

Capacitating the Local Farmers to Enhance Global Marketing of Thailand’s National Aquatic Animal, the Siamese Fighting Fish

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The Siamese fighting fish (*Betta splendens* Regan, 1910) also commonly known as betta or betta fish, is a popular fish in the aquarium trade and was declared on 5 February 2019 as Thailand’s National Aquatic Animal. Centuries ago, the Siamese fighting fish or betta fish was initially bred to enhance their aggression for sparring competitions as a form of entertainment and gambling. But later on, local breeders in Thailand developed different varieties of the fish through selective breeding to attain an assortment of colors and fins that are appealing to customers. As additional business ventures, the unique and striking appearance of betta fish inspired numerous artistic works and creative products, such as in photography, painting, sculpture, weaving, 3D graphics, furniture, cosmetics, fashion, and so on, which could have also built up the popularity of betta fish. For many years, the betta fish industry has generated millions of dollars for Thailand. However, despite the high revenue gained from trading betta fish in the international market, the economic condition of local breeders in Thailand remained low because they lack the knowledge and skills in marketing. In order to uplift the livelihood of small-scale betta fish farmers, the Department of Fisheries (DOF) under the Ministry of Agriculture and Cooperatives of Thailand implemented the Ornamental Fish Strategy Plan in 2013–2016 in collaboration with partner agencies. Aside from financial assistance and transshipment support, capacity development through training was also provided to betta fish farmers for them to learn effective online marketing strategies and be successful farmer-entrepreneurs. Recently, the Office of Small and Medium Enterprises Promotion (OSMEP) of Thailand committed its full support to the home breeders of betta fish to achieve sustainable livelihood by enhancing their capacities to compete in the international market and adding value to products from backyard farms.

Cultural and Historical Legacy

The earliest record of popularity of the betta fish in Thailand was during the Thonburi Period (1767–1782) when Amphawa locals raised and fought the fish in gambling games (Kruangam, 2016). However, animal fights (including cocks, quails, Srichompu birds as well as betta fish) were banned during the reign of King Rama I (1782–1809) and was revived during the reign of King Rama II (1809–1824). Starting from the reign of King Rama III (1824–1851), the fish was used also as gift and souvenir, and it was widely raised and became popular in home aquaria during the reign of King Rama IV (1851–1868). Since the reign of King Rama V (1868–1910), the betta fish has become the most expensive freshwater fish in Thailand. An example of betta fish fights is shown in **Figure 1**.



Figure 1. Thai locals enjoy laying wagers on the sparring Siamese fighting fish

Source: Young, 1898

King Rama III himself owned betta fish and gave some to a Thai man, who later handed over the fish to Theodore Edward Cantor, a Danish physician, zoologist, and botanist. In 1849, Cantor named the fish as *Macropodus pugnax*. But in 1909, Charles Tate Regan, a British ichthyologist, reviewed and verified the fish and scientifically renamed it as *Betta splendens*, which literally means splendid warrior. The word “*Betta*” was derived from the legendary warrior-like tribe named “*Bettah*” and “*splendens*” stands for “splendid” describing the appearance of the fish. Siam is the old name of Thailand, thus, the common English name is Siamese fighting fish, and it is locally known in Thailand as *pla kad* (*pla* is fish and *kad* is bite) which means biting fish. Regan (1909) emphasized that *B. splendens* has an outstanding appearance compared to other fishes around the world, and he assigned Thailand, particularly Chao Phraya River, as the standard reference location of the fish where it was first discovered (Sermwatanakul, 2018).

Considering its rich cultural and historical background and huge economic opportunities, the betta fish was declared as Thailand’s National Aquatic Animal as proposed by the DOF and petitioned by the public through Change.org (2019) that garnered more than 17,000 supporters. The prestigious recognition of betta fish could enhance the cultural and ecological preservation efforts as well as commercial breeding for income generation.

Trade of Betta Fish in Global Market

Ornamental fish production in Thailand continues to be a steadily growing industry where the production of high quality ornamental fish is facilitated by lush natural resources and traditional experience. Thailand is among the top-ranked sources of ornamental fishes in the world (Dey, 2016). For many years, the betta fish has been the most exported aquatic animal and gained the highest value. In 2018, the exported volume of betta fish was around 22.82 million with an estimated value of US\$ 5.55 million (Figure 2).

Even before it was declared as the country's National Aquatic Animal, betta fish persisted to be in great demand both locally and abroad. From 2014 to 2018, the average volume per year and average value per year of exported betta fish were 23.92 million and US\$ 4.29 million, respectively. In 2018, even though the exported volume abruptly decreased, the value significantly increased to about US\$ 5.55 million which was the highest revenue during the five-year period (2014-2018) (Figure 3). The escalating popularity and value of betta fish in the global market could be attributed to the application of effective online marketing strategies, especially enhanced advertisements through social media, that the local betta fish farmers learned from the capacity development trainings organized by DOF during 2013-2016.

Betta fish of different features and qualities have different prices and markets. For those living in the US and Europe, the betta fish is generally kept as pretty pets. In the Middle East, people like to give the colorful fish to others as a gift on special occasions. People from the Asian countries usually prefer to buy high quality fish that can be entered into fish contests. Whereas some people buy betta fish at wholesale prices and sell them at higher prices. The top five destination countries in terms of value of exported betta fish in 2018 include the USA, China, France, Iran, and Singapore (Figure 4). Even though the volume of exported betta fish to France is lowest among the top five importing countries, the high quality of fish and high logistical costs made betta fish the most expensive in this country at about US\$ 0.50 per fish.

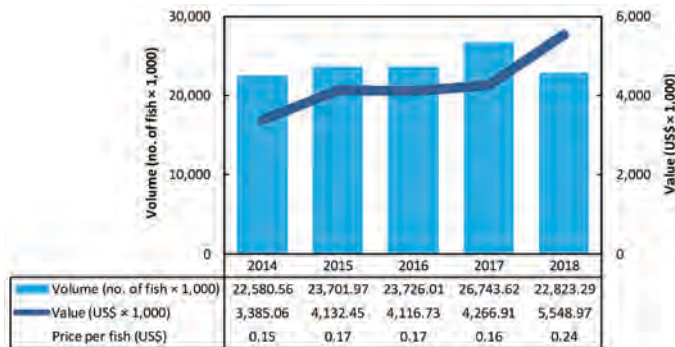


Figure 3. Volume (number of fish) and value (US\$) of Siamese fighting fish exported by Thailand in 2014-2018

Source: DOF, 2018

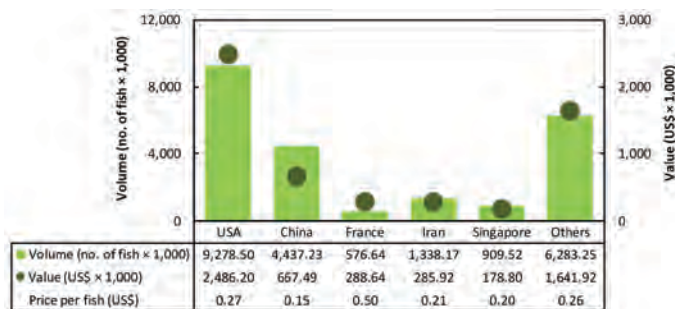


Figure 4. Top five destination countries of Siamese fighting fish exported by Thailand in 2018 in terms of value (US\$)

Source: DOF, 2018

Visiting local shops is the most common way for customers to see and buy betta fish. On the other hand, online marketing extensively reaches the domestic and international markets. Many people from all over the world opt for online means such as fish auction websites and social media. The pricing of betta fish varies according to colors and fin forms, which can go from as low as less than a dollar to outrageously more than a thousand dollars. The most expensive betta fish so far was the one with the colors of the Thai national flag (Figure 5) which was sold at US\$ 1,530 from an online auction (Bangkok Post, 2016).

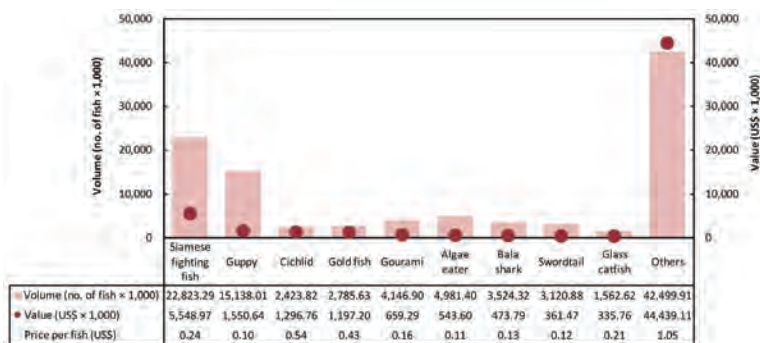


Figure 2. Major ornamental fish species exported by Thailand in 2018 by volume (number of fish) and value (US\$)

Source: DOF, 2018



Figure 5. Siamese fighting fish with the colors of the Thai national flag (blue, red, and white), the most expensive type of betta fish so far, sold at US\$ 1,530 from an online auction

(Photo by Mr. Patchara Aunsangchan, bred by Mr. Piphut Jitreesilp)

Ecology and Biology of *Betta splendens*

The many varieties of betta fish are geographically distributed in tropical areas with temperatures between 24 °C and 30 °C, which include Thailand, Indonesia, Malaysia, Viet Nam, and parts of China. They are also found in the Malay Peninsula and across the Strait of Malacca to adjacent parts of Sumatra. The occurrence in Sumatra is probably due to human introductions. betta fish can be found in floodplains, canals, rice paddies, ponds, slow-moving streams, swamps, and medium to large rivers (Taki, 1978; Rainboth, 1996; and IBC, 2019).

B. splendens are anabantoid fish distinguished by their possession of a lung-like labyrinth organ that enables them to breathe air from the water surface. This allows them to live in low-oxygen water, which is why they can be kept in smaller containers and easier to transport than other tropical fish. They feed on zooplankton and larvae of mosquito and other insects in the wild (Rainboth, 1996). In captivity, they can be fed with Moina (water fleas), brine shrimp, fish feed, and egg tofu. Their lifespan is generally two years according to Hugg (1996) and sellers.

Both males and females have an elongated body with an average total length of 6.5 cm and vary in color in the wild and in captivity depending on its breed. The wild type appearance of both male and female is black or dark green color and simple short fins. Because they have been bred over time into many colors and fin forms, the primary type of betta fish that is seen in pet stores have evolved far beyond their original wild type appearance. The hybrid male species is usually brightly colored with large flowing fins, whereas the female is pale and has small simple fins. Males are known to be extremely territorial and aggressive, thus holding of the males in very small containers is discouraged because they will attack each other if housed in the same tank (Riehl & Baensch, 1991). On the other hand, females can be housed together in a large enough space. Male and female can be kept together temporarily for breeding purposes, and that only one female should be brought into the 20-liter or 30-liter breeding tank.



Figure 6. Female (pink) and male (dark blue) *Betta splendens* mating under bubble nest

(Photo by Mr. Manutham Harnnarongphanich)

The male builds bubble nest on the surface of the water, generally under a plant leaf, to attract females even if one is not in the tank. Once the male and female have bred, they place the eggs in the bubble nest (Figure 6). The male chases the female away and protects the bubble nest and the eggs until hatched. If the female is allowed to stay for extended period of time she will begin eating the eggs that she spawned.

Since it has become increasingly rare in the wild, *B. splendens* has been listed as a vulnerable species by the International Union for Conservation of Nature (IUCN) (Vidthayanon, 2011). The main threats to the species are habitat degradation and pollution especially in central Thailand where most of their suitable lowland habitat had been converted into intensive farmland and urban areas. Another threat is the farmed stock that escaped into wild habitats which causes genetic erosion (IUCN, 2011). Betta fish lovers are hoping that the national designation of the betta fish would lead to stronger conservation efforts in Thailand.

Proper Care for Betta Fish as a Pet

Many appreciate having pet fish as a fun hobby and looking at an aquarium is known to reduce stress in humans. However, betta fish are sold to customers who are often uneducated about proper care, thus creating stress to the fish. Fish hobbyists should ensure that their betta fish pet is provided with warm water and regular feeding and tank cleaning. Infection with *Mycobacterium* spp. (harmful bacteria) should be managed as well because it is abundant in betta fish, live betta food, and betta farms, which has possible pathologic consequences for infected fish. Aquarium size is another potential welfare issue because of the tendency to keep betta fish in small vases. Besides, vegetation as environmental enrichment in betta aquaria is advisable because their natural habitat consists of thick vegetation to hide from predators. Environmental enrichment in aquaria like plants and caves to explore may have sheltering and stress-reducing effects on betta fish (Pleeging and Moons, 2017; National Geographic, 2019; PETA, 2019).

Farming of Betta Fish

There are more than 1,000 betta fish farms all over Thailand that are either home breeders (small-scale) and commercial (large-scale), the economics of which are shown in Table 1. A betta farm, whether small- or large-scale, is divided into three zones: breeding, nursery, and culture (Table 2). Usually, the whole family is involved in betta fish farm activities including women, men, children, and the elderly.




Betta Fish Supply Chain

Over the last fifty years, Thai fish farmers have successfully bred local and exotic species of ornamental fish resulting in a plethora of new varieties and an increase in production. This

Table 1. The economics of large-scale and small-scale betta farms in Thailand in 2018

	Home breeders	Commercial
Capital (US\$)	20,000-35,000	200,000-300,000
Size (m ²)	200	400-800
Production volume (number of fish sold/month)	200-500	200,000
Production cost (US\$/fish)	3.3	1.5
Selling price (US\$/per male fish)	15-20	0.16-3.0
Selling price (US\$/per female fish)	10	0.3
Income from international market (US\$/month)	8,000-1,200	10,000-15,000
Common problem	Production of betta fish to meet the high quality standard demanded by the market	Insufficient supply in some season
Opportunity	Availability of SFF varieties to serve the specific demands of consumers	The demand is all year-round

Table 2. The three zones (breeding, nursery, and culture) in Ratree Betta Farm in Nakhon Pathom Province, Thailand owned by Ms. Ratree Sae Lee

	Breeding zone	Nursery zone	Culture zone
			
Materials	> 500 plastic bowls (100 ml each)	1,000 concrete tanks (100 L each)	300,000 glass bottles (50 ml each)
Number of fish per container	1 pair	300-500	1 (all male)
Duration	6 days	1.5 months	1.0-1.5 months
Water maintenance	NA	Change half of water in tank every 3 days	Water is changed every 3 days
Water temperature (°C)	25-29	25-29	25-29
Water pH	7-8	7-8	7-8
Feeding (feed and frequency)	Moina, once per day	Moina, once per day	Moina and/or ground boiled egg, once per day
Mortality rate (%)	Negligible (well-experienced betta fish farmers)	Negligible (proper live food feeding and routine water change)	Negligible (only high quality betta fish are raised in the bottles)
Average fish size (total length cm)	NA	1-1.5 cm	2-2.5
Number and task of female workers	1 Assist in breeding	2 Assist in nursery works	2 Photography, online marketing, contact customers
Number and task of male workers	1	1 Live food preparation, feeding, fish health monitoring	1 Live food preparation, feeding, fish health monitoring
Number and task of children	Assist parents after school or during holidays	Assist parents after school or during holidays	Assist parents after school or during holidays
Number and task of elderly workers	1-2 All tasks depending on health condition	1-2 All tasks depending on health condition	1-2 All tasks depending on health condition

has led to the necessity to improve the logistics in the supply chain from farm to customer in order to reduce losses and sustain or increase the market value of products. Therefore,

in collaboration with the DOF and OSMEP, Thailand Post has launched in December 2018 the special delivery service for betta fish parcel.



Figure 7. Packaging of betta fish for domestic delivery



Figure 8. Preparing the betta fish for international delivery at JJ Betta Farm in Nakhon Pathum Province, Thailand owned by Ms. Nattha Thannawong

This special service is aimed at supporting the betta fish farmers to supply the high demand especially from abroad under the “safe and fast” concept. The parcel comes with a special betta fish sticker to notify the handlers. For the direct delivery of betta fish from farm to the customer (hobbyist or pet shop), each fish is packed in a double layer of plastic bags and enclosed in banana trunk for insulation before placing in the delivery box (Figure 7).

For the export delivery, each fish is packed in small plastic bowls or small plastic bags (Figure 8). All shipments are attached with health certificate issued by the DOF under World Organisation for Animal Health (OIE) standards. Before departure from the airport, the fisheries inspectors ensure that the delivery boxes do not contain illegal items such as animals under the CITES list.

Empowered Women and Men in Betta Fish Farming

The betta fish farmers in Thailand have extensive knowledge on the breeding and culture of betta fish, and they are successful in producing high quality fish that meet the standards of domestic and global markets. However, most of the local breeders lack the channels (low marketing knowhow, poor English communication, and so on) to access global markets. Because of high supply of betta fish for limited customers, the farmers were forced to reduce the wholesale price of the fish to as low as US\$ 0.10-0.16 per fish to attract

customers. For most home breeders, they lack the capital when they wish to expand their business.

In order to alleviate the livelihood of betta fish farmers, the DOF and partner agencies implemented the Ornamental Fish Strategy Plan during 2013-2016 with the vision of making Thailand as the number one exporter of ornamental fish in Asia. The objectives of the Plan include 1) improving the production quantity and quality of ornamental fish; 2) enhancing the domestic and international ornamental fish trade; and 3) developing the capacity of ornamental fish farmers to become successful farmer-entrepreneurs. One of the crucial action plans was to produce value-added and creative products, specifically of the betta fish which was selected as the most significant fish. The information on Ornamental Fish Strategy Plan was disseminated to ornamental fish farmers through announcement posted in the government website and announcement in fisheries provincial offices. The ornamental fish farmers all over Thailand are required to voluntarily register under the DOF for them to avail of several privileges offered by the government, e.g. training courses on capacity development for registered ornamental fish farmers (Box).

Box. Training courses that also cover effective online marketing strategies

- classification and pricing of fish based on color and fins
- photography and videography using smartphones and setting up DIY studio at the fish farm
- creating accounts in social media, auction websites, online payment schemes, etc.
- simple English communication using language translation apps
- value-added and creative product

Moreover, the Office of Small and Medium Enterprises Promotion (OSMEP) also provides financial assistance to betta fish farmers through the group called Cluster Plakad 2019. The group comprises 700 betta fish farmers all over Thailand with one cluster in each of the five regions of the country including North, Northeast, South, Central, and Nakhon Pathum. The Cluster Plakad 2019 aims to: 1) provide a better understanding of the concept and practice of entrepreneurship, 2) promote connectivity among betta fish farmers, 3) raise awareness of market demands, and 4) boost the capacity of betta fish farmers to compete with other farmers and sellers at the domestic and international markets.

The interventions of the government have had a remarkable impact to the betta fish farmers who are now fully equipped to market their products and earn the high profit that they deserve from their hard work. Numerous betta fish farmers have become self-sufficient farmer-entrepreneurs by selling their fish all over the world. They used to earn THB 15,000/month but now they are earning as much as THB 30,000-100,000/month. Betta fish farmers are now able to take

advantage of the availability and advances in information technology for the online marketing of their fish. Photographs of betta fish are taken in a do-it-yourself (DIY) studio at the farm and uploaded in various online platforms, such as www.aquabid.com, company website, and social media. The buyer pays the betta fish farmer through online payment schemes such as Paypal, Western Union, Money Gram, bank to bank transfers, and others.

As of May 2018, there were 413 (163 female and 249 male) registered betta fish farmers in Thailand. Interestingly, a good number of women are not only betta farm owners, but are also actively engaged and proficient in online marketing. Also, more and more young people are motivated in putting up their own betta fish farms and some have even given up their day jobs to become full-time betta fish farmers.

Way Forward

The Government of Thailand, through the DOF and partner agencies, would continue to support the local betta fish farmers by promoting sustainable betta fish farming and systematic supply chain management by means of 1) effective utilization of information technology, 2) proper planning of production, sales, and cost reduction; and 3) active exchange of information on activities organized by public and private sectors. Also, the Government is planning to provide more support the community to develop betta fish farms as tourist destinations by promoting not only the betta fish but also the value-added and creative products as souvenir items that will be produced by the community.

It is hoped that the designation of betta fish as the country’s National Aquatic Animal would lead to sound conservation actions. The IUCN (2011) strongly recommends captive breeding from wild populations and management of known habitats. Research and monitoring of population size, distribution, and trends are also necessary. Presently, there

are conservation groups of fish farmers in several areas of the country who advocate on the breeding wild betta fish and releasing some of the fish back to their natural environment. The DOF, in close collaboration with the community and provincial government, would tap the conservation groups of betta fish farmers in developing a model of conservation and area-based management plan that will be implemented in Bangkok, Samut Sakhon, and Buriram as areas of resource conservation and habitat protection.

One of the most important awareness raising activities that the DOF, in partnership with betta fish farmers, plans to carry on is during the Children’s Day, an event that Thailand celebrates every second Saturday of the year. Last 12 January 2019, around 3,000 betta fish were distributed to the many children who came to the event organized for the first time at the Government House in Bangkok (**Figure 9**). It was a successful event where the DOF and betta fish farmers joined hands in educating the Thai people, especially the children in a fun and exciting way about proper care of the betta fish as a pet and raise their awareness of betta fish as the country’s National Aquatic Animal.

The local breeders and sellers in Thailand believe that the betta fish industry could definitely grow even bigger because the existing supply is not enough to cater to varying demands. Betta fish farming could be a promising livelihood opportunity also for aspiring betta fish farmers from other ASEAN Member States (AMSs); especially that *B. splendens* is also naturally abundant in many areas of AMSs. Certainly, establishing betta fish farms and making it successful is a lengthy process and full of challenges along way.

By learning from the experiences of Thailand and strong commitment, the governments of AMSs could gain from the benefits of sustainable betta fish farming in empowering the local fish farmers and eradicating poverty in small-scale fishing communities.



Figure 9. The first joint activity of the Department of Fisheries and betta fish farmers during the Children’s Day organized in Government House, Bangkok, Thailand on 12 January 2019

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