

SUSTAINABLE AQUACULTURE

The Future of Seafood?

Fish farming (or aquaculture) is the fastest growing segment within the global agribusiness growing at a compound annual growth rate of 9%. In the 1970's, aquaculture represented only 6% of total seafood consumption. Today, it represents 40% and is expected to rise to 50% by 2024 representing a market size of \$100 billion.

Part of the reason for aquaculture's growth is the increase in global demand for seafood coupled with a flat or declining supply from wild harvesting. While aquaculture is expected to fill the growing demand, conventional aquaculture methods have problems, including the wide use of antibiotics and pesticides to fight disease; the necessity of using of wild caught fish for fishmeal to feed farmed species; contaminants from fishmeal; and limited coastal waters available for aquaculture. If not addressed, the problems facing conventional aquaculture will limit its ability to meet rising demand.

The following are key drivers:

Output from Wild Fisheries in Peril – “We are fighting a war against fish, and we are winning,” according to Dr. Daniel Pauly, a professor at the University of British Columbia, Fisheries Centre and Zoology Department. Dr. Pauly also recently appeared in the documentary “[The End of the Line](#)”. Over 75% of the world's commercial species are now fully exploited, overexploited, depleted, or recovering from depletion, reports the Food and Agriculture Organization of the United Nations. Other forms of animal-protein, such as beef, poultry and pork were domesticated over four thousand years ago and this has just begun in the seafood industry, at scale, over the past few decades.

Expanding Global Seafood Demand – World per capita consumption of fish and fishery products has risen by 50% in the last decades from an average of 11.5 kg during the 1970s to over 17 kg today.

Food Security – In 2008, imports made up 83% of the seafood consumed in the U.S. mostly from countries with practices that are under-regulated and far from sustainable. It is nearly impossible to trace the origins of imported seafood. In contrast, sustainable aquaculture enables local production (which also means fresher produce), year-round availability, and a higher degree of traceability.

Fish Consumption is an Efficient & Sustainable Protein Source – In animal husbandry, one of the key efficiency measures is the feed conversion ratio (FCR). The FCR measures feed fed/weight gained for various animals. This ratio is determined by the biological ability for animals to convert food into tissue. The FCR for sheep and cattle is 8:1, pigs 4:1, poultry 2:1, and fish (Atlantic salmon or tilapia) ~1.5 :1.

Safety & Health Concerns – Many people are unaware of the full range of potential containments in seafood. Fish species that are high on the food chain, such as tuna or swordfish, accumulate greater concentrations of toxins and pollutants. This problem also applies to aquaculture since the main source of protein for farmed fish is fishmeal

produced from smaller, wild caught fish, which can contain mercury, PCBs or other containments. Within sustainable agriculture, there are companies creating fishmeal that derives its protein source from plant-based materials instead of fish.

Scale – The seafood industry is seeking sustainable aquaculture technologies that can scale at cost parity with the existing incumbent technologies. Technologies such as land-based recirculation aquaculture systems (RAS) are either cost competitive with incumbent methods or are poised to become so. RAS grows fish in large quantities “indoors” under controlled conditions.

Opportunity to Innovate – The following are promising next generation solutions for sustainable aquaculture: advanced, closed-loop land-based RAS systems, plant-based protein for replacement of fishmeal, nutrition formulations that replace nutrients found in fishmeal, technologies for conversion of fish waste to biomass and fertilizer, biofiltration for closed-loop systems, and deep-water farming. These innovations have the potential to ripple through the industry and reshape the seafood industry and the industry's suppliers.

More Customers Are Demanding Sustainable Products – An increasing number of restaurants, retailers and food processing companies are looking to source seafood from sustainable providers. The Wall Street Journal recently reported that McDonald's, Long John Silver and Red Lobster have embraced the growing movement toward more eco-friendly seafood- buying practices.

Local is the New Organic – The concept of ‘food miles’ is a measure of the distance that a food product travels from harvesting to where it is sold. For fish, food miles is often 2x to 3x greater than typical produce (1,500 miles) because fish are often caught and processed in very different locations. Land-based aquaculture can be located closer to where products are consumed, and can significantly reduce food miles, transportation costs and simultaneously improve freshness.

Global Warming Effect on Wild Fisheries – Scientists believe extra carbon in the atmosphere is causing a decrease in the ocean's pH (known as “acidification”) which can negatively impact sea life. While computer models can provide clues as to what the rising ocean temperature and carbon absorption may mean to fish, the interactions of those variables is uncertain and therefore the ultimate outcome is unknown.

Conclusion

The confluence of declining wild fish stocks, increasing world seafood demand, problems with conventional aquaculture and the emergence of new technologies are propelling sustainable aquaculture forward. Sustainable aquaculture offers many economic and product benefits such as consistent harvest, scalable operations, lower transportation costs for locally produced seafood, and containment free products. For the right innovators and investors, there are enormous commercial opportunities.