipality in line with the policy being the same as in Surat Thani as mentioned in the preceding section 6.3.2. At same time, a more detailed servey/study of Phuket Island Water Resource Development is necessary to be contenuously undertaken based on the result of Water Resource Development Sector in this study.

#### 2) Flood Control Projects

A further detailed study is necessary for drainage system development in the urbanization area under responsibility of municipality, Department of Town and Country Planning (DTCP) and Public Works Department (PWD), based on our proposals including improvement/enlargement of existing canals, development of new draingage canals and pumping stations. As the existing reservoirs being utilized after tin minings seem to play a significant role in flood control, a careful attention should be given this role in coverting these reservoirs into other landuse.

#### 3) Designation and Development of Specific Tourism Promotion Zone

In order to avoid any conflicts between tourism and other industrial/ urban developments, as well as between tourism development and environmental preservation, a definite zoning system with enforcement power seems to be indispensable. Beach zones of Patong, Karon and Kata which we propose to develop intensively, should be designated as special tourism promotion zones so as to become outstanding tourism assets in Phuket Island under a responsibility of the provincial government (Changewat Administrative Organization) with technical, administrative and special financial support from Tourism Authority of Thailand and the central government. The budget to cover the following projects should be allocated in the name of "Specific Tourism Promotion Zone Development".

- Waste Water and Solid Waste Treatment System;
- Water Supply System;
- Road and Park/Rest Houses Developments.

It is conceivable to impose maintenance cost of the developed facilities on the beneficiaries including hotels, restaurants and so on as a part of private sector participation, since public effort is made to develop the infrastructure and system to promote the private sector's business activities.

# 4) Environmental Improvement of Thalang Road

The architectural assets and amenities accumulated along Thalang Road in the central commercial district should be mobilized as an important tourism asset toward the 200 year anniversary of Phuket Town by environmental improvement involving the following projects:

- Pedestrian road and well-designed pavement development;
- Repairement of historial architecutres;
- Furnishing street furnitures and green;
- Partial redevelopment.

This project should be undertaken by the municipality and DTCP.

#### 5) Promotion of Khlong Thachin Port Supporting Area Development

In order to form an industrial zone centering on fishery activities, the necessary infrastructures of water supply, access roads, tele-communication lines and drainage system should be possitively developed.

#### 6) Developments of Industrial Complex for Small/Medium Scale Factories

This project aims not only at strengthening industrial bases of small/medium scale manufacturings especially in the fields of machinery, metal processing, wood processing, furniture, textile and car-related industries, of which productivities are expected to increase by land consolidation, but also at promoting an effective landuse in the central business district by converting the lands after relocation of factories into more intensified urban uses. This project, therefore, should be undertaken in parallel with administrative relocation programme with several incentives such as tax and financial support with low interest in relation with the policy of Industrial Financing Corporation of Thailand (IFCT). A feasibility study including possible institutional arrangement should be undertaken by IFCT, Small Industry Financing Organization (SIFO), or IEAT as a model case in regional cities.

# 7) Developments of Goods Distribution Centers

As an urgent action, the development of goods distribution center to support the planned deep seaport activities will be required in the port area or outside but near the port. Furthermore in the medium run, another goods distribution center will be necessary to support commercial activities in the busy area. The former will be comprised of warehouses/stock yards or truck terminal to deal with international goods and take one of port functions. Feasibility study of this facility should be undertaken by Ministry of Communications. The latter is provided for rationalization of existing wholesalers/retailers having an intention of expansion of their warehouses, and feasibility of this facility is recommended to be examined by the municipality.

#### 8) Housing Complex Development

Besides the plan of about 540 untis by NHA, an additional housing complex development program with 500 units should be planned by both NHA and Phuket Municipality. A municipal enterprise is recommended to be established and take part in this housing development with a technical coorperation of NHA.

#### 9) Studies of Specific National Projects

Considerating the urbanity of Phuket as an international city, possibilities of the following specific national projects are recommended to be studied under responsibility of NESDB.

#### (1) Phuket University or Graduate School

The enrollment ratio of higher education (university and equivalent) will be higher and is assumed at more than 7.4 percent of the school age population in 2000, compared with around four percent at present. An enlargement of capacity and a diversification of university departments are inevitably required at the national level to meet socio-economic needs, and regional location of these facilities is a very key to realize the policy of decentralization of Bangkok. Phuket is one of the possible locations because the expected socio-economic activities in Phuket will require more knowledge and technology and its environmental amenity is suitable for higher education and collecting faculties and researchers, the following departments are recommended to be furnished:

- International/Development Economics/Trading;
- Fishery/Agricultural Technology and Science;
- Bio-Technology and Science;
- Electric/Electronic Technology and Science; and
- Medical Science.

#### (2) Phuket Medical Center

It is recommended that Phuket Medical Center with specific medical treatment capability of rehabilitation and recupera; tion is established as an international facility to be functionally linked with Songkhla University and otehr universities.

#### (3) International Conference Hall

The opportunity of international conferences will increase more and more along with coming internationalization. To utilize the natural and urban amenities in Phuket, an internationa conference hall is recommended to be established by the central government, although alternative sites are coneivable at Bangkok, Chiengmai or Pattaya in addition to Phuket.

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