

## PROBLEMS IN THE DEVELOPMENT OF FISHERIES RESOURCES IN THAILAND

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### GEOGRAPHICAL SKETCH

Thailand is regarded, from the point of view of climate, a tropical country. She is situated in Southeastern Asia with the Shan States on the north, Laos and Cambodia on the north-east and east, Malaya and the Gulf of Thailand on the south, and Burma on the west. The land area is about 503,000 square kilometers and has a population of approximately 25 million.

Geographically, the country falls into four different natural divisions: Northern, Central, Eastern, and Southern regions. The northern part consists of a number of forest-clad mountains which are drained by numerous streams, some of which join to form the Menam Chao Phya. This is one of the most important rivers running through the central region, a vast plain composed of numerous intersecting water courses. The plain is flooded every year which is beneficial to paddy and fish.

The third region lies northeasterly. It is a plateau tilted to the south-east. This region is provided with large numbers of swamps

of different sizes. The southern region is a narrow strip of land which comprises part of the Malay Peninsula. This region of the country is very suitable for rubber plantation and fishing industry.

The Gulf of Thailand lies between the Malay Peninsula and the peninsula formerly known as Indochina, having an area of approximately 170,000 square kilometers. It has a coastline roughly 1,600 kilometers long. The average depth of the Gulf is 50 meters. In addition to this, Thailand also possesses an oceanic coastline on the west side of the Malay Peninsula. The length of the coast which is facing the Indian Ocean is about 560 kilometers.

Generally speaking, Thailand has a monsoon type of climate. The yearly variations of temperature are great. The average temperature is about 28C (82F). In the central plain the temperature varies from 17C (62F) to over 35C (96F) while in the northern part of the country which is farther away from the seas and shut in by mountains, the tempera-

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ture may exceed 38C (100F) in summer and frequently fall to 10C (50F) in winter.

From May to September the southwest monsoon from the Bay of Bengal and the Gulf of Thailand brings the rain-clouds, and late in September to the middle of October the Northeast monsoon brings appreciable rain from the North China Sea. From November to February the northeasterly wind sets in with cold weather. Occasional typhoons coming from the South China Sea bring heavy rainy spells over the eastern and central regions.

The annual rainfall of Thailand is 280 cms. (112 in.) a year in the south, 135 cms. (54 in.) in the middle plain, and 112 cms. (49 in.) in the north. Heavy rainfall associated with typhoon or depression annually bring floods which rise and fall in a short period.

#### AQUATIC RESOURCES

From the above geographic description, one can realize that the fishery potential is naturally composed of fresh-water and marine resources. The fresh-water resource lies mostly in the vast central plain comprised of swamps, rivers, and rich inundated lands of about 142,000 square kilometers, while the marine resource is principally in the Gulf of Thailand.

For the Thais, fish is the main source of protein food and it is true that the aquatic resources of Thailand are plentiful and varied.

This is due to the influence of the richness of the soil, favorable climatic conditions, and suitable ecological factors. Because of this and in spite of being utilized for centuries the extent of the resources and their potentiality for development remains very high.

Some of the main component of the fisheries resources would be worth while mentioning here. Starting with the invertebrates, molluscs of commercial value may be placed in the first rank of importance. Among them the most prominent ones are the edible mussels (*Mytilus*), horse mussels (*Modiola*), ark shells (*Arca*), oyster (*Ostrea*), and cephalopods (*Loligo* and *Sepia*).

Crustaceans are also very abundant in Thailand. In fresh water there is an immense number of the big long-legged prawn (*Macrobrachium carcinus*). In the estuarine areas small shrimps occur in great quantity and variety. One fine little crustacean of the *Acetes* group is very famous for shrimp paste.

Next come the fishes which is the most important group among the suppliers of protein elements in the Thai diet. Fish is recognized as second only to rice in its significance.

The fish of economic value (Tables 1 and 2) that should be mentioned first is the carp family (*Cyprinidae*). Not less popular are the fresh-water cat-fishes of different species such as *Clarias*, *Kryptopterus* and *Pangasius*. Other excellent fishes are the murrels (*Channa*).

Table 1  
Some fresh-water fishes landed at the Bangkok Wholesale Fish Market

Thai	Common name		Scientific name
		English	
Pla chon	Serpent-head fish	<i>Channa striatus</i>	
Pla duk	Fresh-water catfish	<i>Clarias</i> spp.	
Pla mor	Climbing perch	<i>Anabas testudineus</i>	
Pla lai	Swamp eel	<i>Fluta alba</i>	
Pla kraï	Featherbacks	<i>Notopterus chitala</i>	
Pla salard	Featherbacks	<i>Notopterus notopterus</i>	
Pla sawai	Catfish	<i>Pangasius pangasius</i>	
Pla tepo	Catfish	<i>Pangasius larraudii</i>	
Pla tapien	Carp	<i>Puntius</i> spp.	
Kung	Prawn	<i>Macrobrachium carcinus</i>	

the goramy (*Osphronemus*), the climbing perch (*Anabas*), and the featherbacks (*Notopterus*).

The representatives of the brackish-water and the marine fishes are the expensive sea-bass (*Lates*), the valuable large shad (*Hilsa*), many species of mullets (*Mugil*), and the culturable milk-fish (*Chanos*). The world-wide group of herring is also well represented. Members of the anchovies (*Stolephorus*) occur in enormous numbers and are used in the fish sauce industry.

The mackerel family is also considered to be very important. It is composed of a number of species like the Spanish mackerel (*Cybbium*) and the most valuable of all, the "pla tu" (*Rastrelliger*), which usually comprises about one half of the total quantity of fish landed at the Bangkok Wholesale Fish Market.

It is estimated that among the 400 species of fishes which abound in the Gulf of Thailand 150 of them are highly prized food fishes.

Recent statistics indicate that the fresh-water fish annual production amounts to approximately 80,000 metric tons, while the total annual yield of the sea fisheries is about 150,000 metric tons. The major portion of the latter is composed of fishes of pelagic nature. These made the annual total production of 230,000 metric tons of food fishes (Table 3). About half of this amount is sold fresh for local use and the other half is preserved in various methods such as drying, salting, fermenting, and smoking. Some are processed into paste and fish sauce. The latest record of fisheries statistics shows that in 1957, about 20,000 tons of fisheries pro-

Table 2

Some common fresh marine fishes landed at the Bangkok Wholesale Fish Market

Common name		Scientific name
Thai	English	
Pla tu	Chub mackerel	<i>Rastrelliger brachysomus</i>
Pla insri	Spanish mackerel	<i>Scomberomorus commerson</i>
Pla oh	Bonito	<i>Euthynnus vaito</i>
Pla see kun	Pampano	<i>Caranx</i> sp.
Pla hang kang	Pampano	<i>Caranx</i> sp.
Pla bai kanun	Silvery lactarid	<i>Lactarius lactarius</i>
Pla dab lao	Dorab	<i>Chirocentrus dorab</i>
Pla dab nguen	Hair tail	<i>Trichiurus haumela</i>
Pla nam dok mai	Barracuda	<i>Sphyræna jello</i>
Pla hang luang	Yellow tail	<i>Caranx</i> sp.
Pla chalamed dam	Black pomfret	<i>Parastromateus niger</i>
Pla chalamed kao	Pomfret	<i>Pampus argenteus</i>
Pla kapong kao	Sea bass	<i>Lates calcarifer</i>
Pla kapong daeng	Red snapper	<i>Lutjanus</i> sp.

ductions worth 70 million bahts were exported (Table 4)

#### POST-WAR FISHERIES ACCOUNT

Fishing operations have been conducted throughout the country. The fishing gears used (Table 5) depend on the nature of the water and kind of fish sought. The fishing gears vary. Hook-and-line, traps, small scoop nets, cast nets, gill nets, bag nets and seines are commonly applied. One outstanding feature of the old capturing method is the "poh" or bamboo stake trap. These are the gears commonly used in the pre-war time

and still present.

There was no big change in the sea fisheries until 8 years ago when the introduction of modern techniques in trawling and mechanization were made know to the fishing folks. Among them the method of otter-board trawl fishing was introduced in 1961 by German fishing experts from the Federal Republic of Germany. With the introduction of this implement, bottom fish offshore have been caught and utilized.

Other recent developments in sea fisheries include the investigation and taxonomic work on the fish fauna of Thailand conducted by

Table 3  
Annual catches in Thailand 1957-1961 estimated in tons

Species	1957	1958	1959	1960	1961
a. Sea water fishes					
Total	170,900	145,000	147,770	146,471	233,275
b. Fresh water fishes					
Total	63,670	51,300	57,020	72,534	72,330
Grand total	234,570	196,300	204,790	219,045	305,605

Table 4  
Record of fisheries products exported and imported 1957-1961

Year	Exported		Imported	
	Total		Total	
	Tons	1000 Baht	Tons	1000 Baht
1957	19,371	69,041	2,938	27,405
1958	12,359	35,764	5,324	51,698
1959	8,869	29,553	8,933	95,151
1960	8,959	34,244	9,354	70,691
1961	10,569	42,492	9,676	61,454

the ichthyologists from the George Vanderbilt Foundation. There is also an attempt to investigate new fishing grounds to enlarge the coastal fishing industry. New effective kinds of crafts and gears have been sought. The life history of the "pla tu" has been studied and tagging experiment have been undertaken to trace their migration habits and spawning grounds. In addition determination of the proper level for exploitation of "pla tu" is being initiated.

The sea fisheries alone occupy approximately 80,000 persons with a fleet of about 3,500

boats of different types and sizes, about half of which are mechanized (Table 5). The fresh-water fisheries are engaged in mostly by the farmers and members of their family.

Aside from fish capture, pondfish culture is another phase of fisheries that helps produce human food. The development of cultural practices was started about 26 years ago. The kinds of fish that have been successfully cultured in captivity are some native species, tilapia, and a few exotic cyprinids from China (Table 6). Most of the Chinese carps do not spawn in ponds.

Table 5

Number of principal fishing gear in the Gulf of Thailand 1954-1961

Year	Bamboo stake traps	Set bagnets	Set bag-nets with wings	Chinese purse seines	Thai purse seines	Other nets	Total
1957	1,982	2,287	636	209	116	7,282	12,512
1958	2,074	3,023	977	215	188	6,429	12,906
1959	2,197	2,617	618	201	198	7,050	12,881
1960	2,051	3,433	1,181	174	171	9,980	16,990
1961	1,484	3,199	404	134	207	12,150	17,578

In the inland fisheries, definite progress resulting from post-war developments has been achieved in some respects. For instance modern techniques in hatchery management have been introduced. Brackish-water fish culture has been initiated to exploit the idle mangrove swamps. This was started with the milk fish (*Chanos chanos* Forskal) the fry of which has its peak of occurrence during certain months of the years in the coves and bays.

Good results have been achieved to a certain extent in the rice field fish culture. With the prospect of increasing the rice yield in the field where fish farming is practiced, fish farmers give more attention to this new method. In the regions where there is not enough fish for the farmers propagation of selected kinds of food fishes have been attempted. A good deal of assistance and aids for this side of fisheries have been received from USOM Thailand and FAO of the United Nations.

Furthermore satisfactory progress is being made in the fishery education. The Faculty of Fisheries, Kasetsart University, organized in 1943, has been graduating a number of technical personnel for the Department of Fisheries. They are of undergraduate level which requires a 5 year course in fisheries.

In fishery administration, attention has been given to the establishment of comprehensive statistics which is one of the primary objectives in the development of fisheries. Socio-economic problems in fisheries are studied for solution. In order to encourage the fishermen to invest and exert more funds and energy for the betterment of the fishing industry, a few million baht are granted from the government in loans to the fishermen. Fishery societies established in the fishing villages have been encouraged to be used as starting points for fishery cooperative movements.

To help control the price of fishery products at a fair level for the benefit of the fishermen.

Table 6

Fishes that have been successfully cultured in ponds.

	Common name		Scientific name
	Thai	English	
Pla salid	Sepat siam	<i>Trichogaster pectoralis</i>	
Pla mortan	Kissing gouramy	<i>Helostoma temminckii</i>	
Pla rat	Giant gouramy	<i>Osphronemus goramy</i>	
Pla sawai	Catfish	<i>Pangasius sutchi</i> (?)	
Pla tepo	Catfish	<i>Pangasius larnaudii</i>	
Pla kapong	Sea bass	<i>Lates calcarifer</i>	
Pla nuanchan	Milk-fish	<i>Chanos chanos</i>	
Pla nai	Common carp	<i>Cyprinus carpio</i>	
Pla morted	Tilapia	<i>Tilapia mossambica</i>	
Pla chao-hue	Grass carp	<i>Ctenopharyngodon idellus</i>	
Pla lin-hue	Silver carp	<i>Hypophthalmichthys molitrix</i>	
Pla song-hue	Big-head carp	<i>Aristichthys nobilis</i>	

the government has established in 1953 the Bangkok Wholesale Fish Market. In 1955 an ice plant and cold storage was built at the fish landing place to assist in handling the marine fishes. The refrigeration plant has a capacity of 1,000 tons.

The brief account of the fisheries resources and their post-war development given above shows that the aquatic wealth of Thailand is rich, but not well developed, not fully utilized, and possibly the major portion is untapped. The industries are in general regarded as primitive and not well organized.

As shown by fishery experts, there are evidences of great opportunities and pos-

sibilities for development. But the problems involved are many.

#### PROBLEMS IN THE DEVELOPMENT

The Thai people are proud of their wealth of rice and fish which they have utilized in the utmost during the past hundreds of years. The fisheries have been a genuine asset to the fishermen not less than agriculture to the farmers. They are important means of livelihood and bring immense benefit to the country.

Now the abundance of food is a thing of the past. Indications of food shortages are evident. The steady increase of population and the accumulation of other unfavorable con-

ditions produce new problems. Increased food supply, especially sea food, is badly needed. We need more fish. Without proper measures in response to the challenge we will be lost.

Presented below are the principal existing problems that should be urgently studied and solved.

According to the marine biological scientists, the Thai marine farm land when compared per unit area is believed to be three times more productive than other nearby seas, and being based on egg and larval counts, the Gulf should support an annual potential of about 195,000,000 metric tons of fish of all kinds. Of the total annual potential only 150,000 metric tons or 0.08% has been actually harvested. This reveals that to undertake extensive and intensive study of fish stocks and fish yields is essential for future planning for sea-fishery management.

As it is noted previously that trawling has been practiced over the past 8 years, there is already some indication of over-fishing in the Gulf. This is judged on the basis of decreasing size of catch and size of fishes from the trawl fishery. Now with the introduction of the otter-board trawl-fishing, bottom-fish in the Gulf are becoming increasingly in demand. Proper management and an analysis of the composition of the catch in this fishery are required.

For the dominant food fish, pla tu (*Rastrelliger*) should receive particular attention.

Thorough study of its early life history, spawning areas, food habits, migration, and other important basic factors are required for more effective measures and techniques to enlarge the catch.

Since better productivity depends upon systematic research and technical know-how in fishery food technology well organized teamwork to investigate the aquatic resources is no doubt the missing key for the untapped treasure room. Furthermore, success will not be reached unless technical assistance from experienced organizations or institutions is rendered. This help should include an assignment of technicians, facilities, and equipment.

The marine research project must be continued. Oceanographic work for reliable biological, physical, and chemical data in the Gulf would surely help in exploring the sea food resources. The Naga Expedition in which the "Stranger" from the Scripps Institute of Oceanography took part in the South China Sea and the Gulf of Thailand should be continued.

The program of development of inland fisheries must be carefully reviewed, studied and planned to improve productivity. Fish culture should be encouraged, and new selected native species bred and reared to obtain higher productivity. This aspect of fisheries would definitely help to increase the local fish supply.

As a matter of fact the potential of the inland fisheries is recognized as more important for the farmers and the professional fish-



ermen, who live in the isolated inland regions. This is due to the inadequate ways for the transportation and the proper distribution of fish supply. This makes another problem which concerns the willingness of the farmers to improve the fisheries situation for their own sake. To solve this, good advice of practical methods in fish culture and in fishing is very much needed for them. It should not be overlooked by the technical men and the extension service officers that the peasants would not care to learn and respond to this problem unless they meet efficient well trained man and have faith in them. The problem, therefore, is partly related to the ability of the fishery policy makers and technicians and the way they approach the fishfarmer.

The problem of the uncontrolled exploitation of natural waters is a serious one. It is recommended that the fishery development program should be integrated with agriculture in the aspects of soil and water conservation. The effect of improper use of agricultural land on fisheries is quite grave. The importance of the knowledge of soil and water needs to be stressed.

The problem on the wise use of inland water is quite acute. Natural waters as well as impounded water such as irrigation tanks are not properly conserved and not fully utilized. Shortage of water reservoirs in some sections of the land is still unsolved, and, wherever there is water, aquatic weeds become

a menace. Tools, materials, and techniques for weed eradication are consequently needed.

Distribution of the products and the marketing system for fishery products is very weak. Improvements required include better service to the fishermen and fishing industry. Improvement in the condition of the fishermen is important to fishery economic development.

Because of the lack of qualified technical personnel to supervise the research work in handling, preserving, and processing of fish. The quality of the production is not up to the standard requirements. Methods and management in these aspects should be technically and wisely improved. The fishing industry and fishery technology should be brought together and developed.

In the fisheries administration and management there exist some areas for improvement. The inadequate budget retards the overall development. The establishment of more experimental stations, the development of the existing fishery field stations, the extension service and the training of technical men, which are necessary must be undertaken.

A well set up library of fisheries needs special consideration. Fishery papers and journals on fishery subjects with are necessary for research work are not enough.

#### CONCLUSION

In conclusion it is not an exaggeration to say that, Thailand, although well known for her rich production of food fish, is still

deficient in animal protein, and that, in spite of her strong intention to develop and to utilize her natural resources to the utmost she is still confronted with problems, some of which have not yet been defined. These problems cannot be solved unless Thailand has a well planned project for development and is able to get an adequate budget set aside for fisheries. In addition, practical fishery policy-makers, technical men, assistance, aids, and highly specialized personnel from other friendly nations are necessary.

#### SUMMARY

Thailand, situated in the zone geographically regarded as tropical, possesses extensive inland waters and has about 170,000 square kilometers of sea areas of very high production potential.

The aquatic products are extremely varied and abundant. Fish is of dietetic economic importance to the Thais. Fisheries are a source of employment and income. Phases of fisheries of Thailand include fish cultural operations, inland fisheries, coastal fisheries, fish handling, and fish processing,

From these resources only a relatively small amount of fish has been utilized. Most of them are untapped and very little is known about them. Of approximately 195 million metric tons of fish of all kinds, only about 150,000 metric tons, or 0.08%, is harvested yearly.

The highest annual total production of food fishes of the country is estimated to be 230,000 metric tons. Fresh fishes are mostly sold for local consumption. Salted and other processed products worth 70 million baht are sent abroad.

The post-war fisheries development has been recently intensified in order to improve the rather primitive and not well organized condition, and to increase the yield. New methods and mechanization for sea fishery has been introduced. Investigations for biological, physical, chemical data in the Gulf of Thailand have been initiated.

Yet there are still difficulties and problems that need assistance and aids. The known factors and problems contributing to the situation are herein described.

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