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SENIOR ASIAN AQUACULTURISTS TRAINING READIED

Plans for the training of senior level aquaculturists from the Asian region at the SEAFDEC Aquaculture Department are going through the final stages. The UNDP/FAO-hired senior aquaculturist, Dr. Chua Thia Eng, a scientist from Universiti Sains Malaysia, has set up office at the Department. Dr. Chua will be in charge of the training program and responsible for the planning and execution of theoretical and practical training of the candidates. Widely known in scientific circles for his International Foundation of Science-assisted pioneering studies on fish cage culture, Dr. Chua is on secondment from the Government of Malaysia.

Lead Centers

This training program, a one-year curriculum that will accommodate 25 participants per batch, is actually one of two functions that had been charged on the SEAFDEC Aquaculture Department in its role as one of three lead centers in the regional network of aquaculture centers in Asia. The regional network is being established within the framework of TCDC (Technical Cooperation Among Developing Countries). It is going to be part of the global network of aquaculture centers coordinated through the Aquaculture Development Coordinating Programme (ADCP), headed by Dr. T.V.R. Pillay, of UNDP/FAO.

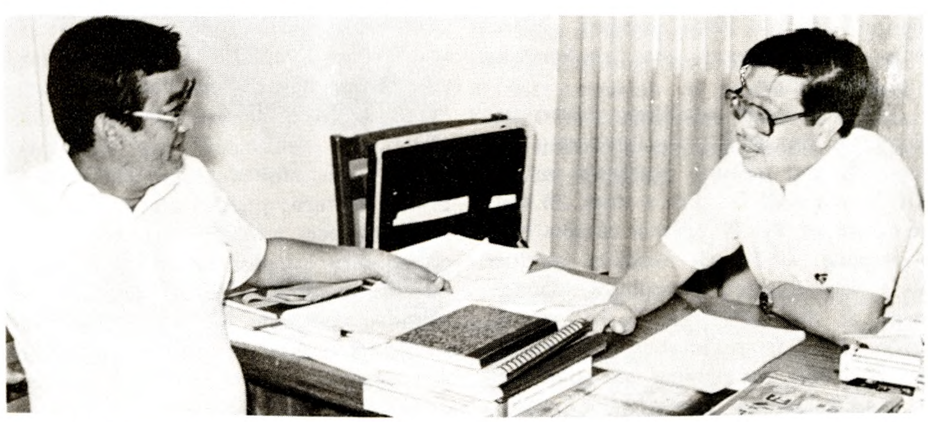
As lead center in the Philippines, the Aquaculture Department, on top of organizing this training for senior level aquaculturists, will be conducting research focused on brackishwater pond production of milkfish, mullets and shrimps, three commodities that had been identified by the country for priority production in its ten-year aquaculture development plan.

The two other lead centers are the Central Inland Fisheries Research Institute (CIFRI) in India and the Bankhen Fish Culture Station of the Directorate of Fisheries in Thailand. CIFRI will undertake the collection, storage and dissemination of information for the benefit of the region and conduct research on (a) mono- and polyculture of Indian, Chinese and common carp in ponds, (b) culture systems in undrainable freshwater ponds, and (c) extensive culture of carps in reservoirs. The lead center in Thailand will study (a) pond culture of freshwater prawn, (b) pond culture of *Clarias,* (c) integrated crop-livestock-fish production, (d) cage culture of catfish or *Pangasius,* (e) pond culture of *Puntius* and *Ophiocephalus,* (f) pond culture of eels, and (g) oyster and mussel culture in estuaries and offshore open waters.

Training at AQD

Practical work will be the emphasis of the training in the Philippines. Candidates will have university level education. They will be sponsored by the participating governments. Instructions will cover all aspects of aquaculture science

(Continued on page 6)



Dr. Chua Thia Eng (right) discusses with physical plant superintendent Engr. Orlando K. Yu the possibility of developing models of engineering structures such as ponds, pens and cages that might be needed by the UNDP/FAO-SEAFDEC training program for senior level aquaculturists. Dr. Chua himself is an expert on floating cage culture of fish.

$ 38-M WB LOAN TO DEVELOP RP'S FISHERY TRAINING SYSTEM

The Philippine national fishery training system will soon be established through a US$38-million World Bank loan. This was reported by Dr. Arsenio Camacho, director of the University of the Philippines Visayas College of Fisheries Brackishwater Aquaculture Center (UPVCF-BAC) in Leganes, Iloilo, site of a series of training programs on brackishwater aquaculture management for key personnel who shall man the various fishery training centers.

Seven fishery schools will be developed as regional fishery training centers, namely: Cagayan State University College of Fisheries in Aparri, Cagayan; Palawan State Agricultural College School of Fisheries in Puerto Princesa, Palawan; Bicol University College of Fisheries in Tabaco, Albay; Quirino School of Fisheries in Cebu; Davao del Norte School of Fisheries in Panabo, Davao del Norte; Mindanao Regional School of Fisheries in Zamboanga City; and Samar Regional Fisheries Technician School in Catbalogan, Samar.

In each of these schools will be established a Regional Institute of Fishery Technology (RIFT) and a Regional Center for Fishermen Training (RCFT). The RIFTs will offer a 3-year post-secondary program leading to a diploma in marine fishery, inland fishery or fish processing technology. On the other hand, the RCFTs will conduct training courses for small-scale fishermen in marine fishery (fish capture), inland fishery (fish harvest), and fish handling and preservation.

The core staff of these centers are going to be trained in preparing the curricula and training programs for the RIFTs and RCFTs. For a start, 25 staff members of the 7 regional centers have undergone a 7-week training seminar on brackishwater aquaculture management at the UPVCF-BAC in Leganes, Iloilo. Held from October 1 to November 19, 1980, the seminar was sponsored by the Educational Development Program Implementing Task Force (EDPITAF) and the UPVCF-BAC. Lecturers came from the UPVCF and the SEAFDEC Aquaculture Department.

As the lead institution in upgrading the fisheries manpower in the Philippines, UPVCF will get about US$17.6 million of the World Bank loan to finance the construction of its buildings and facilities in its new site at Miag-ao, Iloilo.

Among the topics included in the training course are group dynamics; pond design, construction and general operations; acid sulfate soils; pond fertilization; recent innovations in aquaculture; artificial feeds and feeding; fry collection, holding and transport; nursery pond operation; fry production, rearing and feeding (tilapia); crab culture; mussel and oyster culture; engineering aspects of aquaculture; improving fish production rates especially for freshwater fishes; larval fish biology and culture; prawn culture; pond water-soil quality and biological productivity; natural food community; introduction to fish hatchery management; broodstock development; artificial spawning of finfishes; demonstration and exercise on surveying, layout and mapping; and laboratory exercises on water and soil quality.

The 25 participants in the first course were: Ruben Rabe of the Bureau of Fisheries and Aquatic Resources (BFAR) station in Iloilo City; Warlito Besana, BFAR, Capiz; Servando Rasalan, BFAR, Zamboanga; Alberto Molina, BFAR, Pagadian City; Violeta Talavera, Davao RIFT; Marcelo Pidlaoan, Aparri Institute of Technology (AIT); Federico Rioablanca, AIT; Expedito Ramos, Mindanao Regional School of Fisheries (MRSF), Zamboanga City; Mariano Machate, BFAR, Catbalogan, Samar; Armando de Lima, Bicol University College of Fisheries (BUCF); Julieto Legados, Quirino School of Fisheries, (QSF), Cebu; Godofredo Gil, Jr., PDFFN, Catanduanes; Jonathan Floro, Davao RIFT; Nilda Combras, Samar RIFT; Alejandro Cenal, BFAR, Cebu City; Nemesia Cabaron, Davao RIFT; Francisco Buensalida, BUCF; Servando Bernante, QSF; Emiliano Baoilan, BFAR, Davao; Judito Baidiango, BFAR, Davao; Lolito Amparado, Samar RIFT; William Asuncion, MRSF; Ador Amascual, BFAR, Tacloban City; Salvador Rangel, BFAR, Isabela; and Bautista Bayotas, BFAR, Cagayan.

Personnel who shall be assigned in the area of freshwater aquaculture will be trained at the Freshwater Aquaculture Center (FAC) of the Central Luzon State University in Munoz, Nueva Ecija. Others may be trained at the Mindanao State University in Marawi City.

REQUIREMENTS FOR THE DESIGN LAYOUT AND CONSTRUCTION OF A PRAWN HATCHERY

(FINAL INSTALLMENT)

Site Selection

Water Quality. Prawn larvae need a marine environment to develop and survive. Water salinity is therefore an important consideration. The less the seasonal fluctuation in water quality the more desirable is the area. As mentioned earlier the salinity should be mostly if not always above 28 parts per thousand. The area should be free from agricultural and industrial pollution. Turbidity should be at a minimum.

Spawner Source. Gravid prawns are the main raw materials of a prawn hatchery. The closer the spawner source the less would the problem be in terms of acquisition and transport. Furthermore the abundance of prawn spawners and fry within the site is in itself an indicator that the area is a natural spawning ground and therefore the water must be suitable for prawn larval development.

Accessibility. Like all other enterprises, whether agricultural or industrial, the ease in bringing the product to the point of use — in this case postlarvae to the fishponds — is a plus factor.

Electric Power. A continuous supply of energy is necessary to keep the life support system running. It is cumbersome to operate your own power station. If electrical power supply is available the hatchery would need only a stand-by generator for emergencies.

Freshwater Supply. While the need for freshwater in the culture work itself is minimal, a reliable supply is necessary for various activities and the needs of the hatchery staff.

Specification for Design and Construction

Layout. There are two basic points to consider in laying out the hatchery. The first is convenience and economy of effort. The layout should be such that footwork for the technicians would be at a minimum and transfer of materials from one area to another simplified. The flow of materials in the hatchery is shown in Figure 1. The second point to consider is the technical requirement. A basic requirement is sunlight for algal culture. The site of the algal tanks should always be exposed to sunlight not shaded by trees or buildings. An east to west orientation of the long axis of the rectangular algal tanks would result in an even distribution of sunlight on the tank surface even in early morning or late afternoon. The algal tanks need to be as free from contamination as possible. One source of contamination are the Chlorella-Brachionus tanks. To minimize such occurence, the algal tanks should be situated upwind from the Brachionus-Chlorella tanks.

Design. The basic considerations in hatchery design are water circulation in the tanks, water management, sanitation, temperature stability, ease in maintenance and personnel safety. Proper circulation of the water is essential to prevent the settlement of organic particles on the tank bottom. Should such particles, consisting of food organisms, dead larvae, feces, etc., accumulate, anaerobic decomposition takes place. Ammonia, hydrogen sulfide, and other harmful gases are produced. A circular tank allows for a better circulation than a square tank which could have dead spots in the corners. Air lift pipes are more efficient than aeration in stirring the water from top to bottom.

Water quality is managed by changing the water as often as necessary. This is done by partial draining of the old culture water by means of siphoning it through a screened hose. Provisions should be made so that the water can be drained without splashing it all over the hatchery. Sanitation is important both inside and outside the tanks. Temperature stability is desirable in larval culture. Small plastic tanks with thin walls are more subject to temperature fluctuation than large, concrete tanks. Keeping the hatchery area free from draft, having it insulated, or putting up a double wall with provision for a water batch capability would help minimize temperature fluctuation.

Under normal usage, cracking of air and water pipes especially along joints may be expected. Cracks will be easy to detect and fix if pipes are laid above ground. Aesthetics takes a backseat in hatchery design.

Since qualified hatchery workers are the most valuable resource, considerations for their safety and well-being should be foremost in designing the hatchery. In designing large concrete tanks, the service catwalks should not be set at the level of the tank rim. It would be safer and actually more convenient for the technicians to set catwalks at a

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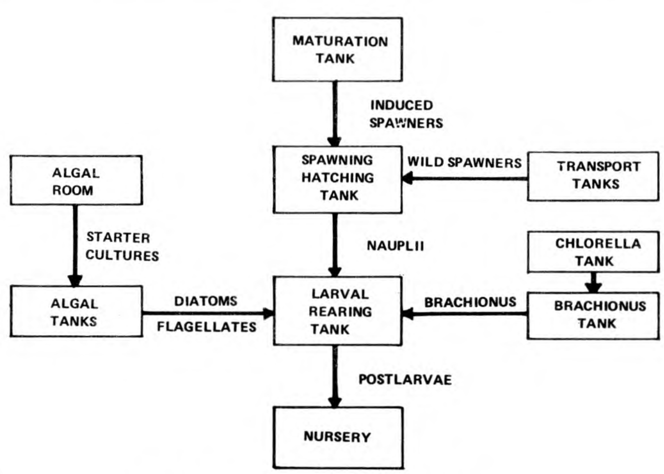

Fig. 1. Flow of materials in a prawn hatchery.

*Wilfredo G. Yap from the Paper discussed at the second offering of Aquaculture Business Project Development and Management (APDEM II), July 28 to Aug. 16, 1980.

POND CULTURE OF NILE TILAPIA

The Nile tilapia was introduced in the Philippines from Israel in 1973. From its original home in the Middle East and Africa, the fish has been distributed throughout the warmwaters of the world. This tilapia can easily be distinguished from the more common Java tilapia (also an introduced fish) by its lighter color, bigger size and the presence of distinct bands in the top and tail fins. Studies have shown that the Nile tilapia grows faster than the Java tilapia and is more profitable to culture.

Source of Fingerlings

The Nile tilapia breeds in ponds throughout the year. Fingerlings may be obtained from government or private hatcheries. Depending on size, the cost of fingerlings ranges from ten to twenty centavos each. To ensure high yields the stocks should be as pure as possible.

Pond Preparation

Prior to the stocking of fingerlings the pond is thoroughly drained, cleared of obstructions, weeds and wild fishes that may be present. The pond bottom is allowed to dry up until it cracks before refilling the pond with fresh, clean water.

If organic fertilizer such as dried chicken manure is to be applied, it should be spread on the bottom with a water depth of 20 to 40 centimeters. Application rate is 500 to 1,000 kilograms per hectare.

With an inorganic fertilizer like ammonium phosphate (16-20-0), water level is initially set at 60 centimeters. The fertilizer is placed on a fertilizer platform raised about 40 centimeters from the pond bottom and applied at the rate of 1 bag (50 kg) per hectare. Water level is increased to 80 centimeters after the first week.

The pond is ready for stocking two weeks after fertilization.

Stocking of Fingerlings

Vigorous and disease-free fingerlings weighing 5 to 10 grams each are suitable for stocking. The fingerlings may be procured from a reliable source or produced by the culturist himself. The larger the fingerlings, the faster the growth and the earlier the harvest.

Only properly acclimated and conditioned fish should be stocked. Fingerlings coming from a hatchery are first acclimated in a tank or suspended net enclosure *(bitinan)* with adequate aeration overnight. Weakened or diseased fish are eliminated.

For plankton ponds, the stocking density may range from 10,000 to 20,000 fingerlings per hectare.

The best time to stock fish is during the early morning or late afternoon.

Pond Care and Maintenance

Daily care and maintenance of the Nile tilapia pond until harvest are minimal. The following maintenance procedures are observed:

Maintain water depth of the pond at 80 to 100 cm. Fish need space for growth. Production of fish food organisms in the water, known as plankton, is also enhanced if water volume is sufficient.

Apply Fertilizers Regularly. The regular application of fertilizers is necessary to maintain the production of fish food organisms. Application of ammonium phosphate fertilizer at the rate of 50 kilos per hectare every two weeks using platforms or dried chicken manure at 500 kilos per hectare every two weeks applied in piles along the periphery of the pond, is done until two weeks before harvest.

Prevent Entry of Predators. Heavy loss of fingerlings in ponds can be caused by predators like mudfish, ten-pounder and tarpon. Proper pond preparation includes elimination of such pests.

Fish predators may enter through the water supply. This can be prevented by installing a nylon or metal screen in the water inlet.

Eliminate Aquatic Weeds. Aquatic weeds compete with phytoplankton (microscopic plant organisms in the water) for nutrients derived from fertilizers. Some forms of aquatic weeds cover the water surface and limit plankton growth. A weedy pond also makes fish harvesting difficult.

Common aquatic weeds in freshwater ponds such as water spinach, water hyacinth and water foil are best removed manually in small ponds. Weeds in large ponds can be economically controlled by stocking weed-eating fishes like grass carp and Zill's tilapia.

Avoid Contamination of Pond Water with Pesticides. Agricultural pesticides are toxic to fish. Contamination of the pond is possible if irrigation water is used as the source and if run-off from adjacent croplands takes place. The tilapia farmer should be alert in detecting and preventing contamination of his pond.

Supplemental Feeding

Supplemental feeding of Nile tilapia may be needed during the second and/or third month of culture if plankton growth is sparse and growth of fish is slow. Fish growth can be checked by sampling the fish. A month after stocking, fish weight should have doubled with adequate food available. Supplemental feeds are also given for fattening fish prior to market.

The kind of supplemetal feed to be given will depend on what is locally available and economical. The common feeds are fine rice bran, copra meal,

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Paper presented by Dr. Rafael D. Guerrero III, Dean, College of Inland Fisheries, CLSU-FAC, at the second Aquabusiness Project Development and Management Workshop at U.P. Diliman, July 28 to Aug. 16, 1980.

corn bran and rice mill sweepings. Feeding is done twice a day, usually in the early morning and late afternoon. The rate of feeding is 2 percent of total fish weight per feeding.

For example, if there are 500 fish in the pond with an average weight of 30 grams, the total weight of the fish will be 15 kilos and the feed to be given per day will be 600 grams. Half of this amount of feed (300 grams) is given in the morning and the other half in the afternoon.

The feed is broadcast on the same part of the pond each day to train the fish. An active feeding response is a good indication of healthy fish.

Diseases and Parasites

The Nile tilapia is a hardy fish. It is tolerant of poor water quality conditions such as low oxygen supply and high temperature. Provided the fish are not stressed at stocking and proper management is applied, one can expect no serious disease and parasite problems in its culture.

Harvesting

Nile tilapia is harvested after 3 to 4 months from stocking in ponds when the fish attains a marketable size of 80 to 100 grams a piece. Harvest is preferably done at daybreak if fish are to be sold fresh in the morning.

In harvesting tilapia, the pond is drained to the half-level mark the night before. The larger fish are caught with a 1" mesh seine and placed in old oil drums, concrete tanks or large buckets filled with clean water to wash away the mud. The fish to be transported to market are placed in tubs (banyeras), weighed and iced, if market is hours away from the farm.

After most of the large fish are caught, the remaining ones in the pond will be fingerlings and a few large ones that escape the seine. The water level is farther lowered to facilitate the capture of these. A fine-meshed seine may be used to collect the fingerlings which are then transferred and kept alive in well-aerated tanks or in suspended net enclo-

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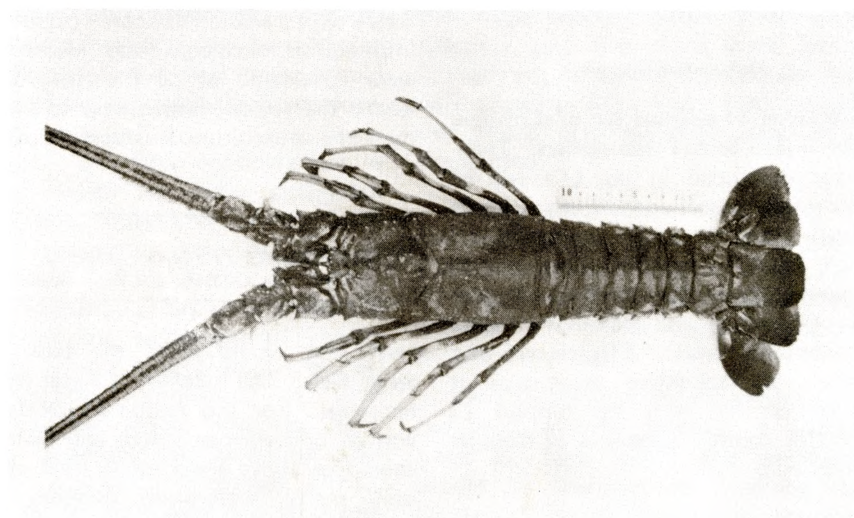
Edible Crustaceans in the Philippines*



24. *Linuparus trigonus* **(VON SIEBOLD)**

English name: Rock lobster (no other names known).

Philippine name: Uson (Ilongo).

The entire body, covered with granules and tubercles, reaches 40 cm in body length. The carapace, showing pentagonal shape in transverse section, is clearly divided into cephalic and thoracic parts by a V-shaped cervical suture. The eye with robust stalk is not protected by a supra-orbital spine, and the flagellum of the antennule is short; these two characteristics distinguish them from genus *Panulirus.*

Entire body color is brown.

This species inhabits the sandy and mud bottom from depths of 20 to 300 m. It is caught by commercial trawlers or gill nets.

It is found in the Indo-West Pacific region, from Hawaii through Japan and Philippines to the Indian Ocean.

It is rarely offered for sale in the market.

*By H. Motoh 24th in a series.

SENIOR ASIAN AQUACULTURISTS . . . *(from page 1)*

from selection of sites through design and construction of installations to harvesting and post-harvest operations. Trainees will participate in actual production programs to make them very proficient in aquaculture practices. For field work, they will make use of facilities in all three lead centers.

The proposed course work was recommended by an international team of aquaculture and fishery experts which convened in Sao Paolo the other year. It has been referred to prospective resource persons in various Philippine and Philippine-based institutions.

National Linkage

A number of selected national centers will be linked to the lead centers. Technologies developed in the LCs will be tested under local conditions by the national centers with assistance, if needed, from LC experts. Lead centers will cooperate in the planning and conduct of research and training activities on a national basis. Efforts will also be made to strengthen capabilities of national centers with the support of the UNDP country programs or through bilateral aids.

Objectives

The long-range objectives of this UNDP/FAO-initiated project (UNDP finances the project, FAO executes it) are to enable large-scale development of viable aquaculture by improving existing technologies and developing new techniques and practices in the region, and to develop technical expertise needed to implement production projects.

Background

This project is the offshoot of an ADCP-organized workshop in Bangkok in October 1975. Ten countries were represented: Bangladesh, Hongkong, India, Indonesia, Malaysia, Nepal, Philippines, Singapore, Sri Lanka and Thailand. The purpose of the meeting was to prepare national aquaculture development plans and identify the nature of external assistance the countries would need to implement the plans. The senior fisheries and planning officials who attended the workshop drafted ten-year development plans for their countries and set up production targets for the ten-year period. Incidentally, the goals amounted to an increased production of three million tons after ten years.

The workshop proposed that national assistance be lent for the identification, formulation and implementation of pilot or large-scale production through multidisciplinary teams of experts. As support services they recommended the training of senior aquaculturists and systems-oriented adaptive research on selected production systems on a regional basis. Research, training of core personnel, information exchange, and investment were considered to be the main areas where the region needed help to implement the aquaculture development plans.

Requirements . . . *(from page 3)*

level that would make the tank rim waist high. The hatchery is a wet working area. For this reason all electrical wirings, convenience outlets and switches should be above water splash level. And only safety, waterproof switches and covered outlets should be installed. All such fittings must be properly grounded.

Materials. The principal consideration in the selection of materials for tanks and pipes is of course corrosion. Seawater is highly corrosive. Unless proper materials are used the lifetime of tanks and pipes will be short and harmful substances may be released to the water to the detriment of the cultures. Non-metals such as concrete, wood, and plastics are generally corrosion resistant. Concrete is the ideal material for large tanks. Small tanks not intended to be permanently in place can be made of wood or fiberglass reinforced plastic. The latter is preferable since it is practically indestructible under normal usage although expensive and difficult to acquire. Wood is cheap but does not last long when properly coated with fiberglass resin or epoxy material. For all pipings, whether seawater, freshwater or drainage, PVC pipes are to be used. As much as possible all valves, air cocks and other fittings should also be made of plastic materials.

Corrosion and biological requirement of the culture should also be considered in the choice of materials in the various parts of the hatchery building. Exposed steel beams require regular maintenance in a salt-laden atmosphere. They are to be avoided in favor of wood or concrete. Proper sealing and water proofing prevents salt water from seeping through concrete to the steel reinforcement bars. Attacked by seawater steel expands as it rusts and can cause untold damage to the concrete structure. Translucent plastic roofing is preferable to other types of roofing; light is essential in growing unicellular algae.

Finishing. The main consideration in surface finishing of tanks is ease in cleaning. Tank bottoms and walls have to be very smooth. Tiles are not recommended because the grouting makes it hard to clean. Epoxy coatings provide seamless, smooth and inert surfaces which are easy to clean. Floorings of catwalks, service alleys and all parts where water cannot be avoided should have non-skid finish. •

Pond culture . . .
(from page 5)

sures installed in another pond. The fingerlings should not be overstocked in the holding units to prevent heavy mortality. These fingerlings may be sold or used for future stocking.

Large Nile tilapia can be kept alive indefinitely if placed in cages or net enclosures in a pond with clean water. In cases when the fish have an "earthy" smell or taste, holding them for about 2 days in a separate pond or tank with flowing water will improve their marketability.

Production of Nile tilapia varies with many factors such as type of culture, stocking density and management. In freshwater fishponds, yields of 4 to 6 tons per hectare per year are attainable.

Marketing

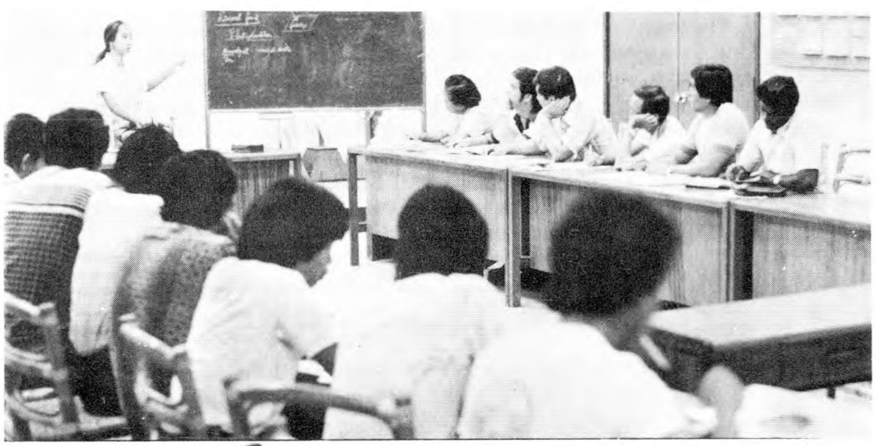
Large-sized Nile tilapia commands a price ranging from P8 to P12 a kilo in the local market. Although the supply at present is not even enough for the fresh fish market, tilapia can also be processed into dried, smoked, canned or fermented products. •

CHEAPER FIBERGLASS TANKS MADE IN SEAFDEC

The Aquaculture Department is making its own fiberglass raceway tanks. A special feature of this particular tank which is for the hatchery is a built-in stand. It measures 200 cm x 110 cm and is 60 cm deep with an inclination of 3/5 of an inch for easy draining. It has a 1.032 -ton capacity.

The Department's carpentry section of the Physical Plant Office is working on 11 similar tanks. Estimated cost of materials for one unit is ₱2,500 (US $1:₱7.5) with an almost lifetime service as compared to about P1,800 for a one ton marine plywood tank with a one-year life span. A JICA-donated fiberglass was purchased for ₱3,000 while the ordinary legless fiberglass tanks of about the same capacity cost ₱4,000 a piece.

Photo shows the AQD carpenters putting the finishing touches with Master carpenter Joe Pineda (second from left) supervising the work. They turned out the first fiberglass product, an algal tank, in 1978.



International and local trainees in the Prawn Hatchery Management Course (October 13—November 12) are all ears as Mrs. Elsie Tech lectures on natural food production.

Twenty nine participants from five countries — India, Malaysia, Thailand, Saudi Arabia and the Philippines have been graduated from the course designed for aquaculturists, farm managers, pond owners/operators and others interested in the operation of prawn hatcheries. Twelve were Malaysians, 3 Thais, 1 from India and 1 from Saudi Arabia and the rest were Filipinos.

Participants to the 4-month Aquaculture Research Methodology Course (April 7—August 7) pose for a souvenir shot. The trainees are (L-R): Dawee Chantarasri, Endi Setiadi, Niwat Sutemichikul, Jephrin Wong, Misri Samingin, Rosly Hassan, Opas Decharuk, Jaafar Bin Sani, Jose Manzano and Ali Awang.

FISH BY - CATCH

Every year as much as 21 million tons of edible marine fish may be thrown away at sea by shrimp trawlers — roughly the same amount as is eaten annually by the people of the developing countries. And most of the waste occurs off the coasts of those countries where food is in short supply.

In a world of increasing hunger, this practice of dumping what the trawlermen call "trash fish" is both unacceptable and unnecessary. This short film shows how one country — Guyana — set about changing this situation, and succeeded.

The film shows shrimp trawlers in operation off the Guyana coast handling both shrimp and fish, and a pilot processing plant in Georgetown built to handle the new fish by-catch. It illustrates the techniques that have been developed to process and preserve the fish, and the beginnings of a distribution system, and export business.

The message is very clear: if all developing countries followed Guyana's example the amount of protein they harvest from the seas might be doubled.

This film, Fish By-Catch, is in 16 mm colour and runs for 15 minutes. It is produced and directed by Neill McKee of the Communications Division, IDRC.

Purchases may be addressed to:
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Ottawa, Canada K1 Y 1x4

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Announcement:

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Special Issue
IFS Regional Meeting on Aquaculture
Universiti Sains Malaysia
Penang, Malaysia
September—October 1978

To help focus research attention on areas for progress and development it is important that there is an increase in the amount of technical information that is being transferred between developing, less developed and developed countries. To speed this process, Elsevier Scientific Publishing Company has cooperated with the International Foundation for Science (IFS) to devote this special issue of the scientific journal, *Aquaculture,* to the proceedings of the IFS sponsored Regional Meeting on Aquaculture, held at the Universiti Sains Malaysia, Penang, near the close of 1978.

Although the meeting was predominantly attended by the recipients of IFS grants who presented papers on their individual research projects, it also provided an international forum for the informal discussion of problems and constraints which plague aquaculture research in the region.

This special issue of *Aquaculture* makes the proceedings available to a wide and critical international audience. Although there have been many regional conferences on aquaculture, a common failing of each has been the limited distribution of proceedings. World advancement in aquaculture is an international priority, and it is necessary that the greatest exchange of scientific and technical research information is pursued at all times.

The thirteen papers included in the proceedings are: Aquaculture in Southeast Asia: some points of emphasis, M.N. Kutty (Tuticorin, India); Studies on the feeding of *Tilapia nilotica* in floating cages, R.D. Guerrero III (Nueva Ecija, Philippines); Control reproduction of *Tilapia nilotica* using cage culture, S.A. Rifai (Bandung, Indonesia); Economic Production of estuary grouper, *Epinephelus salmoides* maxwell reared in floating net cages, T.E. Chua and S.K. Teng (Penang, Malaysia); Some problems in the cage culture of marble goby *Oxyeleotris marmorata* Bleeker) *Abstract,* A.K. Jee (Selangor, Malaysia); Polyculture of milkfish *Chanos chanos* Forsskal), all-male Nile tilapia (*Tilapia nilotica*) and snakehead (*Ophicephalus striatus*) in freshwater ponds with supplemental feeding, E.M. Cruz and I.L. Laudencia (Nueva Ecija, Philippines); A comparative study on larviculture techniques for giant freshwater prawn, *Macrobrachium rosenbergii* (de Man), P. Menasveta and S. Piyatiratitivokul (Bangkok, Thailand); The Isosmotic concept in relation to the aquaculture of the giant prawn, *Macrobrachium rosenbergii,* T. Singh (Kuala Lumpur, Malaysia); Culture of giant freshwater prawn (*Macrobrachium rosenbergii*) in a small reservoir, D. Limpadanai (Bangkok, Thailand) and R. Tansakul (Haadyi, Thailand); Influence of temperature and salinity on survival of the freshwater mullet *Rhinomugil corsula* (Hamilton), M.N. Kutty, N. Sukumaran (Tuticorin, India) and H.M. Kassim (Cochin, India); Stimulation of ovarian maturation in fish by sustained hormone preparations, K.K. Huat (Penang, Malaysia); Some aspects of the biology of Malaysian riverine cyprinids, E.S.P. Tan (Penang, Malaysia); Experimental insight of trace metal environment pollution problems in mussel farming, P.M. Sivalingam and B. Bhaskaran (Pulau Pinang, Malaysia. *Write to:* **Elsevier Scientific Publishing Co., Jan van Galenstraat 335 P.O. Box 330, 1000 AH Amsterdam, Netherlands.**

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