

Abstract for Aquaculture RAS Breeding Farm for Aquarium Corals and Ornamental Fish

This abstract reflects general technical and market aspects of ornamental fish and decorative coral breeding



INTRODUCTION OF FISH BREEDING

The history of raising captive ornamental fish expands back several thousands of years in China. Keeping colorful and fancy fish, known as 'live jewels', is one of the oldest and most popular hobbies in the world. The growing interest in aquarium fishes has resulted in steady increase in aquarium fish trade globally. There are thousand's of species of sea and freshwater fish sold throughout the world in the ornamental fish industry. While



traditionally, many of these fish have been captured from the wild, there has been an increasing trend towards captive breeding over the past twenty years. Indeed, as many as 90 % of freshwater fish now sold in the hobby are farmed.

RAS (usually tanks or containment structures with engineering to circulate water and manage its quality) offers an alternative to the most common used farming techniques like ponds, raceways and net cages. The high capital costs of such RAS implies that the system is operated to the closest maximum efficiency to generate a sufficient income which will cover the initial costs.

Ornamental fish keeping is becoming popular as an easy and stress relieving hobby. Hobby



private households have an aquarium and the number is increasing day by day through out the world. Ornamental fish farming is also growing to meet this demand as also wild sources going more limited in catch do to protection policies, environmental damage and over catching. The fact is that USA, Europe and Japan are

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the largest markets for ornamental fish but more than 65 % of the exports come from Asia.

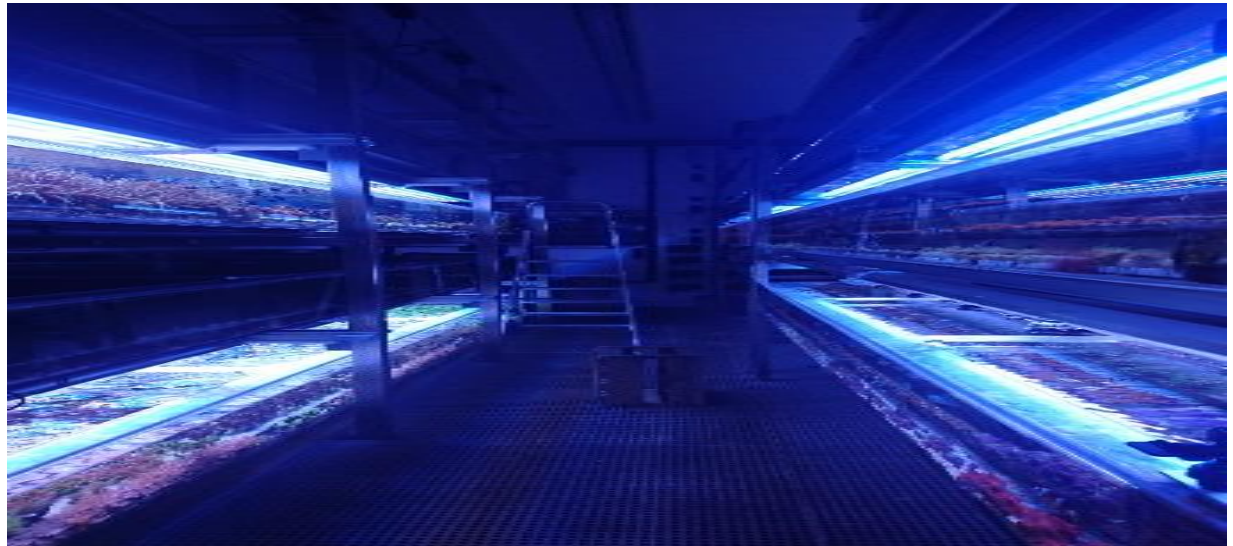
The right brood-stock management leads to a low mortality rate of the farmed fish and corals and therefore guarantees a high harvest. The key factors within brood-stock management are:

- The right choice of fish parents and corals fragments
- The right hatching of coral fragment and harvesting
- The right hatching of ornamental fish ready for farming
- Optimized environmental conditions of the fish species and corals breeding

Additional key factors during farming are an adequate feeding of the fish and corals as well as an adequate water treatment and circulation of the farming facilities to ensure the intended growth and to prevent diseases within the stock.

DECORATIVE CORALS

Corals are marine invertebrates typically living in compact colonies of many identical individual polyps. The most known ones are the Stony Corals (Scleractinia), who are marine animals in the phylum Cnidaria that live on the seabed and



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build themselves a hard skeleton. Solitary corals can be as much as 25cm (10") across but in colonial species the polyps are usually only a few millimeters in diameter.

Additionally to the Stony Corals there exist Soft Corals (Alcyonacea) as well. These Alcyonacea are an order of corals which do not produce calcium carbonate skeletons. Unlike stony corals, most soft corals thrive in nutrient-rich waters with less intense light.

OTHER MARINE INVERTEBRATES

Polyps or Zoanthids (order Zoantharia also called Zoanthidea or Zoanthiniaria) are an order of cnidarians commonly found in coral reefs, the deep sea and many other marine environments around the

world. These animals come in a variety of different colonizing formations and in numerous colors. Sponges are animals of the phylum Porifera. They are multicellular organisms that have bodies full of pores and channels allowing water to circulate through them.

Some of the common species sell for as little as 20 USD while similar sized colony of a rare species like *Acanthastrea* sells for over 1,000 USD.

MARKET ANALYSIS

According to NABARD, the 5 billion USD global ornamental fishery grows 8% annually. The top exporter is Singapore followed by Hong Kong and Malaysia; the largest importer is the USA,

followed by Europe and Japan, while China and South Africa are the emerging markets.

The average hobbyist is male age 25-35 with less than 5 years of experience in the hobby. The average reef aquarium is 100 gallons (approx. 380 L) and it is common for an aquarist to have more than one marine aquarium. Hobbyists tend to be more interested in corals rather than fish and spend between 5,000 USD and 10,000 USD on their aquariums (Thein, 2005).

Upon an international ratio statistic 5% of the population is an aquarium hobby active.

Anemonefish make up 43% of the global marine ornamental trade, and 25% of the global trade comes from fish bred in captivity, while the

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majority are captured from the wild, accounting for decreased densities in exploited areas.

SALES AND EXPORT SOURCES

Sales and export sources are:

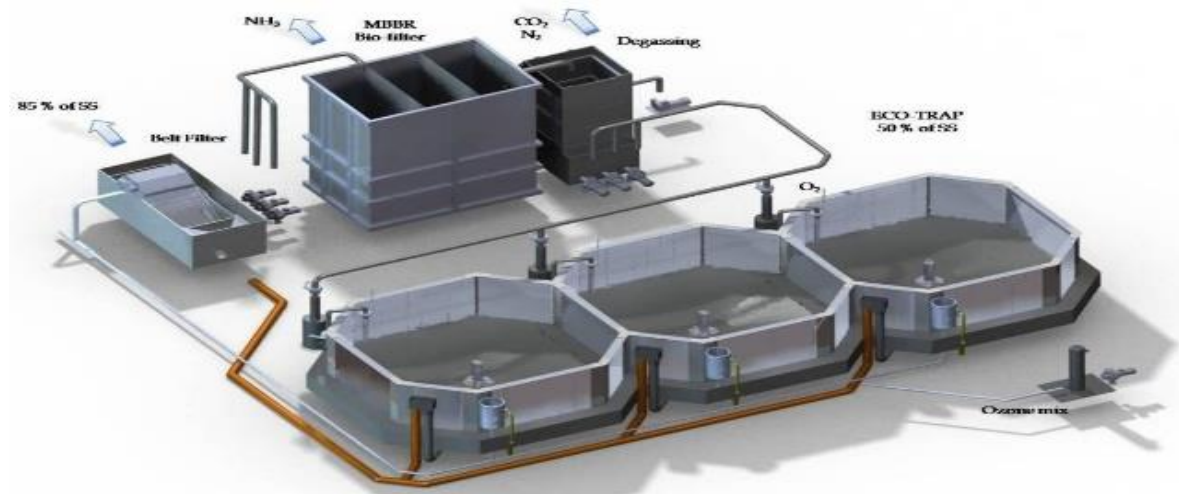
- Private Households with the biggest community of hobby aquarium holder
- Palace and royal family residences
- Commercial Buildings like banks, companies and Organizations
- Ministries
- Shopping malls
- Restaurants
- Aqua zoo
- Museum
- Hotels
- Theme Parks
- Pet shops

Despite the increase in captive coral propagation for the aquarium trade in the last few years it is obvious that the industry is only at the earliest stages of development.

RECIRCULATING AQUACULTURE SYSTEMS (RAS)

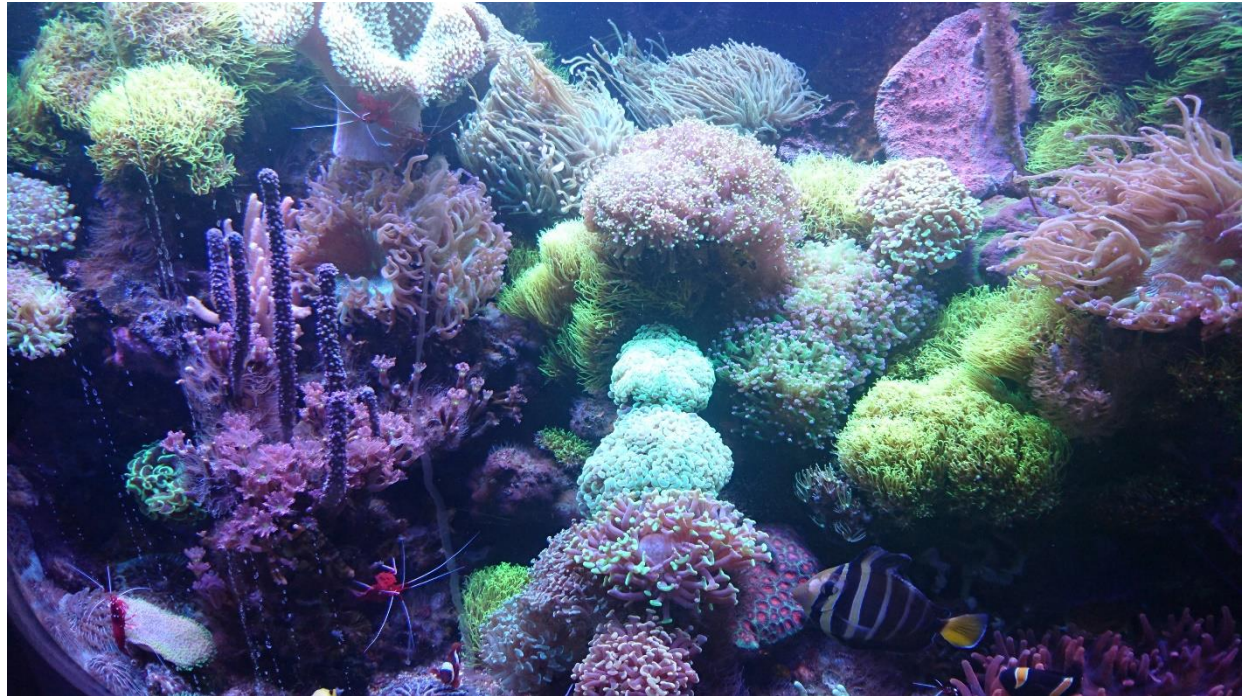
Recirculating aquaculture systems (RAS) are used in home aquaria and

for fish production where water exchange is limited and the use of biofiltration is required to reduce ammonia toxicity. Other types of filtration and environmental control are often also necessary to maintain clean water and provide a suitable habitat for fish. The main benefit of RAS is the ability to reduce the need for fresh, clean



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water while still maintaining a healthy environment for fish. To be operated economically commercial RAS must have high fish stocking densities, and many researchers are currently conducting studies to determine if RAS is a viable form of intensive aquaculture. The need of individual species may vary and therefore the system has to be optimized consequently to deliver an optimum which will assist the consistent conditions for growth. The engineering of any RAS system is difficult to maintain as good quality conditions must be ensured in order to maintain the fish and crustaceans health.



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