# SOCIO-ECONOMIC CONDITIONS OF SMALL-SCALE FISHING COMMUNITIES AND THE IMPLICATIONS FOR COMMUNITY-BASED FISHERIES MANAGEMENT IN PHANG-NGA BAY

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## 1. INTRODUCTION

Thailand has a total population of 58 million, with Gross Domestic Products (GDP) of **3,161** million baht and per capita income of 53,357 baht in 1394. Fisheries accounts for 1.5 percent of Thailand's GDP and 14.9 percent of the agricultural sector's GDP. However, fisheries in Thailand has rapidly developed during the last few years. It also contributes to economic development of the country in various aspects. Fisheries products are a major source of protein for Thai people. Annual average consumption is approximately 27 kg per person.

Development of the marine fishery has led to several interlinked industries. The marine product processing industry in Thailand, for example, was developed before any other countries in the Asian region. The industry expanded so rapidly that domestic raw materials became inadequate and had to be imported from abroad. As a result, Thailand has become the world's largest exporter of fisheries products. Thailand accounted for 10 percent of the total world fish export (110,283 million baht) in **1993.**

However, fisheries development in Thailand has largely focused on commercial fisheries as small-scale fishermen play less of a role in both socio-economics and politics. Consequently, most benefit generated from the development process or government policy has gone to commercial-scale fishermen rather than small-scale fishermen. This is in spite of the fact that the latter is four times greater than the former. Therefore, it is necessary to develop a system of management that provides opportunities to small-scale marine fishing communities to manage fishing resources by themselves so that they can survive in current circumstances.

## 2. STRUCTURE OF COASTAL FISHERIES IN THAILAND

### 2.1 Households and fishing boats

The coastline of Thailand is 2,614 kilometers in length. Twenty three provinces are situated along the coast. The Department of Fisheries has divided the provinces into five coastal fishing regions. Phang-nga Bay is in Region 5, which covers the coastal areas of the Andaman Sea. Regions l-4 cover the Gulf of Thailand and the fishing gears of these regions are given in Fig. 1.

According to a Preliminary Report on Marine Fishery Census in 1995 NSO (1996), there are 80,701 marine fishing households which can be classified into three types. Households that engage exclusively in fisheries account for 62.3 percent. Households engaged in coastal aquaculture account for 35 percent. Households engaged in both fisheries and aquaculture account for 3.7 percent. In 1995, 53,313 fishing households were engaged in marine fisheries, of which 88 percent can be classified as small-scale fishing households' and 12 percent can be classified as commercial-scale fishing households (Table 1).

A structural change in Thailand's fisheries has taken place during the last 10 years. From 1985-1990, the number of fishing households and fishing boats decreased by 5.5 percent and 2 percent respectively. (Tables 1 and 2) Small-scale fishing households and small-scale fishing boats decreased by 6.8 and 3.4 percent respectively whereas commercial-scale fishing households and commercial-scale fishing boats increased by 5.5 percent and 7 percent respectively. The decrease in the number of small-scale fishing boats was largely due to the decrease in coastal fishing resources on the one hand and the conflicts between small-scale and the commercial-scale fishermen on the other.

During 1990-1995, the number of fishing households and fishing boats in Thailand increased by 10.1 percent and 4.5 percent respectively (Tables 1 and 2). The increase in fishing households has largely been in commercial fisheries. Commercial scale fishing households account for 15.3 percent of the total increase. Small-scale fishing households account for 9.5 percent of the total increase.

Conversely, the increase in fishing boats has been in the small-scale sector. Small-scale fishing boats account for 6.6 percent of the total increase, while commercial boats have actually decreased in number by 7.5 percent. One reason for the change in commercial boats has been the creation of a boat-tenure system within the commercial fishing sector, which results in a decrease of the number of boats per household.

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1 Small-scale fishing households are defined as those who use non-power boats or outhoard-powered boars or inboard-powered boats with less than 10 gross ton engines in fishing operations.

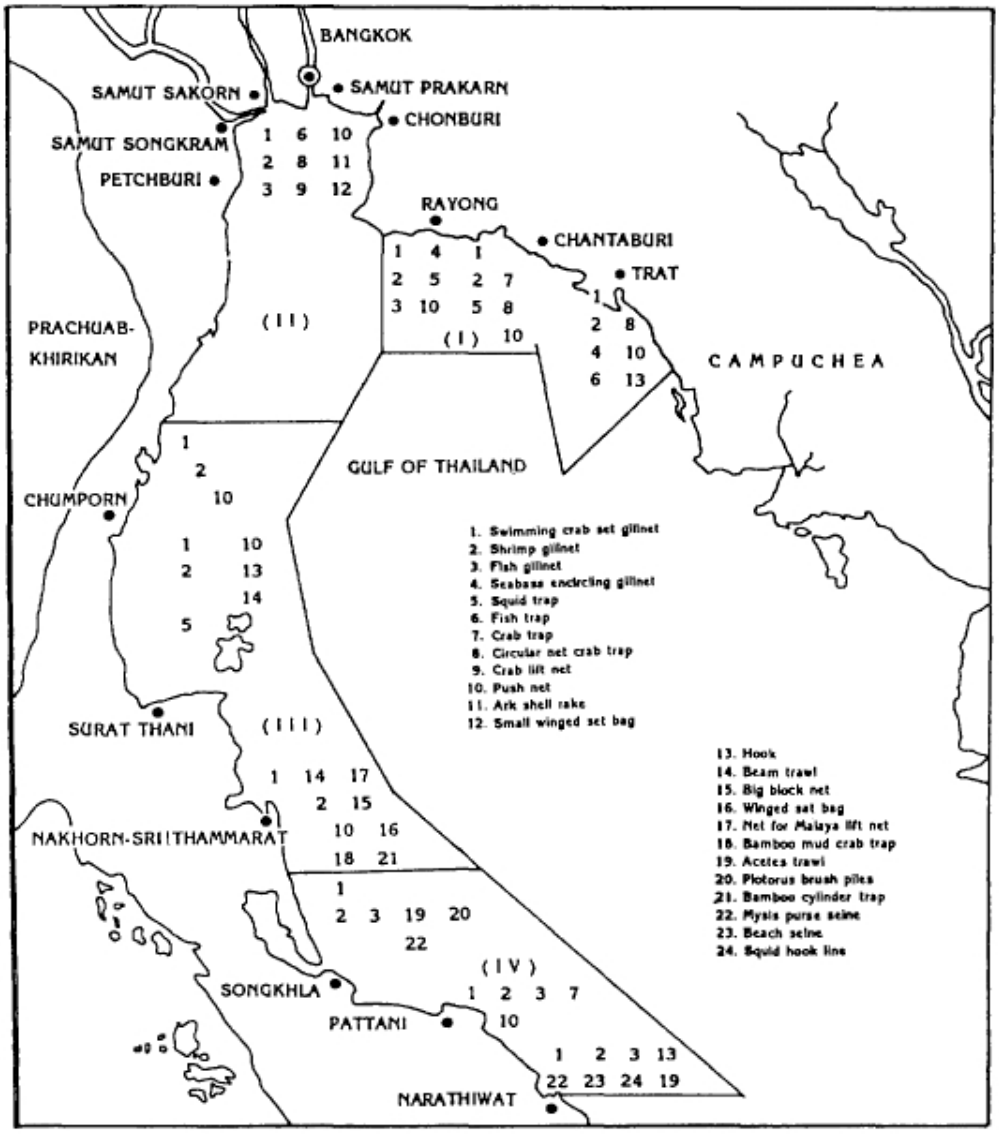


Fig. 1. Map illustrating small-scale fishing gear by Region.

**Table 1. Change in fishing households in Thailand, 1985-1995.**

| | Small-Scale | | | Commercial Scale | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| Year | Number | % | % of change | Number | % | % of change | Number | % | % of change |
| 1985(1) | 46.005 | 89.8 | | 5240 | 10.2 | | 51.245 | 100.0 | |
| 1990(2) | 42.880 | 88.6 | -6.8 | 5,528 | 11.4 | 5.5 | 48,408 | 100.0 | -5.5 |
| *1995(3)* | 46,940 | 88.0 | 9.5 | *6.373* | 12.0 | 15.3 | *53,313* | 100.0 | 10.1 |

**Source:** (1) NSO and DOF (1987); (2) NSO and DOF (1992); (3) NSO (1996).

**Table 2. Number of fishing boats in Thailand classified** by type **of** fishing **operations, 1985, 1990** and **1995.**

| | **Small-Scale** | | | **Commercial Scale** | | | **Total** | | |
|---|---|---|---|---|---|---|---|---|---|
| **Year** | **Number** | % | **% of change** | **Number** | % | **% of change** | **Number** | % | **% of change** |
| 1985(1) | 46,053 | **862** | | 7,374 | 13.8 | | 53,427 | 100.0 | |
| 1990 (2) | 44,487 | 84.9 | -3.4 | 7,887 | 15.1 | 7.0 | 52,374 | 100.0 | -2.0 |
| 1995 (3) | 47,423 | 86.7 | 6.6 | 7,292 | 13.3 | -7.5 | 54,715 | 100.0 | 4.5 |

Source: (1) NSO and DOF (1987); (2) NSO and DOF (1992); (3) NSO (1996).

Three major factors have led to the increase in small-scale fishing households and small-scale fishing boats during the last five vears. First, the population in coastal fishing communities has increased. Second, coastal fishery resources have partly, recovered bacause of artificial reefs. The reefs have become additional fishing areas that have also been able to inhibit coastal trawl fishing. Third, fishing communities are enthusiastic about looking after fishing areas by themselves.

## 2.2 Production of small-scale fisheries

According to DOF marine fishing communities production statistics ( 1995), production of small-scale fisheries in 1993 was 154,467 tonnes per year. This accounts for 5.6 percent of the total catch from marine fisheries in 190.3. The catch has increased since 1984 and reached the highest amount of 159,825 tonnes in 1989 and decreased thereafter, with some yearly fluctuations.

The species composition of the small-scale fisheries catch has been changing considerably throughout Thailand. T he number of squids and crabs have increased, often in substitution for other marine animals. Moreover, the number of shrimps and prawns caught decreases. This is probably due to the expansion of the shrimp culture areas since 1986, especially in areas where pipelines are used to bring in sea water for shrimp culture, and contaminated water is discharged hack to the sea. As a result, the natural production potential of shrimps and prawns resources on the coast of the Gulf of Thailand has decreased. However, the same problem has not yet arisen on the Andaman Sea coast because the area is less intensively used for shrimp culture (Table 3).

Most small-scale fisheries production comes from fishing regions on the coast of the Gulf of Thailand which account for 84.7 percent of the total catch of the small-scale fisheries. The remaining 15.3 percent comes from the Andaman Sea coast. Production of small-scale fisheries from the Andaman Sea coast varies between 20,786 to 24,020 tonnes. It has a tendency to increase during the last five years and reached the highest level in 1392.

# 3. SOCIO-ECONOMIC CONDITIONS OF SMALL-SCALE FISHING COMMUNITIES

Most small-scale fishing communities are located in the coastal areas of Thailand. In 1995, there were 2,562 fishing communities in Thailand (NSO and DOF, 1995). Of these, 76 percent are situated on the coast of the Gulf of Thailand and 24 percent are on the Andaman Sea coast. In Phang-nga province alone, there are 132 fishing communities which account for 21 percent of the total fishing communities on the Andaman Sea coast.

Table 3. Production of small-scale fisheries by Region, 1954-1963.

| Year | Total catch of Marine Fisheries (MT) | Total Catch of Small-Scale Fisheries | | Fishing Ground | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Gulf of Thailand | | | | | | Andarnan *Sea* | |
| | | (MT) | % of Total Catch | Region 1 (MT) | Region 2 (MT) | Region 3 (MT) | Region 4 (MT) | Sub-total (MT) | % of Small-Scale Fisheries Production | Region 5 (MT) | % of Small-Scale Fisheries Production |
| 1984 | *1.973,000* | 138.369 | 7.0 | n.a. | n.a. | na. | na. | na. | na. | n.a. | na. |
| 1985 | 1,997.200 | *141,390* | 7.1 | 16,925 | 53.721 | 25,525 | 24,433 | 120.604 | 85.3 | 20.786 | 14.7 |
| 1986 | 2,309.500 | 146,773 | 6.4 | *17,334* | 52,155 | 28,429 | 25,147 | *123.065* | 83.8 | 23,708 | 16.2 |
| 1987 | 2,540.000 | 155.316 | 6.1 | 14.916 | 59.999 | 30,181 | 28,207 | *133.303* | 85.8 | 22.013 | 14.2 |
| 1988 | 2,337,200 | 159,353 | 6.8 | 18,632 | 57,708 | *29,903* | 30,105 | 136.588 | 85.6 | *23,005* | 14.4 |
| 1989 | 2,370,500 | 159,825 | 6.7 | 18,695 | 57,591 | *30.460* | 29,842 | 136.588 | 85.5 | *23237* | 14.5 |
| 1990 | 2,362,200 | 149,989 | 6.3 | 20,760 | 53,762 | 27,844 | 25,546 | 127,912 | 85.3 | 22.077 | 14.7 |
| 1991 | 2,478.600 | 154,145 | 6.2 | 20.808 | 54.326 | 29.673 | 26.102 | 130.909 | 84.9 | 23236 | 15.1 |
| 1992 | 2,736.400 | 153,074 | 5.6 | 21.426 | 53,852 | 28,502 | 25,544 | 129,324 | 84.5 | 24,020 | 15.7 |
| 1993 | 2,752,500 | 154,467 | 5.6 | 21,908 | 52,445 | 29.933 | 26,594 | 130.880 | 84.7 | 23,587 | 15.3 |

source DOF (1955).

Moreover, 61.7 percent of the small-scale fishing households in the coastal fishing communities are Buddhists whereas 38.3 percent are Muslims (Panayotou, 1985).

### 3.1 Structure of the small-scale fishing households

According to the 1990 survey, the average size of the small-scale fishing households is 5.5 persons per household. Fishing households in Region 4 have the largest average size with 7 persons per household. In Region 5, Region 2, Region 1 and Region 3, the average sizes are 5.5, 5.3, 5.1 and 5.1 persons per household respectively. It was found that custom and religion have effects on the size of fishing households. For instance, in Region 4 (consisting of Nakorn Sri Thammarat, Songkhla, Pattani and Narathiwns Provinces) and in Region 5 (Ranong, Phang-nga, Phuket, Krabi, Trang and Satun) where most of the fishing households are Muslim, the average household size is larger. In Phang-nga province alone, where 97 percent of the household; are Muslim, the average size of the small-scale fishing households is 5.5 persons per household (Adulavidhnya, 1980).

### 3.2 Occupational structure of small-scale fishing households

Apart from their main occupation as marine fishermen, some members of the fishing households may earn additional income from non-fisheries activities. Additional income sources vary and depend on the location of village or fishing community. Examples include activities in fishery sectors such as marine animal culture, marine animal processing and hired labour (fishing boat crew, processing factory labour, shrimp culture labour), activities in agriculture such as rice growing, horticulture, field crop growing and animal raising, other activities such as technician, merchant and small-scale business (shop owner and middlemen). Reasons for supplementary occupation ate;

- low income from fisheries
- instability in fisheries
- unemployed labour in households, especially women
- off-season unemployment

### 3.3 Income structure of fishing households

Incomes of small-scale fishing households come from various sources. However, the main income is generated from fisheries. According to a recent income and expenditure survey (NW, 1992b), the annual national average income is 58,776 baht. Fisheries income accounts for 80.2 percent of the total. For small-scale fishing households on the Andaman Sea coast and those in Phang-nga province, fisheries income accounts for 77.4 percent and 78.0 percent respectively of the total income (Table 4). Therefore, it can be concluded that the condition of coastal resources is a major factor which determines the income and living conditions of small-scale fishing households.

Table 4. Average annual income of small-scale fishing household by source, 1990.

| Income and Source | National Average | | Andaman Sea Coast | | Phang-nga | |
|---|---|---|---|---|---|---|
| | Baht/Year | % | Baht/Year | % | Baht/Year | % |
| Total Income | 58,776 | 100.0 | 54.098 | 100.0 | 50,166 | 100.0 |
| Cash Income | 43,333 | 73.7 | 42.257 | 78.1 | 39.288 | 78.3 |
| Fisheries Income : | | | | | | |
| - Fishing Income | 37,501 | 63.8 | 33,765 | 62.4 | 29,924 | 59.6 |
| - Related Fishing Income | 1,706 | 2.9 | 1,425 | 2.6 | 1,952 | 3.9 |
| - Fish Culture | 139 | 0.2 | 417 | 0.8 | 356 | 0.7 |
| - Fish Processing | 1,567 | 2.7 | 1,008 | 1.9 | 1,596 | 32 |
| Non-fisheries Income: | | | | | | |
| - Salary and Wage | 3,749 | 6.4 | 3,051 | 5.6 | 2,31 1 | 4.6 |
| - Farming Income | 1,656 | 2.8 | 2,279 | 4.2 | 4,006 | 8.0 |
| - Small-scale Business and Services | 1,301 | 2.2 | 1,577 | 2.9 | 960 | 1.9 |
| - Others | 420 | 0.7 | 160 | 0.3 | 135 | 0.3 |
| Non-cash Income | 12,443 | 212 | 11,841 | 21.9 | 10,878 | 21.7 |
| Fishing Income | 6216 | 10.6 | 5,484 | 10.1 | 5,340 | 10.6 |
| Goods and Services | 1,764 | 3.0 | 2,227 | 4.1 | 2,245 | 4.5 |
| Housing Rent | 4,463 | 7.6 | 4,130 | 7.6 | 3,293 | 6.6 |
| Family Size (persons) | 5.5 | | 5.5 | | 5.5 | |
| Income per Capita (baht/year) | 10,687 | | 9,836 | | 9,121 | |

Source : NSO (1992b).

**Table 5. Annual expenditures of small-scale fishing households, 1990.**

| Type of Expenditure | National Average | | Andaman Sea Coast | | Phang-nga | |
|---|---|---|---|---|---|---|
| | Baht/Year | % | Baht/Year | % | Baht/Year | % |
| Total | 49,474 | **100.0** | 44,768 | 100.0 | 42,219 | **100.0** |
| Cash Expenditure | 43,333 | 73.7 | 42,257 | 78.1 | 39,288 | 78.3 |
| Fisheries Income : | | | | | | |
| Food | 37,031 | 74.8 | 32,957 | 73.6 | 29,314 | 72.9 |
| Drink, etc. | 23,696 | 47.9 | 20,553 | 45.9 | 17,480 | 43.5 |
| Cigarette and other | 2,418 | 4.9 | 2,436 | 5.4 | 2,560 | 6.4 |
| Clothing | 1,695 | 3.4 | 1,761 | 3.9 | 1,427 | 3.5 |
| Housing Rent | 3,648 | 7.4 | 3,137 | 7.0 | 3,448 | 8.6 |
| Medical Care | 818 | 1.7 | 758 | 1.7 | 768 | 1.9 |
| Utilities | 1,188 | 2.4 | 1,138 | 2.5 | 1,229 | 3.1 |
| Transportation and Communication | 1,237 | 2.5 | 1,438 | 3.2 | 1,023 | 2.5 |
| Other | 2,322 | 4.7 | 1,289 | 2.9 | 1,099 | 2.7 |
| Non-cash Expense | 12,443 | 2.52 | 11,841 | 26.4 | 10,878 | 27.0 |
| Fish for Household Consumption | 6216 | 12.6 | 5,484 | 12.2 | 5,340 | 13.3 |
| Goods and Services | 1,764 | 3.6 | 2,227 | 5.0 | 2,245 | 5.6 |
| Housing Rent | 4,463 | 9.0 | 4,130 | 9.2 | 3,293 | 8.2 |

Source : NSO (1992b).

### 3.4 Living standard of small-scale fishermen

The living standard of small-scale fishing households can be calculated using two approaches. The first is comparison of the per capita income. The second is estimation of Engel's coefficient (ratio of the household's food expenditure to the total expenditure). A ratio greater than 50 percent indicates that food expenditure is a major expenditure and that such households have a low living standard. This is based on the principle that household income will be spent on food as a first priority and that any remaining surplus will be spent for other purposes.

In 1990, the annual national average per capita income of small-scale fishermen was 10,687 baht. Average per capita income for the Andaman Sea coast was 9,836 baht, and 9,121 baht for Phang-nga province (NSO, 1992). Meanwhile, annual national per capita income of all sectors was 16,463 baht and 14,054 baht in southern Thailand (NSO, I992a). This implies that the per capita income of small-scale coastal fishermen is less than the national average. Furthermore, the per capita income of small-scale fishermen on the Andaman Sea coast is not only less than the national and the southern per capita income but also less than that of small-scale fishermen nationwide. Finally, small-scale fishermen in Phang-nga province have the lowest per capita income compared to small-scale fishermen nationwide, and people living in the southern region.

In 1990, Engel's coefficients of the small-scale fishing households would be 60.5 for the whole country, 58.1 for the Andaman Sea coast and 56.8 for Phang-nga province. Comparing these figures with the national coefficient of 36.2 and the southern coefficient of 39.5, the living standard of small-scale coastal fishermen is lower than the national average and that of southern Thailand. Furthermore, the living standard of small-scale coastal fishermen on the Andaman Sea coast is not only lower than the national and the regional average in southern Thailand, but also lower than that of the nationwide average of small-scale fishermen. Finally, under both methods for calculating living standards, the small-scale fisherfolk of Phang-nga Bay have the lowest living standard compared to the national and regional average of fisherfolk and the general population.

## 4. TYPE OF FISHING OPERATIONS AND FISHING INCOME OF SMALL-SCALE FISHERMEN

### 4.1 Type of fishing operations

The fishing boats of small-scale fishermen can be classified into three types. These include non-power boats; outboard-powered boats; and inboard-powered boats. Usage of the boats accounts for 6.6 percent, 77.2 percent and 16.2 percent respectively. The percentage

**Table 6 : Annual income and expenditure of households in Thailand, 1990.**

| Items | National Average | | Southern Region | |
|---|---|---|---|---|
| | Baht/Year | % | Baht/Year | % |
| 1. Household Income | 67,500 | | 61,836 | |
| 2. Household Expense | 65,244 | 100.0 | 61,920 | 100.0 |
| 2.1 Food | 23,628 | 36.2 | 24,456 | 39.5 |
| 2.2 Drink, etc. | 1,956 | 3.0 | 1,812 | 2.9 |
| 2.3 Clothing | 3,816 | 5.8 | 3,768 | 6.1 |
| 2.4 Housing Rent | 14,628 | 22.4 | 11,616 | 18.8 |
| 2.5 Medical Care | 2,220 | 3.4 | 2,100 | 3.4 |
| 2.6 Others | 18.996 | 29.1 | 18,168 | 29.3 |
| Family Size (persons) | 4.1 | | 4.4 | |
| Income per Capita (baht/year) | 16,463 | | 14,054 | |

Source : NSO (1992a).

**Table 7. Number and types of small-scale fishing boat in Thailand, 1990.**

| Type of Boat | Total | | Gulf of Thailand | | Andaman | | Phang Nga | |
|---|---|---|---|---|---|---|---|---|
| | Number | % | Number | % | Number | % | Number | % |
| Non-power Boat | 3,116 | 6.6 | 1,872 | 6.0 | 1,244 | 7.7 | 348 | 8.7 |
| Outboard-powered Boat | 36,634 | 77.2 | 21,188 | 74.0 | 13,446 | 83.7 | 3,474 | 87.3 |
| Inboard-powered Boat | 7,673 | 16.2 | 6,291 | 20.1 | 1,382 | 8.6 | 159 | 4.0 |
| Total | 47,423 | 100.0 | 31,351 | 100.0 | 16,072 | 100.0 | 3,981 | 100.0 |

Source: NSO 1996

use of inboard-powered boats in the Gulf of Thailand is much greater than that of the Andaman Sea. This indicates more development of fishing boats in the Gulf of Thailand.

In Phang-nga province, the total number of small-scale fishing boats is 3,981. This consists of 87.3 percent of outboard-powered boats, 8.7 percent of non-power boats and 4 percent of inboard-powered boats (Table 7).

Small-scale fishermen in Thailand usually employ specific fishing gear with respect to fishing seasons. However, most fishermen tend to employ one major fishing gear which can be utilized for a longer period, thus generating a higher yearly income. Major fishing gears for the small-scale fisheries in Phang-nga province include shrimp gill net, crabs gill net, fish trap, anchovy purse seines and other moving gears.

4.2 Costs and revenues of small-scale fishing operations

*Fishing revenues*

In 1990, the gross national average of fishing revenues per small-scale fishing household was 71 ,1 66 baht, 60,630 baht for the Andaman Sea coast and 49,767 baht for Phang-nga province (NSO, 1992). Unlike small-scale agricultural households who keep most of the output for household consumption, small-scale fishermen sell 90 percent of their production in response to high prices. Average annual cash revenue of the small-scale fishermen is 64,950 baht for the whole country, 55,146 baht for the Andaman Sea coast and 44,427 baht for Phang-nga province.

Costs *of fishing operations*

For small-scale fishing operations, the main fishing costs are fuel cost, labour cost and equipment cost which accounts for 35.8 percent, 20.5 percent and 13.5 percent of the total cost respectively. For fishing operations on the Andaman Sea coast, the cost components are 33.7 percent, 19.5 percent and 15.2 percent respectively. It is noted that the labour cost of small-scale fishing operations in Phang-nga province (3.5 percent of total cost) is the lowest, compared to that of the whole country and that of the Andaman Sea coast. This indicates that the small-scale fishing operations in that area employ traditional fishing gears and utilize household labour. Fishing costs of the small-scale fishing operations is 3 1,773 baht per household for the national average, and 24,653 baht per household for the Andaman Sea coast. The lowest fishing costs are in Phang-nga province, at 17,151 baht per household.

**Table 8. Annual costs and revenues of small-scale fishing operation in Thailand, 1990.**

| Items | National Average | | Andaman Sea Coast | | Phang-nga | |
|---|---|---|---|---|---|---|
| | Baht/Year | % | Baht/Year | % | Baht/Year | % |
| 1. Gross Fishing Revenues | 71,166 | 100.0 | 60,630 | 100.0 | 49,767 | 100.0 |
| 1.1 Cash: | | | | | | |
| Fishing Income | 64,950 | 91.3 | 55,146 | 91.0 | 44,427 | 8927 |
| 1.2 Non-cash: | | | | | | |
| Value of Fish for Household Consumption | 6,126 | 8.6 | 5,484 | 9.0 | 5,340 | 10.73 |
| 2. Fishing Expenditures | 3 1,773 | 100.0 | 24,653 | 100.0 | 17,151 | 100.0 |
| 2. I Cash : | | | | | | |
| Crew | 6,526 | 20.5 | 4,797 | 19.5 | 600 | 3.50 |
| Fuel | 11,363 | 35.8 | 8,296 | 33.7 | 6,207 | 36.19 |
| Equipment | 4,305 | 13.5 | 3,758 | 15.2 | 4281 | 24.96 |
| Ice | 776 | 2.4 | 678 | 2.8 | 246 | 1.43 |
| Material | 669 | 2.1 | 735 | 3.0 | 701 | 4.09 |
| Boat Repair and Maintenance | 1,520 | 4.8 | 1,164 | 4.7 | 824 | 4.80 |
| Engine repair and Maintenance | 1,497 | 4.7 | 1234 | 5.0 | 1,163 | 6.78 |
| Interest | 554 | 1.7 | 452 | 1.8 | 381 | 222 |
| Others | 239 | 0.8 | 267 | 1.1 | 100 | 0.58 |
| 2.2 Non-cash : | | | | | | |
| Depreciation cost | 4234 | 13.3 | 3272 | 13.3 | 2,648 | 15.44 |
| Net Revenue (1) - (2) | 39,393 | | 35,977 | | 32,616 | |
| NetCashRevenue(l.l)-(2.1) | 37,50 1 | | 33,765 | | 29,924 | |

**Source** : NSO (1992b).

Net *revenue of small-scale fishing operations*

Net revenue is the difference between gross fishing revenues and fishing costs including depreciation cost. High net revenue would justify long-term fishing operations. Net revenue represents returns on factors of production such as capital, household labour, management and rent (including resource rent and rent of ability). According to the 1990 survey, the annual net revenue of small-scale fishing operations in Phang-nga province is 32,616 baht per household, which is the lowest, compared to that of the whole country (39,393) and that of the Andaman Sea coast (35,977).

Furthermore, net cash revenue represents the immediate maximum cash income that can be used to finance fishing operations and household consumption expenditures. It is the difference between cash revenue and cash costs excluding depreciation costs. In 1990, the small-scale fishermen in Phang-nga province had an annual net cash revenue of 29,924 baht per household which is less than that of the national average (37,501) and that of the Andaman Sea coast (33,765). It is noted that the net cash revenue of small-scale fishermen in Phang-nga province is far different from the net cash revenue of the whole country and that of the Andaman Sea coast. More fish are consumed per household in Phang-nga province.

## 5. SOCIO-ECONOMIC POSSIBILITY OF CBFM

In order to develop a system in which fishing communities have opportunities to participate in resource management, three socio-economic principles have to be taken into consideration to ensure that the communities would benefit from the system. First, net returns must be increased. Net returns in this sense are from resource rent or surplus benefit. Second, the pattern of distribution of income or benefit must be improved. Third, conflicts among fishermen of various scales must be reduced.

### 5.1 Increase in net returns

The increase in net returns is the result of higher fishing revenue or lower fishing costs or both. In the case of coastal resource development where artificial reefs have been constructed to enhance marine flora and fauna habitat or small-scale fishing operation areas, such initiatives have been successful so far in terms of generating fishing revenue and cooperation, as well as in improving resource conservation by fishing communities. Such artificial reefs can not only increase resource productivity, but also decrease fishing costs. However, successful systems depend on three major factors. First, fisheries management must be appropriate, conforming to regulations and based on resource conditions. Second, fishing communities must be self-reliant and have the right to take care of themselves. Third, regulations issued by the communities must be effectively enforced.

### 5.2 Improved pattern of distribution of income or benefit

In well-managed systems, fishing areas and types of fishing operations must be specified. Fishermen in the communities who have the right to operate fisheries activities will benefit directly from the system. Nevertheless, other people in the communities will also benefit through the 'Multiplier Effect'. That is, fishing crews will be positively affected by higher income from shared revenues. However, in communities where resources have deteriorated because of overfishing, such operations would have to be restrained. This would give rise to problems of income distribution. In principle, CBFM should be managed in such a way that income and size of fishing operations are not very different among members of the communities.

Equal income distribution is also a matter of value judgment. Wherever benefits are concerned, problems will often arise. In the case of Phang-nga Bay, the government and fishermen in the communities must set up a mechanism which helps achieve a compromise between the losers and the gainers.

### 5.3 To lessen conflicts between fishermen

Any conflicts, if they occur, imply a social loss in implementing a management system. A conflict can be violent if there are socio-economic and cultural differences between the confronting groups who exploit the resources. Therefore, it is necessary to take socio-economic and culcural conditions into consideration when selecting fishing communities for management at the beginning stage. It is expected that if fishermen have similar economic purposes, the integration and harmonization of the members in the communities will be easy. On the contrary, conflicts between fishermen within the managed communities and those between the managed communities and outside communities may increase, especially when resources outside the managed areas are limited. Outsiders will have a tendency to want to fish in the fishing grounds of the managed area where fish may be more abundant because of better management practices.

The degree of violence experienced in conflicts depends on several factors. For example, the conflicts can be violent if the intruding outside communities have socio-economic and political power and the regulated communities are strict about the right to utilize fishing areas.

## 6. CONCLUSIONS AND SUGGESTIONS

From the socioeconomic conditions of small-scale fishing communities on the Andaman Sea coast, and especially those in Phang-nga province who have lower incomes and living standards than small-scale fishermen nationwide and those in the south, the household income is determined mainly by the output from fishing operations. Incomes from other sources are limited. Therefore, fishing operations and fishing resource management should be organized by the fishing communities themselves.

CBFM is a system of small-scale fisheries management for purposes of efficient resource use, impartiality and optimal resource use over time. This system is one of the strategies currently used in several countries and is based on the principles of compromise, respect and trust among various participants of the management system. The usefulness of the operational system is worth considering because successful development of such a system is not easy and cannot be achieved instantly.

In implementing this policy, the relationship between the fishing communities and the government's role has to be adjusted. Explicit identification of agents who will have the right to manage fisheries resources and who will benefit from the policy is needed. Finally, more data and information are needed to help specify conditions for the success of the system.

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