ISSN 0115–4974

Asian Aquaculture

VOL. 3 NO. 9 TIGBAUAN, ILOILO, PHILIPPINES SEPTEMBER 1980

TRAINING PROGRAM BECOMES BROADER

An expansion in the coverage of the various courses and an increase in the number of countries who have been sending participants to these training courses have broadened the scope of the training component of the technology transfer program of the SEAFDEC Aquaculture Department.

The following developments have contributed to bring this about:

More Third World Countries. Aside from the SEAFDEC member-countries of Malaysia, Singapore, Thailand and the Philippines, the following countries have lately been sending trainees: Brunei, Egypt, Fiji Islands, Hongkong, Indonesia, Republic of Kiribati (formerly Gilbert Islands), Nigeria, Sudan, Tanzania and Western Samoa.

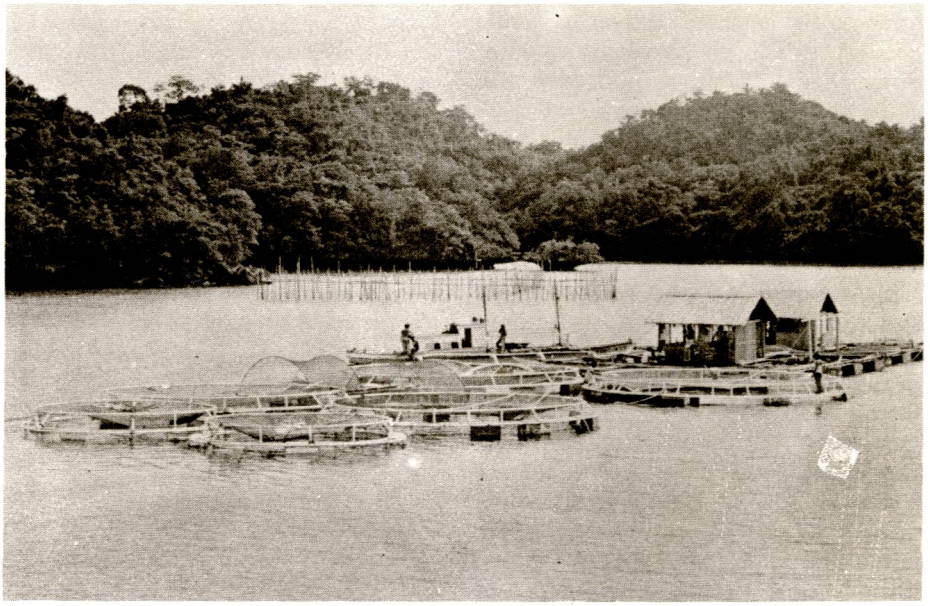
Previous programs have been arranged for aquaculture technologists and fishery officers of Cuba, India, Sierra Leone, Panama, Colombia, and volunteers of the U.S. Peace Corps fielded in the Philippines.

Furthermore, the Canada-based International Development Research Centre has requested SEAFDEC to accommodate trainees from non-member countries who shall be undergoing special courses under IDRC's third country assistance grant. Countries mentioned where trainees could be coming from include Belize, the Dominican Republic, Guyana, Rwanda and Togo.

Intensified Local Training. The mobile training course has largely been responsible for bringing the benefits of aquaculture training to the grassroots. Since 1978 when the Aquaculture Department and the Philippines Bureau of Fisheries and Aquatic Resources started this in situ program for small fishfarmers, 711 pond owners, fisheries technicians, pond workers, and even fishery extension workers, teachers and students have been trained in the latest technology available on shrimp and milkfish pond culture. Ten of the 13 Philippine geopolitical regions have been covered by the program.

Before the mobile program, special quick-reaction courses were organised. Notable examples were the crash courses on pond rehabilitation, construction and management for farmers in the

(Continued on page 2)



It is in these floating cages where the milkfish broodstock that recently matured in captivity were kept (see AA August 1980). The quiet cove is within the Igang substation of the Aquaculture Department. Igang is on Guimaras Island off the province of Iloilo. Designed and built by engineers of the Department, the cages are 3 to 10 m in diameter and 2 to 3 m deep with nylon netting. They were floated in water 7 m deep with sandy-muddy bottom. Annual ranges of temperature and salinity were 25-31°C and 28-35 ppt. Ranges for March to July were 27-30°C and 30-34 ppt. Transparency was 2.5 to 4.5 m.

Training Program . . .

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stricken areas of Mindanao that were hit by the 1976 tidal wave. Another which had a long-term research oriented aim was the cooperators' training program. In this program, fishfarmer cooperators from the island of Panay were introduced to the new practices of growing prawn in ponds as well as the pond management techniques for raising the jumbo tiger prawn or *Penaeus monodon.* It was a research-oriented project in that the Department's researchers obtained from the cooperators production data before and after the training as well as monitored production and management practices employed by the fishfarmers. These provided the highly essential benchmark information needed to do further studies.

With the development of the small-scale prawn hatchery system, a local, followed by a longer international, short course was offered. Eventually the prawn hatchery technology largely supported by the development of an effective prawn broodstock production technique began to attract some innovative aquaculturists a number of whom started setting up their own hatcheries.

Special Courses. Bilateral agreements were forged with a number of institutions for the conduct of special courses for their technologists and researchers. Among these is the Indian Council for Agricultural Research. So far, 10 Indian aquaculture researchers have trained in the culture of fishpond organisms, various aspects of prawn production technology, and induced spawning of fish.

Fourteen fishery officers of Cuba trained in 1979 on diverse aquaculture areas which included tilapia cage culture, fishpen engineering, aquaculture management, hatchery management and operation, and prawn culture. Their program was prepared under an agreement between the Department and the Cuban State Committee on Economic Cooperation.

IDRC in 1979 also sponsored three technologists from Sierra Leone, Egypt and Sarawak to train in pen and cage engineering, culture and management. This year two Malaysians and two Indonesian were the first to undergo at the Department the IDRC-sponsored third country training assistance grant.

AQUACULTURE MANAGEMENT FOR PRAWN

Twenty four participants from 8 countries are now undergoing the 2-month aquaculture management for prawn training course at the SEAFDEC Aquaculture Department in Tigbauan, Iloilo, Philippines.

Left to right are: (front row) Noa Siaosi, Western Samoa and Ildefonso Paguntalan, Phil; (seated) Robert Leong Ho Fook, Malaysia; Kamariah Othman, Mal; Lydia Paule, Phil; Erlinda Lacaba, Phil; Dennis Niyo, Mal; Carlos Canido, Jr., Phil and Chan Chee Weng, Mal; (third row) Aproniano Causin, Phil; Prasit Phuhongs, Thailand; Johari Othman, Mal; Ernie de Ramos, Phil; Winfried V. Haule, Tanzania; Abu Seman bn Yatin, Mal; Dalal El Din A.M. Abbas, Sudan; Ahmad Anuar bn Kassim, Mal and Cannis Nwoko, Nigeria; (last row) Antonio Menchaca, Phil; Timoci Namotu, Fiji Islands; Raul Santos, Phil; Francisco Rosello, Jr., Phil and Louis Dim, Nigeria. Not in photo is the other participant from Thailand, Mr. Sakcahi Chotikun.

The trainees from Tanzania, Fiji, Western Samoa and Sudan are sponsored by the Philippine Government's Technical Assistance Council (TAC) which provides assistance to other Third World countries in the form of training, technology transfer programs or such other activities in which the Philippines has competence. TAC was created by President Marcos and its programs are implemented through the ministry of foreign affairs.

APDEM. Meanwhile the business management-oriented program, Aquaculture Business Project Development and Management was instituted this year. In two offerings, APDEM was attended by 89 fishfarmers, aquaculture entrepreneurs, project analysts, fishfarm managers, researchers, and technologists.

Asian Aquaculture Officers Training. Recently, the signal was received from Dr. T.V.R. Pillay, coordinator of the FAO global aquaculture program, to start preparing for a one-year intensive training course for senior aquaculture officers of Asia. This training is the offshoot of earlier discussions between officials of the Department and Dr. Pillay to enlist the Department as a member of the FAO-coordinated regional network of aquaculture centers. On top of its proposed role in the network of doing research on brackishwater species, the Department has been asked to conduct a one-year training program for aquaculture personnel — 25 per training batch — from the Asian region. The curriculum, prepared by an international task force of aquaculture scientists, has been distributed for study to selected specialists in the Philippines who are being tapped as resource persons for this program.

Graduate Program. This year, 52 graduate students are enrolled in the University of the Philippines - SEAFDEC M.S. in Fisheries (major in aquaculture) program. Eight were graduated last year, the first batch from the program, eleven last April to bring to 19 the number of graduates so far. Of the present enrolment, 25 are in their final year of study.

Students' Practicum. Every summer break in the country's academic year, several graduating students of fishery schools apply to the Department to undertake a 5-week practicum on any field or fields of interest to the student. This year 73 students from 8 schools including the University of the Philippines college of fisheries came.

The scorecard for this year, as of September, reads as follows:

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Philippine Aquaculture Scenario Revisited

Retrospective commentary

It is significant that any outlook for the Philippine aquaculture industry in the 80's must be based primarily on events not more than two to three years old. Since the inception of this paper, there have been significant changes that may have passed unnoticed. These developments are deeply rooted on the importance that the government has given to research as an instrument for inducing innovations.

The benefits from these successes can hardly be overemphasized. For the first time in the history of aquaculture, the breakthroughs have given the much needed boost to individual entrepreneurial activity. Fresh capital poured in from the credit sector as well as from new investors, the value of which has not yet been determined. More so, technology development today may not be claimed solely by universities and research centers. The private sector has moved in to evolve systems for developing and applying intermediate technology and for the smooth transition from a subsistence activity into a mature business-type enterprise.

In many instances it has been proved that the best defensive and offensive strategy in a pioneering enterprise is the ability to operate a distinctive competence over other producers. Undoubtedly, there are many opportunities for specialization for those in pursuit of completely new business ventures. Hereunder are some examples which are currently operational but are not yet considered under Philippine aquaculture statistics.

Potential New Ventures

1. *Artemia Culture*
2. *Broodstock Growing of Prawn Spawners*
3. *Monoculture of Crabs*
4. *Carp and Catfish Culture*
5. *Trepang or Sea Cucumber Culture*
6. *Seaweed Culture*
7. *Integrated Fish-Livestock-Crop Farming*
8. *Rice-Fish Culture*
9. *Piggery-Milkfish/Prawn Farming*
10. *Duck-Fish Farming*
11. *Tilapia Pond and Cage Culture*
12. *Development of Mangrove Swamps into Fishpond Estate (cum real estate subdivision style)*
13. *Prawn Feed Mass Production*
14. *Fertilizer Extender for Intensive Milkfish Pond Production*
15. *New Species Development: Red Tilapia and Golden Pearch*
16. *Tropical Ornamental Fish Breeding, Rare Aquaria Species*
17. *Raising Milkfish Juvenile for Tuna Bait*
18. *Canning and Processing of Aquaculture Products*
19. *Portable Milkfish Raceway Nursery Tank*
20. *Alternative Energy Source Development: Solar, Windmill or Waterwheel System*
21. *Pearl Culture*

Since the inception of the original scenario paper, there have been a number of specific policies that carried the industry into a new era of development. Foremost among the policies was Presidential Decree 1585, issued on June 1978, which announced the full authority of the President to change, annul, revise, modify or revoke any contract entered into by government agencies regarding the exploitation, exploration or utilization of natural resources. Then there was LOI 868 of May 1979 which provided under the *Biyayang Dagat Program* the release of massive credit facility for small-scale fishpond holders and municipal fishermen.

Over the past 2½ years, the preparation of scenarios in order to clarify the path and direction to the future has been a fad among leaders of society. In the fisheries industry, a legion of loyal followers have brought other types of environmental scanners. Because of the seriousness of economic doldrums such as those brought about by ultra-inflation and a panic stricken recession, minds have been opened to the inescapable responsibility of how to cope with today's reality and tomorrow's uncertainties.

The strategic course of the aquaculture scenario has in many cases been dramatic. During the early part of 1978, President Marcos announced the priority thrust in utilizing an increasing part of Philippine resources to farm the seas and inland bodies of water. The President must have realized that aquaculture statistics had been rather understated because it was limited to fishpond resources and production. Preliminary estimates show that the aquaculture industry contributes no less than P1.8 billion to the country's GNP, a conservative figure that even excludes the output of the above list of specialized businesses, and from import substitution benefits and foreign exchange revenues.

The tables below provide the details of our preliminary estimates of present aquaculture resources and production:

Resources Available

	Present Area or Number	Capacity Utilization	Sources of Data
1. Fry Grounds	*Approx. 110 municipalities*	*Seasonal*	*Ohshima, George (1973)*
2. Prawn Hatcheries	*33 plants*	*Only 28 operating at 25% capacity utilization*	*Rodriguez, Luis (Interview, 1980)*
3. Fishponds	*176,000 ha*	*706 kg/ha/yr*	*BFAR Statistics (1978)*
4. Fishpens and Cages	*7,000 ha*	*5,000 kg/ha/yr*	*Current Estimate (1980)*

(Continued on page 6)

*E.N. Encarnacion, Aquaculture Economist and officer-in-charge of the technology verification and packaging program, SEAFDEC Institute of Aquaculture.

Fishpen and Cage Farming in the Philippines

The Philippines has 70 freshwater lakes and impoundments with a total area of 200,000 hectares. Potential production of fish from these waters is estimated to be 50 thousand metric tons a year or 5 per cent of the total annual fish production of the country.

In 1971, the pen culture of milkfish (*Chanos chanos*) was started in Lake Laguna, the largest lake in the Philippines with an area of 900 km^2. The hectarage of fishpens in the lake estimated to be 3,500-4,000 produced some 16,000 metric tons of fish or 20 per cent of the total milkfish production in the country. The fishpen industry in Lake Laguna has an investment of about ₱100 million.

Cage farming in lakes is of more recent development than the fishpens. Culture of *Tilapia mossambica* in floating cages began in 1976. Commercial production of tilapia was reported to be as high as 10-15 metric tons per cage every six months. Cage culture of *T. nilotica* and *Penaeus monodon* in Lake Laguna has shown much promise.

The Milkfish Fishpen Industry

Culture of milkfish in pens has the following distinct advantages: (1) an annual potential yield of about 4,000 kg/ha or over ten times that of the open water catch; (2) abundance of natural food in the lake which makes supplemental feeding minimal; (3) areas between pens serve as refuge and breeding grounds of fish; and (4) it is a source of livelihood of the lakeshore inhabitants.

Fishpen owners in Lake Laguna were reported to derive some ₱24,863 (US$ 1: ₱7.4) in annual income while the caretakers earn ₱8,085/yr. In 1974, a study on the costs and returns of milkfish production in fishpens showed that the highest average net income of ₱1,941/ha was obtained from fishpens of one to five hectares. Fishpens of less than 1 ha and those of 6-10 has reported net losses.

Culture Practices

Site selection

The following factors are considered in the selection of fishpen sites:

1. Availability of fingerlings at reasonable prices.
2. Depth — not less than 1 meter at lowest water level.
3. Wind and current direction — the ideal site is on the leeward side of the prevailing winds with moderate flow of water.
4. Water condition — turbid and polluted waters should be avoided.
5. Cheap labor in the locality.
6. Lake substratum — muddy-clay and clayey-loam soils are good substrates. Lake bottoms with too much silt and decaying organic matter should be avoided.
7. Security — fishpens should be guarded against poachers.

Fishpen design and construction

The fishpens of Lake Laguna are of various shapes — circular, square and rectangular. Construction of the fishpens

* From the country report of the same title presented at the International Workshop on Cage and Pen Culture held at SEAFDEC, Tigbauan, Iloilo, February 12-22, 1979.

Growth and Survival of Milkfish in a Polyculture System

Five different stocking combinations of milkfish and prawn were evaluated in 500-m^2 brackishwater ponds at the SEAFDEC station in Leganes, Iloilo from 18 September 1979 to 28 December 1979 as: (I) 2,000 milkfish per ha, (II) 4,000 milkfish per ha, (III) 6,000 prawns per ha, (IV) 2,000 milkfish with 6,000 prawns per ha and (V) 4,000 milkfish with 6,000 prawns per ha.

Highest total production (463.64 kg) was obtained from treatment IV, followed by treatments II (442.08 kg), V (423.83 kg), and I (396.93 kg). The lowest total production (144.30 kg) which was the only treatment significantly lower than the others was from treatment III. No significant differences existed in different treatments. At both stocking rates, the monoculture of milkfish provided slightly higher production than the polyculture. The highest mean weight gain was obtained from treatment I. This was significantly higher than those of treatments II and V. The production and mean weight gain of prawn in the monoculture were significantly higher than those of treatments IV and V. The competition of prawn to milkfish was almost negligible, while milkfish exerted a greater competition to prawn.

A net income of ₱2,955.00/ha per crop was attained in the monoculture of prawn because its price is 5 times higher than that of milkfish. The polyculture of 2,000 milkfish and 6,000 prawns per ha was economically feasible with an estimated net income of ₱2,143.80/ha per crop. Although the polyculture of 4,000 milkfish and 6,000 prawns per ha gave higher production, it was not profitable due to the smaller size fish which had a lower unit price.

* Submitted by Beato Pudadera, SEAFDEC Aquaculture Department, to the faculty of the University of the Philippines in partial fulfillment of the requirements for the degree of Master of Science in Fisheries, major in aquaculture, April 1980. The author was a scholar under the UP-SEAFDEC graduate program.

is done with netting material (kuralon or nylon), bamboo poles and nylon rope. The poles are staked in the mud at depths of 15-30 cm or more depending on the substratum.

Transport and rearing of fingerlings

Milkfish fingerlings stocked in fishpens are usually purchased from nearby provinces. Fingerlings are transported from source to fishpens on a live fish boat or in oxygenated, water-filled plastic bags. The fingerlings are acclimated in nursery pens for 5-6 hours or for as long as 2-3 weeks after transport to prevent stress and reduce predation. Mortality in the nursery pens vary from 1-3 percent during fine weather to 20-30 percent in inclement weather.

Stocking and management of fishpens

From the nursery pen the fingerlings are stocked at 30,000/ha in the rearing pen where they are grown to marketable size (200 g or more). Mortality rates of 20-40 per cent are usually obtained after transferring the fingerlings from nursery to rearing pen.

Supplemental feeding is not practised in the majority of the fishpens. Some operators however give bread crumbs, rice bran, broken ice cream cones, fish meal, egg yolk in small quantities, ipil-ipil (*Leucaena leucocephala*) leaves, or *kangkong* (*Ipomoea reptans*) leaves.

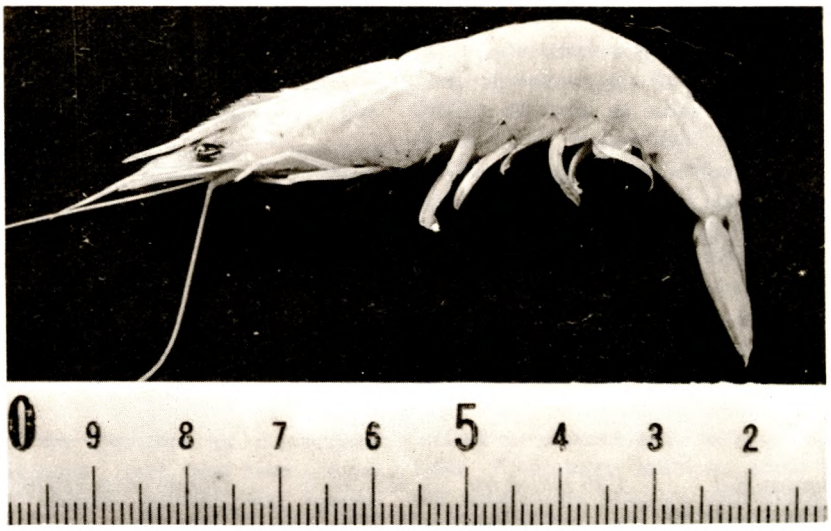
Loss of fish in the grow-out pens may result from predation by the tenpounder (*Elops hawaiiensis*) and tarpon (*Magalops cyprinoides*) or by minor destruction of the pen caused by floating objects. Only about 40-50 per cent of stock is recovered upon harvest.

Cropping pattern and harvesting

Fishpen operators differ in number of croppings per year. Some fishpen operators stock their pens once a year, usually in May or June. Others stock twice a year. The first stocking is done in March and April and harvesting is made in July or August; the second stocking is in July or August (immediately after the first harvest) and harvesting is done after eight months in February or March.

(Continued on page 6)

Edible Crustaceans in the Philippines*



22. *Metapenaeus dobsoni* (MIERS)

English name: Kadal shrimp

Philippine name: Pasayan

This is a more or less small-sized penaeid prawn. The total length (from tip of rostrum to tip of telson with abdomen extended) attains about 8 cm. Females generally grow larger than males. Rostrum shows slightly sigmoidal curve and one-third of its anterior is edentate. The third leg of the male has a strong spine with terminal hook-like tooth at the base. This feature enables a ready distinction of this species from other congener species.

The ground color of the entire body is milky white with bluish black speckles. The uropods are yellow at proximal and greenish blue at distal portion fringed with red hairs. Antennal flagella are brown.

This species inhabits brackishwaters, particularly at the mouth of Cagayan River and off Aparri, probably prefering turbid water. This species was first recorded by Racek and Dall (1965) from Manila Bay. It is not so important commercially because of its smaller size and poor catching amount compared with other penaeids in the Philippines.

It is distributed from the Philippines through Indonesia to Sri Lanka and India.

As far as the writer knows, this prawn is commercially caught in Aparri for rural consumption. (Scale represents 10 cm.)

*By H. Motoh, 22nd in a series.

Training Program . . . *(from page 2)*

Program	Participants
Short- Term	
1. Aquaculture Business Project Development and Management (1st - 35; 2nd - 54)	89
2. In situ mobile training (held in Aklan Province in June-July)	51
3. Aquaculture Research Methodology (April 7- August 7)	14
4. Aquaculture Management for Milkfish (May 5-July 5)	11
5. Prawn Culture (for Filipinos only) (April 14- 19)	15
6. Third Country Training Assistance (IDRC) (April-May)	4
7. Aquaculture Management for Prawn (ongoing, August 25- October 25)	23
Total	207
Others	
1. U.P. SEAFDEC Graduate Program (Academic Year 1979-80)	11
2. Practicum for students	73
	84
TOTAL	291

To date, since the training courses were started more than 2,000 have been trained at the Department. •

Philippine Aquaculture . . . *(from page 3)*

5. Oyster Farm	*1,000 ha*	*16,220 kg/ha/yr*	*Estimated from Phil. Recommends (1977)*
6. Mussel Farm	*1,000 ha*	*78,250 kg/ha/yr*	*Estimated from Phil. Recommends (1977)*
7. Seaweeds	*Southern Philippines*	*not available*	*Trono, Gavino, Jr. Fisheries Today (1979)*

8. Farming of other species such as tilapia, siganids and other finfishes are not recorded.

Aggregate Production

	Total Volume/ Year	Estimated Value (million pesos)	Sources of Data
1. Bangos and other species fry caught from wild	*1.35 billion fry*	*270.0*	*Librero, Aida (1976)*
2. Prawn fry from hatcheries	*28.00 million fry*	*8.4*	*Estimated at 1 million fry/plant/yr*
3. Bangos, fresh or chilled	*159,250 MT*	*1,210.3*	*Estimated from combined fishpond &fishpen production*
4. Shrimps and prawns	*2,970 MT*	*181.2*	*Estimated incremental production: difference of 1978-79 exports, Business Day (1980)*
5. Oyster (with shell)	*16,220 MT*	*16.9*	*Estimated from Phil. Recommends (1977)*
6. Mussel with shell)	*78,250 MT*	*57.0*	*Estimated from Phil. Recommends (1977)*
7. Seaweeds	*10,000 MT*	*30.0*	*Trono, Gavino, Jr. Fisheries Today (1979)*
		Total - - - ₱ 1,773.8	

The author wishes to extend gratitude to Deans Rogelio O. Juliano and Emmanuel T. Velasco for their assistance in the preparation of the original paper.

Fishpen and Cage . . .

(from page 3)

The number of croppings depends on capital and availability of fry or fingerlings. Partial harvests during the rearing period may be done to take advantage of the high price of fish.

Harvesting of market-size fish is done by the use of seines, gill nets or cast nets. Seines are used for total harvest of fish while gill nets and cast nets are used in selective or partial harvest.

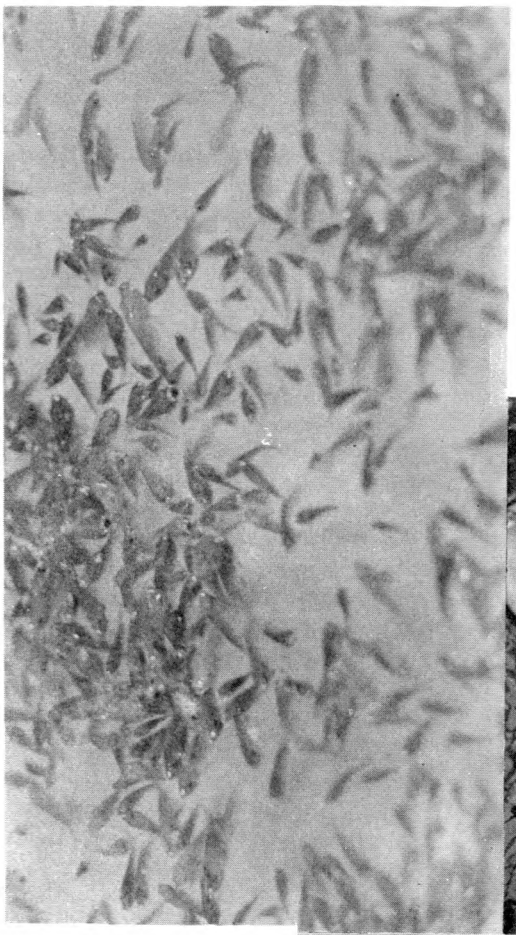
Prospects and Problems

Studies have indicated that the primary productivity of Lake Laguna could support 20,000 has of fishpens. An ADB-OPEC supported project under the administration of the Laguna Lake Development Authority is now being implemented to provide an initial 2,550 has of fishpens and cages for the small fishermen of the lake.

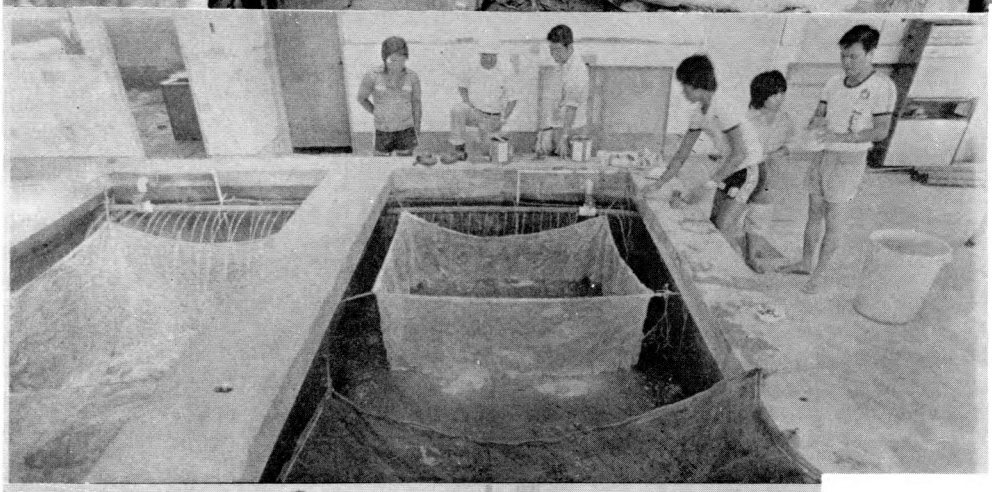
Four major problems seriously affect the milkfish industry of the Philippines. These are: (1) destructive typhoons, (2) water pollution, (3) fry shortage, and (4) high mortality rates of fry in transport and storage.

Cage farming of prawn

Experiments on the cage culture of the jumbo tiger shrimp *P. monodon* in Lake Laguna have had very encouraging results. Shrimp postlarvae were acclimated in freshwater and reared to marketable-size (40 g) in net cages after five months. Pilot-testing of the technology is being considered. •



At the Binangonan freshwater research station of the SEAFDEC Aquaculture Department research on tilapia breeding and culture has expanded to include technology tests in fish farmers' plots. Shown here are the tilapia fry modules inside the wet laboratory of the station, the fry, and a composite harvest of tilapia and milkfish grown together in a trial cage. Also shown is the station workshop where the station's craftsmen build some laboratory facilities like this fiberglass algal culture tank.



NEW PUBLICATIONS OF AQUACULTURE DEPARTMENT

A new pictorial handbook, *Field Guide for the Edible Crustacea of the Philippines*, is now available at the SEAFDEC Aquaculture Department. Written by Mr. Hiroshi Motoh, leader of the ecology project of the Aquaculture Department, with the supervision of Dr. Katsuzo Kuronuma, President Emeritus of Tokyo University of Fisheries, this handbook describes 37 species of common edible crustacea, belonging to the order Decapoda, which are found in the Philippines. Fourteen of the species are commonly known as prawn or shrimps, 8 are lobsters or crayfish and 15 are crabs. A color plate of each species accompanies biological, ecological, taxonomic and economic description.

Each species presented is discussed under six major topics: *Name* (the scientific, English, and Philippine names are given); *Diagnostic Characters* by which the species is identified; *Ecology* referring to the habitat, behavior, etc. of each species; *Geographical Distribution* of species; its *Fisheries* which includes fishing gear used to catch it and known fishing grounds; and the *Economic Potential* of the species.

An immediate practical use of the handbook is to point out the aquaculture value of the species and their requirements for culture or eventual culture. Besides aquaculturists, it will also benefit nature lovers, students, and amateur scientists to read the handbook; the classification scheme by which the species were arranged is provided in a systematic list.

While the title suggests that the species dealt with are commonly found in the Philippines, most are also found in Hawaii, Japan, Taiwan and Southeast Asia, westward to the Arabian Gulf, Red Sea and on to the East Coast of Africa. The area covered is commonly known as Indo-Pacific Region or Indo-West Pacific Region in zoogeography.

Printed in Japan, it consists of 96 pages and 37 color plates. Price including postpacking: US$10 or P75 Philippines. Write to the Communications Publications Unit, SEAFDEC Aquaculture Department, P.O. Box 256, Iloilo City, Philippines.

THIRD APDEM COURSE SLATED

The 3rd offering of the ASIAN AQUACULTURE PROJECT DEVELOPMENT AND MANAGEMENT seminar-workshop (APDEM II) has been scheduled for Nov. 19 to Dec. 10, 1980. It will be held at the main SEAFDEC Aquaculture Department station in Tigbauan, Iloilo, Philippines. Seminar venue is in Panay Island where the most productive and some of the more progressive aquaculture operations (pond culture of prawns and milkfish, prawn hatcheries, integrated fish-livestock-crop farms) are found.

In two previous offerings, 89 participants were successfully graduated; more than half of them are private fishfarm operators, fishfarm managers, and aquaculture entrepreneurs.

APDEM integrates the technical and economic aspects with the management requisites of an aquaculture project. It is designed to provide executives and key staff members in aquabusiness companies, the financial community and other aquaculture-oriented institutions the management concepts and tools to increase their effectiveness in identifying, developing, implementing and evaluating projects in the aquabusiness sector.

For reservations, contact:

1. SEAFDEC Makati External Affairs Office
   4th Flr, Kalayaan Bldg.
   Salcedo and dela Rosa Sts., Makati, Metro Manila
2. Dr. Joseph C. Madamba
   P.O. Box 256, Iloilo City, Philippines
3. Prof. Edward Tayengco
   SEARCA, Los Banos, Laguna, Philippines

Reservations should be received 15 days, at the latest, before seminar opens. You may reserve in writing or through cable or telegram. Seminar fee is ₱3,750 (foreign participants, US $500). A reservation fee of ₱375 or US $50 should be remitted. This fee is non-refundable but will be deducted from the basic seminar fee. Acceptance is on a first-come first-served basis.

FISHING GEAR FOR PRAWN AND SHRIMP

The Technical Report No. 5 on the "Fishing gear for prawn and shrimp used in the Philippines today " by Hiroshi Motoh is now available at the Communications/Publications Office, SIA.

The report describes the different gears used for collecting penaeids which have been traditionally used in the Philippines. Twenty gears are presently found throughout the Philippines: nine for collecting sugpo fry and 13 for capturing adult prawns. Thirty six figures are included in this report. The illustrations were done by Mr. Panfilo Legazpi, Jr., scientific illustrator at SIA, based on colored photographs and actual observations.

ASIAN AQUACULTURE is published monthly by the SEAFDEC Institute of Aquaculture, Aquaculture Department

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(Entered as second class mail matter at the Iloilo City Post Office on August 28, 1978.)