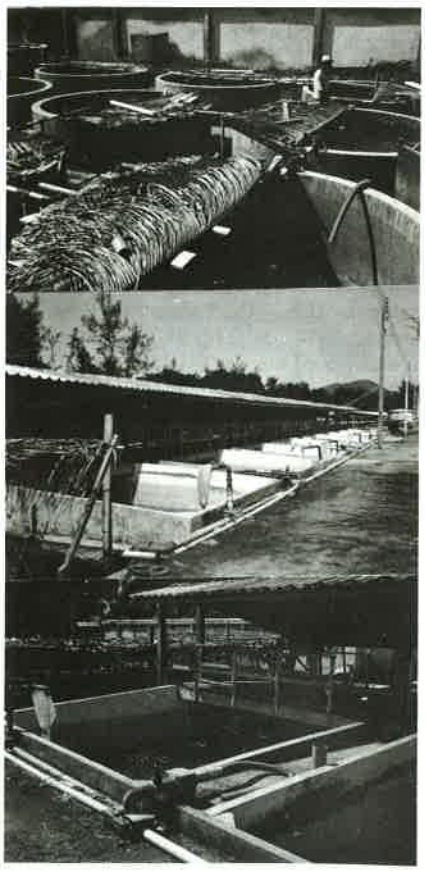
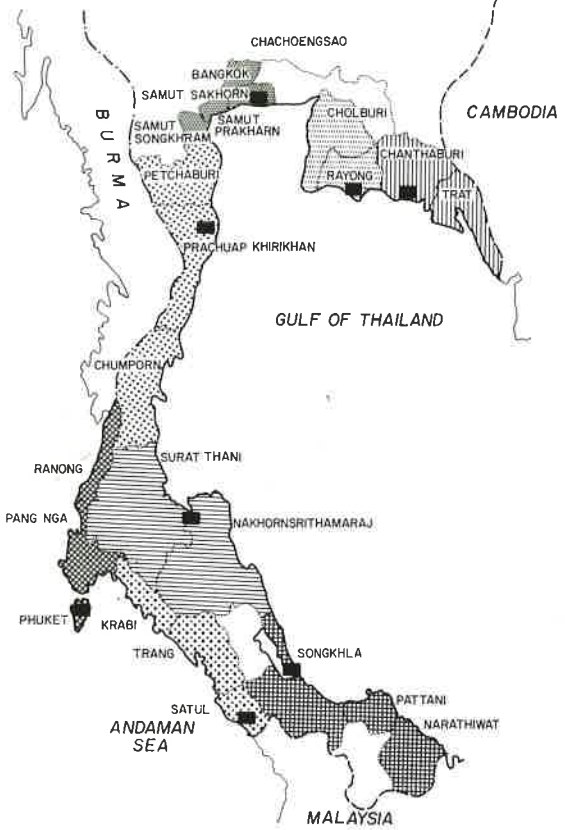
# Brackishwater Fisheries Research in Thailand

The Department of Fisheries of the Government of Thailand is part of the Ministry of Agriculture and Cooperatives. Brackishwater research is undertaken by the Brackishwater Fisheries Division, one of seven Divisions making up the Department. (Other Divisions are Exploration Fishing, Fishery Technological Development, Marine Fisheries, Freshwater Fisheries, Fishery Conservation and Extension, and Finance). The Brackishwater Fisheries Division comprises two technical units—the Aquaculture Resources Survey Section and the Aquaculture Research Section—and eight brackishwater fisheries stations (see map) two of which, Phuket and Rayong, share facilities with the Marine Fisheries Division. This large number of brackishwater facilities reflects the importance of estuarine, mangrove and other brackishwater habitats in Thailand's coastline of about 2,600 km.



Above: Some of the shrimp rearing tanks, Rayong station. Right: (Top) Leader of the Satul station, Mr. Pinij Kuvankij, outlines the station's programs for ICLARM mission members, Drs. Roger Pullin (center) and Richard Neal (seated); (Center) Multipurpose raceways, Satul; (Bottom) Laboratory building, Satul.




Map shows Thailand coastal provinces. Hatching denotes groups of provinces served by each research station indicated by black squares.

Top: Algae production tanks, Prachuap Khirikhan station. Center: Multipurpose rectangular tanks. Bottom: New pond construction, with large holding ponds behind, Prachuap Khirikhan station.

The eight brackishwater research stations have been pursuing programs of research and extension to local fish farmers and fishermen for many years. Each station has responsibility for providing extension services to local coastal provinces, for example, the Samut Sakhorn station's area of responsibility comprises Bangkok, Samut Prakharn, Samut Sakhorn and Samut Songkrahm provinces; the Satul station looks after Satul, Trang and Krabi provinces and the Prachuap Khirikhan station Prachuap Khirikhan, Petchaburi and Chumporn.

An ICLARM team visited four of these stations in December 1980, during a mission to advise the Thai Fisheries Department on the suitability of some stations for expansion of mollusc research, and on research projects and facilities required. Here we describe the work carried out by these and other brackishwater stations.

Upper: Plastic cages for mud crabs, Samut Sakhorn station. Lower: Shrimp tanks, Phuket.

### Rayong Station, Ban Pae

The Rayong station houses both brackishwater and marine division staff. It is a well established station some 250 km southeast of Bangkok. There are extensive research facilities currently being used for hatchery work on shrimp, cephalopod molluscs and fish. Interesting rearing experiments have been carried out on commercial species of the cuttlefish *(Sepia pharaonis)* and squid *(Sepioteuthis lessoniana)*, both of which have been reared from eggs to adult stage.

### Chanthaburi Station, Tha Charep

The location of the Chanthaburi Station was changed about one year ago. The previous site was accessible only by boat, the new location being near the provincial capital, Chanthaburi town. The station carries out shrimp culture work and has been active in mud crab (*Scylla* spp.) research.

### Samut Sakhorn Station, Kogham

This is a relatively new station, five years old, situated among salt farms and fish ponds about 40 km from Bangkok. The site area is around 100 ha. Most of the work program consists of extension activities for local shrimp *(Penaeus merguiensis)* farmers. The Station is reponsible for extension work in four provinces—Bangkok, Samut Prakharn, Samut Sakhorn and Samut Songkrahm. There are two biologists and 10 support staff.

As well as shrimp-related work, the station provides advice to farmers on the culture of sea bass *(Lates calcarifer)*, mud crab *(Scylla serrata)* and brine shrimp *(Artemia salina)*. Sea bass fingerlings are brought from other stations and provided to local farmers.

One research program involves regeneration of mud crab claws. The large claws *(chelae)* sell for up to $4/kg in the market. The claws can be "harvested" repeatedly. Regeneration time was found to be 40 days in crabs kept in plastic cages.

### Prachuap Khirikhan Station, Klongwan

This station has a 20-year history of research in its excellent sheltered site, some 280 km southwest of Bangkok. Seven biologists and 11 technicians work at the station, which has four programs—breeding, extension work, reservoir management and aquaculture survey.

Present research is centered on breeding and culture methods of shrimp *(P. monodon* and *P. merguiensis)*. There are also research and extension projects on sea bass and grouper, broodstocks of which are maintained on site. A milkfish project, mainly fry collection and rearing has been underway for some years. The station has its own 15-m research vessel.

One laboratory is devoted to culture of algae *(Isochrysis, Tetraselmis* and *Chaetoceros)* and rotifers *(Brachionus plicatilis)* as feed for the fish and shrimp larvae.

### Phuket Station, Phuket

Situated on the island of Phuket, 930 km from Bangkok facing the Andaman Sea, the brackishwater section of Phuket station is actively engaged in culture work. Some six million postlarvae of the shrimp *Penaeus monodon* are produced each year. Gravid females are obtained by trawling in local waters and spawn in large hatchery tanks.

Broodstock of sea bass *(Lates calcarifer)* and grouper *(Epinephelus tauvina)* are kept nearby in sea cages.

### Satul Station, Langu

Satul brackishwater research station is located on the Andaman Sea, close to the Malaysian border. The site was chosen to include areas useful for both high and low salinity research activities. The station is only three years old.

Research emphasis is on hatchery production of shrimp, grouper and sea bass. The sea bass broodstock had spawned prior to the visit by the ICLARM mission and fingerlings were being maintained in concrete raceways. Large numbers of shrimp larvae were also present, fed from outdoor algal and rotifer cultures.

Preliminary aquaculture work on two local oyster species has begun recently and laboratory observations on cockles *(Anadara granosa)* are underway. There are large commercial cockle farms in the vicinity.

The two remaining stations, at Surat Thani and Songkhla, in the lower western Gulf of Thailand, are understood to be working mainly on shrimp culture and related extension activities.

The activities of the brackishwater research stations have two outstanding features. First, the crustacean and finfish species of importance for brackishwater aquaculture are broadly similar for most areas; shrimp *(P. monodon* and *P. merguiensis)* are of paramount importance, the finfish, seabass and grouper, are increasing in importance, while bivalve molluscs are only now beginning to assume importance in aquaculture. Second, while it may appear that the programs of the various stations are in many ways similar on these species of common importance, this is inevitable in programs which are orientated towards local extension work. Also, the lack of published information on the biology of most of these species makes it unlikely that any wasteful overlaps in research programs will occur. Particularly with the finfish and molluscan species, the development of entirely new culture technologies is required.

# ADVANCES IN UNCONVENTIONAL FISH FOODS

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A SUCCESSFUL meeting of experts on non-traditional fish foods, convened by the Inter-American Bank in Washington, D.C. was held in September 1980.

The work began in Montevideo 1 yr ago, where a group fo 12 Latin American experts presented recommendations to the IDB for a plan of action and for selection of participants from various countries of the western world for a technical meeting. This was held in Washington, D.C., with the participation of 70 fishing and nutrition authorities of the Americas and Europe from 23 member countries of the IDB and various international agencies.

The President of the Bank, Mr. Antonio Ortiz Mena, opened the meeting with a call for creative innovation and a true technological revolution to make use of the millions of tons of fish caught each year which never reach the consumers. In the case of "trash" fish caught along with shrimp, 500,000 t are cast into the sea each year from fishing vessels. That quantity could satisfy the basic animal protein requirements of about 10 million persons per year.

The lack of adequate technologies is a principal limitation preventing the use of "trash" fish economically for the huge nutritional needs of low income groups. In other words, to manufacture flour for animal consumption with such abundant species is still easier and more profitable than to produce food for human consumption using traditional methods.

The food industries of the American continent have directed their efforts towards the manufacture of products for the high and middle-income classes, since they represent the most lucrative markets. Few consistent efforts have been made to produce for the large low-income markets, where malnutrition and hunger penetrate most deeply.

The round table on non-traditional fish foods succeeded in identifying responses, specific options and viable alternatives to confirm fish as the cheapest source of protein for nutrition purposes.

The quality of fish as a food and the economic aspects were analyzed by Clinton Chichester from the Nutrition Foundation of New York and by Department of the Food and Agriculture Organization (FAO) in Rome. A specific and positive balance of the fisheries resources available for these purposes was presented by Herbert Allsopp from the International Development Research Center of Canada and by Andrés Couve, Chilean expert and consultant of the IDB, World Bank and FAO. Antonio Malaret, from Argentina, college professor and international expert, presented a novel analysis of the protein-deficient markets, both the large urban ones and those of extreme poverty sectors and groups in a vulnerable situation. Fast foods and rations for institutional supply were stressed as efficient means to benefit those groups.

The evaluation of technologies was undertaken by various experts connected with the most prominent advances in each specialization. Ernst Pariser, of the Massachusetts Institute of Technology, considered one of the pioneers in protein concentrates from fish, opened the discussion of models of investment projects. Interesting experiences from Norway, Denmark and France were also heard on the same topic of protein concentrates.

Max Rutman, Chilean expert in nutrition and one of the creators of "hake milk," raised the important premise of seeking first a traditional food which could be replaced with economic, nutritional and qualitative advantages, by products derived from fish. This was the case of the dairy substitute tried out in Chile.

In the same context, Roger Martin of the National Fisheries Institute of the United States gave a complete picture of the alternatives offered by pulps and comminuted fish. Hamburger, sausages, croquettes, bread rolls and many other forms can satisfy efficiently and very economically the increasing demand for cheap quick foods in urban areas. Various experiences of numerous fishing countries such as Peru, Chile, Panama, Costa Rica, Mexico, Guyana, Brazil, Uruguay, Argentina and others, following the hands of the clock form the southern coast of the Pacific to the Atlantic, illustrated Latin American efforts in the search for innovative technologies. This also revealed that those efforts have been limited and sporadic because of the lack of sustained support for the financing of pre-investment studies and, subsequently, for production projects integrated with intelligently designed distribution systems.

The IDB has therefore emerged as the golden bridge, or at least the "financing bridge," to unite these two large segments: unused resources and unsatisfied needs.

Discussions were closed recalling that hunger continues in the world not because of lack of food or money, but mainly because of the lack of decision to implement simple and ingenious solutions. Time has arrived to close the debate and to initiate the action.