

# AQUA CULTURE

A s i a P a c i f i c

**A** Nursery Business  
in India

**R**esistance to White  
Spot in Black Tiger  
Shrimp

**C**hallenges in Marine  
Fish Culture in Asia

**A** Philippine Mariculture  
Park Experience

**I**mproving Health  
Management





Broodstock at the Shrimp Disease Control and Genetic Improvement Centre, Taiwan.

Photo credit: Kemily Huang. p21

#### Editor/Publisher

Zuridah Merican, PhD  
Tel: +60122053130  
Email: zuridah@aquasiapac.com

#### Editorial Coordination

Corporate Media Services P L  
Tel: +65 6327 8825/6327 8824  
Fax: +65 6223 7314  
Email: irene@corpmediapl.com  
Web: www.corpmediapl.com

#### Design and Layout

Words Worth Media  
Management Pte Ltd  
Email: sales@wordsworth.com.sg  
Web: www.wordsworth.com.sg

**AQUA Culture Asia Pacific** is published bimonthly by



#### Aqua Research Pte Ltd

3 Pickering Street,  
#02-36 Nankin Row,  
China Square Central,  
Singapore 048660  
Web: www.aquasiapac.com  
Tel: +65 9151 2420  
Fax: +65 6223 7314

Printed in Singapore by  
Man Cheong Printing Pte Ltd  
996 Bendemeer Road, #03-02,  
Singapore 339944

#### Subscriptions

Subscribe via the website at  
www.aquasiapac.com or  
complete the enclosed form  
and mail with payment.  
Subscriptions can begin at any  
time. Subscriptions rate/year  
(6 issues): Asia SGD 70,  
Other zones: SGD 100  
Email: subscribe@aquasiapac.com  
Tel: +65 9151 2420  
Fax: +65 6223 7314

#### Copyright © 2018 Aqua Research

Pte Ltd. All rights reserved.  
No part of this publication may  
be reproduced, stored in a  
retrieval system or transmitted,  
in any form or by any means,  
electronic, mechanical,  
photocopying or otherwise,  
without the prior permission  
of the copyright owners.

Aqua Culture  
Asia Pacific Online  
View E-magazine  
Download past issues

## From the Editor

- 2 Making aquaculture sexy for the next generation**

## News

- 4 India's farmed shrimp industry soars to new heights**

## Shrimp Culture

- 8 A recirculation aquaculture system nursery business in Andhra Pradesh**

Zero water exchange, biofloc and innovations in aeration are the essentials for this nursery business in India.

- 14 How we alleviated EMS in our farm**

Poh Yong Thong and Mohd Fauzi Salamaun describe collective measures at an R&D farm in Malaysia

- 18 AquaIndia 2018: Route to the future**

Experts guide and prepare industry in India for continued growth and market-led production

- 21 Working towards 'No more threats' from WSD in black tiger shrimp farming**

The Shrimp Genetics Centre in Taiwan is on track to produce SPF/SPR shrimp. By Zuridah Merican

## Industry Review: Marine Fish Culture in Asia

- 25 Addressing challenges in farming marine fish**

Production is increasing but not based on sustainable principles. There are challenges and opportunities according to stakeholders.

- 30 Philippine mariculture parks: the Panabo City Mariculture Park experience**

Rafael D. Guerrero III describes how polyculture of milkfish, rabbitfish and high value fish fulfill a social objective.

## Feed Technology

- 33 Creating synergies towards better aqua farming**

The path to seek technologies to improve farm efficiency.

- 35 Improving health management in aquaculture**

Optimal nutrition is a key element as most prevention measures would be given via feed. By Viviane Verlhac Trichet and Bent Pedersen

- 39 How phytobiotics reduce Vibrio counts and alleviate AHPND in white shrimp**

Niti Chuchird, Arunothai Keetanon, Cristina García-Diez, Álvaro Rodríguez Sánchez-Arévalo and Antonio Martínez report on the reduction of Vibrios in the gut to improve survival rates.

- 43 How to improve the detrimental effects of low fish meal and fish oil diets in sea bream**

The potential of dietary sodium butyrate to reverse such effects in gilthead sea bream. By Cinta Sol and Mónica Puyalto

- 46 A natural mix of free amino acids enhances shrimp feed intake and growth**

There is a clear potential to improve feed palatability for the white shrimp. By Guillaume Le Reste, Pierrick Kersanté and Luksanawadee Soonngam

## Developments

- 48 New directions with the black tiger shrimp**

Return to black tiger shrimp in Malaysia and in Bangladesh, a new push with the availability SPF broodstock.

- 52 Mini symposium on shrimp biotechnology**

Passing the baton to Gen X and millennials in Taiwan.

## Company News & Events

- 54 Life achievement award/JV for EPA & DHA from natural marine algae**

- 56 New GM at Diana Aqua/ ONE: The Alltech Ideas Conference**

- 57 Commitment to aquaculture in India and Myanmar**

- 58 Planting a tree to start off integration/ expansion at Nutriad**

- 59 Tilapia forum to help sector achieve its full global potential**

- 67 Offshore Mariculture Asia 2018 VICTAM Asia 2018**

## Show previews

- 60 Aqua 2018**

- 62 Asian-Pacific Aquaculture 2018**

## Philippine mariculture parks: the Panabo City Mariculture Park experience

By Rafael D. Guerrero III

From the polyculture of milkfish and rabbitfish as well as the culture of high value fish, mariculture parks contribute to annual aquaculture production and fulfill a social objective.

The Philippines' archipelago comprises 7,100 islands and coastal marine waters of 26.6 million ha. In 2016, fisheries production was 4.5 million tonnes with aquaculture contributing to 50.54% of this production. More than 70% of the country's aquaculture production is from mariculture, which is the farming of aquatic organisms like seaweeds, fish and invertebrates.

The concept of a "mariculture park" was initiated by the Philippine Bureau of Fisheries and Aquatic Resources (BFAR) in the coastal waters of Samal Island in Davao del Norte, Mindanao, in 2001 with three floating fish cages stocked with milkfish *Chanos chanos* for demonstration. A "mariculture park" is similar to an industrial park or estate on land where an appropriate area is designated for the commercial operation of business enterprises with government support.

Following its successful experience in Samal Island, the BFAR initiated the setting up of other marine parks in the country either singly or in collaboration with local government units (LGUs) of coastal cities and municipalities which are mandated by law to manage their marine waters up to 15km from the mainland. One such demonstration marine park was set up by the BFAR in Panabo City, a coastal city in Davao del Norte, in 2006.

### Panabo City marine park

In 2009, the 330 fish cages in the park produced 1,999 tonnes of milkfish with a value of PHP160 million (USD3.2 million). As of 2015, there were 22 BFAR-LGU-managed and 20 LGU-managed mariculture parks with 4,888 fish cages in nine regions of the country that produced 31,032 tonnes of milkfish.



Fish were fed commercial slow sinking or floating pellets.

By 2012, the Panabo City government established the Panabo City Mariculture Park (PCMP) in its coastal marine waters with a demarcated area of 614ha of which 40ha were allocated for fish cages. With preferential rights given to marginalized fisherfolk who are among the "poorest of the poor" in the country, a City Ordinance governing the PCMP was passed to ensure "the sound ecological balance, protection and management of its coastal resources."

As the partner of the Panabo City government, the BFAR through its National Mariculture Center (NMC) based in the city has provided funds for the support facilities of the PCMP such as the moorings (anchorage) of cages, temporary fish landing and service boats. It has also extended technical/advisory services for environmental surveys and monitoring, training for its stakeholders on technology development and livelihood programs and mariculture tourism, among others.

According to Dr Andrew Ventura, Chief of the BFAR-NMC, in 2017 there were 348 fish cages operated by seven marginalized fisherfolk and 341 private investors in the PCMP that produced 2,505 tonnes of milkfish and rabbitfish *Siganus guttatus* with gross sales value of PHP239.3 million (USD4.8 million). The PCMP also provided 245 jobs to marginalized fisherfolk who were employed as cage caretakers, fish harvesters, sorters and processors.

The 10 x 10 x 4m floating fish cages in the PCMP are made of bamboo poles or high density polyethylene (HDPE) pipes for frames, plastic drums for floatation and polyethylene netting for the enclosures. Each cage has four concrete mooring blocks weighing 1.5 tonnes each. The cages are spaced 2-3m apart and 50m between cage clusters. Only four cages are allowed in each hectare of the culture area to maintain the "carrying capacity". Private investors pay a lease permit fee of PHP1,100 (USD22) per cage/year and a 0.3% gross sales tax to the City Government.

### Polyculture of milkfish and rabbitfish

The polyculture of milkfish and rabbitfish in the PCMP cages is common. Milkfish fingerlings (12.5-15cm) are stocked at 10,000-15,000 fish/cage and rabbitfish fingerlings (2.5-5 cm) are stocked at 2,000-3,000/cage. The herbivorous rabbitfish help in reducing the growth of algae clogging the mesh of the net enclosures and lessen the need for changing/cleaning the enclosures from every month to every two months. Culture duration of the fish is for 120 days. Fish were fed commercial slow sinking or floating pellets. Two to three production cycles in a year are possible, if fingerlings are available. These fingerlings are produced in brackishwater pond nurseries with fry from either the wild, local hatcheries or imported from Indonesia.

The milkfish harvested at market sizes are categorized as small (250g or more), medium (350g or more) and large (500g or more). Production is 6.5 tonnes/cage. Ex-farm prices for the fish are PHP90-112/kg (USD1.8 - 2.2/kg), depending on the size. With a feed conversion ratio (FCR) of 2 and a survival rate of 80%, the total cost of production was PHP646,520 (USD12,930). The net income and return of investment (ROI) per cage/cycle



Fish harvested from floating cages



Milkfish harvested from a floating cage

was PHP85,500 (USD1,710) and 15%, respectively. On the other hand, the rabbitfish attain market sizes of 50-100g each with a survival rate of 70-80% and production of 100-200kg/cage. Ex-farm prices for the fish were PHP150-200/kg (USD3-4/kg)

### High-value fish

To a limited extent, is the culture of the “kingfish” (saline red tilapia), green grouper *Epinephelus suillus*, and silver pompano *Trachinotus blochii*. Fingerlings of the “kingfish” are produced in a freshwater hatchery, grown to a post-fingerling size of 50g/fish and acclimatized to a salinity of 35ppt before being stocked at 10,000 fish/cage. Fed commercial pellets, the fish grow to market sizes of 250-300g each in four months with a survival rate of 70-80%. A total production of 1,700 tonnes and gross sales of PHP 306,250/cycle (USD 6,125) are reported. Ex-farm prices for the live fish market are PHP150-200/kg (USD3-4/kg).

Green grouper fingerlings from the wild or hatcheries, measuring 10-15cm in length, are stocked in the cages at 30-60 fish/m<sup>3</sup> and cultured for 6-8 months till they attain market sizes of 400-600g each with feeding of trash fish and/or commercial pellets. Silver pompano fingerlings from the hatchery, measuring 6.25-18.25cm, are stocked at 25-30 fish/m<sup>3</sup> and grown to market sizes of 250-300g/fish over 3-4 months with commercial feeds. The fish command prices of PHP600-800/kg (USD12-16/kg) for the grouper and PHP200-450/kg (USD4-9/kg) for the silver pompano in high end seafood restaurants.

The lack of fry/fingerlings for the culture of high-value fish is seen as a major constraint by BFAR-NMC which is presently helping 10 other coastal municipalities in Mindanao to put up

their mariculture parks. To address this problem, more fish hatcheries are proposed. Nonetheless, there are bright prospects for the further development of mariculture parks in the country with the close collaboration of the government and industry, the application of good aquaculture practices in contributing to food security and livelihood generation for the marginalised fisherfolk.



The author at the PCMP cage farm

**Rafael D. Guerrero III**, Ph.D. is an Academician of the National Academy of Science and Technology of the Philippines. Email: rafaeldg7@gmail.com

**SKRETTING**  
a Nutreco company

**THE WORLD LEADER  
IN AQUACULTURE FEEDS**

**NUTRECO INTERNATIONAL (VIETNAM) CO. LTD**  
 \* Tan Tao Industrial Park, Lot 22A, Road #1, Binh Tan District, Ho Chi Minh City, Vietnam  
 \* Tel: +848 3740 7311 / 7312 +818 3740 7317

\* Email: [contact@skretting.com](mailto:contact@skretting.com) | Website: [www.skretting.vn](http://www.skretting.vn)  
 \* Facebook: [www.facebook.com/skrettingvietnam](http://www.facebook.com/skrettingvietnam)

**GLOBAL A.P.** **nutrace**