

Can Seafood Feed the World?

By Amy Mathews Amos

Thinking about grilled salmon for dinner? Or maybe ordering jumbo stuffed shrimp at your favorite seafood restaurant? As a kid, this simply didn't happen in my family. Grilled salmon was an unheard of luxury and shrimp appeared only at my mother's rare dinner parties, served in miniscule amounts with cocktail sauce.

Now they're available anytime, fairly inexpensively.

That's because years ago, salmon and shrimp – which are predatory animals – were only harvested wild from the sea. Today much of it is farmed, with half the salmon now eaten in the U.S. grown in pens, a percentage that has risen steadily in recent years.

Unfortunately, like many luxuries that have become commonplace in the modern world – these now plentiful forms of seafood come with high hidden social and environmental costs.

The problem is anchored in biology: the predatory nature of salmon and shrimp. To farm these carnivores in large numbers, they must be fed huge amounts of seafood to thrive, seafood that other ocean predators – not to mention people in developing nations – need to survive.

Farmed carnivorous seafood – salmon and shrimp – is fed on smaller forage fish such as anchovies, sardines, herring, and mackerel, caught by industrialized factory ships and ground into fish meal and fish oil.

For every pound of farmed salmon produced, two to three pounds of forage fish must be caught from the sea. So for every meal of farmed salmon someone eats in the developed world, two or three people could have had a fish dinner elsewhere.

However, it's not just people who need forage fish. They're a vital food source for marine life throughout the world's oceans. Swordfish, bluefish, cod and other predatory carnivores depend on them, as do seabirds and marine mammals, including seals, sea lions and many whales and dolphins.

As the developed world's consumption of farmed predator fish skyrockets, the impact on marine ecosystems remains unclear. But Chesapeake Bay anglers are now seeing once hefty striped bass suffering from malnourishment and low weight, possibly due to the depletion of their key food source, menhaden, a forage fish increasingly harvested for meal and oil. Likewise local depletions of penguins in Argentina, dolphins in Italy, and cormorants in southern Africa have all been linked to failing forage fisheries.

Scientists have long documented starvation and declines in top predators like seabirds and seals during El Niño years, when unusually warm waters produce fewer forage fish. The question now needs to be asked as to how top ocean predators will fare this year as they are struck by the one-two punch of industrially over-fished forage fish and a moderate to strong El Niño building in the Pacific.

Although fish meal is fed to pigs and poultry too, the rapidly growing predatory aquaculture industry is outpacing those uses. And the trend in aquaculture is to farm additional types of carnivorous fish, such as halibut, cobia and even tuna. The markets for these predator fish too won't be the undernourished poor in developing countries, but rather high end restaurants in Europe, North America and Japan. So while some tout aquaculture as a solution to our growing protein problem, under current trends it could reduce the overall protein supply for people, while depleting a critical link in the oceanic food web.

What needs to happen so that we can have our fish and eat them too?

Seafood companies are already researching ways to reduce the forage fish needed to raise carnivorous species by replacing fish protein with other sources such as soy. These efforts have successfully cut in half the amount of forage fish needed to produce a pound of farmed salmon.

But questions remain about how low this number can go while still producing what is fundamentally a carnivorous fish. Technology can work wonders, but can it ever make a tuna a vegetarian? Moreover, the trend towards farming even more species of carnivorous fish to meet restaurant and consumer demand could quickly overwhelm these gains.

It seems clear that if aquaculture is to feed our hungry planet it will require a more diversified farmed fish portfolio: with better farming of herbivorous species such as mussels, clams, oysters, tilapia, and catfish, which eat algae and plants rather than other marine animals. Scientists and fisheries managers will also need to thoroughly study the risks of forage fish depletion and place limits on the catch of these species to protect ocean ecosystems.

Aquaculture is currently the fastest growing food production system in the world. Done right, scientists agree, it could provide a valuable source of protein for a growing human population. Done wrong, and it could take food from the world's poorest, while doing irrevocable harm to ocean ecosystems.

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