

FINAL REPORT

**LAND USE PROGRAMMING  
FOR  
CHONBURI, SIRACHA AND PHANAT NIKHOM  
THAILAND**

**Volume I  
Project Summary and Evaluation**

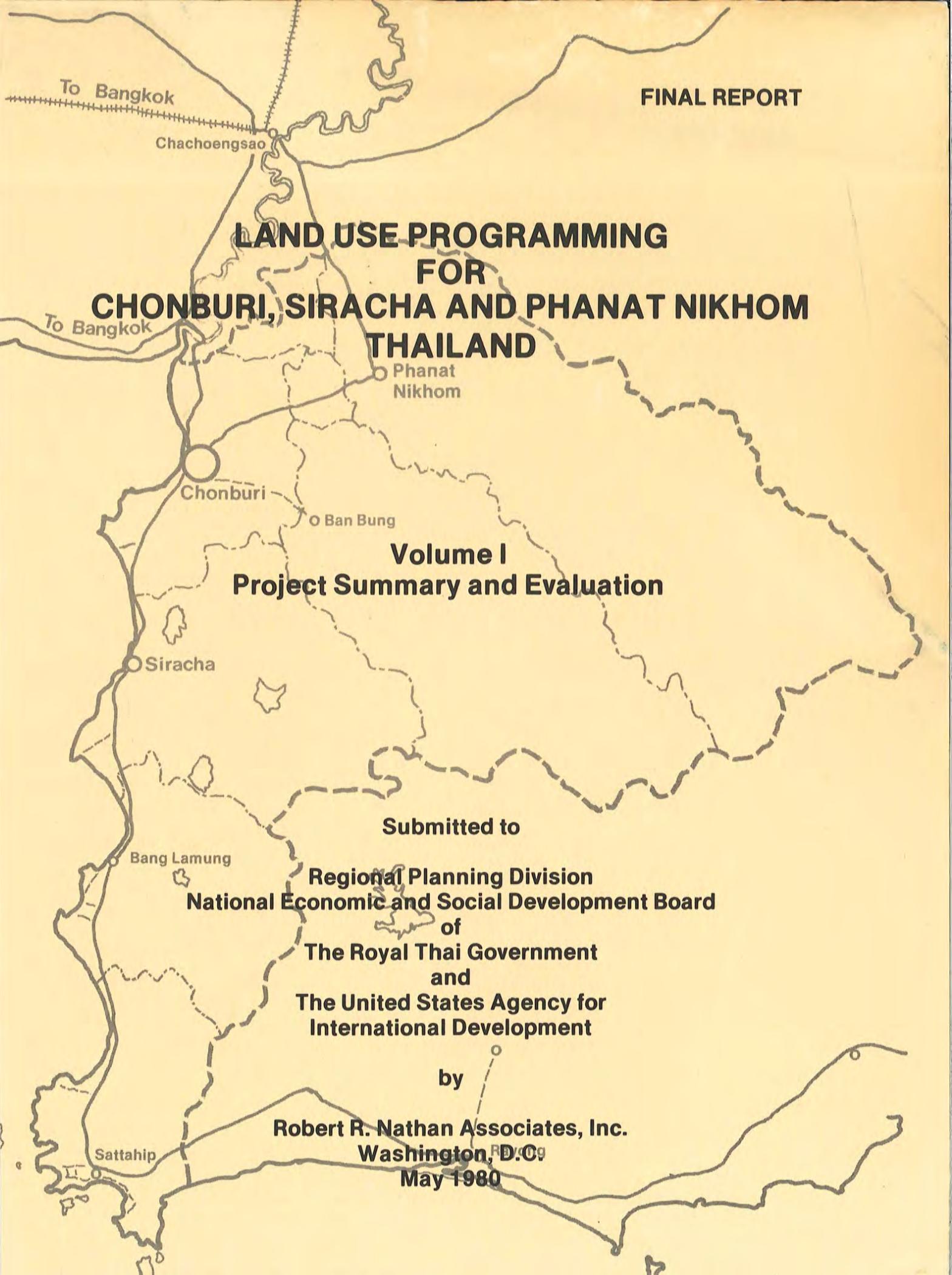
Submitted to

**Regional Planning Division  
National Economic and Social Development Board  
of  
The Royal Thai Government  
and  
The United States Agency for  
International Development**

by

**Robert R. Nathan Associates, Inc.  
Washington, D.C.**

**May 1980**



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# RRN A

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May 23, 1980

Kuhn Vithya Siripongse  
Director  
Chonburi Land Use Programming Project  
Regional Planning Division  
National Economic and Social  
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Bangkok, Thailand

Dear Kuhn Vithya:

Robert R. Nathan Associates, Inc., is pleased to submit the Final Report of the Chonburi Land Use Programming Project. The Final Report is submitted in three volumes: Volume I contains a summary and evaluation of the project, including suggestions for strengthening similar projects; Volume II contains an elaboration of the steps involved in application of land use planning techniques, and Guide Plans for urban development in the study area.

The Final Report includes, also, in Volume III, a "Manual" and lecture notes for possible use in future training programs to strengthen the capabilities of governmental units responsible for urban development planning in Thailand.

The report on Municipal Finance is submitted, with minor editorial revisions, as Annex A of the Final Report. Although this report provides no easy solution to the financial constraints confronting Thailand's intermediate size urban centers, it addresses in a forthright manner the issues that require resolution on a nationwide scale if your Government is to achieve its stated objectives of decentralization in administration of local development.

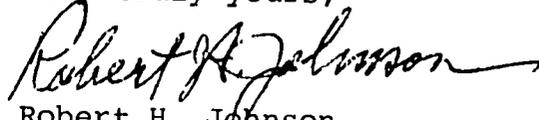
A "Glossary of Planning Terms," in English, is included in Annex B.

# RRNA

Kuhn Vithya Siripongse  
May 23, 1980  
Page two

On behalf of Robert R. Nathan Associates, I would like to express our appreciation for the support and assistance in the project provided by you and your staff. Kuhn Manu gave generously of his time and efforts in many ways; Kuhn Utis' contribution to the Guide Plans was invaluable. To all of you, and to the local Changwat and Municipal officials, we are grateful.

Very truly yours,



Robert H. Johnson  
Senior Vice President  
International Operations

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## I. INTRODUCTION

In most developing countries, rising GNP and diversification of economic activity have been accompanied by rapid growth in urban populations. Typically, national capital cities have been the focus of rural-urban migration in the developing countries of Asia (e.g., Bangkok, Seoul, Taipei, Jakarta, Manila and, to a lesser degree, Kuala Lumpur). The basic forces giving rise to the concentration of population in "primate" cities, such as those noted above, are by now fairly well established:

- 1) The shift in economic structure from subsistence agriculture to market-oriented agricultural production, manufacturing and trade and service sectors. The non-agricultural activities tend to become concentrated in or near primate urban centers because of the external economies available to individual production units, the availability of large markets for consumer goods as well as access to a large, more diversified and highly skilled labor force;
- 2) In combination with high rates of population growth, underemployment in rural areas and the lack of opportunities of substantially improved household incomes in traditional agriculture have provided a massive flow of rural migrants to urban centers, motivated by what are perceived to be better opportunities for economic advancement -- if not for the migrants, at least for their children;

- 3) While the demographic and economic forces noted above have been the major forces for rapid urbanization in the developing countries of Asia, the superior educational facilities (at least in the prestige that brings good jobs for their graduates) found in the principal cities also are a powerful magnet for provincial youth. With a diploma and an opportunity for an urban job, few return to their native provinces.
- 4) The amenities provided in developing countries are likely to be at a higher level, and more widely distributed, in the primate city than in villages, small towns and other cities. These amenities (e.g., piped water, electricity, health and sanitary facilities, libraries, entertainment, etc.) are perceived as offering an improved "quality of life", as compared with the isolation of rural villages and provincial towns.
- 5) Given the financial, economic and regulatory roles of central governments in developing countries, ease of access to government officials provides a powerful inducement for the modern economic sectors to locate in national capitals, particularly if communication and transport facilities are limited.

Unfortunately, the forces that bring about the concentration of population, economic and commercial activity in the creation of "primate" cities are mutually reinforcing: the larger the city becomes, the more attractive it becomes as a market for consumer and intermediate goods; the larger

the population, the broader the range of skills available to plants choosing locations; and -- to a point -- the greater the external economies from location in the primate city.

While the factors noted above continue to draw investors and migrants to the primate cities in developing countries, it has become increasingly evident that the rapid growth and concentration of population and economic activity in such cities have created undesirable social effects, and have almost certainly become uneconomic when viewed from the standpoint of optimum use of resources.

It is demonstrable that per capita costs of providing urban services decline, up to a point, as cities grow; beyond this point, per capita costs rise sharply, partly because increased densities require provision of certain infrastructure at higher standards than in smaller centers. Bangkok, as well as the other cities noted earlier, have long since entered the rising segment of the per capita cost curve. But governmental financial costs are only one component of the total impact of excessive urban growth. Congestion and inadequate housing are other very real sources of social and economic costs. Air pollution is also exacerbated by congestion, while the costs of lost time impose a direct burden on the population as a whole.

Finally, from a broader perspective, excessive concentration of population and economic activity in national capitals magnifies inequalities in the spatial distribution of incomes and other benefits of socio-economic development and thus renders more difficult the tasks of strengthening national unity. Yet, continued economic growth in Thailand

will inevitably be accompanied by increased urbanization, with most of the natural population growth in rural areas being absorbed, through migration, by the nation's urban centers. But it is neither inevitable, nor desirable, that Bangkok be the major destination point for rural-urban migrants in Thailand.

Recognizing the desirability of a more widely dispersed pattern of urban growth, the Regional Planning Department (RPD) of the National Economic and Social Development Board (NESDB) has identified a number of "Principal Towns" throughout the Kingdom to be developed as growth centers.

This evaluation report is a description, and an assessment, of the Land Use Programming Project for the Municipality of Chonburi, and two smaller centers in Chonburi Changwat. The Project location reflects the Government's plans to develop the Eastern Seaboard Region as one of the national "growth poles" to mitigate population pressure in Bangkok.

In three developing countries, the United States Agency for International Development (USAID) has funded projects to provide better management of urban growth through land use programming. One such project, in Leon, Nicaragua, was completed in September 1977. The problems and successes of the project have been reported by a consultancy firm under contract with USAID. Another land use programming project was initiated in Chonburi, Thailand in January 1977. A third such project, in Ghana, was initiated in November 1978.

This volume of the report on the Chonburi Land Use Programming Project is presented in six sections. Following

the Introduction, Section I, Section II contains a description of the land use programming approach to urban development planning, and the conditions conducive to successful application of this approach, and an assessment of the degree to which these conditions are satisfied in the project area.

Socio-economic and physical characteristics of Chonburi Changwat, the seven amphoes, and the study area are described in Section III. This section also contains available information on infrastructure and educational and medical facilities.

Project objectives and the role of national, changwat and urban levels of planning agencies are analyzed in Section IV.

Staffing arrangements and participation of local officials are described in Section V. This section also contains a brief discussion of the Work Program, and summaries of the results of prefeasibility studies conducted in connection with the "short-term action program".

An evaluation of the land use program is presented in Section VI. The materials in this section address what are regarded as some of the constraints that operated to limit the effectiveness of the project. But, more importantly, suggestions and recommendations are put forward in the hope that similar constraints can be minimized in future applications of the land use programming techniques in Thailand, or elsewhere.

## II. LAND USE PROGRAMMING AND CONTROL OF URBAN GROWTH

The basic premise underlying the land-use programming process is that the orderly development of rapidly growing urban centers can be achieved through a process "that relates the use and availability of urban land in space and over time".\* Through the analytical steps depicted in Figure 1, Volume II of this report, "Guide Plans" are formulated to accommodate projected requirements for land for urban use; and a variety of positive inducements and negative controls are considered to channel growth into "planned" areas for residential, industrial, recreational, public services, and other urban uses.

### Land-Use Controls

Provision of infrastructure (roads, utilities, serviced sites, etc.) is one of the more effective positive means of "leading" growth into a planned pattern. Similarly, construction of schools, medical facilities and other typically governmental installations may be utilized to induce private investment in residential housing in locations conforming to the plan. Other positive controls might include tax holidays and/or concessionary rates for limited periods and access to loans at favorable rates. The latter forms of positive controls are appropriate for encouraging the siting of industrial activities in planned areas, including industrial estates.

The creation of "land banks" by government is also an effective means of controlling future land use. Inter

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\*Rivkin, Malcolm D., Land Use and the Intermediate-Size City in Developing Countries, Praeger Publishers, New York, 1976, p.9.

alia, it may enable governments to acquire land (for public use, or resale) at lower prices than will prevail after population growth has placed pressure on available lands. However, acquisition and resale of land by municipalities are reportedly restricted in Thailand.

The most direct means of land-use control is through government investment not only in infrastructure, schools, administrative offices, and other public facilities, but also in low-cost housing, markets, industrial estates and shopping complexes.

As pointed out by Rivkin, in some countries land-use control is effected through detailed provisions in plans, where such plans have the force of law over such matters as type of construction, use, height of buildings, densities, etc. This technique of control tends to be unnecessarily rigid and, frequently, difficult to enforce.

Negative controls include slum clearance, zoning and subdivision controls, denial of construction permits, and measures to discourage speculation in land.

The programming approach to land-use control is more clearly compatible with the positive forms described above. Conceptually, the Guide Plans provide a framework for the identification of projects that will "lead" development in planned directions, rather than detailed provisions that would govern land-use, such as are usually found in master plans, and in zoning provisions.

Socioeconomic Requisites for  
Applicability of Land-Use  
Programming Approach

Rivkin cites a number of characteristics of urban centers for which the land-use programming approach to the control of urban growth is appropriate. \* In general, cities with populations of from 100,000 to 500,000 are considered to be of the size in which the technique can be used most effectively. \*\* However, size is considered to be a less important criterion than the following characteristics:

1. Population growth at rates that create demands on urban facilities and services that cannot be met by existing service levels and facilities, or by historical practices of gradual expansion.
2. Growing industrial or agricultural processing activities on a scale that require not only industrial sites but space for accommodation of growth in population and supporting commercial and service establishments generated by the primary source of growth.
3. Increased aspirations and complexity of urban life, as evidenced by growth in automobile traffic, replacement of older one and two-story buildings by multi-story structures and a faster pace of development of commercial activities of non-traditional types -- all of which contribute to congestion of urban streets constructed

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\*Op. cit., pp. 16-20

\*\*None of the cities in the study area has a population as large as the lower limit of the range; but, with its contiguous built-up area, Chonburi has a population of over 100,000.

to standards to accommodate fewer and smaller vehicles serving populations at lower densities.

4. Degradation of the environment, including air and water pollution and increased pressure on open spaces.

Within the municipal boundaries of the three urban centers (Chonburi, Siracha and Phanat Nikom) the combined population increased at an annual rate of 3.4 percent, 1960 to 1970; from 1970 to 1976, the rate of population growth declined to approximately 1.3 percent per annum. Neither recent annual rates, nor their trend, reflect the explosive growth that Rivkin cites as requiring land-use planning and controls of the type provided by land-use programming.

However, a different demographic pattern emerges in the amphoes surrounding the three municipalities, in which population growth in the areas contiguous to Chonburi and Siracha is quite evident. From 1960 to 1970, in the amphoes as a group -- excluding the three municipalities -- the annual rate of growth was only 1.4 percent; in the amphoe in which Chonburi municipality is located, the growth rate was 3.0 percent per annum; for Siracha, 1.9 percent; and in the amphoe in which Phanat Nikom is located, population declined by 1,346 persons (-0.1 percent per annum) from 1960 to 1970. However, for the three amphoes as a group, population increased at an annual rate of 4.2 percent, 1970 to 1976; in the amphoes in which the urban centers of Chonburi, Phanat Nikom and Siracha are located, the annual growth rates for the same period were 5.0 percent, 4.3 percent and 3.0 percent, respectively, all well above the rates for the 1960-1970 period.

In the case of the contiguous built-up area immediately surrounding Chonburi, the rate of population growth has probably accelerated since 1976, based on observation of recent housing and commercial construction that has occurred. Thus, based on the relatively high rate of growth in the Chonburi built-up area, and especially in the immediate vicinity of the municipality, this center would appear to possess at least one of the characteristics appropriate for application of land-use programming, and the application of land-use controls.

Two other points are worthy of note: Of the three urban centers in the study area, Chonburi has the least unused urban land available to absorb further urban population; as the only center in the amphoe providing a relatively full range of trade and service establishments, Chonburi Municipality's functional role has grown disproportionately to the increase in population residing within the municipal boundaries.

While agricultural processing (cassava and livestock feed mills) are important economic activities in the hinterlands of the three municipalities, these industries are not new, nor do they require a large labor force. The petroleum refinery located a few kilometers south of Siracha contributes significantly to Gross Provincial Product but is capital rather than labor intensive. Thus, the growth in population and economic activity in and near the three urban centers in the study area reflects gradual expansion of established types of agricultural processing, industrial and commercial activities, rather than introduction of a new industry or other form of activity that, in Rivkin's terminology, would "jolt traditional patterns of land ownership and physical form, --- and require land-use control."\*

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\*Ibid., p. 17

Although none of the three municipalities have experienced significant rates of increase in population in the 1970s, nor introduction of major new economic activities that alter their functional role, rising levels of income and population growth in contiguous built-up areas have increased activity in the central business districts of all three of the centers. This is reflected in traffic congestion, particularly in Chonburi, as a larger number of trucks, buses and private passenger cars thread their way through the internal network of urban roads that were not designed to carry the current volumes and types of traffic. In terms of Rivkin's third criterion, at least two of the urban centers (Chonburi and Siracha) possess characteristics the presence of which is appropriate for the application of land-use programming to effect a more orderly accommodation of existing and future urban needs.

Finally, it is noted that, in varying degrees, all three of the municipalities are characterized by water pollution and periodic flooding of urban streets and inter-city roads. In the case of Phanat Nikom, the klongs passing through the town are seriously polluted from up-stream sources, as well as farming activities and an abattoir within the town. A project for which design and evaluation were carried out as a component of the land-use program, is being implemented to alleviate the pollution problem.

There are no sewage treatment facilities in any of the urban centers. Raw sewage, along with other pollutants, and surface water, enter coastal waters through the klongs and/or directly in the case of sea dweller settlements in Chonburi and Siracha. With population growth, this problem

will become a more serious health hazard, as well as a threat to the marine fisheries in the Gulf.

In summary, the urban centers in the study area exhibit three of the four socio-economic characteristics Rivkin identifies as reflecting the need for more effective land-use planning and control: rapid growth in population, taking into account the increase in population in contiguous built-up areas; increases in the "trappings" of modern urban societies; and environmental degradation attributable to pollution, inadequate and easily accessible open space and urban congestion. Up to the present time (1979) none of the urban centers, or their hinterlands, have experienced the implantation of new agricultural and/or industrial activities on a scale to alter the basic economic structure and the nature of the forces that have generated the observed growth in population since 1970.

Of potentially greater significance than the criteria noted by Rivkin are the plans of the RTG to foster industrial development and improve transport facilities in the Eastern Seaboard Region. These plans include:

- . Expansion of the existing naval base at Sattahip for use as a deepwater commercial port;
- . Creation of an industrial estate and new urban center in the general vicinity of Sattahip port, or between Sattahip and Rayong;
- . Development of large-scale industrial plants. Tentatively, petrochemicals, soda ash and sponge iron are being considered along with other industries that might find locational advantage from

the port and/or raw materials (e.g., rock salt, agricultural products), and access to the natural gas line that will be built from a point near Rayong north through the Eastern Seaboard to Bangkok;

- . Extension of the existing rail network from Chachoengsao south to Sattahip Port. This new line will have a station a few kilometers to the east of Chonburi Municipality; and
- . Longer-term plans for the Eastern Seaboard Region include construction of a new deepwater port (cum industrial estate) at Laem Chabang, a few kilometers south of Siracha.

The impact of these projects, if implemented as currently envisaged, will be qualitative as well as quantitative, affecting the economic structure and patterns of land-use as well as land required to meet the needs of population growth in the Region. Careful land-use planning and effective controls should comprise an integral component of the regional planning effort, and in the design of administrative responsibility for maintenance of controls.

While implementation of the Eastern Seaboard Plan will undoubtedly exert some expansionary impact on the urban centers of Chonburi and Siracha, it is not possible, at this time, to identify either the precise nature or magnitude of changes that are expected to occur in the study area as a result of the RTG's program for development of the Eastern Seaboard Region.

### Institutional Requisites

In addition to the socio-economic characteristics giving rise to the need for planning and control of land use, Rivkin cites the following institutional requirements for application of the land-use programming approach to decentralized planning for orderly growth in medium-size centers:\*

1. Institutional mechanisms at the national level expressly interested in land-use and development issues in cities outside the metropolitan (primate city) areas;
2. A commitment by the national government to develop local capacity in provincial cities for planning, administration and control;
3. Assignment of national priority for infrastructure investments to individual intermediate-size cities; and
4. A political climate favorable to controlled growth in areas having statutory responsibilities for land control.

The first of the institutional requirements noted above is present in the Regional Planning Division of the National Economic and Social Development Board, and in the strong support from high levels of the RTG for the decentralization program enunciated in the current five-year plan.

Second, there are explicit pronouncements in the current five-year national plan, as well as policy statements by

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\*Ibid., pp. 122-123.

responsible officials calling for increased local planning and coordinating capabilities.\* At the same time it is recognized that a tradition of centralized planning for municipalities is strongly established in Thailand; even if the tradition is to be modified it will require considerable time to recruit and/or transfer qualified staff to fill positions, even in the relatively small number of urban centers that have been targeted as regional "growth poles."

Third, central government funds are to be channeled -- on a priority basis -- to selected urban and regional infrastructure projects. However, it is noted that projects for which funds are being provided are not always supported by thorough feasibility studies and thus may not represent the most productive use of limited financial resources. It is noted, also, that, understandably, security considerations play an important role in the assignment of funding priorities for local infrastructure projects.

Fourth, the local "political" climate in favor of controlled growth will require some cultivation if restrictive forms of control are to be employed. There appears to be a favorable climate for growth, but controls that would impose constraints on how and for what purpose land is to be used would probably encounter resistance.

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\*Chapter V., pp. 224-230

### III. CHARACTERISTICS OF THE STUDY AREA

#### Location and Area

##### The Changwat

Chonburi Changwat, situated on the eastern side of the Gulf of Thailand, is one of eight provinces comprising the Eastern Region. In terms of size, location, function, growth potential and linkages, Chonburi Municipality has been identified as the Principal Town of the Eastern Region. It is linked to Bangkok, 80 km. to the north by Sukhumvit Highway, a four-lane divided road. A location map is shown in Figure 1.

#### Administrative Structure

Chonburi Changwat contains 7 amphoes, which are usually further subdivided into tambons (communes) and mubans (villages); the village or muban is the smallest administrative unit. Some amphoes with special conditions are also further divided into King amphoes (sub-districts). At present, there are 3 King amphoes, 81 tambons and 583 mubans in Chonburi Changwat, in addition to the 7 amphoes. A number of local governments also exist in Chonburi. These are: 2 tesaban muang (Chonburi and Phanat Nikom); 1 tesaban tambon (commune municipality-Siracha) and 16 sukapibans (sanitary districts).

The land use programming "study area" includes, primarily, Amphoes Muang (Chonburi), Phanat Nikom and Siracha. The three amphoes, together, have a total land area of 2,374

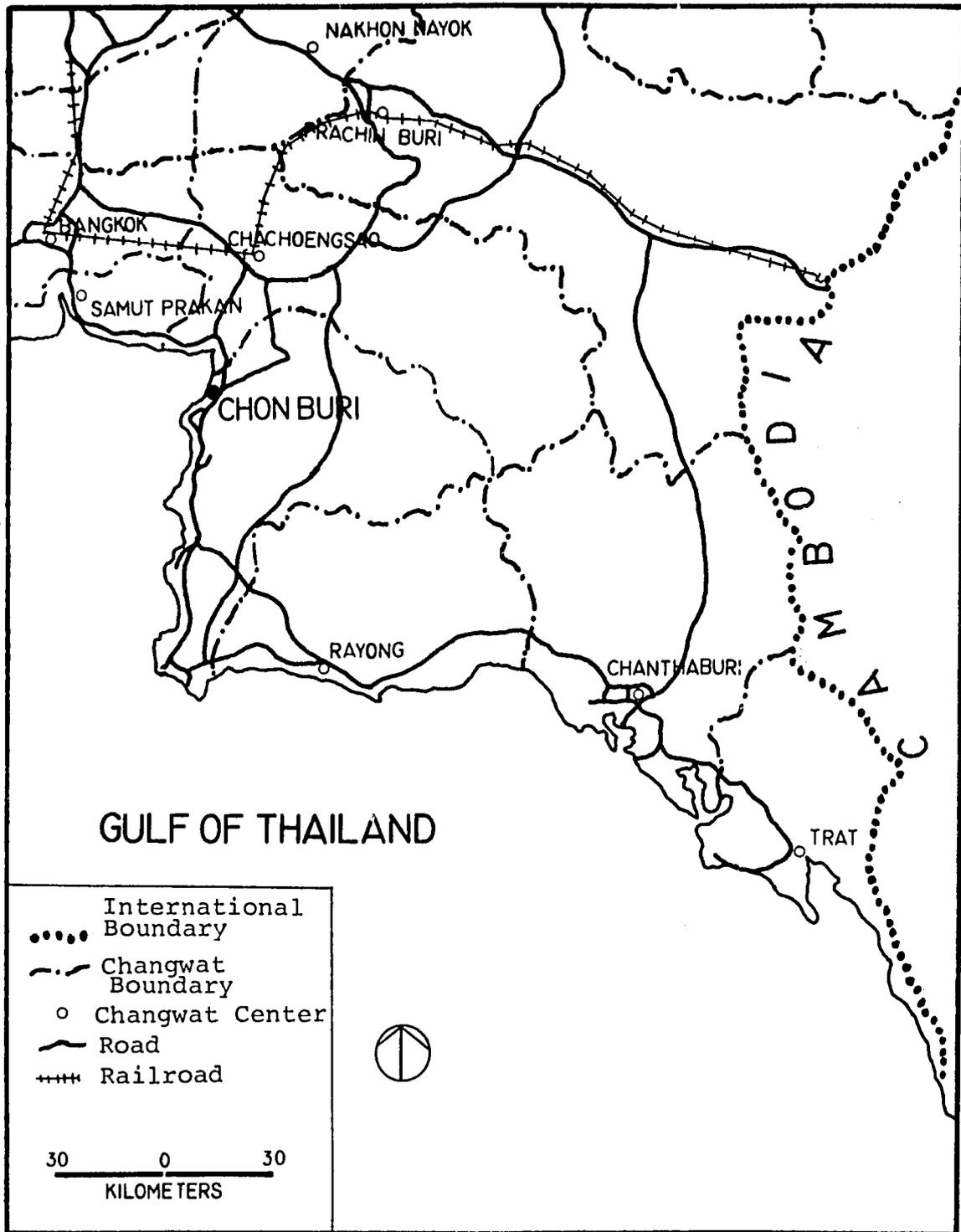


FIGURE I. LOCATION OF CHANGWAT CHONBURI

sq. kms., comprising 52.3 percent of the total land area of Chonburi Changwat, and containing, with the three urban centers, 58 percent of the Changwat population in 1976. Amphoe Phanat Nikom, with an area of 1,658 sq. kms. is by far the largest, followed by Amphoe Siracha with 491 sq. kms., and Amphoe Muang, with 225 sq. kms.

#### Land Use

Chonburi Changwat has a total land area of 4,507 sq. km. or 2,816,875 rai (one sq. km. equals 625 rai and 6 rai equal one hectare). Its area is about 12.3 percent of the total area of the Eastern Region, or .85 percent of the total area of the Kingdom.

Of the 4,507 sq. kms. of land area of Chonburi Changwat, 58 percent (2,615 sq. kms.) was utilized for agriculture in 1976; an additional 28.8 percent was in forests (1,298.6 sq. kms.). The remaining land area, approximately 478 sq. kms., includes lands used for industrial sites, urban and village settlements, defense installations, roads and other unspecified purposes.

The areas within the municipal boundaries are as follows: Chonburi, 4.56 sq. kms.; Phanat Nikom, 4.05 sq. kms.; and Siracha, 2.76 sq. kms. However, in the municipalities of Chonburi and Siracha significant portions of the areas within their boundaries are submerged foreshores. In Phanat Nikom's municipal boundaries, there are substantial areas used for farming and animal husbandry. Population density in Phanat Nikom's municipal boundaries is only one-fourth that in Chonburi, and 12 percent below that in Siracha.

### Topography and Principal Role of the Amphoes

The location, topography and functional role of each of the seven amphoes constituting Chonburi Changwat are described briefly in the following paragraphs. The location of the amphoes is shown in Figure 2.

Amphoe Muang (Chonburi): Geographically, Amphoe Muang lies in the northwest corner of the province and can be described in terms of physical characteristics as flat land in the vicinity of the seacoast, undulating land in the inland areas and, in the extreme eastern edge of the Amphoe, small foothills rising to a height of 212 meters.

Amphoe Muang's role in the Changwat is that of a regional service center. It is the center of administrative activities and of economic and market transactions within the region. The industrial activities in Chonburi are primarily agro-industries: rice milling, cassava processing, as well as fish processing industries. These industries relate very closely to the physical conditions within the Amphoe. Fishing is carried out extensively along the coastal area and as a result there are several related sea product industries in operation. A large wholesale fish market is located in Chonburi Municipality. Trucks transport catches from local fishing centers all along the eastern coast of the Gulf of Thailand to this market where buyers from Bangkok and other points purchase and transship a variety of seafood. Some is processed in Chonburi. Rice growing and milling are found inland, and cassava is extensively cultivated in the uplands. Also, along the seashore are several coconut plantations and fruit growing farms.

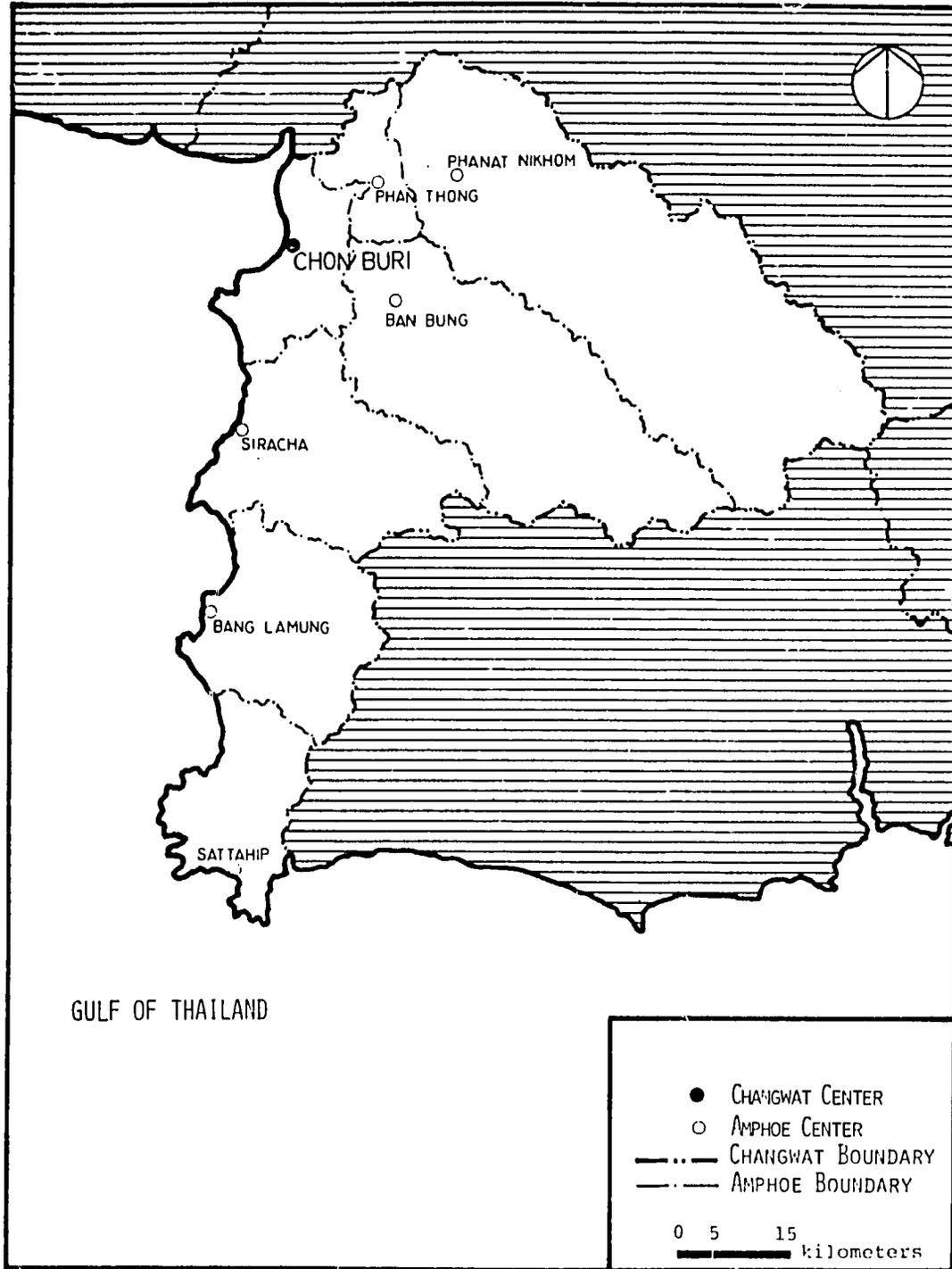


FIGURE 2. CHANGWAT CHONBURI AND PRIMARY ADMINISTRATIVE DIVISION

Amphoe Phanthong: Phanthong lies in a deltaic plain in the northern and northwestern sections of Chonburi Changwat. It is predominantly a rice growing area with brick making as the second most active industry. A strong cottage industry of mat weaving exists in Phanthong, especially before and after the rice harvesting period. Labor for the brick making factories has been recruited locally and from Pathumthani Changwat (north of Bangkok) which is also famous for its brick making.

Those people who live close to Sukhumvit highway prefer to go to Muang Chonburi for their supplies, while those who live inland use local market centers. In terms of farm supplies, people prefer to go to Chachoengsao Changwat for their supplies because the availability of inputs for rice farming is better as Chachoengsao Changwat is primarily a farming area while Changwat Chonburi is not.

Amphoe Phanat Nikom: Phanat Nikom is the eastern most and the largest amphoe in Changwat Chonburi, being six times as large as Amphoe Phanthong and one and one-half times as large as Amphoe Ban Bung. Phanat Nikom consists of deltaic plains in the northwestern section of the district, slowly changing to undulating land in the northeastern section with a small range of foothills rising to 150 meters in the southeastern section. Approximately two-thirds of the Amphoe is in forest areas classified as a reserve where cultivation is prohibited.

The economy is agro based, with cassava, sugar cane and vegetables being the main products. Cassava and sugar cane are upland crops planted on the slopes of the foothills.

Farmers in Phanat Nikom, as in Phanthong, go to Chachoengsao for their farm supplies, but to Amphoe Muang (Chonburi) for other purchases and services. The distance from Amphoe Muang to Phanat Nikom is 22 kms. and from Phanat Nikom to Chacheongsao 28 kms.

Amphoe Ban Bung: Located south of Phanthong and east of Amphoe Muang and Amphoe Sri Racha, Ban Bung is also an area consisting of deltaic plains, undulating landscape and small ranges of foothills rising to a height of 250 meters on its southwest boundary and 150 meters on its northeastern boundary.

Agro-industries also prevail in this area with rice being grown in the low-lying areas and cassava and sugarcane grown in the upland areas. On license from the government, logging is allowed in the hill areas. There are also two large export-oriented fruit processing factories within the Amphoe. Because of a shortage of labor, laborers are recruited from the northeast and central areas of Thailand at harvest time.

Amphoe Siracha: Amphoe Siracha is located south of Amphoe Muang and southwest of Amphoe Ban Bung. The land is generally deltaic, giving rise to undulating land forms and a small foothill range along its boundary with Amphoe Ban Bung.

Siracha is an industrial area with large-scale industries and plantation such as S.R. Tapioca Plantation, Simaharacha Shaving Board Co., Thai Oil Refinery Corporation, Esso Asphalt Plant, and numerous small sugar and tapioca mills. It is also the location of one of the finest golf courses in the country

as well as the Bang Phar Reservoir which serves Amphoe Siracha and Amphoe Chonburi.

Amphoe Siracha depends very much on Muang Chonburi for its supply of goods, reflecting the point made earlier that Amphoe Muang is a distribution center for the Changwat.

Bang Lamung: Located south of Amphoe Siracha, Amphoe Bang Lamung is an agro based area with numerous small-scale factories processing mainly cassava, coconut and sugarcane. The land is generally undulating with numerous small foothills, scattered about the district, which rise to a height of 100 meters.

Cassava fields cover 85 percent of cultivated land in the Amphoe, with coconut plantations being second in land area utilization. Although located along the seashore, Bang Lamung is not a high fish producing area mainly due to a recent Fisheries Department regulation, and to the fact that Pattaya and the seashore has become an international tourist attraction.

Amphoe Sattahip: Located at the extreme southern tip of the Changwat, Amphoe Sattahip is the location of a major military installation. Most of the land belongs to Royal Thai Navy and Air Force.

Because of the close proximity of Sattahip to Muang Rayong, the administrative center for Changwat Rayong, most people in Sattahip Amphoe use the market area in Rayong as their high-level service center.

Two major North-South highways that run through Chonburi

Changwat to Bangkok (Route 3, Sukhumvit Highway) and to Korat (Route 331) intersect in Amphoe Sattahip. The inland road to Korat is used to transport seafood products from Chonburi Changwat to the Northeast, while Sukhumvit Road connects the major urban centers with Bangkok.

### Population

Chonburi Changwat had a population of just over 377 thousand in 1960; in 1970, the unadjusted census enumeration reported a population of 541,695; based on registration data, Changwat population increased further to 669,213 by 1976, and 690,737 in 1978. The annual rates of growth over the several periods were as follows:

| <u>Period</u> | <u>Average<br/>Annual Rate</u> |
|---------------|--------------------------------|
| 1960 to 1970  | 3.7 percent                    |
| 1970 to 1976  | 3.6 percent                    |
| 1970 to 1978  | 3.1 percent                    |

In comparison, from 1960 to 1970, the average annual rate of population growth in Thailand as a whole was 3.1 percent; for the period 1970 to 1977, the national annual average growth rate was 2.9 percent.\* Thus, for almost two decades, the population of Chonburi Changwat has been increasing at a higher rate than the total population of Thailand, although it is noted that the differential has been somewhat smaller during the more recent (post-1976) years for which data are available.

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\*National population growth rates are from "World Development Indicators," published by the World Bank, 1979, p. 42.

Demographic data for the three amphoes, and for Chonburi Changwat for the years 1960, 1970 and 1976 are presented in Table 1. With the exception of the period 1970 to 1976, the rate of population growth in the three amphoes included in the study area was lower than in the Changwat as a whole, and also lower than for Thailand. Thus, in 1960, almost 70 percent of the Changwat's population resided in the three amphoes; by 1976, available data indicate that population in the three amphoes accounted for only 58 percent of the Changwat's population.

Inclusive of the municipal area in each of the amphoes, Phanat Nikom had the largest population in 1960, followed by Amphoe Muang (Chonburi) and Siracha. By 1976, however, population of Amphoe Muang had surpassed that of Phanat Nikom, largely as the result of a rapid growth (average, 5 percent per annum) in population in the built-up areas of the amphoe surrounding Chonburi Municipality.

In the earlier period, 1960 to 1970, population growth increased more rapidly in the three municipalities than in the amphoes in which each urban center was located, with the growth rate being highest in Siracha Municipality. But from 1970 to 1976, the pattern of growth was sharply reversed with the higher rates of growth being experienced in the amphoes outside the municipal boundaries of the three urban centers, rather than within the municipal boundaries (see Table 1). The diversion of population growth from existing municipalities to contiguous areas in the amphoes reflects a number of factors.

In the first place, most of the non-commercial employment generating activities are located outside municipal

Table 1. Population Changes, by Municipality, by Amphoe and for Chonburi Changwat, 1960-1976

| Area   | Population (,000) |              |              | Annual growth rate (percent) |            |            | Distribution of population (percent of total Changwat) |             |             |
|--|-------------------|--------------|--------------|------------------------------|------------|------------|--|-------------|-------------|
|  | 1960              | 1970         | 1976         | 1960-1970                    | 1970-1976  | 1960-1976  | 1960   | 1970        | 1976        |
| <b><u>Municipalities:</u></b>                                |                   |              |              |                              |            |            |  |             |             |
| Chonburi   | 32.5              | 44.8         | 48.7         | 3.3                          | 1.4        | 2.6        | 8.6  | 8.3         | 7.3         |
| Siracha  | 10.5              | 16.1         | 17.4         | 4.4                          | 1.3        | 3.2        | 2.8  | 3.0         | 2.6         |
| Phanat Nikom   | 9.3               | 12.2         | 13.0         | 3.7                          | 1.1        | 2.1        | 2.5  | 2.2         | 1.9         |
| Subtotal   | <u>52.3</u>       | <u>73.1</u>  | <u>79.2</u>  | <u>3.4</u>                   | <u>1.3</u> | <u>2.6</u> | <u>13.9</u>  | <u>13.5</u> | <u>11.8</u> |
| <b><u>Amphoe, excluding population in municipalities</u></b> |                   |              |              |                              |            |            |  |             |             |
| Chonburi   | 60.0              | 80.5         | 107.8        | 3.0                          | 5.0        | 3.7        | 15.9   | 14.9        | 16.1        |
| Siracha  | 54.1              | 65.5         | 78.1         | 1.9                          | 3.0        | 2.3        | 14.3   | 12.1        | 11.7        |
| Phanat Nikom   | 97.1              | 95.8         | 123.3        | -0.1                         | 4.3        | 1.5        | 25.8   | 17.1        | 18.4        |
| Subtotal   | <u>211.2</u>      | <u>244.8</u> | <u>309.2</u> | <u>1.4</u>                   | <u>4.2</u> | <u>2.4</u> | <u>56.0</u>  | <u>44.6</u> | <u>46.2</u> |
| <b><u>Amphoe, including population in municipalities</u></b> |                   |              |              |                              |            |            |  |             |             |
| Chonburi   | 92.5              | 125.3        | 156.5        | 3.1                          | 3.8        | 3.3        | 24.5   | 23.1        | 23.4        |
| Siracha  | 64.6              | 81.6         | 95.5         | 2.4                          | 2.6        | 2.5        | 17.1   | 15.1        | 14.3        |
| Phanat Nikom   | <u>106.5</u>      | <u>108.0</u> | <u>136.3</u> | <u>0.14</u>                  | <u>4.0</u> | <u>1.6</u> | <u>28.2</u>  | <u>19.9</u> | <u>20.4</u> |
| Total, 3 amphoes   | 263.5             | 314.9        | 388.3        | 1.8                          | 3.6        | 2.4        | 69.9   | 58.1        | 58.0        |
| Chonburi Changwat  | 377.0             | 541.7        | 669.2        | 3.7                          | 3.6        | 3.7        | 100.0  | 100.0       | 100.0       |

Sources: For 1960 and 1970, Census of Population; for 1976, official registrations, local governments.  
 Note: Population figure are rounded; totals, rates of growth and percentage distributions computed from unrounded data.

boundaries. Of 164 manufacturing/processing plants in the three amphoes, only 31 are located in the three municipalities, of which 27 are in Chonburi. Given the relatively good network of roads and cheap public transport in the area, providing easy access to urban services, the growth of population has tended to follow employment opportunities, rather than established urban centers.

The recent pattern of population growth reflects, also, the "ribbon" development along Sukhumvit Road north and south of Chonburi and Siracha Municipalities.

Finally, the limited land area available to accommodate population growth within the municipal boundaries of Chonburi and Siracha has probably contributed to the acceleration of population growth in contiguous areas in these two amphoes.

#### Economically Active Population

The distribution of the "economically active" population by sex and by economic sector, 1970, is shown in Table 2. Out of the enumerated 1970 population of 541,695, a total of 229,477, including individuals 14 years through 64 years of age of both sexes were reported as economically active in 1970. The indicated participation rate was 42.4 percent of the total population, and approximately 83 percent of the population, 14-64 years of age.

It should be noted that the economically active population was not necessarily employed at the time of the enumeration. As generally used, the term "economically active" indicates that individuals were either working or actively seeking work at the time of the enumeration. In addition to

Table 2. Economically Active Population, 14-64  
Years of Age, by Sex and Sector, 1970,  
Chonburi Changwat

| Sector                               | Number        |               |               | Percent<br>Distribution |
|--------------------------------------|---------------|---------------|---------------|-------------------------|
|                                      | <u>Male</u>   | <u>Female</u> | <u>Total</u>  |                         |
| Agriculture, Forestry<br>and Fishing | 72,421        | 62,666        | 135,087       | 58.9                    |
| Mining                               | 1,117         | 405           | 1,522         | 0.7                     |
| Manufacturing                        | 11,397        | 7,022         | 18,419        | 8.0                     |
| Construction                         | 5,278         | 586           | 5,864         | 2.6                     |
| Electricity, water<br>and sewage     | 431           | 49            | 480           | 0.2                     |
| Commerce                             | 8,091         | 12,418        | 20,509        | 8.9                     |
| Transport and<br>Communications      | 8,910         | 231           | 9,141         | 4.0                     |
| Services                             | <u>25,963</u> | <u>12,493</u> | <u>38,456</u> | <u>16.7</u>             |
| Totals                               | 133,608       | 95,870        | 229,478       | 100.0                   |

Note: A more detailed breakdown of the economically active population is presented in Information Working Paper No. 4, "A Summary of the Socio-Demographic Characteristics for Changwat Chonburi".

the total population indicated as being economically active in Table 2, a substantial number of individuals below the age of 14 and above the age of 64 were also identified as being economically active, although complete data for these age groups are not available for both sexes.

The data in Table 2 are presented basically for two reasons: First of all, they indicate the sectoral distribution of the indicated age groups in terms of their seeking or finding employment; secondly, the orders of magnitude shown in Table 2 give some indication of the rather narrow coverage of employment shown in Table 3. For example, Table 2 indicates that over 18,000 persons were economically active in manufacturing, whereas Table 3 shows actual employment in manufacturing in 1969 of less than one-half this number. Assuming that the data in both tables are substantially correct, it means that roughly half of manufacturing employment is in establishments with less than 5 workers. As might be expected, the number of workers in commerce (principally wholesale and retail trade) and in services are substantially smaller in Table 3 than the economically active in the corresponding sectors as shown in Table 2. Again, this is indicative of the large number of people active in these sectors as workers in establishments with less than 5 workers.

Perhaps the most important structural characteristic appearing in Table 2 is the large percentage of the population, both male and female, engaged in the agriculture, forestry and fisheries sector. It may be noted that the GPP originating in this sector is less than one-fourth of GPP in the Changwat economy as a whole, while the number of

Table 3. Non-Agricultural, Private Sector Employment in Establishments With Five or More Workers, Chonburi Changwat, By Sector, 1969 and 1976

| Sector  | Number of Workers* |               | Composition Percent |              |
|---|--------------------|---------------|---------------------|--------------|
|   | 1969               | 1976          | 1969                | 1976         |
| Mining & Quarrying                            | 458                | 66            | 2.4                 | 0.3          |
| Manufacturing:                                | 8,704              | 8,993         | 44.9                | 46.0         |
| Food & beverages                              | 4,585              | 5,124         | 23.7                | 26.2         |
| Textiles                                      | 61                 | 225           | 0.3                 | 1.2          |
| Wood products, except furniture               | 2,108              | 1,212         | 10.9                | 6.2          |
| Furniture & fixtures                          | -                  | 197           | -                   | 1.0          |
| Chemical products                             | 384                | 385           | 2.0                 | 2.0          |
| Petroleum products                            | 221                | 535           | 1.1                 | 2.7          |
| Pottery & earthenware                         | 301                | 342           | 1.6                 | 1.8          |
| Non-metallic mineral products                 | 218                | 368           | 1.1                 | 1.9          |
| Metal products, including transport equipment | 767                | 417           | 4.0                 | 2.1          |
| All other manufacturing                       | 59                 | 188           | 0.3                 | 1.0          |
| Electricity & water supply                    | 220                | 240           | 1.1                 | 1.2          |
| Construction                                  | 1,540              | 714           | 7.9                 | 3.7          |
| Commerce:                                     | 2,817              | 2,126         | 14.5                | 10.9         |
| Wholesale & retail trade                      | 2,603              | 1,508         | 13.4                | 7.7          |
| Bank and financial institutions               | 190                | 386           | 1.0                 | 2.0          |
| Insurance                                     | 24                 | 32            | 0.1                 | 0.2          |
| Transport, storage and communications         | 1,993              | 1,225         | 10.3                | 6.3          |
| Services:                                     | 3,649              | 6,168         | 18.8                | 31.6         |
| Education                                     | 1,168              | 1,429         | 6.0                 | 7.3          |
| Restaurants, etc.                             | 893                | 402           | 4.6                 | 2.1          |
| Hotels & lodging places                       | 562                | 3,539         | 2.9                 | 18.1         |
| Repair services                               | 485                | 341           | 2.5                 | 1.7          |
| Personal services                             | 460                | 84            | 2.4                 | 0.4          |
| Motion pictures, theatres                     | 55                 | 182           | 0.3                 | 0.9          |
| Amusement & recreation                        | -                  | 185           | -                   | 0.9          |
| Other services                                | 26                 | 6             | 0.1                 | -            |
| <b>Total</b>                                  | <b>19,381</b>      | <b>19,532</b> | <b>100.0</b>        | <b>100.0</b> |

\* Includes employers and unpaid family workers, as well as employees.

economically active is almost 59 percent of the Changwat total. The implication is that value added per worker in agriculture is very much smaller than in other sectors.

It will be noted that approximately 60 percent of the employment in the commercial sector, largely retail trade, is of women. Economically active females also account for very substantial numbers in the agricultural and fisheries sector, as well as in manufacturing and services.

### Economic Structure

The economic structure of Chonburi Changwat, and insofar as data permit, that of the three amphoes and their respective urban centers, are described below. While the focus of the land use programming project is the formulation of the "Guide Plan", and the identification of infrastructure projects to meet near-term needs and facilitate longer-term development along lines suggested by the Guide Plan, the projected growth in population and requirements for land for urban uses will be strongly influenced by growth in the economic base.

The existing economic structure in the three amphoes is clearly reflected in the hierarchy of settlements; moreover, the existing economic base provides a useful framework for identifying the sectors in which future growth of employment and production can be expected to occur. For these reasons, the existing provincial economy is described in as much detail as available data permit.

## Employment

With 58 percent of the land area of Chonburi Changwat utilized for agricultural purposes, 59 percent of the labor force is engaged in agriculture, forestry and fishing. Definitions of "employment" in the agricultural sector are necessarily broad, as most members of farm households are engaged, from an early age, in some form of activity contributing to production and household income.

Distribution of non-agricultural, private sector employment in establishments with 5 or more workers is shown in Table 3, for Chonburi Changwat, for 1969 and 1976. The data in this table exclude significant numbers of workers (including owners, family workers and employees) in small repair shops, eating places and service establishments, as well as all government employees. However, the total number of workers in the size and types of industries that are likely to provide the impetus for growth in the Changwat are relatively accurately reflected in Table 3.

Total covered employment, as shown in Table 3, increased by less than one percent from 1969 to 1976. In absolute numbers, the largest increase occurred in the service sector, in the "hotels and lodging places" sub-sector. This increase reflects, in part, the development of the international tourism center at Pattaya, outside of the study area. In addition, there is an important resort development at Bang Saen, serving primarily a domestic clientele.

Government employment in the manufacturing sector as a whole registered a modest increase of 3.3 percent between

1969 and 1976. The increase in this sector would have been much larger but for the decline (42.5 percent) of almost 900 in the number of workers in the wood products subsector. It is understood that the depletion of timber in the region, and costs of transport of logs from more distant areas, are affecting adversely the wood processing industry in Chonburi Changwat.

Food and beverage establishments account for 26.7 percent of the total number of workers covered in the data shown in Table 3, and registered an increase of 11.8 percent in number of workers, 1969 to 1976. This subsector includes employment in processing of cassava for export, as well as a variety of establishments producing marine products, primarily for the domestic market.

The number of workers in the petroleum refining subsector rose sharply, by 142 percent, from 1969 to 1976; however, this subsector is still a minor employment generator in the Changwat.

The large decline in the number of workers in wholesale and retail trade, 1969 to 1976, is somewhat surprising in view of the overall increase in population, Gross Provincial Product and the stability in the total number of workers. It suggests the possibility of a change in classification, or in the size limits for establishments included in the enumerations. A similar anomaly appears in the sharp decline in the number of workers in restaurants and other eating places. One possible explanation for both declines is the reduced scale of operations at the military installations (port and air field) near Sattahip at the southern end of

the Changwat. The reported decline in the number of workers in the transport, storage and communications subsector may reflect, also, the reduced activities at these installations.

Employment by Amphoe, 1976. The structure of non-agricultural, private employment in establishments with 5 or more workers, by major sectors, is shown in Table 4, by amphoe, as of March 1976.\* The pattern of employment observed in this table throws further light on the economic structure of the three amphoes comprising the study area. Together, the three amphoes accounted for 52.1 percent of the number of workers in the covered establishments in Chonburi Changwat; the three amphoes contained a slightly larger (58 percent) of the Changwat population in 1976.

Phanat Nikom. In terms of the number of non-agricultural, private sector workers, relative to total population, Amphoe Phanat Nikom occupies a minor position in the economic hierarchy of the study area. As shown in Table 5, this amphoe has the largest land area, and the largest area in cultivation of any of the three amphoes. It is also the least "urbanized", with less than 10 percent of the amphoe's population residing in the municipality. With slightly more than 20 percent of the Changwat population, Amphoe Phanat Nikom accounted for less than 6 percent of the Changwat's workers in private, non-agricultural establishments in 1976.

The importance of the agricultural sector in the economic structure of Phanat Nikom is further evidenced in Table 5.

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\*A more detailed breakdown, by the subsectors shown in Table 3, may be found in Information Working Paper No. 6, "Economic Generators and Their Location," March 1978. Tables 2, 3 and 4.

Table 4. Non-Agricultural, Private Employment, by Sector, in Establishments with More Than Five Employees, by Amphoe, March 31, 1976

| Sector                                | Number of Workers |                           |                        |                           |                |                           | Totals<br>of<br>Three<br>Amphoes |                |
|---------------------------------------|-------------------|---------------------------|------------------------|---------------------------|----------------|---------------------------|----------------------------------|----------------|
|                                       | Amphoe Muang      |                           | Amphoe Phanat<br>Nikom |                           | Amphoe Siracha |                           |                                  |                |
|                                       | Workers           | Percent<br>of<br>Changwat | Workers                | Percent<br>of<br>Changwat | Workers        | Percent<br>of<br>Changwat |                                  |                |
| Mining & Quarrying                    | 66                | (100.0)                   | -                      | ( - )                     | -              | ( - )                     | 66                               | (100.0)        |
| Manufacturing                         | 2,083             | ( 23.2)                   | 921                    | ( 10.2)                   | 2,364          | ( 26.3)                   | 5,368                            | ( 59.7)        |
| Electricity & Water                   | 28                | ( 11.7)                   | 33                     | ( 13.7)                   | 43             | ( 17.9)                   | 104                              | ( 43.3)        |
| Construction                          | 524               | ( 73.4)                   | -                      | ( - )                     | 44             | ( 6.2)                    | 568                              | ( 79.6)        |
| Commerce                              | 1,418             | ( 66.7)                   | 90                     | ( 4.2)                    | 319            | ( 15.0)                   | 1,827                            | (85.9)         |
| Transport, Storage<br>& Communication | 143               | ( 11.7)                   | 8                      | ( 0.7)                    | 69             | ( 5.6)                    | 220                              | ( 18.0)        |
| Services                              | <u>1,241</u>      | <u>( 20.1)</u>            | <u>105</u>             | <u>( 1.7)</u>             | <u>673</u>     | <u>( 10.9)</u>            | <u>2,019</u>                     | <u>( 32.7)</u> |
| Total Workers                         | 5,503             | ( 28.2)                   | 1,157                  | ( 5.9)                    | 3,512          | ( 18.0)                   | 10,172                           | ( 52.1)        |
| Population (,000)                     | 156.5             | ( 23.4)                   | 136.3                  | ( 20.4)                   | 95.5           | ( 14.3)                   | 388.3                            | ( 58.0)        |

Note: The figures in parentheses indicate the percentage of the Changwat's sectoral employment and population in each of the three amphoes.

Table 5. Land in Agricultural and Horticultural Uses, by Principal Crop, by Amphoe and Changwat, 1976

|  | (In thousand rai and percent of Changwat total) |                                     |                           |                                |
|--|---|-------------------------------------|---------------------------|--------------------------------|
|  | <u>Chonburi<br/>Changwat</u>                    | <u>Amphoe<br/>Muang<sup>1</sup></u> | <u>Amphoe<br/>Siracha</u> | <u>Amphoe<br/>Phanat Nikom</u> |
| Rice, rai  | 376.9   | 37.7                                | 10.9                      | 176.3                          |
| Percent  | 100.0   | 10.0                                | 2.9                       | 46.8                           |
| Cassava, rai   | 535.2   | 13.6                                | 120.5                     | 84.6                           |
| Percent  | 100.0   | 2.5                                 | 22.5                      | 15.8                           |
| Peanuts, rai   | 42.0  | 1.1                                 | 5.4                       | 34.3                           |
| Percent  | 100.0   | 2.6                                 | 12.9                      | 81.7                           |
| Sugarcane, rai   | 346.6   | 2.4                                 | 76.3                      | 86.4                           |
| Percent  | 100.0   | 0.7                                 | 22.0                      | 24.9                           |
| Others, rai <sup>2</sup>                                 | 333.6   | 44.7                                | 6.4                       | 4.5                            |
| Percent  | 100.0   | 13.4                                | 1.9                       | 1.3                            |
| Total, rai   | 1,634.3   | 99.9                                | 219.5                     | 386.1                          |
| Percent of Total Area in Agricultural/Horticultural Uses | 58.0  | 71.1                                | 71.5                      | 37.3                           |

1. Amphoe Chonburi

2. Includes areas in coconut and fruit trees

Although only 37.3 percent of its total land area is in cultivation, as compared with over 71 percent in Amphoes Muang and Siracha, Amphoe Phanat Nikom accounted for 46.8 percent of the Changwat's land in rice, 81.7 percent of land planted in peanuts and 24.9 percent planted in sugarcane in 1976. However, in area planted in cassava, Amphoe Phanat Nikom ranked second to Amphoe Siracha.

In terms of production, Amphoe Phanat Nikom accounted for 55 percent of the rice production, 79 percent of the peanuts and 26 percent of the sugarcane produced in Chonburi Changwat, but only 15 percent of the cassava.

In summary, Amphoe Phanat Nikom is basically agricultural, with the municipality functioning as a primary service center for a large rural hinterland. As shown in Table 4, the Amphoe accounts for less than 6 percent of the Changwat's total number of workers in private, non-agricultural establishments with five or more workers.

Siracha. In terms of the number of workers in establishments covered in Tables 3 and 4, Amphoe Siracha possesses substantially stronger characteristics as an urban center than Amphoe Phanat Nikom. With 14.3 percent of the Changwat's population, the Amphoe accounts for 18.0 percent of the total number of workers in private, non-agricultural employment in establishments with 5 or more employees. More than two-thirds of these workers are in manufacturing establishments: food and beverages, 22 percent; wood products, 22 percent; petroleum products, 15 percent; chemical products, 5.4 percent; and other manufacturing, 2 percent.

Relative to its share of the Changwat's population, Amphoe Siracha has a relatively strong base in trade and in the electricity and water supply sectors.

With the exception of rice, of which Amphoe Siracha accounted for only 3.1 percent of the Changwat production, this amphoe also accounted for large amounts of the Changwat's production of cassava (21.5 percent), sugarcane (23.7 percent) and peanuts (12.4 percent) in 1976. Although the amphoe has only 10.9 percent of the Changwat's land area, 71.5 percent of this area was in cultivation in 1976, as compared with a ratio of only 37.3 percent in Amphoe Phanat Nikom.

Land area available to meet the needs of future growth in population and other urban uses is limited within the existing boundaries of the municipality. However, population density within the boundaries was less than one-half that in Chonburi's municipal boundaries in 1976. If, as reported by some local authorities, consideration is being given to the closing of the large wood processing plant in the municipality, additional land for urban uses would become available. Reclamation of the submerged foreshore would also provide additional land for urban growth within the municipal boundaries. However, as in the case of Chonburi Municipality, growth is occurring in areas contiguous to the existing municipal boundaries. Nevertheless, with its relatively low density, and better internal network of roads, the constraints to urban growth within existing municipal boundaries of Siracha Municipality are less serious than in Chonburi Municipality.

While the Government's plans for accelerating development of the Eastern Seaboard Region will provide some stimulus

for growth in Amphoe Siracha, the timing and magnitude of the increase in employment, population and land required for urban uses in Amphoe Siracha will depend, very importantly, on the site selected for the major deepwater port to be located in the Region. A decision to build the port and the industrial estate at Laem Chabang could bring about very rapid growth in Amphoe Siracha, and create strong pressures for expansion of commercial facilities in Siracha Municipality, as well as in the predominantly rural areas south of the Municipality. However, expansion of the port at Sattahip for use as a commercial port would provide substantially less stimulus for growth in Siracha.

Chonburi. Amphoe Muang, in which Chonburi Municipality is located, is the most populous amphoe in the Changwat, with 23.4 percent of the Changwat's population in 1976. It is also the most urbanized, with 31.1 percent of the amphoe's population residing in the Municipality of Chonburi. Even this ratio understates the proportion of the amphoe's population living in urban areas as the municipality proper is surrounded by built-up areas, on the eastern, southern and northern sides of the municipal boundaries.

Chonburi Municipality is the capital of the Changwat, and has been designated a "Principal Town" as a focal center for accelerated development. In addition to its role as a government administrative center, Chonburi is the most important commercial center in the Changwat. As shown in Table 4, two-thirds of the Changwat's workers in the commercial sector are in Amphoe Muang; almost three-fourths of the workers in the construction sector; and 23.2 percent of the workers in the manufacturing sector are in Amphoe Muang.

Within the manufacturing sector, 43 percent of the workers are in the food and beverage subsector; 16.4 percent are engaged in the manufacture of pottery and earthenware; 12.6 percent in establishments producing metal products, other than machinery and transport equipment; and 10.8 percent in textiles. Of the 135 manufacturing establishments in the amphoe, only 28 are located in the Municipality of Chonburi. Over one-half of the 83 establishments in the food and beverage subsector, for example, are engaged in processing cassava; all are located outside the municipal area.

The three amphoes accounted for almost one-third of the number of service workers in the Changwat in 1976, with Amphoe Muang, alone, having one-fifth of the Changwat total. The relative importance of Chonburi's service sector is probably understated, in terms of its role in the Changwat economy, by the large number of service workers in the international tourist center at Pattaya.

#### Gross Provincial Product (GPP)

Gross Provincial Product for Chonburi Changwat is shown in Table 6, by sector, for 1970 and 1976, with both years at 1962 prices.\* Over the six-year period, the data indicate an average annual growth rate of 8.8 percent. In Thailand as a whole, GDP at constant prices rose at an annual rate of 7.1 percent over the period 1970 and 1977, as estimated by the World Bank.\*\* Thus, available data indicate that the

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\*Gross Provincial Product at factor cost is the total returns to land, labor and capital employed in the various sectors. It excludes costs of inputs (raw materials and intermediate goods) purchased from other producers.

\*\*"World Development Indicators," p. 12.

Table 6. Gross Provincial Product, Chonburi  
Changwat, 1970 and Estimated, 1976  
at 1962 Prices, by Sector

| Sector                                       | Gross Provincial Product<br>(Millions of Baht) |                         | Percent<br>Change,<br>1970-76 | Percent<br>Distribution<br>1976 |
|--|--|-------------------------|-------------------------------|---------------------------------|
|  | <u>1970</u>                                    | <u>1976<sup>e</sup></u> |                               |                                 |
| Agriculture, Forestry<br>and Fisheries       | 905.6  | 1,335.1                 | 47.4                          | 22.6                            |
| Mining and Quarrying                         | 15.9   | 18.3                    | 15.1                          | 0.3                             |
| Manufacturing                                | 1,220.0  | 2,307.0                 | 89.1                          | 39.0                            |
| Construction                                 | 66.0   | 85.5                    | 29.5                          | 1.4                             |
| Electricity & Water                          | 27.3   | 159.6                   | 484.6                         | 2.7                             |
| Transportation and<br>Communication          | 147.1  | 230.8                   | 56.9                          | 3.9                             |
| Wholesale and<br>Retail Trade                | 485.4  | 335.3                   | -30.9                         | 5.7                             |
| Banking, Insurance<br>and Real Estate        | 35.9   | 67.3                    | 87.5                          | 1.1                             |
| Imputed Value of Owner<br>Occupied Dwellings | 67.6   | 81.9                    | 21.2                          | 1.4                             |
| Public Administration<br>and Defense         | 70.1   | 127.2                   | 81.5                          | 2.1                             |
| Services                                     | <u>530.1</u>                                   | <u>1,172.2</u>          | <u>121.1</u>                  | <u>19.8</u>                     |
| Total, GPP                                   | 3,571.0  | 5,920.2                 | 65.8                          | 100.0                           |

e. Preliminary estimate.

Changwat as a whole experienced a somewhat higher rate of economic growth than the nation during most of the 1970s.

Although over one-half of the Changwat's labor force is engaged in agriculture, forestry and fisheries, this sector accounted for only 22.6 percent of GPP in 1976, as compared with 25.7 percent in 1970. None of the agricultural subsectors increased at a rate as high as the rate of increase in GPP, while product originating in the forestry sector actually declined by almost 35 percent at constant prices of 1962. Product originating in the livestock subsector rose by only 3.0 percent at constant prices, 1970-1976. Fisheries recorded an increase of 37.7 percent, 1970 to 1976, while product originating in agriculture registered the largest increase: 59 percent, 1970 to 1976, at constant prices of 1962.

The manufacturing sector accounted for 39.0 percent of GPP in 1976, as compared with 34.0 percent in 1970, with product in both years expressed in 1962 prices; over the six-year period as a whole, product originating in manufacturing increased 89.1 percent, as compared with an increase of 65.8 percent in total GPP.

The largest rate of increase (484.6 percent) in product originating was registered in the electricity and water sector; in 1976, this sector accounted for 2.7 percent of GPP in Chonburi Changwat, as compared with 0.8 percent in 1970. The second largest percentage increase was registered by the service sector, 121.1 percent, 1970 to 1976. In the latter year, this sector accounted for 19.8 percent of GPP, as compared with 14.8 percent in 1970.

It will be noted that GPP originating in the wholesale and retail trade sector shows an absolute decline from 1970 to 1976, with both years expressed in 1962 prices. As shown in Table 3, employment in this sector, as well as some service subsectors, also declined over the same period. The factors cited as being possible explanations for the decline in employment in these sectors may have accounted, also, for the declines noted in product originating in these sectors.

The economic structure of Chonburi Changwat, as measured in terms of the sectoral composition of gross product, is compared with that of Thailand as a whole in Table 7. It is noted that the "services" category in Table 7 includes all sectors other than those explicitly listed in the table. Thus, very importantly, services include wholesale and retail trade, transportation and communication, banking, insurance and real estate, and public administration and defense, as well as the conventional service sectors.

The comparisons presented in Table 7 suggest that Chonburi Changwat has reached a high degree of industrial development, relative to Thailand as a whole, as well as relative to other nationwide structural patterns. For example, product originating in the manufacturing sectors account for only 30 percent of GDP in Spain, Israel, Japan and Austria; 38 percent in West Germany; and 34 percent in Italy. The presence of the petroleum refinery in Chonburi Changwat is probably responsible, in large measure, for the importance of the manufacturing sector in the GPP.

The data in Table 7 indicate that the (broadly defined) service sector is relatively underdeveloped in Chonburi

Table 7. Comparative Structure, Composition of GDP,  
Thailand, and GPP, Chonburi Changwat, 1976,  
at Current Prices

| Sector                                       | Thailand, 1976 <sup>a</sup><br>(Percent) | Chonburi<br>Changwat, 1976 <sup>b</sup><br>(Percent) |
|--|--|--|
| Agriculture                                  | 31                                       | 23   |
| Manufacturing                                | 18                                       | 42   |
| Mining, Construction,<br>Electricity & Water | 8  | 3  |
| Services <sup>c</sup>                        | <u>43</u>                                | <u>32</u>  |
|  | 100                                      | 100  |

a. NESDB, National Income of Thailand, 1977 Edition,  
Table 2, p. 11.

b. Information Working Paper, No. 6, "Economic Generators  
and Their Locations," NESDB/RRNA, Table 12.

c. Includes all other sectors.

Changwat. This could be attributable to the "leakage" of factor earnings originating in the Changwat, to recipients residing outside the Changwat, and, thus, serving as a constraint on growth in trade and service sectors within the Changwat. Moreover, proximity of the northern amphoes to Bangkok, the excellent transport linkage and the wider ranges of goods and services available in the primate city would be expected to draw heavily from purchasing power in portions of Chonburi Changwat.

Infrastructure and  
Public Services

Piped Water Supply

All three of the municipalities in the study area, as well as portions of the built-up contiguous areas, have piped water supplies. Currently, approximately 72 percent of the households in Siracha, 44 percent of the households in Phanat Nikom, and 62 percent of those in Chonburi have piped water supply.

In 1975, the number of metered customers and total consumption, including public consumption, were as follows in the three municipalities:

|              | Number of customers | Percent change 1973-1975 | Total Consumption (in thousands of m3) | Percent change 1973-1975 |
|--------------|---------------------|--------------------------|--|--------------------------|
| Chonburi     | 6,461               | 10.6                     | 3,493                                  | 38.0                     |
| Siracha      | 2,527               | 10.3                     | 1,065                                  | 2.8                      |
| Phanat Nikom | 893                 | 30.2                     | 259                                    | 35.7                     |

The municipalities of Chonburi and Siracha, as well as the tambons of Ban Sai, Ban Suan and Saen Suk are served from the Bang Phra Reservoir; Phanat Nikom is served from a small reservoir located near the southwestern boundary of the municipality.

Along with other areas in the Eastern Seaboard Region, the three amphoes lack adequate capacity in existing (1979) reservoirs to meet current requirements for piped water. For the immediate future, water will constitute a constraint on population and economic development. However, dams now under construction, and planned, will alleviate the limited capacity of reservoirs to support future growth. Additional capacity will be required, also, in water treatment plans as the supply of raw water is augmented.

### Electricity

Currently, all but two of the 48 tambons in the Changwat are served by electric distribution lines. Twenty-four of the tambons are supplied with both electricity and piped water, while 22 are supplied with electricity but not piped water. Only two have neither service. As is the case for other infrastructure and public services, piped water and electricity services are more widely available in the more densely populated areas along the western portion of Chonburi Changwat.

In the Municipality of Chonburi, over 95 percent of the households are supplied with electric service; in Phanat Nikom, the comparable ratio is almost 98 percent. However, in Siracha, the ratio reported was only slightly over 54 percent.

Electric power distributed in Chonburi Changwat is purchased by the Chonburi Electricity Authority from the Electricity Generating Authority of Thailand (EGAT). A planned gas-fired, thermal generating plant, to be located near the northern border of Chonburi Changwat will enhance the potential for industrial development and population growth in the Changwat.

### Educational Facilities

As a result of guidelines specifying distances from which public schools draw pupils,\* public schools are widely dispersed, with distribution of schools and number of classrooms reflecting location of population of school age. Other standards set by the Ministry of Education specify number of classrooms per school, from 4, at the lowest level, to 14 classrooms per school at the MS-5 level; also, pupil/classroom standards are specified: 35 per classroom at the elementary levels 1-7, to 40 per classroom at the MS-1-5 levels.

Selected indices of educational facilities for the three amphoes and their respective urban centers are shown in Table 8, for elementary levels 1-7.

Although in the amphoes the average number of elementary level pupils per classroom is well within the standard of 35, this is not the case for the municipalities of Chonburi

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\*For example, the guidelines specify that pupils in the lower elementary age groups should not be more than 2 kms. from a school; at the highest level, MS-4-MS-5, the distance is 12 kms.

Table 8. Number of Schools, Classrooms  
and Pupils, by Amphoe and  
Municipality, Levels 1-7

|   | <u>Amphoes, 1976</u>        |                |                     |
|---|-----------------------------|----------------|---------------------|
|   | <u>Chonburi</u>             | <u>Siracha</u> | <u>Phanat Nikom</u> |
| Schools   | 40                          | 45             | 74                  |
| Classrooms                                      | 358                         | 350            | 630                 |
| Pupils  | 10,344                      | 10,464         | 19,238              |
| Pupils/Classroom                                | 29                          | 30             | 31                  |
| Pupils/Teacher                                  | 27                          | 26             | 29                  |
| Increase in No. of Pupils,<br>1972-76 (Percent) | 6.5%                        | 7.7%           | 11.5%               |
|   | <u>Municipalities, 1977</u> |                |                     |
|   | <u>Chonburi</u>             | <u>Siracha</u> | <u>Phanat Nikom</u> |
| Schools   | 5                           | 3              | 4                   |
| Classrooms                                      | 82                          | 55             | 32                  |
| Pupils  | 2,835                       | 1,907          | 846                 |
| Pupils/Classroom                                | 35                          | 35             | 26                  |
| Pupils/Teacher                                  | 22                          | 24             | 20                  |
| Increase in No. of Pupils,<br>1972-76 (Percent) | 16.3%                       | -3.4%          | -2.3%               |

Source: Information Working Paper No. 6. Tables 6 and 7.

and Siracha. In Phanat Nikom Municipality, a declining number of students (and the addition of one classroom in 1974) has lowered the pupil/classroom ratio since 1973.

The situation is less satisfactory with respect to the secondary levels of education, where the number of classrooms serves as a limiting factor on enrollment.

### Health Facilities

In 1977, there were seven general hospitals with a total of 1,158 beds, within the Changwat. Most of the hospitals are located in municipal or urban areas. In addition there are 73 health centers (out-patient clinics) and 12 midwifery centers located throughout the Changwat.

The Changwat hospital located on Sukhumvit Road just outside the southern boundary of Chonburi Municipality, is the principal medical facility in the Changwat. In addition, there are general hospitals in Siracha, Ban Bung, Phanat Nikom and Phan Thong Amphoes.

The five hospitals listed below have a total of 857 beds, distributed as follows:

| <u>Location</u> | <u>No. of Beds</u> |
|-----------------|--------------------|
| Chonburi        | 454                |
| Siracha         | 314                |
| Phanat Nikom    | 60                 |
| Ban Bung        | 10                 |
| Phan Thong      | <u>19</u>          |
|                 | 857                |

Assuming a 1977 population of 690,000 for Chonburi Changwat as a whole, for the five hospitals listed above, the Changwat-wide average is 805 persons per hospital bed. The two larger hospitals, especially the Changwat hospital in Chonburi Amphoe, are used by residents from other than the amphoes in which the hospitals are located. Thus, ratios of persons per bed, based on populations in these two amphoes, are not representative of the adequacy of the number of beds, relative to population.

In addition to the hospitals located in the three amphoes of Chonburi, Siracha and Phanat Nikom, these amphoes had other medical facilities and personnel shown below in 1977:

|                 | <u>Chonburi</u> | <u>Siracha</u> | <u>Phanat<br/>Nikom</u> |
|-----------------|-----------------|----------------|-------------------------|
| Midwife clinics | 2               | 0              | 3                       |
| Health clinics  | 13              | 10             | 18                      |
| Physicians      | 33              | 17             | 4                       |
| Dentists        | 3               | 2              | 2                       |
| Nurses          | 78              | 61             | 6                       |

Ministry of Health guidelines call for a population/bed ratio of 1 to 1,000. For the Changwat as a whole, the number of beds available in the general hospitals exceeds Ministry recommendations. However, most of the beds are located in Amphoes Chonburi and Siracha. Thus, if expansion of Sattahip Port to serve as a deepwater commercial facility, and development of an industrial zone in the vicinity of the port, are realized, it would appear that a 300-400 bed general hospital would be required in Sattahip Amphoe.

## Transportation

Chonburi Changwat is served by two major north-south national highways: Route 3, Sukhumvit Highway, which enters the Changwat at the northern boundary of Amphoe Chonburi, and constitutes the major road link between the Changwat and the Bangkok Metropolitan Region. Route 3 follows the coast in a general southerly direction, passing through the eastern side of Chonburi Municipality, along the eastern edge of Siracha Municipality, about 2 kms. east of Pattaya and south to Wat Sattahip. From this point, Route 3 turns eastward into Rayong Changwat.

At a point approximately 1.5 kms. west of the Rayong-Chonburi border, Route 3 is intersected by National Highway 331. The latter highway runs in a northeasterly direction through Chonburi Changwat, well to the east of the more densely populated areas in the Changwat, to the east of Phanat Nikom Municipality, and exits the Changwat at the northern border with Chachengsao Changwat.

Route 331 serves primarily as a link between the port and other installations at the southern end of Amphoe Sattahip, and the Northeastern Region. While, at present, Route 331 does not carry as much commercial traffic as Route 3 in Chonburi Changwat, it will become a more important inter-regional road transport link to the Northeast Region if Sattahip Port is expanded to serve as a commercial port, and an industrial zone is developed in the Sattahip-Rayong corridor of Route 3.

A number of roads provide connections between Route 3 and the inland portions of the amphoes. Route 315 links

Phanat Nikom Municipality with Chonburi to the southwest, and with Chacheongsao to the north; Route 3133 runs from Chonburi southeastward to Ban Bung, and on to Ban Lam Phang.

At several points, where the coastline protrudes westward from the more or less straight north-south alignment of Route 3, there are short connecting all-weather roads from Route 3 to built-up areas along the coast: Ang Sila and Bang Saen in Amphoe Chonburi; Ban Ko Klang, Ban Lam Chabang and the Thai Oil Refinery in Amphoe Siracha; and Pattaya in Amphoe Bang Lamung.

There is also a direct, primary grade east-west road connecting Routes 3 and 331 located approximately 8 kms. north of Sattahip. A relatively new road intersects Sukhumvit Road in Amphoe Bang Lamung, and runs in a southeastward direction to Rayong.

Although Sukhumvit Highway has a design capacity to carry the present volume of traffic, the effective capacity has been reduced in and near built-up areas, particularly in the vicinity of Chonburi Municipality, where Route 3 serves as a local urban road, as well as the principal north-south arterial highway. This has occurred as growth of the Municipality has spread eastward from the older built-up areas to both sides of Route 3, and beyond. To alleviate the congestion arising from local traffic, a by-pass still further to the east of Chonburi's built-up area is nearing completion. In the absence of effective land-use control, the same congestion is likely to develop along the by-pass, especially where it intersects Route 35, Chonburi to Phanat Nikom.

A schematic of the major road links in Chonburi Changwat is shown in Figure 3. Average daily traffic over a 24-hour period, 1976-1977, is shown graphically in Figure 4. The role of Chonburi as the Changwat's principal commercial and administrative center is clearly evident in the latter figure.

At present, (1979) Chonburi Changwat has no railroad. However, firm plans exist for the construction of a line from Chacheongsao southward. The proposed alignment is somewhat to the east of Route 3, and thus would not pass through the Municipalities of Chonburi and Siracha. If the port at Sattahip is expanded to serve as a commercial port, the rail line extension would probably terminate at the port; alternatively, if a new port at Laem Chabang is built to serve as the regional deepwater port, the rail line would probably terminate at this port.

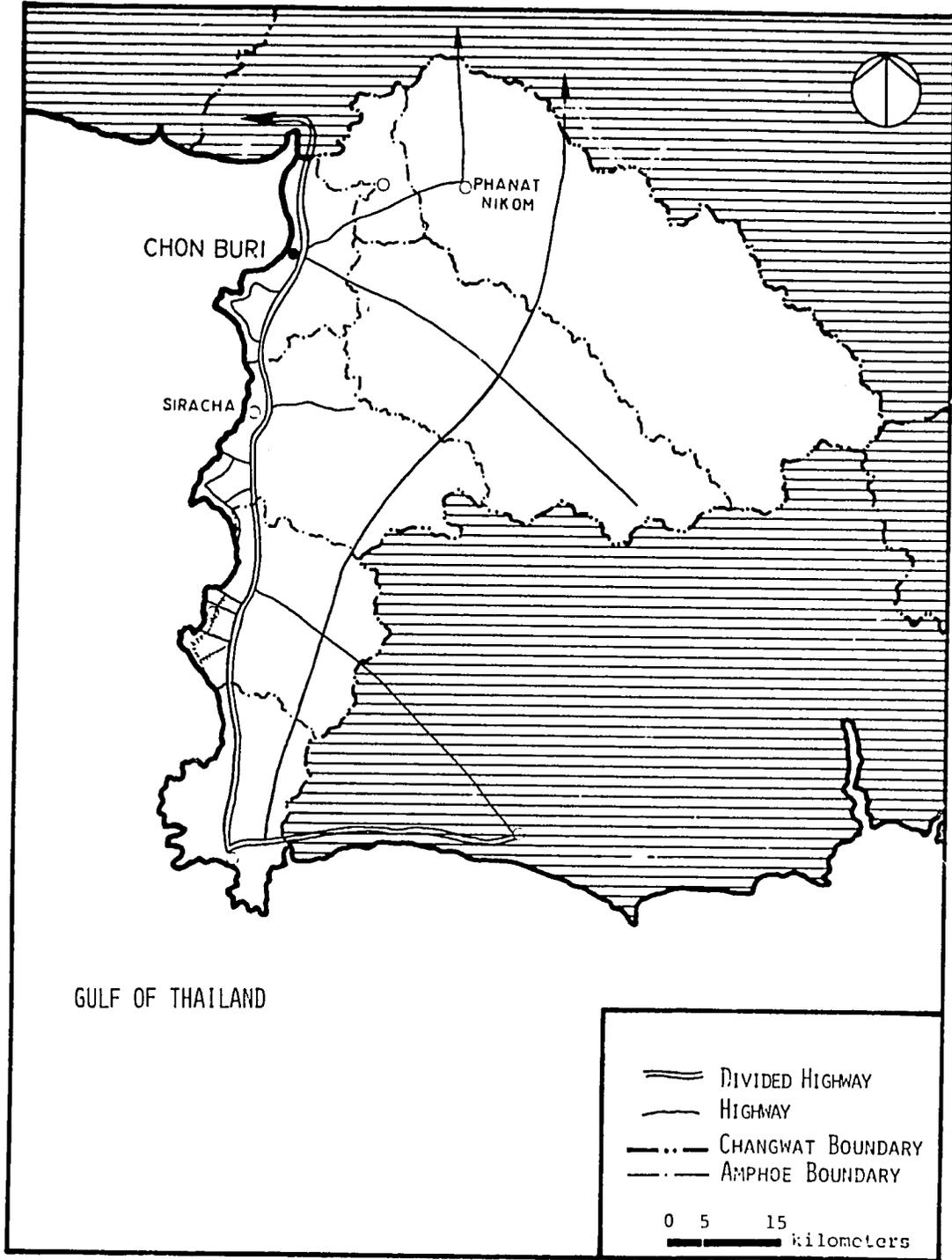


FIGURE 3. PRINCIPAL ROADS

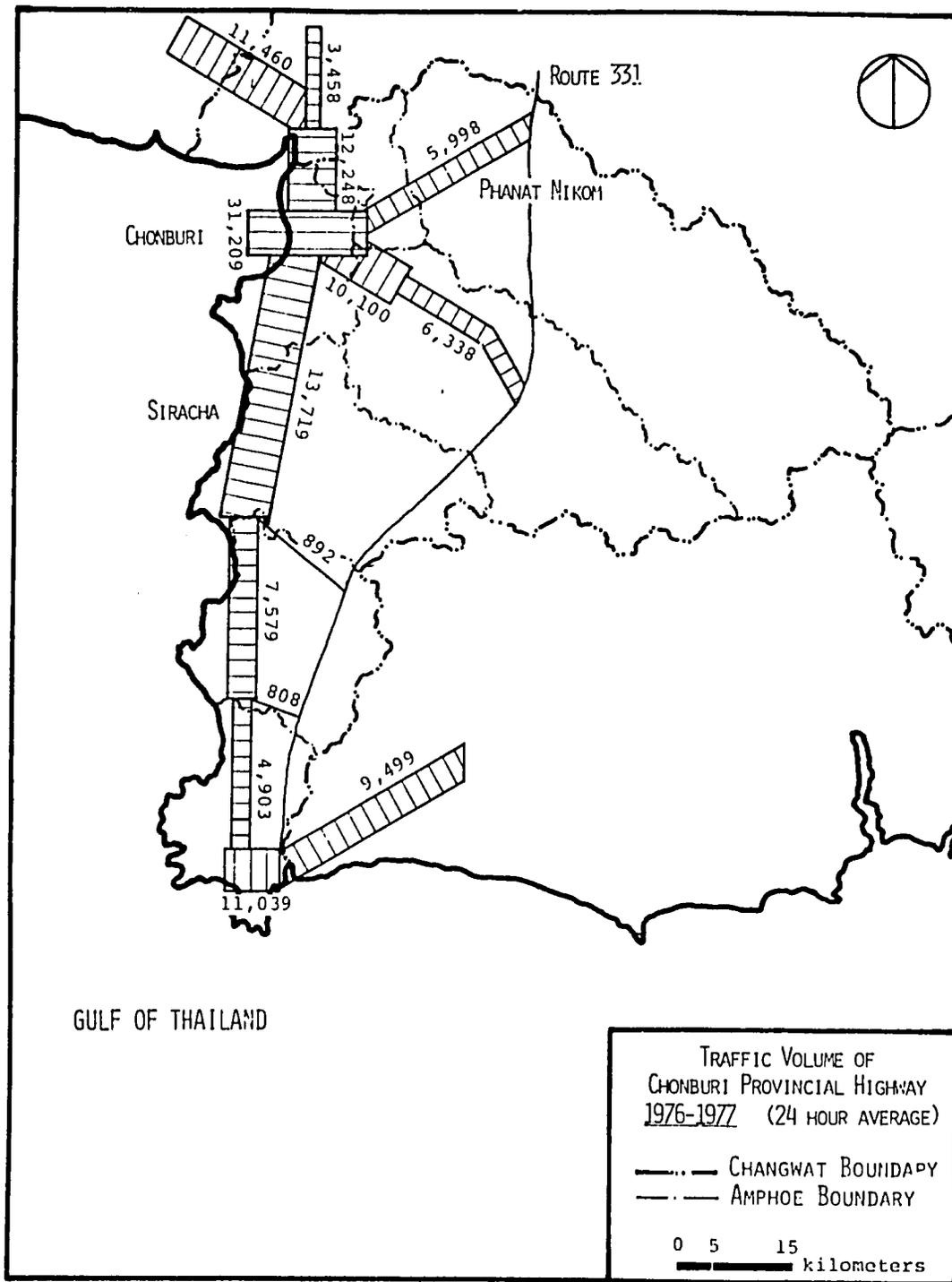


FIGURE 4. TRAFFIC VOLUME OF CHONBURI PROVINCIAL HIGHWAY

#### IV. PROJECT OBJECTIVES

In its efforts to decentralize administration and development from the Bangkok metropolitan region, NESDB undertook, with the assistance of USAID, a Land-Use Programming project for three urban centers in Chonburi Changwat: Chonburi, Siracha and Phanat Nikom, as well as the defined hinterlands of those urban areas (see Figure 5). Being relatively close to Bangkok (80 km. south) it is planned that through effective land-use programming, these three centers and their hinterlands can be developed to relieve some of the population pressures on the capital. The basic approach of the project involves an examination of the physical, legal, administrative, economic and social framework of the Changwat in general, and of the urban centers in some detail.

In addition, the plans of the Royal Thai Government for accelerated development of the Eastern Seaboard Region, of which portions of Rayong and Chonburi Changwats constitute the focus, have been analyzed for their potential impacts on population and economic growth, and requirements for infrastructure and land for urban use.

##### Local Objectives

At the local level, the project was designed to achieve several objectives: (a) the strengthening of planning capabilities in the municipalities of Chonburi, Phanat Nikom and Siracha; (b) provision of assistance to local officials in meeting day-to-day problems; (c) identification and evaluation

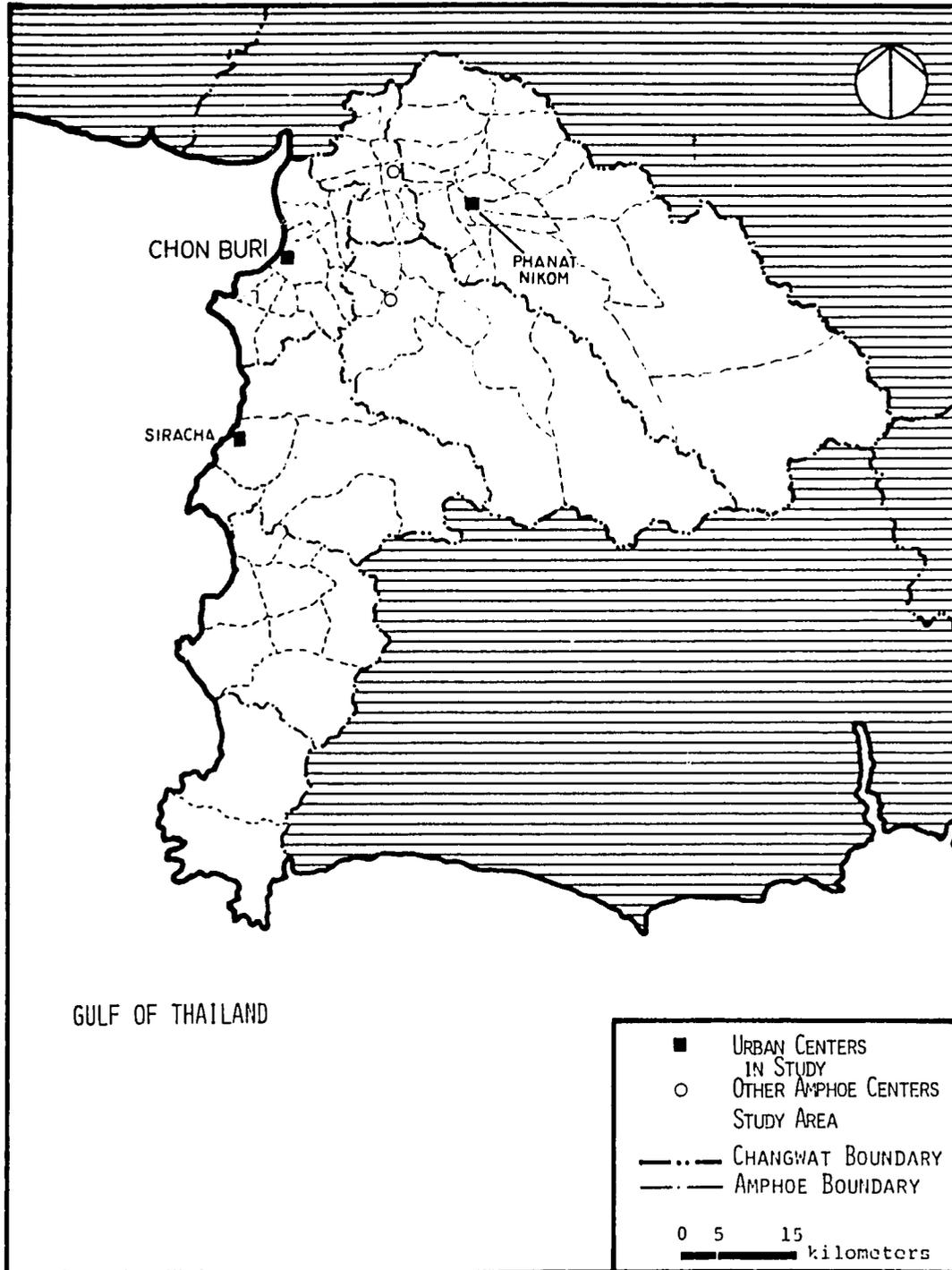


FIGURE 5. LOCATION OF STUDY AREA

of components of a short-term action program; and (d) formulation of a "Guide Plan" for future development, employing land-use programming techniques.

The first of these objectives was to be achieved with the development of capabilities in urban planning institutions serving the three municipalities, with effective linkages to existing institutions at the national and regional levels. The Executive and Operations Working Groups, comprised of representatives from national ministries, provincial and local governments were to function as policymaking and implementing bodies, respectively, with the Field Representative serving as advisor to both groups. Institution-building was also to be accomplished through on-the-job and formal training programs to strengthen and develop professional skills among local level officials and counterparts.

#### National Objectives

Viewed in terms of the broader objectives set forth in the current Five-Year Development Plan, the general goals of the Chonburi Land-Use Programming Project can be stated as:

- a. minimizing future population growth and economic activity centering on Bangkok by diverting rural-to-urban migration, and industrial development, to new growth centers;
- b. diversification of the economic structure of the intermediate-size cities and their hinterlands, as a means of narrowing the income gap between the population in Bangkok and the population in predominantly agricultural areas of the nation;
- c. decentralization in government responsibility for physical and economic development planning and implementation.

Consistent with these general objectives, USAID and NESDB set out the following specific goals for the land-use programming project:

- a. to strengthen the capacity of local officials to plan for and administer orderly growth in the three urban centers, particularly Chonburi, designated as a "Principal Town" in the Eastern Seaboard Region; and
- b. to serve as a catalyst to encourage development through the direction and assistance of national agencies.

With the current Five-Year Economic and Social Development Plan as a guideline, and following the specific tasks set out in the Terms of Reference for the project, a program was designed to support the realization of the objectives through demonstration and application of land-use programming techniques directed toward action, rather than static master planning techniques; strengthening existing institutional capabilities through appropriately designed training programs; and development of an institutionalized process for continuous evaluation of land use, and periodic review of projections of population and economic growth affecting urban land-use requirements.

As background for the evaluation of the land-use programming project, a brief review of existing regional planning activities is presented in the following paragraphs.

Regional Development Planning  
at the National Level (NESDB)

In the five years since its formation, the Regional Planning Division (RPD) of NESDB has functioned effectively

in advancing the concept of regional planning throughout the country. Through its work, the RPD has identified the functions of major urban centers and, using a modified "growth pole" concept, has established a strategy for development of "Principal Towns." This has been incorporated as an integral part of current national development planning, and the strengthening of Principal Towns has been adopted as a central government strategy to improve spatial distribution of population, income and urban growth.

The RPD has compiled regional information to provide a data base and describe, for each region, appropriate development strategies. Through the efforts of the RPD, Changwat Planning Offices have been established to coordinate development of designated urban areas and their rural hinterlands.

#### Evaluation of the "Principal Town" Concept in the Context of Regional Development

To strengthen designated Principal Towns, the RPD has proposed: the use of promotion and incentives to attract investment to designated towns to increase employment opportunities; upgrading of economic and social infrastructure in these towns; and the development of decentralized urban planning mechanisms in order to coordinate socio-economic and physical development.

The Principal Town concept envisions concentration of public resources in relatively few places within large economic regions in order to create the prerequisites for general industrial development within the regions. The

effectiveness of this approach in attaining the goals of a more balanced spatial distribution of population and economic development in Thailand will depend, very importantly, on the successful implantation of industries characterized by strong backward and/or forward linkages to other components of the Thai economy, especially to those within the region. In the absence of such linkages, and the resulting multiplier effects on regional employment and income, Principal Towns may become isolated pockets of development in regions that remain largely untouched by activities in the designated urban development centers. Ideally, industries to be promoted in the Principal Towns would utilize inputs from the region; would be labor rather than capital intensive, at least in the initial stages; and would provide outputs of intermediate and/or consumers' goods more economically than alternative sources of supply, including foreign sources.

Given the resource base in Chonburi Changwat, these "ideal" criteria will not be easy to meet. Most of the agricultural products of the region are not processed beyond the levels required for transport out of the region, e.g., cassava chips, crude sugar and milled rice; timber resources are seriously depleted; future supplies of marine products, which do lend themselves to processing, are uncertain and may be adversely affected by water pollution from proposed industrial projects and population growth; and, at present, available water resources are a serious constraint on most types of industrial development and on growth in urban populations. However, ready access to the substantial reserves of natural gas constitutes a valuable resource for industrial development in the region.

A second set of problems in the form of institutional limitations will require to be overcome if the regional development strategy based on the Principal Town concept is to be effective. One component of this set arises from the practical difficulty of expanding the boundaries of designated Principal Towns. As a result, urban growth spills over into contiguous areas in which land use controls, establishment of standards for social services and the tax base are beyond the reach of the municipal authorities. Yet, as the Principal Town will continue to serve as the central business district for an expanding built-up urban area, municipal costs will tend to rise more rapidly than revenues from sources available to municipalities.

A related constraint on the ability of all local units of government to meet the additional current and capital (infrastructure) costs of increased urban population and accelerated economic growth is the limited -- and inflexible -- local taxing powers. While local political considerations inhibit collection at the full ceiling rates permitted by national regulations, even collection at the maximum rates allowed probably would not provide revenues sufficient to cover the financial requirements for additional infrastructure and costs of services that will be necessary if the Principal Towns are to play the role envisioned in regional development.

Finally, it is noted that the limited availability of development planning and implementation capabilities at the Changwat and at lower levels of local governments will pose an obstacle to the decentralization of those functions. The establishment of the Changwat Planning Office provides an organizational base for the coordination and strengthening of planning capabilities at a sub-national level. However,

at this stage, its effectiveness is limited by inadequacies in staffing that will be required if the Office is to function in more than a passive screening role for transmitting local requests for funding to national ministries.

Without adequate personnel and sources of revenue under its control, the Changwat administration necessarily relies on technical staff and financial support from national ministries for preparation and implementation of projects. Under these conditions a number of problems exist that affect adversely the RTG's efforts to decentralize planning, project selection and preparation in the context of overall regional development, and in implementation of projects in a properly phased sequence. Some of these are noted below:

- . Projects submitted by local governments for Changwat approval frequently lack technical, economic, financial and environmental impact analyses on the basis of which their merit can be assessed at the Changwat level where, in turn, limited staff capabilities preclude remedial studies.
- . In the absence of clear-cut guidelines based on overall regional plans, and the role of Principal Towns vis-a-vis their respective hinterlands, many projects reflect priorities set by local officials without regard to how such projects will contribute to, or conflict with, the realization of regional plan objectives.
- . Because of uncertainties as to the amounts and specific projects for which national funding will

be made available each year, budgeting for major capital projects is rendered tenuous. Implementation of such projects is often interrupted, raising costs and postponing benefits; not surprisingly, the Changwat administration tends to favor small projects that can be financed in their entirety from an annual allocation of funds. In effect, capital budgeting is on a year-by-year basis.

Department of Town and  
Country Planning (DTCP):  
Ministry of Interior

The DTCP is the designated agency of government responsible for urban planning in Thailand. It has responsibility for preparation of land-use plans ("general plans") for the 118 municipalities within the country. The number of municipalities for which plans are to be prepared by the DTCP is excessive, even though the Department has a relatively large staff. The Town Planning Act (1975) requires that plans be revised every five years. It remains to be seen whether the requirements of the law can be met in the future without changes in the institutional framework of responsibility for urban development planning, e.g., a delegation of authority to lower administrative levels.

As a result of the heavy workload of DTCP, and minimal contact with local problems affecting planning and implementation, the plans prepared by DTCP suffer from a number of shortcomings. Perhaps the most serious has been failure to comply with plans for urban development on the part of local government officials. Until 1975 there was no way to

force the municipalities by law to implement the plans. In this respect, the new Town Planning Act of 1975 has brought decisive changes. This Act provides that legal action may be taken against municipalities, and even their individual representatives, unless they proceed according to the specifications of the land-use plans. The DTCP seems to be prepared to enforce the implementation of their plans by legal action.

A general review of land-use plans prepared by the DTCP has revealed the following:

- a. In general, there is a lack of integration between objectives for urban planning and national and regional development goals.
- b. There is no growth strategy for the municipalities reflecting government policies to stimulate growth of lagging regions and Principal Towns; rather, the plans are based generally on projections of population growth at historical rates.
- c. The lack of adequate consideration of socio-economic development goals in urban planning is especially significant. For example, the plans are lacking provision for new industrial areas based on analyses of locational factors such as markets, inputs, transport and availability of labor that affect location decisions, and related infrastructure, required to implement the declared strategy for growth of secondary centers. Also, rural-urban linkages are not sufficiently incorporated in the plans.
- d. Beyond rather narrowly defined planning areas, no land-use control measures are provided in those areas in which major developments are taking place, thus allowing individual landowners to use land in ways that may compromise future efforts to achieve rational urban development patterns. Although the recently proposed Master Plan for Chonburi Municipality incorporates some contiguous areas outside the boundaries of the municipality, the plan does not cover all nearby areas in which development is taking place.

- e. The needs of the low-income majority of the population are not sufficiently taken into account in the formulation of plans. As an example, the plan for Chonburi does not address the problem of "slums" that are beginning to grow.
- f. Financial resources are not available to carry out infrastructure projects implied or recommended in the plans, particularly for sewerage and road construction. This gap has created resistance to the plans by the municipalities as many measures simply are not financially feasible under existing strictures on local revenues.
- g. The land-use categories to be used as a basis for legally binding zoning ordinances do not sufficiently correspond to the rather heterogenous mixture of land utilization which may be expected to remain typical for Thai municipalities.

To supplement the activities of the DTCP, which have been concerned primarily with physical planning, the RPD has been designated to initiate important planning tasks concerned with socio-economic development. Following the selection of a strategy, and identification of Principal Towns to serve as focal points for regional growth, the RPD has carried out activities designed to stimulate economic growth in selected urban centers outside of Bangkok. These activities are being undertaken in the context of regional development plans; therefore, economic linkages and infrastructure needs, as well as promotion of new and expanding employment opportunities, are integral components of the planning activities of the RPD.

The proposed urban pre-investment study for Korat, as well as the recent Chiangmai pre-investment study, the Chonburi land-use programming project, and the forthcoming regional planning study for the Eastern Seaboard are designed, in part, to strengthen secondary cities.

The concept of "Land-Use Programming," and the guide plans that emerge from this process, are especially suitable for application as a framework for preparation of more detailed plans of the type for which DTCP has responsibility. Inter alia, land-use program planning facilitates consideration of socio-economic factors, and provides a mechanism through which local views can be reflected in more detailed master planning. Further steps to improve coordination of the activities of the RPD with those of DTCP would provide valuable support for the government's objective to bring about an improved spatial pattern of economic growth and urban population.

Given the heavy responsibilities of the DTCP under the Town Planning Act of 1975, consideration should be given to a gradual delegation of planning functions to Changwat and/or municipal authorities. The Town Planning Act provides for this option, which is also a declared policy of the Fourth National Plan. It is noted, however, that such action will require the strengthening of planning capabilities at lower levels.

#### Urban Development Planning at the Municipal Level

Existing conditions affecting development planning at the municipal level were reviewed in formulating the RRNA work program for the Chonburi project:

- a. There exists a serious shortage of land to accommodate increased population, and commercial and industrial activity within the existing boundaries of Chonburi Municipality; and there are practical obstacles to expansion of municipal boundaries.

- b. Serious limitations are imposed on the municipalities by the central government in raising revenues needed to provide adequate public services and facilities; this is exacerbated by the inability of the municipalities to make full use of even the limited authorized revenue structure. Although extending municipal boundaries would add to the tax base, it would also add to service and public facility requirements, the costs of which may, or may not, be covered by revenues from the expanded tax base, given the limited taxing powers of municipalities.
  
- c. Local planning capabilities have not been developed because of the historical pattern of centralization of responsibility for urban planning in Thailand. Chonburi, in particular, for example, has not developed the local capabilities for planning and implementing programs and projects conducive to orderly urban growth, especially on the scale required to attain the objectives visualized in the "Principal Town" concept.

## V. PERSONNEL AND WORK PROGRAM

Prior to the beginning of field activities in January 1977, RRNA staff (the original Field Representative) conducted a two-week reconnaissance of the project areas. This provided information for preparation of a project work program, in consultation with representatives of the National Economic and Social Development Board (NESDB), and USAID. However, it was not until September 1977 that a final, revised project work program was accepted by NESDB. This work program provided a description of the approach to be employed by RRNA in meeting the stated objectives of the project and a description of staffing, logistical and training requirements.

Direction and coordination for the land-use programming project were provided by two "Working Groups," an Executive Working Group, and an Operations Working Group. At the Executive level the group was chaired by the Governor of Chonburi Changwat or his designee, and included the Mayors of the three municipalities, the Chief of the Changwat planning staff, and representatives of NESDB, the DTCP, the Budget Bureau and the Municipal Public Works Department. The Executive Group was to function as the key decision-making and policy guidance body, as well as providing overall support to the project.

Members of the Operations Working Group were, in general, more directly involved with the day-to-day activities of the project staff. The Operations Working Group consisted of the Mayor of Chonburi, Chairman, a NESDB representative, Changwat planning staff, municipal architects and engineers,

the Deputy Mayors of each municipality, a local representative of the DTCP and three appointed members of the Executive Policy Group. Provincial and municipal officials in this group will have major responsibility for future regional and urban development planning.

NESDB provided the following logistic support: office space and equipment, transportation, administrative support staff and technical assistants (economists). The RRNA work program stated that NESDB was to provide approximately 12 manmonths of senior professional staff time to assist the Field Representative and to coordinate project activities with those of other government agencies as necessary and appropriate.

The contractor, Robert R. Nathan Associates, Inc., selected jointly by USAID and NESDB, provided the services of an urban-regional planner (Field Representative) for 21 manmonths and a fiscal expert, on a short-term basis, for a total of 4 manmonths and backup support of a senior representative of RRNA for 4 manmonths in the contract, as amended. The Field Representative who carried out most of the work succeeded the original Field Representative, six months into the original contract.

Project Team Staff  
Provided by RRNA

The project team consisted of: the RRNA Field Representative, the RRNA short-term Fiscal Expert, administrative support staff (secretary/interpreter, typist and project driver) and two junior economists. The project office was

located in the Municipal Library and was technically a field unit of the NESDB (Regional Planning Division).

- a. Dr. Robert H. Johnson, Senior Vice President, RRNA, who as home office project manager, provided support in the field, as well as direction from Washington. His time involvement on substantive aspects of the project was approximately 4 man-months.
- b. Mr. Morris Simon, the RRNA Field Representative, an architect/urban planner, was responsible for overall project direction for both administrative and technical work. His time input was 21 man-months.
- c. Mr. Jacob M. Jaffe served as a RRNA consultant in local finance and administration; his input consisted of two short-term assignments in Thailand, totalling slightly over 4 manmonths.

Staff Provided by  
the Host Country

As stated in the Terms of Reference, the project office was to be located in Chonburi Municipality and the Regional Planning Division of NESDB would provide 44 personmonths input of technical personnel to work with the Field Representative, as well as providing the necessary administrative support staff of 66 personmonths input.

In addition to the direct full-time input, RPD junior staff members were to participate on an unspecified part-time basis. The purpose of this RPD staff input was to

assist the project team and to coordinate project activities with those of other government agencies when necessary. Time inputs were not specified for either municipal staff or Changwat Planning Office staff.

In addition to the two junior economists temporarily assigned as counterparts by NESDB, two graduate students from Silaparkorn were available for part-time work on the project.\* One of the students participated three days per week over a four-month period; the other participated, on a three-day per week basis, for thirteen months during which time he provided valuable assistance, as well as gaining a good grasp of planning methodologies and development issues in the study area.

#### Work Program

The RRNA (September 1977) work program outlined a collaborative effort on the part of local, provincial and national agencies. Early attention was to be directed to the identification of a portfolio of viable projects which would be supported by the government at local and national levels. These projects, in turn, would provide the basis for a realistic and implementable action program of a scale and time frame needed to keep pace with anticipated population growth and economic development. The work program was designed, also, to consolidate the techniques for controlling the use of land to achieve a desired pattern of urban growth. The experience gained in this exercise was viewed as an important part of on-the-job training for counterparts and

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\*It is understood these students received academic credit for their participation.

local personnel. The methodology, sources and results would be fully documented for use as a guide in the replication of the land-use programming approach in other areas within Thailand.

The concept of land use programming implies the availability of information on land for urban uses, existing patterns of utilization and prospective future requirements consistent with the time horizon of the "guide plan." The establishment of realistic goals and the formulation of the guide plan, in particular, were based on the following types of information:

- a. existing availability of land suitable for urban use and patterns of land use, to be compiled in the form of a cadastral survey.
- b. demographic, social and economic structures of the three urban centers.
- c. regional economic, demographic and spatial linkages as they influence the role of the three urban centers.
- d. prospective infrastructure projects and their relationship to planned regional development programs.
- e. municipal revenues and expenditures in recent years and identification of the levels of resources that could be expected to be available in the future.

Utilizing the data base described above, the work program established the following steps:

- a. the establishment of goals that would serve to direct future development of the urban centers.

- b. the preparation of guide plans which would constitute the general framework for project identification and phasing of implementation.
- c. within this framework, the identification of specific projects for preinvestment studies.
- d. identification of specific measures to control land use as well as consideration of the effectiveness with which alternative types of control can be administered.
- e. the preparation of guidelines for implementation of feasible projects.

#### Project Identification and Evaluation

An important end product of the land-use programming process is viewed as a portfolio of viable and implementable projects supported by all levels of government. Complete project evaluation includes project packaging, which requires identification of the agency, public or private, to be responsible for implementing the project, sources and method of financing not only the investment but operation costs and amortization of the investment and, finally, establishment of responsibility and methods for monitoring and feedback for modification of goals and guide plans. It is this form of activity, an action oriented, iterative process, that distinguishes the land-use programming approach from the preparation of conventional "Master Plans" for urban centers.

#### Institutional Development and Staff Training

The Terms of Reference set as one of the priority "outputs" of the project, establishment of urban development institutions to serve the three municipalities within

the framework of the existing institutional setting at the regional (Changwat) and national levels.

As an integral component of the overall planning process, the work program included explicit provisions for strengthening planning capabilities of local staff and institutions responsible for development planning.

To assist in meeting this objective, two working groups were established: the Executive Working Group, to play a crucial role in policy and project decisions and in the overall guidance and support of the project, and the Operations Working Group to be more directly involved in the day-to-day activities of the project office.

The RRNA work program explicitly recognized that the usefulness of the land-use programming approach as a catalyst in urban development depends, to a large extent, on its success in the development of local capabilities to carry out, on a continuing basis, the planning and implementation of urban projects. The development of these capabilities was undertaken as an integral part of the contractor's responsibilities in the form of formal training sessions, on-the-job training, study tours and advisory relationships with members of the two working groups. In the formal training, as well as in the on-the-job training, emphasis was placed on:

- a. Field surveys and data analysis,
- b. Project identification and analysis,
- c. Project packaging,
- d. The land-use programming concept, and
- e. Formulation of a "Guide Plan" to accommodate urban growth in the study area.

### Municipal Finance Evaluation

A thorough study of municipal revenue and expenditure patterns was incorporated in the work program. The purpose of this component was to assess the ability of the three municipalities to finance both current service and capital development costs.

The financial assessment was conducted by means of interviews with central government, provincial and municipal officials, as well as by the compilation and analysis of municipal revenue and expenditure data. Relevant laws and regulations dealing with municipal finance and also previous studies of local finance in Thailand, were analyzed, and recommendations for changes in local fiscal structures were submitted. A detailed analysis of this component of the work program is presented in Annex A of the Final Report.

### Schedule of Activities

The RRNA work program included a schedule of anticipated start up and completion dates for the various components of the project. In the original schedule, it was envisaged that at least one complete cycle of the program would be achieved by the fifteenth month of the project, and that a second cycle, with a lower input by the Field Representative, and increased involvement of local officials and counterparts, would then be initiated. However, for a variety of reasons, the actual work program deviated in several respects from the original. Activities carried out during the project, by quarters, are described briefly below:

First Quarter: During the first through the third months following his arrival in Bangkok, the Field Representative carried out the following tasks in Bangkok and in Chonburi: reconnaissance visits to the three project sites; preparation of outline for training program, and initiation of contacts with trainers; planning for short-term action project studies; reconnaissance visits to central agency offices in Bangkok; organization of project team; move to project site; and collection of data (regional secondary sources).

Second Quarter: Continuation of data collection (regional); selection of consultants for short-term action project feasibility studies; and continuation of arrangements for formal training program.

Third Quarter: Analysis and evaluation of base data (regional and urban); initiation of formal training programs; supervision of short-term project feasibility studies; beginning of modified cadastral survey; preparation of preliminary population forecasts; and preliminary identification of specific goals.

Fourth Quarter: Continuation of cadastral survey; evaluation of short-term action feasibility studies; continuation of formal training program; revision of population forecasts; and analysis of potential growth in the defined hinterland.

Fifth Quarter: Completion of modified cadastral survey; completion of short-term action feasibility studies; completion of formal training program; completion of preliminary hinterland studies; preparation of guide plan; and initiated fiscal analysis.

Sixth Quarter: Continuation of guide planning as framework for urban development; identification of projects; and preliminary project analysis and packaging.

Seventh Quarter: Completion of guide planning; continuation of project analysis and packaging; completion of fiscal analysis; and preparation of draft final reports.

#### Short-Term Action Program

The contract between USAID and RRNA provided funds\* to finance prefeasibility studies of projects to be undertaken as part of a "short-term action program." In a reconnaissance carried out in January and February 1977, the original Field Representative met with officials of the three municipalities from which a list of potential projects was compiled. The proposed projects are described, briefly, below:

#### Chonburi

Chonburi officials identified three projects:

1. Relocation of the wholesale fish market from the central business district, near the intersection of Thai Pracha and Wachirapakan, to reclaimed land at the seaward end of Soi Sang Khep. This project was already at an advanced stage at the

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\*In the original contract, the amount provided was \$20,000; by amendment, this was increased to \$47,000 with the latter amount to cover, also, the costs of a study tour for Thai officials.

outset of the land use program and, therefore, was not selected for a prefeasibility study. However, a new road linkage to connect Sukhumvit to Soi Sang Khep was considered as a part of the feasibility study for the reclamation of foreshore areas in Chonburi. Without this road, the relocation of the fishing market will not contribute significantly to the reduction of traffic congestion on some roads in the built-up center of Chonburi Municipality.

The location of the old and new fish markets, the route taken by trucks carrying fish to and from the old fish market and the proposed new access road connecting Sukhumvit and Soi Sang Khep are shown in Figure 6.

2. A reclamation project that would, in some versions of the design, provide an alternative route to the new fish market on a filled area behind a sea wall. This project was one of those selected for a prefeasibility study by a firm of Thai consultants, Applied Scientific Research Corporation of Thailand (ASRC).
3. A third project discussed at the outset of the project was the construction of a park to be located on existing vacant and reclaimed land. This project was not subjected to a prefeasibility study.



Siracha

Municipal officials in Siracha Municipality suggested three projects which they had selected on the basis of the expected contribution which these projects would make to municipal development and to increased local tax revenues:

1. A new commercial center to be constructed on reclaimed land lying between the present shoreline and a small offshore island on which is located a local tourist attraction. This project was put forward as a basis for strengthening Siracha's role as a commercial service center. The area to be filled is shallow and it was proposed to use a part of the area adjacent to the island as a marine museum. A prefeasibility study of the proposed reclamation was included in the initial request for proposals from local firms. However, it was subsequently eliminated because of budgetary constraints.
2. The marine life museum was technically separable from the development of a commercial center on the reclaimed land. However, it was not considered for inclusion as a separate project for a prefeasibility study.
3. The third project was for the construction of a sports complex in the northeast corner of the intersection of Surasak and Janjompon roads to be used as a play field with an indoor stadium and swimming pool. This project was not selected for a prefeasibility study.

Phanat Nikom

Local officials in Phanat Nikom identified five projects for consideration in the short-term action program:

1. The number one priority was flood control. Phanat Nikom's urban area is subject to flooding from the two klongs that flow through the municipality. The flooding results from a number of factors, including obstructions in the channels of the klongs and construction of roads outside the municipal area which have served to divert flood waters into the klongs passing through the town. This project was included in a dual purpose study for a prefeasibility study subcontracted to a Thai consulting consortium: Development Consultants Co., Ltd.; Interdesign Co., Ltd.; and Pollution Control Engineering Co., Ltd.
2. Pollution abatement. Both of the klongs passing through the urban area are polluted during several months of the year when low levels of rainfall reduce the flow. The pollution constitutes a health hazard within the urban area and also renders water in the klongs unsuitable for irrigation downstream from Phanat Nikom. Measures to alleviate pollution were included in the prefeasibility study for reduction of flooding hazards.
3. Phanat Nikom does not at present have an adequate supply of potable water. Local officials asked that attention be directed to means to increase the availability of water to meet urban needs.

4. Local officials also expressed interest in an expansion of municipal boundaries to contain the anticipated increase in urban population and to improve its tax base. This suggestion was not incorporated in studies during the land use programming, partly because considerable land already exists within the municipal boundaries that could be diverted from agricultural to urban uses with the provision of proper access.
5. A fifth suggestion was that a ring road be constructed to facilitate traffic flow and to open additional land for development. Most of the alignment of the proposed road would have been outside existing municipal boundaries. It was not included in the projects for which prefeasibility studies were conducted.

Prefeasibility Study:  
Land Reclamation  
Project, Chonburi

The prefeasibility study for the land reclamation project in Chonburi Municipality was conducted by the Applied Scientific Research Corporation (ASRC) of Thailand under a subcontract with RRNA.

As shown in Figure 7, the area to be reclaimed contains 782.1 rai. Of this total, somewhat more than 46 percent would be used for housing, almost 14 percent for business and commercial structures, 16.7 percent for government offices, and the remainder, 23 percent, would be used as a site for a public park and areas for roads and other public

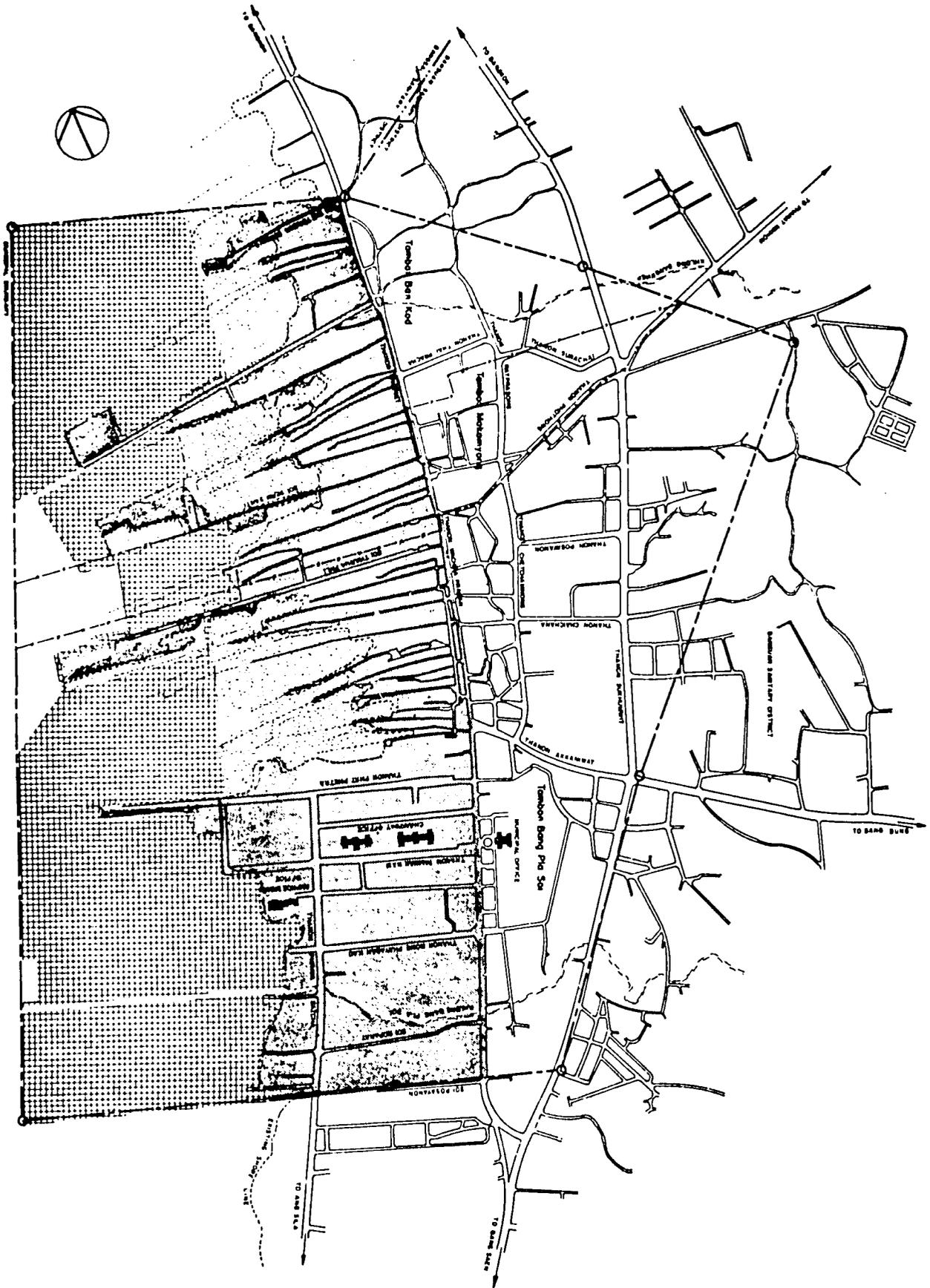


FIGURE 7

PROPOSED LAND RECLAMATION PROJECT

LEGEND

-  Area to be Filled
-  Remaining Swamp
-  Existing Land

0 100 200 300 400  
 Scale in meters

THE LAND RECLAMATION IN  
 CHONBURI MUNICIPALITY

uses. Thus, a total of approximately 602 rai of land would be available for housing, commercial and government purposes.

It was estimated that this project would require a capital investment of approximately 506 million Baht. The sale of the 602 rai of land was estimated to produce revenues of 481.6 million baht, at an estimated average price of 800,000 Baht per rai. In addition to the revenue from sales, it was estimated that the reclaimed area when fully developed would yield tax revenues to the Municipality of slightly more than 8 million Baht per year, based on 1978 prices and tax rates.

Even with the most optimistic assumptions with respect to the rate at which land could be sold, ASRC found that the internal rate of return was only 6.2 percent over a period of 25 years. The internal rate of return is very sensitive to the estimated cost, including transportation, for the material to be used as fill. An estimated cost of 40 Baht/m<sup>3</sup> was used in the analysis, but a lower price of 20 Baht/m<sup>3</sup>, for example, would increase the internal rate of return to over 14 percent.

As will be noted in Figure 7, the proposed reclamation would leave an unfilled area between the reclaimed area and the existing land area containing residential housing. From the standpoint of health and the esthetic properties of the reclaimed land, the remaining swampy land was an undesirable feature of the proposed plan for reclaiming a part of the area.

The financial analysis probably understates the economic value of the project, partly because it attributes no value

to the 15 percent of the reclaimed area that would be utilized for a public park since this would not result in any cash return to cover cost of development; in addition, other benefits such as employment creation and increased value of existing land area abutting on the reclaimed area are not taken into account.

ASRC concluded that under present circumstances the project was probably not financially feasible. However, it was pointed out in their report that the project should not be permanently abandoned. To the extent that future prices of urban land in Chonburi rise more rapidly than the costs of carrying out the reclamation, the project would become increasingly attractive from a financial point of view. Even in the absence of sharp increases in the price of urban land, the project may be rendered feasible by an alternative design that would be based upon using a different method of filling the area behind the seawall as well as different phasing which would facilitate a more rapid rate of cost recovery from the sale of lands that would command a higher price, particularly toward the south end of the reclaimed area on which middle and upper income housing could be expected to be located.

Prefeasibility Studies:  
Flood and Pollution Control,  
Phanat Nikom

The feasibility study for Phanat Nikom considered two separate, although related, projects: measures to reduce damage from flooding of the klongs passing through the town and the development of measures to reduce pollution in the klongs during the dry season when water flow drops to very low rates.

The feasibility study for reduction of flood damage considered several alternative project designs for structures that would provide protection at the 20-year and 10-year levels of flood recurrence. One of the alternatives in design included the construction of a short road that would serve not so much as a transport link but as a diversion barrier to hold flood waters outside the town until drainage could proceed at a less rapid rate. For protection at a 20-year level, without this road, an internal rate of return of almost 14 percent was calculated. With the road option, the internal rate of return is slightly lower. At a discount rate of 10 percent per annum, the net present value of the 10-year and 20-year level, both without the road, are positive, being somewhat higher for the 20-year level than for the 10-year level. With the road, net present values are somewhat lower.

While the study for flood control yielded measures indicating economic feasibility, implementation of the project would encounter several administrative problems in view of the fact that certain modifications in roads would be required and perhaps irrigation schemes would be affected in the absence of modifications in the irrigation and drainage facilities.

The second project in Phanat Nikom involved the design of facilities to reduce pollution in the two klongs during the dry season. The study, also carried out by a consortium of Thai firms including Development Consultants Co., Ltd., Inter-Design Company, Ltd., and Pollution Control Engineering Company, Ltd., was completed in March 1979. The abatement controls proposed involved the emplacement of ultimately 10

small pumping installations in the klongs with the pumping stations located at principal points at which polluted waters entered the klongs. Utilizing a submerged pump that operated when the water level in the klongs fell below a certain level, i.e., during the dry season, the polluted water would be pumped to a main collection station located on the northwest corner of the municipality. From this pumping station, the polluted water would be pumped to an oxidation pond located north of the municipality. The design of the project permitted considerable flexibility in phasing. The oxidation pond was designed to be constructed in two stages, and the submerged pumps could be installed in phases, beginning with the locations having the greatest inflow of pollutants.

Although no attempt was made to quantify the benefits from this project, a number of alternative designs were considered in order to arrive at a "minimum cost solution." In addition, the design chosen has the advantage of being implementable in relatively small segments after the first initial investment. Thus, it is well suited to the usual method of financing capital improvements in municipalities in Thailand. The tentative investment plan calls for a maximum investment of 1.5 million Baht in year 4, declining to approximately 600,000 Bhat in subsequent years.

It is understood that financing has been arranged to begin implementation of this project.

The design of measures to control flooding in Phanat Nikom Municipality, as well as the pollution abatement measures, exhibited a sophisticated capability in project design. While some minor methodological corrections were

requested and made, it was felt that the expertise reflected in the Phanat Nikom study was of a high order.

## VI. EVALUATION

In preceding sections of this report, demographic, economic and physical characteristics of the study area have been described; infrastructure and public services have been analyzed in terms of their adequacy, particularly as they may affect economic and population growth. The institutional framework within which subnational planning and local governments operate has been noted; and the organization, staffing and work program for the land use programming project in Chonburi, Siracha and Phanat Nikom set forth.

While most of the material in the preceding sections has been drawn from the more than 20 "Working Papers" presented to NESDB and USAID/UD/TA during the period field work was in progress, it was considered useful to present summaries of selected portions of these reports as background for the evaluation to follow.

The evaluation will provide an assessment of the degree to which the project succeeded in achieving the objectives specified in the "Statement of Work" incorporated in the contract between USAID/W and Robert R. Nathan Associates. However, first, comments are addressed to several factors that affected, in varying degrees, the achievement of the objectives.

### Project Area

The "Statement of Work" specifies the municipalities of Chonburi, Siracha and Phanat Nikom as the urban centers in which the project was to be implemented. Since 1970, not

one of these municipalities has experienced the explosive growth in population, or restructuring and rapid increase in employment, cited by Rivkin as conditions suitable for application of land use programming to assist in orderly development of urban centers. In fact, population in all three centers grew at rates below the rate in the Changwat as a whole from 1960 to 1970, and at much lower rates than in both the Changwat and the nation, 1970 to 1976 (See Table 1).

The designation of the three municipalities might have been accepted as simply a broad area designation -- and that what was intended was urban growth centers of which the named municipalities were the nuclei -- except for the fact that from the outset, Thai officials, as well as the Terms of Reference, gave high priority to measures to increase municipal revenues. The priority was appropriate. Without substantial increases in municipal revenues, land use programming can be of only limited practical applicability in the municipalities. The high priority assigned to a solution to the municipal fiscal problem was also reflected in the staffing for the project: the only expatriate specialist, in addition to the Field Representative, was a local finance expert.

That the three municipalities were regarded as the foci for the land use programming project was reflected, also, in the composition of the two "Working Groups". Except for officials from the Changwat (the Governor, the Chief of the Changwat Planning Office, and -- on the Operations Working Group -- a member of the staff of the Changwat Planning Office), all other members were from the municipalities and from NESDB, DTCP, the Budget Bureau and the Public Works

Department. There were no representatives from the tambons or sanitary districts surrounding the municipalities, where significant population growth is occurring, and where land suitable for urban uses could be made available for "programming".

Finally, it is noted that all of the "short-term action projects" were for projects within the municipal boundaries, which were given local support as a means of increasing municipal revenues.

Given all these factors pointing to a focus on the municipalities, it is not surprising that some efforts in the early months of the project were not directed in an optimum manner. As reference to Table 1 will indicate, the amphoes in which the three municipalities are located have experienced high rates of growth since 1970 -- more than three times the rate in their respective municipal centers, and also well above the rates in the Changwat and the nation.

With the exception of Phanat Nikom, the municipalities in the study area contain only small areas of unused, developable land. This, coupled with the reported difficulties of extending existing boundaries of municipalities, leaves minimum opportunity for land use programming of developable lands to accommodate urban growth. However, it does not preclude, within the framework of Guide Plans, short and long-term phased projects for urban redevelopment to absorb population growth by increased density of population within existing boundaries. and to enable municipalities to better serve their existing populations and their hinterlands.

There is some evidence -- visual and statistical -- that more intensive land utilization is occurring in the

Municipalities of Siracha and Chonburi: one and two-story wood shophouses are gradually being replaced by multi-storied structures, and the wholesale fish market in Chonburi is being relocated, freeing land in the center of the municipality for other uses. However, it is noted that the accommodation of larger populations and increased commercial activity within the existing municipal land area of Chonburi will exacerbate some of the current problems, e.g., traffic congestion, inadequate drainage, waste disposal and environmental degradation. These problems can be alleviated by widening and straightening the internal urban road network, engineering works minimizing flooding and, in due course, treatment of sewage. All of these, and other needed improvements/extensions of infrastructure are expensive, particularly where private property must be purchased to permit construction. Thus, the fiscal constraints under which local governments operate in Thailand become critical if population and commercial growth are to be accommodated through increased density within existing municipal boundaries (see Annex A).

#### Project Timing

As part of NESDB's regional development planning activities, the Eastern Seaboard, in which Chonburi is the principal urban center, has been assigned a high priority in the RTG's program to promote population and economic growth outside the Bangkok metropolitan area. Inter alia, the following regional projects are in various stages of consideration: The expansion of Sattahip Port for commercial use and/or the construction of a new commercial port at Laem Chabang, approximately eight miles southwest of Siracha; the extension of a rail line south from Chachoengsao to the port(s); the

establishment of one or more industrial estates near the port(s); and the development of a number of industries, including petrochemical and soda ash plants. A number of port studies have been made, and other projects, including extension of the rail line, have also been the subject of special studies. An overall multisectoral regional planning study has been scheduled for early in 1980.

A sketch plan has been prepared for a new urban center in the general vicinity of the proposed Laem Chabang Port to accommodate a projected population of 300,000. If this urban center is established on the scale envisaged, it would have a population six times that of Chonburi Municipality and almost four times that of Amphoe Chonburi, including the Municipality, in 1976. Creation of a new urban center of this size probably would absorb the major portion of the increase in urban population in the region, thus minimizing the requirements for additional urban land in existing centers. The costs of establishing a new center of the proposed size would probably absorb most of the funds available for urban development in the region for several years.

The Government's commitment to industrial development of the Eastern Seaboard Region provides a logical basis for the selection of the region's urban centers for the land use programming project. However, the project could have had a much sharper focus if carried out within the framework of an approved overall regional development plan. The impact on urban land requirements in the three urban centers of implementing the regional plan will be quite different depending, for example, upon the final decision on location of the commercial port and industrial estate. If Sattahip is to be expanded to serve as the region's commercial port cum industrial center, population and economic growth in Siracha

Municipality and its contiguous built-up area will be of a different order of magnitude than if the final decision is to construct a new port, industrial estate and urban center at Laem Chabang.

Similarly, decisions with respect to the type of industries to be promoted for specific locations in the region will be critical determinants of the magnitude of urban land requirements in existing and/or new urban centers.

The absence of definitive information on certain of the planning parameters noted above operated as a constraint in the formulation of realistic guide plans. That is to say, the land use programming project could have been more successful in formulation of short-term "action programs" following, rather than preceding, the adoption of a location specific overall long-term plan and goals for the development of the region. It is also likely that local officials would have had a keener appreciation of the role of land use programming, and a more spontaneous participation in project activities had the project been carried out in response to firmly identified plans that would affect in a significant way their respective areas of responsibilities.

While, for the reasons noted, the land use programming project in our judgment would have been more relevant at a later point in time, on the whole it has contributed in a significant degree to creating an awareness of some of the actions that will be required if the goals of the regional development plan are to be realized. The project output may be useful, also, in the formulation of the regional plan.

### Staffing and Participation of Local Officials

One of the objectives in the "Statement of Work" calls for the establishment of a system of urban development institutions serving the three municipalities, with effective linkages to existing institutions at the regional and national levels. The project was only partially successful in achievement of this objective. The reasons for the shortfall are set forth below as constructive suggestions for future consideration in the design of such projects.

From the outset, there existed a pattern of inflated expectations on the part of local officials. These took the form of anticipation that a variety of capital projects would be financed from unspecified sources. In fact, the services of a short-term local finance specialist were provided to identify such sources. As the project developed, it became clear that no easy solution to the shortage of funds for capital projects was imminent nor likely to be achieved in the foreseeable future with a nationwide restructuring of the local tax system. From this point on, the project lost some of its appeal for local officials who came to regard it as "just another study" that would result in no immediate benefits in the form of highly visible and revenue-producing capital projects.

As a result of the fact that they did not perceive that the land use programming project would bring immediate financial support for local priority projects, and that day-to-day operating responsibilities placed heavy demands on them, their participation in the project fell short of what would have been desirable. From the outset, it was difficult to convince them of the merits of land use programming as a

process rather than assessing its usefulness solely on the basis of immediate tangible results. While throughout the project local officials were cooperative in supplying data to counterparts and the Field Representative, to the extent data were available, the demands on their time were such that except for the formal training program, their participation was of a passive rather than active type.

The project would have benefitted, also, from a more active participation of the Executive Working Group, the composition of which was described earlier. This group, as well as the Operations Working Group, provided, in principle, a linkage between regional and municipal officials who would be involved in planning, and planning officials at the national level, that is, NESDB, DTCP and national ministries. However, with the exception of representatives from the NESDB, there was no significant contribution from other groups at the national level. Perhaps one of the most serious shortcomings in the effort to bring about local-national linkages of planning activities was the failure of DTCP to take a more active role in the project.

As noted in the earlier description of NESDB's role, technical counterparts, as well as administrative support, were provided. While it was never expected that the technical counterparts would have advanced capabilities for application in the project, their contribution was less than might have been expected, primarily because of frequent turnovers in the staff provided. A notable exception exists in the case of one counterpart who served for approximately 13 months. Reportedly, since the termination of field work he has been assigned to the Planning Office of Chonburi

Municipality. Because of his comparatively long-term participation in the project office in Chonburi, he not only made significant contributions to the program, but he also developed a comparatively high level of skills in land use programming techniques. The reported assignment is one of the more tangible bits of evidence that some institutional capability was established in Chonburi.

At this point, it may be relevant to pose the question of whether, given the size of the municipalities and the fact that most of the recent growth in urban population has taken place outside of the municipal boundaries, the municipalities as such should be the administrative unit in which efforts to develop local institutional planning capability should be focused. In the course of the regional planning study, attention should be directed to the identification of an appropriate body to be responsible for regional planning, including urban areas, whether or not they are within municipal boundaries.

The Changwat planning office would appear to be one logical site for the development of sub-national planning capabilities. However, as currently staffed, and with its current functions, it is not an effective organization for the type of planning that will be required for land use programming in urbanizing areas of the region. It may well be that a regional planning authority similar to those established in other developing countries that have chosen to emphasize decentralization in population and economic growth would be the appropriate type of body. Such a regional authority may very well be so organized as to assume responsibilities, also, for coordination of the implementation of plans where much of the responsibility for construction and

administration will continue to reside in national ministries.

While the recommendation of a planning/implementing body is outside the scope of work of the land use programming project, it is doubtful that such a capability in each of the three municipalities is really cost effective. Among other considerations, it would require a large number of technically qualified personnel who simply are not available outside the national ministries.

The project would also have benefitted from more frequent participation by senior members of the staff of NESDB. Here, again, the manpower resources of NESDB are stretched very thin. While the interest of NESDB in the project was never in question, it must be recognized, that more on-site presence and participation by NESDB would have helped to secure more meaningful involvement by local officials.

As a general observation appropriate wherever an attempt might be made to replicate the land use programming project, it is noted that most of the local officials who would be expected to develop capabilities in land use programming procedures are frequently transferred within the general government service. During the project, the following key individuals were reassigned: the Changwat planning officer; the Municipal Clerks of Chonburi and Siracha; and the Chief Engineer of Siracha. The Mayor of Chonburi resigned. These changes in personnel have adverse effects on the training program to develop local capabilities and to provide leadership and continuity in the land use programming process.

From the standpoint of providing appropriate expatriate assistance, it is noted that improvements could be made in

future projects of this type. The only long-term expatriate in the Chonburi project was an architect/planner. It is widely recognized that urban planning requires a variety of disciplines, including urban sociologists and economists; experts in public administration and finance; housing specialists; and engineers. In the design of future projects of this type, it is recommended that, without necessarily increasing the total number of person months, a more balanced planning process would be forthcoming with a different pattern of staffing along the lines intimated above. Ideally, the various types of expertise should be drawn from the staff of local units of government in order that local planning capabilities be strengthened, with expatriates serving as advisers and in a training role.

#### Formal Training

The formal training course described in detail in Annex B was moderately successful. However, participants offered several criticisms of the program. One criticism was that the training sessions which were scheduled intermittently over a period of three and one-half months should have been compressed into a shorter continuous training period in order to minimize the loss of continuity between training sessions. From the standpoint of effectiveness in training, the criticism is well taken. However, the scheduling utilized was consciously adopted as second best for the reason that a period of a few weeks absence from their regular duties would have been unacceptable to the officials responsible for day-to-day operations.

Participants also felt that the content of the lectures and training material was somewhat theoretical and employed

too many terms with which the trainees were not familiar. This criticism, again, has merit. In retrospect, it is recognized that too many of the trainers came from academic positions and therefore tended to develop lectures that were more suitable for classroom presentation than in a training program designed to have applicability in the work of participants. In part, the feeling on the part of participants that the training program did not provide immediately applicable planning techniques may have been attributable to a factor mentioned above, namely that local officials simply were not convinced that their particular units of government were likely to be faced with the full implications of the planned regional development program. Therefore, it was difficult to establish and sustain interest in the anticipatory type of activities implied by the land use programming approach.

Other comments from participants included the suggestion that the course should have utilized the "case study" approach more extensively, with the cases selected from actual planning projects, or issues, in the three municipalities.

In the design of the formal training course, it was assumed that the lectures and training materials would be supplemented by the trainees' active participation in the work program of the field office. Thus, ample opportunities would be provided for practical applications of the concepts and techniques presented in the lectures. However, this participation did not occur on a significant scale. Therefore, the potential benefits of the formal training program were not fully realized.

Near the end of field work, a one-day seminar was held

during which the final results of the two project feasibility studies were reviewed by staff of the Thai firms that conducted the studies, and the basic features of project evaluation and "packaging" were discussed. Members of the Operation Working Group participated in the seminar.

#### On-the-Job Training

Given a general understanding of the basic concepts involved, "learning-by-doing" is a highly effective method of training. It was anticipated that it would provide, in conjunction with the formal training course, the principal inputs for the development of a local institutional capability in urban planning.

In fact, on-the-job training was provided, in large measure, only to the various technicians assigned to the project office by NESDB, and to students from Silapakorn University. Local officials who would have constituted the core of an institutionalized capability participated on an ad hoc basis, particularly in supplying data and other information.

With one exception, such knowledge as the technicians may have gained through brief experience in the land use programming project made only limited contribution to the development of a local planning capability because of the high rate of turnover in personnel. Reliance on temporarily hired personnel is an unworkable approach to the establishment, or strengthening of an institutionalized planning capability.

### Study Tour

The contract between USAID and RRNA provided for a "study tour" to selected neighboring countries to allow Thai officials involved in the land use programming project to familiarize themselves with local planning activities in other countries. As arranged, a group of 17 persons, including members of the Executive and Operations Working Groups, visited the Philippines, Singapore and Malaysia during a period of two weeks, beginning April 29, 1979.

The visit to the Philippines included meetings with USAID officials, the Department of Local Government, University of the Philippines staff members, officials of the National Economic Development Authority and site visits to several squatter upgrading projects and USAID rural development pilot projects.

In Singapore the group received briefings by officials from Jurong New Town Corporation; the Department of Urban Design; Town Planning Board and the Housing Development Board. The group made site visits to Jurong New Town and several housing estates developed by the Housing Development Board.

Included in the visit to Malaysia were briefings by officials from the Urban Development Authority, the Selangor State Planning Department, the Selangor State Development Corporation and the Municipality of Petaling Jaya near Kuala Lumpur.

In each briefing the main points of discussion related to:

- . Organization, staff development and responsibilities of the various agencies;
- . Financing of capital projects; and
- . The role of local versus central government in urban development planning.

Participants in the study tour expressed satisfaction with what they regarded as a broadening of horizons and exposure to the organizational structures within which urban development planning had been carried out in the three countries. Only the passage of time will allow an objective evaluation of how useful the study tour will be in resolving Thailand's problems involved in decentralization of urban planning.

#### Replicability

The land use programming project in Chonburi and, by extension, in Siracha and Phanat Nikom, Thailand, like similar projects in Nicaragua and Ghana, was designed "to demonstrate the application of the conclusions of the research study" conducted by Rivkin/Carson, Inc., under contract with TA/UD, AID/W. Inter alia, the three projects were to serve as pilot projects for potential replication elsewhere in urban areas in the three countries, or in other countries.

The Chonburi project did not represent an ideal test of the applicability of the land use programming project for several reasons. Some of these reasons have been elaborated in earlier parts of this report. As noted in a description of the area selected, the municipalities themselves were not

experiencing the kind of growth in which land use programming can be most productively employed, although such growth does appear to be occurring in built-up areas, particularly in the areas immediately surrounding Chonburi and along Sukhumvit Road between Chonburi and Siracha. If future applications of this approach are to be attempted, an effort should be made to achieve a closer approximation to the conditions described by Rivkin as conducive to land use programming, with less attention paid to the definition of the project area in terms of municipal or other administrative boundaries.

If the objective of achieving an institutionalized local capability for urban planning and land use control is to be achieved, the availability of staff in which capabilities can be developed is an absolute prerequisite no matter the location or the rate of population growth. As elaborated in some detail in earlier sections of this report, the limited participation of local officials and the rapid turnover of technicians supplied by NESDB imposed serious limitations on the degree to which local personnel could become part of an institutional capability. In the design of future projects, adequate host country input should be an absolute requirement in efforts to develop an institutional capability in any type of local urban planning.

In this connection, reference is made to a project recently completed in one of the regions of Korea. The planning activities for this project were located in what is known as the Korea Research Institute for Human Settlements. A permanent staff of some 35 to 40 individuals are employed, including some with advanced training in various disciplines. RRNA was contracted to provide assistance to the unit in

project identification and evaluation, including infrastructure industrial estates and suitable industries for location in secondary cities located in the region. Under the terms of the contract, responsibility for carrying out the work was vested in the Korean staff. RRNA was required to supply a coordinator/planner throughout a period of approximately 16 months in the field. In addition, 8 short-term specialists were provided who went to Korea at varying times early in the project, where they provided guidance in project identification and methodologies to be employed to Korean counterparts, following which they departed Korea. The resident coordinator/planner supervised and provided assistance to the Korean staff for a period of approximately 2 to 3 months, at which time the short-term specialist returned to review the work accomplished during their absence, and to indicate revisions as needed and set out a work program for the ensuing period of his absence.

Again, the coordinator/planner would exercise supervision and provide assistance as needed during absence of the various short-term specialists, and to request assistance from RRNA home office staff by correspondence as required. Finally, short-term specialists returned to Korea near the end of the project to assist their counterparts in putting the results of their efforts into documents suitable for submission in connection with applications for loans from international agencies such as the Asian Development Bank. The contrast in staff development and project output between these two projects, which went on concurrently, was striking.

The language problems were similar in both projects. The type of work being done was also, in general, somewhat similar, although more action oriented, perhaps, in the

Korean project than in the case of Chonburi. The difference that mattered was that a full-time staff with permanent positions was available to receive the benefit and direction of expatriate assistance in Korea, but not in the Chonburi project.

It is accepted that the commitments made to provide suitable personnel in whom capabilities could be developed was made in good faith, but the pressures of day-to-day work on the part of local officials who had a multiplicity of obligations plus the rotation of technical trainees provided to the project on a temporary hire basis has not really left a result in terms of which the usefulness of land use programming in urban development should be evaluated.