

# Beyond Bangus and Tilapia: Future Directions of Philippine Aquaculture

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## ABSTRACT

Despite incremental growth in basic fish production, Philippine aquaculture continues to lag behind our ASEAN neighbours. After decades of involvement in aquaculture, we now realize that Philippine R & D efforts have benefited those countries that have the political, fiscal structures, and physical infrastructures to scale up, mass produce, and process for export. Our successes have not been in larger scale but in local niches. We see success stories in the production of all male tilapia through sex reversal by hormone and by using supermale or YY-males, sea cage farming of milkfish and pompano, grouper breeding, crab hatchery and development of saline-tolerant strains of tilapia. Looking forward, rather than developing new species and refining existing technology in hatchery and aquaculture feeds, we see research in climate adaptation, disease control, micro-algae production and extraction, developing of single cell proteins as fish meal substitute, electronic monitoring, and data gathering systems as frontiers we can pursue.

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## INTRODUCTION

The period of 1985 to 2017 has been a period of rapid application of technologies developed by various research institutions in the region, especially Taiwan. Many economies in the ASEAN and China have benefited from aquaculture production and

and export, earning billions of dollars in foreign exchange and transforming coastal communities with new found wealth. But this rise in aquaculture activities has also tested the limits of environmental sustainability and occurrence of many bacterial and

viral diseases.

In the Philippines, these three decades have seen the rise of intensive aquaculture as never before. With the breeding of the Nile tilapia (*Oreochromis niloticus*) and production of compounded feed, cage farming in Taal Lake, Sampaloc Lake, Lake Buhi, and many inland lakes in Luzon took off. As extruded floating feed became commercially available, rice farms were converted to tilapia farming in Pampanga and other parts of Central Luzon boosting farmer income more than five fold.

Semi-intensive culture of milkfish or bangus (*Chanos chanos*) was also adopted in the shallow fishponds in Bulacan with the use of extruded feed instead of *lablab* (algae chiefly of the Myxophyceae) as source of food. Fish pens, which used to grow bangus without feeding, were converted to floating fish cages. This intensified production resulted in periodic fish kills due to low dissolved oxygen resulting from congested cages. The rise of planned mariculture parks in Leyte and Davao addressed the problems encountered in Pangasinan. These transformations in bangus and tilapia farming have enabled the aquaculture industry to feed the Filipino people with an affordable protein source.

During this same period, the fish catch of sardine and *galunggong* (*Decapterus macarellus*) commercial fishing has declined and fleets have moved from the overfished Visayan Sea to Southern and Southwestern Philippines, making these sea-caught fish more expensive.

Looking forward, what is beyond bangus and tilapia? How can R&D play a role in solving the future problems of sustainable aquaculture? This paper will address these questions.

### STATE OF PHILIPPINE FISHERIES PRODUCTION

The Philippines produces 4.69 million tons of marine products (Figure 1). This provides each Filipino 45 kg of marine products if these were consumed locally. This volume is double the 20 kg per head for the rest of the planet.

Philippine fisheries rank seventh among fish-producing nations. The value of aquaculture is PHP 93 billion out of a total fisheries production value of PHP 239 billion. Bangus and tilapia are worth PHP 53 billion and comprise a fifth of fisheries.

In terms of volume, seaweeds have decreased from 70.6% in 2010 to 64% of aquaculture production in 2016 (Figure 2).

### Analysis of Aquaculture Species

In the last five years, the volume of aquaculture production has decreased from 2.550 million metric ton to 2.200 million metric tons (Tables 1 and 2). However, this is to a large extent due to a decline in seaweed production. From 2010 to 2016, bangus production increased from 350,000 tons to 398,000 tons. While tilapia volume has stayed at flat at 259,000 tons from 2010 to 2016.

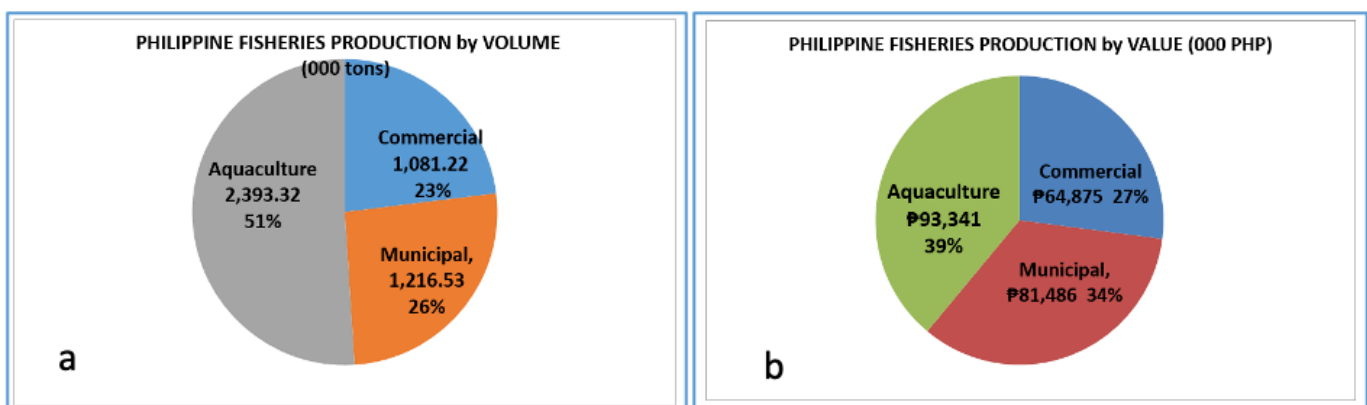


Figure 1 a & b. Philippine fisheries production by volume and value (2016).

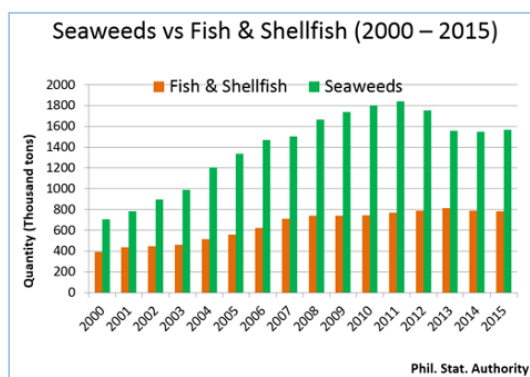


Figure 2. Production of seaweeds vs fish and shellfish (2000-2015) (PSA 2015).

Table 1. Volume and value of major Philippine aquaculture species (2010).

	Quantity (1000 tons)	Percent (%)	Value (PhP million)	Percent (%)
Seaweeds	1801.3	70.6	11974.70	14.97
Milkfish	349.4	13.7	27673.80	34.59
Tilapia	258.8	10.2	16516.70	20.65
Tiger shrimp	47.8	1.9	18224.20	22.78
Oyster	19.9	0.5	158.2	0.20
Mussel	19.9	0.8	195.8	0.24
Mangrove crab	13.7	0.8	3900.6	4.88
Carps	15.7	0.6	369.3	0.46
Vannamei	5.0	0.2	987.9	1.23
ALL SPECIES	2550.1	100.0	80001.30	100.00

Source: PSA 2017.

Table 2. Volume and value of major Philippine aquaculture species (2016).

	Quantity (1000 tons)	Percent (%)	Value (PhP million)	Percent (%)
Seaweeds	1404.5	63.58	6100.9	6.55
Milkfish	398.1	18.02	35033.1	37.62
Tilapia	259.0	11.73	18325.6	29.68
Tiger shrimp	48.1	2.22	20926.0	22.47
Oyster	19.5	0.88	203.4	0.22
Mussel	18.8	0.85	273.7	0.29
Mangrove crab	16.9	0.76	6255.4	6.72
Carps	16.2	0.76	413	0.44
Vannamei	8.8	0.4	2008.0	2.16
ALL SPECIES	2209.7	100.00	93136.8	100.00

Source: PSA 2017.



When an oral vaccine using nanotechnology was proposed, somehow it was not funded.

Our farmers stock fingerlings to ponds at 1 gram. The application of an injected vaccine could not be done for fingerling of that size. On the other hand, in Malaysia, 20-gram fingerlings are used to stock fish cages. Thus, each fingerling could be vaccinated as we witnessed in an immunization operation in Trapia (Genomar-owned).

Figure 3 shows the comparative growth of the tilapia industry in the world’s top five tilapia producing countries. The Philippines tilapia industry grew slowly from 1995 to produce about 250,000 mt in 2007 and has levelled off since then. Bangladesh tilapia production overtook that of the Philippines in 2014.

*The Case of Bangus Breeding*

In the case of bangus, the hatchery breeding techniques were successfully used in 1970. Taiwan commercialized it followed by Indonesia. Today we import half of our supply from them. From 2004, milkfish production in the Philippines increased slowly from 280,000 mt to 400,000 mt in 2013 and has plateaued while that of Indonesia was at 240,000 mt in 2004 and increased steadily from 2007 to 580,000 mt in 2013 (Figure 4) (FAO 2016).

**RESEARCH BEYOND BANGUS AND TILAPIA**

**Species beyond bangus**

We believe that the aquaculture industry will turn from volume of production to higher value species. Of the present species our company has been focusing efforts, much R&D still has to be done on the following:

**1. Shrimp**

Shrimp farm gate prices (PHP 430 per kg) remain high in spite of higher production volume (60,000 MT). However, available farms have been neglected since 1995. For both

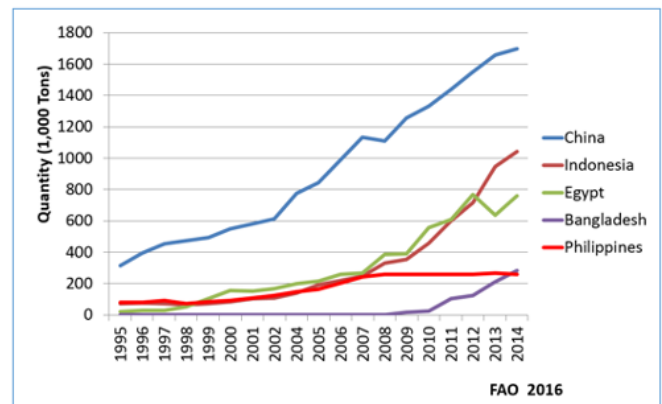


Figure 3. Tilapia industry growth: top five countries.

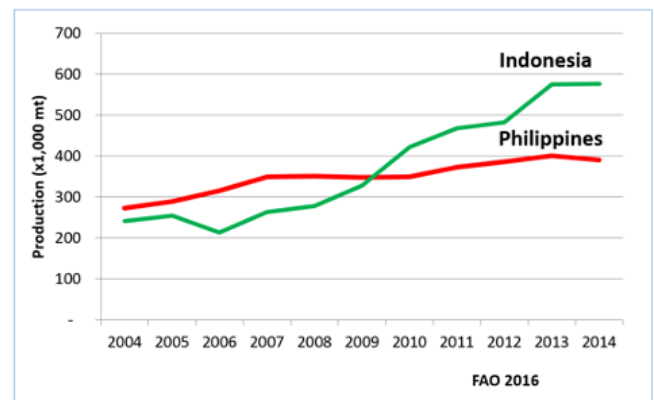


Figure 4. Milkfish production of the Philippines and Indonesia (2004-2014).

*Peneaus mondon* and *Peneaus vannamei*, a domestication program for local breeders can only be funded by government. Presently, breeders are still imported from Hawaii.

**2. Mangrove crab**

Philippine crabs are a preferred product in HongKong and China. Hatchery technology, though available, is still very much in the pilot stage. Nursery survival is also still low and needs refinement. At Santeh, we are adopting the hatchery technology developed by SEAFDEC and we offer to buy back harvests of farmers.



