

# Farming the Amur Sturgeon (*Acipenser shrenckii*) and the Mississippi paddlefish (*Polyodon spathula*) in Malaysia

Sturgeon, a fish of subarctic and temperate waters, is famous as the source of the luxury food, caviar. The Amur Sturgeon is now being farmed successfully for the first time in the tropics, in Malaysia.

By Larry Lim, in interview with Francis Ng



A 25 kg Amur Sturgeon

**S**turgeon and paddlefish are being farmed by BaoLai International, a Malaysian-Taiwanese joint venture aquaculture company established in 2008. Its 3.3 acre farm is located near Tanjung Malim in the state of Perak, at the foot of the central Titiwangsa mountain range of Peninsular Malaysia.

There are globally 27 species of sturgeon and two species of the closely-related paddlefish. The sturgeon and the paddlefish are characterised by having a soft cartilaginous skeleton instead of a hard bony one, a smooth skin without scales,

and a caudal fin reminiscent of sharks. In the fossil record, the first sturgeons first appeared in the Triassic Period 250 to 200 million years ago, before the Jurassic dinosaurs and long before the flowering plants. They have changed little in external appearance and are sometimes referred to as living fossils, but they have changed internally. The first sturgeons had hard bony skeletons but through evolution, the skeletons became cartilaginous.

The farm is rearing the Amur Sturgeon (*Acipenser schrenckii*) which is native to the



Paddlefish

Amur River on the border of China and Russia, and the Mississippi Paddlefish (*Polyodon spathula*) which is native to North America. It is now experimenting with other species such as the Beluga (*Huso huso*) and the Keluga (*Huso dauricus*) sturgeons.

In nature, sturgeons are found in the sub-arctic and temperate regions of Eurasia and North America, in rivers, lakes, estuaries and coastlines. There are no natural sturgeons in the tropics. The closest to the equator in which sturgeon has been farmed successfully until now is in Taiwan at latitude 24° N and perhaps Vietnam. The farm in Tanjung Malim is almost at the equator, at latitude 4°N. The farm is watered by cool water from a mountain stream.

In nature, the breeding of sturgeons is dependent on the availability of cool unpolluted water. The

fish migrate upstream to spawn and the female releases 100,000 to 3 million eggs to be fertilized in the water by sperm released by the males. The eggs are sticky and attach to the surfaces of stones and other materials in the river. The fry develop in 8–15 days and are carried by the river to calmer backwater areas where they live for about one year, feeding on insect larvae and small crustaceans. When they are about 6 inches long and about 1 year old, they migrate back into the main stream of the river.

All sturgeons are critically endangered in the wild, because of overfishing, water pollution, and habitat fragmentation such as the damming of rivers.

With permission from the Fisheries Department of Malaysia after exhaustive risk assessment studies completed in 2011, and with permits



A four-year old female sturgeon opened up for its roe



Roe extracted from the four-year old sturgeon

from CITES for import and export of sturgeon, BaoLai began to experiment with fry of the Amur Sturgeon and eggs of the Mississippi Paddlefish from the USA. BaoLai started with know-how from the Taiwan partner. Later, it had access to the authoritative Sturgeon Hatchery Manual by Russian experts Mikhail Chebanov and Elena Galich, published by the Food and Agriculture Organization of the United Nations. BaoLai made many introductions of sturgeon but the fish failed to survive. However, valuable lessons were learnt each time and finally, the fish not only survived but grew rapidly, to the great surprise of sturgeon scientists overseas. The biggest fish in the farm reached 40–50 kg in 5 years.

The sturgeons in the Malaysian farm seem to grow faster than those in temperate climates. At four years, some females have begun to produce eggs, which is very surprising. In nature most species of sturgeon need 15–20 years to reach sexual maturity and they live for over 100 years. The biggest sturgeon on record is a Russian Beluga sturgeon caught in the Volga estuary in 1827, which measured 8 m long and weighed 1.571 kg.

Sturgeons and paddlefish are docile animals and do not bite because they have no teeth. In nature, sturgeons are bottom-feeders, and their mouths are designed to suck in food such as molluscs, crustaceans, small fish and small aquatic animals, while paddlefish are plankton feeders. The workers wade into the fish tanks once a month to scrub the sides and the fish do not mind. In nature the big fish have few enemies because of their size and strength.



UTAR academic staff at the sturgeon farm



A worker handling a sturgeon in the water



A 5 kg sturgeon packed for delivery to a restaurant

Malaysia has many favourable factors for sturgeon farming, such as the availability of clean cool mountain water, lack of low winter temperature to slow down or interrupt growth, and absence of typhoons and earthquakes that regularly destroy farms elsewhere. The biggest

threat to the farm is logging and land-clearing activities in the forests upstream, beyond the control of the farm, which would destroy the water quality. This could happen without warning, and has already happened, requiring the farm to install emergency water filtration equipment.



The BaoLai farm and its environment



Log extraction at the back of the farm that has caused soil erosion and water pollution and posed a serious threat to the farm

Sturgeon is hardy and can be transported alive in large plastic bags containing water and oxygen, but they are very sensitive to polluted water. BaoLai once delivered some live sturgeons to Penang and the fish had no problems during the drive to Penang, but on arrival they were transferred by the client to a tank holding normal domestic chlorinated tap water. The fish died in two hours in this water.

In the farm, the water is kept clean by continuous flow of mountain water and the water that is discharged is of exceptionally good quality compared to water discharged by other fish farms.

Larry Lim, the Executive Director of BaoLai, hopes eventually to sell caviar but the waiting

time for the fish to reach puberty is long and expensive. An important and more immediate source of income is the demand by restaurants for the fish. The farm now supplies sturgeons to over 20 restaurants in in the Greater Kuala Lumpur area and Penang. The restaurants need the fish to be delivered live, and the most popular size is 4-5 kg. The quality of the meat improves with the size of the fish. The 4-5 kg fish taste better than the 1 kg fish and the 10 kg fish would probably be even better.

Larry has transported four 10-kg-sized fish to the 'River Safari' of Singapore Zoo where they are on public display and are thriving.

The availability of sturgeon has brought forth great displays of culinary skill. In several



Hong Kong celebrity chef Hugo Leung with Larry Lim at a local Chinese restaurant



A sturgeon feast being prepared in a Chinese restaurant kitchen



**Cordon Noir Christmas Inauguration Dinner**  
*TanjungMalim 13. December 2014*

**MENU**

**Chinese Oscietra and Tasmanian Trout Caviar  
with sour cream, onion and blinis pancake**

*Chilled Vodka*

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**Natural mountain spring**

**Sashimi of Mississippi Paddle fish**

*Pencarrow Sauvignon Blanc New Zealand*

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**Soup**

**Dato Ringo's Diamond Creek Elixir**

*Protos Viognier South Africa*

\*

**Maine**

\*

**Behrang ula Amor River Sturgeon**

*Rustenberg Chardonnay South Africa*

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**Steam and Baked Domestic Capone**

*Cartagena Pinot Noir Chile*

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**Vegetable & Tanjung Malim Homemade Noodles**

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**Taiwan Aiyu Jelly  
with Orange Ice cream**

*Henessy XO*

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**Café or Tea**







A sturgeon feast in a Japanese restaurant

Chinese and Japanese restaurants in Greater Kuala Lumpur it is possible to order, in advance, eight-course meals in which every course is made with sturgeon: raw, fried, steamed, boiled, baked, etc and even in sweet desserts . Because the skeleton is soft and edible, 98% of a fish is consumable. The fish is very high in collagen-content. In December 2014 Cordon Noir, an international group of chefs over 20 countries, held its inaugural dinner in a restaurant in the small town of Tanjung Malim and dined on a special gourmet meal featuring fresh sturgeon and paddlefish from the nearby BaoLai farm.

Larry Lim, a Committee Member of the Selangor and Federal Territory Gardening Society, has a passionate interest in gardening and nature conservation. After schooling in Malaysia, he went to the US to study engineering and computer science. Back in Malaysia he worked in manufacturing and construction before becoming a sturgeon farmer, in which it was crucial to quickly identify and resolve problems in the design, construction and operation of systems to provide a favourable environment for sturgeon growth and development.

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### **Bibliography**

- Anon. (undated). *Manual on Sturgeon Reproduction*. Copens Interational nv. Netherlands.  
 Chebanov, Mikhail S. & Galich, Elena V. 2013. *Sturgeon Hatchery Manual*. FAO, Ankara.