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The Study on Emergency Flood Prevention Planning  
for  
Hat Yai District, in Khlong U-Taphao River Basin

Final Report  
Supporting Report

November 2002

Japan International Cooperation Agency ( JICA )  
Thailand Office  
Ministry of Agriculture and Cooperatives  
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The Kingdom of Thailand

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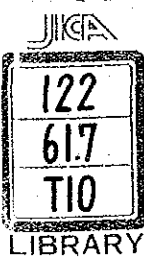
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November 2002

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**APPENDIX A**

**SOCIO - ECONOMIC AND LAND USE**

## APPENDIX A SOCIO-ECONOMIC AND LAND USE

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## APPENDIX A

### SOCIO-ECONOMY AND LAND USE

#### CHAPTER 1 EXISTING SOCIO-ECONOMY

##### 1.1 Administrative Units and Areas

Administrative units base on Provincial Government line administration is divided from National level into: Province, District, Tambon, and Muban or Village respectively. For Songkhla Province in which Hat Yai District is attached divided into 16 Districts, 127 Tambon, and 994 Villages.

For Local administration, a Municipality is organized to administer a large and densely populated community; whereas a TAO (Tambon's Administration Organization) is organized to administer all villages within Tambon but not overlapping with Municipal area. For some districts, such as Hat Yai, Ranot, Rattaphum, and Sadao Districts, there may have more than one municipality whereas some Districts such as Krasae Sin, Khlong Hoi Khong, Na Mom, and Bang Klam are without municipality because none of communities is large enough to organize a municipality. Rests of the Districts are with one municipal in the District town. A Tambon where a municipal is organized may have both municipality and TAO together. Details of Administrative units and their area are shown in Table 1.

**Table 1. Administrative Unit and Area of Songkhla Province ranked by area**

|                    | Area<br>(Sq. Km.) | Number of<br>Tambon | Number of<br>Village | Number of<br>Municipal | Number of<br>TAO |
|--------------------|-------------------|---------------------|----------------------|------------------------|------------------|
| 1 Thepha           | 978               | 7                   | 62                   | 1                      | 7                |
| 2 Saba Yoi         | 866               | 9                   | 61                   | 1                      | 9                |
| 3 Hat Yai          | 814               | 13                  | 92                   | 3                      | 12               |
| 4 Sadao            | 812               | 9                   | 66                   | 4                      | 8                |
| 5 Ranot            | 784               | 12                  | 70                   | 2                      | 11               |
| 6 Na Thawi         | 620               | 10                  | 90                   | 1                      | 10               |
| 7 Rattaphum        | 592               | 5                   | 57                   | 2                      | 5                |
| 8 Chana            | 503               | 14                  | 133                  | 1                      | 14               |
| 9 Khlong Hoi Khong | 275               | 4                   | 32                   |                        | 4                |
| 10 Singha Nakhon   | 228               | 11                  | 77                   | 1                      | 9                |
| 11 Khuan Niang     | 208               | 4                   | 46                   | 1                      | 4                |
| 12 Muang Songkhla  | 163               | 6                   | 42                   | 1                      | 5                |
| 13 Bang Klam       | 148               | 4                   | 36                   |                        | 4                |
| 14 Sathing Phra    | 120               | 11                  | 79                   | 1                      | 11               |
| 15 Na Mom          | 118               | 4                   | 29                   |                        | 4                |
| 16 Krasae Sin      | 96                | 4                   | 22                   |                        | 4                |
| <b>Total</b>       | <b>7,324</b>      | <b>127</b>          | <b>994</b>           | <b>19</b>              | <b>121</b>       |

Source : Department of Local Administration, Ministry of Interior.

Within Hat Yai District, two municipalities are established: Hat Yai, and Tambon Ban Phru municipalities. The rest of areas (area outside municipal in Hat Yai District) are 13 Tambon and 92 villages having 13 TAO organized to administer the 92 villages. Administrative Unit and their area of Hat Yai District are shown in Table 2.

**Table 2. Administrative Unit and Area of Hat Yai and Na Mom Districts**

|  | Area (Sq.Km.) |
|--|---------------|
| Hat Yai District   | 814           |
| Hat Yai Municipality   | *21           |
| Tambon Ban Phru Municipality                                   | *18           |
| Non-Municipal Area (13 Tambons and TAOs, covering 92 villages) | *775          |
| Na Mom District (Khlong Wa Basin)                              | 118           |

Note : Included in Hat Yai District area

Source : Department of Local Administration, Ministry of Interior.

The study concentrates only the districts partially and wholly under the basins of Khlong U-Taphao and Khlong Wa from which floods are created.

Districts falls into Khlong U-Taphao Basin are five following districts those are: Bang Klam, Khlong Hoi Kong, Sadao, Hat Yai and Na Mom. The last one covers Khlong Wa sub-basin. Their area and administrative units are as shown in Table 3.

**Table 3. Area and administrative units of districts in Khlong U-Taphao Basin**

|                  | Area (Sq. Km.) | Number of Tambon | Number of Village | Number of Municipal | Number of TAO |
|------------------|----------------|------------------|-------------------|---------------------|---------------|
| Hat Yai          | 814            | 13               | 92                | 3                   | 12            |
| Sadao            | 812            | 9                | 66                | 4                   | 8             |
| Khlong Hoi Khong | 275            | 4                | 32                |                     | 4             |
| Bang Klam        | 148            | 4                | 36                |                     | 4             |
| Na Mom           | 118            | 4                | 29                |                     | 4             |
| Total            | 2,167          | 34               | 255               | 7                   | 32            |

## 1.2 Population, Engagement and Households.

### 1.2.1 Population, population density and labor population

Considering total Songkhla Province area, total population in 2001 was over 1.2 million, which is among a few provinces in the South, where population is over one million. The largest District in Songkhla Province base on population is Hat Yai, which has 310,995 population or 16% of total population in the province. Base on area the largest District is Thepha, which has 978 sq. Km. or 13% of province area; the District with highest population density was Muang Songkhla District, which has 486 per sq. Km.

Size of household is averaged at 3.9 per household, ranging from 3.29 (Hat Yai)-4.98 (Saba Yoi District). Population density is averaged at 165.86 ranging from 66.98 (Thepha District) to 993 (Muang Songkhla District) (Table 4)

**Table 4. Area, population, and working age group by District of Songkhla Province ranked by population in 2001, ranked by population**

|                  | Area<br>(sq. Km.) | Population       | Household      | HH Size     | Density       |
|------------------|-------------------|------------------|----------------|-------------|---------------|
| Hat Yai          | 814               | 310,995          | 94,502         | 3.29        | 382.14        |
| Muang Songkhla   | 163               | 161,398          | 45,784         | 3.53        | 992.53        |
| Chana            | 503               | 91,565           | 18,851         | 4.86        | 182.05        |
| Sadao            | 812               | 84,991           | 21,467         | 3.96        | 104.67        |
| Singha Nakhon    | 228               | 78,230           | 17,166         | 4.56        | 343.11        |
| Ranot            | 784               | 74,221           | 18,713         | 3.97        | 94.69         |
| Rattaphum        | 592               | 65,822           | 16,161         | 4.07        | 111.23        |
| Thepha           | 978               | 64,528           | 13,885         | 4.65        | 65.98         |
| Saba Yoi         | 866               | 57,861           | 11,608         | 4.98        | 66.81         |
| Na Thawi         | 620               | 55,412           | 12,971         | 4.27        | 89.41         |
| Sathing Phra     | 120               | 50,938           | 11,332         | 4.50        | 424.48        |
| Khuan Niang      | 208               | 33,370           | 7,629          | 4.37        | 160.43        |
| Bang Klam        | 148               | 25,817           | 6,785          | 3.81        | 174.69        |
| Khlong Hoi Khong | 275               | 22,216           | 5,459          | 4.07        | 80.73         |
| Na Mom           | 118               | 20,279           | 5,578          | 3.64        | 171.86        |
| Krasae Sin       | 96                | 17,131           | 3,969          | 4.32        | 177.71        |
| <b>Total</b>     | <b>7,324</b>      | <b>1,214,774</b> | <b>311,860</b> | <b>3.90</b> | <b>165.86</b> |

For Municipal areas, Hat Yai Municipal is largest base on population; Tambon Sadao municipality covers largest area, and Songkhla shows highest population density due to smaller command area.

Labor population bases on age group of 20-60 are ranged between 52-55% of total population, which is a little higher than that of Districts. Details are shown in Table 5.

**Table 5. Area, population, and working age group of Selected Municipalities of Songkhla Province ranked by population in 2001**

|                                 | Area<br>(Sq. Km.) | Population     | Density<br>(head/sq.<br>Km.) | Age 20-less<br>than 60 | % of age<br>group to<br>population |
|---------------------------------|-------------------|----------------|------------------------------|------------------------|------------------------------------|
| Hat Yai<br>Municipality         | 21                | 157,806        | 7,515                        | 83,598                 | 53%                                |
| Songkhla<br>Municipality        | 9                 | 82,307         | 9,145                        | 44,166                 | 54%                                |
| Tambon Sadao Municipality       | 47                | 17,687         | 376                          | 9,128                  | 52%                                |
| Tambon Ban Phru<br>Municipality | 18                | 16,941         | 941                          | 9,029                  | 53%                                |
| <b>Total Municipal Area</b>     | <b>95</b>         | <b>274,741</b> | <b>2,892</b>                 | <b>145,921</b>         | <b>53%</b>                         |

### 1.2.2 Number of Households in municipal area

In 2000 Number of households in municipal areas in Songkhla Province was 274,741; size of household was averaged at 3.5. For Hat Yai District, number of households was 45,776 or 58% of the total municipal population in the province; whereas size of household was average at 3.4, slightly less than provincial average. Details are as shown in Table 6.

**Table 6. Household and size of household by Municipality ranked by number of households in Songkhla Province in 2001, rank by number of household**

|                              | Population     | Household     | HH Size    | Area         |
|------------------------------|----------------|---------------|------------|--------------|
| Hat Yai Municipality         | 157,806        | 45,776        | 3.4        | 21.00        |
| Songkhla Municipality        | 82,307         | 23,075        | 3.6        | 9.27         |
| Tambon Sadao Municipality    | 17,687         | 4,828         | 3.7        | 47.00        |
| Tambon Ban Phru Municipality | 16,941         | 4,576         | 3.7        | 17.97        |
| <b>Total</b>                 | <b>274,741</b> | <b>78,255</b> | <b>3.5</b> | <b>95.24</b> |

Base on National Statistical Office data of Songkhla Province, in 1999, off total population of 966.4 thousands, about 693.8 thousands or 72% of total population were in labor force<sup>1</sup> the remaining 272.6 thousands or 28% are persons not in labor force. (Table 7)

**Table 7. Population Engagement in Songkhla Province in 1998 and 1999**

|                                   | <b>(Unit: Thousand Persons)</b> |               |              |               |
|-----------------------------------|---------------------------------|---------------|--------------|---------------|
|                                   | 1998                            |               | 1999         |               |
| Persons in Labor Force (Thousand) | 645.8                           | 67.9%         | 693.8        | 71.8%         |
| Person not in Labor Force         | 305.8                           | 32.1%         | 272.6        | 28.2%         |
| <b>Total</b>                      | <b>951.6</b>                    | <b>100.0%</b> | <b>966.4</b> | <b>100.0%</b> |

Source : Statistical Data Bank and Information Dissemination Division, National Statistics Office

### 1.2.3 Sector of employment of persons in labor force

Among the main sector of employment (agriculture, industry, and services), agriculture employs highest number of labor force, second after agriculture is services. Among these three, industry, which employs least number of labor forces. It should be noted that number of unemployed was about 2-2.5%. (Table 8)

<sup>1</sup>

Labor Force, by NSO definition, is defined as the person of 13 years and above

**Table 8. Sector of employment of persons in labor force**

|              | (Unit: Thousand) |               |              |               |
|--------------|------------------|---------------|--------------|---------------|
|              | 1998             |               | 1999         |               |
| Agriculture  | 295.1            | 45.7%         | 294.5        | 42.4%         |
| Services     | 247.8            | 38.4%         | 246.8        | 35.6%         |
| Industry     | 93.7             | 14.5%         | 135.4        | 19.5%         |
| Unemployed   | 9.2              | 1.4%          | 17.1         | 2.5%          |
| <b>Total</b> | <b>645.8</b>     | <b>100.0%</b> | <b>693.8</b> | <b>100.0%</b> |

Base on status of work engaged by labor forces, more people work on their own account than working as employees because farmers form the major part of work force. (Table 9)

**Table 9. Status of working of persons in labor force**

|                      | (Unit: Thousand) |               |              |               |
|----------------------|------------------|---------------|--------------|---------------|
|                      | 1998             |               | 1999         |               |
| Own Account Worker   | 243.6            | 37.7%         | 239.2        | 34.5%         |
| Private Employee     | 128.1            | 19.8%         | 202.8        | 29.2%         |
| Unpaid Family Worker | 193              | 29.9%         | 164          | 23.6%         |
| Government Employee  | 65.1             | 10.1%         | 61.1         | 8.8%          |
| Employer             | 6.8              | 1.1%          | 9.6          | 1.4%          |
| Unemployed           | 9.2              | 1.4%          | 17.1         | 2.5%          |
| <b>Total</b>         | <b>645.8</b>     | <b>100.0%</b> | <b>693.8</b> | <b>100.0%</b> |

Source : Statistical Data Bank and Information Dissemination Division, National Statistics Office

#### 1.2.4 GDP and per Capita GDP of Songkhla Province

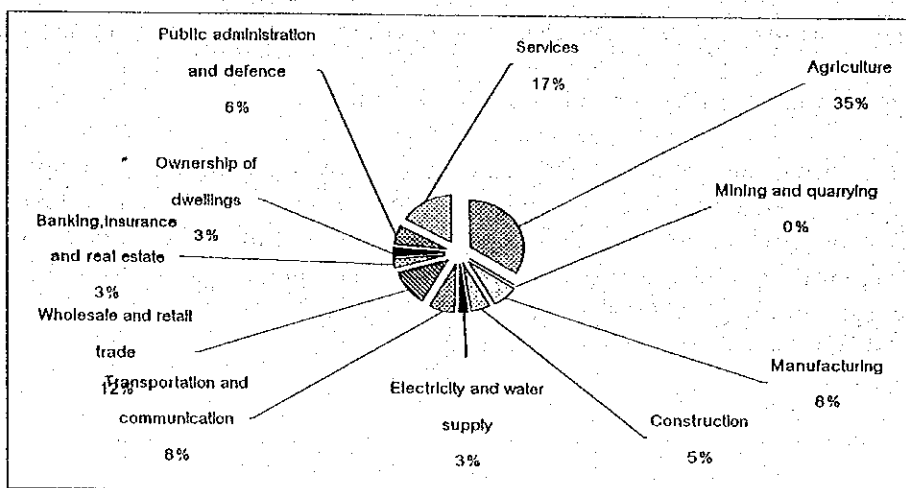
Gross Provincial Product (GPP) of Songkhla Province accounts for about 1.6% of National economy; 18% of Southern economy. In 1999 of Songkhla Province based on 1988 constant price was totaled 44,649 Million Baht. Base on current price, GPP in 1999 was 76,617 million Baht. The main economic sectors in 1999 are agriculture (34.39% of total), services (17.22%) wholesale and retail trade (12.45%). Details are depicted in Table 10 and Fig. 1

**Table 10. Share of GPP by sector of economy in 1999, Songkhla Province**

| Economic Sector                    | Million Baht  | Share          |
|------------------------------------|---------------|----------------|
| Agriculture                        | 26,352        | 34.39%         |
| Crops                              | 6,537         | 8.53%          |
| Livestock                          | 1,057         | 1.38%          |
| Fisheries                          | 13,458        | 17.57%         |
| Forestry                           | 1             | 0.00%          |
| Agricultural services              | 85            | 0.11%          |
| Simple agri. processing products   | 5,214         | 6.81%          |
| Mining and quarrying               | 110           | 0.14%          |
| Manufacturing                      | 5,774         | 7.54%          |
| Construction                       | 4,101         | 5.35%          |
| Electricity and water supply       | 2,159         | 2.82%          |
| Transportation and communication   | 5,913         | 7.72%          |
| Wholesale and retail trade         | 9,539         | 12.45%         |
| Banking, insurance and real estate | 2,279         | 2.97%          |
| Ownership of dwellings             | 2,397         | 3.13%          |
| Public administration and defence  | 4,803         | 6.27%          |
| Services                           | 13,190        | 17.22%         |
| <b>G P P.</b>                      | <b>76,617</b> | <b>100.00%</b> |
| <b>Per capita GPP (Baht)</b>       | <b>58,846</b> |                |

Source : NESDB

**Fig.1 GPP of Songkhla Province by sector**



Source : NESDB

Base on current price, since 1991, annual GPP growth rate was averaged 8.3% annually. Growth rates of GPP for the period from 1991-1995 were significantly high, as the growth rates were higher than 13% per annum (between 13.4-17.8% per annum). During the same period, population growth rates were between 1.5-1.6% per annum, making per capita GPP growth rate to vary between 11.7-16.1% per annum. After 1995, GPP growth rates dropped considerably from previous period, the worst year was 1999 when the country was hit hard by financial

drawback, causing the GPP growth rate of Songkhla Province dropped to -8.3% from previous year. Details are shown in Table 11

**Table 11. GPP, Population, and Per capita GPP of Songkhla Province during the period from 1991-1999**

|       | G P P.<br>(Million<br>Baht) | Per capita<br>GPP.(Baht) | Population<br>(1,000) | Annual Growth Rate (%) |                    |            |
|-------|-----------------------------|--------------------------|-----------------------|------------------------|--------------------|------------|
|       |                             |                          |                       | GPP.                   | Per capita<br>GPP. | Population |
| 1991  | 40,512                      | 34,774                   | 1,165                 |                        |                    |            |
| 1992  | 46,315                      | 39,183                   | 1,182                 | 14.3%                  | 12.7%              | 1.5%       |
| 1993  | 52,533                      | 43,777                   | 1,200                 | 13.4%                  | 11.7%              | 1.5%       |
| 1994  | 61,375                      | 50,349                   | 1,219                 | 16.8%                  | 15.0%              | 1.6%       |
| 1995  | 72,299                      | 58,447                   | 1,237                 | 17.8%                  | 16.1%              | 1.5%       |
| 1996  | 77,227                      | 61,584                   | 1,254                 | 6.8%                   | 5.4%               | 1.4%       |
| 1997  | 78,387                      | 61,722                   | 1,270                 | 1.5%                   | 0.2%               | 1.3%       |
| 1998  | 83,575                      | 64,988                   | 1,286                 | 6.6%                   | 5.3%               | 1.3%       |
| 1999p | 76,617                      | 58,846                   | 1,302                 | -8.3%                  | -9.5%              | 1.2%       |

Source : NESDB

### 1.3 Industrial Factory and Commercial Business in Hat Yai and Na Mom District

#### 1.3.1 Industrial Factory

Songkhla Province particularly in Hat Yai District is an important industrial area in the south. Typical industries were marine product processing, rubber related industries and furniture made from rubber woods and palm oil. At the end of year 2000, number of industrial factories were 1,667 with registered capital of 28,000 million Baht, employed over 63, 000 workers. Details are as shown in Table 12.

**Table 12. Number of Industrial factories, capital, and number of workers employed in industries, Songkhla Province by type of industry at the end of 2000**

| Type                                | No.         | Capital<br>(Million Baht) | No. of<br>workers |
|-------------------------------------|-------------|---------------------------|-------------------|
| Agricultural products<br>processing | 554         | 96.44                     | 987               |
| Construction                        | 193         | 1,427.84                  | 2,740             |
| Foods and drinks                    | 155         | 4,677.20                  | 23,701            |
| Wood processing                     | 176         | 6,503.57                  | 7,989             |
| Textile and garments                | 3           | 15.7                      | 121               |
| Chemicals and Plastics              | 51          | 1,072.81                  | 1,315             |
| Metals                              | 95          | 1,005.08                  | 1,678             |
| Services                            | 244         | 2,988.41                  | 2,076             |
| Others                              | 206         | 10,078.24                 | 21,999            |
| <b>Total</b>                        | <b>1677</b> | <b>27,865.28</b>          | <b>63,236</b>     |

Source : Songkhla Industrial Office

Hat Yai is the main industrial area in the South as well as in Songkhla Province. In 2000, among 1,202 factories locating in Songkhla Province 652 or 54% are located in Hat Yai. Among these, by amount of investment, number of employment, and horsepower, share of Hat Yai were 49% and 50% respectively. On the contrary, industry in Na Mom District were minimal as it's share were only 2% by number, 1% by amount of investment, and less than one percent by horse power. (Table 13)

**Table 13. Industrial Factory in Hat Yai and Na Mom Districts as compared with rest of areas of Songkhla Province in 2000**

|                        | Hat Yai Yai   | Na Mom      | Others        | Total          |
|------------------------|---------------|-------------|---------------|----------------|
| Number of factory      | 652<br>54%    | 21<br>2%    | 529<br>44%    | 1,202<br>100%  |
| Investment (M. Baht)   | 15,783<br>57% | 237<br>1%   | 11,572<br>42% | 27,592<br>100% |
| Labor                  | 32,774<br>49% | 2,038<br>3% | 31,852<br>48% | 66,664<br>100% |
| Horse Power (Thousand) | 387.9<br>50%  | 2.8<br>0%   | 387.4<br>50%  | 778.2<br>100%  |

Source : Songkhla Industry Office

Type of industries are various base on available raw materials in the South. These include marine food industries, rubber base products and rubber wood processing for domestic and export markets, metal and chemical industry for local demand, vehicle parts, body production and repair services, agro-industries from oil palm, construction material and quarrying etc.

### 1.3.2 Commercial Business

Hat Yai is the main commercial center in the South, Hat Yai city is filled with all kinds of wholesale and retail trading of goods and services, financial services, air and land communication, and also education center of all levels. Besides, Hat Yai is the main Anchor City for across border trade with Malaysia and Singapore through four border posts.

In 2000, value of imports were 45,198 million Baht, while exports were 12,6927 million Baht.<sup>2</sup> Number of registered commercial in Songkhla Province in 2000 were 17,533, registered at Hat Yai were 7,520 or 43% of total.

### 1.4 Tourism Industry in Hat Yai

"Tourist" in tourist industry term includes visitor, tourist, and travelers. In 2000, numbers of tourists, both Thai and foreigners were totaled 4.4 million. Number tourists by each category including length of stay are shown in Table 14.

<sup>2</sup> Songkhla Provincial Statistical Office, National Statistical Office, Office of the Prime Minister  
*Statistical Reports of Changwat Songkhla, 2001 Edition*



**Table 14. Number of guest arrivals and length of stay of tourist of Hat Yai in 2000**

|                          | (Unit: Thousand) |           |           |
|--------------------------|------------------|-----------|-----------|
|                          | Thai             | Foreigner | Total/Av. |
| Visitor                  | 1,334            | 867       | 2,201     |
| Tourist                  | 1,136            | 762       | 1,899     |
| Excursionist             | 198              | 105       | 302       |
| Total Number             | 2,668            | 1,734     | 4,402     |
| Av. Length of Stay (day) | 2.09             | 2.21      | 2.14      |

Source : Tourism Authority of Thailand

Each tourist spends about 2.96 thousand Baht per day. Base on this amount, revenue from tourists were estimated at 27,861 Million Baht in 2000 (Table 15)

**Table 15. Average Expenditure and revenue from tourists in Hat Yai in 2000**

| Average Expenditure |         | Thai                   | Foreigner | Total/Av.     |
|---------------------|---------|------------------------|-----------|---------------|
|                     |         | Baht thousand/head/day |           |               |
| Visitor             |         | 2.49                   | 3.65      | 2.95          |
| Tourist             |         | 2.49                   | 3.74      | 2.99          |
| Excursionist        |         | 2.49                   | 3.03      | 2.67          |
|                     | Average | 2.49                   | 3.65      | 2.95          |
| Revenue             |         |                        |           | Baht: Million |
| Visitor             |         | 6,935                  | 6,995     | 13,930        |
| Tourist             |         | 5,907                  | 6,296     | 12,203        |
| Excursionist        |         | 1,027                  | 700       | 1,727         |
|                     | Total   | 13,870                 | 13,991    | 27,861        |

Source : Tourism Authority of Thailand

#### 1.4.1 Accommodation for tourists

Base on Tourism Authority of Thailand's records, in 2000, Hat Yai has 96 hotels and guesthouses or other form of accommodation for tourists, visitors, and excursionist established. Numbers of rooms were 9,174 with occupancy rate averaged at 48% that is considerably low due to economic slump.

#### 1.4.2 Transportation

Mode of transportation of tourist to Hat Yai in 2000 was all except by vessels although there is a seaport in Songkhla but it is used only for goods shipment. (Table 16)

**Table 16. Mode of transportation of tourist to Hat Yai**

(Unit: Thousand)

| Transportation                        | Thai  | Foreigner | Total | %      |
|---------------------------------------|-------|-----------|-------|--------|
| Bus                                   | 324.5 | 128.4     | 452.9 | 27.6%  |
| Airplane                              | 365.0 | 83.7      | 448.7 | 27.3%  |
| Train                                 | 315.6 | 100.3     | 415.9 | 25.3%  |
| Travel by oneself (including by cars) | 169.5 | 156.8     | 326.3 | 19.9%  |
| Total                                 | 1,175 | 469       | 1,644 | 100.0% |

Source : Tourism Authority of Thailand

## 1.5 Other Socio-Economies in Hat Yai and Na Mom District.

### 1.5.1 Social

#### A. Religion

Population in Songkhla Province, 20% are Islamic, 3% are Christian, Hindu and Sikh, the remaining are Buddhism. The districts where Islamic exceeds 30% are Saba Yoi, Thepha, Chana Sadao, and Na Thawi. The Districts where Islamic is less than 10% are Khuan Niang, Ranot, Sathing Phra, Khlong Hoi Khong, Krasae Sin, and Na Mom. The rest of districts have Islamic between 11%-29% of all population. Number of shrines of each religion is presented in Table 17.

**Table 17. Number of Buddhist temples, Buddhist temporary temples, Buddhist monk resident, Christian church, and Mosques**

| District         | Buddhist temple | Temporary Temple | Monk resident | Christian Church | Mosque |
|------------------|-----------------|------------------|---------------|------------------|--------|
| Ranot            | 44              | 0                | 2             | 0                | 1      |
| Singha Nakhon    | 41              | 2                | 2             | 0                | 16     |
| Hat Yai          | 37              | 8                | 9             | 3                | 35     |
| Sathing Phra     | 36              | 0                | 2             | 0                | 5      |
| Muang Songkhla   | 35              | 0                | 5             | 4                | 15     |
| Chana            | 20              | 6                | 2             | 0                | 60     |
| Sadao            | 18              | 0                | 10            | 2                | 53     |
| Khuan Niang      | 18              | 0                | 3             | 0                | 7      |
| Rattaplum        | 14              | 6                | 7             | 2                | 16     |
| Krasae Sin       | 13              | 0                | 1             | 0                | 0      |
| Bang Klam        | 12              | 0                | 1             | 0                | 12     |
| Saba Yoi         | 9               | 1                | 5             | 0                | 46     |
| Khlong Hoi Khong | 9               | 0                | 3             | 0                | 1      |
| Thepha           | 5               | 12               | 6             | 0                | 61     |
| Na Thawi         | 3               | 21               | 1             | 0                | 26     |
| Na Mom           | 1               | 8                | 7             | 1                | 0      |
| Total            | 315             | 64               | 66            | 62               | 354    |

Source : Songkhla Education Office

## B. Education

Songkhla Province has all levels of education from pre school age to university: both privates and governments classified by governing agency are as shown in Table 18.

Number of education institutes, instructors, and ratio of students to instructors as in June 2000 by governing agency

Table 18. Number of Education Institutes, instructors and ratio to students

| Governing Agency                                      | No. | Instructors | Instructors : students |
|---|-----|-------------|------------------------|
| Office of National Primary Education Board            | 481 | 6,366       | 1: 20                  |
| Department of Formal Education                        | 44  | 2,995       | 1: 18                  |
| Department of Non Formal Education                    | 17  | 951         | 1: 32                  |
| Office of Private Education Board                     | 67  | 3,511       | 1: 22                  |
| Department of Vocational Education                    | 9   | 632         | 1: 25                  |
| Department of Local Government (Municipal School)     | 12  | 698         | 1: 23                  |
| Royal Thai Police (Border Patrol Police)              | 9   | 100         | 1: 20                  |
| Rajabhat Institute Songkhla                           | 1   | 244         | 1: 25                  |
| Rajamongala Institute of Technology                   | 1   | 252         | 1: 18                  |
| Prince of Songkhla Universtiy                         | 1   | 1,514       | 1: 11                  |
| Thaksin University                                    | 1   | 224         | 1: 18                  |
| Muang Hat Yai College (Private) Bachelor Degree level | 1   | 62          | 1: 41                  |

Source : Songkhla Province, Office of Commerce, Marketing Information Songkhla Province 2000

### 1.5.2 Cooperatives

Songkhla Province has five types of cooperatives. Each type has capital and number of members as follows (Tale 20)

Table 19. Cooperatives, their capital and number of members in Songkhla Province

| Type                      | No. | Capital (Mill. Baht) | No. of members |
|---------------------------|-----|----------------------|----------------|
| Agricultural cooperatives | 26  | 2115.33              | 49,089         |
| Rubber funds cooperative  | 90  | 55.65                | 7,372          |
| Consumers cooperatives    | 10  | 21.92                | 11,498         |
| Services cooperatives     | 4   | 23.61                | 3,935          |
| Savings cooperatives      | 34  | 9,075.66             | 3,3081         |
| Total                     | 164 | 11,292.17            | 104,975        |

Source : Songkhla Province, Songkhla Province Data 2001(Thai).

## CHAPTER 2 FUTURE SOCIO ECONOMIES

### 2.1 Projection of Population

Khlong U-Taphao Basin covers five Districts namely: Hat Yai, Chana, Sadao, Bang Klam and Khlong Hoi Khong. During the past ten years from 1992-2001, population records are as shown in Table 20. These will be used as base for forecasting future population.

**Table 20. Actual and annual growth rate of population of Khlong U-Taphao basin from 1992 – 2001, by districts**

(Unit: Thousand)

|             | Hat Yai Urban | Hat Yai Rural | Total<br>Hat Yai | Na Mom | * Other 3<br>Districts | Total  |
|-------------|---------------|---------------|------------------|--------|------------------------|--------|
| 1991        | 142.35        | 144.60        | 286.95           | 17.95  | 97.00                  | 401.90 |
| 1992        | 124.30        | 149.04        | 273.33           | 18.18  | 123.64                 | 415.16 |
| 1993        | 148.63        | 128.38        | 277.01           | 18.29  | 121.54                 | 416.84 |
| 1994        | 152.44        | 118.99        | 271.43           | 18.47  | 122.98                 | 412.88 |
| 1995        | 151.25        | 125.87        | 277.12           | 18.86  | 123.65                 | 419.63 |
| 1996        | 147.84        | 127.14        | 274.98           | 19.16  | 125.34                 | 419.47 |
| 1997        | 155.26        | 134.76        | 290.02           | 19.43  | 127.14                 | 436.60 |
| 1998        | 156.81        | 139.09        | 295.91           | 19.74  | 129.48                 | 445.13 |
| 1999        | 157.62        | 143.40        | 301.02           | 19.89  | 130.42                 | 451.33 |
| 2000        | 157.02        | 147.44        | 304.47           | 20.00  | 131.30                 | 455.77 |
| 2001        | 157.81        | 153.19        | 311.00           | 20.28  | 133.02                 | 464.30 |
| Growth Rate | 2.7%          | 0.3%          | 1.4%             | 1.2%   | 0.8%                   | 1.3%   |

Note : \* Other 3 Districts are Sadao, Bang Klam, and Khlong Hoi Khong

Source : Office of Local Government, Songkhla Province

During the course of past ten years annual population in the basin changes was averaged at 1.3% per annum.

Projection of population in the future is made by using linear regression method ( $Y = a + bX$  equation), trend of population in Khlong U-Taphao basin is projected to the years 2002-2020 as follows (Table 21).

**Table 21. Forecast population from 2002 to 2020, Hat Yai Yai and Na Mom District**

|      | Hat Yai<br>Urban | Hat Yai<br>non Rural | Total<br>Hat Yai | Na Mom | Other 3<br>Districts | Total  |
|------|------------------|----------------------|------------------|--------|----------------------|--------|
| 2002 | 163.64           | 144.58               | 308.22           | 20.58  | 134.15               | 462.95 |
| 2003 | 165.90           | 145.76               | 311.66           | 20.82  | 135.50               | 467.98 |
| 2004 | 168.15           | 146.95               | 315.10           | 21.07  | 136.85               | 473.02 |
| 2005 | 170.40           | 148.14               | 318.54           | 21.31  | 138.20               | 478.06 |
| 2006 | 172.66           | 149.33               | 321.99           | 21.56  | 139.55               | 483.09 |
| 2007 | 174.91           | 150.52               | 325.43           | 21.80  | 140.90               | 488.13 |
| 2008 | 177.17           | 151.70               | 328.87           | 22.05  | 142.25               | 493.16 |
| 2009 | 179.42           | 152.89               | 332.31           | 22.29  | 143.60               | 498.20 |
| 2010 | 181.67           | 154.08               | 335.75           | 22.53  | 144.95               | 503.23 |
| 2011 | 183.93           | 155.27               | 339.20           | 22.78  | 146.30               | 508.27 |
| 2012 | 186.18           | 156.46               | 342.64           | 23.02  | 147.64               | 513.31 |
| 2013 | 188.43           | 157.65               | 346.08           | 23.27  | 148.99               | 518.34 |
| 2014 | 190.69           | 158.83               | 349.52           | 23.51  | 150.34               | 523.38 |
| 2015 | 192.94           | 160.02               | 352.96           | 23.75  | 151.69               | 528.41 |
| 2016 | 195.20           | 161.21               | 356.41           | 24.00  | 153.04               | 533.45 |
| 2017 | 197.45           | 162.40               | 359.85           | 24.24  | 154.39               | 538.48 |
| 2018 | 199.70           | 163.59               | 363.29           | 24.49  | 155.74               | 543.52 |
| 2019 | 201.96           | 164.78               | 366.73           | 24.73  | 157.09               | 548.55 |
| 2020 | 204.21           | 165.96               | 370.17           | 24.98  | 158.44               | 553.59 |

Note : \* Other 3 Districts are Sadao, Bang Klam, and Khlong Hoi Khong

It can be seen from the table that population of five Districts in Khlong U-Taphao river basin in the next twenty years may change from 464.3 thousand at present to 553.59 thousand in 2020 or approx. 19% more than present. Population in Hat Yai Municipality (urban) will increased from 157.81 thousand to 204.21 thousand or 29% increased, which is significantly higher than the rest. As for Na Mom, the population will increase from 20.28 thousand in 2001 to 24.98 thousand in 2020 or 23% more than present. The remaining three districts will increase only 0.8% from 133.02 thousand at present to 158.44 thousand in 2020.

## 2.2 Projection of GDP and Per Capita GDP of Songkhla Province

During the 7 years period from 1993 to 1999, Songkhla Province's GPP aggregate growth rate was averaged at 1.9% per annum base on constant price. However, considering from major events, the rate varied from year to year. Before financial crisis in 1997, GPP growth rate was about 4%-9% annually. After crisis GPP reduced about 3% annually. (Table 22)

**Table 22. Gross provincial product at constant 1988 prices Songkhla Province**

|                                    | (Millions of Baht) |        |        |        |        |        |        |
|------------------------------------|--------------------|--------|--------|--------|--------|--------|--------|
|                                    | 1993               | 1994   | 1995   | 1996   | 1997   | 1998   | 1999p  |
| Agriculture                        | 15,145             | 15,879 | 15,791 | 16,263 | 16,061 | 16,398 | 16,225 |
| Crops                              | 4,870              | 5,301  | 5,701  | 6,253  | 6,806  | 6,919  | 6,965  |
| Livestock                          | 543                | 521    | 511    | 652    | 998    | 924    | 784    |
| Fisheries                          | 6,801              | 6,623  | 6,244  | 6,073  | 5,185  | 5,568  | 5,419  |
| Forestry                           | 11                 | 59     | 32     | 1      | 1      | 0      | 0      |
| Agricultural services              | 41                 | 40     | 40     | 42     | 47     | 43     | 47     |
| Simple ag. processing              | 2,880              | 3,334  | 3,262  | 3,243  | 3,023  | 2,944  | 3,011  |
| Mining and quarrying               | 56                 | 65     | 66     | 74     | 47     | 39     | 58     |
| Manufacturing                      | 2,103              | 2,226  | 3,002  | 3,768  | 3,756  | 3,490  | 3,865  |
| Construction                       | 2,927              | 3,696  | 4,228  | 3,668  | 2,822  | 1,515  | 2,111  |
| Electricity and water supply       | 1,079              | 1,212  | 1,444  | 1,479  | 1,497  | 1,583  | 1,625  |
| Transportation and communication   | 3,441              | 3,812  | 4,228  | 4,590  | 4,700  | 4,105  | 4,128  |
| Wholesale and retail trade         | 5,460              | 5,988  | 6,537  | 6,610  | 6,275  | 5,398  | 5,524  |
| Banking, insurance and real estate | 2,632              | 3,284  | 3,673  | 3,919  | 3,559  | 4,156  | 1,332  |
| Ownership of dwellings             | 991                | 1,040  | 1,116  | 1,212  | 1,315  | 1,375  | 1,445  |
| Public administration and defense  | 1,619              | 1,689  | 1,760  | 2,034  | 2,003  | 2,202  | 2,216  |
| Services                           | 4,331              | 4,570  | 5,282  | 5,468  | 5,994  | 5,963  | 6,119  |
| G P P.                             | 39,784             | 43,461 | 47,127 | 49,087 | 48,028 | 46,224 | 44,649 |
| Growth rate from previous yr.      |                    | 9.24%  | 8.43%  | 4.16%  | -2.16% | -3.76% | -3.41% |

Source : National Economic and Social Development Board

The latest available record available of GPP for the provinces including Songkhla is 1999, which is not as up to date as GDP that is applied, for the whole country's economy, the latest report is 2001. Change of GDP is presented in Table 23.

**Table 23. Change of GDP (applied for the whole country) from 1997 to 2001**

|   | 1997  | 1998  | 1999  | 2000  | 2001p | 2002f |     |
|---|-------|-------|-------|-------|-------|-------|-----|
| GDP at constant 1988 prices (Bil. baht) | 3,073 | 2,750 | 2,872 | 3,005 | 3,059 | 3,120 |     |
| % Change (Real)                         |       | -1.4  | -10.5 | 4.4   | 4.6   | 1.8   | 2.0 |
| Agriculture                             |       | -0.7  | -1.5  | 2.2   | 4.8   | 1.5   |     |
| Manufacturing                           |       | 1.4   | -10.9 | 11.9  | 6.0   | 1.3   |     |
| Construction                            |       | -25.6 | -38.3 | -6.8  | -9.4  | -3.0  |     |
| Others                                  |       | -0.3  | -9.4  | 0.8   | 4.4   | 2.5   |     |

Source : National Economic and Social Development Board

From the table, it can be seen that, total economy started improving from 1999 as the growth rate improved 4.4% from previous year, in 2000 the following years also improved for 4.6% and 1.8% in 2001. For 2002 NESDB first forecasted as 2% as in the table, then variations were made many times. Up to middle of June 2002 forecast for current year was 4-5%.

GPP for the provinces as well as Songkhla should improve in parallel with total economy. For optimum forecast, Songkhla's GPP should grow at the rate of the past seven year from 1993 to 1999, which is the mixture of up and down trends. The projection for future up to years 2020 are projected as Tables 24.

**Table 24. Projected GPP 2000-2020 at constant price by economic sector, Songkhla Province**

|                                    | (Unit: Baht Million) |        |        |        |        |        |         |
|------------------------------------|----------------------|--------|--------|--------|--------|--------|---------|
|                                    | 2000                 | 2002   | 2005   | 2008   | 2010   | 2015   | 2020    |
| Agriculture                        | 16,616               | 16,940 | 17,428 | 17,915 | 18,240 | 19,052 | 19,864  |
| Crops                              | 7,634                | 8,393  | 9,532  | 10,670 | 11,429 | 13,327 | 15,224  |
| Livestock                          | 993                  | 1,137  | 1,353  | 1,569  | 1,713  | 2,073  | 2,433   |
| Fisheries                          | 4,943                | 4,420  | 3,636  | 2,853  | 2,330  | 1,024  | -282    |
| Forestry                           | 0                    | 0      | 0      | 0      | 0      | 0      | 0       |
| Agricultural services              | 47                   | 49     | 52     | 55     | 58     | 63     | 68      |
| Simple agri.processing             | 3,010                | 2,965  | 2,898  | 2,831  | 2,786  | 2,674  | 2,562   |
| Mining and quarrying               | 49                   | 44     | 37     | 30     | 25     | 14     | 2       |
| Manufacturing                      | 4,397                | 5,009  | 5,927  | 6,845  | 7,457  | 8,987  | 10,517  |
| Construction                       | 2,217                | 2,560  | 3,408  | 4,535  | 5,488  | 7,004  | 8,939   |
| Electricity and water supply       | 1,765                | 1,938  | 2,199  | 2,460  | 2,634  | 3,068  | 3,503   |
| Transportation and communication   | 4,589                | 4,812  | 5,147  | 5,481  | 5,704  | 6,261  | 6,819   |
| Wholesale and retail trade         | 5,792                | 5,702  | 5,568  | 5,434  | 5,345  | 5,122  | 4,899   |
| Banking, insurance and real estate | 2,898                | 2,736  | 2,493  | 2,250  | 2,088  | 1,683  | 1,278   |
| Ownership of dwellings             | 1,532                | 1,692  | 1,931  | 2,170  | 2,329  | 2,727  | 3,126   |
| Public administration and defense  | 2,369                | 2,588  | 2,915  | 3,243  | 3,462  | 4,008  | 4,555   |
| Services                           | 6,655                | 7,288  | 8,238  | 9,187  | 9,820  | 11,403 | 12,985  |
| Total GPP                          | 48,878               | 51,310 | 55,290 | 59,551 | 62,592 | 69,329 | 76,485  |
| GPP base on 2002 Price             | 47,900               | 51,310 | 61,183 | 71,094 | 78,365 | 96,881 | 118,002 |

## 2.3 Projection of Tourism Industry in Hat Yai

### 2.3.1 Past Trend of Tourism

It is observed from past 13 year growth records (1988-200) that the growth rate of tourists to Hat Yai was irregular or up and down as total numbers dropped during years 2 (1989) year 4 and 5 (1991-1992), year 9 (1996) and year 12 (1999). The numbers of the remaining years increased. However when consider the whole period, the aggregate trend was increasing at a minimal rate. (Fig.2 and Table 25)

Fig. 2 Past records (1988-2000) of number of tourists to Hat Yai

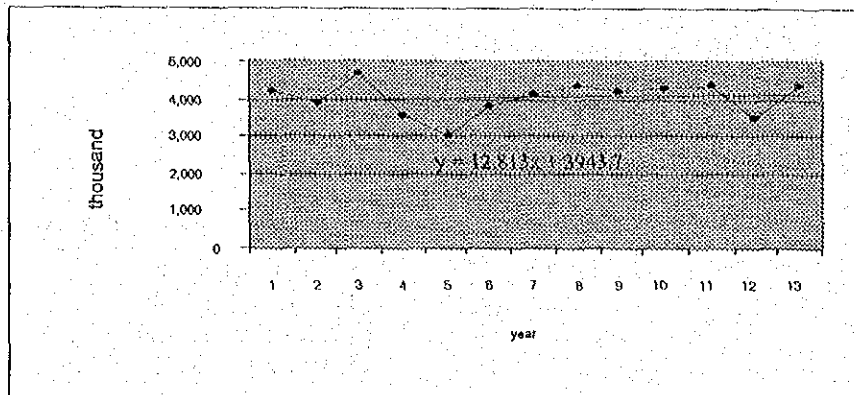


Table 25. Record of tourists to Hat Yai from 1988-2000

(Unit: Thousand)

|      | Visitors |           |       | Tourist |           |       | Excursionist |           |       | Grand Total |
|------|----------|-----------|-------|---------|-----------|-------|--------------|-----------|-------|-------------|
|      | Thai     | Foreigner | Total | Thai    | Foreigner | Total | Thai         | Foreigner | Total |             |
| 1988 | 1,357    | 752       | 2,109 | 982     | 716       | 1,698 | 375          | 38        | 413   | 4,220       |
| 1989 | 1,154    | 797       | 1,951 | 824     | 787       | 1,611 | 330          | 30        | 360   | 3,921       |
| 1990 | 1,482    | 861       | 2,343 | 1,011   | 730       | 1,741 | 471          | 131       | 602   | 4,686       |
| 1991 | 972      | 819       | 1,792 | 790     | 785       | 1,575 | 183          | 34        | 217   | 3,583       |
| 1992 | 837      | 677       | 1,514 | 644     | 605       | 1,249 | 193          | 72        | 265   | 3,029       |
| 1993 | 1,076    | 831       | 1,907 | 906     | 725       | 1,631 | 170          | 107       | 276   | 3,815       |
| 1994 | 1,310    | 764       | 2,074 | 1,043   | 679       | 1,722 | 267          | 85        | 353   | 4,149       |
| 1995 | 1,420    | 762       | 2,182 | 1,168   | 659       | 1,826 | 252          | 103       | 355   | 4,363       |
| 1996 | 1,390    | 711       | 2,101 | 1,145   | 610       | 1,755 | 244          | 101       | 346   | 4,202       |
| 1997 | 1,339    | 795       | 2,134 | 1,094   | 691       | 1,786 | 244          | 104       | 348   | 4,267       |
| 1998 | 1,405    | 766       | 2,171 | 1,164   | 667       | 1,830 | 242          | 99        | 341   | 4,342       |
| 1999 | 1,437    | 788       | 2,225 | 199     | 691       | 889   | 243          | 98        | 341   | 3,455       |
| 2000 | 1,334    | 867       | 2,201 | 1,136   | 762       | 1,899 | 198          | 105       | 302   | 4,402       |
| *    | 1.2%     | 1.2%      | 0.4%  | 1.2%    | 0.5%      | 0.9%  | -5.2%        | 8.8%      | -2.6% | 0.35%       |

Note : \* Average annual change rate  
 Source : Tourism Authority of Thailand

### 2.3.2 Forecast number of tourists in the future

By using linear regression equation ( $Y=a+bX$ ) base on past records, number of tourists in the future, to the year 2020, can be forecasted as follows (Table 26).



**Table 26. Forecast number of tourist 2001-2020**

(Unit: Thousand)

|      | Visitor |           |       | Tourist |           |       | Excursionist |           |       | G. Total |
|------|---------|-----------|-------|---------|-----------|-------|--------------|-----------|-------|----------|
|      | Thai    | Foreigner | Total | Thai    | Foreigner | Total | Thai         | Foreigner | Total |          |
| 2001 | 1,405   | 791       | 2,197 | 954     | 670       | 1,624 | 184          | 119       | 302   | 4,123    |
| 2002 | 1,425   | 792       | 2,217 | 957     | 666       | 1,623 | 173          | 123       | 296   | 4,136    |
| 2003 | 1,444   | 794       | 2,238 | 960     | 661       | 1,622 | 161          | 128       | 290   | 4,149    |
| 2004 | 1,463   | 795       | 2,258 | 963     | 657       | 1,620 | 150          | 133       | 283   | 4,162    |
| 2005 | 1,483   | 796       | 2,278 | 967     | 653       | 1,619 | 139          | 138       | 277   | 4,174    |
| 2006 | 1,502   | 797       | 2,299 | 970     | 648       | 1,618 | 128          | 143       | 270   | 4,187    |
| 2007 | 1,521   | 798       | 2,319 | 973     | 644       | 1,617 | 116          | 147       | 264   | 4,200    |
| 2008 | 1,541   | 799       | 2,339 | 976     | 640       | 1,616 | 105          | 152       | 257   | 4,213    |
| 2009 | 1,560   | 800       | 2,360 | 980     | 635       | 1,615 | 100          | 157       | 257   | 4,232    |
| 2010 | 1,579   | 801       | 2,380 | 983     | 631       | 1,614 | 100          | 162       | 262   | 4,256    |
| 2011 | 1,599   | 802       | 2,401 | 986     | 627       | 1,613 | 100          | 167       | 267   | 4,280    |
| 2012 | 1,618   | 803       | 2,421 | 989     | 622       | 1,612 | 100          | 171       | 271   | 4,304    |
| 2013 | 1,637   | 804       | 2,441 | 992     | 618       | 1,610 | 100          | 176       | 276   | 4,328    |
| 2014 | 1,657   | 805       | 2,462 | 996     | 614       | 1,609 | 100          | 181       | 281   | 4,352    |
| 2015 | 1,676   | 806       | 2,482 | 999     | 614       | 1,613 | 100          | 186       | 286   | 4,380    |
| 2016 | 1,695   | 807       | 2,502 | 1,002   | 614       | 1,616 | 100          | 191       | 291   | 4,409    |
| 2017 | 1,715   | 808       | 2,523 | 1,005   | 614       | 1,619 | 100          | 195       | 295   | 4,437    |
| 2018 | 1,734   | 809       | 2,543 | 1,009   | 614       | 1,622 | 100          | 200       | 300   | 4,466    |
| 2019 | 1,753   | 810       | 2,564 | 1,012   | 614       | 1,625 | 100          | 205       | 305   | 4,494    |
| 2020 | 1,772   | 812       | 2,584 | 1,015   | 614       | 1,629 | 100          | 210       | 310   | 4,522    |

### 2.3.3 Length of Stay

Tourist average lengths of stay in Hat Yai during the past 13 years have been decreasing. This could be result from improved transportation facility and improvement of other towns in the South that induce tourists from Hat Yai although the number of tourists has increasing. Length of stay is recorded as follows: (Table 27)

**Table 27. Length of stay of tourists in Hat Yai during 1988-2000**

|      | Thai (day) | Foreigner (day) | Average (day) |
|------|------------|-----------------|---------------|
| 1988 | 2.63       | 3.41            | 2.71          |
| 1989 | 3.18       | 2.94            | 3.06          |
| 1990 | 3.83       | 3.82            | 3.83          |
| 1991 | 2.61       | 3.09            | 2.51          |
| 1992 | 3.09       | 2.91            | 3.02          |
| 1993 | 2.94       | 2.91            | 2.93          |
| 1994 | 2.66       | 2.46            | 2.58          |
| 1995 | 2.38       | 2.38            | 2.37          |
| 1996 | 2.51       | 2.52            | 2.51          |
| 1997 | 2.49       | 2.42            | 2.46          |
| 1998 | 2.52       | 2.68            | 2.58          |
| 1999 | 2.56       | 2.71            | 2.61          |
| 2000 | 2.09       | 2.21            | 2.14          |
| *    | -1.90%     | -3.55%          | -1.95%        |

Note : \* Average annual change rate  
 Source : Tourism Authority of Thailand

It is anticipated that length of stay will not be less than present as transportation condition and development of nearby towns in the South will not change further. Then the length of stay should be at the same length as of 2000's.

### 2.3.4 Tourist Expenditure

Tourist expenditure expressed in thousand Baht per person per day during the past 13 years has been increased by the average of 5-6% per year. The rate is a little less than consumer's price index<sup>3</sup>. That means, in the real term, tourist expenditure per person per day has been increased only a little. (Table 28)

**Table 28. Expenditure of tourists to Hat Yai 1988-2000**

(Unit: Thousand Bath/person/day)

|      | Visitor |           |       | Tourist |           |       | Excursionist |           |       |
|------|---------|-----------|-------|---------|-----------|-------|--------------|-----------|-------|
|      | Thai    | Foreigner | Av.   | Thai    | Foreigner | Av.   | Thai         | Foreigner | Av.   |
| 1988 | 0.96    | 2.15      | 1.38  | 0.97    | 2.14      | 1.38  | 0.73         | 2.63      | 1.38  |
| 1989 | 0.84    | 2.58      | 1.60  | 1.02    | 2.59      | 1.84  | 0.32         | 2.50      | 0.54  |
| 1990 | 1.55    | 2.53      | 1.91  | 1.55    | 2.40      | 1.91  | 1.54         | 3.27      | 1.92  |
| 1991 | 1.82    | 2.35      | 2.03  | 1.96    | 2.39      | 2.15  | 1.26         | 1.57      | 1.31  |
| 1992 | 2.62    | 3.55      | 2.98  | 2.83    | 3.61      | 3.72  | 1.34         | 1.15      | 1.31  |
| 1993 | 2.65    | 3.19      | 2.88  | 2.72    | 3.44      | 3.04  | 2.26         | 1.52      | 1.97  |
| 1994 | 2.44    | 3.09      | 2.68  | 2.74    | 3.30      | 2.97  | 1.23         | 1.39      | 1.27  |
| 1995 | 2.67    | 3.28      | 2.89  | 2.96    | 3.56      | 3.18  | 1.35         | 1.51      | 1.40  |
| 1996 | 2.85    | 4.17      | 3.29  | 3.15    | 4.59      | 3.65  | 1.41         | 1.59      | 1.47  |
| 1997 | 2.95    | 3.96      | 3.33  | 3.28    | 4.30      | 3.68  | 1.48         | 1.66      | 1.54  |
| 1998 | 3.26    | 4.42      | 3.67  | 3.59    | 4.79      | 4.03  | 1.64         | 1.83      | 1.70  |
| 1999 | 3.16    | 3.91      | 3.44  | 3.47    | 4.20      | 3.75  | 1.60         | 1.89      | 1.69  |
| 2000 | 2.49    | 3.65      | 2.95  | 2.49    | 3.74      | 2.99  | 2.49         | 3.03      | 2.67  |
| *    | 8.23%   | 4.52%     | 6.51% | 8.17%   | 4.77%     | 6.64% | 10.74%       | 1.18%     | 5.67% |

Note : \* Average annual change rate

Source : Tourism Authority of Thailand

### 2.3.5 Revenue from Tourism

Base on the recorded number of tourist, length of stay, and average expenditure per person per day, total revenue from tourists are estimated as shown in Table 29.

<sup>3</sup> CPI during past 15 years increased about 4-5% annually

**Table 29. Estimated revenue from tourists to Hat Yai 1988-2000**

|      | Thai<br>(Mil. Baht) | Foreigner<br>(Mill. Baht) | Total<br>(Mill. Baht Per year) | per day |
|------|---------------------|---------------------------|--------------------------------|---------|
| 1988 | 2,532               | 3,252                     | 5,784                          | 15.85   |
| 1989 | 1,919               | 4,173                     | 6,091                          | 16.69   |
| 1990 | 4,593               | 4,363                     | 8,956                          | 24.54   |
| 1991 | 3,551               | 3,857                     | 7,408                          | 20.30   |
| 1992 | 4,277               | 4,673                     | 8,950                          | 24.52   |
| 1993 | 5,703               | 5,310                     | 11,013                         | 30.17   |
| 1994 | 6,385               | 4,722                     | 11,107                         | 30.43   |
| 1995 | 7,591               | 5,003                     | 12,595                         | 34.51   |
| 1996 | 7,915               | 5,928                     | 13,843                         | 37.93   |
| 1997 | 7,902               | 6,295                     | 14,197                         | 38.89   |
| 1998 | 9,158               | 6,765                     | 15,923                         | 43.62   |
| 1999 | 5,623               | 6,171                     | 11,794                         | 32.31   |
| 2000 | 6,645               | 6,335                     | 12,980                         | 35.56   |

Source : Tourism Authority of Thailand

## CHAPTER 3 LAND USE

### 3.1 EXISTING LAND USE

#### 3.1.1 Khlong U-Taphao Basin

According to the existing land use map (shown in Fig.3) which was prepared in year 2002 by the Consultant of the Land Development Department on the Land Use Planning Project of Khlong U-Taphao Basin, five main land use types can be categorized as:

|                         |           |     |          |
|-------------------------|-----------|-----|----------|
| Urban and built up land | 120,077   | rai | (8.81%)  |
| Agricultural land       | 1,023,878 | rai | (75.12%) |
| Forest land             | 192,194   | rai | (14.10%) |
| Water body              | 10,802    | rai | (0.79%)  |
| Miscellaneous land      | 16,038    | rai | (1.18%)  |
| Total Basin Area        | 1,362,989 | rai | (100%)   |

Details are shown in Table 30 and can be described as follows:

- (1) Urban and Built up Land:** This unit having 120,077 rai or 8.81 percent of the basin comprises many types of land use units namely, town and commercial area, land allotment project, lowland villages, institutional land, airport, industrial estate, industrial factory, recreation area, golf course and cemetery. The most extensive unit in this category is the lowland villages. The second and the third are the areas of town with commercial areas (21,225 rai or 1.55%) and institutional lands (12,462 rai or 0.9%). The lowland villages are in rural areas which mostly being located along roads, railway, and some streams where as the commercial zone and institutional area cluster within the Hat Yai Municipality and in the sanitation zones of other districts
- (2) Agricultural Land:** It is the largest main unit covering the area of 1,023,878 rai or some 75 percent of the basin. It composes of rice field (52,197 rai or 3.8%), upland crops (2,103 rai or 0.15%), tree crops (955,685 rai or 70.1%) fruit orchards (11,311 rai or 0.83 percent), pasture and livestock (431 rai or 0.032 percent). Within this type, para rubber which is grouped in tree crop land is the biggest covering 943,923 rai or 69 percent of the basin, followed by rice land, oilpalm and fruit orchard occupying 3.83%, 0.86% and 0.83% of the basin respectively.
- (3) Forest Land:** Its coverage is 192,194 rai or 14.10% of the basin comprising moist evergreen forest on the western, eastern and southern mountain ranges. Most are still fertile and are good water sources of the basin. Some parts of unit are covered by national preservation and conservation forests. Toan Nga Chang Wildlife Sanctuary together with Toan Nga Chang Waterfall, which is one of the beautiful and popular recreation places of Southern Thailand, is included in this unit.

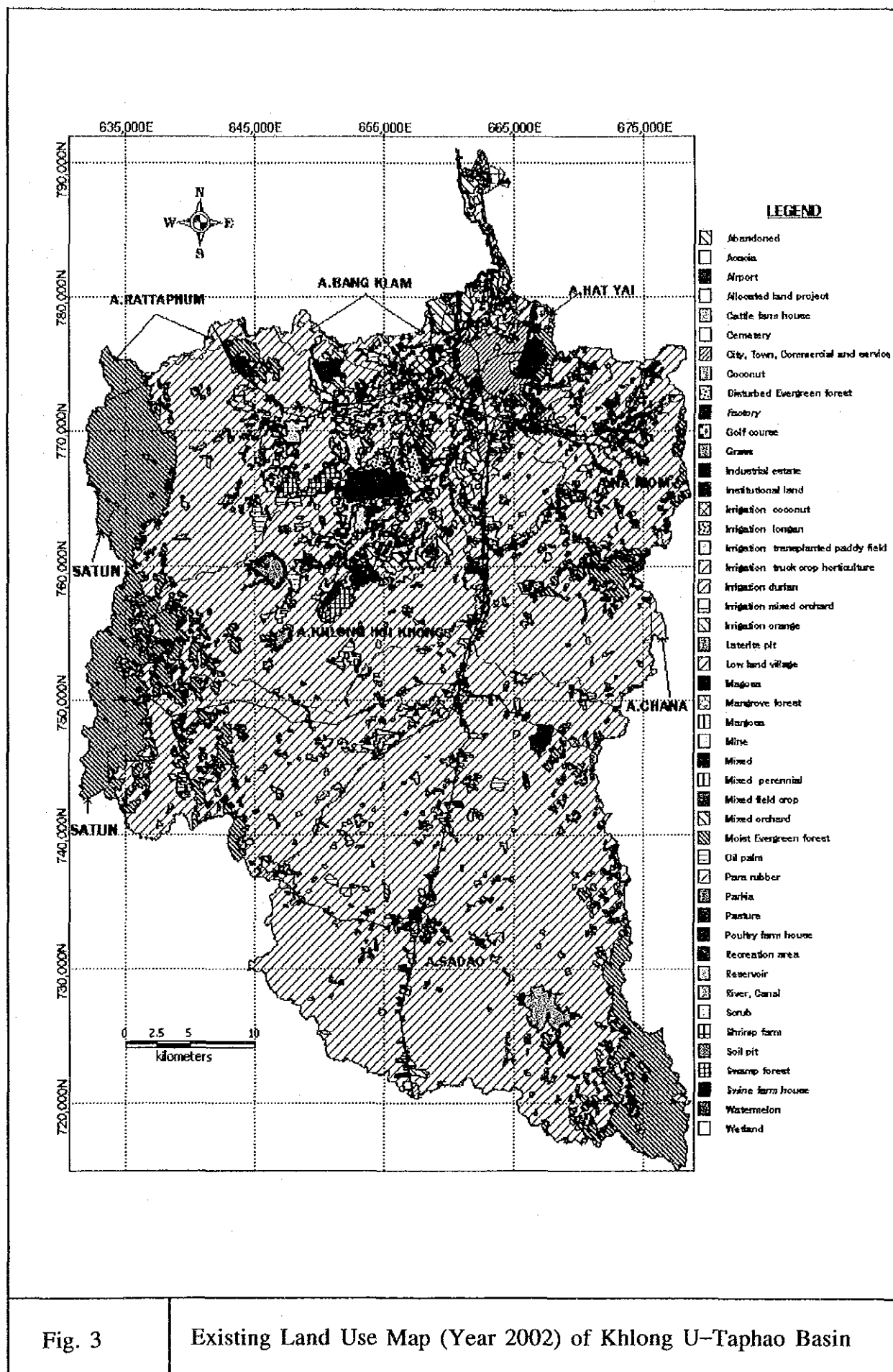


TABLE 30 EXISTING LAND USE IN YEAR 2002 OF KHLONG U-TAPHAO BASIN

| Symbol                             | Land Use                    | Area             |               |
|------------------------------------|-----------------------------|------------------|---------------|
|                                    |                             | Rai              | Percent       |
| <b>URBAN AND CONSTRUCTION AREA</b> |                             | <b>120,077</b>   | <b>8.809</b>  |
| U1                                 | Town and Commercial Area    | 21,225           | 1.557         |
| U200                               | Allocated Land Project      | 2,685            | 0.197         |
| U201                               | Lowland Village             | 70,442           | 5.168         |
| U3                                 | Institutional Land          | 12,462           | 0.914         |
| U401                               | Airport                     | 2,798            | 0.205         |
| U501                               | Industrial Estate           | 1,817            | 0.133         |
| U502                               | Industrial Factory          | 5,000            | 0.367         |
| U601                               | Recreation Area             | 525              | 0.039         |
| U602                               | Golf Course                 | 2,650            | 0.194         |
| U603                               | Cemetery                    | 473              | 0.035         |
| <b>AGRICULTURAL LAND</b>           |                             | <b>1,023,878</b> | <b>75.120</b> |
|                                    | Rice                        | 52,179           | 3.828         |
| A100                               | Abandoned Rice Land         | 35,660           | 2.616         |
| IA101                              | Irrigated Transplanted Rice | 16,519           | 1.212         |
|                                    | Upland Crops Land           | 2,103            | 0.154         |
| A200                               | Abandoned Upland Crop Land  | 1,523            | 0.112         |
| A201                               | Mixed Field Crops           | 327              | 0.024         |
| A220                               | Watermelon                  | 253              | 0.018         |
|                                    | Tree Crop Land              | 955,685          | 70.117        |
| A301                               | Mixed Tree Crops            | 62               | 0.005         |
| A302                               | Rubber                      | 943,923          | 69.254        |
| A303                               | Oil Palm                    | 11,700           | 0.858         |
|                                    | Fruit Crop Land             | 11,311           | 0.830         |
| A401                               | Mixed Orchards              | 2,668            | 0.196         |
| IA401                              | Irrigated Mixed Orchards    | 5,636            | 0.414         |
| IA402                              | Irrigated Citrus            | 708              | 0.052         |
| IA403                              | Irrigated Durian            | 181              | 0.013         |
| A405                               | Coconut                     | 1,809            | 0.133         |
| IA405                              | Irrigated Coconut           | 139              | 0.010         |
| IA413                              | Irrigated Longan            | 170              | 0.012         |
|                                    | Horticultural Land          | 63               | 0.005         |
| IA502                              | Irrigated Vegetables        | 63               | 0.005         |
|                                    | Pasture and Livestock       | 431              | 0.032         |
| A701                               | Pasture                     | 80               | 0.006         |
| A702                               | Cattle farm house           | 167              | 0.012         |
| A703                               | Poultry farm house          | 77               | 0.006         |
| A704                               | Swine farm house            | 107              | 0.008         |
|                                    | Aqua Culture                | 2,106            | 0.154         |
| A903                               | Shrim pond                  | 2,106            | 0.154         |

**TABLE 30 (Cont'd) EXISTING LAND USE IN YEAR 2002 OF KHLONG U-TAPHAO BASIN**

| Symbol                          | Land Use Area                       | Area             |                |
|---------------------------------|-------------------------------------|------------------|----------------|
|                                 |                                     | Rai              | Percent        |
| <b>FOREST</b>                   |                                     | <b>192,194</b>   | <b>14.101</b>  |
| F100                            | Evergreen Forest                    | 190,976          | 14.012         |
| F101                            | Disturbed Evergreen Forest          | 7,087            | 0.520          |
| F105                            | Moist Evergreen Forest              | 176,209          | 12.928         |
| F106                            | Swamp Forest                        | 6,834            | 0.502          |
|                                 | Mangrove Forest                     | 846              | 0.062          |
|                                 | Forestation                         | 1,218            | 0.089          |
| F301                            | Mixed Forestation                   | 273              | 0.020          |
| F306                            | Sadao Chang                         | 277              | 0.020          |
| F308                            | Kratin Thepa                        | 668              | 0.049          |
| <b>WATER BODY</b>               |                                     | <b>10,802</b>    | <b>0.793</b>   |
| W101                            | River/stream                        | 1,865            | 0.137          |
| W201                            | Reservoir                           | 8,937            | 0.656          |
| <b>MISCELLANEOUS LAND TYPES</b> |                                     | <b>16,038</b>    | <b>1.177</b>   |
| M101                            | Grass land                          | 604              | 0.044          |
| M102                            | Scrub                               | 1,393            | 0.102          |
| M2                              | Depression Swampy Area              | 5,041            | 0.370          |
| M300                            | Old Mine Land/Old<br>Excavated Land | 6,606            | 0.485          |
| M301                            | Mine land                           | 679              | 0.050          |
| M302                            | Borrow Lateritic pit                | 1,441            | 0.106          |
| M304                            | Borrow Soil pit                     | 128              | 0.009          |
| M404                            | Solid Waste land                    | 146              | 0.011          |
| <b>Total Area</b>               |                                     | <b>1,362,989</b> | <b>100.000</b> |

This unit also includes swamp forest and mangrove forest. Both are respectively found in depression area and in tidal flat of the basin.

- (4) **Water Body:** The unit includes rivers, streams and reservoirs, covering the total areas of 10,802 rai or 0.79 percent of basin. Important reservoirs are namely Khlong Sadao reservoir, Khai Senanarong reservoir, Khlong La reservoir and Khlong Chum Rai reservoir. These are for water supply and agriculture.
- (5) **Miscellaneous Land Types:** This unit has the extense of 16,038 rai or 1.17 percent of the basin. It includes various types of lands such as grass and scrub, depression, mine land, excavated borrows pits and sanitary landfill.

### 3.1.2 Hat Yai Municipality

Existing land use within the Municipality of Hat Yai shown in Figure 4 has four main landtypes as follows;

Urban and built up area  
Agricultural land  
Forest  
Water body  
Miscellaneous landtypes

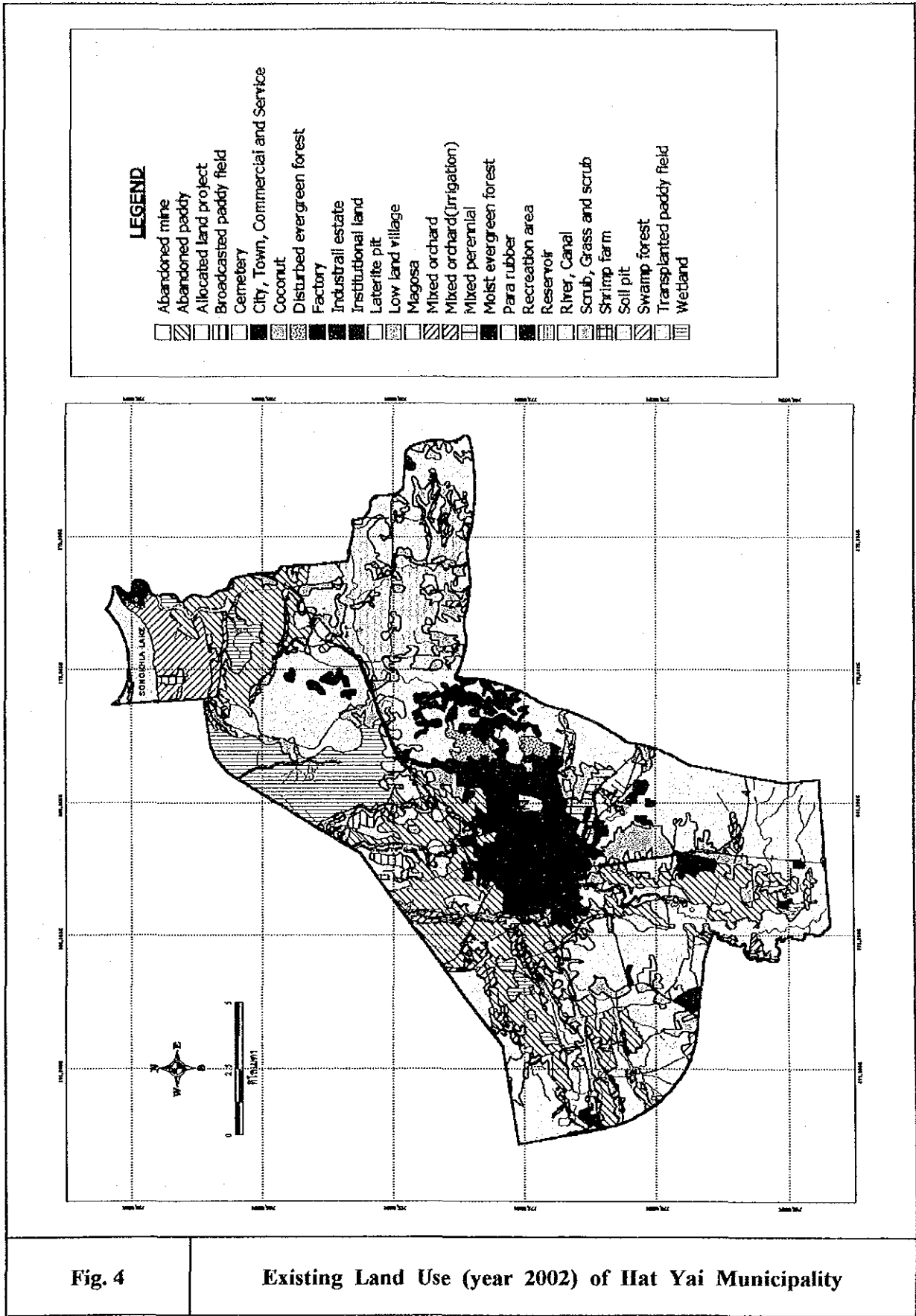
Details are tabulated in Table 31 and described as followings:

- (1) **Urban and Built Up Land:** It covers the land area of 10,535 rai or 6.62 percent of the study area. As of being the centers of commercial, transportation and tourism, Hat Yai Municipality grows very fast with more commercial centers and other service facilities. Apart from this, its population together with their residential becomes greater and greater, making the commercial zone and residential area being the biggest coverage of the town area. (about 12 in 15 percent of the Municipality area)

The rests of this unit include small areas of institution, industries, and recreation that are scattering located in the town and its surroundings.

- (2) **Agricultural Land:** This occupies the outer part covering about 43 percent of the municipality area. Para rubber (40.53 percent) is the greatest sub unit fallow by Riceland (22.73 percent), and orchards (5.43 percent)
- (3) **Forest Land:** Its area is about 5 percent of the municipality including moist evergreen forest on the mountain and swamp forest in the northern tidal area.
- (4) **Water Body:** This unit includes a part of Songkhla Lake in the north and other reservoirs around town covering area of some 2 percent of municipality.
- (5) **Miscellaneous Land:** It comprises mine land, borrow pits, grass, and wetland (in the north). The area is about 8 percent of the municipality.





**Table 31 Existing Land Use of Hat Yai Municipality**

| Land Use Types   | rai            | Percentage of total area |
|--|----------------|--------------------------|
| <b>1. Urban and Built up Land</b>                      |                |                          |
| 1.1 Town, commercial and high density residential area | 10,535         | 6.62                     |
| 1.2 Medium to low residential area                     | 8,971          | 5.64                     |
| 1.3 Allocated land project                             | 477            | 0.30                     |
| 1.4 Institutional land                                 | 2,847          | 1.79                     |
| 1.5 Industrial estate and factory                      | 687            | 0.44                     |
| 1.6 Recreation   | 84             | 0.05                     |
| 1.7 Cemetery   | 500            | 0.31                     |
| <b>Sub total</b>                                       | <b>24109</b>   | <b>15.15</b>             |
| <b>2. Agricultural Land</b>                            |                |                          |
| <b>2.1 Paddy Land</b>                                  |                |                          |
| 2.1.1 Broadcasted and transplanted                     | 10,067         | 6.33                     |
| 2.1.2 Abandoned Riceland                               | 26,089         | 16.40                    |
| <b>Sub total</b>                                       | <b>36,156</b>  | <b>22.73</b>             |
| <b>2.2 Tree Crop</b>                                   |                |                          |
| 2.2.1 Para rubber                                      | 64,480         | 40.53                    |
| 2.2.2 Mixed perennial                                  | 890            | 0.56                     |
| 2.2.3 Other (magosa)                                   | 52             | 0.03                     |
| <b>Sub total</b>                                       | <b>65,421</b>  | <b>41.12</b>             |
| <b>2.3 Orchards</b>                                    |                |                          |
| 2.3.1 Coconut  | 4,475          | 2.81                     |
| 2.3.2 Mixed or Chareds                                 | 4,155          | 2.62                     |
| <b>Sub total</b>                                       | <b>8,630</b>   | <b>5.43</b>              |
| <b>2.4 Shrimp Farm</b>                                 | <b>250</b>     | <b>0.16</b>              |
| <b>3. Forest Land</b>                                  |                |                          |
| 3.1 Moist Evergreen forest                             | 3,140          | 1.97                     |
| 3.2 Disturbed forest                                   | 1,168          | 0.73                     |
| 3.3 Swamp forest                                       | 3,688          | 2.32                     |
| <b>Sub total</b>                                       | <b>7,996</b>   | <b>5.02</b>              |
| <b>4. Water Body</b>                                   |                |                          |
| 4.1 Lake   | 3,313          | 2.08                     |
| 4.2 Reservoir  | 166            | 0.10                     |
| <b>Sub total</b>                                       | <b>3,479</b>   | <b>2.18</b>              |
| <b>5. Miscellaneous Land</b>                           |                |                          |
| 5.1 Abandoned mine                                     | 1,065          | 0.67                     |
| 5.2 Laterite and Soil pit                              | 262            | 0.16                     |
| 5.3 Scrub and grass                                    | 1,700          | 1.07                     |
| 5.4 Wetland  | 10,018         | 6.30                     |
| <b>Sub total</b>                                       | <b>13,045</b>  | <b>8.20</b>              |
| <b>Grand Total</b>                                     | <b>159,079</b> | <b>100.00</b>            |

### 3.1.3 Khlong Wa Basin

Khlong Wa basin is a part of Khlong U-Taphao basin having four main land use types as shown in Existing Land Use Map in Figure 5 namely:

|                         |        |     |          |
|-------------------------|--------|-----|----------|
| Urban and built up land | 1,434  | rai | (1.90%)  |
| Agricultural land       | 69,244 | rai | (92.30%) |
| Forest land             | 2,556  | rai | (3.40%)  |
| Miscellaneous land      | 1,825  | rai | (2.40%)  |
| Total Basin Area        | 75,059 | rai | (100%)   |

Details are shown in Table 32 and described as follows:

(1) **Urban and Built up Land:** The unit area is 1,434 rai or 1.90 percent of the basin. It composes of four sub units namely:

town and commercial area  
lowland villages  
institutional land  
industrial factory

- **Town and Commercial Land:** Most is located in Tambon Kho Hong of Amphoe Hat Yai, the western portion of the basin occupying the area of only 230 rai or 0.3 percent of the basin.
- **Lowland Villages:** This unit has the area of 1,014 rai or 0.35 percent of the basin. It is mostly scattering located along roads and streams. Within the unit, coconut and some fruit trees are normally grown as the homestead garden.
- **Institutional Land:** It is the built up land for the government and sanitary offices and schools. The total area is about 40 rai or 0.05 percent of the basin.
- **Industrial Factory:** The unit is found in the western portion of the basin next to Hat Yai Municipality. Its coverage is some 150 rai or 0.20 percent of the basin.

(2) **Agricultural Land:** This unit occupies the largest area of 69,244 rai or 92.3 percent of the basin. It is subdivided into three sub units namely, rice land, tree crop and fruit tree. Among these, para rubber has the greatest area of 53,152 rai or 70.8 percent of the basin while the rests of rice land, mixed orchards and coconut have nearly equal areas between 6 to 9 percent of the basin.

(3) **Forest Land:** Total area is 2,556 rai or 3.4 percent of the basin. It is moist evergreen forest found on the mountain in the eastern basin boundary.



**Table 32 Existing Land Use of Khlong Wa Basin**

| Land Use Types                           | Area          |                  |
|--|---------------|------------------|
|  | Rai           | Percent of Basin |
| <b>1. <u>Urban and Built up Land</u></b> |               |                  |
| 1.1 Town and Commercial                  | 230           | 0.30             |
| 1.2 Lowland Village                      | 1,014         | 0.35             |
| 1.3 Institutional Land                   | 40            | 0.05             |
| 1.4 Industrial Factory                   | 150           | 0.20             |
| <b>Sub total</b>                         | <b>1,434</b>  | <b>1.90</b>      |
| <b>2. <u>Agricultural Land</u></b>       |               |                  |
| 2.1 <u>Rice Land</u>                     |               |                  |
| 2.1.1 Abandoned                          | 2,000         | 2.6              |
| 2.1.2 Irrigated                          | 2,378         | 3.2              |
| <b>Sub total</b>                         | <b>4,378</b>  | <b>5.8</b>       |
| 2.2 <u>Tree Crop</u>                     |               |                  |
| 2.2.1 Mixed Tree Crop                    | 856           | 1.2              |
| 2.2.2 Para rubber                        | 53,132        | 70.8             |
| <b>Sub total</b>                         | <b>53,988</b> | <b>72.0</b>      |
| 2.3 <u>Fruit Crop</u>                    |               |                  |
| 2.3.1 Mixed Orchards                     | 4,278         | 5.7              |
| 2.3.2 Coconut                            | 6,600         | 8.8              |
| <b>Sub total</b>                         | <b>10,878</b> | <b>14.5</b>      |
| <b>Total Agricultural Land</b>           | <b>69,244</b> | <b>92.3</b>      |
| <b>3. Forest: Moist Evergreen</b>        | <b>2,556</b>  | <b>3.4</b>       |
| <b>4. <u>Miscellaneous Land</u></b>      |               |                  |
| 4.1 Grass and Scrub                      | 696           | 0.9              |
| 4.2 Old mine and Pit                     | 1,129         | 1.5              |
| <b>Sub total</b>                         | <b>1,825</b>  | <b>2.4</b>       |
| <b>Total Basin Area</b>                  | <b>75,059</b> | <b>100.0</b>     |

- (4) **Miscellaneous Lands:** It includes the grass land, scrub, old mine and various soil borrow pits, making up to 1,825 rai or 2.4 percent of the basin. Most of these are unproductive agricultural lands.

## 3.2 FUTURE LAND USE

### 3.2.1 Land Use Development Plan in Khlong U-Taphao Basin

To mitigate flood hazards in the basin, suitable land use planning is considered a good preventive measure among some others. To achieve an appropriate comprehensive plan for flood damage mitigation in Khlong U-Taphao basin, Land Development Department is now studying to undertake land use development plan of this basin area. Various concerning data having been assembled, surveyed and analyzed are namely: existing land use, soil data, agricultural development, water source development, Socio-economic condition, community development plan, Hat Yai Town plan, etc. By now, draft final report is going to be finished very soon. However, draft land use zonings have been figured out as shown in Figure 6. It can be summarized as follows:

There are 7 zones including:

Forest zone  
Agricultural zone  
Seashore aqua-cultural zone  
Urban and built up land zone  
Industrial zone  
Water Development zone  
Tourism zone

Details of subzones and area coverage are presented in Table 33.

- (1) **Forest Zone:** It is found on mountainous area mostly in the western, eastern and south eastern basin boundaries. Total area is 377,592 rai or 27.70 percent of the basin. It is subdivided into three subzones namely:

|                                      |         |     |          |
|--------------------------------------|---------|-----|----------|
| - Preservation and conservation zone | 222,945 | rai | (16.35%) |
| - Economical forest zone             | 94,689  | rai | (6.95%)  |
| - Agroforest zone                    | 59,958  | rai | (4.40%)  |

- a) **Preservation and Conservation Zone:** It is still fertile forest that should be preserved and conserved. Where it has been deteriorated, reforestation should be executed.
- b) **Economical Forest Zone:** This type is for timbering or for a forest concession. It may be still fertile or unfertile. The declined one should be replanted.

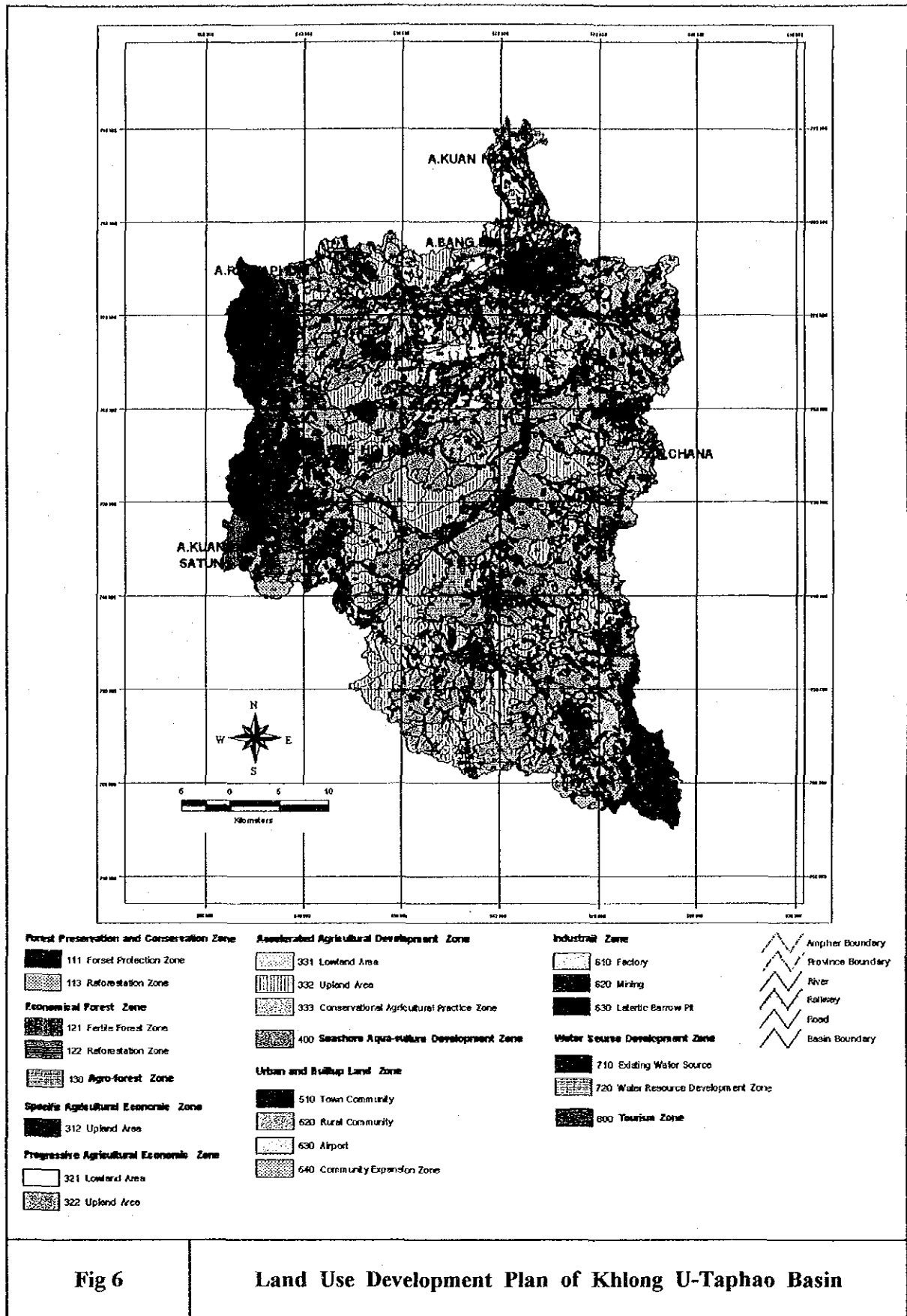


Fig 6

Land Use Development Plan of Khlong U-Taphao Basin

**Table 33 Land Use Zonings of Khlong U-Taphao Basin**

| Symbol     | Zonings   | Area             |               |
|------------|---|------------------|---------------|
|            |   | rai              | percentage    |
| <b>100</b> | <b><u>FOREST ZONE</u></b>                               |                  |               |
| <b>110</b> | <b><u>Preservation and Conservation Zone</u></b>        |                  |               |
| 111        | Forest Protection Zone                                  | 131,295          | 9.63          |
| 113        | Reforestation Zone                                      | 91,650           | 6.72          |
| <b>120</b> | <b><u>Economical Forest Zone</u></b>                    |                  |               |
| 121        | Fertile Forest Zone                                     | 50,872           | 3.73          |
| 122        | Economical Reforestation Zone                           | 43,817           | 3.22          |
| <b>130</b> | <b><u>Agroforestry Zone</u></b>                         | 59,958           | 4.40          |
| <b>300</b> | <b><u>AGRICULTURAL ZONE</u></b>                         |                  |               |
| <b>310</b> | <b><u>Specific Agricultural Economic Zone</u></b>       |                  |               |
| 312        | Upland Area   | 5,865            | 0.43          |
| <b>320</b> | <b><u>Progressive Agricultural Economic Zone</u></b>    |                  |               |
| 321        | Lowland Area  | 43,939           | 3.22          |
| 322        | Upland Area   | 417,336          | 30.62         |
| <b>330</b> | <b><u>Accelerated Agricultural Development Zone</u></b> |                  |               |
| 331        | Lowland Area  | 9,313            | 0.68          |
| 332        | Upland Area   | 282,423          | 20.72         |
| 333        | Conservation Agricultural Practice Zone                 | 73,690           | 5.41          |
| <b>400</b> | <b><u>SEASHORE AQUA-CULTURE DEVELOPMENT ZONE</u></b>    | 2,104            | 0.15          |
| <b>500</b> | <b><u>URBAN AND BUILTUP LAND ZONE</u></b>               |                  |               |
| 510        | Town Community  | 26,991           | 1.98          |
| 520        | Rural Community   | 77,175           | 5.66          |
| 530        | Airport   | 5,541            | 0.41          |
| 540        | Community Expansion Zone                                |                  |               |
| <b>600</b> | <b><u>INDUSTRIAL ZONE</u></b>                           |                  |               |
| 610        | Industrial Factory                                      | 6,511            | 0.48          |
| 620        | Mining  | 960              | 0.07          |
| 630        | Lateritic Borrow Pit                                    | 1,420            | 0.10          |
| <b>700</b> | <b><u>WATER SOURCE DEVELOPMENT ZONE</u></b>             |                  |               |
| 710        | Existing Water Source                                   | 10,794           | 0.79          |
| 720        | Water Source Development Zone                           | 4,759            | 0.35          |
| <b>800</b> | <b><u>TOURISM ZONE</u></b>                              | 3,115            | 0.23          |
|            | <b>TOTAL AREA</b>                                       | <b>1,362,989</b> | <b>100.00</b> |



c) **Agroforest Zone:** This unit has fertile soils suitable for agriculture. By law, it is still the state forest which had been deteriorated for agriculture. It is permitted for agricultural executing under state regulations

(2) **Agricultural Zone:** Total area is 832,566 rai or 61.08 percent of the basin. According to degree of agricultural potential it is subdivided into three subzones as follows:

|   |         |     |          |
|---|---------|-----|----------|
| Specific agricultural economic zone       | 5,865   | rai | (0.43%)  |
| Progressive agricultural economic zone    | 461,275 | rai | (33.84%) |
| Accelerated agricultural improvement zone | 365,426 | rai | (26.81%) |

a) **Specific Agricultural Economic Zone:** It includes the lands having good soils, complete irrigation schemes, good transportation and being close to markets or agro-industrial factories. It should be grown with specific crops that give high return and can be exported.

b) **Progressive Agricultural Economic Zone:** This zone has somewhat lower potential than the first but still gives somewhat high return. There are some problems on land resources that can be solved and improved by farmers themselves.

c) **Accelerated Agricultural Development Zone:** This zone, even having poor soils, is still necessary to use for agriculture. High cost is needed to correct problems. Farmers need help from concerning agencies to improve land use and specific management in the area.

(3) **Seashore Aqua-culture Development Zone:** The lowland close to Songkhla lake is classified into this unit due to being suitable for such aqua-culture as shrimp pond or fish-pond. The coverage area is 2,104 rai or 0.15 percent of the basin.

(4) **Urban and Built up Land Zone:** It includes:

|                          |        |     |         |
|--------------------------|--------|-----|---------|
| town community           | 26,991 | rai | (1.98%) |
| rural community          | 77,175 | rai | (5.66%) |
| airport                  | 5,541  | rai | (0.41%) |
| community expansion zone | 13,423 | rai | (0.98%) |

Town community zone like Hat Yai includes commercial area and dense residential buildings and homelots. There are a lot of services and facilities. The rural community, opposite to the town, consists of rural villages. Population and residents are fewer. For the air transportation in this basin, Hat Yai International Airport is very important situated in Amphoe Bang Klam.

The community expansion is very important issue to study due to it shows the direction of community growing. Trends of expansion extend along

highways and roads around the town of Hat Yai especially in Tambon Ban Phru, Tambon Tha Chang and Tambon Khlong Hae.

- (5) **Industrial Zone:** The unit includes industrial estates and factories. Areas suitable for this zone are in Tambon Tha Chang, the west of Hat Yai and Tambon Thung Larn, Tambon Ban Phru along highway No.4, the south of Hat Yai.
- (6) **Water Source Development Zone:** It includes the three existing reservoirs namely Khlong Sadao reservoir in Sadao district, Khlong La reservoir and Khlong Hoi Khong weir in Khlong Hoi Khong district.

For water source development plan to mitigate floods and for other objectives, there are at least six reservoirs of RID which are now under studying including the reservoirs of Khlong Tam, Khlong Toan Nga Chang, Khlong Tong, Khlong Lam, Khlong Lapang and Khlong Rian.

In Khlong Wa basin, the upper Khlong Wa reservoir and Phru Phli Khwai retarding basin in Amphoe Na Mom are now under the study of JICA.

- (7) **Tourism Zone:** There are many recreation places for tourists. But the significant ones are Toan Nga Chang waterfalls, recreation areas in Tambon Thung Tam Sao and Tambon Ban Phru.

### 3.2.2 Town Plan of Hat Yai Municipality

- (1) **Area Coverage:** According to the ministerial regulations No. 452 (B.E.2543), the comprehensive plan covers 10 tambon (T.) of Hat Yai district, two tambon of Bang Klam district and one tambon of Na Mom district as follows:

Hat Yai district

- T. Nam Noi, T. Khu Tao
- T. Tha Kham, T. Khlong Hae
- T. Thung Yai, T. Kho Hong
- T. Khuan Lang, T. Cha Loong
- T. Thung Tam Sao, T. Ban Phru

Bang Klam district

- T. Mae Thom
- T. Tha Chang

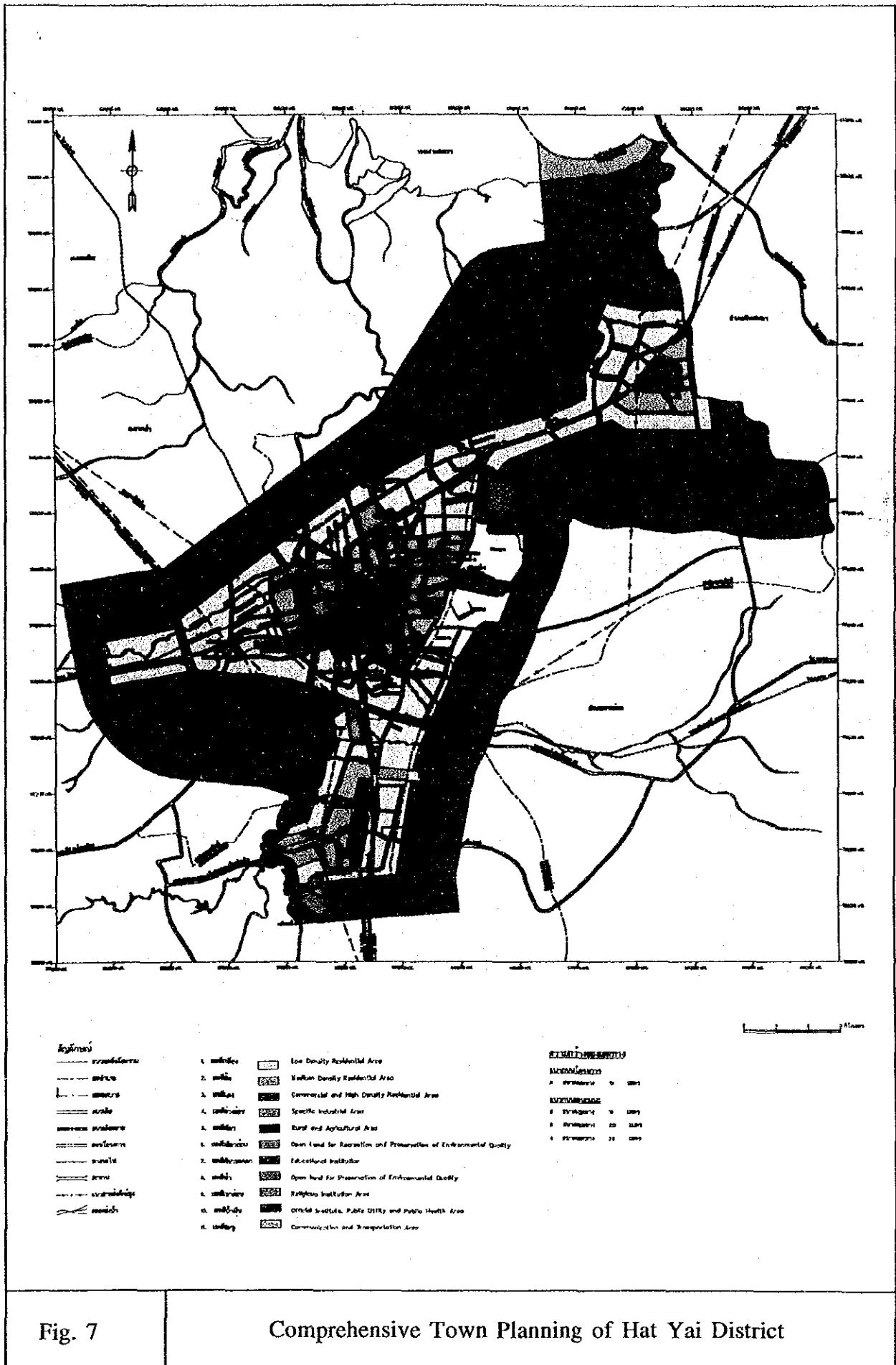
Na Mom district

- T. Na Mom

Map showing the comprehensive plan is in Figure 7.

- (2) **Objectives:** This comprehensive town plan has following objectives:

- 1) to make the town become the center of economical prosper of southern Thailand, the center of communication and transportation, commerce and services.



- 2) to promote tourism, export industry and other industries that use local resources.
  - 3) to develop appropriate social services, public utilities and public health.
  - 4) to conserve natural resources and maintain environmental quality.
- (3) **Land Use Zonings:** The lands are divided into 11 Zones on the consideration of existing condition with the probable changes in the future. The map shows the legend by colors as follows:
- 1) yellow zone: low-density residential area.
  - 2) orange zone: medium density residential area.
  - 3) red zone: commercial and high density residential area.
  - 4) light purple zone: specific industrial area.
  - 5) green zone: rural and agricultural area.
  - 6) light green zone: open land for recreation and preservation of environmental quality.
  - 7) olive zone: educational institution area
  - 8) sky-blue zone: open land and preservation of environmental quality
  - 9) light gray zone: religious institution area
  - 10) Marine blue zone: official institute, public utilities and public health
  - 11) pink zone: communication and transportation area

To use the lands for any purpose in each zone, it has to follow guidelines stated in the ministerial regulation No. 452 (B.E. 2543)

### 3.2.3 Town Plan of Na Mom District

The town plan of Na Mom district is not prepared yet. It may be due to the whole area of Na Mom district is not under such local administrations as neither municipality nor sanitation. It is obvious that the vicinity center of Na Mom district in which the important local government head offices such as the district head office, the police station having been located is just a small area similar to other rural villages. The center of the village is under the local administration of tambon Na Mom Administration Organization (Or. Bor. Tor., or T.A.O).

However, for the view of urban planning, it is assumed that future expansion trend of the village should be the area along the highway No.43 which is high beyond the floodway of Khlong Wa basin.