

# **DRAMATIC CHANGE IN SHRIMP CULTURE IN THAILAND**

by

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## **1. INTRODUCTION**

Thailand conducted its first marine fishery census in 1967 and its second census in 1985. Owing to the rapid expansion of shrimp farming and aquaculture, the National Statistical Office (NSO) and the Department of Fisheries (DOF) deemed it necessary to conduct the third census in 1995.

With the expanded world market, the export of farmed shrimp has played a major role in the Thai economy. The rapid increase of shrimp export made this new commodity outrank, in value, rice and rubber, the traditional export commodities of Thailand. The values of annual shrimp export for 1993, 1994 and 1995 amounted to 38,622; 49,847 and 51,246 million Baht, respectively, whereas those of rice came to 32,959, 39,187 and 48,627 million Baht, respectively. Anticipating the interest of planners and entrepreneurs, this document of the National Statistical Office is devoted exclusively to shrimp culture statistics.

The 1995 marine fishery census set out the following two distinctive objectives:

- a) to collect data on basic economic structure of marine capture fishery, coastal aquaculture and socio-economic characteristics of fishery households, fishery employees' households, fishermen and aquaculture workers; and
- b) to provide data as a sampling frame of other related surveys.

The census dealt mainly with marine capture fishery and coastal shrimp culture. The census covered all households and establishments conducting these activities, the households of their employees within and outside the municipal areas of the 24 coastal provinces of Thailand. The households of foreign employees were excluded from the census. For the purpose of the census, the coastal provinces were divided into five coastal zones:

Coastal Zone 1 (Eastern part of the Gulf of Thailand) consisting of three provinces: Trat, Chanthaburi and Rayong;

Coastal Zone 2 (Inner part of the Gulf of Thailand) consisting of seven provinces: Chon Buri, Chachoengsuo, Samut Prakan, Bangkok Metropolis, Samut Sakhon, Samut Songkhram, and Phetchaburi;

Coastal Zone 3 (Central part of the Gulf of Thailand) consisting of five provinces: Prachaup Khiri Khan, Chumphon, and Surat Thani;

**Coastal Zone 4 (Southern part of the Gulf of Thailand) consisting of five provinces: Nakhon Si Thammarat, Phatthalung, Songkhla, Pattani, and Narathiwat;**

**Coastal Zone 5 (Andaman Sea) consisting of six provinces: Ranong, Phangnga, Phuket, Krabi, Trang, and Satun**

**The data collected from coastal shrimp culture households and establishments were:**

- a) **Number of coastal shrimp establishments (called households and establishment together) and the acreage under the shrimp culture;**
- b) **The types of land tenure for the area under shrimp cultivation;**
- c) **The shrimp farming practices, i.e., cultured species, and culture method, source of seeds, etc.;**
- d) **Number of workers and source of workers;**
- e) **Type of shrimp buyers; and**
- f) **Debt and source of loan.**

**The method of complete enumeration was used. The total of 920 enumerators, the NSO and DOF staff, temporary employees, and some local teachers, prepared the list of all establishments under the area of coverage. Subsequently, each establishment was interviewed for detailed information. All enumerators were fielded simultaneously from April 16 to May 20, 1995. They covered all 3,500 Enumeration Districts (EDs) in all coastal provinces. The post enumeration survey was conducted a month later to verify the data collected in the first survey. The area under 120 EDs came under the data verification.**

**Inspection of all enumeration sheets by the field officers for completion and consistency was carried out before these are sent to the central office in Bangkok. The data were then transferred to magnetic tapes. Computer editing was performed for the final review and correction, and subsequently for tabulation. The time reference used was as follows:**

- a) **Census Date.** Referred to as April 1, 1995, the date was used as the time reference for the data on:
  - **Type of management;**
  - **Acreage under shrimp culture;**
  - **Types of land tenure; and**
  - **Source of debt and loan.**
- b) **The last 12 months.** This period was from 1 April 1994 to 31 March 1995. It was used as the time reference for all data except those mentioned in (1).

**The unit of measurement used is rai, and 1 rai = 0.16 hectares = 0.4 acres. In the data a hyphen (-) denotes a Nil.**

## 2. DEFINITIONS AND CLASSIFICATION

**Marine Shrimp Culture** is defined as an economic activity, carried out in a coastal area, to rear juvenile shrimp to a commercial size, excluding those activities carried out in the hatchery.

**Marine Shrimp Culture Establishment** is an economic unit engaged in coastal shrimp culture during the last 12 months. The subsets of such establishments are:

- a) Operator's household is a household engaged in coastal shrimp culture on its own account;
- b) Joint management is an economic unit engaging in coastal shrimp culture under a joint investment of two or more households or by their own joint principal production means such as loan and equipment; and
- c) Company limited or Juristic partnership is an economic unit engaged in coastal shrimp culture under the management of a company or juristic partnership.

**Area Under Culture** refers to the surface area of water used for the purpose of shrimp culture, e.g., grow-out ponds, water reservoirs, including the area occupied by dikes surrounding these water areas.

**Land Tenure for Shrimp Culture** refers to the land-holding rights or the arrangement made by the establishment to use the land. An establishment may come under one or more tenure forms defined below:

- a) **Owner:** An establishment under this category must be
  - i) An establishment, according to law, holding a full right of the land, i.e., having in possession a form of land-holding certificate, e.g., Title Deeds, N.S. 3, SK. 1, issued by a Land Authority Office, other land-holding certificates such as those under the Land Reform Act which give the right for land use;
  - ii) An establishment openly occupying and cultivating the land without a documentary evidence, e.g., inheritance cultivators or land-owner whose land-holding certificate is under processing; or
  - iii) An establishment occupying and cultivating the land, without interruption and any opposition from a lawful owner for a period no less than 10 years.
- b) **Renter:** A person who rents the land from another person for the purpose of shrimp culture.
- c) **Others:** This type of land tenure refers all remaining types of tenure, such as those cultivators who encroached mangrove forest, those who rented a piece of land without pay, etc.

**Aquaculture Workers** is the person engaged in some forms of activity relating to the shrimp culture, e.g., repair of the pond, water supply, feeding, etc. However, those engaged exclusively in the management, planning and accounting do not fall into this category.

**Coastal Shrimp Culture Methods** can be divided into three following categories:

- a) **Extensive culture** acquires the shrimp seeds that occur in nature through pumping seawater into the pond. It provides neither additional stocking with nursery-bred or nursery-reared shrimp seeds nor feeding of any kind. Under a normal circumstance, shrimp seeds take 45 to 90 days to reach marketable size.
- b) **Intensive culture** refers to a method of shrimp culture in the following conditions:
  - Stocking with no less than 24,000 pieces of shrimp seed in a rai of water;
  - Feeding 3-5 times a day;
  - Using at least one paddle wheel for the purpose of aerating a water area of 1 to 2 rais;
  - Extending the cultivation period over 4 to 5 months.
- c) **Semi-intensive** refers to the culture method under the following conditions:
  - Stocking with no more than 24,000 pieces of shrimp seed in a rai of water;
  - Feeding as one or no paddle wheel for aerating the water;
  - Extending the cultivation period over 4 to 5 months.

### 3. SUMMARY FINDINGS

The census results showed that there was a total of 25,210 coastal shrimp culture establishments in the 24 coastal provinces of Thailand. These establishments operated a total water area of 421,282 rais for the purpose; with the average water area per establishment of 16.7 rais.

The Zone-wise congregation of the shrimp culture establishments showed the highest percentage at 36.0% in Zone 4 (Southern part of the Gulf of Thailand) and the lowest percentage at 10.0% in Zone 3 (Central part of the Gulf of Thailand). The average water area per establishment in Zone 4 was 9.0 rais; while that of Zone 3 was 19.0 rais (Table 1).

As shown in Figure 1, majority of shrimp culture establishments (33.2%) were operated by operator households, followed by 11.4% under joint management. Only 0.4% came under the company operation. On the other hand, Table 2 shows the dramatic increase of shrimp culture establishments from 4,544 in 1985 to 15,060 in 1990. This trend continued up to 1995 which had 25,210 establishments, 4.5 times over that of 1985 contributing to an annual increment of 44% in operation (Figure 2).

The land area under marine shrimp culture was also expanded rapidly from 216,990 rais in 1985 to 317,841 rais in 1990 and further to 421,282 rais in 1995. The average land area under shrimp cultivation per establishment continued to shrink from 47.8 rais in 1985 to 21.1 rai in 1990 and 16.7 rai in 1995. The shrinkage of the average land area per establishment may be attributed to the fact that the method of shrimp culture had shifted all these years, from extensive to intensive shrimp cultivation.

Table 3 shows that majority of the 64.9% shrimp establishments operated a cultivation area of less than 10 rais. The next largest group (21.3%) cultivated an average land area from 10 to 29.9 rais; and the least group (13.8%) operated land area of 30 rais and larger.

The largest number of the less-than-10 rais shrimp establishments (80.4%) were found in Zone 4; while that of 10-29.9 rais group (34.5%) were in Zone 2 and of 30-rais-and-above (15.5%) in Zone 3 (Table 3).

The change in the method of shrimp culture from extensive to semi-intensive was apparent starting in 1985. As the change continued, more and more shrimp farmers adopted the intensive cultivation method which requires smaller pond area for effective rearing and management. As shown in Figure 3, the percentage of establishments cultivating <10-rai of land rose from 5.7% in 1985 to 53.1% in 1990, and further to 64.9% in 1995.

Conversely, the percentage of larger shrimp culture establishments continued to decrease during the 1990s. Figure 3 also shows that the establishment, operating 10-29.9 rai of land reduced from 31.8% in 1995 to 25.2% in 1990, and further to 21.3% in 1995. The similar pattern is also true for the establishments cultivating land area of 30 rai and larger.

The shrimp culture establishments acquired land from different sources, i.e., owned and/or rented from the private or public sectors. As presented in Table 4, the great majority (72.5%) owned the farmland. Some 23.9% of the establishments either rented the land or held the tenure of the land in some other forms. The last group, comprising 4.6%, was made up of mangrove forest encroachers and those who operated on someone else's land but not paying any rent.

Coastal Zone-wise analysis, the proportion of the number of establishments holding the other forms of land tenure in Coastal Zone 1 was at 32.0%. These proportions were considerably high. The proportion of the number of establishments operating on their own farmland and that of establishments renting land from the government did not show marked difference in the Coastal Zones.

The extensive shrimp culture method which depended entirely on the wild shrimp seeds that enter the ponds with the tide, was widely used in Thailand until 1985. From 1985 to 1990, the percentage of shrimp culture establishments practicing extensive method was reduced from 94.9% in 1985 to 14.2% in 1990. Until 1995, however, some 13.6% of shrimp culture establishments still practiced the traditional method.

Conversely, more and more shrimp farms switched from wild shrimp seeds to hatchery-raised fry. From only 5.1% of shrimp culture establishments in 1985 using hatchery shrimp seeds, exclusively the black tiger shrimp, the percentage increased to 85.8 in 1990. For the next five-year period until 1995, the percentage of hatchery-shrimp seed users, increased slightly to 86.4% (Figure 4).

The results of the 1995 marine fishery census also showed that as much as 79.2% of the marine shrimp culture establishments in Thailand cultivated exclusively the black tiger shrimp using the intensive method; leaving only 7.1% of the establishments practicing the semi-intensive method. The remaining 14.6% was found to practice the extensive method which produced mainly the banana shrimp, which is found preponderant in the wild. This type of culture method was found in Coastal Zone 1 on the western part of the Gulf of Thailand (Table 5).

Marine shrimp farming requires workers employed on a permanent basis, who assume the regular duties, e.g., feeding, maintaining water levels, repairing of ponds, monitoring of water quality, etc. Most of the shrimp culture establishments (61.6%) engaged family members in performing the works. The remaining establishments resorted to hired labor.

Of the 38.4% establishments hiring workers on farms, almost all (30.2%) depended on the people in the same or nearby locality. Only 5.1% of the establishments engaged employees who came from afar, while 3.1% had both types of employees.

Almost all employees (92.8%) in Coastal Zone 2 (the Inner part of the Gulf) were members of the family, while only 37.0% of shrimp farms used intensive cultivation. This was in contrast to the hiring pattern in Coastal Zone 5 on the Andaman Sea where 64.7% of the establishments hired workers, although some 45.0% depended on the local people (Table 6).

The total number of permanent workers in shrimp culture establishments in 1995 was 72,074 comprising 41,510 family members (57.6%) and 30,564 employees (42.4%) respectively. Of the total workers, 69.9% were from the same and nearby locality. The remaining percentage comprised 15.6% of workers from Northeastern Thailand and 9.4% came from the other regions.

Zone-wise, it was noted that as much as 88.1% of the workers employed by the shrimp culture establishments in Coastal Zone 4 (the southern part of the Gulf) came from the same or nearby locality; while in Coastal Zone 1 (the eastern part of the Gulf) the situation was remarkably different. As much as 44.0% of workers in Coastal Zone 1 came from the northeastern provinces compared to 40.5% who came from the same or nearby locality. Regarding the employment of overseas workers, it was noted that as much as 14.9% of the workers in Coastal Zone 5 were overseas workers (Table 7).

All shrimp culture establishments were on commercial scale based on their produce. However, it was found that 1.9% of the establishments could not bring their operation to the commercial stage. Some may still be beginners who had never produced any crop during the year of the survey, or their crops were totally lost. Majority of the shrimp culture establishments which could offer their produces for sale did not have direct contact with the consumers. Some 89.7% dealt with middlemen, 4.3% with cold storage and 2.6% with retailers.

The Zone-wise comparison (Table 8) showed that as much as 4.7% of the shrimp culture establishment in Zone 5 (on the Andaman Sea) could not offer their farm produce for sale. The proportion of establishments in the Zones were less than 2% of the number in each Zone.

Cold storage attracted as much as 11.7% of shrimp culture establishments in Zone 1; although the figures from cold storage in the other Zones remained below 5%. Retailers had brisk business with the establishment in Zone 2, where 47.4% of the shrimp farms made use of extensive cultivation method and could not offer the merchandise in bulk to middlemen or cold storage. However, retailers could only strike a deal with no better than 2.3% of establishments in the other Zones.

#### **4. DEBT AND SOURCES OF LOAN**

Shrimp culture establishments need a high cash liquidity, particularly to facilitate the regular purchase of feed. It was found that as many as 16,808 establishments (66.7% of the total) resorted to taking loans and still showed outstanding debts. Of these, 44.6% took loans from banks: The Bank of Agriculture and Agricultural Cooperatives (BAAC which is government controlled gave loans to 28.1%, while private commercial banks extended loans to 27.3% of the establishments.

With the exception of Coastal Zone 5, the BAAC succeeded in extending its loans to 40% or more shrimp culture establishments. On the other hand, private commercial banks extended loans to as much as 46.4% of the shrimp culture establishments in Zone 5. It was also remarkable to find that other sources of loan, which include shrimp feed dealers, accounted for as much as 31.7% of the establishments in Zone 5 (Table 9).

**Table 1. Number of marine shrimp culture establishments and area under culture by coastal zone**

Coastal Zone	Establishment		Area under culture		Average area under culture (Rai)
	Number	%	Area (Rai)	%	
<b>Whole country</b>	<b>25,210</b>	<b>100.0</b>	<b>421,282</b>	<b>100.0</b>	<b>16.7</b>
Coastal Zone 1	4,428	17.6	121,994	29.0	27.6
Coastal Zone 2	5,331	21.2	123,581	29.3	23.2
Coastal Zone 3	2,531	10.0	47,677	11.3	18.8
Coastal Zone 4	9,083	36.0	85,248	20.2	9.4
Coastal Zone 5	3,837	15.2	42,782	10.2	11.1

**Table 2. Number of marine shrimp culture establishments and area under culture: 1985, 1990 and 1995**

Year	No. of Establishments	Area under culture (Rai)	Average area under culture (Rai)
Census year 1985	4,544	216,990	47.8
Survey year 1990	15,060	317,841	21.1
Census year 1995	25,210	421,282	16.7
Percentage change 1990/85	231.4	46.5	-55.8
Percentage change 1995/90	67.4	32.5	-20.8
Percentage change 1995/85	454.8	94.1	-65.0



**Table 3. Percentage of marine shrimp culture establishments by size of area under culture and by coastal zone, 1995.**

Coastal Zone	Size of area under cultivation (rai)				
	Total	less than 10	10-29.9	30-49.9	50 and over
Whole country	100.00	64.9	21.3	6.1	7.7
Coastal Zone 1	100.00	61.8	17.7	5.0	15.5
Coastal Zone 2	100.00	38.8	34.5	14.1	12.6
Coastal Zone 3	100.00	59.1	26.8	7.1	7.0
Coastal Zone 4	100.00	80.4	13.8	2.9	2.9
Coastal Zone 5	100.00	72.2	21.0	3.1	3.7

**Table 4. Percentage of marine shrimp culture establishments by land tenure and by coastal zone**

Coastal Zone	Owned	Rented		
		From private sector	From government	From others
Whole country	72.5	23.9	0.8	4.6
Coastal Zone 1	70.6	15.3	0.4	15.3
Coastal Zone 2	69.6	27.6	2.0	2.6
Coastal Zone 3	75.7	22.2	0.8	2.3
Coastal Zone 4	76.3	23.1	0.4	2.3
Coastal Zone 5	67.5	32.0	0.2	1.6

**Note:** An establishment may report more than one form of land tenure.

**Table 5. Percentage of marine shrimp culture establishments by method of culture and by coastal zone**

Coastal Zone	Method of culture		
	Intensive	Semi-intensive	Extensive
Whole country	79.2	7.1	14.6
Coastal Zone 1	85.6	5.6	12.8
Coastal Zone 2	37.0	46.0	47.4
Coastal Zone 3	85.1	4.9	10.8
Coastal Zone 4	92.8	4.2	3.4
Coastal Zone 5	94.5	5.1	0.4

**Note:** An establishment may report more than one method of culture.

**Table 6. Number of marine shrimp culture establishments by type of employment and by coastal zone.**

Coastal Zone	Total	Without employment	Employing			
			Sub-total	Local people	Non-local people	Both local and non-local
Whole country	100.0	61.6	38.4	30.2	5.1	3.1
Coastal Zone 1	100.0	69.4	30.6	17.8	8.7	4.1
Coastal Zone 2	100.0	92.8	7.2	5.0	1.9	0.3
Coastal Zone 3	100.0	53.7	46.3	35.8	6.5	4.0
Coastal Zone 4	100.0	52.7	47.3	43.3	2.4	1.6
Coastal Zone 5	100.0	35.3	64.7	45.0	10.7	9.0

**Table 7. Percentage of marine shrimp culture employees by source of employees and by coastal zone**

Coastal Zone	Total %	Source of Employee			
		Local employee	Non-local employee from		
			NE region	Non-NE regions	Overseas
Whole country	100.0	69.6	15.6	9.4	5.4
Coastal Zone 1	100.0	44.0	40.5	11.6	3.9
Coastal Zone 2	100.0	60.1	22.4	17.3	0.2
Coastal Zone 3	100.0	69.1	22.5	6.9	1.5
Coastal Zone 4	100.0	88.1	5.9	5.8	0.2
Coastal Zone 5	100.0	62.2	10.6	12.6	14.6

**Table 8. Zone-wise percentage of shrimp establishments selling their farm produces to different types of customer.**

Coastal Zone	Total	Without sale	With sale				
			Sub-total	Retailer	Middlemen	Cold storage	Others
Whole country	100.0	1.9	98.1	2.6	89.7	4.3	1.5
Coastal Zone 1	100.0	1.7	98.3	1.3	84.1	11.7	1.2
Coastal Zone 2	100.0	1.1	98.9	7.0	86.7	3.3	1.9
Coastal Zone 3	100.0	1.3	98.7	2.3	90.4	3.1	2.9
Coastal Zone 4	100.0	1.4	98.6	1.6	94.8	1.3	0.9
Coastal Zone 5	100.0	4.7	95.3	0.6	88.0	4.9	1.8

**Table 9. Percentage of loans and their sources extended to marine shrimp culture establishments in different coastal zones, 1995.**

Coastal Zone	Source of loan						
	Government agencies	BAAC	Private commercial bank	Middle man	Money lender	Relative and friend	Others <sup>1/</sup>
Whole country	3.8	44.6	28.1	5.0	13.4	27.3	10.2
Coastal Zone 1	7.4	41.7	23.0	7.2	14.3	32.9	4.5
Coastal Zone 2	2.3	57.4	14.1	3.2	19.3	31.9	2.3
Coastal Zone 3	6.2	53.5	25.8	11.6	10.0	29.6	4.1
Coastal Zone 4	2.9	40.8	29.8	4.2	12.2	27.3	7.5
Coastal Zone 5	2.3	37.7	46.4	2.5	12.0	16.5	31.7

Note: An establishment may report more than one source of loan.

<sup>1/</sup> Others included loan from feed dealers

Figure 1. Percentage of shrimp culture establishment in Thailand, 1995.



Figure 2. Number of shrimp culture establishments and area under culture : 1967, 1985, 1990 and 1995

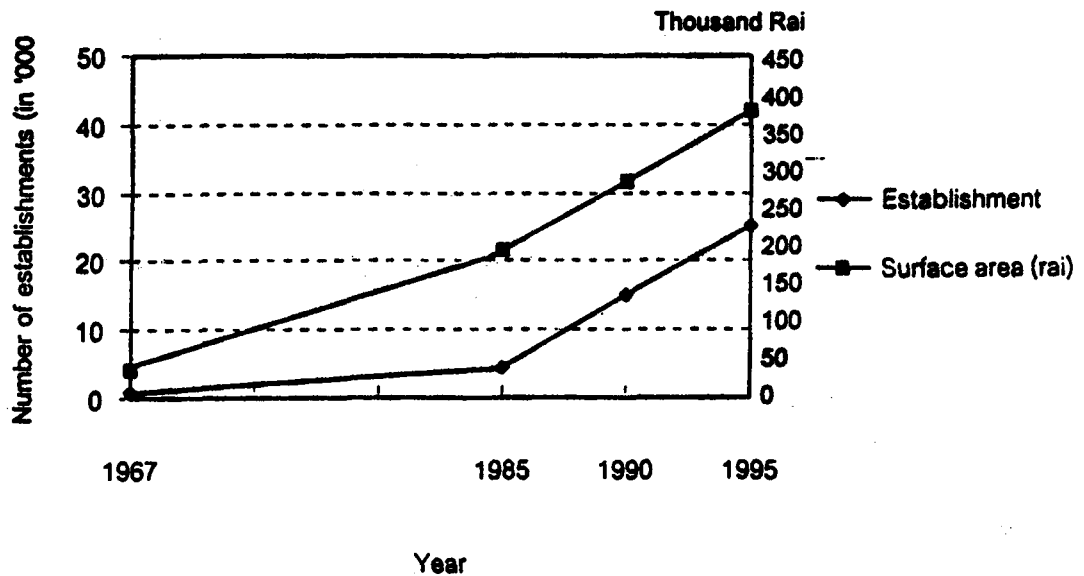


Figure 3. Percentage of marine shrimp culture establishments by size of area under culture : 1985, 1990 and 1995

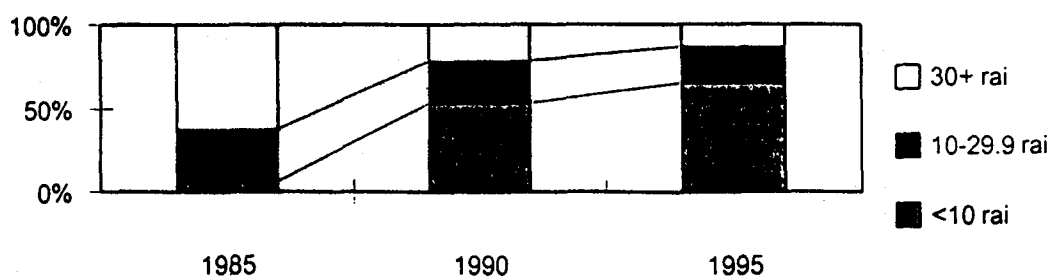


Figure 4. Percentage of marine shrimp culture establishments by source of seeds : 1985, 1990 and 1995

