

Selected Aspects in Economic Study on the Southeast Asian Fisheries

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Abstract

Some typical problems on the developing fisheries in the Southeast Asian Countries are analyzed in this treatise. The author has pointed out in the first chapter why and how the existence of rural fishing communities have influenced the modernization of fisheries industry, and in the second chapter, the different characters of development in each of the Southeast Asian Countries were described logically in relation with the stages of economic growth. The objective of the third chapter was to set up special viewpoint on the ownership under traditional utilization patterns of brackish water fishpond.

1. Artisanal Fisheries with Special Reference to Southeast Asia

1-1. *Rural Fishing Communities as the Basic Structure of Southeast Asian Fisheries*

Historically, in advanced countries which have experienced the industrial revolution, the fishing industry was already maintaining an important part of the economic activity before the progress of heavy-chemical industrialization. The industrial revolution has contributed in the industrial development of the fishing industry of the advanced countries. Fisheries of Southeast Asian did not under go such a historical process of fisheries development. However at the moment, Southeast Asian Fisheries have become the subject of International investment.

On the other hand, the number of several hundred thousand artisanal fishermen is increasing in almost every country.

From a geographical viewpoint, most countries in Southeast Asia are archipelagic or peninsular in shape, forming a long coastal zone. In this coastal zone there are large areas of marsh and swamps of mangrove where people cannot live and work as they do in the plains.

Many small fishing communities still maintain their existence under a long historical process of change. These small fishing communities consist not only of full time fishermen, but also of people who make their living through coconut growing, potato farming, etc. as well as peasant fishing. In the Southeast Asian Countries there are many small communities which consist of people like the above. There are many communities which are not only fishing communities but include people performing all types of work.

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However, in a broad sense, the number of fishermen in Indonesia is about one million. In the Philippines there are about seven hundred thousand. These are the two countries where fishermen make up of a large proportion of the rural population. The estimated population of the Southeast Asian Countries is about 300–350 million. An estimated 25 million people are part of the fishing population of which about 3–3.5 million are full time or part time fishermen. Therefore it can be seen that the fishing population represents about 10% of the total population of the Southeast Asian Countries. This is about ten times the percentage of fishing population in the total population of the advanced countries. For example, in Japan the percentage of fishing population is about 1% of the total population.

In the Southeast Asian Countries we can find big fishing communities as well as small fishing communities. Usually these fishing communities consist of 70–80 families and an estimated 40,000 of such communities are scattered mostly around the long coastal areas although some are found in the inland areas of the Southeast Asian Countries. In Indonesia this type of fishing community is called DESA whereas the Administrative unit or Village is called KANPUNG. In the Philippines, these are called BARRIO.

A large number of these fishing communities are completely isolated from the national society including urban areas and maintain their existence in small scattered islands. Among these communities we can also find old as well as new communities.

In the rural areas of the Southeast Asian Countries, the life style has no fixed pattern and there are different, interrelated problems. As such, we cannot analyze logically any particular problem. With the above background, the small scale fishermen's communities previously described can now be taken under consideration.

The agricultural village population in the Southeast Asian Countries has been increasing and will continue to increase which will raise the demand for new land. This demand will encourage the development of new communities resembling those in the colonial period. In the case of fisheries also, with the increase in the fishing population, a necessity for discovering new fishing ground emerges, which thus helps in the formation of new fishing communities. These fishing communities are called fishing tribes since these fishing people have the capacity of forming new fishing communities.

Through the historical process, fishing communities are increasing as new branch fishing communities. In the following paragraphs four processes of the formation of fishing communities are described.

1) — ORAN-LAUT. These people lived on boats since olden times, and after accumulating enough savings, they formed new fishing communities. These kinds of fishing communities will be found around the South China Sea and the Java Sea. Of these people who live surrounding this area, some have a nationality and many do not have any nationality. They maintain fishing businesses like buying, selling and transporting fish products to Singapore.

Historically, these people first established their trading business and then formed

communities in suitable places for trading or fishing. They do not own land but they build their platform houses of bamboo and palm tree pilings on the water very close to the beach and thus form a community.

2) — Some of the fishing communities were formed around 150–200 years ago by the descendants of the overseas Chinese from mainland china. There were rich as well as poor people among those Chinese. These Chinese people maintained a joint family system and also nourished a regional fellow feeling. They formed some of the fishing communities.

However, these fishing communities are subjected to different political policies of the Country to which they belong. In some cases, they receive political status as other communities, and in some cases, their recognition is avoided for any political consideration, resulting in many social problems.

3) — In most Southeast Asian Countries there exists some racial or religious majority in the National Population. In some of these Countries there are many minority classes oppressed socially and psychologically. This is true of some small fishing communities. For example, in the Philippines the Muslims are in the majority and in Bangladesh this is true of the Hindus. One of the special features of the Southeast Asian Countries is that in most Countries job opportunities are regulated or classified by religion. Thus we can find in these Countries such communities as a Hindu community, a Buddhist community, a Christian community, etc.

4) — Another type of fishing community is formed through Administrative policy by undertaking internal immigration activities.

In the case of Agriculture, farmers maintain their living by land development which is considered as an estate. Whereas in the case of fishermen, fishing ground cannot be considered real estate where great care is taken to avoid mishaps causing depletion of resources.

So far I have explained the formation of some fishing communities. These communities are not formed in one day. In the initial stage, some of the leading people select a place after inquiring about the availability of water, the possibility of farming, and the living conditions of the surrounding areas. Later on the people join them in forming a community. In this way, after ten or more years since the formation of the community, it is recognized as an administrative unit or village.

Thus the formation of a fishing community seems very easy. One of the reasons is that in Agriculture and Forestry, land is considered as private property, whereas in fishery there are some advantages in forming a fishing community:

- 1) — Land property is not necessary.
- 2) — Social infrastructure such as power and a water supply are not necessary.
- 3) — The people can live on fishing and by subsidiary extraction of potatoes, coconuts, copras, etc.

In the Southeast Asian Countries, urban developed fisheries are present but there are many small scale fishing communities as described above which are important to consider.

As government action does not reach the poor fishing population, they sometimes are influenced or attracted by actions of the neighboring country close to their community.

I have described above that there are many fishing communities; small, new, and old. Historically, they have maintained a resources preservation rule or self-control among themselves, influenced by their antecedent's tradition or culture, although there exists no governmental regulations. This is important to note.

In general, it would be wrong to consider that there exists no modern technology in these fishing communities. The fishermen of these fishing communities have developed and adopted such artisanal techniques which have no destructive effects on the natural environment and thus maintain close harmony with the ecological system of resources. Moreover, in any use of advanced technology there appears some social capital accumulation which is used for other social services. In the case of these small fishing communities, the people are not aware of social capital accumulation, and so they are happy with what is readily available.

Further, in the large scale traditional fishery there is no use of mechanical techniques. These duties are mostly carried out by intensive manual labor. Even when such technologies are used, they are matched to natural conditions, for example, ocean tides and waves.

1-2. *The Relationship Between Artisanal Fisheries and International Fisheries Efforts*

The majority of the Southeast Asian Fisheries are artisanal fisheries, consisting of household coastal fishermen, operating on subsistence level with low productivity, resulting from traditional techniques. However these traditional techniques have been maintaining the historical harmony with the natural resources. For instance, in many places it has been observed that fishermen practice such a technique as wait and catch. That is to say the fishermen wait according to the flow of the current, which they use to catch the fish by net, in certain seasons. This suggests that there is a passive activity on the fishermen's part with regard to this kind of fishing activity. In set fishing or trap fishing, the fishermen always have to wait for fish to fall into the trap or enter the set net which thus maintains a close harmony with the marine resources as well as with the marine ecological system.

In connection with this, it is worthwhile to take note of how the large scale fishery exploitation effects the ecological system. For example, the size of the skipjack fish around the offshore waters of the southern part of Japan were said to be smaller in the year following the American skipjack 'purse seine' operation in the West Caroline Sea. This suggests that a large scale fishing activity has certain effects on the marine ecological system.

Further, the demand of the vast rural areas of the Southeast Asian Countries are supplied entirely by these artisanal fisheries. Though the individual fishermen has very low productivity their combined total production of various species is quite large. The traditional fish products in the form of salted, salt-dried and fermented

are supplied to a wide range of interior areas. Obviously, these kinds of food stuffs are cheaper when compared to other food stuffs such as fresh fish, meat, etc. Out of these traditional fish products, in some cases, there are pested shrimp and smoked milk fish products which are exported to European Countries.

From the above discussion two major points are understandable. First, there is a very close relationship between the coastal artisanal fishing and the offshore or pelagic fishing. The activity of the large scale vessels fishing for migratory species in the continental shelf close to offshore waters has ecological effects on the coastal fisheries. The large scale fishing vessels are, in most cases, capital intensive and their efforts are directed toward expensive species such as shrimp, tuna, skipjack, etc. Whereas the coastal fishing efforts are directed toward cheap species and are the main supplier of fish products to a large proportion of the local population. And so the fishing activity of the large scale vessels has some direct effects on the coastal small scale fishing. For example, until recently, the coastal fishermen had little or no knowledge of the migratory, expensive fish resources in their offshore waters. But upon noticing the fishing activity of foreign vessels in the offshore waters for expensive fish, the coastal fishermen's desire has also increased for exploiting those resources. In connection with this, their requests to the authority or private interests for funds and equipment have gradually increased. This is one development in the relationship of artisanal fishermen with marine resources and the ecology. International conflicts over fisheries are usually centered around good and rich fishing grounds. Although, by the extension of territorial waters, some of the rich fishing grounds have become inaccessible to foreign fishermen. These foreign fishermen do not think that fishing within the 200 mile zone of other countries is illegal. This is because the fishermen of neighboring countries exploited those rich fishing grounds as common property for a long time. Therefore, from a historical point of view, questions could be raised on the legitimacy of the 200 mile independent marine jurisdiction. Such questions may call for a solution to international fisheries conflicts by allowing free access for multiple use of fishery resources to neighboring countries in such fishing grounds where there has been a long history of fishing by fishermen of different nationalities.

Next is the problem of smuggling or unauthorized fishing trade of artisanal products. In the Southeast Asian Countries, a large proportion of the catch is traded unofficially between the neighboring countries. The actual figure of this kind of trade does not appear in the statistics. However, this type of unofficial trade has long been carried on. The overseas Chinese traders in the Southeast Asian Countries had maintained this system of trade long before the establishment of present day Southeast Asian Countries. And so they still carry on the same practices without taking into consideration the new situation.

2. Economic Interaction and Competition among the Southeast Asian Fisheries

2-1. *The Character of Fisheries Modernization in the Southeast Asian Countries*

Generally speaking, the condition of the Southeast Asian Fisheries cannot be developed substantially without proper acknowledgment of the following three factors:

First, unless the relative and supporting industries, such as shipbuilding, engine making and repair, cold storage, transportation, etc., develop, fisheries development will be difficult.

Secondly, there is an absence of substantial demand for fish and fisheries products in most Southeast Asian Countries. If demand is to be increased significantly, industrial activity must be expanded. The development of industries will increase the industrial labor population which will then boost the demand for fish and fisheries products. No substantial increase in demand can be expected from the agricultural society.

Thirdly, during colonial rule the basic pattern of the monocultural, stagnated economy developed. Therefore, in most countries, fisheries did not develop much, except in the case of Thailand. In Thailand colonialism did not invade. The overseas Chinese controlled the economy and the fisheries sector of Thailand had a greater opportunity for development.

Until now the fisheries infrastructure in the Southeast Asian Countries has been very weak. First of all, the port facilities are not adequate. The facilities for shipbuilding and ice making are still unsophisticated, although there has been some progress in the technological field, especially in the Philippines. In these countries the National Capital has been increased in the public sector in the form of industrial infrastructure (T. 1-2). Though it seems that the Philippines and Indonesia have been able to develop their fishing industry with their own efforts, due to insufficient trained manpower and lack of national funds, independent development of fisheries has been difficult.

Let us now review the development situation in fishing vessels (T. 4 and 5). In the Philippines, construction of purse seine, otter trawl boats of 50-100 tons has increased to 300 boats. In Thailand, 20-50 ton otter or pair trawl boats have substantially increased to 100 vessels. In Indonesia, there has been no increase in big vessels, although 20-30 ton vessels called PAJANG (boat seine) have increased significantly. In the case of Indonesia, apart from private vessel owners, national capital investment has increased significantly in tuna long line fishing, skipjack hook and pole fishing. In Malaysia, small trawl and gill net fisheries of under 10 tons have increased considerably.

The fisheries of the Southeast Asian Countries have developed as described above.

There are three main objectives in the development of fisheries in the Southeast Asian Countries:

- 1) — To earn foreign exchange.
- 2) — To increase production of proteolytic foodstuffs.
- 3) — To improve employment in the related industries.

In order to attract foreign investments in the form of private foreign capital, many new policies have been adopted by foreign international financing institutions. Governmental agreements in the field of fisheries have recently been approved in many countries.

For example, let us review how much capital has been financed through the Asian Development Bank for the fishery's sector of the Southeast Asian Countries.

Until 1976, ADB had disbursed loans for 13 projects in 11 countries (Bangladesh, Burma, Indonesia, Malaysia, South Vietnam, Srilanka, Pakistan, Philippines, Thailand, Korea, etc.). The total amount lent to fisheries was about \$ 120 million (U.S. dollars). An average credit of \$ 10 million per project was released. These 13 projects can be classified by orientation as follows:

- 1) — Export oriented fisheries development projects — 4
- 2) — Regional fisheries development projects — 5
- 3) — Domestic foodstuffs production projects — 4

When classifying the actual type of investment, there appears three major categories:

- 1) — Small trawl group.
- 2) — Tuna and skipjack fishing vessels and fishing port construction.
- 3) — Relative onshore equipment facilities.

Now let us review the development projects in the Southeast Asian Countries under foreign credit. In Indonesia two projects under the World Bank credit for skipjack pole and line fishing are in operation. ADB financed two projects in New Guinea for skipjack pole and line fishing. Under credit from the Japan Overseas Economic Cooperation Fund, boats were purchased and onshore equipment and fishing ports were established in Sumatra and Bali. The above are foreign governmental and foreign international financing institution investments. Apart from this, several Japanese fishing companies have started joint ventures in the Banda Sea area (T. 8-9).

In the case of the Philippines foreign capital is also flowing into the fishery's sector. However, in the near future, the tuna long line, skipjack pole and line, and shrimp trawl fishery which is currently financed as a joint venture is likely to be taken over by National financing.

2-2. *Capabilities of Southeast Asian Nations to Replace Foreign Fishing in their Waters*

In the Southeast Asian Countries, there are artisanal household fisheries that operate on subsistence level and also some enterprise scale fisheries. These two types of fisheries differ basically on two main points. One is that the household fisheries operate as a means of subsistence, while the enterprise businesses operate in order to

make a profit. The artisanal household fishermen live in a community. In most of the Southeast Asian Countries there is little improvement in the condition of these small scale household fishermen.

In this situation, the growth of private enterprise scale fishery or joint venture fishery will create severe problems in marketing, labor supply, etc., for the small scale fishery. This will in turn cause many artisanal households to withdraw from the fishing operation. Enterprise scale fisheries need certain expensive species of fish products which are costly in terms of effort as well as in capitalistic management. Whereas the artisanal household fisheries concentrate, in most cases, on mass consumed fish species. This is why it is not feasible to help disintegrate the small scale fisheries. The coastal and inshore fishery is the most basic part of the fishing industry. However, these coastal and inshore fisheries should extend their activities towards aquaculture as well as towards offshore fishing. These areas have great potential.

If the intention to develop pelagic fishery and big scale fishery in the Southeast Asian Countries grows, the following three types of management systems will become prominent.

- 1) — One which originates through multinational enterprise management in the form of joint ventures, etc. .
- 2) — Management by government staff, originating through financing from International Financing Institutions like the World Bank, the Asian Development Bank, etc. .
- 3) — Management by domestic staff, originating through local capital finances.

From the viewpoint of resource potentiality, there is a great prospect for developing a shrimp trawl fishery in the Philippines and tuna long line, skipjack pole and line fishing and shrimp trawl fisheries in Indonesia in the near future. That is to say that there is an expectation of such an increase in the production of fish products. In discussing the problem of fishery economic development in the Southeast Asian Countries the following three problems appear to be prominent:

1) — The techniques for tuna long line, skipjack pole and line fishing which were introduced in Taiwan and Korea are receiving good results. But as far as shrimp trawl, skipjack pole and line fishing, and tuna long line fishing techniques, which were originally developed in Japan and later successfully applied in Taiwan and Korea, are concerned, it is not know if these techniques will yield the same results in Taiwan and Korea as when applied in the Philippines and Indonesia.

2) — The other problem of fishery development in Southeast Asia is that the fishing ports and related facilities for manufacturing engines, electronics, etc. are still lacking. For this reason it is difficult to develop fisheries.

3) — In most Southeast Asian Countries, the government public sector management lacks administrative efficiency and democratic management. Corruption is rampant. There are also procedural formalities which cause long delays. These are major hindrances in the development of fisheries. Considering the above problems, it is understandable that to replace foreign fishing in the waters of Southeast Asian

Countries is not easy.

Nevertheless, in the Southeast Asian Countries, there is a growing acknowledgment of the need to preserve natural resources. This awareness has prompted the idea of Resource Nationalism. Let us consider the prospects of replacing foreign fishing from the viewpoint of this Resource Nationalism. Also, it has been observed that there is a growing tendency of new capital accumulation in the economies of some Southeast Asian Countries. This is important because, with the emergence of new capital accumulation and resource nationalism, these two factors might be helpful in replacing foreign fishing some day.

2-3. *The Relationship of Fisheries in Indonesia and the Philippines as Compared to the Rest of Southeast Asia*

When trying to classify the fisheries of the Southeast Asian Countries, the fisheries of Indonesia and the Philippines appear quite different from the rest of the region. Geographically, these two countries are archipelagic, forming a long coastline as well as wide archipelagic water. According to archipelagic theory, in the 1960's they enclosed the Banda Sea and Sulu Sea as territorial inland seas in order to protect their natural resources from foreign invasion. In comparison to other Southeast Asian continental countries, the size of the marine fisheries in these archipelagic countries is quite big. Both the Philippines and Indonesia are emphasizing an increase of exports of marine products to Singapore, Japan, the United States of America and various European Countries. The fish eating habits of the people of these two countries are also different from the other Southeast Asian Countries. People of these archipelagic countries consume more marine fish than the other continental shelf Southeast Asian Countries. They have a low consumption of fresh water fish. It should be noted that there is no statistical analysis on the actual consumption of fish in the Southeast Asian Countries. There are many cases in the rural areas where people catch fish for their own consumption, especially in the Philippines and Indonesia. If these facts are taken into consideration, it would be found that the people of these areas consume 2-3 times the amount of fish that is generally quoted in the statistics. Therefore, in my mind, the demand for fish and fish products in the Philippines and Indonesia is higher than in other Southeast Asian Countries.

Obviously, there exists many differences between continental countries and archipelagic countries with regard to marine industries. But there are also certain differences between the two archipelagic countries of the Philippines and Indonesia. Let us first consider these differences.

Although there is a combination of tenant land ownership and multi-national investment, the economic structure of the Philippines has basically developed along capitalistic lines. Therefore the fishing industry has also come under the process of capitalistic development. This is different than in some other countries. Recent indications show that there is a growing tendency to increase the size of the boats in the Philippines. In 1976, out of a total of 2,500 inboard powered boats, 590 vessels

were over 20 tons, 400 vessels were over 50–100 tons and about 230 vessels were over 100 tons. Otter trawl and purse seine boats over 50 tons have substantially increased. The landings from a purse seine operation are round scad, Pony fish, thread fin bream, etc. Catches of cheap species are large and as such most of these fish are consumed domestically. Apart from this, small scale bag net fishery, which attracts a large number of fishermen, is also quite important in the Philippine fisheries.

Indonesia has a larger area with a larger population than the Philippines. The rural areas are also larger than those in the Philippines. The Indonesian economy has not undergone any capitalistic development where the state enterprises have been developed under governmental sponsorship. Private fishery enterprises have not developed to the extent they have developed in the Philippines and thus the fisheries structure of Indonesia presents a different situation.

In 1975, there were about 8,000 inboard powered vessels in Indonesia. But the overall size of these boats was small. Out of the total 8,000 boats, about 1,000 boats were 10–20 tons, about 320 boats were 20–30 tons, and about 140 boats were 30–50 tons. There were about 170 boats of over 50 ton size. The rest were below 10 tons in size. From the above information, it is understandable that the overall size of vessels is small as compared to the Philippines. In Indonesia there are many boats of 20–30 tons. These boats are called "PAYANG" (boat seine fishery). There is also a large amount of small scale hookline fishing. The above types of fisheries produce cheap fish like those produced in the Philippines.

There are numerous fishermen living in the rural areas of Sumatra and Kalimantan. These fishermen transport their huge catches to Java Island.

Production of sardines and anchovies amounts to 200,000 tons (T. 6–7). Production of scad species is around 150,000 tons. The catch of skipjack and tuna are

Table 1. *Economic Indicators for Four South East Asian Countries.*

	Year	Population (10,000 person)	Gross National			Product	
			Nominal Value (\$million)	Actual Rate of Growth (%)	Per Capita (U.S.\$.)	Composition to GDP (%)	
						Agr., For. & Fishery	Manu- facturing Industry
Thailand	1976	4,296	16,242	7.8	378	29.2	18.7
	1977	4,404	18,085	6.2	427	27.2	20.1
	1978	...	...	8.7	490	...	...
Philippine	1976	4,375	17,717	6.7	405	26.7	23.8
	1977	4,503	20,514	6.3	456	26.4	24.1
	1978	4,635	23,172	5.8	500	26.1	24.2
Malaysia	1976	1,224	10,613	10.5	867	27.4	17.5
	1977	1,256	12,534	7.6	998	26.2	18.1
	1978	1,290	14,841	7.2	1,150	24.8	18.8
Indonesia	1976	13,519	36,228	6.9	268	36.1	11.4
	1977	13,680	44,395	7.5	325	34.7	11.9
	1978	...	...	...	...	...	...

Source: *Asian Affairs* 1979 by Institute of Asian Economic Affairs

Table 2. Geographic and Economic Data for Southeast Asian Countries.

Country	Area (km ²) ^a	Length of coastline (km) ²	Population ^a (in thousands)	Rate of population increase (% per year) ^a	GNP (U.S. \$ million) ^c	Employment in fisheries ^d	Total catch, 1971 (1,000 metric tons) ^e
Brunei	5,765	163	116	3.6	N.A.	360	1.5
China	9,561,000	6,467	740,000	1.4	N.A.	N.A.	6,880.0
Hong Kong	1,034	111	3,990	2.2	N.A.	45,000	114.1
Indonesia	1,491,564	36,834	116,000	2.5	8,430	1,081,000	1,244.5
Khmer	181,035	435	6,701	2.2	655	40,600	77.2
Laos	236,800	—	2,893	2.4	198	N.A.	20.0
Malaysia	332,633	3,432	10,581	2.9	4,298	81,700	367.8
Philippines	300,000	17,460	37,158	3.5	7,660	687,900	1,049.7
Singapore	581	140	2,017	2.1	2,482	2,200	15.2
Taiwan	35,961	870	13,800	2.8	6,230	N.A.	650.1
Thailand	514,000	2,584	34,738	3.1	6,951	337,000	1,587.1
Vietnam. North	158,750	707	21,340	3.1	N.A.	N.A.	300.0
Vietnam. South	173,809	1,602	17,867	2.6	2,350	317,400	587.1
						$\Sigma =$	12,894.3
						$\Sigma - \text{China} =$	6,014.6

Country	Gross value ex-vessel (U.S. \$ 1,000) ^f	Fisheries as percentage of GNP ^f	Per capita consumption of fish (kg/year) ^d	PCE per capita (U.S.\$) ^g	Projected demand, 1980 (trend) (1,000 metric tons)	Projected demand (high), 1980 (1,000 metric tons) ^b
Brunei	345	—	N.A.	N.A.	N.A.	N.A.
China	1,582,000	—	7.6	N.A.	9,485	10,442
Hong Kong	51,100	—	48.1	573	290	305
Indonesia	286,000	3.4	10.2	107	1,736	1,894
Khmer	44,000	6.7	25.4	109	246	251
Laos	4,600	2.3	10.2	N.A.	40	42
Malaysia	93,000	2.2	25.7	214	377	392
Philippines	279,000	3.6	24.2	160	1,417	1,502
Singapore	7,200	0.3	41.5	686	112	114
Taiwan	152,000	2.4	N.A.	N.A.	890	928
Thailand	219,000	3.2	19.1	116	1,142	1,284
Vietnam. North	69,000	—	11.2	N.A.	372	495
Vietnam. South	122,000	5.2	18.9	N.A.	528	541
					16,635	18,190
					7,150	7,748

Source: John C. Marr, *Fishery and Resource Management in Southeast Asia*, by RFF Program of International Studies of Fishery Arrangements p. 11, 1976

Table 3. *Fishery Production.*

Unit: Metric ton

Country	Year Referred	Total	Marine Fishery (capture only)			Inland fishery (capture only)
			Sub-total	Small-scale fishery	Large-scale fishery	
Indonesia	1975	1,390,074	996,856	...	...	228,571
Malaysia	1976	516,856	482,926	156,025	326,901	685
Philippines	1976	1,393,483	1,127,342	619,145	508,197	106,360
Thailand	1976	1,699,086	1,388,239	173,826	1,214,413	113,263

Country	Aquaculture			
	Sub-total	Marine-culture	Brackishwater culture	Freshwater culture
Indonesia	164,647	—	78,776	85,871
Malaysia	33,245	...	31,642	1,603
Philippines	159,781	—	112,761	47,020
Thailand	197,584	—	163,553	34,031

Source: *Fishery Statistical Bulletin For South China Sea Area 1976* by Southeast Asian Fisheries Development Center (SEAFDEC).

Table 4. *Number of Fishing Craft by Type and Tonnage.*

Country, sub-area	Year referred	Total	Non-powered boat	Out-board powered boat	In-board		
					Total	Less than 5 tons	5-10 tons
Indonesia	1975	257,152	242,221	6,771	8,160	4,348	2,150
Malaysia	1976	32,091	6,906	5,803	19,382	6,385	6,818
Philippines	1976	305,416	117,388	—	118,073	185,778	610
Thailand	1976	26,135	5,367	10,333	10,435	4,657	1,951

Country, sub-area	powered boat.					
	10-20 tons	20-50 tons	50-100 tons	100-200 tons	200-500 tons	500 t & over
Indonesia	1,026	459	67	71	39 ¹⁾	...
Malaysia	3,512	2,526	135	6	—	—
Philippines	520	532	397	174	62	—
Thailand	1,852	1,592	383	61	29	—

Note 1) The original national classification of Indonesia is "200 tons and over", it is, therefore, a possible that this figure may include some fishing boats in the class of "500 tons & over".

Source: *Fishery Statistical Bulletin for South China Sea Area 1976*, by Southeast Asian Fisheries Development Center.

Table 5. *Main Fishing Units by Size of Craft.*

5.1. Philippines (1976)

Type of Fishing Gear	Total	Out-board powered boat	In-board powered boat								
			Sub-total	Less than 5 tons	5-10 tons	10-20 tons	20-50 tons	50-100 tons	100-200 tons	200-500 tons	500 tons
Otter trawl	786	—	786	55	235	98	193	169	35	1	—
Bagnet	648	—	648	52	168	251	141	12	23	1	—
Purse seine	338	—	338	52	50	27	39	115	49	6	—

(Note) This table shows data for commercial fishing only; non powered boats are excluded.

5.2. Thailand (1976)

Otter trawl	4,088	—	4,088	1,319	588	1,056	874	169	55	27	—
Gill net	2,289	—	2,289	1,475	607	177	28	2	—	—	—
Pair trawl	832	—	832	69	39	230	369	118	6	1	—

(Note) Gill net includes Mackerel Encircling gill net, Pomfret gill net and other gill net.

Source: *Fishery Statistical Bulletin for South China Sea Area 1976* by Southeast Asian Fisheries Development Center.

5.3. Malaysia (1976)

Type of Fishing Gear	Total	Out-board powered boat	In-board powered boat, sub-total
Otter trawl	6,336	—	6,336
Drift gill net	9,590	2,971	6,619

(Notes)

- 1 Excludes non-powered units.
- 2 Licenced units, unlicensed units are excluded.
- 3 Tonnage breakdown is not available.

5.4. Indonesia (1975)

Type of Fishing Gear	Total
Drift gill net	36,037
Set gill nets	25,315
Troll lines	27,323
Pajang	15,542

(Note) Tonnage breakdown is not available.

Source: *Fishery Statistical Bulletin for South China Sea Area 1976*.

Table 6. *Catch of Fish by Main Species (1976).*

Unit; Metric ton

Country, sub-area	Total	Round scad & Selar scad	Sardine	Ancho-vies	Tunas	Mack-erels (Indo-Pacific mack-erels)	Miscel-laneous marine Fishes	Shrimps & prawns
Indonesia	996,856	114,276	104,995	66,780	86,507	70,985	161,261	58,465
Malaysia	482,926	31,049	22,905	14,337	8,779	2,570	177,042	71,308
Philippines	1,127,342	267,143	61,668	66,117	88,404	24,650	17,001	41,015
Thailand	1,388,239	83,760	105,692	17,296	9,719	53,771	701,488	86,139

(Note) Tunas include Skipjack tuna, Yellowfin tuna, Big-eye tuna, Long tail tuna and Eastern little tuna.

Source: *Fishery Statistical Bulletin for South China Sea Area 1976* by Southeast Asian Fisheries Development Center.

Table 7. *Catch of Fish by Type of Main Fishing Gear & Main Species.*

7.1. Malaysia (1976)		Unit; Metric ton	
Type of Fishing Gear \ Species	Total	Trashfish	Panaeid prawn
Total	482,926	140,356	62,027
Trawl	263,897	123,659	46,401

7.2. Philippines (1976)		Unit; Metric ton	
Type of Fishing Gear \ Species	Total	Round scad	Pony fishes
Total	1,127,342	224,665	82,719
Trawl	211,417	14,420	49,166
Purse seine	206,206	154,563	219

7.3. Thailand (1976)		Unit; Metric ton		
Type of Fishing Gear \ Species	Total	Round scad	Sardine	Trash fish
Total	1,388,239	83,760	105,692	620,646
Otter boat trawl	608,059	3	—	479,689
Luring purse seine	187,372	70,533	58,864	—

Source (Table 7.1., 7.2., 7.3.): *Fishery Statistical Bulletin for South China sea Area 1976* by Southeast Asian Fisheries Development Center.

Table 8. *Japanese-invested Fishery Enterprises by Region.*

Unit: \$1,000

Region	Country	No. of cases	Capital	Japanese investment (%)
Central & South America	12 [11]	23 [22]	17,325	13,151 (76%)
Asia	15 [24]	84 [99]	57,148	34,562 (60%)
Oceania	8 [6]	24 [6]	3,336	1,891 (57%)
Europe, Middle & Near East	5 [11]	28 [20]	8,316	3,592 (43%)
Africa	12 [2]	58 [45]	28,874	15,594 (54%)
North America				
Total	57 [54]	225 [192]	114,999	68,750 (60%)

Note: Data compiled by PARC as of October 1978.

Figures in the brackets indicate these published by the Fishery Agency, as of March 1978, according to 1978 Fishery Yearbook (Reference No. 7).

Table 9. Number of Japanese-invested Fishing Enterprises by Type of Business (as of March 31, 1978).

Type of fishing Area	Trawling	Skipjack-Tuna fishing	Whaling	Others	Aquaculture	Freezing & refrigeration	Canning Processing	Total
Central and South America	8 (3)	2	1	2	1	4	4	22
Asia & Oceania	22 (20)	7	—	5	28	12	25	99
Middle and Near East	1	—	—	—	—	—	1	2
Africa	10 (4)	3	—	1	—	4	2	20
Europe	2	1	—	—	—	—	1	4
North America	1	—	2	3	2	2	35	45
Total	44 (27)	13	3	11	31	22	68	192

Note: Figures in parentheses are shrimp trawling.

Source: 1978 Fishery Yearbook (Reference No. 7).

quite significant and amounts to 100,000 tons, the largest catch of this kind in Southeast-Asia. The production of marine shrimp is around 60,000 tons which is also the highest in the Southeast Asian Countries.

In Indonesia, hook and line skipjack fishery, tuna long line fishery and shrimp trawl fishery are operated on a large scale with large vessels. The scale of joint ventures in Indonesia fishery is also large and governmental involvement is quite significant. Tuna long line, hook line skipjack and shrimp trawl fisheries are operated in and around Indonesian archipelagic waters.

The conditions that have been described above show some of the differences between the structure of the fishing industries of the Philippines and Indonesia.

There has been a marked development in Thailand of otter board trawl fishery of 5-20 tonnage. However, there has been a sharp increase in trash fish production while the main fish consumption continues to be from inland waters (T. 7). According to 1976 statistics, out of a total production of 1,300,000 tons, over 600,000 tons consisted of trash and miscellaneous fish. This indicates that most of the marine fish products are used for animal feeding, in the form of fish meal, etc. Among other Southeast Asian Countries, only Malaysia is capable of self-supplying its demand for fish and fish products, though the size of its fishery is relatively small. Fisheries of other countries such as Vietnam, Cambodia, Burma are still in a underdeveloped condition and have been growing at a slower rate recently.

The fishing efforts for tuna, skipjack and shrimp in the adjacent seas of Southeast Asian Countries have developed quite significantly, especially in Indonesia. On the other hand, tuna and skipjack fish resources are said to be scarce in the surrounding sea. In this situation, if the efforts for tuna and skipjack fishery keep increasing the fishing activity is likely to move eastward in the direction of the South China Sea.

3. Socio-economic Aspects of Brackish Water Fish Culture in the Southeast Asia

3-1. *Ecological Character of "Tambak" in Comparison with Aquaculture in Japan*

To say about coastal zone in Indonesia, I first recall the wide coastal zone of north Sumatra which is waiting for renovation. This coastal zone is lacking in many facilities like water and electric supply, well-linked transportation system and river protection measures. This place is also naturally depressed due to its wet and humid climate, muddy and swampy soil.

This type of environmental factors are very much unfavourable and hopeless for the development of this zones. But developing activities of this zone are to be expanded for keeping the balance relationship between the human life and biological-ecology of the zone.

Considering the prevailing drawbacks faced by each coastal zone, practical approach for improvement and management of coastal utility are to be adopted. To improve the utilities of coastal are, the brackish water fish culture and fish preservation in the coastal area that may be called "Tambak" could be the most feasible action point. So attention is to be paid for the introduction of the brackish water fish culture system keeping equilibrium and proper balance with the biological-ecology system of oceanographic management.

The historical fish culture system with naturally grown plankton and grass food through the management of biological ecology of water will impart more effective result for fish culture with low cost. Secondly, avoiding the artificial feeding systems, food through culture of plankton and introduction of feed-back and other transformation techniques for supplying food is to be preferred. By the by, it can be mentioned that there is an excessive cost involvement during shallow water fish culture by artificial feeding which is being done in Japan recently. Specially in case of sea bream and yellow tail fish culture as to produce a fish of 1 kg. requires food materials to 7 kgs. of fish, which is more than 60% of the cost production. Moreover the cost investment for making frame, nets and other accessories, make the system uneconomics and cost intensive.

Also, during the artificial supply of food the fish like mackerel, sardine and other fish are caught for regular supply food. During the practices, the biological ecology systems are noticeably unbalanced, and the same time fingerlines of yellow tail and sea bream has been reduced obviously as a result of over fishing in offshore resources disturbing the growth of marine resources, and the growth generation of these fish varieties are drastically changed, which could be the potential earning marine resources.

It is also found that in case of shrimp culture the construction cost for regulating clear water supply and other auxiliary cost makes the cost on its higher side of in-

vestment leading the market price undesirably higher. As these investments are unavoidable in case of fish culture, the prime important is the introduction of high productivity system through the control of investment cost factors due to the supply of artificial food, by creating natural environment for growing fish food in the culture system.

Beside artificial feeding, some thing about water pollution is urgently felt to be mentioned, specially the coastal zone water pollution in Japan is considered to be a problem due to its alarming situations.

The Japanese government's policy of rapid industrialization and high economic growth has contributed to the pollution of Japan's fishing water. Industrial pollution has greatly reduced Japan's marine resources in 1960's. After 1970 people began gradually to get interested in pollution problems. By this time, however, various kinds of deformed fish had been found over 300 places through Japan. A report published by the Ministry of Health and Welfare in 1973 concerning mercury and PCB contamination in offshore water became a national sensation.

The water pollution is mainly attributed to the industrial effluent, house-waste and left-over of artificial fish feeding. In addition to the self-pollution by fish excretion, red tide water pollution in some parts of Japan, specially in Setonaikai, a large aquaculture field is spoiled. There is no probability for fish culture in that area in near future.

Beside pollution due to industrialization and housewaste, the water pollution for aquaculture is a problem in Japan. It should be carefully checked in any other country during fish culture, so that this type of water pollution problems due to supply of artificial food does not arise at all.

Now it is clear that due to different reasons the capital intensive aquaculture system in Japan is not encouraging. So quite naturally it is expected that to develop the aquaculture e.g. "Tambak" system in Indonesia, emphasis is to given to the improvement of the autonomic re-production of biological technique for fish culture, which is to be done by investing probable least amount of capital with the improvement of the biological-ecology system of the environment.

It was observed in some Asian countries that a high capacity power machine from Japan was used to construct pond for shrimp culture, which ultimately found to be unsuccessful and not accepted for the purpose, so this type of investment is not only the wastage of money but also a fruitless effort and misuse of a resource which could be better utilized for improving the biological-ecology of the nature for fish culture.

3-2. *Ownership of "Tambak" under Traditional Utilization System*

Recently, interest is growing in many Southeast Asian countries in the importance of inland fisheries. One of the main objectives of this interest is to have self-sufficiency in protein in the local food supply. But it has been observed that there is insufficient knowledge about the situation of inland fisheries in their socio-economic aspects in the Southeast Asian countries. So here I would like to explain the relationship

between inland fisheries and the rural socio-economic pattern.

Inland fisheries in Southeast Asia could be classified roughly into two categories. That is fresh water fisheries and brackish water fisheries, each of them includes fish culture and fishing. At the present stage, the fresh water fisheries in lakes, reservoirs, rivers and paddy field are the main sources of fresh water fish supply of the farming villages. On the other hand, brackish water culture are operated in man-made ponds and swamps near the sea side, and has been developed in the Philippines, Indonesia and Thailand. The uniqueness of these brackish water could be said to be specialized because of the fact that these brackish water culture performed the role of mass production system resembling to an enterprise management system in each rural society.

In the case of Thailand, even though it is a traditional technique, tiger shrimp culture has been developing for more than several decades. Philippines and Indonesia, with the background of about 200 to 400 years, the milk-fish (*Chanos-Chanos*, in Taiwan they said Sabahi) culture is practiced by releasing the fingerlings to the brackish water ponds. The reclamation area of fish culture ponds are 150,000 ha. in Philippines and 170,000 ha. in Indonesia in the beginning of 1970's.

At first, I would like to describe the ownership relation of fish culture pond in Indonesia and Philippines. The brackish water ponds located at urban areas where the approved land prices are estimated in terms of unit of a hectare per dealing. These fish culture ponds are owned mainly by merchants, specially the overseas Chinese merchants who are living in urban areas and few other owners are living in the country area. Almost of the ponds located in very rural areas of thin population, are registered in governmental ownership rather than privately owned, however, some of them are belonging to the authorities of military or bureaucrats. These are because of the imperfectness of personal possession system. It is not an uncommon case to find that in the remote areas where the brackish water ponds are located under conditions of naturally swampy or marshy some of the such ponds are being dealt in unit of ten thousand.

Only a part of these ponds are managed by the owners, while most of them are run by the absentee ownership system. Also the ownership registration are eligible to lease or selling. The actual control and operation of fish culture have been contracted with the supervisor who is an experienced manager of fish ponds. The responsibility of the supervisor are to repair and rebuilt the ponds, buy fry fish, manage fish culture and harvest for selling while they share the profits with the owner through the system of contract. Usually change in the owner's registration due to sells or lease does not call for the change of the supervisor who are connected with the ponds.

Almost all the owners of the self-managed ponds are the occupant from the overseas Chinese merchants. However, recently self-management system are increasing gradually among the local land owners class. This tendency should contribute to the increase of commercial profits by improved efforts through capital intensive management. There is a rising difference in productivity and harvest of milk-fish

as ranged from 300 kg./ha. to 10,000 kg./ha. between the ponds. However milk-fish is originally categorised to high class fish due to its popularity as a favorite food, and fish culture pond management offers a profitable type of business in the primary industry. It is observed that rising of purchase and leases value compensated with the technical progress of ponds construction as well as rationalized fish culture technology.

Then, I would like to shift the attention into character of labourer who are employed at rate of one person per hectare pond area on the basis of time worker. However full-time employee are very few, a large number of neighbouring farmers are employed in traditional working system of pond operation, which are organized particularly during fish harvest and pond renovation seasons. Workers employed are controlled entirely by supervisors and it has got no relation with the changing systems of ownership of the ponds.

To say further, the activities of the ponds have influenced greatly to economic aspect of the community life, because the management of ponds have to buy necessary materials for operations from the locality. On the other hand, the local inhabitants who are employed as part time workers are being freely supply with miscellaneous fish.

Recently, there are some opinions to introduce tiger shrimp culture by feeding system instead of milk-fish culture. It may be useful for suitable location to change milk-fish to tiger shrimp through capital intensive technique. But if we consider the relationship between traditional fish ponds and the socio-economy of the rural communities, it becomes obvious that the introduction of too much intensive technique of fish culture might lead the settings of communities to a state of confusion and disorders. In view of the above, it should be considered that the increase of productivity of fish pond will be achieved by the ecology existing synthetic system of fish culture.

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