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THE MARINE AND COASTAL FISHERIES STATIONS OF THAILAND

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THE MARINE AND COASTAL FISHERIES STATIONS OF THAILAND¹

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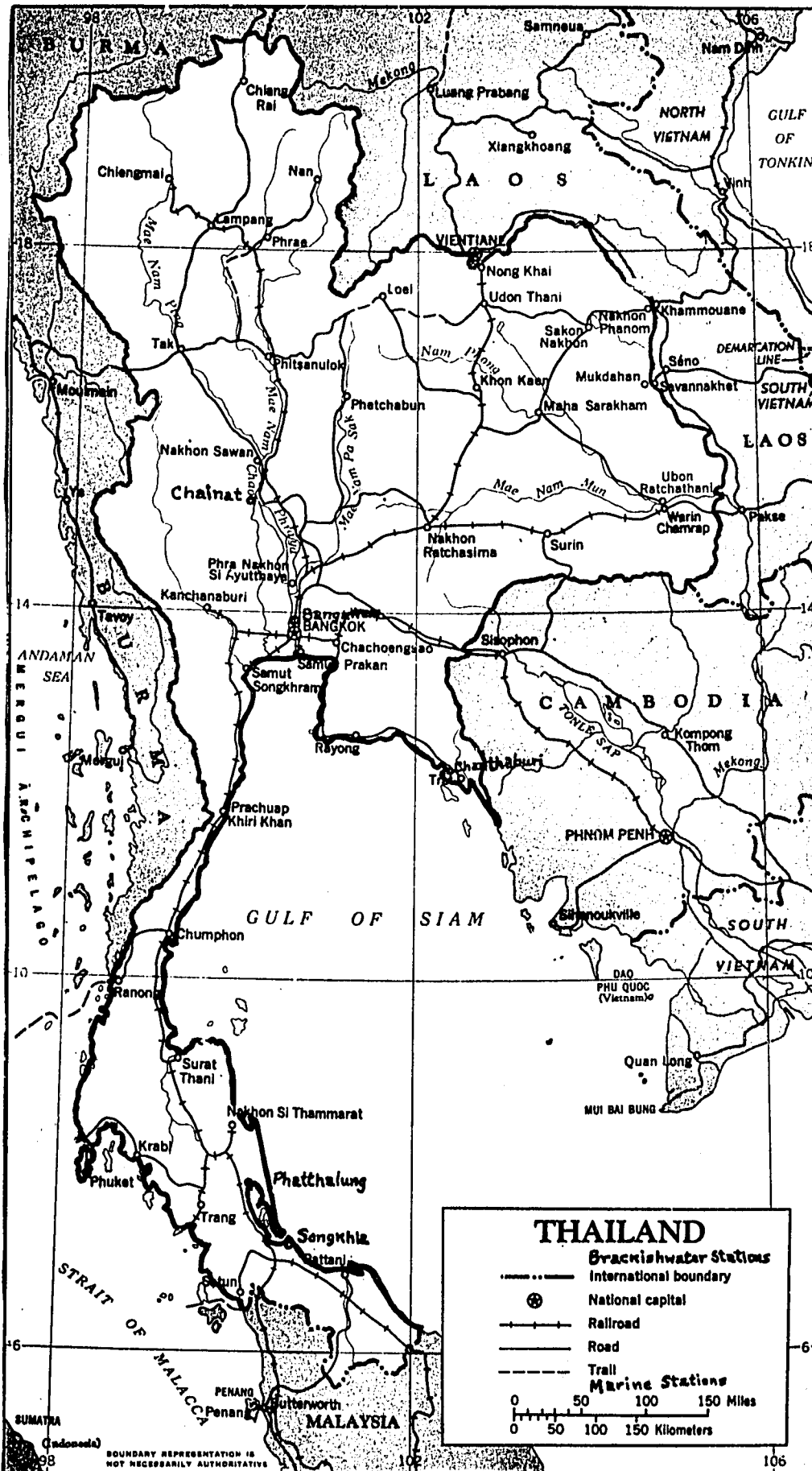
Locations of both the Coastal and Marine Fisheries Stations are shown on the following map. Phuket and Rayong deal principally with the offshore fisheries. Chantaburi, Prachuap Khiri Khan and Songkhla Stations work on various phases of coastal fisheries, including aquaculture in both brackishwater and seawater.

Phuket Marine Station

Phuket is the only station on the western side of the peninsula facing the Indian Ocean. It is a small station staffed with 8 biologists who work on the taxonomy of various marine species, economics and statistics of the fishery, evaluation of the shrimp and fish stocks by periodic trawling, and exploratory fishing. Part of the continental shelf provides productive shrimp fishing, but much of the bottom area is too rough for deep-water trawling. There is private oyster culture, and one farm for pearl culture in the area. Along one section of the coast are mangrove swamps that could be developed into aquacultures for shrimp or other seafoods. A limited amount of trash fish is available from shrimp trawling that might be used for basket or pond culture of sea bass (Pla Kapong). Trash fish is sold at the dock at 1 to 1.5 cents per pound.

A new laboratory is to be built nearby by the Thai government and staffed by the Danish government. A rather expensive laboratory building is contemplated, with facilities for student training. Its need and usefulness would appear very doubtful. Neither this nor the present Phuket Station are located where experiments on aquacultures could be conducted.

1. This report is based on a survey made April 14 to May 17, 1969.



Locations of the Coastal and Marine Fisheries Stations of Thailand.

Rayong Marine Station

Rayong Station is located on the east shore of the Gulf of Thailand. Its principal purpose is to develop, test, and demonstrate various types of fishing gear. Some work is also being done on ferro-concrete fishing boats. One biologist is working at the Station aquarium on culture of shrimp to the post-larval stage, assisted part-time by several other biologists. The Station aquarium is poorly planned for research, as its circular form allows space for only a very limited number of aquaria. The Station grounds and service buildings are quite extensive, but are not in an area where research on aquacultures would appear promising.

Prachuap Khiri Khan Coastal Fisheries Station

This Station is on the west side of the Gulf of Thailand, approximately 150 miles by air southwest of Bangkok, and is about 1 mile from the local airport. It is located on a tidal stream back of a low mountain that borders the Gulf (Figure 1).

The Station was constructed in 1953-1954 to develop methods for the culture of milkfish (Chanos chanos) in Thailand. It was located at Prachuap because milkfish fry were found abundantly in the tidal stream that now furnishes water for the Station ponds.

The total area of the Station is 195 rai, with 34 ponds having a total water area of 45 rai (Figure 2). Also, Kasetsart University was given 22 rai upon which it has constructed a dormitory-classroom building capable of accommodating



Figure 1. Prachuap Khiri Khan Fisheries Station is alongside a tidal stream, with a mountain between it and the Gulf of Thailand.

60 students, a staff house, bath house and 4 ponds with a total water area of approximately 12 rai (Figure 3). These facilities are used only occasionally (once in the last 2 years), but all buildings and grounds are kept in excellent condition.

The Department of Fisheries Station has a small office and laboratory building, equipment buildings, residences and a guest house. The 34 experimental ponds are of the following sizes:

<u>Square Meters</u>	<u>Number of Ponds</u>
16,700	1
10,000	2
7,200	1
6,600	1

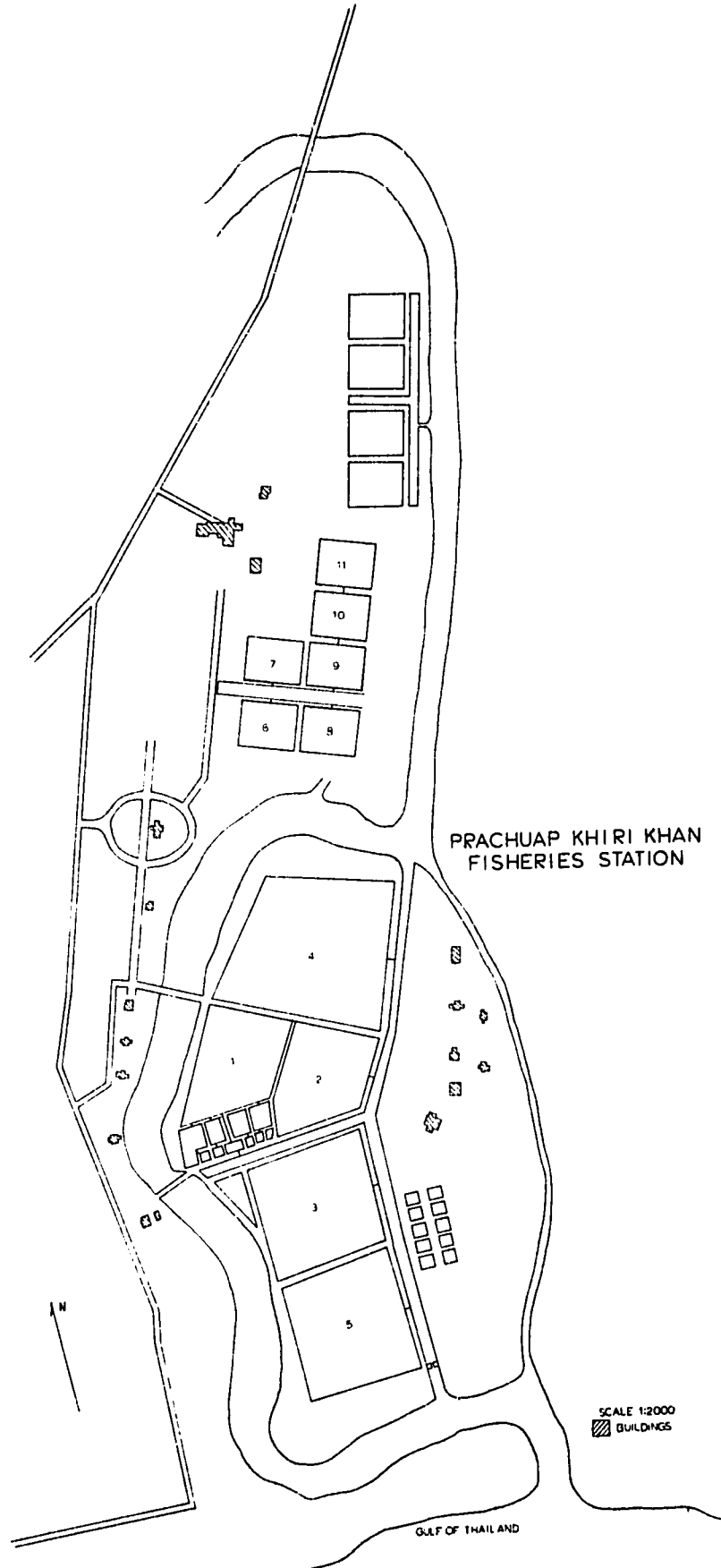


Figure 2. Plan of the Prachuap Fisheries Station

	<u>Square Meters</u>	<u>Number of Ponds</u>
	3,195	1
	2,000	6
	1,564	1
	800	1
	480	1
	423	1
	357	2
	100	10
	<u>50</u>	<u>5</u>
Total	71,326 = 44.57 rai	34

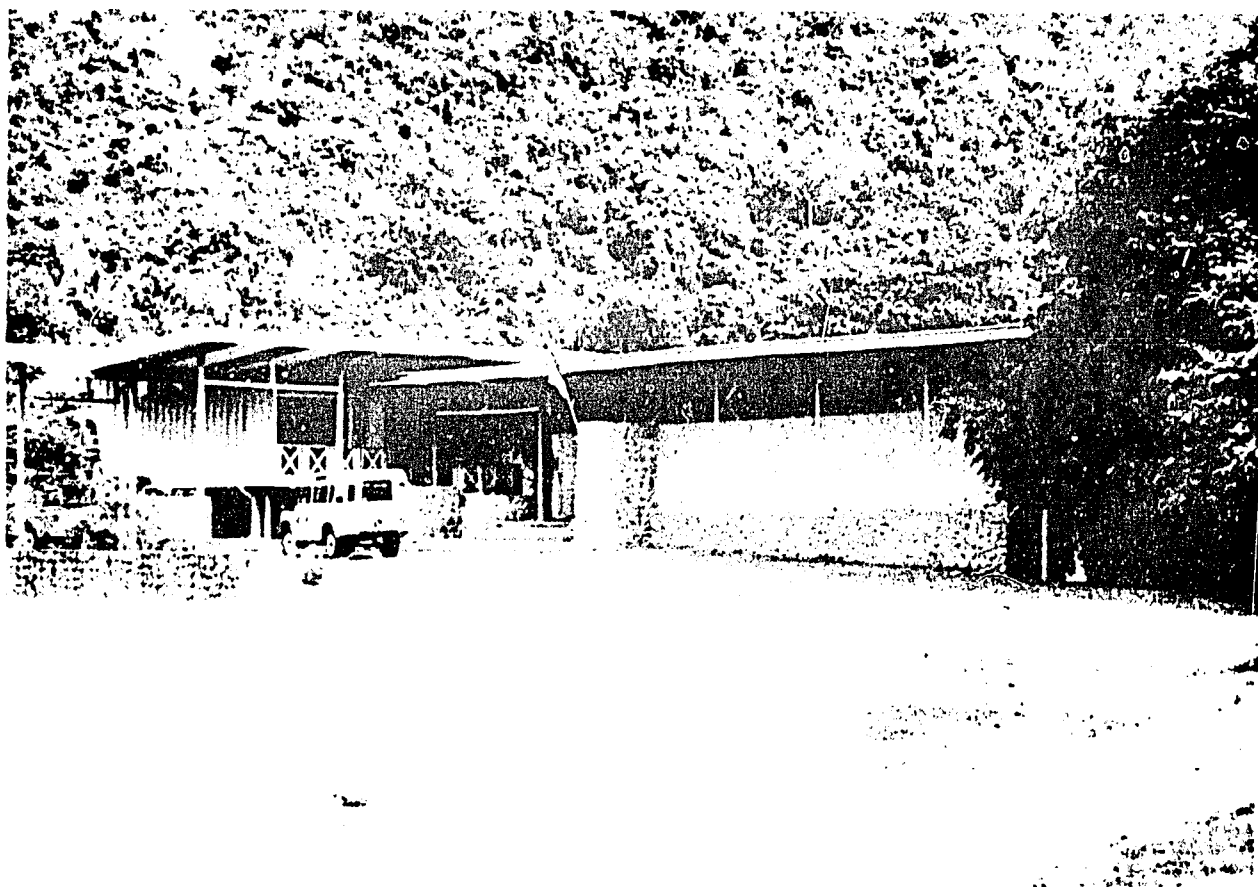


Figure 3. Dormitory and classroom building of Kasetsart University at Prachuap.

All of the ponds at the Station receive sea-strength water (32 - 34 ppt) from the tidal stream (Figure 4) except for 2 ponds that collect freshwater and are used for spawning of Tilapia nilotica. During the dry season, the salinity in ponds



Figure 4. Ponds are filled with sea water from the tidal stream, through an inlet structure at the Gulf.

containing sea water rises to between 35 and 70 ppt. While milkfish and tilapia survive at the higher figure, they do not grow at a satisfactory rate. However, it would be possible to keep the salinity down by frequent water exchange at high and low tides. Water exchange between ponds and tidal waters is by means of concrete and shiplap board monks in some ponds and through cast iron pipe and gate valves placed in the bottom of others. The ponds and pond system are well constructed.

The original purpose of the Station - to develop a system of milkfish culture for Thailand - did not prove feasible because the Thai people did not like the

milkfish and also the supply of fingerlings along the coast was low and unreliable. In 1968, the extension personnel collected 202,000 Chanos fry for distribution to farmers. In 1969, private fry collectors had taken an approximately equal number for sale to Taiwan.

While the Station continues to raise annual crops of Chanos in the experimental ponds, no attempts at intensive culture have been made. Maximum production was 562 pounds per acre with fertilization and light feeding. Due to the unpopularity of milkfish, the Station is attempting to find other aquacultures that will be sufficiently profitable to develop commercial industries. It is a good Station with good facilities looking for something important to do.

Mullet culture has been attempted at the Station, but the species available locally is not large enough to be considered desirable for culture. Current research deals with culture of Tilapia nilotica; a combination of the sea bass (Lates calcarifer) and Tilapia mossambica; the culture of the Japanese oyster Crassostrea gigas on rafts in the Gulf with salinity of sea strength (Figure 5); and also the culture of Crassostrea vitrefacta in brackishwater in the mouth of the Pram River. Experiments are also conducted on methods for capture of Chanos fingerlings.

The Station is staffed with a Head, Mr. Uthai Suntarotok; two biologists with B. S. degrees from Kasetsart University; 6 extension personnel; and 12 permanent plus 10 temporary laborers.

Extension personnel collected fingerling Chanos and mullet and have assisted in stocking 122 ponds with a total area of 1,247 rai, and 3 reservoirs with a

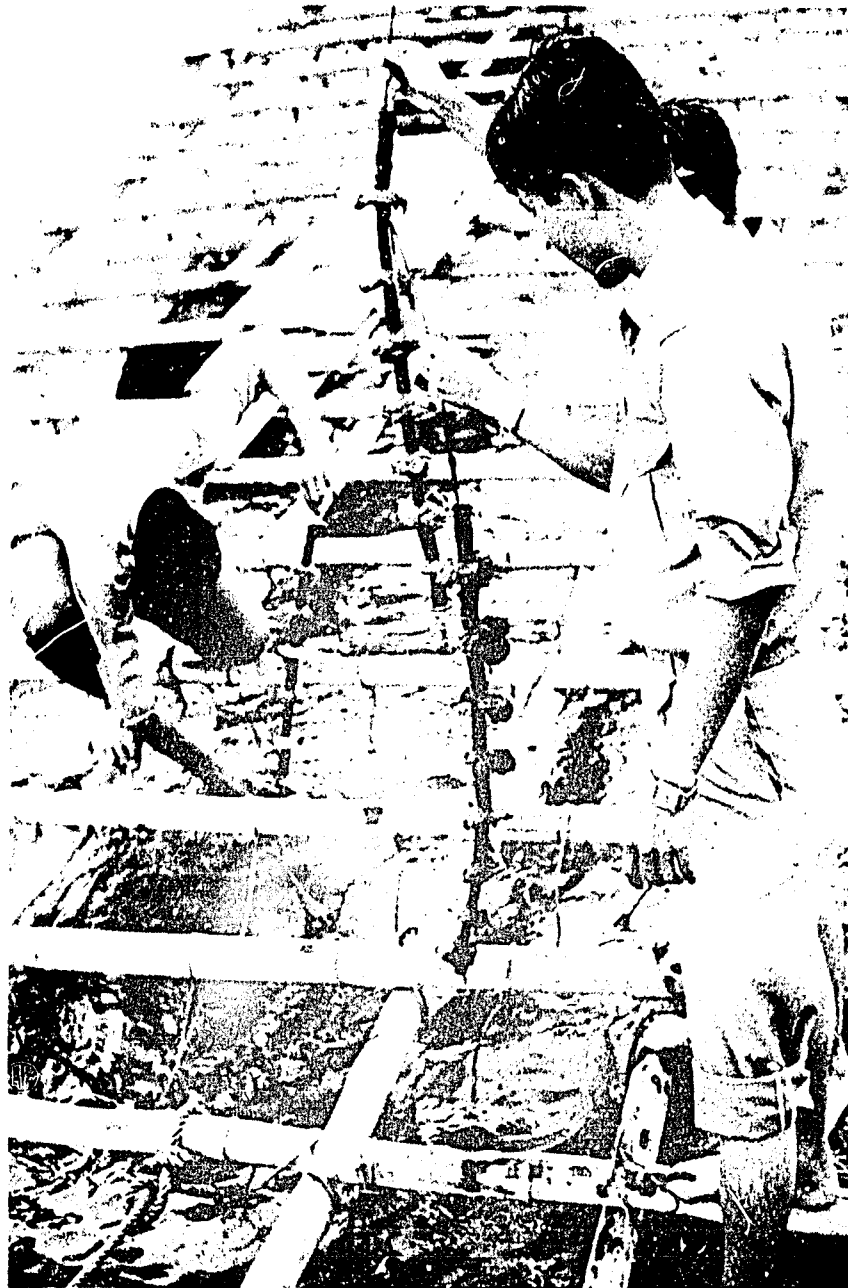


Figure 5. Culture of the Japanese oyster in the Gulf of Thailand at Prachuap.

total area of 3,525 rai. They also conducted local meetings on fisheries in the province.

The area does not appear especially suitable for oyster culture as there are few coves protected from winds and very few brackishwater areas. However,

the research in progress should rapidly evaluate the possibilities. The arc shell clam is cultured commercially in nearby areas of the Gulf and no research has been conducted in their culture. The Station is making invertebrate collections in the area to learn the types of animals available for culture. There are available limited amounts of trash fish that sell for 1.7 cents per pound, and a fish meal made by grinding whole dried fish that sells for 4.6 cents per pound. Both might be used as fish feeds in ponds or in floating cages for the culture of sea bass or other species.

The tidal stream supplying the Station ponds leads upstream to a swamp which fills with brackishwater in the rainy season to a total area of 1,000 rai. In the dry season, the swamp only floods to a small extent at high tides. The high tides are about 1 meter higher in the rainy season because of the strong prevailing southwest winds. This area could be developed into commercial ponds.

Chantaburi Coastal Fisheries Station

This Station is located on the eastern shore of the Gulf of Thailand approximately 170 miles by air from Bangkok. However, it cannot be reached by plane, and the journey by car requires 6 hours to the small village of Klung plus approximately 2 hours by boat on tidal stream through mangrove swamps to the site of the Station (Figure 6). This was a surprisingly neat and complete Station despite its isolation, and the area is quite valuable from a biological viewpoint. Thousands of acres of mangrove swamps are presently operated by the Forestry Department, but will probably develop into fish and shrimp farms if sufficient

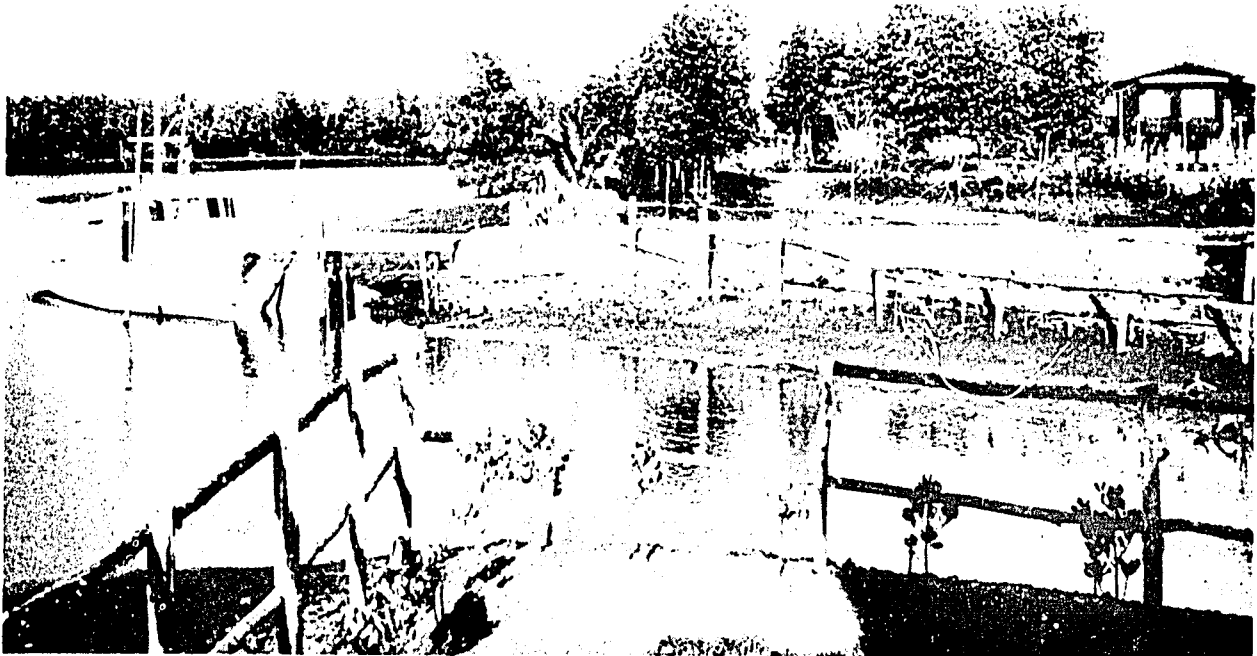


Figure 6. Headquarters of the Chantaburi Station.

research is done to develop productive and economical methods of culture. The value of the whole area as nursery grounds for small fishes and shrimp has not been evaluated. In most of the areas visited, the swamp lands were slightly above normal high tides. There are at present over 1,000 rai of commercial shrimp farms in the area.

The isolation of the Station is such that trained biologists do not like to be stationed there, especially as many wives refuse to remain there.

Also at the Station there are 15 houses and a laboratory (Figure 7), with a diesel-operated lighting system that supplies insufficient power for air conditioning or even operation of fans at night. It is a hot and humid location.



Figure 7. Laboratory building at Chantaburi Fisheries Station.

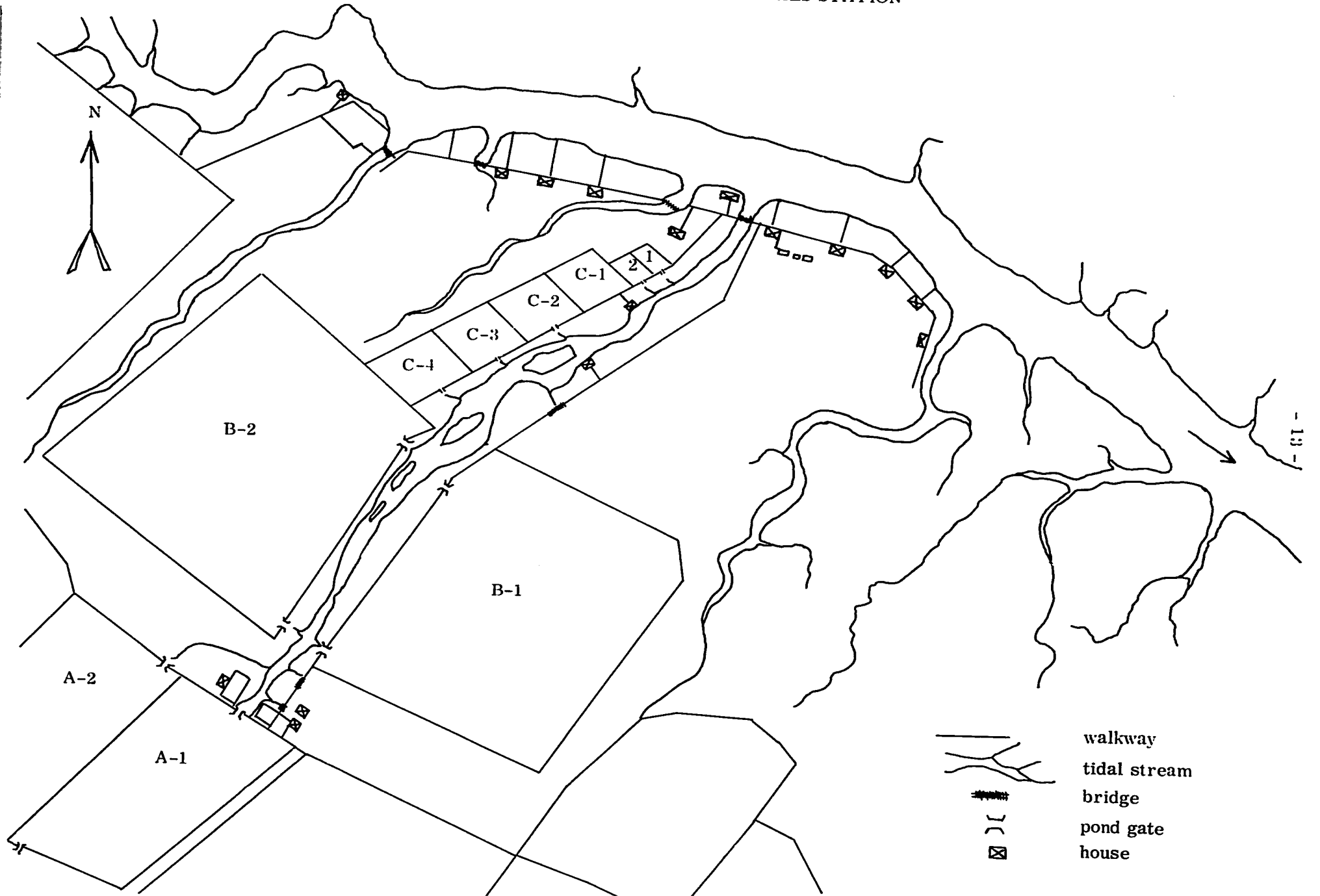
Despite all handicaps, it is an area where important research can be done and sizeable commercial aquacultures can develop.

Freshwater is supplied by catching rainwater off the roofs and by a vendor who distributes water by boat throughout the marsh area. Children are transported to school by the Station boat.

The total area of the Station is 300 rai of which 250 rai are in ponds or tidal streams (Figure 8). Additional land can be made available as it is all owned by the government.

Ten experimental ponds have been constructed of the following sizes:

Figure 8. CHIANTABURI FISHERIES STATION



<u>Size (rai)</u>	<u>Number of Ponds</u>
50	2
25	2
2	4
<u>0.5</u>	<u>2</u>
159.0	10

The Station was established in 1958. Over the years it has conducted experiments on shrimp culture in ponds and on the production of the blue crab, Scylla serrata. The arc shell clam, Arca sp., is also cultured in the area. Most of the research and observations made by biologists have never been published, and that published was in Thai. The results are briefly summarized below:

Shrimp Culture. The culture is simple in that the ponds were filled at high tide at the time the juvenile shrimp were most abundant. The gates were closed and the shrimp allowed to grow to harvestable size upon natural foods that developed in the pond. The shrimp were harvested by draining. Production results were available for a 9-year period beginning in 1960. The dominant species of shrimps were Penaeus merguensis, P. indicus, P. monodon, and Metapenaeus monoceros. The first two made up 75 per cent of total production. The productions of shrimps per rai were:

<u>Year</u>	<u>Kg per Rai</u>	<u>Pounds per Acre</u>
1960	33	181.5
1961	24	132.0
1962	18	99.0
1963	17	93.5
1964	24	132.0
1965	18	99.0
1966	18	99.0
1967	20	110.0
1968	19	104.5
1969	<u>20</u>	<u>110</u>
Average	21.1	116.1

In addition to the shrimps, the ponds produced in earlier years about 1.5 kg per rai of fish, principally Mugil. In more recent years contamination with Tilapia mossambica has occurred.

We assisted in devising experiments in several ponds on shrimp production with phosphate fertilization. Biologists are also evaluating the production in a flat, shallow pond compared with one having a deeper diagonal ditch.

Blue Crab Culture. The first work with culture of the blue crab began in 1957. In a 45-day experiment in 1962, crabs 7 to 11 centimeters carapace width, weighing an average of 108 grams, were stocked at the rate of approximately 1 pound per 4 m² (or 1 crab per m²) and fed fresh trash fish at the rate of 5 per cent of original body weight per day. The initial weight per acre was 946 pounds per acre; the standing crop on draining was 1,782 pounds or a gain of 836 pounds per acre. Survival was 89 per cent. The conversion was 2.5.

In a 60-day experiment in 1968, similarly stocked and fed, the initial total weight per acre was 885 pounds and the weight at draining was 1,147 pounds, a gain of only 262 pounds with 72 per cent survival. The conversion was 10.1

At 1 cent per pound for the trash fish, and the local price for crabs at 11.3 cents, the profits without labor or pond costs were as follows:

1962 Experiment

Cost feed per net pound of crab	2.5 cents
Sale price per pound of crab	11.3 cents
Net profit per pound	8.8 cents
Net profit per acre	\$73.56

1968 Experiment

Cost feed per net pound of crab	10.1 cents
Sale price per pound crab	11.3 cents
Net profit per pound	1.2 cents
Net profit per acre	\$3.14

It is obvious that additional research is needed to develop improved methods of crab culture.

Arc Shell Clam Culture. This culture developed without benefit of research. An enclosing fence is built in shallow parts of the Gulf of Thailand around plots up to 20 rai in area. The young arc clams, about 1 centimeter in diameter, are planted at the rate of 50 liters per rai. The young clams are collected by raking or sieving bottom muds in May, June or July. They grow to harvestable size in about 6 months. No feeding or other care is given except periodically the shells that work their way to the edge of the enclosing fence are thrown back towards the center of the plot. No authentic figures were available on production per rai. These clams sell for 2 to 7 cents per pound in the shell. Usually the arc farmer's house is built over water within the enclosed area.

Oyster Culture. There is a small oyster culture in the area. Villagers place concrete blocks or large rocks in the water at the mouth of a nearby river to collect the spat. After a set has been obtained, the rocks or blocks are carried back to the village and placed under their houses, which are constructed over water along the shore. There the oysters grow in a rich, contaminated environment. Better methods for production of oysters on a commercial basis would be useful.

Current Research

The current research projects at the Station are as follows: 1) Pond culture of the blue crab, Scylla serrata; 2) Raft culture of the oyster, Pycnodonta numisma; and, 3) Pond culture of the sea bass, Lates calcarifer.

Mr. Saman Puriphul is in charge; other staff included 2 biologists with B.S. from Kasetsart University, and 4 undergraduate trainees.

While this Station is not in the best location for people, it is in an excellent location for biological work. The Thai Fisheries Department is planning to improve living conditions for the personnel and to increase the number of experimental ponds. Any comprehensive program for development of coastal fisheries and aquacultures should include assistance to the personnel of the Station in planning pertinent research and in training.

Songkhla Coastal Fisheries Station

The Songkhla Coastal Fisheries Station is located on the west coast of the Gulf of Thailand at the entrance to Songkhla Lake. It is 465 air-miles south of Bangkok and is near an airport. The Station offices and laboratories are located back from the edge of the channel between the Gulf and the lake and within the city of Songkhla (Figure 9). The Station boats are kept at a boat dock on the opposite side of the channel, while the experimental pond area is approximately 3 miles from the laboratory, and can be reached only by boat.

The Station has a very attractive concrete building with several offices, laboratories for chemistry and biology, a museum, a taxonomy room, a dark

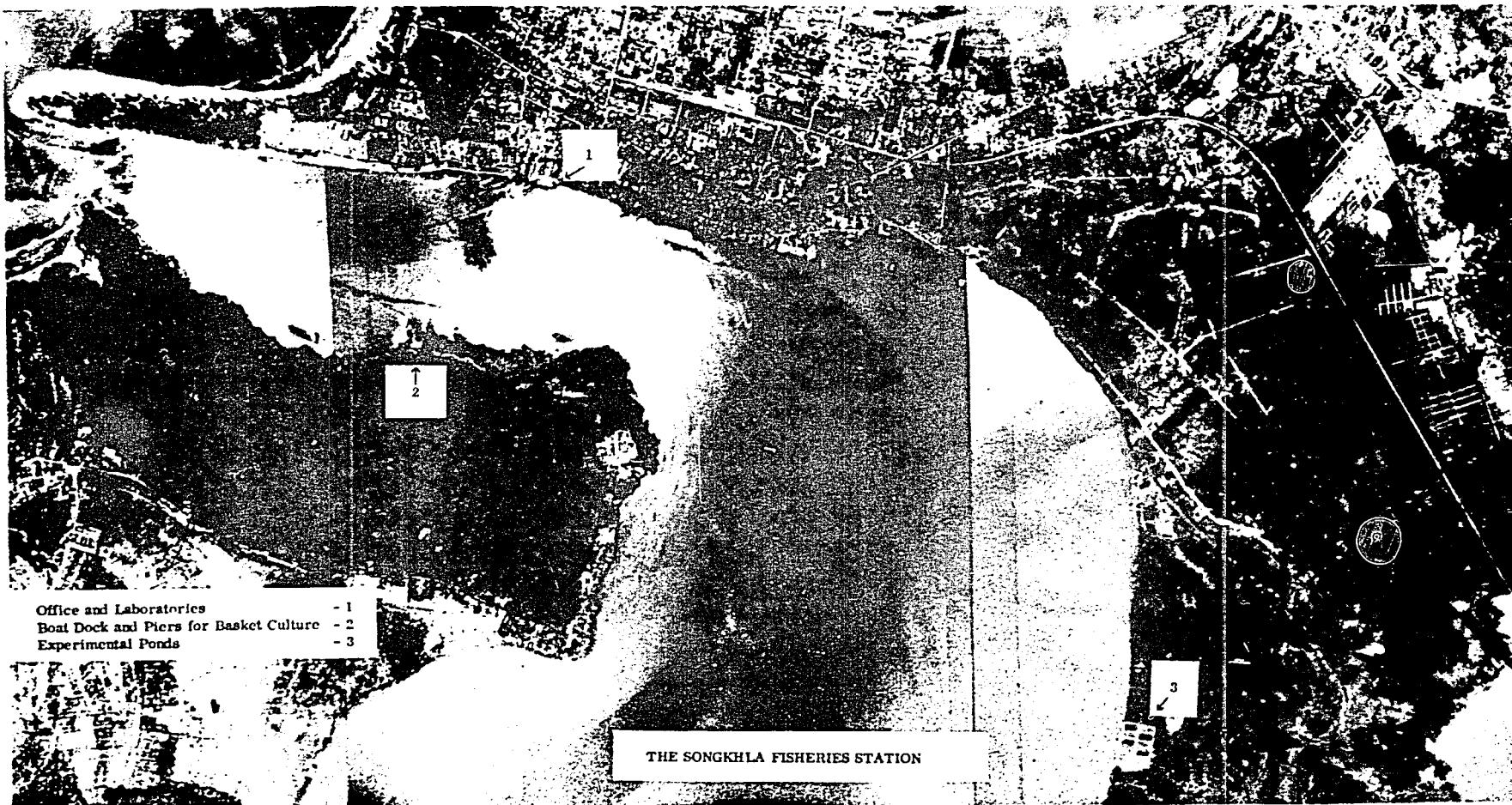


Figure 9. Aerial photo of Songkhla showing laboratory, boat dock and pond area.

room for photography and a clerical room (Figure 10). Another building houses the concrete pools and aquaria used for shrimp culture experiments, and another,



Figure 10. Central laboratory and office building at Songkhla Coastal Fisheries Station.

approximately 36 feet x 36 feet was used for storing gear or for occasional training sessions. A residence for the head of the Station and 7 other residences are located on the Station. A radio transmission unit provides contact with the boat dock across the bay, the pond research area, and the Department of Fisheries in Bangkok.

The Station is staffed with 8 biologists plus a Head, Umpol Pongsuwana, and an Assistant Head, Pairoj Brohmanonda. There are also 10 technicians, 40 permanent laborers and 30 temporary laborers. The permanent laborers include 10 crewmen, 2 watchmen and 1 driver. The transportation available includes 1 Jeep pickup, 2

boats with outboard motors and 1 trawl.

The research in progress includes the following:

1. Culture of Macrobrachium rosenbergii, the freshwater shrimp.

This includes spawning and raising the larval forms to the juvenile stage, plus culture methods in ponds from juvenile to marketable size. Their culture in floating cages will also be attempted.

2. Methods for tagging Macrobrachium.

3. Factors relating to abundance and growth of Penaeid shrimps.

This includes periodic estimation of the abundance and rate of growth of juvenile shrimps in Songkhla Lake, together with a study of the distribution, kinds and amounts of benthos and also quantitative estimation of abundance of plankton and zooplankton.

4. Culture of diatoms for feeding larval shrimps.

5. Culture of the sea bass, Pla Kapong, in floating cages.

Previous research has dealt with a study of the types of bottoms and the chemical properties of the bottom soils in Songkhla Lake (published in the 1966-1967 Annual Report). The Station has been and is engaged in research important to the coastal shrimp fisheries and is beginning to develop the basis for new aquacultures.

The Lakes

There are three connecting lakes, the lower of which has a channel to the Gulf of Thailand at the City of Songkhla (Figure 11). The ship channel is in the process of being straightened and deepened so that larger ships can come into the docks.

T H A I L A N D

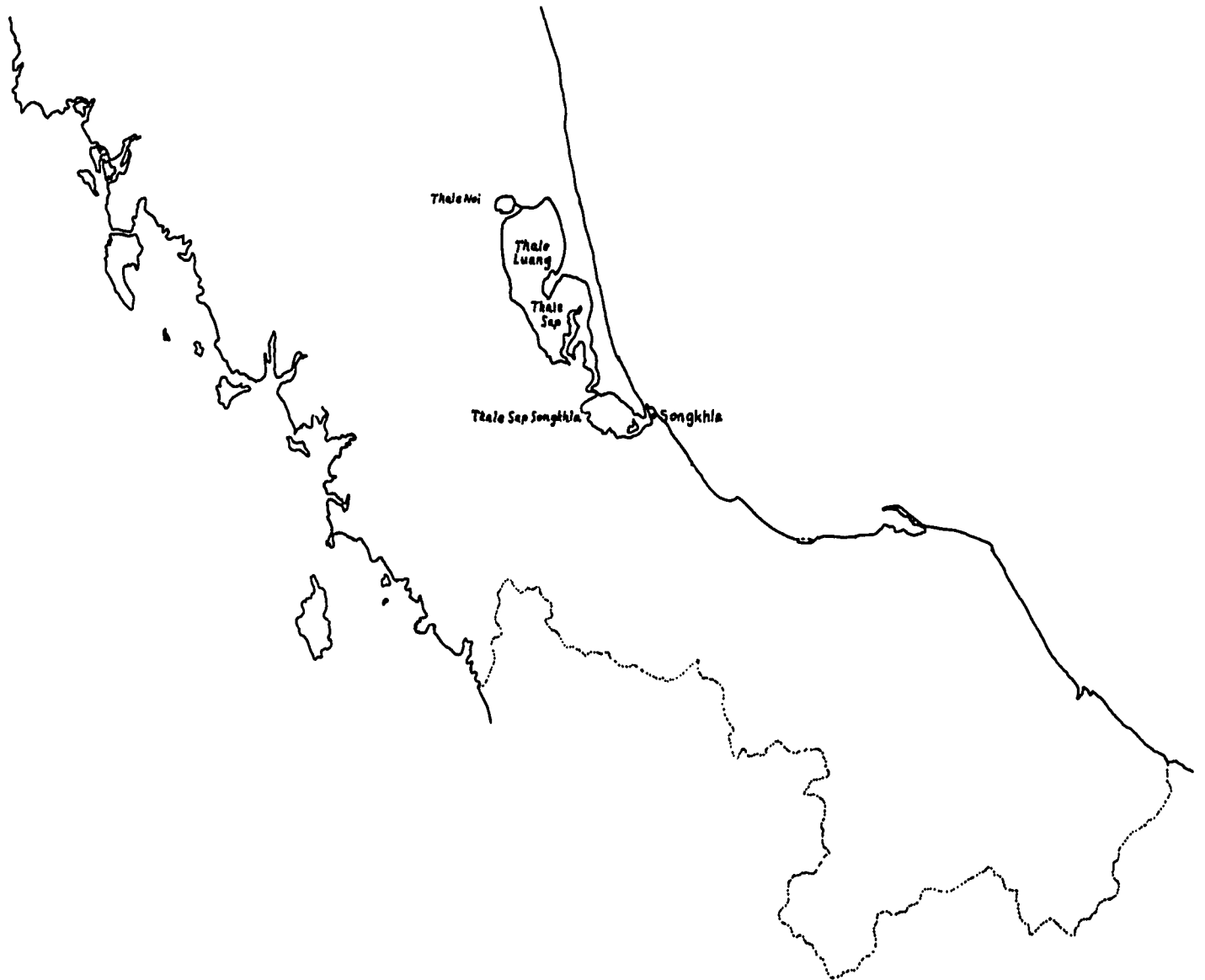


Figure 11. The three connecting lakes at the Songkhla Coastal Fisheries Station

This may have the effect of raising the salinity in Songkhla, the lowermost lake. The experimental pond area is located along the western edge of this lake on the same side as the laboratory, but 3 miles away.

Songkhla Lake has relatively high salinity, the middle lake lower salinity and the upper lake is almost entirely freshwater. However, the salinities of the lakes vary seasonally, depending upon the rainfall. Near the entrance to Songkhla Lake the salinity varies from 15 to 28 ppt during the dry season, but in the rainy season, November to January, it may go as low as 0.5 to 7 ppt. The middle lake is 7 to 10 ppt in the dry season and practically fresh in the rainy season. This changing environment presents some disadvantages and some advantages to research at the Station. The experimental pond area is too far from the Gulf to maintain ponds with high salinity throughout the year. However, they will remain close to 15 ppt salinity for 6 months which is long enough to grow a crop of fish or shrimp. Subsequently, research in the same ponds can be conducted on animals requiring water of lower salinity.

The Experimental Pond Area. This area is on the western side of the lake and is 3 miles from the Station headquarters. It can be reached only by boat, as the shoreline is too boggy to permit road construction. This area of the lake is shallow and silted in several hundred feet from the shoreline. The margin of the lake is boggy, and some areas will not support the weight of a man. This has apparently resulted because erosion products from the mountain nearby have filled in the old lake to a distance of 1,000 to 2,000 or more feet from its original shoreline.

On a previous trip (1968), soil borings were made in the area where the ponds were to be built and the soil profile is shown on the following chart (Figure 12). This indicated that the ponds should not be excavated more than 18 to 42 inches, as it is necessary to leave the stiff layer of clay at 46 to 66 inches intact to provide a firm pond bottom. Below this was a fluid silt and clay which would make seining of the ponds impossible and would greatly decrease the utility of the ponds for shrimp production. Where necessary to excavate into this fluid clay layer, water must be drained away and the clay allowed to dry to a point at which it regains its cohesiveness. Annual drying of the pond bottoms would then be necessary.

When the area was visited in April, 1969, nine ponds had been constructed with a total area of 20 rai, and cost \$720 per pond or \$325 per rai (Figure 13).

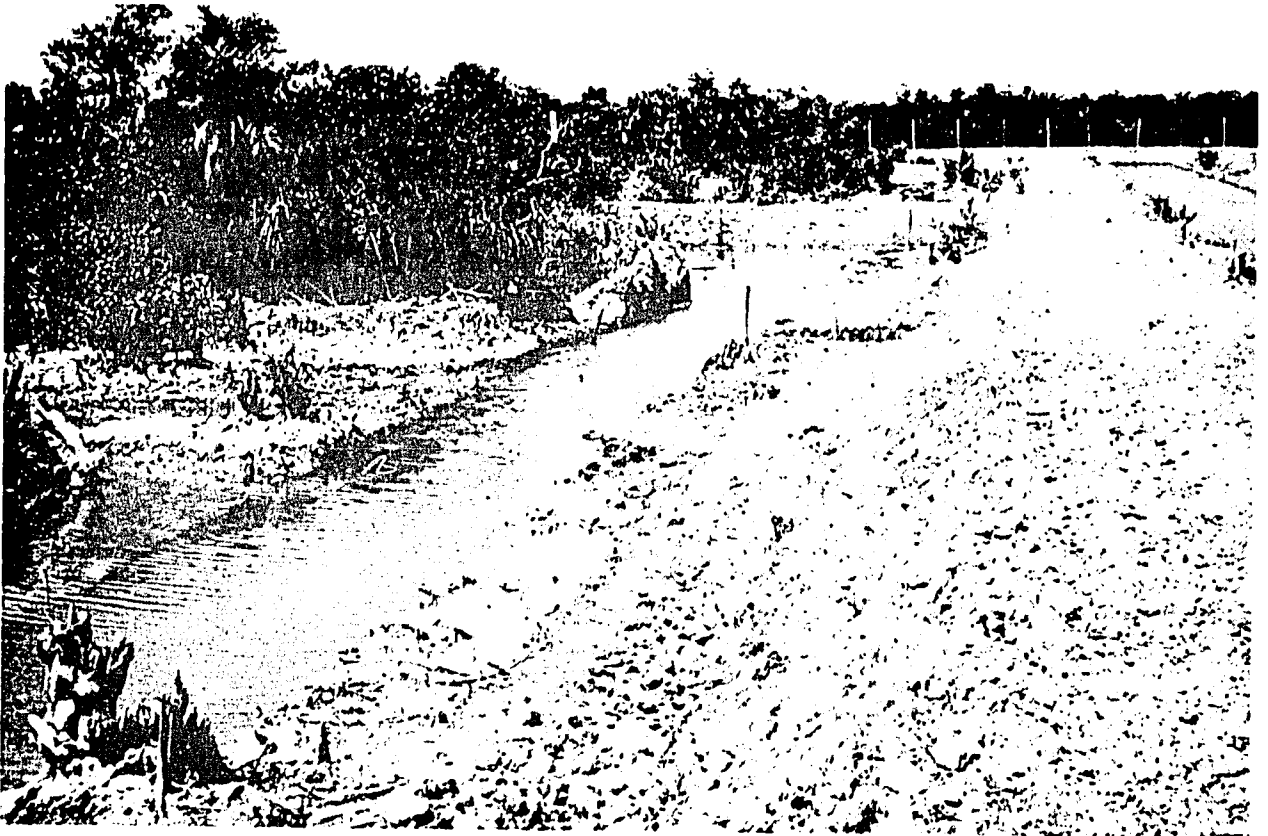
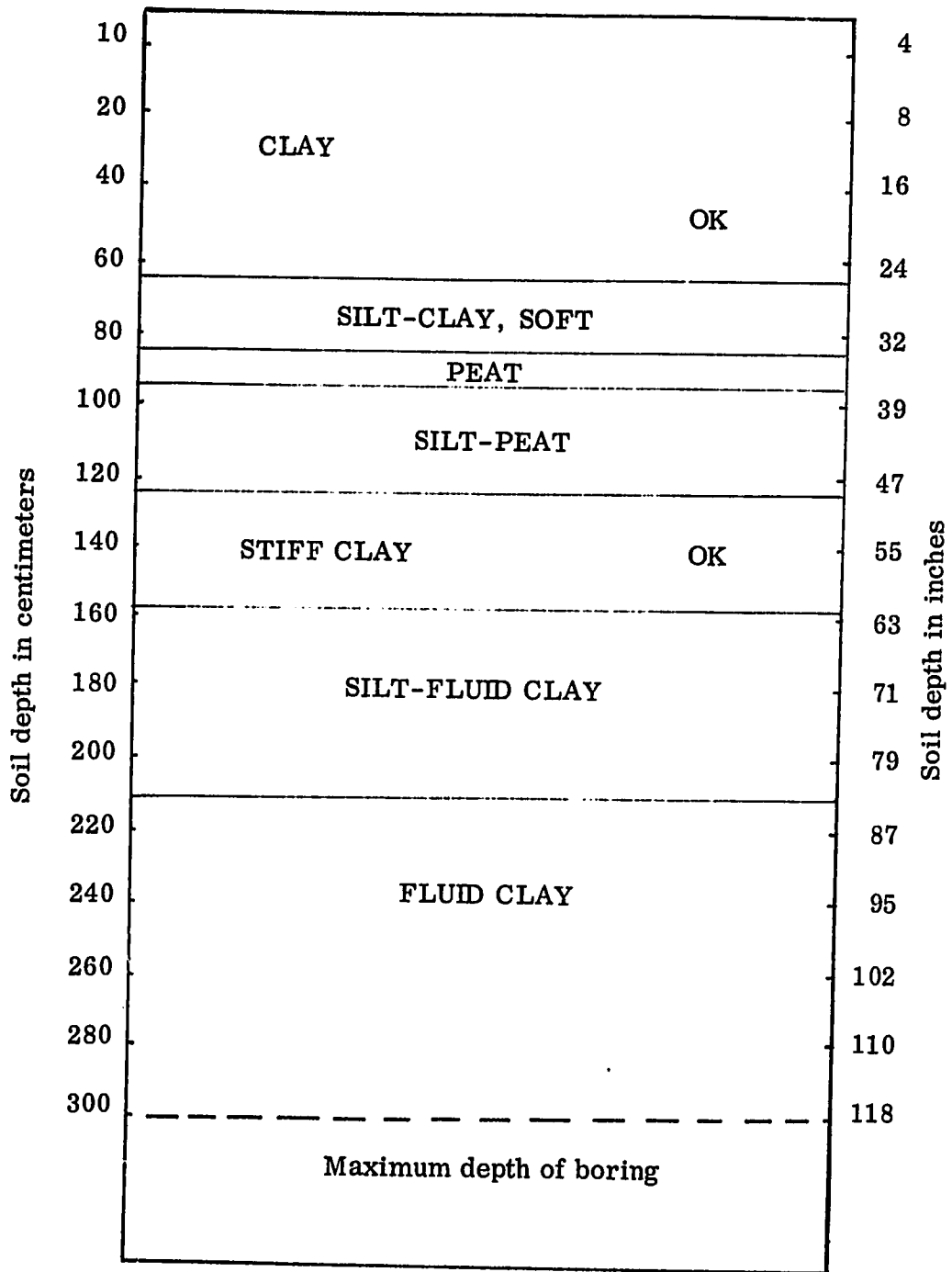


Figure 13. Construction of ponds at Songkhla.

Figure 12. Songkhla Pond Site

SOIL PROFILE CHART



This included cost of the water supply and drainage canals (Figure 14), fencing and construction of a guard house. If this is to develop as the Central Coastal

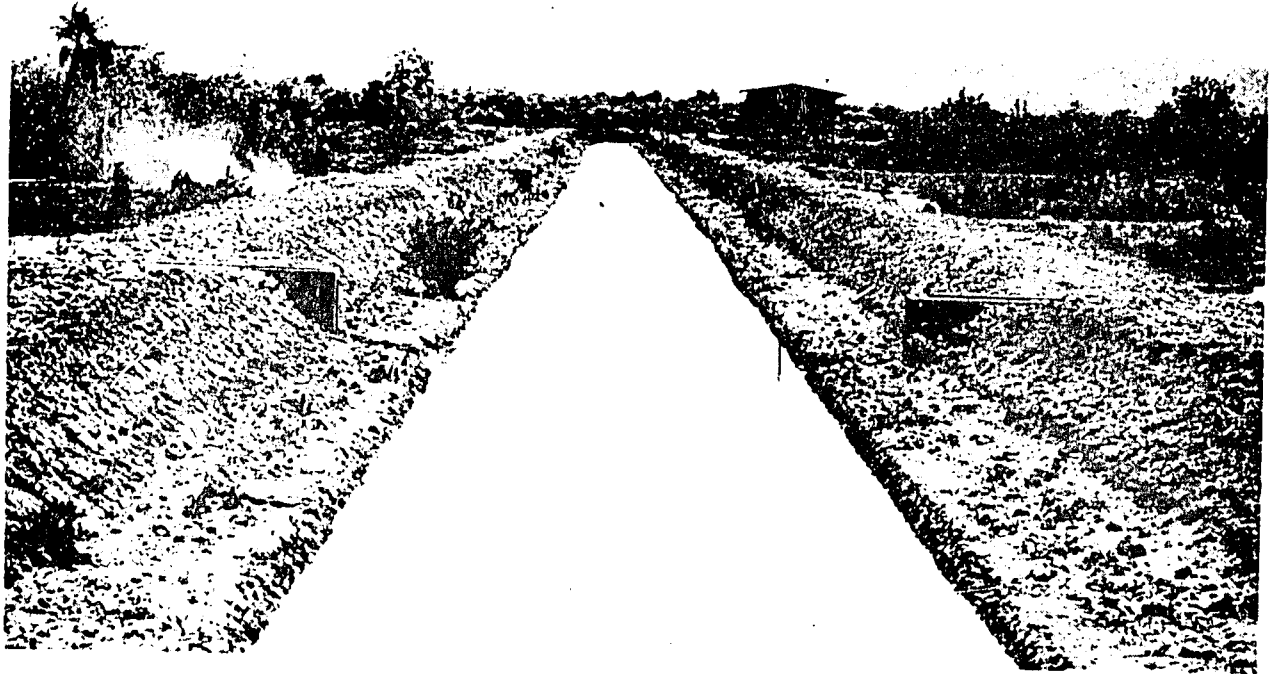


Figure 14. Drainage canal at Songkhla Pond Research Area.

Research Station, an additional 40 ponds, 0.5 rai each and 60 ponds, 0.1 rai each will be needed for an effective facility. Mr. Pongsuwana, Head of the Station, has prepared a plan of the proposed ponds (Figure 15) and estimated the cost at 718,000 baht or \$35,900. Additional construction he considers necessary at the pond research site includes the following:

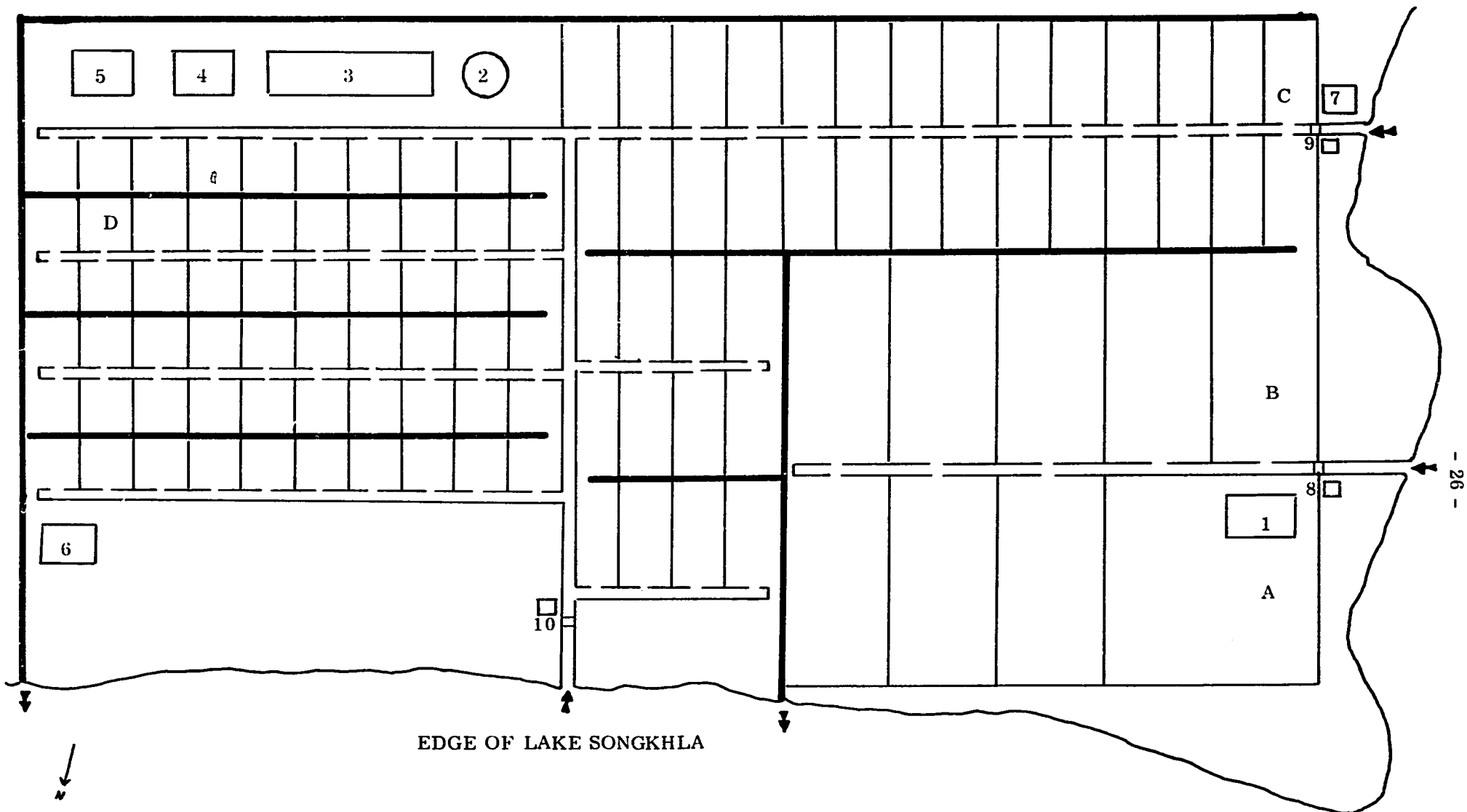


Figure 15. Proposed ponds at Songkhla Coastal Fisheries Station

- 1. Residence Officer
- 2. Pump and F-W Res.
- 3. Workmen's Qtrs.
- 4. Residence Officer
- 5. Residence Research

- 7. Guard Residence
- 8, 9, 10. Fresh lake water locks and pumping stations

- Present Ponds: A & B
- Proposed Ponds: C & D
- A Ponds: 80 x 80 meters
- B Ponds: 80 x 40 meters
- C Ponds: 40 x 20 meters
- D Ponds: 20 x 20 meters

	<u>Baht</u>	<u>Dollar Equivalent</u>
Sluice gate, pumps and shed	50,000	2,500
Elevated freshwater reservoir well and pump	150,000	7,500
Diesel electric generator unit	50,000	2,500
Small laboratory	80,000	4,000
Fencing pond area	<u>30,000</u>	<u>1,500</u>
Total	360,000	\$18,000

The total cost of ponds and associated facilities would thus be \$53,900. Of this, probably only the pumps, fencing and diesel generator unit would require dollar costs. The period required for construction is estimated at 2 years.

The ponds now available are of the following sizes and number:

	<u>Area (m²)</u>	<u>Number of Ponds</u>
	6,400	1
	<u>3,200</u>	<u>8</u>
Total	32,000 (20 rai)	9

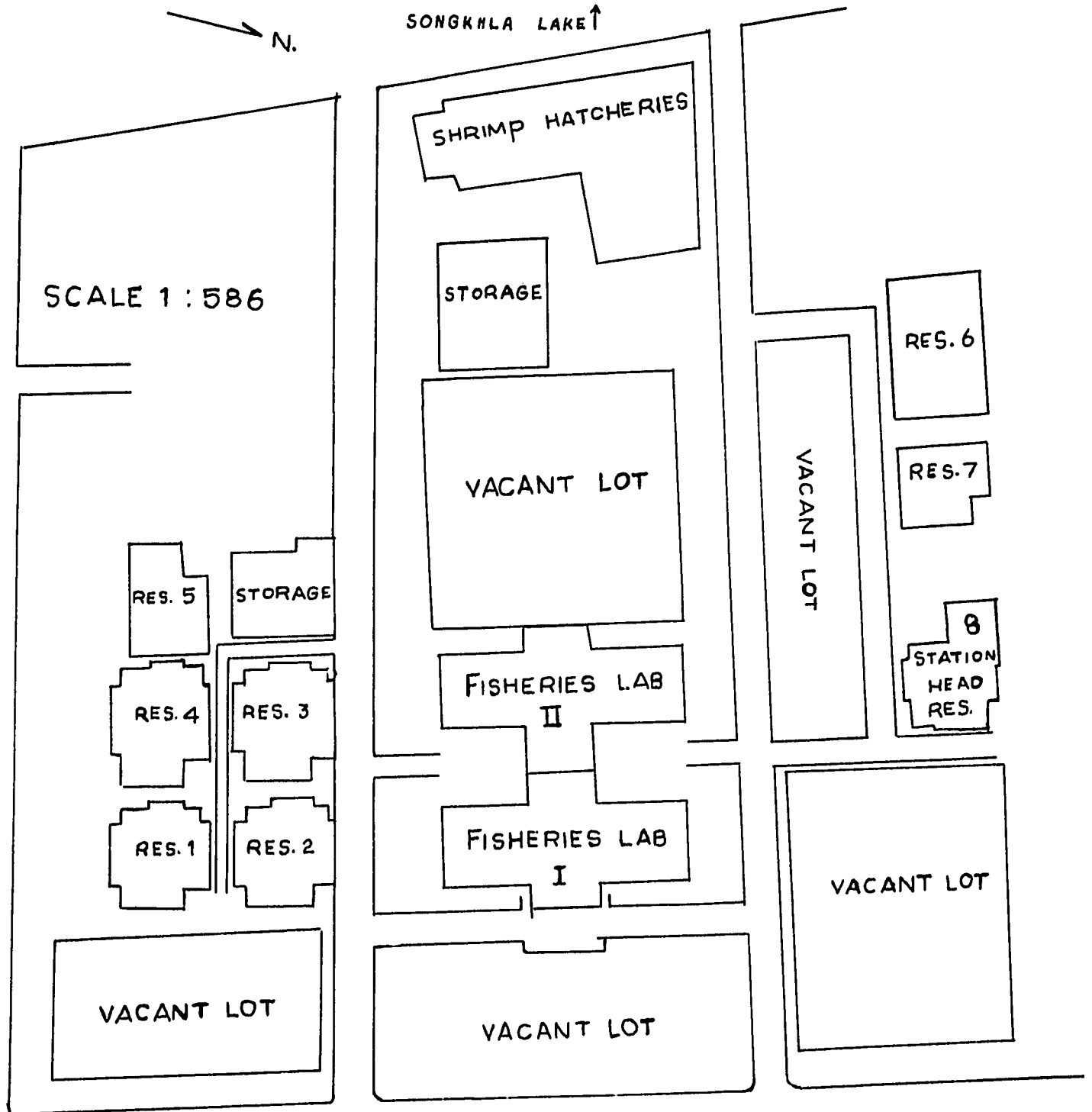
Central Laboratory and Buildings

The central office and laboratory is essentially an H-shaped structure with 2 wings each 8 m x 24 m connected by a center hall. At present, there is little or no extra space not in use by the present personnel.

A research building labeled Shrimp Hatcheries on Figure 16 is utilized 50 per cent by 8 concrete tanks at floor level. More space for shrimp culture could result by filling in the tanks and using feeding troughs at two levels above the floor. This would make observation and feeding much easier. A small aquarium room is also in this building.

The principal unused space is the building (36 feet x 36 feet) for fishing gear storage. This was occasionally used for training sessions.

Figure 16
SONGKHLA MARINE FISHERIES STATION
CENTRAL LABORATORY



If four American biologists (two from Auburn University and two from the Philadelphia Academy of Science) are to be located there, then additional space for offices and research will be necessary. Mr. Pongsuwana suggests the following alternatives for providing the necessary space:

- A. Temporarily converting the present museum/reference collection room (5 m x 8 m) into office space by moving the collection into the fishing gear storage building, or
- B. By utilizing the storage building itself for office space, or
- C. Since the present office/laboratory space is limited and immediate future needs dictate additional construction would be needed, it is suggested that,

A first-stage, small scale expansion which could be completed within 4 months, would be to fuse the areas between Fisheries Laboratories I and II. This would provide two rooms each of 7.5 m x 10 m and would cost approximately 120,000 bahts, followed by a second stage, a large scale construction of a new laboratory which would have two or more floors upon the 24 m x 24 m vacant lot, or

- D. Convert a portion of the shrimp hatchery building by constructing a new wing with two or more floors on 250 square m of spare hatchery space.

The museum and reference collection should not be moved as this can only be done with detriment to the collection.

The most feasible, economical and rapid solution would be to utilize the storage building by dividing it into 4 office-laboratories, with insulation and air conditioning. More extensive and costly construction would be optional depending upon the long range plans of the Department. At the present time, practically nothing is stored in the building.

Additional Research Facilities

Water Pipeline to the Laboratory. A sea-water pipeline would be a desirable addition to the facilities as during most of the year, the salinity beside the Station in Songkhla Lake is only 15 ppt and in the rainy season from 1 to 7 ppt. Also, at present, the Station has no pipeline bringing water directly from this lake, and the shrimp culture experiments are conducted in filtered recirculated water. Mr. Pongsuwana has prepared a map showing the proposed route of a pipeline from the Gulf of Thailand across town to the laboratory. He estimated the length of pipe as 1,904 meters, with possible need to extend the pipe 100 meters out into the sea, giving a total pipeline of about 2,000 meters. At Songkhla prices, he estimates the cost of 6-inch pipe and fittings at 256,000 baht (\$12,800) and for 8-inch pipe and fittings at 385,000 baht (\$19,250).

The cost of installation was not calculated. In addition, a filtering intake structure would be necessary and pumps for intake and backwashing the pipeline and filter. Also, periodic facilities along the pipeline would have to be provided for cleanout.

Other Research Facilities. A pipeline from the lake to the laboratory would facilitate backwashing the sea water intake.

salinity for mixing with sea water in research. The wharfside area back of the laboratory, however, is too polluted for use. Possibly a pipeline could be run approximately 100 meters from the shoreline into the lake to obtain suitable water. However, it would be necessary to know the locations of the sewage disposal system of the city.

One or more wells to provide freshwater for research would be very useful. Mr. Pongsuwana reports that wells at Songkhla are 5 to 6 meters in depth. He estimates that a multiple-headed well with a 4.5 HP pump would supply the Station needs.

A stand-by electric generator with diesel engine of sufficient capacity to operate all electrical systems would also be needed.

The equipment presently available at the Station is given in the Appendix to this report.

Samut Sakhon Shrimp Station

A small experiment on penaeid shrimp culture is located on lands rented from private individuals in the Chao Phraya River delta and is operated by Mr. Banchong Teinsongrusmee, a biologist with the Marine Division of the Department of Fisheries. Mr. Banchong has a M. S. degree from the University of Miami and wishes to obtain the Ph. D. He is making observations on production from ponds operated just as the local farmers do. Annual production has been in the order of 20 kilos per rai (110 pounds per acre).

In the major area of shrimp farming (Figure 17), lands have been set

aside near the Tha Chin River at Samut Sakhon for a shrimp research farm.

The location is in a bend of the river above the city and on a paved road to Bangkok.

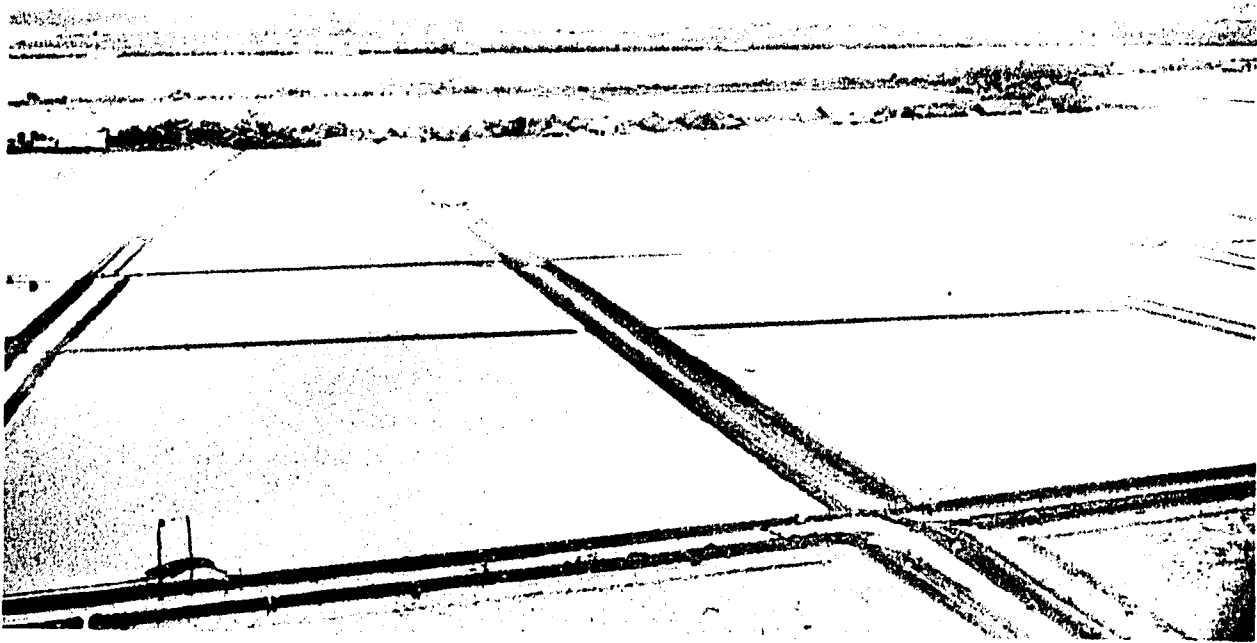


Figure 17. The principal area of shrimp farming and salt ponds is around the northern coast of the Gulf of Thailand, south of Bangkok .

Research on spawning Macrobrachium rosenbergii and raising the larval stages to the juvenile stage is being conducted also by Mr. Snit Tongsanga in the Biology Department of Kasetsart University.

APPENDIX

PRACHUAP KHIRI KHAN

<u>STATION</u>	<u>LOCATION</u>	<u>ESTABLISHED</u>
Prachuap Khiri Khan Coastal Fisheries Station	Amphur: Muang Province: Prachuap Khiri Khan	1954

<u>AREA</u>	<u>AVAILABLE FOR EXPANSION</u>
Land - 135.25 rai Water - 44.57 rai	

<u>PERSONNEL</u>	<u>TRAINING</u>	<u>YEAR</u>
Head: Mr. Uthai Suntarotok		
Biologists: Mr. Chamrus Khuntijit	B.S. Kasetsart Un.	1964
Mr. Thavorn Thammasvet	B.S. Kasetsart Un.	1968
Extension: 6	3 years experience	
Laborers: 12 permanent 10 temporary		

NUMBER AND SIZE OF PONDS (earthen)

6	2,000 (m ²)	1	1,564 (m ²)
2	10,000 (m ²)	1	800 (m ²)
1	16,700 (m ²)	1	480 (m ²)
1	7,200 (m ²)	1	400 (m ²)
1	6,600 (m ²)	1	423 (m ²)
1	3,195 (m ²)	2	357 (m ²)
10	100 (m ²)	5	50 (m ²)

NUMBER AND SIZE OF RICE PADDIES

1 5 rai

NAME AND LOCATION OF RESERVOIRS

Kaotao	Hua Hin	200 rai
Bangnangrom	Muang	3,125 rai
Nongtamsao	Bangsaphan	200 rai

NUMBER AND SIZE OF PONDS USED TO PRODUCE FINGERLINGS (earthen)

10	100 (m ²)
5	50 (m ²)

RESEARCH PROJECTS

1. An investigation on milkfish fry collected at the Amphur Patiew area, Chumporn Province.

PRACHUAP KHIRI KHAN

2. An experiment on the combined rearing of Pla Kapong Khao (Lates calcarifer Bloch) and Tilapia (Tilapia mossambica Peters).
3. Experimental Culture of the Japanese oyster, Crassostrea gigas.
4. Experimental oyster culture, Crassostrea vitrefacta Sow, at the mouth of Pran River.

TRANSPORTATION FACILITIES AVAILABLE

1. Jeep, Willy; purchased in 1953; no good.
2. Jeep, Land-rover; purchased in 1968; o.k.
3. Truck; purchased in 1953; no good.
4. Boat, Outboard motor; 35 HP.

EQUIPMENT AVAILABLE FOR RESEARCH

1. 1 pocket pH meter
2. 1 binocular microscope
3. 1 electric balance - 200 grams
4. 1 plankton net
5. 1 salinometer
6. 1 dissecting apparatus
7. 1 underwater thermometer recorder
8. 1 electric pH meter
9. 2 balances - 500 grams
10. 1 Ekman dredge
11. 2 sieves
12. 1 electric centrifuge
13. 1 profile projector
14. 1 compound microscope

EQUIPMENT NEEDED¹

1. 1 truck
2. 1 jeep
3. 1 camera
4. 1 amplifier

1. This is equipment Station Head has requested.

CHANTABURI

<u>STATION</u>	<u>LOCATION</u>	<u>ESTABLISHED</u>
Chantaburi Fisheries Station	Amphur: Khlung Province: Chantaburi	1958

<u>AREA</u>	<u>AVAILABLE FOR EXPANSION</u>
300 rai Land - 50 rai Water - 250 rai	200 rai

<u>PERSONNEL</u>	<u>TRAINING</u>	<u>YEAR</u>
Head: Mr. Saman Puriphul	B.S. Kasetsart Un.	1963
Biologists: Mr. Manot Hongpromyat	B.S. Kasetsart Un.	1967
Mr. Boonsong Sirikul	B.S. Kasetsart Un.	1968
Extension: 2	Each with 3 years experience	
Laborers: 10 permanent; 15 temporary		

NUMBER AND SIZE OF PONDS (Earthen)

2	50 rai
2	25 rai
4	2 rai
2	800 (m ²)

RESEARCH PROJECTS

1. Experimental pond culture of blue crab, Scylla serrata (Forsk.)
2. The experiment on raft method culture of oyster, Pycnodonta numisma.
3. The experiment on pond culture of sea bass, Lates calcarifer.
4. A comparison of yield of shrimp between a ditch sectional and a plain field.

TRANSPORTATION FACILITIES AVAILABLE FOR STATION USE

1. Jeep, Land-rover; purchased in 1963; fair condition.
2. Boat, In-board motor; 50 HP; 11 m long; purchased in 1961.
3. Boat, In-board motor; 7 HP; 8 m long; purchased in 1958; fair condition.
4. Boat, Out-board motor; 6 HP; 10 feet long; purchased in 1966; no good.
5. Boat, Outboard motor; 28 HP; 10 feet long; purchased in 1967; no good.

CHANTABURI

EQUIPMENT AVAILABLE FOR RESEARCH

1. 2 dissecting microscopes
2. 1 compound microscope
3. 1 current meter
4. 4 plankton nets
5. 1 Ekman dredge
6. 1 analytical balance (poor condition)
7. 10 aquaria
8. 1 10 KVA generator
9. 1 5 KVA generator
10. 1 1 KVA generator
11. 1 300 watt portable generator
12. 1 5 HP pump
13. 1 50 m seine
14. 1 25 m seine
15. 1 flow meter

EQUIPMENT NEEDED¹

1. 1 pH meter
2. 1 analytical balance
3. 1 150 HP in-board motor boat; 12 m long
4. 1 15 HP long-tail boat
5. 1 50 KVA generator

1. This is equipment Station Head has requested.

SONGKHLA

<u>STATION</u>	<u>LOCATION</u>	<u>ESTABLISHED</u>
Songkhla Coastal Fisheries Station	Amphur: Province: Songkhla	
<u>AREA</u>	<u>AVAILABLE FOR EXPANSION</u>	
20 rai - Water	200 rai	

<u>PERSONNEL</u>	<u>TRAINING</u>	<u>YEAR</u>
Head:	Mr. Umpol Pongsuwana	
Assistant Head:	Mr. Pairoj Brohmanonda	
Biologists:	Miss Prajuab Sookchareon Mr. Chalae Vatanaprida Mr. Songchai Sahawacharinta Mr. Swasdi Wongsomnuk Mr. Sopon Chantaratna Mr. Yudh Hansopar Mr. Swasdi Chienkananurak Mr. Somchart Sookwong	
Technicians:	10 (girls)	
Laborers:	40 permanent 30 temporary	

NUMBER AND SIZE OF PONDS

1	6,400 (m ²)
8	3,200 (m ²)

RESEARCH PROJECTS

1. Biology of mullet.
2. Macrobrachium shrimp culture.
3. Density of juvenile Penaeid shrimp.
4. Tagging Macrobrachium shrimp.
5. Floating basket culture of Macrobrachium.
6. Culture of diatoms.
7. Benthos in the lake distribution, amount, kinds.
8. Plankton-zooplankton, quantitative.
9. Pla kapong basket culture.

TRANSPORTATION FACILITIES AVAILABLE

1. 1 Jeep pickup.
2. 2 outboard motor boats.
3. 1 trawl.

SONGKHLA

EQUIPMENT AVAILABLE FOR RESEARCH

1. 1 pH meter
2. oven
3. 1 water still
4. 1 H. P. Olympus microscope
5. 1 binocular dissecting scope
6. 1 desiccator
7. 1 Nikon autophotographic outfit
centrifuge
current meter
shadow graph
micro projector
8. 2 calculators
9. 1 freezer
10. 1 stove (bottled gas)
11. 2 ovens
12. 1 analytical balance
13. 1 magnetic stirrer
14. 1 refrigerator
15. 1 drying oven
16. 1 carousel Kodak slide projector
17. 2 cameras (Rolliflex)
18. 1 blender
19. 1 60 kg scales
20. 2 snorkel face masks
21. 1 temperature recorder for pools
22. 1 radio communication system
23. 2 air compressors
24. 1 3 KW diesel generator
25. 1 air conditioner
26. 8 concrete tanks for shrimp cultures

EQUIPMENT NEEDED¹

1. spectrophotometer
2. Kjeldahl apparatus

1. This is equipment Station Head has requested.