

Environment-friendly schemes in shrimp farming

By **ET Aldon**

The prawn industry which was once dubbed as a sunshine industry is in limbo. The demand in 1980s showed a growth of 2.5% per year which was said to last until the 21st century. Production peaked in the '80s then started declining towards the '90s. The decline was due to disease outbreaks attributed to environmental degradation. Because of this, prawn growers lost heavily after several failed runs.

To address the problem, the Department of Agriculture organized the Oplan Sagip Sugpo (*Save-the-Shrimp*) on September 16, 1996 with Dr. Rolando Platon, Chief of SEAFDEC/AQD, as Chair. The members are Ms. Celia Pitogo (AQD), Dr. Arnulfo Marasigan (UPV), Dr. Rolando Edra (PCAMRD), Roselyn Usero (NPPMCI), Dr. Tereso Abella (CLSU), Simeona Aypa (BFAR), and Dr. Quintin Bautista (MSU). The Task Force aims to hasten the rehabilitation of the shrimp culture industry, and to set the R&D direction of shrimp health management and production aspects.

AQD's verification study

SEAFDEC/AQD does not recommend intensive culture of prawn for environmental reasons, but Dr. Platon said, "we should not leave the growers alone in their present predicament. We will deal on the aquaculture waste problems."

SEAFDEC in collaboration with the Negros Prawn Producers' Marketing Cooperative Inc. (NPPMCI) tested in private farms in Negros, environment-friendly schemes, either two or combinations of the following schemes: use of reservoirs, fish biomanipulators, improved aeration, low salinity and bioaugmentation. Studies showed that the schemes were useful in

Prawn fry sampling is done twice a month by AQD's Fish Health staff to determine bacterial levels



One of the grow-out ponds where shrimp are stocked at 20 per m². Long-arm paddle wheel aerators are used to improve aeration



About 15-20% of the total pond area is enclosed with a net and stocked with tilapia. The enclosure is sometimes called "sludge collector." A modification of this technique is the installation of "sludge collectors" in the four corners of the pond



preventing shrimp diseases. The test runs further indicated that some fine-tuning can be developed to come up with the best combination.

A verification study of two schemes is now being conducted in two ponds at AQD's Dumangas Brackishwater Station in Iloilo. Both ponds were stocked with prawns at 20 per m². In Scheme A, however, the usual intensive culture method is followed (i.e., use of paddle wheel, probiotics, low salinity and the green water technology). In Scheme B, the usual intensive protocol plus some environment-friendly schemes are employed (i.e., use of a sludge collector; improved aeration using long-arm paddle wheels; and use of reservoirs stocked with the so-called biomanipulators, tilapia and siganids). "These schemes have a good chance to counter occurrence of luminous vibriosis," says Dan Baliao, proponent of the study.

Biomanipulators

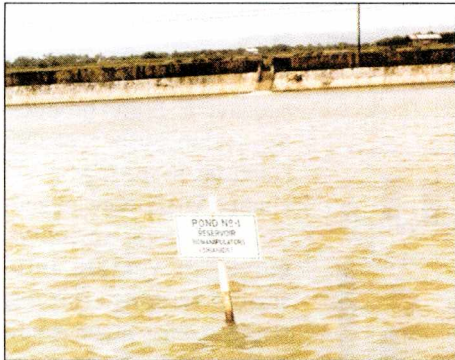
Adult tilapia and siganids were stocked separately in two reservoirs whose water supplies the grow-out ponds. A rectangular net (10% of the total area, also referred to as a sludge collector) was also installed at the center of the grow-out pond where 3,000 tilapia adults were stocked. Tilapia and siganids are grown to a biomass of at least 3 tons or more to produce "greenwater." The "greenwater" is said to encourage the growth of yellow vibrios, a more benign relative of the harmful luminous vibrios.

Improved aeration

Four long-arm paddle wheel aerators were installed with a capability to spin the waters towards the sludge collector for the dirt to concentrate at the center. This minimizes the contact of shrimp and sludge. Further, adequate aerators also provide enough cir-



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culuation and can turn over the water for better penetration of sunlight to maintain the desired plankton level.

Low salinity

Low salinity is maintained at 22 ppt from initial stocking and to be gradually reduced to 16 ppt after 60 days from the start of the culture period, then at 15 ppt after 90 days until the desired salinity of 8 ppt at 150 days of culture.

Bioaugmentation

Microbial inoculants were introduced to counter the dominance of non-beneficial or pathogenic microbes. Intensive monitoring of bacterial and phytoplankton levels were done to prevent outbreak of diseases.

Use of reservoirs

Two reservoirs are used in the scheme. Water pumped in from the river is allowed to settle for at least one day before it is used to replenish the grow-out ponds.

Result of the study at 55 days of culture

Scheme B pond yielded shrimp weighing 3.0 g with estimated survival of 85% while in Scheme A, shrimp weighed 3.5 g with estimated survival of 70%. "The initial result is very encouraging," says Mr. Baliao. "But we need to do further runs. If we get consistent results, then maybe we can say 'this is it'." At least, he said, this will convince the prawn growers that SEAFDEC is really doing its best to help them. ###

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covered with production already exceeding 100,000 mt in 1997.

The meteoric rise in the Chinese shrimp industry was made possible by a massive development program along the Bohai Bay coastline in the northeast all the way down to Fujian in the south. Every year, thousands of hectares were developed by the Chinese government, when it came to the realization that shrimp farming was the best way of making productive vast tracts of arid saline-alkaline coastal flat lands, provide employment and earn foreign exchange to boot.

If subjected to a standard feasibility study it is doubtful if any of the megafarms along the northeastern coast would have been found feasible. Most of the area is above 30° N latitude, about the same level as Los Angeles, California. Therefore, it has a narrow window of opportunity for shrimp farming. The ponds have to be stocked by July of each year at the latest and have to be harvested by November. The rest of the year it is too cold to do any aquaculture. The hatcheries operate only for a brief period from mid-spring to early summer and have to produce all the fry required for the year in a period of no more than 8 weeks.

But the Chinese government took a macro-economic approach to development. Without the shrimp farms the coastal flat lands were useless for anything else. Saline and highly alkaline and without any freshwater they cannot be used to grow crops. There was not enough economic activity to gainfully employ all the people. The government had to subsidize food, clothing and shelter. With the shrimp farms money which would have gone into subsidy went into shrimp farm development and provided employment to the people starting from the construction stage. To maximize employment all the construction works were done by manual labor. Machines were used very sparingly, if at all. Even the crushing of boulders into concrete aggregates was done by hand. Sand,

gravel, cement, bricks and other construction materials were hauled to the construction sites either by wheelbarrows, if the distance was only a few kilometers away or with bullock or donkey carts if the source of material was 50 km or more away. Cement mixing were all done manually. In that manner hundreds of thousands of people were gainfully employed to develop the shrimp farms.

The fall of the industry in 1993 has been attributed to over-stocking and the lack of provision for treating wastewater discharge. The heavy use of wet and fresh feedstuff such as small mollusks and brine shrimp biomass as feed exacerbated the build up of organic load in the water. With so many families depending on the industry the production failure must have hit the shrimp producing areas hard. The industry is now showing signs of recovery and with the hard lesson already learned the Chinese shrimp farmers like their counterparts everywhere are likely to be more cautious this time.

The rest of Asia

The case of Taiwan is already well known. From one of the top producers in 1986-87, Taiwan is now a net shrimp importer.

Philippine shrimp production continues to be sluggish due to widespread infection by the luminiscent *Vibrio* bacteria. At its peak in 1993, the Philippines produced 95,816 mt, of all species but mostly of the giant tiger prawns, based on official government statistics which is also the basis for the FAO figures. The total 1997 production was 41,610 mt. The 10,000 mt production level in the 1997 World Shrimp Farming published in the United States by Shrimp News International is even less than the export figure of 10,532 mt.

Unlike Indonesia or Thailand, the Philippine shrimp growers do not have the luxury of finding new areas for development. The Philippines have run out of new sites to develop. Shrimp growers in Negros Occ. which used to be the center of intensive shrimp farming are slowly and very