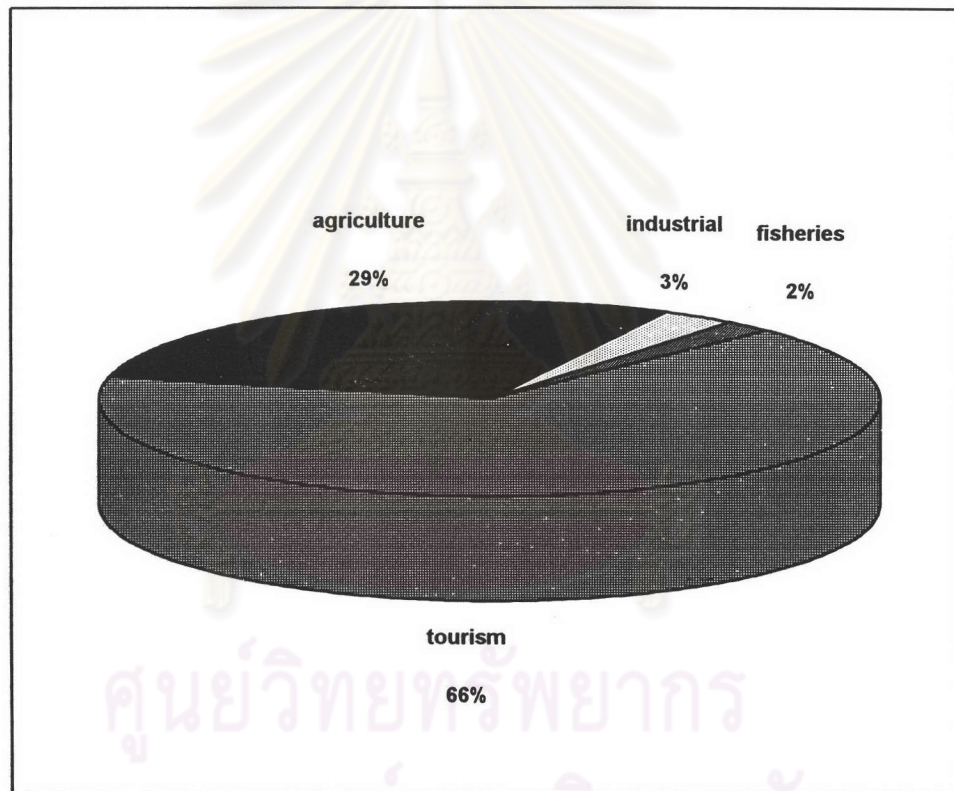


## CHAPTER IV

### IMPACT OF TOURISM EVALUATION

Since 1988, Ko Samui economics have been depended on tourism industries. The portion is shown in Figure 4.1.

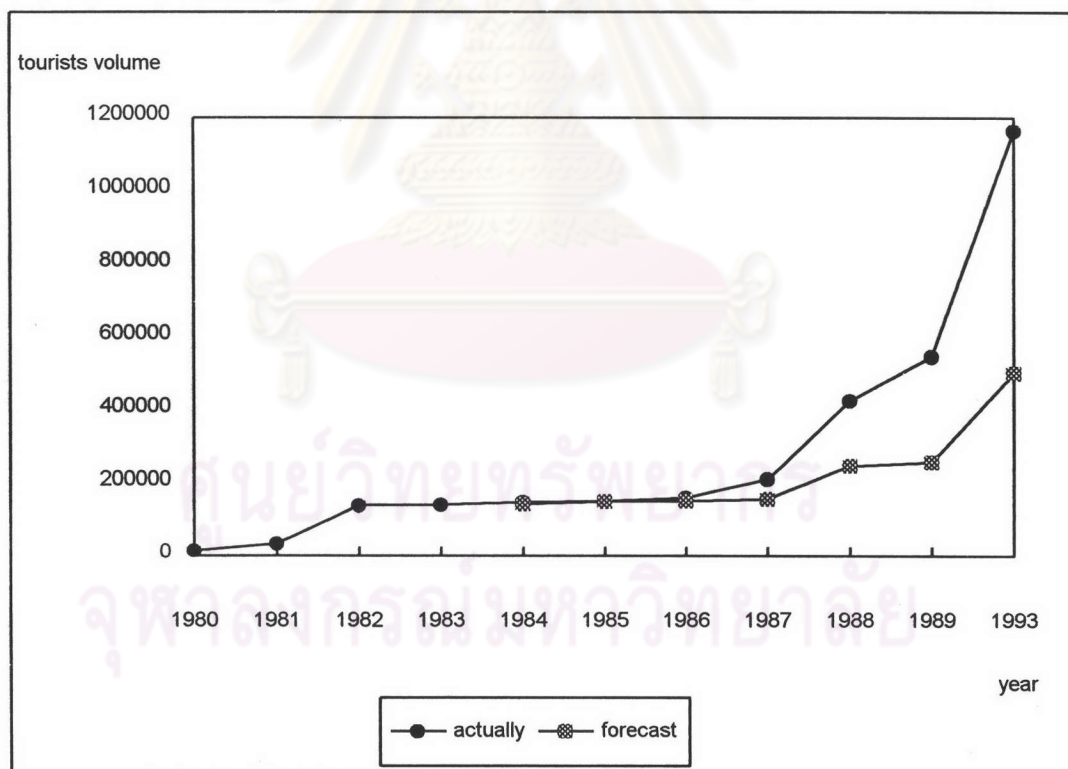


**Figure 4.1** Ko Samui economics in 1988

Tourism has the important rule for the island incomes. Because tourism industries play the role of economic catalyst in multiplier effect characteristic. It is the motivation of relative business investment. There was development plan to make this island as an important tourism place in this region. The scope of development was performed in the

master plan of tourism which will develop Ko Samui is the tourism place in Surat-thani province and the international standard center of marine tourism (TISTR, 1988). The master plan has carrying capacity for development supply, and the basis of sustainable development. Carrying capacity for tourism development refer to capacity of tourism supply in the number of people in every time that natural and environment were at least damaged. Infrastructure accessibility should enough for tourists need.

Recently, Ko Samui has been developed over its carrying capacity considered by the tourists volume and the number of resorts. The comparison of the present tourists volume and the prediction (Figure 4.2) show the number of tourists is greater than the estimation. A number of travelers have been more than prediction since 1986.



**Figure 4.2** the comparison of tourists volume prediction and actual

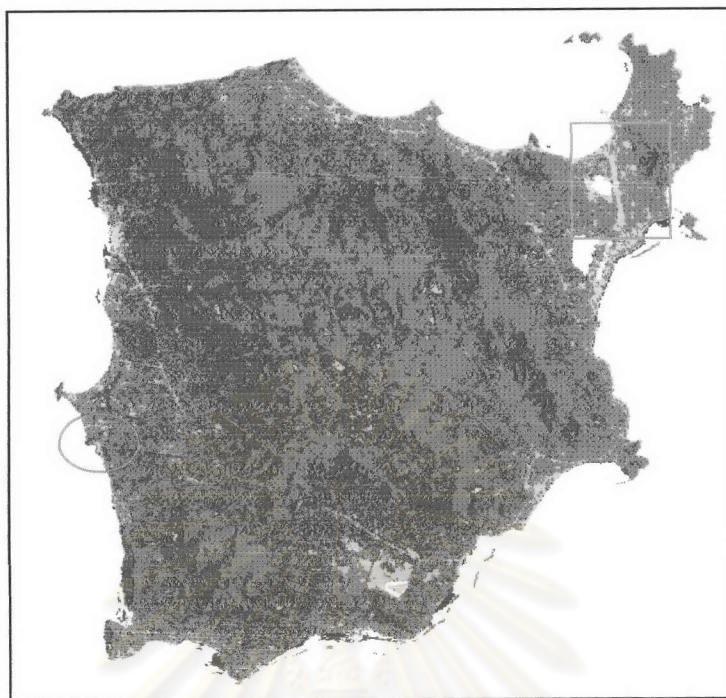
The numbers of tourist in 2001 was predicted to be 1,114,893 visitors (TISTR, 1988) but the actual figure 1,163,401 tourists since 1993 (TAT, 1994). The island has capacity for resorts less than 4,500 rooms in 1994, there were exactly 7,033 rooms in 1995.

Both tourists and resorts volume are over expectancy. The resources and environment were highly used. Tourism expansion greater than suitable area has generated many problems. The major problems in Ko Samui are land use change and environmental degradation.

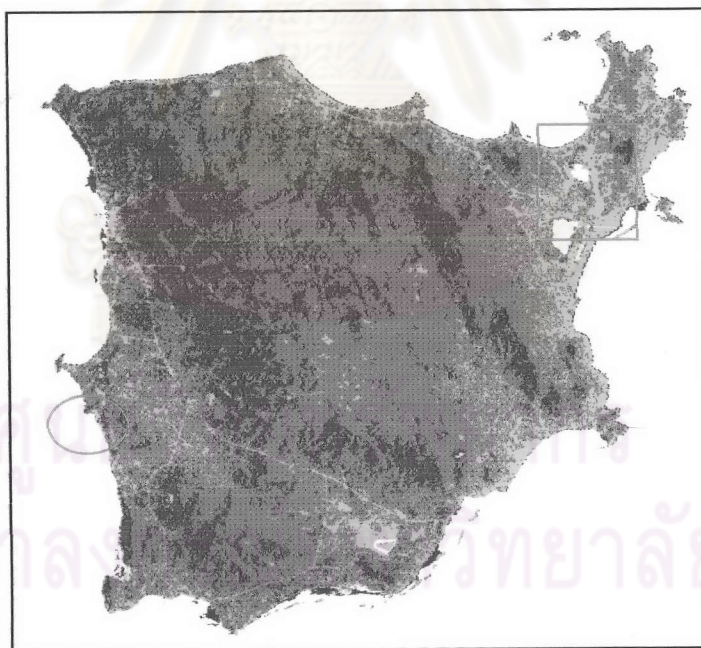
### **Impact on Land Use Change**

In the past, tourism of Ko Samui began in the area of Chaweng beach and expanded over others areas. The major factors for tourism expansion access to beach area were the ferry port and the airport. Plate 4.1 showed the expansion of tourism area during 1988 to 1994. Resorts and bungalows in the area of ferry port and airport were less expanded in 1988 and increased in 1994. Tourism not only arise in ferry port and airport area but it also expanded follow as the road line. Therefore, the area of every beaches around the island are now fullness of bungalows and resorts.

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(a)



(b)



Remark      ○ : Ferry Port  
                 □ : Airport

Plate 4.1 Ferry port and airport (a) 1988, (b) 1994

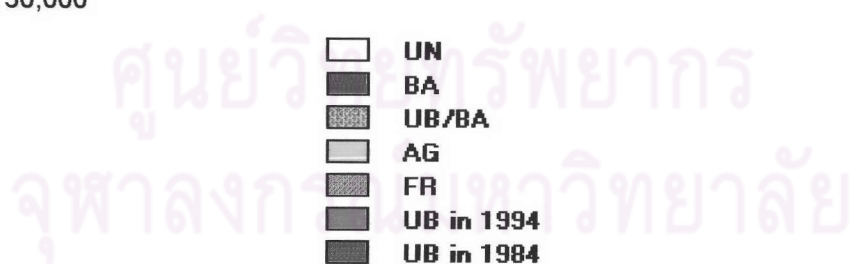
Plate 4.2 shows land use change and most of land cover types were changed to tourism area. The types of changes have two main kinds. First, absolutely change, coconut fields (agricultural area) were clear cut for tourism area and was the major changed of Ko Samui that identified in satellite image. Second, some of area such as Lamai Beach has mixed use between coconut plantations and bungalows (Figure 4.3). This mixed use is the example for the compromise between tourism development and environmental concern. Because the original area was not absolutely developed.



**Figure 4.3** Mixed land use between coconut plantation and bungalow at Lamai Beach  
(from ground truthing in January 1996)



scale 1:150,000



|               |            |   |
|---------------|------------|---|
| <b>Remark</b> | UN         | : unclassified                                  |
|               | BA         | : beach area in 1988                            |
|               | UB/BA      | : urban area in 1994 located in 1988 beach area |
|               | AG         | : agricultural area in 1988                     |
|               | FR         | : forest area in 1988                           |
|               | UB in 1994 | : urban area expansion in 1994                  |
|               | UB in 1988 | : urban area in 1988                            |

**Plate 4.2** Cross-tabulation between urban area in 1994 and 1988 classified image

When comparison between urban area in 1994 and land use in 1988 by cross-tabulation technique found the rate of land use change for individual types (Table 4.1).

**Table 4.1** cross-tabulation between UB category in 1994 and classified image in 1988

| land cover in 1988 | UB in 1994 (pixel) | land use change (km <sup>2</sup> ) |
|--------------------|--------------------|------------------------------------|
| BE                 | 6512               | 4.07                               |
| AG                 | 21712              | 13.57                              |
| FR                 | 13376              | 8.36                               |
| Total              | 41600              | 26                                 |

Whereas the comparison of the tourism development potential area and the classified image in 1994 show the present development. The development expanded greater than the potential area. This means that it is over carrying capacity. TISTR (1988) reported the prediction of the tourism expansion should be cover the potential area in 2001. But in 1994 tourism has been developed more than the expectancy.

### Impact on Environment

Environmental impact is partly caused by land use change. Tourism impact on environment can be discussed in major topic as.

1. Sandy beach accessibility problems cause by the closely packed of the resort constructions. Several beaches have highly of seaside building (Figure 4.4), for example Chaweng, Lamai, Maenam and Bo Phut beach. Chaweng beach has the highest density of resort's rooms, so this beach has many problems.

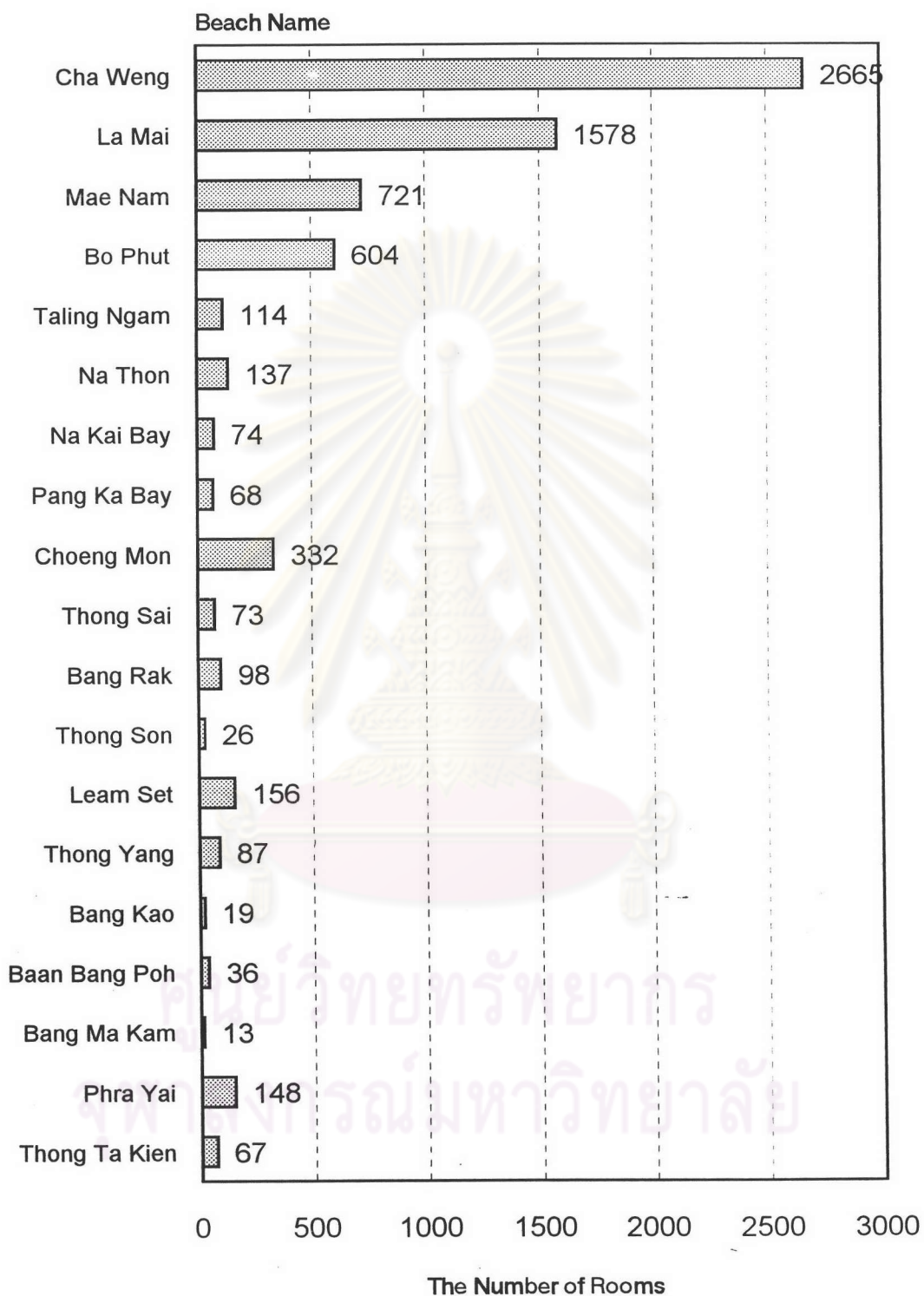


Figure 4.4 The distribution of resorts in Ko Samui



2. Sandy beach was encroached from many of resort buildings. Sandy beach is important for coastal ecology and economic development of the country. In ecology, sandy beach can reduce the intense of wave and current to coastal, and it is the generation source of some flora. In transportation, beach can be developed to harbor. It become as the door of marine transportation. Taling-ngam Bay and Na Thon beach have ferry port for tourism support. In tourism, sandy beach is the recreational place and make the economic incomes. Sandy beach has been changed for tourism site.

3. The lack of water supply is the important problem for tourism area. Ko Samui has a little of surface water supply. Tourism areas in Ko Samui are mainly dependent on ground water supply. When the tourism highly expanded, then the lack of water supply has been arisen.

4. Solid wastes are the problem for every site of tourism. This island is no the method and the disposal site for solid wastes disposal. Solid wastes are disposed in coconut plantations with unburied, and so much of these wastes are washed down during heavy monsoon rains. In the future, these solid wastes might be the impact on people health and environment.

5. Wastewater from resorts discharge to marine water. Marine water quality is indicator of coastal resources diversity such as coral reef, mangrove and many of organisms. Because marine water is the habitat of the organisms and make coastal ecosystem has been equilibrium (Office of Environmental Policy and Planning : OEPP, 1996). Pollution Control Department (1996) describe that the water quality of many tourism places have degradation trend. They are effect of solid wastes and wastewater from tourism area. The most of untreated wastewater will discharge directly to marine water. PCD (1996) report that there is 2,700 MPN/100 ml coliform bacteria in the area of Chaweng and Lamai Beach. It indicate that marine water was contaminated by domestic waste. These are cause of impact on coastal resources, namely water quality change, marine ecology damage and coastal environmental degradation.

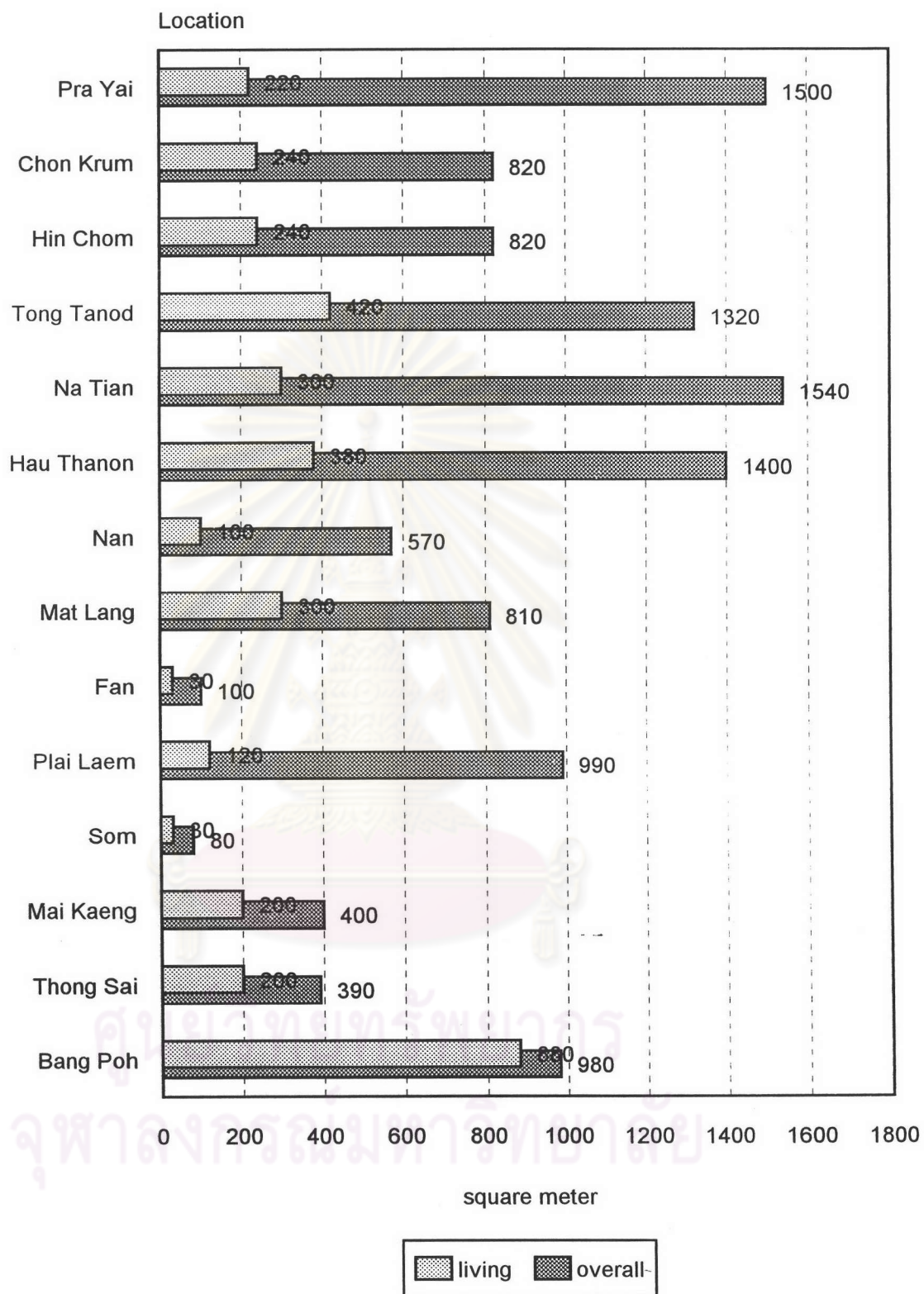
6. Coral reef ecosystem degrades from tourism activities and wastes. The benefits of coral reefs are the habitat of many marine organisms, marine fisheries source, the food spot for marine biota, the natural barrier for protect seashore from wave and current, and the attractive place for tourism. Ko Samui has a large of coral reef ecology around the island but lately, coral reefs are degraded and damaged status (Figure 4.5). Tourism is the major cause for reefs degeneration that can describe as :

- reefs collection directly from tourists
- reefs collection for trade
- coral reefs damaged from anchor
- coral reefs degraded from tourism area wastewater.

Since radiation is necessary for reef, these coral reefs usually locate at shallow water and nearly seashore that can receive sufficient radiation. When wastewater discharge from tourism area directly to marine water, it generate the turbid water. The turbidity is the radiation resistant. Reefs can not have photosynthesis, so they will die and have impact on other organism within this ecology.



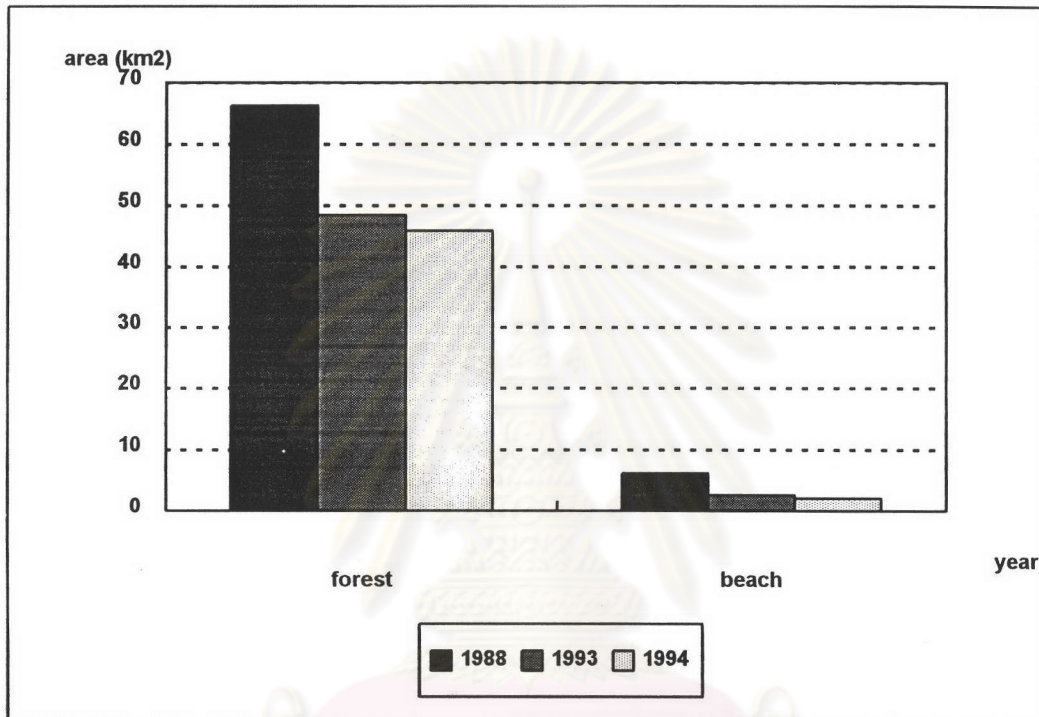
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**Figure 4.5** The overall and living coral reef area at Ko Samui in 1988

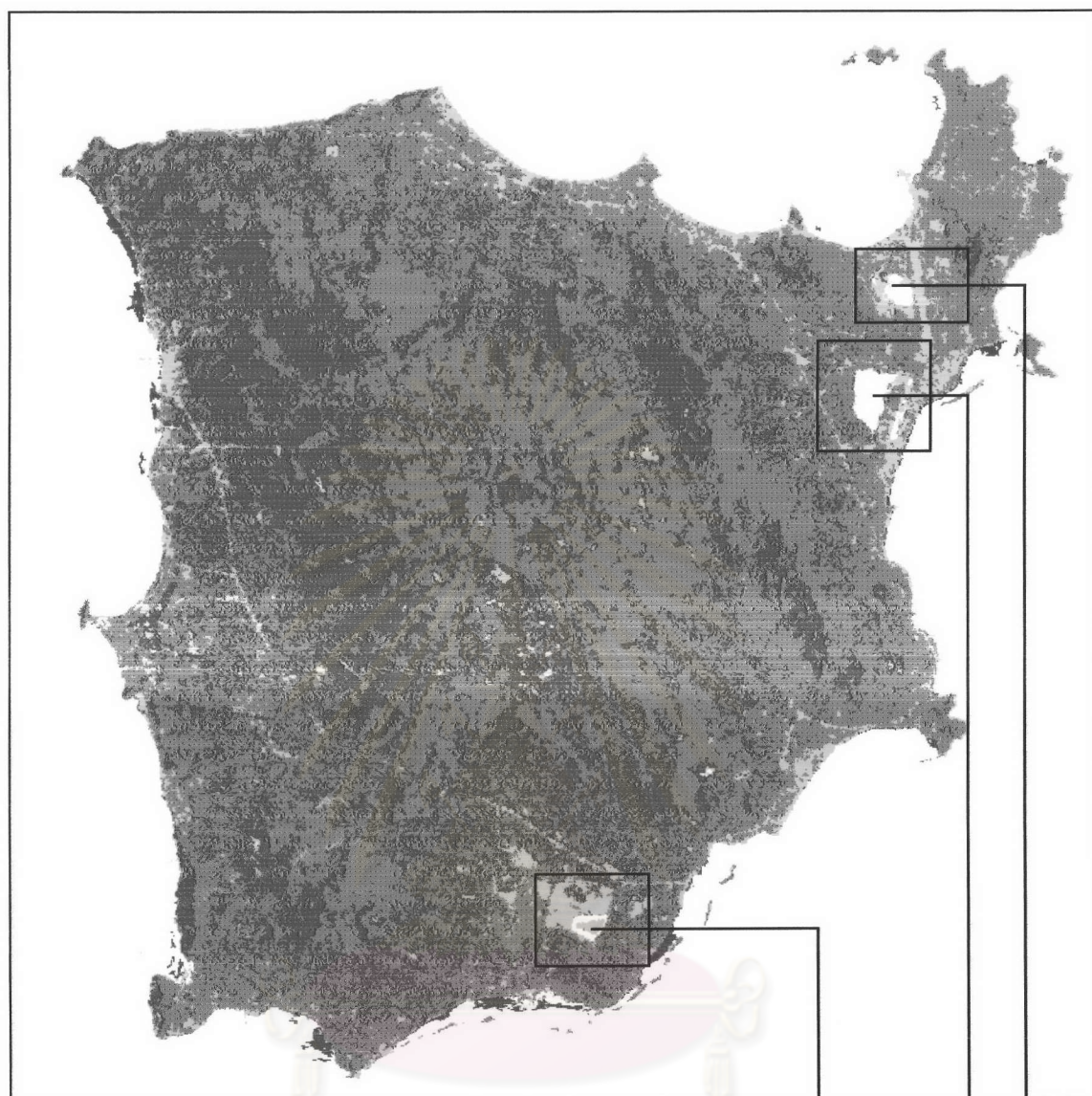
(source : Thamrongnavasawat, 1991)

7. Public areas, forest and beach area, were encroached. From satellite data in chapter 3 illustrate the lessen forest and beach area have been developed for tourism. These areas have the decrease tendency from 1988 to 1994 (Figure 4.6)



**Figure 4.6** the depletion trend of public area

8. Swamp areas were encroached. Ko Samui has many swamps such as Ban Han Swamp, Chaweng Swamp, and Bang Rak Swamp that located near the tourism place. Since 1983 these swamps declined both of quantity and quality. The area of three swamp decreased more than 50% (Table 4.2). Land use around these areas were identified as urban area (Plate 4.3). So, the swamps were encroached by tourism expansion.



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3

1 : Ban Han Swamp

2 : Chaweng Swamp

3 : Bang Rak Swamp

**Plate 4.3** Swamp area in 1988 classified image

**Table 4.2** The swamps area during 1983-1994

| Swamp name     | Swamp area (km <sup>2</sup> ) |        |         |
|----------------|-------------------------------|--------|---------|
|                | 1983*                         | 1988** | 1994*** |
| Ban Han Swamp  | 4.29                          | 0.35   | 0.17    |
| Chaweng Swamp  | 1.53                          | 0.926  | 0.706   |
| Bang Rak Swamp | 1.00                          | 0.45   | 0.25    |

**Remark** \* : from 1:50,000 topographical map

\*\* : from 1988 classified image

\*\*\* : from 1994 classified image

**Figure 4.7** Swamp area at Chaweng Beach (From ground truthing in January 1996)

Furthermore, the diversity in this swamp is likely to be decreased (Figure 4.7). This, thus, could indicate that the quality of swamps are depleted partly caused by tourism expansion.



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