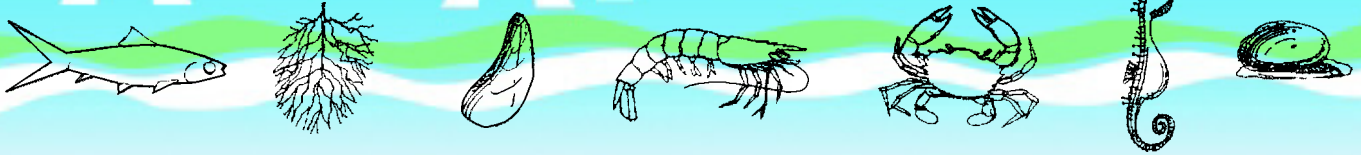


# SEAFDEC Asian Aquaculture



RESEARCH AND  
DEVELOPMENT



PRODUCTION



INFORMATION  
TECHNOLOGY



MANPOWER  
DEVELOPMENT



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The Southeast Asian Fisheries Development Center (**SEAFDEC**) is a regional treaty organization established in December 1967 for the purpose of promoting fisheries development in Southeast Asia. Its Member-Countries are Japan, Malaysia, the Philippines, Singapore, Thailand, Brunei Darussalam, the Socialist Republic of Viet Nam, Union of Myanmar, and Indonesia.

Four departments were established in the Member-Countries; one of them, the Aquaculture Department (**AQD**) located in the Philippines, pursues aquaculture research and development

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#### **Contributions**

We accept articles that focus on issues, developments, and information on all phases of sustainable aquaculture for publication in this newsletter. Photographs and line drawings must be camera-ready, glossy B&W prints or colored slides. The newsletter editor reserves the right to edit contributed articles for brevity and style.

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**Nota bene** Mention of trade names in this publication is not an endorsement.

### Israel: danger to its freshwater resources?

Israeli policy makers must implement a clear course of action that would balance the demand of local aquaculturists for new species with the need to protect the vulnerable freshwater ecosystem. This was the conclusion of a study made by researchers Daniel Golani of the Hebrew University of Jerusalem and Dan Mires of the Ministry of Agriculture, Israel.

Israel's aquaculturists demand the introduction of new fish species for two reasons, the researchers say. These are: (1) their conviction that diversification will lead to greater consumption and profits, with a marginal effect on other marketed species; and (2) their wish to increase the number of species available for breeding, thus limiting the risk that a species-specific pathogen will destroy their entire yield of fish.

The introductions — 40 species of fish since the '50s (?) — serve the needs of aquaculture since most of the local species are unsuitable for culture. The primary target is Lake Kinneret (also known as Lake Tiberias or Sea of Galilee) which is the country's largest and most suitable freshwater body.

Of the introduced species, five succeeded in establishing a flourishing population, namely: the mosquito fish *Gambusia affinis*, the common carp *Cyprinus carpio*, the rainbow trout *Oncorhynchus mykiss*, the swordtail *Xiphophorus hellerii*, and the sailfin molly *Poecilia velifera*.

A few studies, Golani and Mires say, claim that the mosquito fish competed with the indigenous *Aphanius mento* and had possibly displaced the latter in several localities. "But on the contrary, there is evidence that these two species co-exist and flourish in the same habitat. Also, *A. mento* has not become extinct in places where they were recorded in the early '40s."

The introductions of common carp, rainbow trout, swordtail and sailfin have not been found to cause detectable damage either.

Most of the introduced species have not established permanent populations. These are the species stocked each year in Lake Kinneret and those that are bred for aquaculture. The stocking policy in the lake has been alternately defended (as economically good with few ecological consequences) and attacked (as causing the decline of total catch). For the

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### AQD repackages its R&D program

The SEAFDEC Council, the center's policy-making body, has approved the proposal of the SEAFDEC Aquaculture Department (AQD) to implement five major programs beginning 2001 up to 2005. This restructuring of existing programs will give more focus and priority to aquaculture issues that are important to Southeast Asia, and enable a more holistic approach to R&D management.

The five AQD programs are: (I) broodstock management and seed improvement of cultured species; (II) responsible aquaculture management; (III) screening of new species for aquaculture; (IV) stock enhancement; and (V) special programs. Each of these programs will have research, technology verification-demonstration, training, and information dissemination components.

Program I is aimed at controlling the life cycle of culture species in captivity so the supply of seed stock for aquaculture can be assured, and the exploitation of wild stocks would ease. Program II integrates environmental responsibility to existing aquaculture practices so the industry would be more sustainable and not become a threat to the world's food sources. This program would include SEAFDEC's efforts to develop new, environment-friendly shrimp culture systems and to develop low-polluting feeds.

"AQD has been working on these areas for quite some time," AQD Chief Dr. Rolando Platon explains, "but we are not allowed to stop. Technologies have to be refined continuously, and the industry needs more innovative approaches to increasing aquaculture production and decreasing production cost. These innovative approaches include the application of biotechnology, particularly on growth acceleration, disease control, and environmental enhancement."

On the other hand, Program III and IV are relatively new priorities for AQD. Program III anticipates the industry's need for new culture species for possibly new areas (like open water aquaculture). Program IV is aimed at helping overexploited wild stocks recover.

Program V would mostly cover the collaborative projects with other institutions and agencies that do not fall under the first four programs.



AQD Chief Dr. Rolando Platon makes a point while Deputy Chief Susumu Ito, fish disease expert Dr. Yasuo Inui, consultant Mr. Fred Yap look on. This is during the departmental meeting held January 22-23 in Iloilo to discuss the new AQD programs

## Around the World ... continued

latter, the introduction of silver carp *Hypthalmichthys molitrix* was viewed by some as increasing the predatory pressure on zooplankton; with less zooplankton grazing on microalgae, the summer bloom is enhanced, degrading water quality during algal die-offs. Other researchers argue that the amount of silver carp is negligible in relation to total lake biomass and has no effect on zooplankton. The same case for the gray mullet has been raised and defended as without basis in fact.

Still, Golani and Mires say, it would be worthwhile to exercise great caution prior to the introduction of (more) exotic species. For though the natural freshwater environment has proven to be resilient to a great extent, the native species should continue to be preserved and protected. Rational management would temper the economic necessity of introducing exotic species. [REF: dgolani@cc.huji.ac.il; The Israeli Journal of Aquaculture – Bamidgah 52 (2) 2000: 47-60]

## A case for stewardship, not ownership, of the oceans

In this new century, a very large part of the resources, goods, and services will be ocean-dependent. So says economist Elisabeth Mann Borgese of Dalhousie University, Canada. Today, the total value of revenues generated by these goods and services is around eight trillion dollars per year. Sea-borne trade, tourism, offshore hydrocarbon extraction are three of the top earners.

Borgese says living resources presently account for less than \$200 billion per annum, but it is well-known that fisheries in most parts of the world are in dire straits. The only growth sectors are aquaculture (growing at 6-8% annually) and the so-called “genetic resources” (i.e., microorganisms which abound in the oceans and sea beds).

But aquaculture, she says, is beginning to cause serious problems of pollution of soils, ground waters and coastal seas as well as social problems in coastal communities. “There is obviously nothing wrong with aquaculture as such. Just as agriculture began to replace an economy based on hunting and gathering some 10,000 years ago, aquaculture might eventually replace the hunting and gathering in ocean space which technological development and industrialization have made unsustainable.”

“There is nothing wrong with aquaculture,” she repeats, “but there is something wrong with the economic system that is driving it. The ‘bottom line’ prin-



*Japanese study team with A/QD Deputy Chief Susumo Ito and RD head Dr. Clarissa Marte inspect the site of the Biotech Lab at SEAFDEC AQD, Tigbauan, Iloilo.*

## Biotech lab soon to be established at AQD

Negotiations are underway for the establishment of a biotech laboratory in Iloilo, Philippines. This would address the need for advanced aquaculture technologies in the region. The proponent and recipient of the Biotech Lab is the Department of Agriculture (DA) but the facility will be located at SEAFDEC/AQD which will host and operate it in collaboration with the Bureau of Fisheries and Aquatic Resources (BFAR).

Financial assistance amounting to US\$6 million is being requested from the Government of Japan for additional advanced equipment and machineries to supplement existing laboratory facilities at AQD. The Philippine government, the host country of AQD, will provide counterpart funds of US\$ 0.6 million for the improvement of the laboratories and the acquisition of experimental tank systems.

The biotech facility will have four laboratories for the following: (1) molecular endocrinology and genetics – for studies on growth enhancement, control of reproduction, developing strains with desirable traits like fast-growth and disease-resistance; (2) microbiology – for the development of fast, accurate, and sensitive methods of disease diagnosis; (3) feed technology – to look for cheap alternative protein sources as replacement for fish meal in artificial feeds, determine nutrient requirements for improved feed efficiency and growth performance and develop low polluting or “environment-friendly” feeds; (4) algal production technology – to develop improved strains of commercially important seaweeds like *Gracilaria* and *Kappaphycus* for increased production, isolate natural products from the seaweeds for industrial and pharmaceutical uses, and utilization of seaweeds for pollution control.

A series of meetings have been held between the representatives of the DA, SEAFDEC/AQD, BFAR and the Japanese Basic Design Team. And on February 5 this year, the Minutes of Discussion was signed by DA Undersecretary and SEAFDEC Council Director for the Philippines Mr. Cesar Drilon, AQD Chief Dr. Rolando Platon, BFAR Director Mr. Malcolm Sarmiento Jr and Japanese Team Leader Mr. Akira Nakamura. The signing was held in Iloilo City.

## Around the World ... continued

principle of maximizing short-term financial profits is obsolete. Instead, aquaculture should improve nutrition and enhance job creation in local communities. It should not ignore the social and environmental needs of contemporary society.”

What to do then? “First, we have to give value to the ‘ecosystem services’ of aquatic resources, or the value of the ocean as an essential component of the earth’s life-support system. Though hard to quantify and express in monetary terms, the oceans’ value has nonetheless been pegged at 21 to 30 trillion dollars.” Borgese says the figure is based on market prices, people’s estimated willingness to pay, and the cost of replacing such services.

In rethinking the value of the oceans, ownership rights have to be re-evaluated, too. This is because the ocean should, Borgese emphasizes, “benefit humanity as a whole, with particular consideration for the needs of the poor.” Presently, most countries in more advanced countries practice ITQs or the individual transferable quotas where fishers or fishing companies are allocated an amount of fish to be caught and which are considered their property. In developing countries, on the other hand, fish resources are “common” property though there had been successful efforts to implement the TURFs or territorial-use rights in fisheries where communities are “given” areas to manage and utilize responsibly.

“I do not suggest we abandon or abolish these systems,” Borgese says. “We should transcend them. The oceans should fall into non-ownership, whether ‘trusteeship’ or ‘stewardship’. The goal of economics is not the greatest good for the greatest number – which might leave 51% of the (world) population free to exploit the remaining 49! – but the welfare of all.” [REF: elisabeth.borgese@dal.ca; *Ocean and Coastal Management* 43 (2000): 763-779]

## China: mollusc aquaculture

China continues to have the world’s largest aquaculture industry, contributing 63% of the world total in 1995. Its mollusc sector in particular has been growing rapidly. “China produced 6.4 million tons in 1996,” notes researcher Ximing Guo of Rutgers University (US), “which is an eight-fold increase over that of 1985. There are at least 32 species of marine mollusks farmed commercially.”

China’s production include 2.3 million tons of oysters; 1.6 million tons of clams mostly *Ruditapes*, *Meretrix*, razor clams, and blood cockles; 1 million

## AQD officials visit Myanmar for the mangrove-friendly aquaculture project

Three SEAFDEC/AQD officials met with officers of the Myanmar Department of Fisheries in Yangon on February 20-23 to discuss establishing a mangrove-friendly aquaculture project in Myanmar.

The AQD officials were Deputy Chief Susumu Ito, Training and Information Division Head Mr. Pastor Torres Jr, and Technology Verification-Extension Section Head Mr. Dan Baliao. The Department of Fisheries representatives were led by Deputy Director General U Hla Win.

The Myanmar project has two components: (1) two-week training on responsible coastal aquaculture involving species which AQD has active R&D activities like tiger shrimp, mudcrab, grouper and seabass; and (2) pilot demonstration of a mangrove-friendly shrimp culture.

The Myanmar Department of Fisheries proposed to execute the project soonest, but, it was agreed to start the project after the rainy season. Both training and demonstration components will be implemented late this year, with the latter to run for three years, or up to 2003. Budget support for the project will come from the Japanese Trust Fund. The Myanmar government also committed to provide counterpart funds for both project components.

The Myanmar project is part of a region-wide program on



(Left to right) Mr. U Hla Win, Mr. Dan Baliao, Mr. U Than Tun, Mr. Susumu Ito and Engr. Pastor Torres. Mr. U Than Tun is Director General of the Department of Fisheries and SEAFDEC Council Director for Myanmar

mangrove-friendly aquaculture being implemented by SEAFDEC. It is a reaction to the concern raised by shrimp producing countries, and especially SEAFDEC member-countries, against the destruction of mangrove forests to give way to shrimp farms and its consequent impact on the international trade of farmed shrimps. Similar projects are already underway in the Philippines, Thailand, and Vietnam.

This regional project intends to: (1) disseminate environment-friendly shrimp culture technology in SEA through demonstration and training; (2) prepare position papers to advocate for policies that could promote the adoption of environment-friendly shrimp culture technologies; and (3) launch a multi-media information campaign about the technology.

The multi-media information campaign will be done through scientific publications; technical reports; state-of-the-art technologies compilation; manuals which will be translated in Malay, Thai, Vietnamese, Filipino and Burmese; video documentation; the Internet website; and on-site and AQD-based training programs.

The regional project will hold a mid-Project workshop in Bangkok in October 2001 to evaluate the progress of project sites in participating countries.

## Around the World ... continued

tons of scallops, 0.4 million tons of mussels, 700 tons of abalone, and 20 tons of marine pearls.

Shandong province is the largest producer followed by Guangdong, Fujian, Liaoning, Guangxi and Zhejiang.

The above figures were collected by Guo and colleagues, including Fusui Zhang of the Chinese Academy of Sciences, during a 1996-1997 industry survey which augmented official government statistics.

“We have found a general pattern or characteristic of the industry,” says Guo. “The northern provinces like Shandong and Liaoning produce scallops, abalone and Manila clams; while southern provinces like Fujian, Guangdong, and Guangxi produce oysters and pearl oysters. The middle provinces like Zhejiang and Jiangsu produce various clam species.”

China’s production technology ranges from simple gathering and stocking of wild seeds for several clam species to sophisticated hatchery and grow-out operations for abalone and pearl oysters. Polyculture of molluscs, shrimp and/or fish in ponds is widely practiced.

However, there has been a steep price for the industry’s rapid development. “The most pressing problem is the deterioration of culture environment. The carrying capacity of the coastal water may have been exceeded in many areas,” Guo said. “Longlines and rafts often cover much of a bay. Overcrowding and poor water quality, coupled with high water temperature, are believed to be the leading causes for the massive scallop mortalities in 1997 to 1998. Scallops are often cultured at excessive densities in cages in bays. Excessive feeding of shrimp and abalone has led to accumulations of tremendous waste. Red tides have become more frequent along China’s coasts. Abalone culture has been seriously affected by diseases.”

“What we need are new management strategies to maintain yields while minimizing conditions that degrade the environment, cause disease or both,” Guo elaborated. “Future growth of China’s molluscan aquaculture industry may largely depend upon technological advances that would make the industry more efficient and environment-friendly, instead of crude expansion in scale.” [REF: xguo@hsrl.rutgers.edu; *Journal of Shellfish Research* 18 (1999): 19-31]

-- EXCERPTED BY MT CASTAÑOS

## Another go at intensive shrimp culture

SEAFDEC/AQD is running another trial of the environment-friendly tiger shrimp culture system developed last year. Shrimp fry have been stocked on February 20 at the demonstration ponds in AQD’s Dumangas Brackishwater Station in Iloilo. Stocking density is 40 pieces shrimp per m<sup>2</sup>, considered an intensive level. Two ponds are being used in the new trial.

The innovations for this newly developed culture system – called closed-recirculating system – include the use of baffles and a filter box in the treatment canal. The baffles are a series of nets installed in the treatment canal intended to reduce the flow of the water for the sludge to settle. The water then passes through the filter box before it is finally pumped into the grow-out pond. The treatment canal is stocked with oysters / mussels and seaweeds.

The positioning of substrates in the grow-out ponds is also modified; one type is directed towards the drain system of the pond, the other is circular and goes with the shape of the central sludge collector.

A pond water reservoir serves as water source. It is stocked with fishes and equipped with long-arm paddle wheel aerators to facilitate reduction of organic load, a potential breeding ground for disease-causing bacteria.

The trial run is under the auspices of the AQD-BFAR Joint Mission and partially funded by the Japanese Trust Fund.



*Stocking the shrimp ponds at AQD’s Dumangas Brackishwater Station in Iloilo, Philippines*

## AQD explores distance learning, internet-based training

The learning environment has been much enhanced with the advent of computers and the internet. To take advantage of this new medium, SEAFDEC/AQD has taken steps towards the development of internet-based aquaculture training courses.

Mr. Pastor Torres Jr., head of AQD’s Training and Information Division, led his staff in meeting with distance learning course developers from the University of the Philippines – Open University (UPOU) to discuss a collaboration. They met with Dr. Josefina Natividad, Vice-Chancellor for Academic Affairs; Dr. Sheila Bonito, Registrar; Dr. Maria Lorenda Suplido, Online Teaching Lab In-charge; and Prof. Patricia Arinto, Director for Academic Support and Services. The meeting, which was held March 15-16 at AQD’s Tigbauan Main Station in Iloilo, also enabled the UPOU officials to see and familiarize themselves with AQD activities.

“Internet-based training is a low-cost mass delivery system for learning aquaculture technologies,” Mr. Torres said. “AQD’s training modules have been tested over the years, and we only need the UPOU to teach us how to conduct these online. For their part, UPOU expands their offering to cover aquaculture.”

Plans are underway to hold a workshop to be conducted by UPOU instructional designers for AQD researcher-authors early this April. Two aquaculture courses would probably be put online first — Fish health management and Management of sustainable aquafarming systems.



### Shrimp state-of-the-art technologies documented

Two publications on the giant tiger shrimp have recently been released. This state-of-the-art series is published by

SEAFDEC and ASEAN as part of the project on the development of mangrove-friendly shrimp culture technology that is partly funded by the Government of Japan. Both publications carry a joint message by the Secretaries-General of SEAFDEC and ASEAN.

On this collaboration, Mr. Panu Tavarutmaneegul of SEAFDEC and Mr. Rodolfo Severino Jr. of ASEAN wrote: “On March 4, 1999, the first meeting of the ASEAN-SEAFDEC Fisheries Consultative Group (FCG) was held in Bangkok. During that meeting, it was agreed that the promotion of mangrove-friendly aquaculture in Southeast Asian countries be placed under the FCG collaborative mechanism as one of three initial programs with financial assistance from the government of Japan.

“It is with great pleasure that we now present the fruits of our labor. We hope that the result of this effort will guide shrimp producers throughout the ASEAN region in producing shrimps sustainably...”

The new publications are titled (1) Closed-recirculating shrimp farming system, 27 pages, written by Siri Tookwinas, Director of the Marine Shrimp Research and Development Institute, Department of Fisheries – Thailand; and (2) Environment-friendly schemes in intensive shrimp farming, 25 pages, by Dan Baliao, Head of SEAFDEC/AQD’s technology verification efforts.

Copies of these publications are available at SEAFDEC Aquaculture Department: fax (63-33) 336 2891, 336 1008; sales@aqd.seafdec.org.ph; or visit us at www.seafdec.org.ph/

### AQD welcomes Japanese experts



**Dr. Yuzuru Mizukami**, 56, is a seaweed biotechnology expert who will work with AQD seaweed researchers Dr. Anicia Hurtado and Ms. Ma. Rovilla Luhan. Dr. Mizukami’s three-month term started February 27.

Dr. Mizukami is presently a professor at the Department of Applied Aquabiology at the National Fisheries University in Japan. Prior to that, he worked with Seikai National Fisheries Institute, Meijiiseika Co Ltd, Cancer Institute of Japanese Foundation, and the Japanese Society of Science Promotion in various capacity. Dr. Mizukami earned his PhD, master’s and bachelor’s degrees at Hokkaido University, Japan.



**Dr. Takaji Iida**, 46, is a fish pathology expert (fish immunology) who will work on immune response and protective immunity in marine fish. He will work with AQD fish health researcher Dr. Eduardo Leano. His tour-of-duty started February 26 and will end on July 6.

Dr. Iida is presently a professor at the Faculty of Agriculture at Miyazaki University. He was previously an Assistant Professor at the University of Tokyo. Dr. Iida earned his BS, master’s and PhD degrees from the University of Tokyo.



**Mr. Yukio Maeno**, 41, is an expert in fish physiology and pathology who will work on the project “Systems for sustainable production of aquatic animals in brackishwater.” He will work with AQD fish health researchers Dr. Erlinda Lacierda and Dr. Leobert de la Pena. Mr. Maeno’s two-year assignment started November 1, 2000.

Before his AQD assignment, Mr. Maeno worked at the Fisheries Division of the Japan International Center for Agricultural Sciences (JIRCAS) in Tsukuba, Japan.

He earned both his BS and master’s degrees in fisheries from Hokkaido University.

[www.seafdec.org.ph](http://www.seafdec.org.ph)



**LGU-NGO-SEAFDEC Collaboration:** San Remegio Mayor Norma Cabigunda, Cong. Exequiel Javier, Usec. Sally Zaldivar-Perez and Mr. Dan Baliao sign the agreement to collaborate

## SEAFDEC/AQD takes on more collaborative projects

Two heads are always better than one, and this applies to aquaculture projects as well. AQD has thus worked out collaborative projects with its host government, the Philippines, to bring aquaculture to poor areas in the country.

Recently, AQD, the provincial government of Antique and the Antique Development Foundation drew up plans for breeding and raising tilapia in the town of San Remegio. Antique is a mountainous area blessed with abundant freshwater in west central Philippines.

The tilapia strain being used is the one developed by AQD researchers in AQD's Binangonan Freshwater Station. This strain is fast-growing and hardy.

When the tilapia project was launched on February 10, AQD conducted a 2-day skills development session which was attended by 48 people. Antique Governor Exequiel Javier lauded SEAFDEC for its technical assistance. "Soon, mountain farmers can have a taste of fresh fish and immediate supply of protein," he said.

Meanwhile, AQD, the Philippine Business for Social Progress (PBSP), and the Bureau of Fisheries and Aquatic Resources renewed its agreement on March 5. The livelihood program lined up includes cage culture of grouper along Maqueda Bay, Catbalogan, Samar (east central Philippines), and mudcrab culture in mangroves. There is also a plan for a multi-species hatchery in Catbalogan. AQD has previously assisted PBSP after the first agreement forged in April 1999.

To date, the project has stocked about 1,000 crablets in a 1,000 m<sup>2</sup> enclosed mangrove area.

## A follow-up to the mollusc issue

The live shrimp feed, *agiis* clam was referred to as "no scientific name" in the *SEAFDEC Asian Aquaculture* 12:4, July-August 2000 issue. It should have been referred to as "no species name" as it has already been identified as belonging to the genus *Donax*.

Description of a shell that is *Donax* sp. and which resembles "agiis" in appearance except for size goes thus: moderately inflated, triangular-elongate, rounded umbones. The shell has fine radial lines on the surface. Inside edges are closely serrated. Colors include orange, brown, yellow, violet and white, often rayed. Habitat: shallow water in sand.

If *agiis* is ocularly inspected, the above description comes close. It is hoped that this follow-up would clarify confusions caused by the unqualified statement. -- MBS

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## We've got mail!

I would like to share my thoughts on the article *Milkfish fry shortage may not be a problem for long* (SAA June 1999; p 15).

The participants failed to recommend the most natural and logical thing to do about *bangus* fry shortages: that is to increase the natural *sabalo* stocks. This would in turn increase fry production, assuming our coastal waters will not get polluted further.

If a program is placed on increasing the natural *sabalo* stocks, an increase in the wild fry production would mean success of the program.

By the way, is there an assessment by SEAFDEC or anybody on how many *sabalo* stocks the Philippines has? I do not think there is.

Jose P. Peralta, PhD  
 Professor/Food Engineer  
 University of the Philippines-Visayas  
 5023 Miag-ao, Iloilo, Philippines





## AQD Research Publications

Reprints of papers listed here may be requested directly from AQD authors or from the AQD Library

Compiled by the AQD LIBRARY <library@aqd.seafdec.org.ph>

**Caberoy NB, Quintio GF.** 2000. Changes in Na<sup>+</sup>, K<sup>+</sup>, ATPase activity and gill chloride cell morphology in the grouper *Epinephelus coioides* larvae and juveniles in response to salinity and temperature. *Fish Physiology & Biochemistry* 23 (1): 83-94

*Abstract.* The activity of the enzyme Na<sup>+</sup>, K<sup>+</sup>, ATPase and morphological changes of gill chloride cells in grouper, *Epinephelus coioides* larvae and juveniles were determined 6-48 h after abrupt transfer from ambient rearing conditions (30-32 ppt, 26.5-30°C) to different salinity (8, 18, 32, 40 ppt) and temperature (25, 30°C) combinations. Na<sup>+</sup>, K<sup>+</sup>, ATPase activity in day 20 larvae did not change at salinities 8-32 ppt. Activity decreased significantly ( $P < 0.01$ ) after exposure to 40 ppt at 25-30°C, which was accompanied by an increase ( $P < 0.05$ ) in density and fractional area of chloride cells. Enzyme activity in 40 ppt did not reach a stable level and larvae failed to recover from an osmotic imbalance that produced a low survival at 25°C and death of all larvae at 30°C. Enzyme activity and chloride cell morphology in day 40 groupers did not change in 8-40 ppt at 25°C and 8-32 ppt at 30°C. A significant decrease and a subsequent increase in Na<sup>+</sup>, K<sup>+</sup>, ATPase activity in 40 ppt at 30°C was associated with the increase in chloride cell density resulting in an increased fractional area but a decreased cell size. Enzyme activity and chloride cells of day 60 grouper were unaffected by abrupt transfer to test salinities and temperatures. These results demonstrate that grouper larvae and juveniles are efficient osmoregulators over a wide range of salinities. Salinity adaptation showed an ontogenetic shift as the larvae grew and reached the juvenile stage. This development of tolerance limits may reflect their response to actual conditions existing in the natural environment.

**Fermin AC and Gapsin RSJ.** 2000. Postlarvae density and photoperiod effects on the settlement and metamorphosis of the donkey's ear abalone, *Haliotis asinina* Linne, 1758. *Phuket Marine Biological Center Special Publication* 21 (1): 231-234

*Abstract.* The effects of photoperiod and density of postlarvae on settlement and metamorphosis of the native abalone, *Haliotis asinina* were determined in two separate experiments. Abalone larvae were hatched from spontaneously spawned eggs of tank-held broodstock. Experiments were conducted in static water conditions within a 10-day period. Postlarvae held under at 24 h light regime showed higher settlement rates (mean: 12%) than did larvae held at different light-and-dark periods (range: 3-9%). Larvae kept in the dark had the lowest survival (3%). Postlarvae stocked at lower stocking densities of 100 and 150 1-1 had higher settlement rates (12-12.5%) than postlarvae stocked between 200 and 600 postlarvae 1-1 (1-5%).

**Fermin A, Gapsin R and Teruel M.** 2000. Spontaneous spawning, fecundity, and spawning periodicity in the donkey's ear abalone *Haliotis asinina* Linnaeus 1758. *Phuket Marine Biological Center Special Publication* 21 (1): 195-201

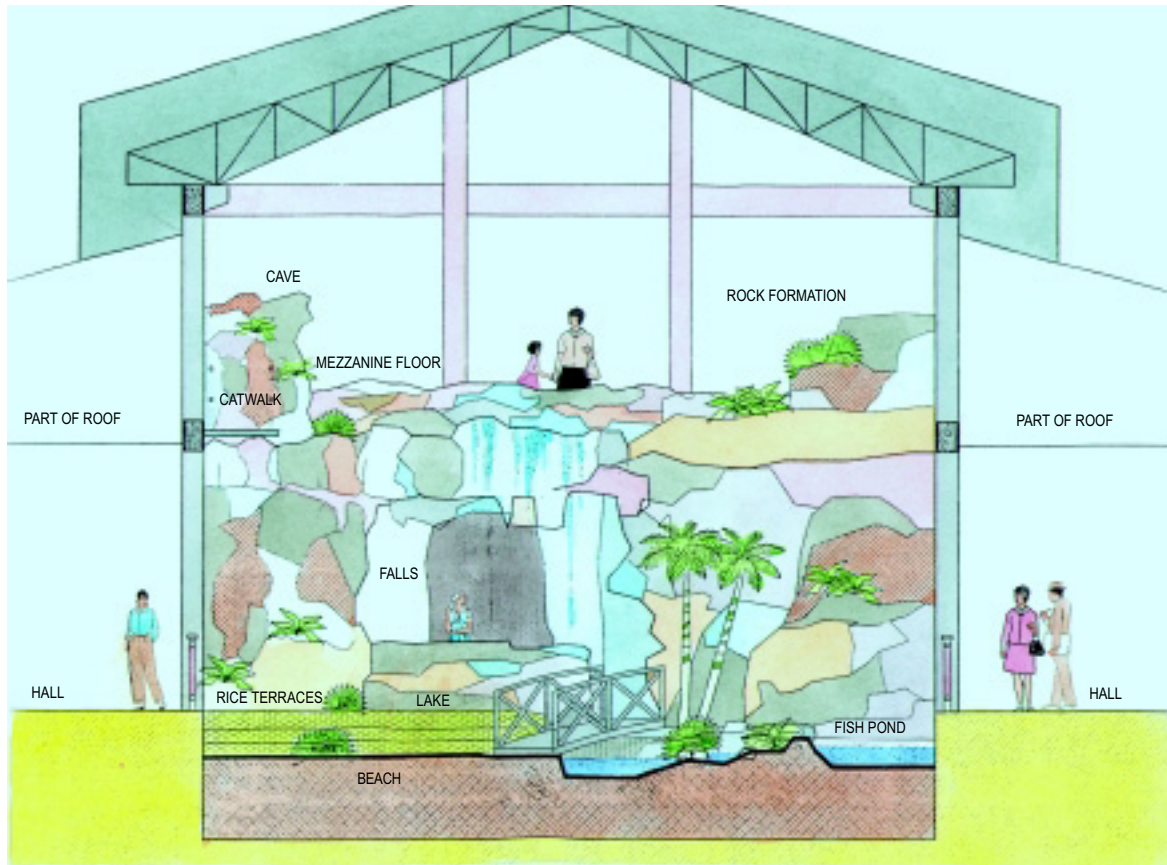
*Abstract.* Spontaneous group spawning was monitored in wild-caught (WC) and hatchery-bred (HB) abalone broodstock held in duplicate tanks at 1:3 (male:female) ratio from June 1997 to January 1999. Abalone breeders (mean SL, wild = 69-79 mm, HB = 68-71 mm) were kept in perforated plastic baskets and fed red alga, *Gracilariopsis bailinae*, to excess given at weekly intervals. Abalone spawned spontaneously year-round. Water temperature during the study ranged from 26-29°C. A total of 139 and 128 spawning episodes were recorded for WC and HB group respectively. Spawning in WC group (mean:  $7 \pm 0.8$ ) were more frequent in September (1998) and from February to April. Spawning frequency in the HB group (mean  $6.4 \pm 1$ ) was generally high during September (1998) until April. Likewise, egg production was highest during these months. Pooled mean survival from trochophore to veligers stage ranged from 7 to 30% ( $n=36$ ). "Potential" fecundity was determined in sacrificed group of HB females ( $n=21$ ) varied from 5,741-11,902 oocytes g<sup>-1</sup> BW. Mean oocyte diameter ranged from 136 to 150  $\mu$ m. Bigger females had higher potential fecundity (range:  $6.2$  to  $11 \times 10^5$  oocytes individual<sup>-1</sup>) than smaller females (range:  $2.8$  to  $3.3 \times 10^5$  oocytes individual<sup>-1</sup>). The time interval between successive spawning among animals that spawned more than twice during a 5-month period range from 13 to 34 days for the small-size group and from 18 to 37 days for large-size group. In separately stocked HB females (without males), "instantaneous" fecundity was shown to range between 1,500 and 12,300 eggs g<sup>-1</sup> BW ( $n=16$ ). In contrast to potential fecundity, smaller and younger individuals gave higher mean instantaneous fecundity range:  $>3,000$  -  $>12,000$  oocytes g<sup>-1</sup> BW than the bigger and older individuals (1,500 - 6,500 oocytes g<sup>-1</sup> BW).

**Primavera JH, Quintio ET.** 2000. Runt-Deformity syndrome in cultured giant tiger prawn *Penaeus monodon*. *Journal of Crustacean Biology* 20(4): 796-802

*Abstract.* A total of 24 morphological abnormalities associated with the Runt-Deformity Syndrome (RDS) is reported for the first time in 17- to 18-month old F3 generation *Penaeus monodon* (>40 mm CL) belonging to three breeding families. Although diagnosed as positive for the infectious hypodermal and hematopoietic necrosis virus (IHHNV), the shrimp appeared normal at 9 to 10 months when they were procured from a commercial facility in Antique, central Philippines, in September 1996. The abnormalities affected either specific shrimp organs and appendages (e.g., rostrum, antennae, uropods) or the whole body (e.g., shell color and hardness). A two-way analysis of variance was used to evaluate differences in the morphometric characters rostral length (RL), carapace length (CL), abdominal length (AL), body length (BL), total length (TL), carapace width (CW), 1(st) abdominal segment width (AS(1)W), and body weight (BW) and the morphometric ratios RL:CL, CL:AL, and CW:AS(1)W by sex and stock (3 families and wild controls). Female *P. monodon* had significantly larger CL, AL, BL, TL, CW, and BW than males, regardless of stock. Wild females had longer BL and TL than

## PROFILE

# A closer look at FishWorld



*Proposed Ecosystems Walk-through Exhibit inside Fish World*

SEAFDEC FishWorld is a museum-aquarium-ecopark being built by the SEAFDEC Aquaculture Department at Tigbauan, Iloilo, Philippines, in response to the need for informal public education so necessary for responsible aquaculture and fisheries, and for environment protection and sustainable development in general. FishWorld is dedicated to environment education, particularly about aquatic ecosystems and biodiversity, aquaculture, fisheries, ecotourism and aquatic sciences.

### **The beginning: the AQD Museum**

FishWorld grew out of the AQD Museum, formally inaugurated on 9 July 1993 but actually begun about 1985. The museum started with JICA Expert Hiroshi Motoh's collections of crustaceans (shrimps, crabs, lobsters, etc.) from the ecological studies on the tiger shrimp from 1975-1980. At about the same time, ecological studies on milkfish by JICA Expert Shigeru Kumagai produced a

large collection of fish larvae and juveniles, later sorted, identified and published about by Teodora Bagarinao, then research assistant. The collections became part of the Data Bank, then run by Virgilia Sulit. Unfortunately, the collections were moved from the Research Building to the third floor of the Nutrition Building, where they were forgotten and many samples (about 25%) dried up, decomposed or got lost.

In 1991, Dr. Bagarinao came back from graduate studies and asked Research Division Head Dr. Clarissa Marte to commit rooms, funds and an assistant to transfer the remaining collections back to the Research Building, where they could be rehabilitated and displayed for public viewing. The commitment was given and the AQD Museum was opened to the public in 1993 by then AQD Chief Dr. Efren Flores, RD Head Dr. Relicardo Coloso, and Museum Curator Dr. Bagarinao. The AQD Museum was funded and supervised by the Office of the Chief. The seaweed

collection of Dr. Anicia Hurtado was added to the museum. Mollusk research team leader Wenresti Gallardo turned over his shell collection, and so did other shell collectors at AQD (Bagarinao, Dr. Emilia Qunitio, Rovilla Luhan, Dr. Veronica Alava, etc.). Dr. Marte donated her beautiful coral collection from around Mararison Island. More fishes, crustaceans, other invertebrates, and snakes were added to the museum collections over the years by Dr. Bagarinao from her trips - official business and personal, local and foreign.

In 1995, the AQD Museum held its first Bring, Show, and Tell contest during the AQD Anniversary. Pupils from four neighboring elementary schools brought nature objects (a marine turtle, sea anemones and clown fish, catfish juveniles, natural food used in the hatchery, etc.) and told stories about them. This was the start of the Aquaculture Week held yearly in July, and now encompassing several contests for 20-25 elementary and high schools.

Students on educational tours and other visitors to SEAFDEC AQD dropped by the museum and it soon became clear that the museum space was not large enough to accommodate the everyday public, nor the large crowd during Aquaculture Week. More museum space was needed to improve and expand the information and education services for the public.

### **The rationale and concept plan for FishWorld**

Environmental education of the general public is a key to sustainable development, a fact duly recognized by the United Nations Conference on Environment and Development's Agenda 21. Formal education in the Philippines tends to be short in the sciences, and even shorter in the environmental and aquatic sciences. Integrating environmental education in the school curriculum is a slow process. Alternative informal environmental education for the public is necessary:

- when the concepts and attitudes to be taught apply to the



*The FishWorld facade and some of its shell collections*

general public (e.g., the concept of connectedness and interdependence of ecosystems and people)

- when the concepts and attitudes must be learned by a target group that drops out early from the formal school system (e.g., most farmers and fishers attend only a few years of elementary school)
- when the concepts and attitudes must be inculcated early in life, that is, among children, before irresponsible habits have formed.

Informal public education is an important function of museums and parks, but there are not many museums and parks in the Philippines, relative to its population, and many of the existing ones are poorly maintained and do not have much of a public education program. The Philippines needs more museums, more parks and more aquariums for the education and recreation of its people. This is an important step in 'greening' the minds, hearts and spirits of citizens.

The SEAFDEC AQD is well equipped to set up Fish World.

AQD is a research and development institute with scientists, researchers and information specialists (about 70 Ph.D. and M.Sc. degree holders) who can provide technical advice, expertise, and related services (e.g., judging contests) to FishWorld. AQD has laboratories, hatcheries, and fish holding facilities not equalled elsewhere in the country and which can provide many of the live animals needed at FishWorld. AQD has an extensive training and information dissemination program that includes integrated coastal resources management. AQD publishes a variety of information materials and reaches out to local governments and people's organizations. AQD is located in Western Visayas, a top fish-producing region and the site of many beach resorts and seafood restaurants.

FishWorld will help develop aquaculture, fisheries, and ecotourism by educating fishers, farmers, resort and tour operators, and local communities in the responsible and sustainable use of ecosystems. Moreover, AQD has the University of the Philippines-Visayas, Philippine Science High School-Western

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Visayas and many other universities and schools as neighbors and collaborators. FishWorld works with private and public elementary and high schools, serving as destination for educational trips, conducting training-workshops and educational contests, and providing leadership training and eco-jobs.

### **FishWorld dreamed and realized**

Interested in expanding the relevance of SEAFDEC AQD to the aquaculture industry in Asia and the national life in the Philippines, the present AQD Chief Dr. Rolando Platon signified his willingness to consider a plan for FishWorld. Dr. Bagarinao drew up a floor plan according to the space requirements of the existing collections, the would-be exhibits, and the viewing public. Architect Noli Patiño and SEAFDEC Engineering FishWorld polished the plan and drew up detailed engineering specifications. To mark his commitment, Dr. Platon agreed to hold a groundbreaking ceremony for FishWorld on 9 July 1998, AQD's 25<sup>th</sup> anniversary and the Philippines' centennial year.

But a fire broke out at the AQD Library and funds had to be diverted to its repair. The Chief organized a Museum Committee that reexamined the plan for FishWorld. It was found that available funds were good only for the building and part of the grounds (designated Phase I), but not for the exhibits in it, particularly the oceanarium and the ecosystems walk-through (now called Phase II). Dr. Bagarinao argued for going ahead with Phase I and make FishWorld work while waiting for Phase II. The Museum Committee decided in early 1999 to negotiate a building contract with RJ Landoy to start the construction of FishWorld in July and finish it within a year. And so FishWorld Phase I was completed and opened to the public on 9 July 2000.

Busloads of students have come to FishWorld, many schools have participated in contests and training-workshops, and many visitors have been impressed by the tremendous effort that SEAFDEC AQD has put into reaching out to its various publics.

### **What's at FishWorld now?**

In the **Aquaculture Hall**, small aquaria of fish, crustaceans and mollusks, mostly marine, a few freshwater, have been set up. The aquariums show mostly aquaculture species that SEAFDEC AQD does research on. Posters in the hallways explain aspects of the biology and farming of tropical fishes, crustaceans and mollusks. The **Reference Collections** of fishes and invertebrates are in airconditioned rooms; these are the collections that scientists, teachers and students can use in their research and science classes. In the **Arts and Culture Gallery** are exhibited some present-day art work and artifacts showing the influence of fish and the ocean in our daily lives. A well-equipped **Audio-Visual and Reading Room** is well used by visiting groups. A **Kids' Activity Center** has been set up where children can read nature publications, do artwork, play with models and later manipulate devices and 'experiments' that teach about water and its properties.

### **What's Phase II?**

The plan is to build an **Oceanarium** (about 120 tons of water) that shows the reefs and seagrass beds with many fishes, crustaceans, mollusks, corals, and plants together, including some adult milkfish, groupers, and snappers. Upstream of the oceanarium will be built an **Ecosystems Walk-through** showing parts of a mangrove forest, beach, river, marsh, stream, waterfall, lake, cave, mountain, fish pond and rice field, and the connectedness and the interdependence of their fauna, flora and ecological processes. The **Fisheries Hall** will show the major fisheries around the world and explain the various issues affecting fisheries. The **Marine Science Hall** will explain important concepts in water chemistry and physics, oceanography and marine biology, and show some of the important research in marine science.

The FishWorld logo will be installed on the building façade. A botanical garden will be landscaped out of an existing plant nursery and hillside thicket outside FishWorld. The driveway centerpiece, *Our Water Planet*, will be a large globe showing the oceans and continents.

### **FishWorld's main message and storyline**

In May 2000, Dr. Bagarinao presented papers at the World Aquaculture Society conference in Nice, France and afterwards swung by the museums and aquariums in Monaco, Barcelona, Paris, Washington DC and Chicago. She worked for a week at the Division of Fishes of the National Museum of Natural History at the Smithsonian Institution, and for a few days at the Field Museum of Natural History and the John Shedd Aquarium. The Shedd Aquarium is currently building a Philippine Coral Reefs Exhibit, planned in 1998 and due to open in 2002. One of the main lessons from the museum visits was that FishWorld must have a definite storyline running through the exhibits.

Thus, a Committee for FishWorld Exhibits was formed consisting of Dr. Bagarinao, Dr. Marte, Dr. Jurgenne Primavera, Dr. Aurelio delos Reyes, Dr. Fe Estepa, Ms. Marietta Duray, Ms. Mila Castaños, and Engr. Salvador Tillo. The storyline was drafted and approved by the committee according to the following main message:

*The oceans and other aquatic ecosystems support an amazing diversity of life, ecological processes and economic activities, and must be used with care for present and future human benefit.*

Interactive computers will be part of the exhibits. Interpretive signs and write-ups will be prepared to explain the exhibits and identify the species on display in the different sections of FishWorld. Some exhibits will change every 6-12 months.

### **Environment education programs**

The environmental education program of FishWorld includes several yearly activities that target various stakeholders, but mostly children in and out of school:

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# Tips for successful freshwater prawn culture

By **G Ramesh**  
 Aquaculture consultant  
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Giant freshwater prawn, *Macrobrachium rosenbergii* (local name, scampi) culture is attracting considerable attention from farmers in India and many Asian countries owing to its profitability and lesser disease incidences in the culture operations. They can also be cultured in salinities ranging from 0-10 ppt, and are suitable species for both monoculture and polyculture. This article provides some useful guidelines to the farmers for successful scampi farming.

## Site selection

The site selected for scampi culture should have an adequate supply of good and pollution free freshwater. Although run-off from rivers, streams and reservoirs can be used, well water would be an ideal choice. Check the quality of water and soil to know if all the essential parameters are within the optimal range especially if they are free of pollutants and pesticides which may be harmful for prawns.

## Pond design and pond preparation

Rectangular ponds of 0.5–1 ha size with a depth of 1-1.5 m are ideal for scampi culture. The pond should have a good inlet and the slope of the pond bottom towards the outlet should allow for rapid draining. During pond preparation, the ponds have to be sun dried and ploughed to expose the soil for oxidation. Check the soil pH using a soil pH meter at 6 different points in each pond. If the pH of the soil is less than 6.5, agricultural limestone should be added to increase the pH to a minimum of 6.5, and preferably to 6.8. After filling the pond, fertilize the pond using 5 kg urea and 10 kg superphosphate per hectare for 1 m water depth. The fertilizers have to be dissolved in water and spread evenly all over the pond during morning hours. This would help in the development of abundant phytoplankton which serve as a natural food for the prawns and to shade out unwanted aquatic weeds. If a phytoplankton bloom has not developed within a week, make a second application of fertilizer. Additionally, organic fertilizer such as dried cow dung (500 kg per ha) has to be soaked in water overnight and it has to be filtered and the extract can be applied. If a water source other than well water is used, it is important to prevent the entry of unwanted fishes into the culture ponds by the installation of suitable meshes in the inlet.

## Seed selection and stocking

Health and disease free postlarvae (PL 10 or above) are ideal for stocking in nursery ponds. Seed selected should be of uniform size, strong and healthy without any deformities. They should have passed the quality check with 100% survival for 1 hour in 100 ppm formalin and a salinity increase of up to 5 ppt. Early morning or evening hours are ideal for seed stocking. Seeds brought from the hatcheries or elsewhere should be first acclimatized to culture pond conditions, which is done by slowly replacing the water in the seed bags with pond water.

## Nursery phase

A nursery phase of culture has become a standard part of scampi culture. Ideal nursery ponds should be of 0.5-1 acre size (about 0.2 to 0.4 ha) with a water depth of 1-1.5 m. PL 10-15 stage seeds are stocked in the nursery ponds at 25 pcs per m<sup>2</sup> without aerators, which can be increased up to 50 pcs per m<sup>2</sup> if provided with 4 aerators per ha and reared for a period of 40-45 days after which they are shifted to grow-out ponds. This phase has been adopted to improve the growth and survival of prawns in grow-out ponds besides bringing about effective feeding. It also helps to estimate the number of animals that have been transferred to the grow-out ponds. After the juveniles are shifted from the nursery, the nursery pond can again be restocked.

## Grow-out phase

Juveniles of about 3-4 g size can be transferred from the nursery to the grow-out ponds with cast net or drag net. The grow-out ponds are stocked at 2-3 pcs per m<sup>2</sup> without aerators, which can be increased up to 4-6 pcs per m<sup>2</sup> with 4 aerators per ha. During transfer, even sizes are counted and released into the grow-out ponds. This helps to calculate the actual stocking density and helps in better feed management.

## Shelters

Since scampi is highly cannibalistic, it is necessary to provide shelters which should occupy 2-5% of the total pond area. Shelters can be hiding places for the prawns during the moulting period and improve their survival rate. Aquatic plants such as morn-

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ing glory and water hyacinth are grown along the bunds with branches of coconut fronds and palm fronds placed inside the pond.

### Water quality management

Water quality is just as important in scampi culture as it is in any other species of aquatic animal. Although freshwater prawns have been successfully raised in soft water (5 to 7 ppm total hardness), a softening of the shell was noticed. Hard water with a total hardness of 300 ppm and above has been reported to cause reduced growth and lime encrustations on freshwater prawns. Therefore, use of water with a hardness of above 300 ppm is not recommended. Water transparency is maintained between 30-40 cm of secchi disc visibility. During the first month of culture, water exchange is not necessary, pumping of water is done to maintain the water level. Whenever there is a dense algal bloom, the top 15 cms of the pond water has to be drained. Herbivorous fishes such as the carp (*Catla*) are stocked at 500-1000 pcs per ha one month after stocking scampi seeds to maintain the water quality. The optimal water quality parameters are given below:

	Optimal range
pH	7.5-8.5
Dissolved oxygen	at least 4 ppm
Total alkalinity	at least 80 ppm
Hardness	below 300 ppm
Ammonia	not more than 0.1 ppm

### Feed and feed management

Commercially available pelletized feed is used for feeding scampi. Feeding is done four times a day by broadcasting from the bund in the nursery ponds, whereas in the grow-out ponds broadcasting from the boat is generally practiced. The feeding program is given below:

Average body wt (g)	% Feed
0.1	20.0
1.0	15.0
2.0	10.0
3.5	7.5
5.0	5.5
7.5	4.5
10.0	4.2
15.0	3.0
20.0	3.0
25.0	2.5
30.0	2.0
35.0	1.7
40.0	1.5
>40.0	1.0

### Sampling

Periodic sampling is very vital for successful scampi culture. It is recommended to do weekly or fortnightly sampling to check the health condition as well as to estimate the growth of prawns. At least 150-200 prawns should be sampled. It is also necessary to estimate the ratio of males to females in the pond -- weigh them separately -- as this would help in estimating the total biomass in the pond and for better feed management.

### Disease

Diseases so far do not appear to be a significant problem in scampi culture but as densities are increased to improve production, disease problems are bound to become more prevalent. Generally, "black spot disease" or "shell disease" is encountered which is caused by bacteria that break down the outer skeleton. Usually it follows physical damage and can be avoided by careful handling. At other times, algae or insect eggs may be present on the shell. This condition is not a disease, but rather an indication of slow growth, and is eliminated when the prawn molts.

### Harvesting

Generally, partial harvesting is followed in scampi grow-out ponds because of the differential growth rates encountered among the males and females and also among the different morphometric types of the former. Partial harvesting is done beginning from the fourth month of culture in the grow-out ponds and subsequent harvesting is done every fortnight. During partial harvesting, only the blue-clawed males with an average size of above 50 gms and above and big and berried females are harvested while the small males and the orange-clawed males are put back into the culture ponds for further growth. ###

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### FISHWORLD ... CONTINUED FROM PAGE 12

- **Aquaculture Week.** Held in July every year during the AQD anniversary — arts, writing, song, dance, and science competitions among elementary and high school children (about 20-25 schools and 250 students participating each year)
- **International Coastal Cleanup.** Held on the third Saturday of September every year — removal of marine debris by multi-sectoral groups and local communities (10-20 schools and local government units, about 1,500 volunteers and 1,500 kg of marine debris removed every year in southern Iloilo)
- **Seafood Festival.** Showcases local cooking skills and novel recipes using products from fisheries and aquaculture
- **Pasko sa Dagat and Parol ng Dagat.** Christmastime art contests focusing on aquatic ecosystems and biodiversity
- **AquaScience Fair.** Elementary and high school students conduct science projects in aquaculture and aquatic ecosystems and biodiversity, and teachers attend science workshops
- **FishWorld Publications.** A bimonthly newsletter *Nature Matters* featuring instructional materials, and occasional journal papers about biodiversity, systematics, conservation and environment education
- **Invited Lectures.** Lectures and seminars by professionals in environment education, biodiversity research, systematics, ecotourism, environmental protection and related fields
- **Ecology Camp.** Seminar-training (nature immersion, practicals and lectures) for school children towards environment consciousness and stewardship
- **Eco-Jobs for the Youth.** Training-on-the-job for out-of-school youth and high school students in plant nursery, gardening, raising ornamental fish, composting, solid waste management, etc.
- **Ecotourism from FishWorld.** Tours to various aquatic ecosystems to encounter nature and wildlife and see environmental threats and problems first-hand ###

## Career opportunities in aquaculture

The industry was worth close to 500 million US dollars at the close of the century. Making this wealth or contributing to it are a lot of people in the industry, whether they work at producing huge amounts of fishes (the entrepreneurs, consultants, aquaculturists and technicians), developing technologies (the researchers), acting as conduits between the production and research sectors (the government extensionists, the information specialists), training new manpower (the teachers), or overseeing the industry for the public or common good (the policy-makers, advocates).

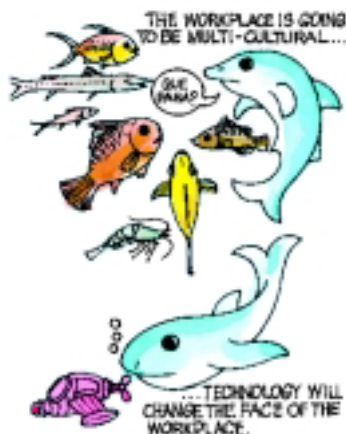
This issue examines the myriad opportunities for wealth, fame and good old honest work that the aquaculture industry offers. But first, you must ask yourself if aquaculture is your area of interest, and if you would want a career in this field. So, we made up a simple assessment which you can examine at your leisure. Of course, this is nothing definitive, just testing the waters so-to-speak.

We strongly feel that planning and assessment are important because, according to a survey in the US in 1989-1995 (Isaacson & Brown 2000), only half of the workers surveyed reported that they were very satisfied with their jobs. It is thought that most are in the wrong area of work because only a third of the adults were in their jobs because of conscious planning; the remaining two-thirds entered their jobs because of chance circumstances, the influence of others, or because they took the only job available.

The assessment guide is followed by short interviews of elementary, high school, college, masteral and doctorate students about their career goals. It would appear that there are aspects of aquaculture that did not capture their interest. Perhaps with our interviews of people who are at the top of these fields, the rest of the young (and the once young) can find a good future in them.

Last but not least, we have included tips for searching for jobs online.

We hope you find your passion!



Isaacson LE and Brown D. 2000. *Career information, career counselling, and career development*, 7<sup>th</sup> ed. Allen and Bacon, MA. p 1-16

**Career is the totality of work one does in a lifetime**

# Is aquaculture the career for you?

By **JR Paniza**

Aquaculture is a challenging career. Success in this field does not solely depend on an impeccable academic foundation but also on personal values and the environmental forces that influence it. Employment or ventures in aquaculture may take one to all corners of the world and in diverse living conditions. Aquaculture can be a toss up between career and lifestyle. Practitioners often tell about their fulfillment in this field. It can also be a gold mine if luck strikes you.

Deciding on a career in aquaculture is not an easy task. It is a mind-boggling process of evaluating one's interests, financial capability, relevant training and experiences, and personal attributes that fit in this particular career path.

According to human development experts, an individual's career choice relies on qualities that vary in combinations and degrees that exist in a person. Measuring tools have been developed to examine individual qualities that determine career paths.

The following test, which was adapted from TV Rao's *Entrepreneurial Orientation Inventory*, proposes to gauge an individual's prospect for a career in aquaculture.

## Take the test! Instructions

This test contains 15 pairs of statements. In each pair, you may agree with one statement than the other. You have five points to distribute between two statements in each pair to indicate the extent to which you agree with each. You may distribute the five points in any combination (0, 5; 1, 4; 2, 3; 3, 2; 4, 1; 5, 0) and vice versa but you cannot divide the points equally (e.g., 2.5) between two choices.

- 1  How successful an aquaculturist will be depends on a number of factors. One's capabilities may have very little to do with one's success.  
 A capable aquaculturist can always shape his/her own destiny.
- 2  Aquaculturists are born, not made.  
 It is possible for people to learn to become more scientific/technical/entrepreneurial/managerial even if they do not start out that way.
- 3  There is no need for advance planning because no matter how scientific one is, there will always be chance factors that influence good harvest/output.  
 Capable aquaculturists believe in planning their activities/inputs in advance.
- 4  Whether or not an individual can become a successful aquaculturist depends on social and economic conditions.  
 Aquaculturists can always be successful, irrespective of social and economic conditions.
- 5  Aquaculturists are bound to fail at least half the time because success or failure depends on a number of factors beyond their control.  
 Aquaculturists fail because of insufficient academic training or their own lack of ability and perceptiveness.
- 6  Aquaculturists are often victims of forces they cannot understand or control.  
 By taking an active part in scientific, academic, technical, economic, political and social affairs, aquaculturists can control events that affect their projects.
- 7  Whether or not you can get a business loan depends on how fair your parents/bank officers you deal with are.  
 Whether or not you get a business loan depends on how good your project plan is.
- 8  There is no point in collecting a lot of information/technology. In the long run, the bigger your farm/project, the better the profit is.  
 Whether putting up a farm, consulting, or consulting a company, it is wise to collect as much information/technology as possible from various sources or trainings/education before making a choice.
- 9  Whether or not you make a profit or a name in aquaculture depends on how lucky you are.  
 Whether or not you make a profit or a niche in aquaculture depends on how capable you are in the industry.
- 10  Some types of people can never be successful as aquaculturists.  
 It is possible to develop scientific/technical/entrepreneurial/managerial knowledge in different types of people.
- 11  Whether or not you will be a successful aquaculturist depends on the environment from which you came.  
 People can become successful aquaculturists with effort and capability irrespective of the environment from which they came.
- 12  These days, people must depend at every point on the help,



support or benevolence of others (e.g. government, banks, families).

- It is possible to put up one's own aquaculture venture without depending too much on other people. What is required is the knack in dealing with people, technology and nature.
- 13  The environmental, economic and political situation today is very unpredictable. Even perceptive aquaculturists falter quite often.
- When the aquaculturist's outlook of the environmental, economic and political situation is wrong, that person can blame only himself/herself for failing to read the environment, economy, and politics correctly.
- 14  There is no point in spending time planning or doing things to change one's destiny. What is going to happen will happen.
- With efforts, related studies and training, aquaculturists can determine their own destiny.
- 15  No matter how hard a person works, he/she will achieve only what is destined.
- The reward one achieves depends solely on the efforts one makes.

### How do you score? Computation and interpretation

The next thing you do is to sum up the points. Sum up the points of the first statements; the total is your score for internal locus of control. Next, add the points for the second statements; this total is your score for "external locus of control."

Now, get the internal/external locus of control ratio. Divide the total internal score by your total external score.

If your internal/external ratio is above 3.0, this indicates a high level of aquaculture internality. This may mean that you have high chances to initiate or be involved in aquaculture activities. Ratios below 1.0 point are those respondents who have a more external (less interest in aquaculture activities) locus of control orientation. It may follow then that there is a need for this type of person to become more internal in order to be able to initiate aquaculture activities. Ratios above 1.0 indicate possible interest in the field and practice of aquaculture. The higher the ratio above 1.0, the more internal the person is.

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## Take this aquaculture orientation test!

### Do you identify yourself with these statements?

YES NO

- I am fascinated with fishes.
- I am interested in chemistry, biology and physics.
- I can survive living in diverse environments.
- I am meticulous even to the smallest details.
- I love the idea of becoming a scientist.
- I know how to swim.
- I spearhead/get involved in writing scientific papers.
- I can work alone.
- I find laboratory work challenging.
- I can work with people, even with those I do not know.
- I like to work in remote places.
- I am keen on working on something even without a guarantee that it will succeed.
- I prepare alternative courses of action.
- I look at things and events analytically.
- I discover new things.
- I find writing interesting.
- I am motivated to do things not only for money but also for their merits.
- I seek first to understand, then to be understood.
- I am curious about the development of things.
- I do not mind going through complicated processes.
- I plan things and events systematically.
- I attribute success not only to academics but also to other factors that influence it.
- I am a risk taker.
- I am innovative.
- I am eager to learn and discover unknown things.
- I don't surrender even on the verge of failure.
- I am adventurous.
- I am comfortable working with people from different backgrounds.
- I get things started and make them go.
- I search answers for things unfamiliar.

If you say "yes" to 15 or more of these statements, consider a career in aquaculture. Your orientation inventory may be a sign of a serious leaning towards aquaculture. -- JRP

## I want to be a deep-sea scientist



By **Carl Emilio Bagarinao**, 12 years old  
Kinaadman Elementary School  
Tigbauan, Iloilo

It's the year 2000 and *Homo sapiens* has been on earth for about a million years. But we don't know much about our earth, especially our oceans, and particularly the deep parts of the oceans. That's why I want to be a marine scientist, a deep-sea explorer to be exact. I really like the idea of going down in a submersible to explore the deep oceans. That's really cool. These scientists, when they go down, are in great danger, but they are brave. They learn new things. I want to be like them.

To do this, I would probably work at the Scripps Institution of Oceanography in La Jolla, California. That's where my mom and dad went for their doctoral degrees. Scripps is a research and education institution that studies almost anything related to water. I myself like water. Scripps has lots of high-tech equipment for studying the seas and oceans. One of their most extraordinary vessels is FLIP, a floating laboratory and instrument platform that is towed to its destination, and when it gets there... it flips! When that happens, the roof of the ship becomes the front! Really cool, eh! Scripps has lots of other vessels, but I like FLIP the best. I also would like to go down in the DSRV Alvin, just like my dad did. The Alvin is a deep-submergence research vessel that can go down to a depth of about 3,000 meters, that's pretty deep. It is slow going down to the sea floor and coming back to the surface, but it's worthwhile.

Do you know why I want to be a deep-sea explorer? No? I want to be a deep-sea explorer so that I can learn or even discover new things. I want to go down in a submersible and overcome the fear in me. Just like my dad at Scripps. My Dad was still young at that time, but he was brave and I'm proud of him. Together with Dr. Robert Hessler, famous deep-sea biologist, Dad went down in the Alvin to the hydrothermal vents at the ocean floor at the equator near the Galapagos Islands. The vents are continually spewing out black smoke from under the crust. Dad saw the clams, crabs, and other amazing animals that lived down there, about 2,600 meters below the ocean surface. He studied the giant tubeworm *Riftia* that feeds off its symbiotic sulfide-oxidizing bacteria. The vents are dark, cold, toxic, and under crushing water pressure. Dad went down with a styrofoam mannequin head and came back with a shrunken styrofoam no bigger than a doll's head! Imagine that!

If I want to be a deep-sea scientist, I have to prepare for it. Now I'm studying at the Kinaadman Elementary School and I hope to pass the qualifying exam for the Philippine Science High School, which seems to be very tough. Phil Sci seems to be the best in the country, so I will study extra hard to pass. I also have to be curious, which I

## A career in fisheries? High

The high school department of the Iloilo State College of Fisheries (ISCOF) at Tiwi, Barotac Nuevo, Iloilo has a special vocational program designed to make graduates ready for regular college education or work right away after graduation. Graduates earn a high school diploma plus a certificate of proficiency with specialization in either fish capture, culture or fish preservation. This program is supported by the Department of Science and Technology (DOST) and the Philippine Council for Aquatic and Marine Research and Development (PCAMRD). Four of ISCOF's graduating high school students share their plans for the future.

On the other hand, the College of Fisheries and Ocean Sciences is the flagship of the University of the Philippines in the Visayas, Miag-ao, Iloilo. It has four institutes -- Aquaculture, Fish Processing Technology, Marine Fisheries and Oceanology, and Fisheries Policy and Development Studies. We interviewed a few of their students, too.



**DANIELLA JULIETA CARO**  
16 years old

*I want to help my father in managing our fishpond. I am confident that I can learn new technologies in school. There is also a big opportunity for employment in the aquaculture industry because there seems to be less graduating students who want to pursue a career in fisheries. Most of all, I want to help improve our country's economy – we have vast potential areas for aquaculture. Count me in.*



## school, college and post-graduate students tell us why



**IRENE de MONTEVERDE**  
17 years old

*I have a special affection for fishes. My parents are fish vendors and I sell fish, too. By pursuing fisheries in college, I hope I can learn and understand more about fishes. I am also interested in other marine fishes like groupers, red snappers and sea basses. However, I am most interested in prawns. This is where the action and money are.*



**ANNALYN BUENAVIDEZ**, 17 years old  
*I want to earn a Diploma in Fish Technology (DFT) majoring in Fish Culture. Despite my father's lack of formal fisheries education, he is a technician of a big fishpond. His earnings are enough to send us to school. By knowing his "trade secrets" and the new aquaculture technologies I will learn in*

*school and in the industry, I hope to become a successful technician with a much bigger fishpond to manage. Employment in government agencies is remote because even if I may have a diploma and the capability, I do not have a backer.*



**FLORIE MAE BAITO**, 17 years old  
*I will pursue a bachelor's degree in fisheries here at ISCOF. I became interested in fisheries because of my aunt who works with the Bureau of Fisheries and Aquatic Resources (BFAR). Her work as a researcher brings her to many places around the country. I hope to become like her by being an employee at*

*BFAR or at SEAFDEC where there are good facilities to do research and for a good fee, too. I want to be a successful tilapia breeder.*



**LOURDES FAITH SAUL**, Senior;  
*BS Marine Fisheries, Class of 2001*  
LC, as she wants to be called, figures that she wants to make her mark in research. She believes that this discipline is relatively young, and contrary to conventional wisdom, she is convinced there are still vast and untapped marine resources in our seas and she

wants to closely study the local fish migration.

She thinks there is much funding for the fisheries sector, but

the sector has not alleviated the poor plight of fisherfolk, may be due to corruption or a poor sense of priorities. She notices too that law enforcement in fisheries tends to favor those who have money and connections.

On second thought, LC ponders that if she can't make it as a researcher, she would be an entrepreneur dealing in gears like sports diving equipment catering to tourism.



**JONELO SOBREGUEL**  
**ABIGAIL CORPORAL**  
*Senior students, BS Fisheries*

It seems all the graduating seniors want to go into research. Jonel and Abigail are no exceptions. Jonel wants to hone his skills and discipline in the rigorous world of science, to enter graduate school, and be a scientist. He said that money is not a major consideration in his quest.



Abigail is the same. She said her first step is to work in an academic or research institution, and later on go to graduate school. "Money will come later if you have etched a niche for yourself in the extremely competitive world of science," she said. But if she can't make it as a researcher, she wants to be an entrepreneur, possibly in the food business.

Abigail also thinks that science in the country is tainted with politics. "That's why it is exceedingly slow in its development and our country remains poor."



**ARNOLD TANOY**, Senior; *BS Fisheries major in Fish Processing Technology*

Another would-be researcher is young Arnold. He wants to be a researcher because he does not want to be separated from the academe. His fulfillment and happiness lie in solving problems for the industry and seeing his work published in peer-reviewed science journals.

Asked why our fishery products, particularly those canned sardines and other seafood, lag behind in the competition from other Asian countries, Arnold explains: "There is lack of knowledge and product information about our fishery products. Hence, there is little or no support at all in terms of patronizing them. We have the capability to compete though," adds Arnold.

If he can't make it in research, Arnold would like to work with NGOs involved in resource management.

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**EMEBETH CHAKA**  
Research and Agricultural Office (Ethiopia)  
Student, MS Fisheries

*I'd like to apply the aquaculture technologies I am learning here in the Philippines to my own country – Ethiopia. We do not have “sophisticated” technologies and not many manpower working on aquaculture. We rely mostly on livestock production (as source of*

*protein) but we have freshwater resources that can be exploited for food production. I had a chance to go to Netherlands on a scholarship but I've chosen the Philippines because the fisheries activities here are more similar to Ethiopia. The distance did not matter.*



**IRWAN J. EFFENDY**  
Haluoleo University (Indonesia)  
Student, PhD Fisheries

*I'd like to continue teaching marine biology and fisheries subjects, and doing experiments. I am working on abalone and the hatchery of other important molluscs. Abalone is exploited naturally in Indonesia and the release of hatchery-reared abalone in*

*natural waters would help ensure sustainability of catch.*

*I work in the fisheries sector because Indonesia has the widest coastline – 81,000 km – next to Canada. The chance to get a job and get ahead are better assured.*



**ANDI B. PATADJAI**  
Haluoleo University (Indonesia)  
Student, PhD Fisheries

*My present work is on traditional products in Indonesia. I dream of increasing the prices of fish by-catch by making value-added products and of making something out of wastes from traditional processing. For example, what do you do with the abalone shell*

*when it's only the meat that is exported? Maybe there's something inside the shell that can be extracted.*

*Most Indonesians don't know how to process fish products, although some fisheries students have improved the traditional salted, boiled products. Now, we can have soft-boned milkfish which had been pressure-cooked. Boneless milkfish is expensive in Indonesia.*



**RENE LEDESMA**  
National Fisheries Research and  
Development Institute (Philippines)  
Student, PhD in Fisheries

*I foresee myself as a guardian of sustainable fisheries, focusing on applied research that the industry needs. With the Philippines a signatory to the Rio Summit, and with the so-called Philippine Agenda 21, it is my*

*hope that we come up with a Code of Practice for responsible fisheries.*

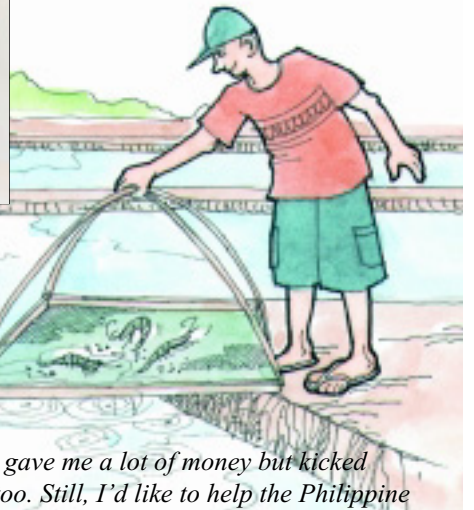
**RONELLE SALVADOR**  
University of Eastern Philippines  
Student, PhD in Fisheries

*I love research and will continue to do it. I'd like to focus on the seaweed industry because this is where we can compete globally. Seaweed culture is a low-cost technology easily adopted by poor fisher communities in the Philippines.*



**REY CENTINA**  
Private Sector  
(Philippines)  
Student, MS  
Fisheries

*The shrimp industry gave me a lot of money but kicked me out of business, too. Still, I'd like to help the Philippine shrimp industry recover. My present direction is the study of immunology, and the development of a vaccine for luminous vibriosis.*



-- Interviews by RY Buendia, AP Surtida and MT Castañon

# THE FISH PRODUCERS



## *What makes a good entrepreneur?*

A fishpen operator from Bolinao, Pangasinan (northern Philippines), Mr. Elias Quisay, Jr. believes that on top of education and experience, a good aquaculture entrepreneur

must have the following qualities:

- **Guts** – cage/pen culture is a high-risk and high-yield undertaking, one must have the courage to face unexpected outcomes and must be able to rebound from any unfavorable situation
- **Honesty** – to oneself, the creditors and caretakers to promote camaraderie, good working relations and mutual respect to redound to a more productive endeavor
- **Good leadership** – he/she must be transparent and flexible, and must be able to communicate to caretakers the “do’s and don’t’s” of the industry without being taken as “too bossy”
- **Vision** – he/she must have the ability to forecast, understand the market situation and adapt to prevailing circumstances and seasonality of products in order to have a successful business undertaking
- **Concern for the environment** – as the blood and life of aquaculture. Abuse the environment and you deny yourself the unending opportunity of life

Mr. Quisay started his milkfish business in 1995 initially with two (30 x 40 m) fish pens. His capital investment was only for the construction of the pens. Operating expenses like the cost of fry and fishpen inputs (commercial feeds) were paid after the harvest had been sold. At present, he is one of the major fish pen operators in Bolinao, operating no less than 20 units of fish pens and cages.

He said that he does not have any trade secrets. “I share whatever knowledge I have in aquaculture with anyone interested in the undertaking.”

Mr. Quisay is not only a successful fishpen operator. He is serving his last term as municipal council member in Bolinao, Pangasinan. He plans to seek a higher political office. -- *AJE*

## Philip Cruz makes a mark in aquaculture in the Philippines

By **AJ España**

Purposiveness and foresight plus a strong academic foundation made it easy for Philip S. Cruz, young at 36, to create a niche in the aquaculture industry. He is known in the field for having developed various aquaculture fish feeders which answer the need for efficient and low cost feeding technology for fishes like milkfish, tilapia, catfish and grouper. His kinetic fish feeder won for him the grand prize in the Philippine competition for industry and energy research sponsored by the government in 1997. His other technical achievements and contributions made him the “Most Outstanding Young Alumnus Awardee” of the University of the Philippines in the Visayas (UPV) also in the same year.

His interest in the field of aquaculture started before he entered college when his father bought a fishpond in Davao and he liked the activities there. He did consider chemistry, agriculture (he enrolled briefly at UP Los Baños where his parents once taught) and zoology (in preparation for a medical career) as courses but eventually decided to shift to fisheries at UP Diliman.

“The moment I stepped into the College of Fisheries, I knew it was what I wanted.”

After finishing his masters in fisheries at UPV in 1988, “*tuloy tuloy na*” (things went smoothly). He started as a technical services manager of FeedPro Corporation (now Santeh Feeds Corp.), a company involved in aquafeed manufacturing. This job allowed him to move around a lot and get to know the problems and trends in the aquaculture industry. It was there where he saw the need to develop more progressive feeding technologies.

As it was, “60-75% of the cost of production of intensive aquaculture systems went to feeds.”

After five years with FeedPro, he resigned to go into private business.

“It so happened that my wife is a very good businesswoman. She was very instrumental in starting my own business.”

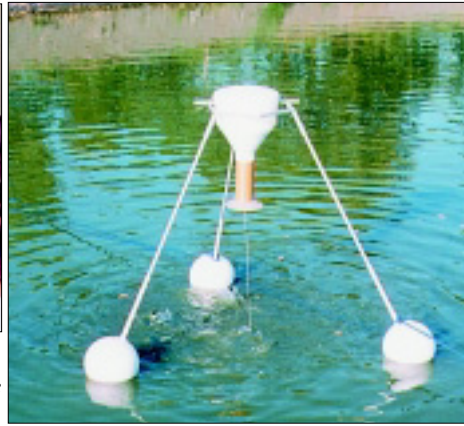
Being more of a “technical guy” than a “business guy,” he initially invested more time on research and development than on marketing. He gambled his savings of five years in the development of a demand-type feeding equipment and after a year came up with his kinetic fish feeder. The cost of the mold alone was about half a million.

“I knew it was going to pay off and it did. Right now, I have over 2,000 units of kinetic feeders sold and have come up with

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*Philip Cruz and his inventions (top to bottom): the kinetic fish feeder, diesel-powered aerator (developed with Gilbert Opinion), and marine cages*



five other feeder models for various applications from cages to hatcheries.”

Making it good in the business also requires the ability to take problems as opportunities. This was Philip’s recent experience with the rapidly growing cage farming industry.

“I feel that I am in the right place at the right time.”

There is enormous interest in mariculture right now. Sea cage culture became an alternative beginning the early 1990’s when the catch from capture fisheries and pond culture declined due to the destruction and overexploitation of mangrove and marine resources. The Philippines started to import fish cages mostly from Norway.

“But they were too expensive and did not come with the technology. I figured, we have the expertise to develop equipment and technologies that are more suited to local needs and conditions.”

In 1997, he acquired a research loan from the government’s science body to develop and test various modern cage designs. At present, he has already three cage models with over 35 units installed. He is now studying the feasi-

bility of establishing a model mariculture investment park that will have its own marina-type mooring facilities, cage equipment and centralized utilities for hatchery and processing. This can be operated either by a private investor, the local government or a farmers’ cooperative.

“This can make feasible the concept of shared use of resources,” he said.

Given lack of funds of the local government and limited capability of farmers’ cooperatives, he suggests that a private investor be responsible for operating and maintaining the park facilities and rent them out to farmers. The local government could then monitor the maintenance of the facilities in terms of safety and environmental conservation.

“The risk of localized waste accumulation can be minimized because the mooring system can be regulated in such a way that after two or three crops, the cages can be moved to another place. Seaweed or bivalves culture can be done in the original area.”

He believes that for a person to succeed in the aquaculture industry, he or she must have a good grasp of the technical aspects of the business.

“I feel I have enough technical knowledge, so I am taking on partners to complement me on the marketing aspect.”

An aquaculture entrepreneur must also be versatile and innovative because fish farming is a new and dynamic industry where one cannot establish clear cut ways and means to do things in the most efficient way.

“We start with whatever is available, innovate and adapt to what turns out to be more cost-effective and productive.”

He or she must be self-reliant “because government guidance is not very strong as far as fisheries development is concerned” unlike in some countries where “*hanggang sa dulo tutulongan sila ng kanilang gobyerno*” (their government would support them all the way). He cites the crash in the tiger shrimp industry in the late 1980’s to the early 1990’s, as an example.

“Here, developments in the industry are pretty much allowed to take their own course

“Here, developments in the industry are pretty much allowed to take their own course

*The Cruz family runs honeybee culture (right) and milkfish processing business in Negros Occidental*



## Two aquaculturists: from country to country, from site to site

By **EGasataya**

The career of an aquaculturist is challenging. It provides plenty of opportunities for professional development and personal satisfaction. Living proofs are successful Filipino aquaculturists Vincent Encena II and Arlene de la Vega.

One can never imagine that Vincent has served several government agencies and has been to various countries for research and development. He seems too young.

Vincent started as a technician of a scallop hatchery owned by Stellar Sea Farms in Manila. Then, he came to work for SEAFDEC/AQD's mollusc project in 1993-1995 in Iloilo. His expertise and experience later paved the way for him to join Charoen Pokphand Feedmill Company in Madras, Tamil Nadu, India where he worked as a prawn culture technician. Afterwards, he came back to AQD and again served as technical assistant for its mollusc project.

But in 1997, he got hired by Brunei Darussalam's Department of Fisheries - Ministry of Industry and Primary Resources as site staff for their abalone study. He has stayed there since then.



Vincent Encena II



Arlene De la Vega

Vincent seemed a man destined to succeed in his chosen field. Now in the peak of his career, one cannot simply ignore how he worked his way to the top. Asked what inspired him to pursue his career as an aquaculturist, he said it was more of a practical decision. Originally, he was enrolled as an engineering student at the University of the Philippines, but later shifted to BS Fisheries with a major in inland fisheries / aquaculture. He said he wanted to be different from his family so he dared to try a different path. He believes in the quote: "Better one's path though untrdden than the path of another well made."

Besides, he saw plenty of career prospects in fisheries after

## THE AQUACULTURE TECHNICIAN: INDUSTRY "WORKHORSE"

By **RY Buendia**

Aquaculture technicians are the backbone of the aquaculture industry. Their expertise is honed by years of dedication and hard work. For example, they work night and day especially when the stocks are ready for harvest. Past midnight to early morning for them is "hora de peligro" (critical hours). They conduct monitoring for "hangla" or dissolved oxygen depletion, and they watch, most of all, for poachers.

"To become a successful technician, one must be dynamic," says Neil Raphael Jamon, an aquaculture technician of 14 years. "Oftentimes, growing areas have different conditions. For instance, soil quality even in adjacent ponds is not the same. One has to be open-minded and must learn how to listen to others. Even 'failure technicians' have their own stories to tell."

"Today, prospects are bright for would-be technicians, just like when I started as a technical sales representative after I finished Fisheries at UP Visayas in 1990.

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Jam (above) with Thailand's shrimp expert Siri Tookwinas (second from right) at AQD's Dumangas shrimp demonstration ponds

graduation. Among these were: (1) research and development like the work at SEAFDEC, UPV College of Fisheries, UP Marine Science Institute; (2) government service like the mandate of BFAR and DA-FSP; (3) teaching at ISCOF, UPV and others; (4) as a fish farmer, aquaculturist, or technician working in a hatchery or grow-out production; and (5) the work of non-gov-

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ernment organizations particularly on coastal resources management.

Vincent said his experience at AQD working with JICA expert Masahiro Hosoya on the abalone project has been extremely useful and later hooked him to the job. The dearth of information on the seed production and culture of the tropical abalone, and the signs of overexploitation and the steady decline of abalone harvest deepened his concern and interest in the field. He began reading about abalone culture which he hope will become a sustainable industry in the Philippines.

Despite his overwhelming enthusiasm, he encountered problems and made mistakes. But he said hard work and perseverance always brought him closer to success. He has experienced spending sleepless nights observing the stock under his care, trying to solve technical problems, and reading volumes of papers and research results. Of course, the low feeling on the job is outweighed most of the time by the fulfillment of having a manuscript accepted for publication in a science journal.

Vincent revealed that the greatest fulfillment an aquaculturist like him can get is neither monetary nor prestige or recognition. Rather, it is the thought that he has contributed to the development of the industry which has helped uplift the difficult life of fisherfolk families.

Vincent is from Sta. Barbara, Iloilo.

Nobody was surprised when Arlene de la Vega became a recipient of the BFAR Scholarship Program in 1980-84 and when she took the job as a fisheries specialist right after graduation. Her impressive academic track record speaks for the kind of person she is, both as a student and a professional. Arlene sums herself up in a few words - "I love my profession."

That is why she held increasingly responsible positions in government and private companies in the country. Presently, she is the marketing manager of the Integrated Aquaculture Specialists, Inc. (INTAQ) since 1997. Previously, she was farm manager of RAM Aqua Farm in Negros Occidental from 1994-1997; research assistant of the UP Visayas - Roche Philippines' project on astaxanthin at UPV's brackishwater aquaculture center in Leganes, Iloilo, 1986-1989; and fishery extension specialist at the ADB-assisted aquaculture project with BFAR in Roxas City, 1984-1986.

When asked what persuaded her to enter this field, Arlene said that she was attracted by the big stipend granted to fisheries students during her time. But after graduation, she learned a lot of things that urged her to do something great in her own way. She planned to own a small fishpond where she can conduct her experiments. But job opportunities were overflowing for BS Fisheries graduates, like working as an aquaculture technician for fishpond/ fishpen/fish cage operators, as a technical/sales representative for aquaculture companies, as an extension worker for government agencies, as a hatchery technician and as a teacher in fisheries schools.

#### THE AQUACULTURE TECH ... CONTINUED

Fishery production is rapidly shifting towards aquaculture due to the decline in sea catch. There are also new technologies like open sea culture of fishes and seaweeds. Tiger shrimp culture is picking up in Southeast Asia, India and some Middle East countries because of advances in technology (e.g., green water, probiotics and environment-friendly aquaculture). It is also a lucrative dollar-earning industry," he added.

According to him, aquaculture corporations and private fishpond owners have different ways in hiring technicians. Corporations, academic institutions and research and development agencies hire technicians through advertisements in newspapers, radio or television. They prefer young and healthy new college graduates (with a degree in fisheries, bio-sciences or a diploma in fish technology) because they can be trained easily. Trainings are usually on production protocol, the use of monitoring equipment and how to sell products. Senior technicians supervise new recruits.

This is the formative stage, so Mr. Jamon advises the neophytes to take advantage of it. He said that they should make it a habit to follow instructions correctly, observe and ask the right questions and be aggressive. He also recommends flexibility. This attitude ensures more experience and builds their confidence.

"Mistakes here are not considered a 'mortal sin'."

On the other hand, pond owners are a small and closely-knit group. They usually hire experienced technicians through reference, scouting or research. Once hired, a technician's main responsibility is to produce the projected production. Personal qualities count so much because the work involves dealing with people, equipment and machineries.

"Make friends and learn how to be lovable. Maintain constant contact with your former colleagues and classmates. They make good references. Salary is lesser than

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At first, fishpond operators and owners met her idealistic enthusiasm with skepticism. Actual dealings with fish farmers were the most challenging phase of her entire career but this did not discourage her. More so, the fulfillment she felt came from the fact that she was able to share her knowledge with fishpond operators and caretakers and helped them improve their production and increase the profitability of their business venture.

Experience has richly equipped Arlene with the necessary knowledge and skills the job demands. This, aside from making her a widely-traveled specialist, consultant and manager. She has gone to Bangkok, Thailand and Singapore.

Arlene graduated *cum laude* from UP Visayas, finished her MS Fisheries also at the same university in 1989. She hails from Lucena City. ###



## CAREER 2

# THE RESEARCHERS



*Dr. Evelyn Grace de Jesus*



*Dr. Felicitas Pascual*



*Mr. Siri Tookwinas*



*Mr. Wilfredo Yap*

## Give scientific research another dimension

By **MB Surtida**

Aquaculture research in both government and academe are job areas for aspiring researchers. These job areas differ slightly in that researchers in government are relatively constrained by the mission of their office and their changing priorities while researchers in the academe are able to pursue their research interests. But government researchers have more freedom to conduct research in that they can be assured of a funding and a job in research, while researchers in the academe teach and constantly need to secure funding.

Big, corporate industrial organizations and non-government organizations (NGO) are also areas to consider, although in the Philippines, organizations such as these with aquaculture components come few and far between. An example of a corporate set-up was the aquaculture division of San Miguel Corporation which folded up after a few years of operation, while the NGO Philippine Business for Social Progress collaborates with research institutions to do the research activities for them, saving on funds needed for other priorities.

Nevertheless, all these areas are worth considering if one desires to work as an aquaculture researcher. With the proper academic preparation and necessary motivation, landing a job in aquaculture research may not be so difficult. The following are experiences of people who have been working as aquaculture researchers for several years now. Their experiences as researchers are eye-openers to the world of aquaculture research.

**Evelyn Grace de Jesus**, Doctor of Zoology

Evelyn Grace de Jesus, “Bing” as everyone calls her, is an aquaculture researcher at SEAFDEC/AQD. She has barely completed ten years as researcher in aquaculture but has experiences

that might as well be that of a seasoned researcher. She has three degrees: Bachelor of Science in Biology (from UP Los Banos), Master of Science in Zoology (University of Tokyo), and Doctor of Zoology (University of Tokyo). She has published several papers on larval physiology.

For Bing, aquaculture research demands the same hard work, dedication, creativity, and curiosity as in any field of research. But a strong background in biology, chemistry, biochemistry is necessary. She says, however, that the job is not lucrative in the Philippines because R&D activities are limited to SEAFDEC, a few government agencies, universities and colleges, while private enterprises do not have a research component. But research work that is directly necessary for production (pathologists, chemists, phycologists) would have better employment opportunities.

Bing finds that the most appealing part of her job is the chance to understand the biology of marine organisms. She says, “it is never boring because each experiment that one designs and does is a challenge to answer a different question or try a different approach. There is always the promise of finding something new.”

For Bing, her job is unceasing study. A researcher’s major activities include reading (keeping updated about the activities in one’s field or related field), planning and doing experiments, analyzing results, and publishing one’s findings. She likes reading and planning best. She adds that through her readings, she gets to know about what other scientists do all over the world and a lot of times it is awe-inspiring and at the same time humbling. When she comes across a super paper, it gets her to think-

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ing, "how did they think about this?"

She also likes doing experiments. According to her, during the course of her experiments, she goes through different emotions. She worries, prays that everything would go well, feels depressed, and racks her brains through a failed experiment. She goes through a high though when she gets good results.

For Bing, the employment scenario for aquaculture research would definitely improve, what with the emphasis on improved production and development of sustainable systems. But she says that it can barely compete with information technology-related jobs and health care.

Bing pushes for research in basic science. She believes that aquaculture must have a strong science base that would anchor applications in production.

Lastly, Bing says that "research is not a 9-5 job. For the amount of time and effort you put into the job, the pay is not too good. But if you are looking for a job that constantly challenges, this is for you."

#### **Felicitas Piedad-Pascual, Ph.D Nutrition**

Dr. Pascual was an aquaculture researcher at SEAFDEC/AQD for 15 years. As a researcher, she planned nutrition and feed development activities, developed practical diets for tiger shrimp and milkfish grow-out, and conducted pond studies for effectiveness of formulated diets screened under laboratory conditions, among many other jobs such as being a consultant or head of office.

Her productive years as researcher brought her many awards, among them the Elvira O. Tan Memorial Award, Five Thousand Personalities of the World 1986, chosen one of the thirty-three leaders in Nutrition, Dietetics Association of the Philippines 1985, and the World Who's Who of Women, 3rd edition, 1976.

After her retirement in 1991, she went into consulting and textbook writing and editing. She is currently editing a textbook in *Aquaculture Nutrition* and has just published a textbook which she co-authored with JW Hertrampf, titled *Handbook of Feeds*, 2000, published by Kluwer Academic Publisher, the Netherlands.

She has three degrees, BS Pharmacy (UP Diliman), MS Foods and Nutrition (Michigan State University), and PhD Nutrition (Iowa State University). Prior to being an aquaculture nutrition researcher, Dr. Pascual was into research in human nutrition.

For her, getting into AQD to work on aquaculture nutrition was an accident which proved to be a blessing. Although she says that there is relatively little money in research, she found satisfaction in having to present papers in conferences and meeting colleagues which her job as a researcher at AQD afforded.

For Dr. Pascual, a master's degree is necessary to become an aquaculture researcher and preferably a PhD with a dissertation. For her, aquaculture research is a great challenge and demands dedication, honesty, patience, perseverance, industry and hard work, and humility in order to have good relations with others.

She believes that one cannot do research alone.

Dr. Pascual mentions institutions that conduct aquaculture research such as AQD, UP Visayas, Mindanao State University, other colleges of fisheries, feed companies like San Miguel Corporation, Purina, the International Development Research Center, and the International Foundation of Science (IFS). She particularly mentions IFS as an institution that encourages and funds researches of young graduates.

She enjoys most the planning and experimental phases of research most. She says that these two phases bring both negative and positive results. If positive results are obtained, one becomes very satisfied, happy, and inspired to do more. Negative results challenge the researcher to look for other ways to achieve positive results. Sometimes, the "negative" results become blessings in disguise and can lead to even better results that one did not expect. In short, research for her is both challenging and exciting. She further adds that results of research can be visible or invisible; visible in terms of monetary compensation and invisible in terms of satisfaction, honor, respect of colleagues and the community.

For a career in aquaculture research, she urges that one should know whether one genuinely likes to do research. She observes some unfortunate researchers who go through rigorous schooling, go through an MS degree, but later find out that they do not exactly enjoy the whole process of research work. She reminds would-be researchers that when you love your work, there is less stress and one can accomplish more. Money does not always bring happiness, it can be the root of evil.

#### **Siri Tookwinas, MS Environmental Science**

Mr. Tookwinas of the Department of Fisheries, Thailand, is the Director of the Marine Shrimp Research and Development Institute. He has two degrees: Bachelor of Science (Kasetsart University, Thailand) and Master of Science (University of Alberta, Canada). He has published several scientific papers in refereed journals on cockles, shrimp, mudcrab, seabass, grouper, and seaweed; on farming systems, water quality and effluents, coastal aquaculture, and biotechnology. He has recently published *Closed-recirculating shrimp farming system*, a manual on a shrimp farming technology that is environment-friendly but highly profitable. This shrimp technology is being pushed by SEAFDEC to be used by interested ASEAN or SEAFDEC member countries.

For Mr. Tookwinas, interest in aquarium fish, swimming, or scuba diving would boost a person's edge as an aquaculture researcher but a degree on the biological sciences, fisheries science, environmental science, food technological science and related fields would be necessary.

For him, aquaculture research is a lucrative job because aquaculture products have been gaining popularity in the past years and he expects the trend to continue. Besides, such products are within reach of the mass population due to its reasonable price.

For Mr. Tookwinas, interest in fisheries is a plus in doing aquaculture research. As a young student in secondary and high school, Mr. Tookwinas loved to work on aquaculture projects and liked to watch sea explorer movies. He also likes scuba diving. When he joined the Department of Fisheries, he worked on aquaculture management systems.

As a researcher, he works on fisheries survey and ecological management of aquaculture systems. Particularly interesting for him is setting a system or model on results from a survey.

In Thailand, Mr. Tookwinas identifies fish disease, hatchery biology (reproductive biology) and water chemistry as good areas to specialize in. He says that these are relatively new areas, and thus, employment demands on these fields are plentiful compared with the other areas.

He adds that for the aquaculture industry to expand in Thailand and thus create more jobs, research on reproductive biology, genetic biology, aquatic environmental science, food technology, and disease should be strengthened.

Lastly, he says that in Thailand, aquaculture research plays a big role in production. Mr. Tookwinas says that investment in aquaculture research is minimal in Thailand. It is less than 5%, he says. In his opinion, investment in research must be more than 10% of production.

#### **Wilfredo G. Yap, MS Oceanography**

Fred Yap started his career in fisheries in the late sixties. He went on to become a researcher at SEAFDEC/AQD and was tapped by the Food and Agriculture Organization (FAO) to become Chief Technical Adviser to the United Nations Development Programme to assist in shrimp culture development in Indonesia and later, to the Islamic Republic of Iran. Various short-term missions for FAO took him to China, Kenya, and Mozambique and private consulting firms sent him to Saudi Arabia and Malaysia in the same capacity. He is affiliated as a Fishery Resource Specialist with the Aquafarming Development Foundation, Inc., a non-stock, non-profit technical service organization. He holds two degrees: BS Fisheries (Mindanao State University) and MS Oceanography (University of Hawaii).

For Fred Yap, one does not need to be a fisheries graduate to be an aquaculture researcher because aquaculture is a multidisciplinary field. A degree in engineering, chemistry, biology, and economics would do. But he says that the job market is not as big as computer science or engineering because not many institutions are involved in aquaculture research. Research work is never as lucrative as being in business or in specialized professions like accounting, law, or medicine. He adds that if one wants to get rich quick, this is not the right career path.

Fred Yap looks back to the Dean of the College of Fisheries of the Mindanao State University as the person who opened his eyes to the wonders and importance of aquatic resources.

In research, he enjoys being out in the field for data collection. He says that finding something new which had never been known before is a reward in itself. For example, in one of his trips, he found the reason why the brown mussel or *amahong* can never be found adhering to bamboos, pilings, or other substrates like the green mussel, making them impossible to farm. He observed that the brown mussel spats settled only on the lip of living brown mussels and often formed dense mats on the seabed.

Fred Yap says that it is unfortunate that aquaculture research is not given much emphasis and support. There are more opportunities for those specializing in aquaculture but not necessarily in research. He says that if one knows how to breed or raise fish or shrimps consistently in a way that would give good return on investments, chances are one can always find work whether at home or abroad.

For Fred Yap, the aquaculture industry would expand if there are more risk takers who would invest in new developments. He adds, "research is important in order to be always competitive, but without bold entrepreneurs and incentives from government, no research would make the Philippine aquaculture industry flourish and capable of contributing fully to national economic development in terms of creating wealth, generating livelihood and employment, alleviating poverty and earning foreign exchange."

###



# THE GOVERNMENT EXTENSIONISTS



*Roed Shane Hablon and Erwin Pador deal with different kinds of people like the members of a local cooperative in Aklan*

## Bring science closer to the communities

By **AJ España**

In the course of their work which involves the transfer of aquaculture technology to fish farmers – big or small – in the communities, Erwin Pador and Roed Shane Hablon get to interact with all sorts of people everyday – women, the youth, the aged, businessmen and government officials. Both of them rose from the ranks. Erwin is now the regional project coordinator of the Fisheries Resource Management Project (FRMP) while Roed is officer-in-charge of the Extension, Training and Communications Division (ETCD) at the Bureau of Fisheries and Aquatic Resources's regional office in Iloilo City.

Graduates of BS in Fisheries – Erwin from UP Visayas and Roed from the Northern Iloilo Polytechnic State College, they describe their job as challenging because they “try to connect the art of aquaculture with science.”

“We have to have academic preparation because we cannot extend or teach something we do not know.”

They simplify scientific technology and try to make it work in the field. Transfer of knowledge also involves correcting common misconceptions fish farmers have about their occupation.

For example, farmers believe that the number of goby increases when it rains. Goby is considered a pest because it competes with the cultured milkfish for space, food and oxygen in fishponds. Or, milkfish gives out a bad smell when fed with chicken manure.

“We explain to them that goby proliferates when their eggs hatch – whether it rains or not, and chicken manure is used not as feeds but as fertilizers to enhance the growth of plankton which serve as food for fishes in the pond.”

Plankton are tiny microscopic plants. Their presence is indicated by the greenish coloration of water.

At the same time, the two technicians learn indigenous technology from the farmers, like the use of “*banata*” gear which follows the countercurrent system in harvesting milkfish. The mouth of the gear, which actually is a bamboo screen, opens when water comes into the pond during high tide and takes in milkfish which are known to swim against the current. At low tide, the screen closes due to water pressure from inside the pond and traps the fishes in.

“We did not take this up in the classroom,” they both say.

What about adequate compensation?

“Definitely not in the financial aspect. Our salaries are hardly commensurate to our position and the multiple roles that we play in the agency.”

They have administrative, financial, field and other extra assignments because of the lack of personnel at BFAR. This started when BFAR was integrated with the Department of Agriculture (DA) in 1986. A lot of plantilla positions were absorbed into the DA and BFAR's functions became recommendatory. In 1998, RA 8850 or the Fisheries Code of 1998 again prescribed the reconstitution of BFAR as a line bureau with independent functions within DA and allowed the former to get back its fisheries technical plantilla positions. However, casual employees still are not assured of getting permanent status.

“This will largely depend on political intervention, the *padrino* system and other funny things,” Erwin says.

“There was also the implementation of the Local Government Code of 1991 that provided municipal aquaculturists to be paid by their respective local government units. Salaries of municipal employees depend on their local government’s level of income. So, employees of fifth class municipalities can hardly expect to get paid much.”

Erwin and Roed said that as a result, some government employees lose focus on their job and look for other sources of income.

One case, as cited by the BFAR central office, is that of a fisheries extension specialist in a local government who was obliged to render agricultural services in crops and livestock due to manpower deficiencies.

Aquaculture extensionists also have to contend with frustrating situations like dealing with inconsistent government policies. BFAR has banned the use of a certain pesticide for snails because of its harmful effects on the environment.

“But they prescribed no alternatives except for tobacco dust which is slow acting and not readily available. So fish farmers either spend extra money to pay laborers to manually pick up the shells or continue to use the banned chemical illegally.”

What made them stay with BFAR for 20 years now? Basically, it is psychic rewards over the relevance of their work.

“We go to different places to facilitate meetings and conduct trainings. We teach people appropriate technology to increase their production and conserve their environmental resources. We actually are workers who extend to the community the government’s thrusts on adequate food and increased income.”

BFAR is into seaweed and fish cage culture, mudcrab fattening, backyard aquaculture, including habitat enhancement and mangrove reforestation. These technologies are made available to small farmers, thus their big clientele in the rural areas. Field technicians also have to have basic knowledge on family planning and religion so they are able to discuss common issues with the common people — as their job also involves community organizing. They teach records keeping, savings mobilization and recording of minutes of meetings.

And with the BFAR vision and present mission under RA 8550, a revitalized national extension program will be strengthened with its renewed line function mandates reviving the Regional Field Units in the 15 regions of the country. It calls for an extension modernization program, the operationalization of provincial fisheries offices and the full utilization of regional aquaculture facilities to serve as outreach centers for training and demonstration to fish farmers.

Their job has made them grow both professionally and personally. Erwin and Roed are not lacking in opportunities for career advancement. They go to other

countries like Thailand and Indonesia to attend relevant trainings and conferences. Erwin went to Belgium to get his MA in Marine Ecology in 1994. Roed is presently taking up Masters in Marine Affairs at UP Visayas with a scholarship grant from the Philippine Council for Aquatic and Marine Resources Development (PCAMRD). He was recently offered to manage the Visayan Sea coastal resource management project that covers Palawan and three other regions. But he decided to stay close to his wife and child.

“My family is my top priority,” he said.

On the other hand, Erwin hears such statements as: “*UP graduate ka pero sa BFAR ka lang gihapon asta subong?*” (You are a UP graduate but you are still with BFAR?) This, when most of his fellow fisheries graduates were more concerned with becoming either fishpond managers or owners.

“*Mababaw lang ang kaligayahan ko* (My basis for happiness is quite simple),” he says.

Extension work where he meets a lot of people, including the *pilosopo*, the hard-headed and crazy ones, he says, teaches him to be more tolerant and patient.

“I have learned to recognize other people’s strengths and accept their shortcomings. I have also been exposed and have adjusted to all kinds of temperament – Bulaqueño, Kapampangan, Tagalog, Muslim, Ilonggo.”

Roed goes by the words, “No man is an island.” He values the kind of bonding among field workers like them. They are not conscious of hierarchies and power structures. They treat each other as equals and learn from each other’s strengths and weaknesses. They have developed a support system, not only among themselves but also with the people they meet.

“I am not afraid of getting lost or running out of money anywhere because I know a lot of people – from the mayors down to the smallest fish farmers — would be willing to help me.”

He admits that through these people, he becomes more effective in his work.

“Making other people see how we enjoy what we do would encourage especially the fresh graduates to go into extension work,” Erwin says.

“Our contemporaries who do not go to the field look a lot older than us,” Roed laughs.

The BFAR national office, through Mr. Nelson Lopez who is chief of the inland fisheries and aquaculture division, describes aquaculture extensionists thus:

“Overall, the existing aquaculture extensionists of today and the remnants of the devolution are the same products of BFAR who are well-equipped despite the lack of logistics, well-trained minus the lack of equipment and well-respected by their clients, armed only by their long experience and sincere services in their field.”

###



# THE INFORMATION SPECIALISTS

## The information group at SEAFDEC

The group works together to produce the *SEAFDEC Newsletter*, a quarterly, which publishes news on all aspects of fisheries related to research, training and information in SEAFDEC Member-Countries. The work is done

mainly through e-mail; the newsletter is published in Bangkok.



**Suriyan Vitchitlekarn**  
32, Information Officer and Co-Editor, *SEAFDEC Newsletter*  
SEAFDEC Secretariat, Bangkok, Thailand  
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*"Communication is basic, it's a foundation. Then, keep yourself updated in your field of interest."*



**Nualanong Tongdee**  
29, Policy and Program Officer and Co-editor, *SEAFDEC Newsletter*  
SEAFDEC Secretariat, Bangkok, Thailand  
<nual@seafdec.org>  
*"Work, work, work"*

*Suriyan and Nae*

**Jaruwan Mahitthi**  
SEAFDEC Training Department, Samut Prakan, Thailand  
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*"I jumped into the information field because of my keen interest though I have a fisheries background."*

**Ronnie Tan**  
SEAFDEC Marine Fisheries Research Department, Singapore  
<mfrdlibr@pacific.net.sg>

*Azam and Mila*



**Muhamad Nor Azam Bin Lajin**  
34, Head of Information and Training Section, SEAFDEC Marine Fisheries Research, Development and Management Department, Kuala Terengganu, Malaysia  
<azmseafdec@po.jaring.my>  
*"Whatever you do, God always know. Do it right"*



**Milagros Castaños**  
35, Head of Development Communication Unit, SEAFDEC Aquaculture Department, Iloilo, Philippines  
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*"Know your passion and go for it"*

By **MT Castaños**

The pesky prepositions of the English language can be the stuff of nightmares because professional reputation and competency can depend on it. Though English is not the mother tongue of most information officers in southeast Asia, language competency is nonetheless the first and foremost requirement of an information officer working outside of his home country. The lingua franca of the international community is English, with French and Spanish only coming in close second and third.

But an information career is so much more than language. In the words of the information officers (IO) of SEAFDEC, information dissemination is:

*"... there to educate people, and this would contribute a lot to this world. Like the oft-repeated phrase 'give a man a fish and he will live for a day, teach a man how to fish and he will live for a lifetime,' information dissemination, particularly the web-based technology, is the era of human education."* – Suriyan Vichitlekarn of SEAFDEC Secretariat, Bangkok, Thailand

*"... a tool to publicize what the organization has been doing. It is very important!"* – Nualanong Tongdee, also of SEAFDEC Secretariat

A government IO in the Philippines, Lourdes Sampani Arciaga of Cebu's agriculture office, considers fisheries information as "our crusade for fish sufficiency and security. It is the telephone (network) among the various stakeholders of the fishery sector."

### The work specifics

The job of the IO is basically repackaging technical information so that it would be more understandable to lay persons. The position entails skills in writing and visualization, knowledge of the target audience, and understanding of the topics under consideration. It is also a collaborative effort with other IOs, with researchers in the field, with top management of organizations, and, more to the point, with the users of information like the fish farmers.

Suriyan says his office produces reading materials for promotional purposes. Nualanong, called Nae by friends, specifies these as newsletters, brochures, annual reports, and announcements. Lourdes on the other hand added more to the list – techno-guides, fisheries profiles, directories of the industry's various sectors, and conference proceedings.

# Pete Bueno: information specialist extra-ordinaire

Pedro Bueno — Pete to his friends and colleagues — has been elected head of NACA by its governing council. NACA<sup>1</sup> started as a development arm of the United Nations' Food and Agriculture Organization (FAO) but became an autonomous regional organization owned and operated by its member governments since 1990. NACA has 14 member countries to date and is based in Bangkok, Thailand. Pete begins a 5-year term on April 1, 2001.

Before his election to this important post, Pete, 56, has established an unsurpassed track record as information specialist. He began his career as a lecturer in journalism and other communications courses at the University of the Philippines in 1966, moving on to PCARRD<sup>2</sup> as information specialist in 1972, to FRIP<sup>3</sup> as researcher and chief of technical services in 1975, SEAFDEC AQD as communications officer in 1978 (and where he was Editor of this newsletter), SEARCA<sup>4</sup> as communications manager in 1982, and IRRI<sup>5</sup> as assistant scientist in 1984.

He joined NACA as a regional information specialist in 1987; as such, he assisted in NACA's overall coordination and the management of the Secretariat, and provided advise to participating government agencies and associated institutions on project development and implementation, information and communication support. As a special assignment, he edits *Aquaculture Asia*, a commercially oriented magazine, and the *NACA Newsletter*.

Pete earned his BS Agriculture major in communications and MS Development Communication minor in economics and rural



“It might be humbling to consider that the role of information as a process is nothing but a supporting activity to science, technology development, human resources development, wealth generation, and knowledge generation and transfer. On the other hand, it might be awesomely inspiring to realize that the one and only commodity involved in all human transactions is information.”

sociology from the University of the Philippines at Los Baños in 1966 and 1978, respectively. He has also undergone formal training at the Asian Institute of Management and Australian Broadcasting Commission.

Below, he shares his views on information as a career and a mission during an e-mail interview with AQD's Mila Castaños.

## What made you take interest in working for SEAFDEC and NACA?

With SEAFDEC/AQD, and that was a long time ago, a new unit was being established which was to be the regional outreach arm of AQD. A communications support component was needed. I thought that was a good pioneering job. NACA, which was then a project, also needed to strengthen its communications component. I was information specialist for both the NACA project and the regional seafarming development project of UNDP/FAO. A regional project was always a chancy thing — it has a definite life span after which project workers have to look for another job. I believed NACA was going to become institutionalized. Which is why I took the chance of leaving a regular job at IRRI which hired me as assistant scientist for a short-term (initially 14 months) contract.

## What sort of career path would technical organizations offer to info specialists?

An information specialist can build up a strong development communications support program for a technical organization — which includes in-house communication in support of management, and an outreach arm that includes supporting the training unit and, of course, projecting the public image of the institution. The last is not the same as a PR (public relations) job. An information support arm is an essential part of any organization.

1 Network of Aquaculture Centres in Asia-Pacific

2 Philippine Council for Agriculture and Resources Development Research, Los Baños, Laguna

3 Forest Research Institute of the Philippines, Los Baños, Laguna

4 Southeast Asian Regional Center for Research and Graduate Studies in Agriculture, Los Baños, Laguna

5 International Rice Research Institute, Los Baños, Laguna

PETE ... FROM PAGE 31

**Describe a typical working day when you were an info specialist. Your highest and lowest points?**

You come in and rummage through the incoming communications; reply or get someone to reply to urgent requests, take a look at the deadline and work furiously to beat them (you do beat them but they keep coming); do some creative thinking over coffee with your colleagues (I find it fruitful to brainstorm over coffee or during more relaxed time periods, not in a structured and formal meeting); get back to beating deadlines; and work deep into the afternoon or night to get over the days' pile.

A high point is receiving a message from anyone that says your work is useful. A low point is receiving a request from anyone to make him/her a speech! A lower point is getting a message that you have been misunderstood or misinterpreted. An abysmal point is being told you meant malice.

**How is NACA's information unit presently organized?**

There are only the information specialist and the associate editor (we are looking for an information technologist to manage the web and the electronic based information system of NACA). There is a mailing database for publications and a clerk takes care of the routine work on this. Printing jobs are contracted.

**What are the unit's expected outputs?**

Being a secretariat of an intergovernmental organization — everyone in the secretariat has an information function. The technical officers act as resource persons and advise on technical matters. The information unit coordinates the information support activities of the network.

The NACA governing council has approved a reorientation of the network from mainly institution-based to people-centered. This necessarily brings into the system a strong information support that will need to rely much on electronic computing and the internet. Immediate expected outputs are information messages in the form of policy guides, packages of information for better practices aimed at governments and farmers. The intended "outputs" are better farmers, better policies, a sustainable in-

dustry and resource base, and a knowledge-based rather than a resource-dependent sector.

**What do you think is the future direction of information management and dissemination?**

Information management will be relying more on the application of information technology (IT). The processes are still the same but the collection, analysis, organization, storage, retrieval and access procedures will be tremendously facilitated by IT. The benefits are clear but the downside, even as we see it now occurring, include: (1) glut of info the quality of which is dubious; (2) an increasing disparity between those who have the skills and access to it and those who don't (this, in practical reality translates to poor farmers vs. those who are better off).

This, of course, is nothing new. Even now you need mediating agents and institutions to improve access to information, technology and advice. Their roles will be

even more critical. One phenomenon that the World Wide Web is bringing about is personal networking which is great because it can bypass bureaucracy and get around institutional constraints. You'd think that this will also eliminate the need for information brokers like NACA, SEAFDEC/AQD, as well as information units like ours. Not quite, because the easy accessibility (placing or putting online as well as retrieving) of information will even more require the need for quality control — what some people would liken to "honest brokers". This makes the role of institutions like NACA and SEAFDEC even more critical.

Reliance on the new information and communication technology or ICT will require certain qualities, not only in information managers but in managers as a whole. Changes would not be fundamental however; anyone who is a good manager can be a good ICT manager, but certain qualities will become even more important. A recent survey on e-management by the *Economist* magazine (11 November 2000) listed 10 qualities. I would like to share them by highlighting eight that I think would apply most to information and communications managers in R and D organizations:

“The World Wide Web has brought personal networking, and can even bypass bureaucracy and get around institutional constraints. You'd think that this will eliminate the need for information brokers like NACA, SEAFDEC/AQD, as well as information units like ours. Not quite, because the easy accessibility of information will even more require the need for quality control — what some people would liken to 'honest brokers'. This makes the role of institutions like NACA and SEAFDEC even more critical.”



## INFO SPECIALISTS ... FROM PAGE 30

An information group also produces posters, leaflets and flyers, video programs, radio programs, how-to-manuals, reference books, and CD-Roms; provide content to the institution's website; be the prime mover of the institution's participation in fairs and exhibits; and deal with the mass media to some extent. In other words, any or all forms of media as long as the message gets across or a technology gets airtime. This work has been called "development communication" or communication for country-side development.

Mr. Pedro Bueno, the head of the intergovernmental body Network of Aquaculture Centres in Asia-Pacific and who has earned his spurs as aquaculture information specialist in Southeast Asia, puts this better in perspective, saying that "an information specialist can build up a strong communications program for a technical organization. (This can cover) in-house communication in support of management, an outreach arm that can support training, and (the job) of projecting the public image of an institution." Please see interview-profile on page 31-32.

### How does one prepare for it?

One can start this career from two disciplines: a degree in people communication (mass communication, development communication and related fields) or a degree in a technical field (agriculture, fisheries, biology). The caveats for success: in the first one, the IO must quickly pick up the lingo of science; and in the second, the IO must seek to understand human communication. Of course, one can always shift career midstream, that is, from an established aquaculture career in research to, say, environment education like Dr. Teodora Bagarinao of SEAFDEC (see her interview on this page). Dr. Bagarinao has found fulfillment in her new assignment as Curator of FishWorld (featured on page 10, this issue).

Nae says that a good IO needs to have a very wide field of knowledge, so the most important thing is the willingness to learn and improve oneself all the time.

Suriyan clarifies further: "Information work has a unique nature as an IO must follow the movement, regionally and internationally, of the topics of interest."

Nae has a masters degree in aquaculture from the Asian Institute of Technology, Thailand, in 1995. Suriyan studied the management of agricultural knowledge systems at the Wageningen University, the Netherlands, from 1994 to 1995.

The IO of SEAFDEC in Malaysia is even a librarian by profession. Muhamad Nor Azam Bin Lajin says: "... the nature of my work is more on providing information and library services to our researchers. But since last year, I was involved in research programs so that we can have a better view of information dissemination. It is a great task for me to learn a lot of new things and I am still learning." Azam has a Diploma in Library and Information Science from MARA Technology University in Shah Alam, Selangor, Malaysia, in 1990.

The staff of the development communication unit at SEAFDEC in the Philippines have mixed backgrounds – one

## TEODORA BAGARINAO: FROM RESEARCH TO ENVIRONMENT EDUCATION



### What were your reasons for changing directions?

Research was not enough. We can not have aquaculture development from research alone. We must develop our people's capacity for development in general and for aquaculture in particular. Development must be holistic: it must look beyond aquaculture at other sectors; it involves not

only the technologies but also the users and potential users of the technologies, people who will benefit and others who will be adversely affected; it must include environment education of the general public.

### What are your career or life goals now?

Help improve environment education of the general public and science education in schools through FishWorld.

### What type of work does a museum curator /environment educator do?

These are two different jobs, and I actually do three jobs with one research salary:

- *Conduct aquaculture research as required by our Research Division, and biodiversity research as I find necessary based on the FishWorld collections and field trips*
- *Direct and manage the operations of FishWorld and curate the biodiversity collections and the arts and culture artifacts*

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editor has a fisheries degree, one is a sociologist, and one an English major. The writers and video producer have degrees in mass communication, development communication, or the fine arts. The group works on the publication of all kinds of extension materials (from manuals to videos to website content) and has recently gone into text and reference book publication with the senior research staff.

Lourdes, who also has a fisheries degree, from the University of the Philippines in the Visayas, says that "the best preparation is being well-versed in grammar, sentence composition, and paragraph development. Being a student leader and a staff of your

☞ NEXT PAGE

## INFO SPECIALISTS ... FROM PAGE 33

school paper (high school or college) is a good training for an information job. As an IO, you need to be accommodating, patient, and cautious. Make sure that what you're saying or writing are real facts. It's more important to get the truth out rather than the answers to all questions. To have an advantage, be a voracious reader."

### The daily grind

An IO can wear many hats in the course of implementing, coordinating, and evaluating information programs – he or she can be the editor, writer, publication designer, layout artist, desktop publisher, printing press liaison, radio host, video producer and writer, or webmaster. He or she can also do research on target readers, for example, profiling these readers and pre-testing and post-testing extension materials. The IO has to try on any and all roles to get the information out in the shortest time possible and in the form that is most useful to his clients.

"It would sound very weird but my main tasks can be grouped into two," Suriyan says. "First, I am responsible for the coordination and implementation of the information and statistics program, including public relations, for the SEAFDEC Secretariat. My work involves the annual reports, the *SEAFDEC Newsletter* [see box on page 30], the internet homepage, among others. (I also have to deal with) the annual meetings of the center and collaborations with other organizations. On the other hand, I am also responsible for some technical programs like the coastal fisheries management and fishing technology-related issues."

On a typical day, he looks for new developments through the internet and published materials in his field of interest before he goes to staff meetings. "The institution I most admire is FAO, the Food and Agriculture Organization. I have been using their data for most of my working career. Yahoo! also, as it has been my starting point to look for unidentified sources of information. Basically, I like both because of availability, accessibility and the coverage that match my requirement and interests."

He works with a six-member team, two technical persons, the policy officer (Nae) and an assistant, another IO, and a public relations officer. The rest of Suriyan's day is spent coordinating the team's work to ensure focus and output. "Quite a number of my working days are also spent in conferences organized by SEAFDEC or collaborating agencies. Just last year, I attended 21 such conferences."

Nae, who has a dual role, too – she is also SEAFDEC's program and policy officer – says that her day starts this way: "I check e-mail, go over the list of things to be done, then work, work, work. Before going home, I check what I have to do the next day. And every few weeks, we have a

meeting among the team to figure out the incoming events or activities of SEAFDEC and what needs to be done." Nae says she works closely with five people whose jobs include writing the articles and reports, prepare (computer) presentations and correspondence, to name a few.

Azam on the other hand, says that his work includes the conduct of training, workshops and seminars when needed. His sources of information from within his department includes their 13 researchers but he works directly with a systems analyst, a researcher, a research assistant, and another librarian. They provide information and articles to the Malaysian government's fisheries center that publishes a fisheries bulletin called the *FRI Newsletter*. "I like my work very much because it gives me a chance to learn new things, whether one realizes it or not. Last year, our team managed to organize two important SEAFDEC meetings, the 23rd program committee meeting and the Code of conduct. It was my first time to handle such conferences."

### The rewards, the future and advice to the young

"I like my work because there are always many new things to learn and to do all the time," says Nae. "I would like people who are not working in information-related fields to realize the importance of disseminating information and to provide IOs with as much information for them to work on."

Asked the same question, Suriyan replies: "I surely do like my work. I guess my work just happens to match my personality. It has allowed me to learn from many people with different views and experiences. As to the future ... it has been my dream to see

SEAFDEC as a center of information for fisheries in Southeast Asia. In other words, whenever people think of fisheries, they should think of SEAFDEC. To fulfill this dream, I believe a unified system of all SEAFDEC offices is the first area to look at, followed by improving accessibility and relevance of information. I also believe that information in the future will be more web-based. And information, to be useful, will have to be audience-specific or tailor-made. IOs must understand the audience and know the strategies to put the message across."

To students interested in being information specialists, he has this to say: "Make use of the information system available near you and you will find ways to achieve (your dream)."

Azam believes the same thing about the internet. "Information is everywhere on the internet. Apart from continuous training and knowledge we provide clients of SEAFDEC, there must also be efforts to develop relevant content that can benefit the community around us. The issue is how one can blend traditional and digital information services and enhance serv-



**Lourdes Sampani Arciaga, PIO, BFAR Region VII, Cebu City, Philippines:** "In this age of computers and the internet, where information overload is everybody's common illness, information products should be brief, concise and well illustrated. But the substance must still be intact. It must catch attention and be effective!"

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# THE EDUCATORS



Dr. Tereso Abella



Dr. Leonor Santos



Prof. Alita Openiano



Dr. Elpidio Locsin, Jr.

## Key players in manpower development

By **RIY Adan**

The importance of the aquaculture/fisheries sector in the development of Southeast Asia and the world is increasingly acknowledged. The sector is not only a major food source but is valuable for generating employment and foreign exchange.

Looking at the people in aquaculture, you will see diverse and variable personnel – depending mainly on their training and education. Education directly affects the direction of the industry. Aquaculture/fisheries curriculum should therefore be relevant and must present current issues. Education and training programs should respond to appropriate manpower needs for research, teaching and training, industry and government service, considering not only economic gains but also ecological ones.

Thus, we can say that the key players behind the aquaculture/fisheries sector are the educators, the teaching force. Everybody knows nobody gets rich from teaching. There is no money in this kind of profession. We should therefore be grateful to people serving the sector in this way.

What's the story behind their profession? What made them decide to teach? What fulfillment do they get from teaching? These questions and a few more will give us insights on what teaching aquaculture is like.

"I accepted the offer to teach right after graduation. I accepted it without second thoughts because that was my chance to work with luminaries in the field of aquaculture – the likes of Dr. Rafael Guerrero III and Dr. Catalino dela Cruz. I knew that by accepting the job, a lot of opportunities were waiting for me. Now, twenty-four years later, I know I made the right decision," states

Dr. Tereso A. Abella, dean of the Central Luzon State University (CLSU) College of Fisheries and at the same time an alumnus of the said school.

"The enthusiasm and excitement when I began teaching has not waned. There is still the urge to do more," he added.

On the other hand, Dr. Leonor M. Santos, dean of the University of the Philippines in the Visayas, College of Fisheries (UPV-CF), says there are pros and cons in academe but believes that each (industry vs academe) has its own excitement and purpose. "Teaching enables us to do both research and instruction as well as extension work, although research in the private sector is more result-oriented with immediate application. In academic instruction, we can find better answers to the *why* rather than the *how*. The industry is more interested in the *how* though."

"I find teaching challenging. As an educator, one should keep abreast with the recent trends in the industry. In the science of aquaculture, the basic principles vital in instructions can be sourced from books, manuals and journals. However, the art of growing and improving the stock is dynamic. Thus, attendance to seminars, conferences and symposia is also imperative for educators. Field visits to successful entrepreneurs and experimental ventures should be encouraged as part of instruction activities."

That is how Prof. Alita E. Openiano, dean of the School of Marine Fisheries and Technology (SMFT) at Mindanao State University (MSU) at Naawan sees the profession.

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Not all people in the academe, though, have an extensive background in aquaculture/ fisheries. Here is one president of a fisheries state college who admits not knowing anything about fish, except eating it.

“I must be frank and candid to say that I did not have any fisheries or aquaculture orientation/background prior my appointment as president of the Iloilo State College of Fisheries (ISCOF). I did not know fish beyond eating it,” says Dr. Elpidio Locsin, Jr.

But this did not hinder him from accepting the job. He believes there are aspects in the profession that he can tackle.

“To be an educator in the field of fisheries or aquaculture is highly crucial and critical. It is always crucial on the part of a teacher to translate and relate theories, concepts, ideas and principles to the level of understanding of the students or participants. In this way, the next critical aspect is to harness this motivation and desire into concrete or functional capabilities.”

Furthermore, he believes that “if a person has capabilities, the best avenue to demonstrate it is by teaching.”

These teachers agree that educators in this field should emphasize the benefits to be reaped from aquaculture; and help the students see how scientific reasoning and experience have benefited this enter-

prise. It is their job to encourage students to venture in this sector in the future – to keep the aquaculture industry alive.

The four educators interviewed all describe a feeling of accomplishment or satisfaction about their work, knowing that being involved in their fields has or will make a difference in the present and future generations. They may not gain a lot monetarily but their fulfillment from the sense of service is enough. Producing future aquaculturists, they say, is the greatest thing they can contribute to the sector and society.

“It gives me so much pleasure contributing to the development of the fisheries industry in our country. This is in terms of human resource development, supplying the industry with professionals in the fisheries and aquaculture disciplines. It is gratifying to see my former students find their own niches and succeed in their chosen profession,” says Dr. Abella.

“It is more fulfilling, too, when former students recognize the contributions and role of their teachers in their success and well-being,” says Prof. Openiano.

Nevertheless, this should be noted: Having a career that makes you feel good about yourself and your responsibilities is very important. After all, it is not enjoyable to get up and go to work everyday if you do not like what you are doing. Facing students with diverse attitudes towards the subject matter is also complicated. The ability to communicate effectively with a variety of students of different ages and backgrounds is therefore very important.

Enrollment trends in aquaculture/fisheries related courses have a great tendency to level off. One factor is substitutability of the degree with one from the natural sciences. The other is, aquaculture/fisheries traditionally is not one of the glamorous and prestigious courses. However, other schools reported an increasing trend in its enrollment. Accordingly, more students are taking related courses due to the expanding aquaculture industry, which creates job opportunities for graduates. One thing, the industry needs extensionists to disseminate technologies for the fish farmers. This is a point of entry for the graduates. Universities and other research institutions are still looking for fisheries

graduates who can teach and do independent research at the same time.

“As one moves up the ladder of being a faculty member, s/ he also expands scientific work or gets involved with the industry on a consultancy basis; or becomes an administrator in the academe or in a government institution. There is also the opportunity to work in a regional or international organization. Or, one can become an entrepreneur or a full-time consultant,” says Dr. Santos.

“But one’s career path is often a result of personal planning, aggressiveness and available opportunities,” she concludes.

“It gives me so much pleasure contributing to the development of the fisheries industry in our country. This is in terms of human resource development, supplying the industry with professionals in the fisheries and aquaculture disciplines. It is gratifying to see my former students find their own niches and succeed in their chosen profession,” says Dr. Abella.

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## How it is to teach in a state college



“I’ve been teaching for 24 years already but I’m not tired of it yet. At 44, I’m still young and have a long way to go,” says Dr. Reynaldo Paler, an expert on fisheries and aquaculture education, who organized and handles the Graduate School of the Iloilo State College of Fisheries (ISCOF). He started serving state colleges and universities at the age of 20, and became the youngest full professor at 34.

“I am solely into teaching. I can’t do any research because of time and financial constraints. How can you conduct research when you are handling a full academic load? Another thing, it is very difficult to get funding when you are in a state college because of the bureaucracy and a lot of other things. If you have a fish to feed, it will die before the funding reaches you. We can therefore say that our involvement in research lies in the theses of our students. It is indirect involvement through thesis advising.”

What made him stick to this profession?

“Teaching is a noble job, that’s why I’m still here. There is no money in this profession but what you get is the fulfillment of being able to serve your countrymen. It is purely service. The only fulfillment you get is when you can educate people, give them the necessary knowledge, so when they graduate, they are ready to accept responsibilities at work.”

“What is also challenging is the kind of teaching we give the students. If you are not intelligent, you can not enter UP. But here in ISCOF, we accept everybody. Anybody can study here. We have the privilege to teach the laggards. That is the challenge – it is very difficult to teach this kind of people. Most of these students have very weak foundations; children of peasants who can barely afford to send them to school, who themselves can barely read and write. So what can you expect from them?”

“Teaching them requires patience – we do our best, we give them the most understanding and patience.”

According to Dr. Paler, a strong educational foundation is very essential, because if there is none – then it is garbage in, garbage out.

“It is difficult to produce something good from that – that is what we are trying to do, to make these students good in something they can do. To produce something good out of them.”

In ISCOF, they don’t produce scientists but field workers. Students’ training is technology-based practicum.

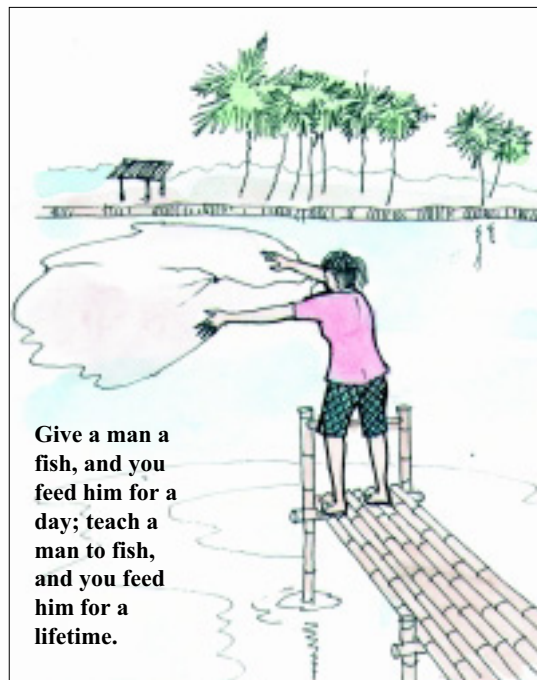
“And since most of them come from low-income families, they are already used to hard labor.”

On the other hand, Dr. Paler noted that in the present set-up, almost all courses offered in fisheries/aquaculture focus on producing scientists and researchers. It should, however, be taken into consideration that not everyone wants to and can become a scientist. Therefore, there should be strong efforts to train personnel for other aspects of the field. There should be a training ground for educators, for instance.

You cannot take a scientist out of the laboratory, put him in a classroom and expect him to teach well. He cannot become a teacher overnight. It requires a different treatment, a different approach.

“*Tao ‘yan, hindi isda!* In teaching, you are handling people, not fish. One has to have the necessary social science background to effectively teach. You can’t be a mediocre in the academe. I therefore encourage those highly intelligent students in aquaculture to join the academe. We need quality educators to produce quality graduates.”

To end, Dr. Paler leaves this message: “We’re not supermen. But we are doing our best. I am fulfilled already but I know there is still a lot of things to be done. It is pure and simple work. I do not want to be called a hero – we are just doing our job - in accordance with our pledge of being a teacher. I always tell my students that we should be able to produce graduates who are better than us because when we are out of the scene already, a bigger job awaits them. That is the only goal we have: to give quality and relevant fisheries education.” -- *RIY Adan*



## CAREER 6

# THE ECONOMISTS, POLICYMAKERS AND ADVOCATES



Mr. Damrong Silpachai



Dr. Benedict Posadas



Dr. Danilo Israel



Dr. Carlos Baylon



Dr. Nerissa Salayo

## Striking a balance between theory and practice

By **AP Surtida**

Careers in aquaculture and fisheries are varied and stimulating. They often involve practical as well as intellectual skills. However, the entry to a career in aquaculture and fisheries-related occupations, like the entry to any worthwhile career, requires years of study and some form of training.

The subsequent examples will show what hard work and serious study will bring a student, if he or she puts his/her heart into it. The following experiences are of those who more or less gravitated to the social science aspect of aquaculture/fisheries such as economics, policy and advocacy. Read on.

**Mr. Damrong Silpachai**, 61, recently retired from active service in the realm of aquaculture. Still, his wisdom and influence are being felt, particularly when he joined the Food and Agriculture Organization (FAO) and a private company as a consultant in aquaculture.

In 1977, while working as a project officer in fish culture at UNICEF, he earned the UN agency a gold medal from the president of the Republic of Bangladesh for its contribution to the improvement of animal protein supply to the rural population of that country.

Mr. Silpachai continued to work for UNICEF in Nepal, and a second tour-of-duty in Bangladesh and Indonesia, until 1987. That stint with UNICEF was certainly a career highlight, being recognized as a thorough professional who made a difference in his particular field, and credited by no less than the president of Bangladesh.

Mr. Silpachai is from Chumphon province in southern Thailand. He graduated from Kasetsart University, Bangkok, in 1963 with a Fisheries Science degree. He took his Master of Arts in Zoology at the University of Missouri, Kansas, in the United States.

Upon his return, he joined the Department of Fisheries, Thailand, in various capacities until 1975 when he joined the UNICEF as project officer for fish culture in Bangladesh.

After UNICEF, he returned to Thailand in 1988 and worked on a number of projects including the evaluation of a CIDA-funded fishery project; as co-team leader on construction and design of hatchery of the *Small-swamp inland fishery* project in northern and eastern Thailand; as co-team leader of the *Accelerated aquaculture* project in northeast Thailand; as communications specialist at the Kung Krabaen Bay Royal Development Study Center in Chantaburi province, where he developed a multi-disciplinary training program, strengthening of extension services, rural development and an environmental awareness project.

In all his professional endeavors, Mr. Silpachai attempted to approach the task or challenge with a holistic view by combining the religious, cultural, philosophical, political, economic, technological and scientific components to a problem.

In a fairly recent conversation with him when he visited AQD in the Philippines, this writer asked him about his view of the communication breakdown between scientists and other highly learned individuals. Mr. Silpachai views it as a sort of disease caused by hubris or pride, and exacerbated by the individuals' narrow disciplines and their inability to see other people's views.

## MIKE PHILLIPS: FOCUS ON PEOPLE, RATHER THAN ON TECHNOLOGY



Michael Philipps, PhD, is the resident environment specialist of the Bangkok-based Network of Aquaculture Centres in Asia-Pacific (NACA). He believes that sustainable aquaculture to be effective should be treated as a component of a much larger scheme of rural development and poverty alleviation, rather

than as an isolated sector. The focal point should be on people rather than on technology, when trying to diffuse some innovations or effecting technology transfer.

Mike takes great pride in his work at NACA. Working with that organization provides Mike with tremendous opportunities to support aquaculture development at various levels — from farmers to senior government officials of member countries.

Just recently, he has seen in Vietnam the direct benefits to poor people of NACA's extension and technical cooperation activities at the grassroots level. Similarly, he has also witnessed senior government officials emphasize the importance of the work of NACA at high-level meetings in the United Nations.

Mike is extremely proud of his involvement in the recent work on the development of Asian regional technical guidelines on health management and the responsible transboundary movement of live aquatic animals. He believes it is an important milestone in government cooperation in policy development for control of aquatic animal diseases in Asia.

"Such cooperation will become increasingly important for the development of joint policies on key issues affecting Asian aquaculture," says Mike.

He anticipates some very exciting emerging activities on the educational front that he expects to have a major impact within the next five years. His contributions to the NACA

teamwork has made the organization increasingly effective in tapping the vast potential that exists for effective cooperation in aquaculture development not only in Asia, but globally.

He firmly believes that the industry, vast and diverse as it is, has many opportunities for effective collaboration, that the inclusive networking approach, promoting genuine ownership by the institutions, governments, farmers and other stakeholders, has a good future. He is sure that NACA activities will outlive the short-term donor or interest-driven projects that we see around the region today.

As an environment specialist at NACA, Mike provides environmental management and related advice to the regional aquaculture program of the organization, covering the environmental aspects of NACA's cooperative research activities, training and educational programs, information exchange and technical assistance programs.

What advice would Mike give to young people intending to enter the field?

"The virtues of patience, perseverance and hard work would come in handy. There are tremendous opportunities for skilled young people in aquaculture, which is the world's fastest growing food production sector."

The requirement for aquatic products from aquaculture will increase substantially in the future as capture fisheries fails to meet the demand for food. Similarly, over a billion poor people in the planet rely on fisheries as the main source of protein. Meeting the huge demand for aquatic products with a declining resource base will raise major challenges. This needs skilled and dedicated people.

"Some people, including management guru Peter Drucker, believe that such challenges will make aquaculture more exciting than the internet in the 21<sup>st</sup> century," says Mike.

Prior to joining NACA in 1994, Mike was an associate professor and researcher at the Asian Institute of Technology (AIT) in Bangkok, working on the regional sea farming project of FAO. He also worked at the Institute of Aquaculture at the University of Stirling in Scotland.

Mike has a BS degree in biological sciences from the University of Lancaster, UK (1978) and a PhD in fish ecology and culture from the University of Stirling (1982).

-- APS

He hopes that the young students of today would be able to rise above this kind of parochialism and adopt a more cosmopolitan approach in solving problems.

Mr. Silpachai is married and has two sons. He resides in Bangkok.

Way down in the deep south, in the United States, **Benedict Posadas**, PhD, is assistant economist at the Coastal Research and Extension Center, Mississippi State University (MSU) in Biloxi, Mississippi.

Dr. Posadas is involved in research and educational programs of MSU, particularly on coastal and offshore aquaculture, commercial and underutilized fisheries, ornamental horticulture, coastal environment and other related development issues.

At the same time, he also conducts research on natural resource economics in collaboration with industry researchers and specialists involved in the same issues, disciplines or areas.

Dr. Posadas was a former faculty of the University of the Philippines in the Visayas (1980-1988) and the Mindanao State

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University in Marawi City, Philippines.

He graduated *cum laude* from Mindanao State University with a Business Administration major in economics degree in 1974. He took his MA Economics at the Ateneo de Manila University, Philippines in 1985 and PhD in Agricultural Economics at Mississippi State University in 1998. In between, he took short courses in aquaculture economics and fisheries management at Clemson University, South Carolina, USA and Universiti Pertanian Malaysia, Serdang Selangor, respectively.

He has published several peer-reviewed papers on the different aspects of fisheries and aquaculture economics, as well as production of educational materials on the same subjects.

Asked about his views on aquaculture as a career, Dr. Posadas says, "In my case, except for biology, I did not have an undergraduate training on basic chemistry and physics. A good understanding of these basic sciences will truly help one to succeed in the field of aquaculture. This field provides monetary and non-monetary rewards for those with the expertise and dedication to service."

Incidentally, Dr. Posadas is married to a successful aquaculturist, the former Miss Ruth Alviola. Mrs. Posadas was a former research associate at the crustacean broodstock project of SEAFDEC/AQD. She is presently the director of the Seafood Technology Division, Department of Marine Resources, a state-run institution. Prior to that, she was a senior biologist at Sea Chick Mississippi Inc., a private fish farm raising tilapia in the gulf coast.

The Posadas couple has four children, and resides in Biloxi, Mississippi.

Another economist, **Danilo Israel**, PhD, believes that those who want aquaculture or fisheries as a career should take their work seriously since it is not easy and requires patience, dedication and long years of study.

And be forewarned: a board exams for fisheries technologists is in the offing.

Dr. Israel was a former research associate and head of SEAFDEC/AQD's aquaculture economics section (1983-1987). He was responsible for financial feasibility studies of aquaculture production systems as well as studies on marine resource and fishery economics.

He left in 1987 to pursue his PhD in applied economics at Clemson University, South Carolina, USA. He got his doctorate in 1990. While at Clemson, he further honed his skills and talent as a graduate research assistant and later as a research associate at the Department of Agricultural Economics and Sociology. He conducted researches on marketing and consumption of fishery and specific aquaculture products in the southeastern United States.

In 1991, he joined the Philippine Rice Research Institute, in Nueva Ecija, central Luzon, as head and chief science specialist of the Social Science Policy Research Division.

The following year, he joined the Philippine Institute for

Development Studies (PIDS), where he is presently a senior research fellow. He conducts research on natural and environmental economics, and policy issues. He is also active in the academic community being a professorial lecturer in various colleges and universities in Metro Manila including De La Salle University, and the graduate schools of San Sebastian College and Technological University of the Philippines. He was a former faculty of the University of San Agustin, Iloilo City.

He has published more than 40 scientific papers, including those in refereed journals on a broad range of studies including aquaculture, environment studies, labor productivity, and rice consumption.

Prior to joining AQD in 1983, he was an economic analyst at the National Economic and Development Authority (NEDA).

Dr. Israel has a Business Administration major in economics degree from Mindanao State University (1979), and an MA in Economics major in international economics from the University of the Philippines, Diliman in 1982.

Dr. Israel is married and has two children. He resides in Imus, Cavite.

**Carlos Baylon**, PhD, is the director of the Institute of Fisheries Policy and Development Studies (IFPDS) at the University of the Philippines in the Visayas (UPV), Miag-ao, Iloilo.

According to Dr. Baylon, IFPDS is a response to the burgeoning concern of both international and national clamor for policies pertaining to fisheries and aquatic resources and directed towards proper management for sustainable development. It has three functions: (1) to conduct policy research and development studies on different areas of fisheries and management of aquatic resources, (2) to assess and determine appropriateness of fisheries technologies, and (3) to conduct training, extension and outreach programs to both government and non-government organizations on fisheries policy.

Its academic program includes a BS Fisheries major in Fisheries Business Management with minors in either aquaculture, marine fisheries or fish processing technology and a Masters in Marine Affairs Program (MMAP), which is fairly recent, being offered only last year.

The MMAP aims to provide a broad perspective in looking at the problems in coastal areas focusing on the management of resources as well as people using these resources to ensure sustainable development.

For young people intending to enter the field, Dr. Baylon has this to say: "We are looking for young students who have the right attitude, dedication to work, and the drive for excellence. Just like the other centers of excellence of the University of the Philippines system, we want our graduates to reflect that. We are trying to inculcate the right values on work ethics, motivating the idealistic youth to be more interested in nation building rather than the usual career path of just a high paying job. "



## CAREER TIP

# ONLINE JOB SEARCH

By **RIY Adan**

Got a job? Need a job? The Internet should be your first stop for fisheries and aquaculture-related employment, whether you are posting an open position or searching for that ideal job. The Internet has certainly made life easier for everyone. One can just sit down, announce a job opening or submit an application all under one roof! This online job search offers a wide range of opportunities for aquaculturists – from internships, short-term work to permanent, long-term technical and professional positions. Check the sites we have selected – and maybe you will find your luck here!

### Advice from the experts

by

**marinecareers.net**

- **Take as many math and science courses as you can, starting in high school and continuing throughout your undergraduate years.** This is important for students interested in research and non-research careers because these subjects provide a solid base of knowledge about the way things work and how to solve problems. Computer and writing skills are important too.
- **Do not specialize too early!** Keep your options open. Even if you think you want to pursue a postgraduate degree, hold off from selecting a specialty area as an undergraduate. This could limit your options later.
- **Be flexible!** One course, professor, book, experience, or adventure could open your eyes to a career you might never have considered. Remember: very few people currently employed in oceanography or the marine sciences get to their positions by taking the same path.
- **Be persistent!** Worry less about job forecasts and more about working at what you really want to do in life. With hard work, enthusiasm, and creativity, you can achieve your goals.
- **Volunteer, volunteer, volunteer!** Start young and never pass up an opportunity to get experience in an area that interests you. Volunteer opportunities, internships, mentoring camps, science clubs, and independent research projects will give you a taste of what the field is like and may give you an edge over someone who lacks experience.

#### AQUACULTURE.DOM JOB SEARCH

**www.aquaculture.com**

The site is indeed true to its mission: to better the lives and livelihoods of all members of the global aquaculture community. With the powers of the Internet and in a spirit of partnership, Aquaculture.com brings jobs to aquaculturists all over the world through its Job Center. The section posts a list of jobs presently available in the aquaculture industry. If you think you qualify for a job based on the description provided, simply fill up the form and apply online. Moreover, to post a job opening with your organization on the site, you do the same and you are assured that your announcement will be broadcast worldwide. This feature is one of the many free services offered by Aquaculture.com.

#### WORLD AQUACULTURE SOCIETY EMPLOYMENT SERVICE

**www.was.org**

The World Aquaculture Society (WAS), an international non-profit society funded to improve communication and information exchange within the diverse global aquaculture community, offers the WAS Employment Service to assist its membership with job and career information. The annual posting of jobs and resumes at WAS and US Chapter meetings, and the online job and resume databases via the internet serve as a clearing house for employment opportunities. The job and resume databases (which contained about 600 entries) are maintained throughout the year by the Employment Service Coordinator in cooperation with the Aquaculture Network Information Center (AquaNic). One can search through the AquaNic job posting, and can likewise post job vacancies. The site also features a long list of linkages with other related online job searches.

#### SEA GRANT'S MARINE SCIENCE CAREERS RESOURCES AND LINKS

**www.marinecareers.net**

Interested in learning more about careers in marine biology and other marine sciences? Marinecareers.net is the site for you. This site will introduce you to a wide range of marine career fields and to people working in the field. The people featured, coming from colleges and universities, state and federal agencies, marine-related industries, research laboratories, independent organizations, consulting firms and many more, will share with you their experiences in the work. They come from all around the country and represent a variety of educational backgrounds. Some are in the early stages of their careers while others are well estab-

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lished already. As you read through the profiles, it's easy to identify some common themes and advice: volunteer, take plenty of math and science courses, and don't give up!

The website also has an ever-growing list of additional resources to help you in your search for volunteer opportunities, internship and fellowship programs, additional career advice, and sources of additional career information. It also provides information on salaries and links to additional resources.

#### YOUR ONLINE GUIDE TO MARINE CAREERS

##### **www.seajobs.com**

Seajobs.com is an Internet resource for students and individuals interested in working with the oceans. Sponsored by government, business, industry and education sector, this website provides in-depth generic job descriptions, editorial and news items on all aspects of working with the oceans in a professional capacity.

It is easy for the user to browse and search for a particular job with the jobs classified into several categories: engineering, design and construction; fisheries, aquaculture and conservation, government service and law enforcement, transportation, shipping and ports; tourism, recreation and business; sciences, research and education. The site also features links to other marine organizations that offer job and job databases specializing in various aspects of the marine industry.

#### THE SEAFOOD INDUSTRY JOBS NETWORK

##### **www.fishjobs.com**

HM Johnson and Associates brings FishJobs™ ON-LINE, an exclusive and confidential Internet listing service. FishJobs is inviting seafood, fisheries or aquaculture companies seeking to fill sales, marketing, management, operations or quality control positions. Employers may post job opportunities on the site for a small fee (often less than the cost of a single newspaper advertisement). Prospective applicants can submit resumes directly to the company or through HM Johnson and Associates.

HM Johnson and Associates also provides executive search and recruiting services. Employers seeking assistance in filling

highly skilled positions can contract with them for assistance in identifying key individuals with necessary experience and qualifications. HM Johnson and Associates will develop a detailed position description, develop advertising materials if necessary and network within the industry to provide a list of candidates meeting the selection criteria. The total cost of these services is usually far less than that charged by executive search firms. Moreover, FishJobs advertises regularly in *Aquaculture Magazine*, *Seafood Business* and other trade-related publications to draw attention to this website. In addition, it is linked to major seafood and aquaculture industry-related websites as well as all major Internet search engines.

#### FISHERIES TECHNOLOGY ASSOCIATES INC.

##### FISHERIES CONSULTING

##### **www.ftai.com**

Fisheries Technology Associates is a full-service aquaculture and fisheries consulting company that offers information, decades of experience, know-how and expertise of a team of professionals in aquaculture and fisheries-related services. They also offer job listings and resume posting services. Unlike other online job search, FTAI requires one to have at least 15 years of aquaculture consulting experience or other substantial expertise or qualifications for them to seriously consider the applicant for employment. It should be noted that FTAI do not maintain production facilities or other operations that include intern, entry-level, or technician-level positions.

#### INFORMATION SERVICE FOR THE AQUATIC WORLD

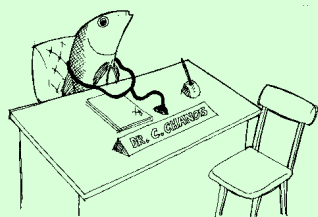
##### **www.aquanet.com**

This site includes aquaculture, conservation, fisheries, limnology, marine science and oceanography, maritime heritage, ocean engineering, and seafood employment opportunities worldwide. Aside from the job search, there are also links to additional resources for career and job information offered by related organizations and societies.

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# support sustainable aquaculture

# Aquaculture Clinic



## INQUIRY

### What is the effect of lime and zeolite on water quality?

#### REPLY BY LIBRARY ASSISTANT J. BUENDIA

Lime, a chemical substance rich in calcium, is applied in fish ponds particularly with acid soils to increase total alkalinity or total concentration of calcium in the water. Liming eventually increases and stabilizes pH. Increase in pH results to better release of nutrients, especially phosphorus, which enhances plankton growth and production of food organisms. Certain harmful substances such as iron compounds and humic acids are neutralized and precipitated as pH increases. High pH also results to more carbon dioxide for photosynthesis. By stabilizing the pond pH, liming minimizes fluctuation of physico-chemical conditions of the water that cause physiological stress and reduced fish growth. Aside from these effects on water quality, lime aids in the control of fish parasites and diseases, and hastens the decomposition of organic matter in the soil.

Zeolites are minerals, in certain volcanic rocks, with an open structure having channelways which can act as molecular sieves. Unlike lime, they are widely utilized in closed or recirculating water systems and fish transport. Natural zeolites such as clinoptilolite improves water quality by acting as ion-exchange filters. They efficiently remove more than 90% of ammonia in the water which is toxic to the fish. Zeolites are also capable of producing inexpensive aeration oxygen through selective adsorption of nitrogen. In Japan, small generators with activated zeolites have been used to aerate fish breeding tanks and in the transportation of fish.

#### SOURCES

- Avault JW Jr. 1988. Liming. *Aquaculture Magazine* 14 (4):77-79  
Coche AG, Muir JF, Laughlin T. 1996. Management of freshwater fish culture: ponds and water practices. *FAO Training Series* 21/1. Rome: FAO. 233 p  
Pond WG, Mumpton FA (eds). 1984. *Zeo-agriculture: use of natural zeolites in agriculture and aquaculture*. Colorado: Westview Press. 296 p

The SEAFDEC/AQD Library is pleased to answer queries on published information about aquaculture.

Contact the Library:  
<library@aqd.seafdec.org.ph>

## AQD ABSTRACTS ... FROM PAGE 9

cultured ones, whereas wild male shrimp had shorter CL, CW, and BW than cultured male *P. monodon*. Cultured shrimp had significantly higher CL:AL and CW:AS(1)W ratios and lower RL:CL ratio compared to wild *P. monodon*. The shorter and narrower abdomen relative to the carapace gave the shrimp a "runted" or dwarf appearance characteristic of RDS earlier described in *Litopenaeus vannamei* with IHNV. Confirmed by parallel studies, IHNV infection of the cultured *P. monodon* may account for their cuticular deformities, slower growth, and smaller sizes. The appearance of deformities in older (and bigger) *P. monodon* suggests that RDS expression is dependent on age and size. Examination for external abnormalities and evaluation of the three morphometric ratios may complement existing screening protocols for diseases and growth rates in shrimp breeding programs. Cultured giant tiger prawn also had lower sperm count, greater proportion of dead and abnormal sperm, and lower incidence of mating (absence of sperm in thelyca) compared to wild *P. monodon*.

Kock M, Frocken U, Richter H, Becker K, Santiago CB. 2000. Feeding ecology of silverperch, *Terapon plumbeus* Kner, and the impact of fish-pens in Laguna de Bay, Philippines. *J. Appl. Ichthyol.* 16: 240-246

*Abstract.* Aquaculture is an important factor in the fishery of Laguna de Bay in the Philippines; fish-pens and net-cages covered ~ 10% of the lake surface in the late 1990s. The present study was carried out to assess the possible influences of aquaculture on a wild fish species, silverperch, *Terapon plumbeus* Kner, with a special emphasis on the feeding ecology of this fish. For the purposes of the investigation, 24-h samples were taken at 2-month intervals close to a fish-pen as well as in open water over a one-year period to acquire more information on this species. Significant differences in standard length and total weight were found between stations and sampling months. In open water, a mean standard length of 53.6 mm and a mean total weight of 4.2 g were found, whereas close to the fish-pen, the corresponding values were 57.6 mm and 5.4 g, respectively. The maximum mean standard length was attained around December 1996 and February 1997 (59.5 mm in open water; 66.1 mm close to the fish-pen), and the minimum was found in June 1996 (49.1 mm in open water; 46.2 mm close to the fish-pen). Noticeable differences were found in the food spectrum between the two sampling stations. Zooplankton, the major food source at both stations, was more important in the stomach content of fish in open water. The same was true for insects (i.e. chironomid larvae), although these did not make up such a large fraction of the diet. On the other hand, close to the fish-pen, *aufwuchs*-algae, phytoplankton and fish were more important. Generally, benthic organisms were consumed more frequently close to the fish-pen. Zooplankton was more important in the diet of smaller fish. In all size groups, the importance of zooplankton decreased during the rainy season. ###

## IS AQUACULTURE ... FROM PAGE 17

Non-aquaculture practitioners are externally oriented while aquaculture practitioners are internally controlled. Non-aquaculturists think that things happen to them. Aquaculturists believe that they can make things happen.

Aside from internal proficiency, there are other competencies that you should develop to become successful. These are the values identified with accomplished aquaculture practitioners:

- Knowledge of the technical aspects of the business
- Innovativeness
- Risk-taking
- Opportunity/information seeking
- Persuasion and networking
- Self-confidence
- Systematic planning
- Self-reliance
- Obsession for quality/efficiency/effectiveness

If you zealously identify yourself with the above-mentioned values, it follows that you may have a certain extent of interest in aquaculture. But this may vary in certain combinations and degrees. It may also imply that you have a knack for this practice.

On the other hand, if you only identify some values innate to you or none at all, it does not mean that you no longer have a chance for a career in aquaculture. All you have to do is work hard and widen your interest in fisheries, acquire a good grasp of the science, develop good human relations and look forward that soon you will find a niche for yourself in aquaculture. ###

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## PHILIP CRUZ ... FROM PAGE 22

and the government would intervene only when problems occur. Most of the time, the help would come too late.”

The person must also learn to persevere and be resilient because aquaculture is a risky business.

“The rate of failure is high. There are chances for diseases, slow growth and mortality. So you have to understand what you are doing in order to be on top of problems and not just depend on technicians.”

“We have a lot of very good aquaculturists around but they are not coming out because they are not willing to take risks. So it is the businessmen with the money who reap the benefits of aquaculture. They hire the experts and it is them who grow big.

“I would like to see more of my colleagues as entrepreneurs. I’m sure they will realize, as I did, that it is worth the risk.”

Philip Cruz lives in Bacolod City with his wife Ruby and their three kids. ###

## I WANT TO BE A DEEP-SEA SCIENTIST ... FROM PAGE 18

already am, so that I will learn from nature. Just like my Dad did when he was small. He was smart, meticulous, curious, always an outside person, and... “explorative”. He would go to a place called Calvert Cliffs and come home with a bucket full of fossil shells and sharks’ teeth. He had a skull collection which included the skull of a wild cat from the forest behind their house. He found a racoon skeleton which he assembled really carefully and now is still in perfect condition. I really want to be like my Dad.

If I become a deep-sea explorer, I could help the Philippines a lot because I can learn about underwater earthquakes and I can give out warnings of possible tidal waves. I could learn more about the fishes in the sea, and provide information that would help fishermen a lot. I could even explore the bottom of the Philippine Deep, the second deepest part of ocean in the world, and I might find a fish that is very healthy to eat, or might have something that can prevent certain cancers or sicknesses. Well, that would be a great help. Imagine, the Philippines known around the world for something like that! Or I might even discover a colony of coelacanths! Remember, the last specimen was caught in Indonesian seas, so it is possible to have some in Philippine waters. ###

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## THE AQUA TECHNICIAN ... FROM PAGE 24

those in equivalent positions in companies, but the incentives are good. You can have privileges like getting P2 per kilo of harvested products or 10% to 15% profit sharing. (An exceptional technician in Mindanao had a 50-50 sharing.) Success in the industry means more and bigger offers and a very bright future.”

Just like in any career, technicians have their ups and downs. Up means a good harvest, especially if production is above target. Everybody is happy and the rewards are big. Production failures also happen, but vigilance can minimize damages. Extra efforts are admired and would sometimes soften the impact of a failure on the management.

People come for advice, assistance or services.

“This is where fulfillment comes in – when one is able to share his technical know how and sees his clients happy.”

Originally, he did not like fisheries. It was his mom who chose it for him. She inspired him to pursue the course which he eventually liked and learned to love.

Jam, as his friends call him, is from Basilan and is married to Rosalie who comes from Butuan City. They have a daughter named Melona Rose.

Mr. Jamon is now an aquaculturist at SEAFDEC AQD’s technology verification and extension project. ###

## PETE BUENO ... FROM PAGE 32

- **Speed.** Being quick is more important than being big. The increasing pace of change in science and economics, and therefore the need of clients, the farmers, will require the organization to respond fast or, better, anticipate changes. Big organizations find it hard to be speedy. With ICT, things can be done by the organization in parallel rather than in sequence. Speed is also a matter of the decision making process of an organization. Bureaucracy will always slow things down, and bureaucracy is one of the very few processes that the Internet can slow down.
- **Good people.** The information unit and, for that matter, the entire organization will need fewer but better people. Staff with new talents, skills and attitude must be made to feel at home. New jobs have sprung up in recent years: content manager, information architect, e-business officer, chief knowledge officer. Organizations need new ways to hire and – more tricky – retain these people. They also need new ways of measuring their performance.
- **Collaboration skills.** ICT creates many opportunities for the R and D teams within the organization and with those of other like-minded organizations everywhere for new ways to collaborate. Collaboration and alliances require a different management approach from that required to manage competition.
- **Knowledge management.** ICT has raised the importance of pooling the skills and knowledge of a workforce. The development of sophisticated databases and intranets makes it possible for institutions to build a core of knowledge that they can draw upon across the globe. But managing workers of this kind is not easy. Getting intelligent people to share what is in their heads takes more than money or clever software — although these would help.
- **Good communications.** Given the pace and complexity of change, communicating organizational strategy and philosophies to the staff and clientele will be as critical as ever. Communications would no longer be confined within the organization or even within the country. What an organization thinks as external information can turn into an internal sort, and vice versa.
- **Content management skills.** All those websites that organizations design to reach staff, clients and other organizations start off by carrying far too much information. Heads of R and D institutions, and just about every other division director or senior researcher, will equate effective communication with a lot of materials. Unfortunately, those managing the information support unit either do not themselves know how to manage the content or are steamrollered by the senior researchers. A manager of one company's intranet site reported that after taking out 80% of the information in the site, its usage rose by 3,000%. The cost of running it fell drastically as well. Organization managers and many senior researchers crucially need to sharpen their skill at expressing themselves clearly and concisely. It goes back to a basic principle in communications: knowing who the

audience is and what they need to know. Dwight Eisenhower, as Supreme Commander of the Allied Forces in Europe, teased his longwinded-memo-enamored staff by telling them, “If you can't tell it well in one page, chances are you can't tell it well at all.”

- **Focus on the client.** ICT has opened new opportunities for R and D organizations to improve their relations with clients. Strategies have shifted from a mass audience to personalized service, a diffused to a sharper information targeting. Concern is now more on the client and less on the information product and process management – giving the clients what they precisely want. One important implication of this shift – which has been made possible by enhanced communications – is a criss-crossing of lines of functional responsibility: the head of the technology verification and transfer might also be in charge of monitoring the response of the farmers to innovations.
- **Leadership by example.** Plenty of heads of organizations do not know how to use the Internet, nor what an ICT comprises and how it works. Worse, they wear their ignorance as a badge of honor. It would help the organization if the boss wrote his or her own e-mail, brought something online, or spent some time looking at the web sites of other organizations. A first hand experience of what the Internet can bring to the organization will be important in inculcating in the boss the new information culture.

### What would be ICT's impact on small-scale fish farmers and the aquaculture industry in general?

ICT's impact on the industry is the same as its impact on the global, regional and local economies. There are now many assessments that show a lot of positive impact — e-business or e-commerce will facilitate transactions; ICT could eliminate the much maligned middleman so that at least the farmer gets more of the margin; a faster exchange of technology; a quicker alerting of disease problems; quicker analysis of events and results of events as well as more precise predictions so that these could be translated into policy advice and fed quickly to government; or a quicker galvanizing of mass action or industry action to get government to act or at least listen carefully to industry concerns (an extreme example would be the text messaging that helped galvanize EDSA II); a quicker access to instructional materials; a better support to training and education; and more. Transparency will be promoted, I hope. Under the threat of a widespread, rapid spread, and difficult-to-pinpoint-source of information — bad practices, whether corrupt practices by government managers or destructive practices by farmers — might be discouraged.

On the other hand, there is the disparity that might widen as I have already pointed out; with the poor farmers being left behind even more. This will need more creative and resolute actions to, in effect, allow the poorer — those with less resources, and those with less access to technology, and therefore the more vulnerable to any adverse event on natural resources and the economy — to

## TEODORA ... FROM PAGE 33

- Conduct an environment education program through the FishWorld exhibits, competitions, seminars and workshops, ICC, EcoCamp, eco-jobs, etc.

### Describe a typical day.

I do not have a typical day. There is so much to do at FishWorld now and I just do what I can every day.

FishWorld has a stream of drop-in visitors who come in just any time, for free. We get big groups of visitors, school tours almost every day. These are the people who pay entrance fees. Sometimes I talk to visiting groups if I find it worthwhile. Most of the time, these big groups are in a hurry trying to keep up with their schedules, they do not have time to listen nor learn much, so I tell them to come back when they have more time. Learning can not be hurried.

### What have been your highest and lowest points so far?

Highest when we finished Phase I and opened FishWorld to the public. Low now because funding for Phase II is not in sight.

### Is there a career ladder for this new career?

In other museums, I am sure they have a career ladder and in museums abroad, I'm sure it pays handsomely. For me, I remain on the AQD research track because I will continue to be publishing scientific papers.

### What would a 21st century curator be like?

Museum work is one of the earliest science professions if we think of those museums that are 200-300 years old. Many museums and curators have become high-tech IT subscribers. Many museums are now on-line, many curators use molecular genetics to sort out problems in systematics and phylogeny. My dream is to finish the cataloguing and identification of the biodiversity collections of FishWorld, publish the catalogue, put it on-line, and publish books or guides on biodiversity in the Philippines.

### Other thoughts on the future?

I hope someday, some of the FishWorld visitors or EE participants become science or EE teachers or professionals, or responsible users of aquaculture technology, or responsible citizens aware of their impacts on, and responsibilities towards society and the natural world. Then I would be happy.

### Lastly, what can you advise students interested in a career such as yours?

There is a need for more EE practitioners and more systematics-oriented students and scientists in the Philippines. It pays little in terms of money but the rewards are great. So, join me and let's make a deep impact.

— INTERVIEW BY MT CASTAÑOS



## About Doris

Teodora (aka Doris) Bagarinao was born in the Philippines in 1956, earned her B.Sc. (Biology) in 1977, and started work at the SEAFDEC Aquaculture Department (AQD) in 1978. Working with a team studying the ecology of milkfish *Chanos chanos*, she developed a deep interest in fishes and ecology on the job. With a fellowship from the International Development Research Centre (Canada), she earned her M.Sc. (Marine Biology) from the Scripps Institution of Oceanography, University of California at San Diego in 1982, with a thesis on the visual spectrum of northern anchovy *Engraulis mordax* larvae. She came back to SEAFDEC AQD and studied the development, behavior, and ecology of marine fish larvae. She won a Fulbright-Hayes fellowship in 1986 and went back to Scripps and earned her Ph.D. in 1991 with a dissertation on sulfide toxicology and biochemistry, using as model system the California killifish *Fundulus parvipinnis*, a salt marsh resident.

Teodora started writing scientific papers in 1978 and has published 35 papers in national and international journals, including articles on biodiversity conservation and environment education. She wrote *Biology of Milkfish Chanos chanos Forsskal* (1991, out of print) and the more comprehensive and reader-friendly *Ecology and Farming of Milkfish* (1999), and edited the conference proceedings *Towards Sustainable Aquaculture in Southeast Asia and Japan* (1995), all published by the SEAFDEC Aquaculture Department. Teodora serves on the editorial board of two scientific journals.

Teodora set up the AQD Museum in 1993 and later proposed the construction of FishWorld, a museum-aquarium-ecopark, which was approved for implementation by SEAFDEC AQD in 1998. FishWorld was started in July 1999 and may be finished in 2001. It is dedicated to informal public education about aquatic biodiversity and ecosystems, responsible fisheries and aquaculture, environment protection, and sustainable development. Teodora has made it her mission to strengthen science and environment education in the Philippines for the sake of the next generation, which includes her son Carl, a nephew, four nieces, and their friends. She and Carl have travelled extensively to wild places, including Tikal, the Galapagos, and national parks in the USA and the Philippines.

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## PETE BUENO ... FROM PAGE 45

catch up and play on a more level field with the rest. Rather than the adept and skillful use of information technology, this development of an effective information strategy (based on the information technology) targeting the poor, will be a far greater challenge and will demand far more creativity. One might add that the unethical use of IT could be even more exacerbated but then, even without IT, this is a problem and the issue lies not in the tool but in how it is used.

### **What would you advise students who are considering fisheries information as a career?**

To one who would go into information as a career— whether in fisheries or any other field — it might be humbling to consider that the role of information as a process is nothing but a supporting activity to science, technology development, human resources

development, wealth generation, and knowledge generation and transfer. On the other hand, it might be awesomely inspiring to realize that the one and only commodity involved in all human transactions is information. Getting information to perform both roles the best way it can is not based on knowing how to use the tools but in knowing what each one can do, and cannot do, and what a combination of tools can do the best job for the least energy and cost.

The ultimate purpose of information is to get someone to act in a desired way. In the ultimate, then, it is knowing what motivates a person to act and why, that will make the difference between an effective and a useless information person. I will not attempt to go into the ethics of information — suffice it to say that it can cut both ways — it can do good or evil. Christ or Goebbels.

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## INFO SPECIALISTS ... FROM PAGE 34

ices not only to stakeholders but also to the (global) community.”

Azam adds: “I would prefer if SEAFDEC libraries can play roles in (providing) a gateway to SEAFDEC information and (as part of the) linkages to related information, project or programs. I believe in resource sharing and networking to improve the flow of information and quality of interactions within SEAFDEC member countries. Secondly, we must encourage and provide training and assistance in the use of electronic info services to our researchers.”

But there is a drawback to the heavy workload. This is the intense concentration needed to stay focused because of multiple tasks and the broad functions of an IO. As Lourdes says, “My lowest point was when I forgot my husband’s birthday because of my very busy schedule! (Other than that, I still have high hopes

for my country’s fisheries and agriculture bureau to) give more importance to the value and benefits of institutionalized and responsible information dissemination. That is, it is important for projects to have an IEC, information-education-communication, component. Some very sensible programs and tested technologies become useless due to poor info dissemination and feedback mechanisms.”

Her advice to students: “You need to have an insatiable appetite about fisheries. You have to love fisheries like you love chocolates or green mangoes.”

*[My deep appreciation to my colleagues for responding to the e-mail interview no matter how busy they are. – Mila]*

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## ECONOMISTS, POLICY-MAKERS ... FROM PAGE 40

Asked about the rise of his professional career, Dr. Baylon waxed philosophical. “You know, as you go up the ladder, you learn to focus on the big picture. You begin to open-up and listen to other disciplines, and shed-off the narrow confines of your own. Consensus-building, the ability to be a good listener, and above all, practicing the virtue of humility, these are the qualities of an effective leader. The more learned you are, the more humble you should be.”

As a concurrent associate professor at the UPV College of Fisheries, he is busy with his graduate and undergraduate courses. He has also published a number of scientific papers including those in refereed journals and conferences both here and abroad.

Dr. Baylon has a PhD in biology and living resources from the University of Miami (1988), a masters degree in soil science

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## ECONOMISTS, POLICY-MAKERS ... FROM PAGE 47

from the University of the Philippines at Los Banos (1981), and a BS Fisheries Degree from the University of the Philippines in Diliman (1975).

Dr. Baylon is married to the former Miss Julie Corcino, with whom he has three children. Mrs. Baylon is an assistant professor at the Division of Biological Sciences, College of Arts and Sciences, UPV. The Baylons live on campus at Miag –ao, Iloilo.

**Dr. Nerissa Salayo** is a fairly recent addition to SEAFDEC/AQD's pool of diversified aquaculture experts. She joined the department in July last year as associate scientist; thus, strengthening AQD's capability in the social sciences. Her job is to propose and conduct researches in socio-economics and publish the results in scientific journals. She is also a part of the research evaluation team within AQD.

Aisa, as she prefers to be called, views her career as a personal mission to create a legacy through teaching and writing for people who aspire to work smartly and enjoy a certain degree of quality life. And if it is any indication, her track record will bear her out.

She earned her Doctor of Philosophy in Economics (1999) at Griffith University in Queensland, Australia. Her thesis entitled "Hedonic price of product characteristics: evidences from the shrimp industry in the Asia Pacific" modeled the effects of shrimp quality characteristics on export size.

While writing her PhD thesis, she also presented papers in international conferences and authored two papers with her thesis supervisors. One was published in the June 1999 issue of *Marine Resource Economics*. An excerpt from that article has been published in the *INFOFISH International*, an international marketing journal for practitioners in the fishing and marketing industry.

She views her work in the referred journal publication as a result of her attempt to communicate with colleagues in economics, while the abridged paper as an accomplishment of her goal to reach a group of ultimate users of her research findings.

She also writes a weekly column on economics in a newspaper circulated in the Calabarzon area in Southern Luzon. She views it as an attempt to communicate with the people in the places where she lived: Sampaloc and Lucena City in Quezon province and San Pablo City in Laguna, the importance and relevance of economics in our day-to-day activities.

Prior to joining AQD, she had a six-month research project at the Philippine Institute for Development Studies (PIDS) on "International trade patterns and trade policies in the Philippine fisheries industry." In between consultancy work at PIDS, she went back to Griffith University in September 1999 as a Visiting Fellow where she wrote another research paper with her supervisors.

It is her belief that joining AQD is just a part of a continuing

series of more challenging tasks ahead. She encourages young students to pursue careers in aquaculture and related sciences, such as economics, and apply this science in research geared towards a better understanding of the aquaculture industry and related production systems. These are challenging prospects for the young generation of social scientists who want to play a role in aquaculture's mission for humankind.

Aisa has a BS in Agriculture Economics (1984) from the University of the Philippines at Los Baños and an MS in Fisheries Economics (1989) from the Universiti Pertanian Malaysia in Serdang, Malaysia. She started her professional career at the Socio-Economics Research Department of the Philippine Council for Agriculture (PCARRD) as a research assistant in 1984. The following year, she worked at the Department of Agricultural Economics, College of Economics and Management at the University of the Philippines at Los Baños as a research assistant in a fish marketing project. In 1987, she was a research associate at the Center for Policy and Development Studies at the same university. In 1991, she worked as assistant documentation officer at the ASEAN Plant Quarantine Centre and Training Institute (PLANTI) in Serdang, Malaysia. She proceeded to Australia to earn her PhD degree. ###

### ***SEAFDEC Asian Aquaculture now available online***

Visit our website [www.seafdec.org.ph](http://www.seafdec.org.ph) and learn more about aquaculture!

Feature stories focusing on SEAFDEC/AQD's research activities are posted and updated weekly. Moreover, previous issues of this newsletter are available online and downloadable for free. Initially posted are the April 2000 issue on *Beginner's guide to aquaculture* and the June 2000 issue on *Exotic aquaculture*. Additional issues will be posted every month.

On the other hand, eleven of AQD's flyers and brochures can be downloaded already. These are:

- The Farming of Kappaphycus
- Fishworld
- Netcage culture of tilapia in small freshwater reservoir,
- Grouper culture
- Reviving Kapis fishery along the Panay Gulf
- Mangroves and community aquaculture
- R&D: Abalone seed production and culture
- Milkfish breeding and hatchery technology of SEAFDEC/AQD,
- Mudcrab culture
- Seed production of the native catfish *Clarias macrocephalus*,
- Training module on sustainable aquaculture and coastal resource management
- The commercialization of SEAFDEC/AQD's milkfish production technology

Check it out!

-- RIY Adan



## Year 2001 AQD TRAINING COURSES

Freshwater Aquaculture Management of Sustainable Aquafarming Systems (includes module on Aquaculture Management)	April 18 to May 17 (4 weeks) May 9 to June 14 (5 weeks)
Marine Fish Hatchery	June 5 to July 13 (5 weeks)
Fish Nutrition	Oct 10 to Nov 15 (5 weeks)
Third Country Training Program on Responsible Aquaculture Dev't (TCTP)	By invitation, to be scheduled later

### For application forms and further information, please contact:

Training and Information Division  
SEAFDEC Aquaculture Department  
Tigbauan, Iloilo 5021, Philippines  
Tel/fax: 63 (33) 336 2891, 335 1008  
E-mail: [training@aqd.seafdec.org.ph](mailto:training@aqd.seafdec.org.ph)

### For local applicants who wish to apply for fellowships, contact:

Hon. Cesar Drilon, SEAFDEC Council Director for the Philippines  
Office of the Undersecretary for Fisheries and Legislative Affairs  
Department of Agriculture, Elliptical Road, Diliman, Quezon City 1104  
FAX: (02) 927 8405

### For fellowship applicants from other countries, please contact your respective SEAFDEC Council Director.

## SEAFDEC websites on the internet

- [www.seafdec.org](http://www.seafdec.org)  
maintained by the SEAFDEC Secretariat and SEAFDEC Training Department in Samut Prakan (Thailand) with contributions from the various SEAFDEC departments. Regional programs are highlighted
- [www.seafdec.org.ph](http://www.seafdec.org.ph)  
all about the SEAFDEC Aquaculture Department based in Iloilo, Philippines
- [www.asean.fishnet.gov.sg/mfrd1](http://www.asean.fishnet.gov.sg/mfrd1)  
all about the SEAFDEC Marine Fishery Research Department based in Singapore
- [www.agrolink.moa.my/dof/seafdec](http://www.agrolink.moa.my/dof/seafdec)  
all about the SEAFDEC Marine Fishery Resources Development and Management based in Kuala Terengganu, Malaysia

## Videos from SEAFDEC/AQD

**Milkfish hatchery operations**, 12 minutes. Describes SEAFDEC/AQD's recommended mode of operations for a milkfish hatchery.

**A CFRM experience: the Malalison story**, a 30-minute video documentary that shows the lessons gained by SEAFDEC's 7-year coastal fishery resource management project (CFRM) in Malalison Island, west central Philippines.

**Culture of oyster and mussel using raft method**, a 9-minute documentary that depicts the AQD favored method of using the environment-friendly hanging raft for oyster and mussel culture.

**Grouper cage culture**, 16 minutes. Promotes a profitable way of raising grouper in cages. Describes briefly the processes of site selection, cage construction, and grow-out culture.

**Grouper culture in brackishwater ponds**, an 8.5-minute video documentary showing the different stages of grouper culture: grow-out, harvest, and post-harvest, as well as site selection and pond preparation. It also describes the economics of one grouper crop, and marketing and transport techniques.

**Conserving our mangrove resources**, a 12-minute video documentary that describes the plight of mangroves in the wake of the fishpond boom and efforts to sustain the mangroves.

Price for each video title: P500 within the Philippines; US\$45 for other countries. Postage is included in price. Kindly indicate format of VHS tape (eg. NTSC, PAL, etc). See next page for ordering address.

## New publications



**Mangrove-friendly aquaculture**, the 217-page proceedings of the first regional workshop of the same name. It contains 3 review papers, and country status papers from the Philippines, Japan, Thailand, Vietnam, Myanmar, Brunei Darussalam, Indonesia and Cambodia. Price: P300 in the Philippines, US\$50 other countries (includes postage).

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*New publications*



**Diseases of penaeid shrimps in the Philippines**, a 83-page second edition of a book first published in 1988. Of the 25 major diseases described, five are new. Entries have been updated, and include causative agent, penaeid species and stages affected,

gross signs, effects on host, preventive methods and treatment. *Price (includes postage): P200 in the Philippines, US\$ 45 other countries.*



**Netcage culture of tilapia in dams and small farm reservoirs**, a 14-page manual that gives details on net cage design and farm management. Profitability analysis is also included.

*Price (includes postage): P80 in the Philippines, US\$ 30 other countries.*

**Ecology and farming of milkfish**, a 117-page monograph that discusses the life history and ecology and various aspects of the farming industry in the Philippines.

*Price (includes postage): P300 in the Philippines, US\$50 other countries.*



**Mudcrab**, a 32-page manual that gives a general overview of mudcrab species of commercial value and their grow-out monoculture in ponds; polyculture with milkfish; and fattening in ponds, mangroves, and cages. *Price (including postage): P100 in the Philippines, US\$ 35 other countries.*



**Mudcrab *Scylla* spp. production in brackish-water ponds**, a 14-page manual that covers the specifics of grow-out operation. *Price (includes postage): P80 in the Philippines, US\$ 30 other countries.*



**Pen culture of mudcrab in mangroves**, a 10-page manual that details the operation of net enclosures in mangroves for mudcrab culture. Includes site selection, net installation, stock management, and marketing.

*Price (including postage): P80 in the Philippines, US\$ 30 other countries.*

**Grouper culture in ponds**, a 17-page manual discussing basic information about groupers and detailing brackishwater pond culture: sourcing fry and fingerlings, site selection, pond preparation, nursery operation, grow-out culture, harvest, and post-harvest. It also describes the economics of one grouper crop, marketing and transport techniques and diseases. *Price (including postage): P80 in the Philippines, US\$ 30 other countries.*

**Grouper culture in floating net cages**, a 10-page manual that details grow-out culture. *Price (includes postage): P80 in the Philippines, US\$ 30 other countries.*

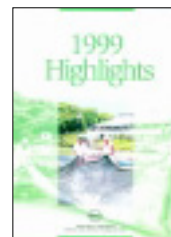
**The modular method: milkfish pond culture**, an 18-page manual that describes a better way of raising milkfish in brackishwater ponds. The modular method is an improvement of the traditional extensive method. *Price (including postage): P80 in the Philippines, US\$ 30 other countries.*



**Promoting appropriate aquaculture technology for more fish in Southeast Asia**, a 24-page report that discusses AQD's technology verification trials on (1) milkfish

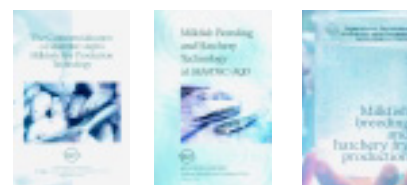
hatchery, pond culture using hatchery-raised fry, and polyculture of milkfish and seaweeds; (2) the use of environment-friendly schemes in tiger shrimp culture; (3) mudcrab culture in ponds and net enclosures in mangroves; (4) cage culture of hybrid tilapia; (5) catfish hatchery technology; and (6) oyster and mussel culture in rafts. *This report is free upon request.*

**1998 Highlights**, a 31-page report on AQD's research and development activities for 1998. A special insert on AQD's 25th year anniversary celebration is included, describing the organization's contributions to the aquaculture industry in the Philippines and other Southeast Asian countries. What's new for 1998 is AQD's thrust on mangrove-friendly aquaculture; preliminary results are presented. *This report is free upon request.*



**1999 Highlights**, a 32-page report of AQD's 1999 activities. It highlights AQD's collaborative projects with the private sector, and three international symposia that AQD hosted.

**Aquaculture, volume 164**, 374 pages. A special issue of the Elsevier journal that contains the papers presented at the *Second international conference on the culture of penaeid prawns and shrimps* held 13-17 May 1996 at Iloilo City, Philippines. This volume is guest-edited by AQD researchers ET Quintino and JH Primavera. *Price: P600 in the Philippines or US\$30 other countries.*



**Milkfish breeding and hatchery fry production**. Summarizes the integrated milkfish broodstock and hatchery operation technology developed by AQD.

**Milkfish breeding and hatchery technology at SEAFDEC/AQD**. Describes the techniques already adopted by the private sector: broodstock management, broodstock diet, commercial fry production, live transport, and larval diet. A list of AQD research publications on milkfish is included.

**The commercialization of SEAFDEC/AQD's milkfish fry production technology**. Illustrates AQD's newest hatchery facility -- the Integrated Fish Broodstock and Hatchery Demonstration Complex -- and the extension program that go with it -- Accelerated Transfer of Milkfish Fry Production Technology.

**NEW BOOKS / FLYERS / VIDEOS from SEAFDEC Aquaculture Department**



*Mangroves and community aquaculture.* Describes the efforts of AQD to raise mudcrab in pens in mangrove areas in Palawan and Aklan with the participation of local communities.

*Grouper culture.* Describes the technology of growing grouper in net cages and in brackishwater ponds.

*R&D: Abalone seed production and culture.* Details the research conducted at AQD for the tropical abalone *Haliotis asinina*. AQD has developed the rudiments of a hatchery protocol.

*Seed production of the native catfish Clarias macrocephalus.* Describes SEAFDEC/AQD's work on artificially propagating the catfish.

*Mudcrab culture.* Summarizes the available technologies on mudcrab grow-out -- monoculture in ponds, polyculture with milkfish in ponds, monoculture in tidal flats with existing mangroves -- and mudcrab fatten-

ing. Details on stocking density, some management tips and investment costs are given.

*Netcage culture of tilapia in small freshwater reservoirs.* Includes details on site and net cage construction and tilapia farm management.

*The farming of Kappaphycus.* Introduces the red seaweed *Kappaphycus* with notes on the types of culture systems, the environmental factors required, initial investment needed, and crop management.

*Aquaculture training program.* 20-page brochure that introduces SEAFDEC/AQD's short-term regular courses.

*Training Module on Sustainable Aquaculture and Coastal Resource Management.* Describes the new SEAFDEC/AQD training course (including course content), qualification of participants, and enrollment process.

**These flyers and brochures are free upon request. They can also be downloaded from the AQD website -- [www.seafdec.org.ph](http://www.seafdec.org.ph)**

**NEW!**



**The farming of the seaweed *Kappaphycus***, a 25 page how-to manual. Authored by SEAFDEC/AQD researchers Dr. Anicia Hurtado and Mr. Renato Agbayani.

It details seaweed culture from site selection to actual culture methods. Marketing and costs-and-returns analysis of the different culture techniques are also included.

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