

## Aquaculture May Be Fishing for Trouble

By Cat Lazaroff

Second in a [\*two part ENS special report\*](#)

**SAN FRANCISCO, California**, February 21, 2001 (ENS) - New studies released this week reveal that farmed fish and shellfish, which form a growing percentage of the seafood consumed around the globe, may pose unexpected risks to wild species, as well as to the environments in which they are raised.

At the American Association for the Advancement of Science (AAAS) meeting in San Francisco this week, an international group of scientists presented new findings on the unintended impacts of fish farming that put both oceans and the aquaculture industry at risk.

Dr. Daniel Pauly of the University of British Columbia Fisheries Centre released a new global study, "Farming Up Marine Food Webs," showing that major sectors of the booming aquaculture industry are literally feeding on world fisheries.

Aquaculture, the fastest growing sector of the world food economy, is increasing by 11 percent a year. Many people expect this growth to relieve pressure on ocean fish stocks, most of which are now fished beyond capacity, and to provide a reliable source of food to a world population that adds 78 million people each year.

But paradoxically, Pauly's new study shows that the increasing trend toward farming carnivorous fish means that many types of aquaculture are contributing to a worldwide collapse of wild fisheries.

Production of a single pound of fish eating species such as shrimp, salmon, tuna or cod demands two to five pounds of wild caught fish that is processed into meal and oil for feeds.

Pauly previously discovered a global pattern of fishing down the food chain, putting more pressure on lower level species as the bigger carnivorous fish are depleted. His new analysis demonstrates that the mean trophic level, or relative position of



*A fish farm in British Columbia, Canada inland waters. (Photo courtesy B.C. Salmon Farmers' Association)*

organisms within food chains, of farmed fish has been rapidly increasing in almost all regions of the world outside Asia.



*Tilapia is among the most common - and most sustainable - farm raised fish (Photo by Warren Gretz, courtesy National Renewable Energy Laboratory (NREL))*

The new study discovered that traditional aquaculture - farming fish that eat plants and bottom muck - is being replaced by modern intensive farming of large, carnivorous fish because overfishing has decimated these fish in the wild. Even in Asia, the ancient home of aquaculture, vegetarian fish like tilapia and carp are now being fed fishmeal and fish oil for faster weight gain and marketability.

"The new trend in aquaculture is to drain the seas to feed the farms. Meanwhile capture fisheries now focus on what we once considered bait," said Pauly. "These two trends - farming up and fishing

down the food web imply massive impacts on marine ecosystems that are clearly unsustainable."

## **INDUSTRY EXPERT REFUTES FISH FOOD ARGUMENT**

Dr. Ronald Hardy, director of the Hagerman Fish Culture Experiment Station and a professor at University of Idaho, disagrees with Dr. Pauly and other aquaculture critics.

"These individuals and groups are not making efforts to work toward solving the problems that they identify, problems that we in the field have been aware of and working on for literally decades," said Hardy, who is also the vice president of the World Aquaculture Society.

Hardy argues that the AAAS studies use out of date information concerning the amount of fish meal used in feed formulations for salmon and other farmed fish, citing a 2000 study in "The Global Aquaculture Advocate."

The AAAS studies also use out of date feed conversion ratios, "which lead them to exaggerated conclusions concerning the amount of wild caught fish (used to make fish meal) that is needed to produce farmed fish," Hardy said in a release timed to counter the AAAS symposium.



*At Fish Breeders of Idaho, sustainable fish - white tilapia - are raised with the help of sustainable power - geothermal energy (Photo courtesy Geo-Heat Center)*

"Economics and consumer preferences dictate aquaculture production and the use of fishmeal," said Hardy. "At present, fish meal is abundant and inexpensive, but this will inevitably change in the future."

Hardy noted that ingredients such as soybean meal, corn gluten meal, wheat gluten meal, and other byproducts of grains and oilseeds can easily replace between a third and a half of the fish meal in feeds for the primary aquaculture species - salmon and trout, shrimp and marine fish.

Hardy also noted that fish meal made from wild fish is important to many other industries, such as the pet food market and some livestock operations. Chicken farms are the largest consumers of fish meal, Hardy said.

"If aquaculture ceased using fish meal in feeds tomorrow, there would be absolutely no impact on landings of fish to make fish meal, because other agriculture production sectors would buy it all," Hardy said. "The fact that a higher proportion of world fish meal production is used in feeds for fish today than a decade ago does not mean that aquaculture is responsible for overfishing of stocks, fishing down trophic levels, or lowering global supplies of seafood for humans."

## **AQUACULTURE FORMS VITAL FOOD SUPPLY**

"A lot of countries could use more protein, and aquaculture is a good way to get there," said Rosamond Naylor, an economist at the Stanford Institute for International Studies.

The problem, Naylor pointed out, is that farmed salmon, shrimp and other carnivorous species often take more out of the oceans than they keep in.



*Armed guards protect the illegal construction of a new shrimp farm along the Gulf of Fonseca on the Pacific coast of Honduras. (Photo courtesy Greenpeace)*

At the AAAS meetings in San Francisco, a panel of seven international scientists presented data showing that aquaculture is necessary to the world's future food security. But they also warned that the growing demands of the world's food production systems upon a finite quantity of resources means that all aquatic and terrestrial farming systems must become more efficient.

Cost benefit analyses into the viability of certain kinds of aquaculture must incorporate issues such as declining wild fisheries, water pollution, habitat destruction and impacts on wild stocks. Examples of better aquaculture practices include farming vegetarian species and employing technologies that recycle nutrients and minimize polluted discharge.

Dr. Jason Clay released the findings of a three year study by the World Wildlife Fund, the World Bank, the United Nations Food and Agriculture Organization and the Network of Aquaculture Centres in Asia Pacific on the best and worst practices of shrimp farming.

Shrimp farming now produces half of all internationally traded shrimp. Raising 800,000 metric tonnes world wide each year, for a total value of U.S. \$6 billion, the industry was predicted to generate benefits for cash strapped countries.

Instead, disease induced "boom and bust" shrimp farming has resulted in increasing poverty and landlessness, declining food security, and the breakdown of traditional livelihood systems. Impacts have included the destruction of mangroves and wetlands, the large scale capture of wild larvae and brood stock, pollution, use of chemicals and antibiotics, intensive fish meal demands and the privatization of public resources.

Fish farms can have negative impacts on surrounding ecosystems as well. Nils Kautsky from the University of Stockholm in Sweden demonstrated how fish farms can affect surrounding areas by discarding excess fishmeal, transferring parasites to wild populations and introducing exotic fish into native ecosystems.

Kautsky showed that the so called footprint of a farm - its influence on the local environment - can be up to 50,000 times larger than the physical farm itself.

Jurgenne Primavera of the Southeast Asian Fisheries Development Center noted that shrimp farms frequently displace rice paddies, boat landings, houses and even burial grounds. He pointed out that saltwater from inland shrimp ponds can seep into nearby soil and reduce rice yields.

## **SMALL CHANGES COULD YIELD BIG BENEFITS**

Aquaculture need not be so disruptive. Several of the AAAS participants discussed ways that the farming industry can produce more efficiently and with fewer negative environmental effects.

"There are now identifiable ways to improve shrimp aquaculture," said Stanford's Dr. Naylor, who chaired the AAAS session. These may include reducing food input and developing closed water systems that prevent waste and parasites from escaping.

"Aquaculture is at a critical crossroads," said Dr. Albert Tacon, head of the Oceanic Institute's Aquatic Feeds and Nutrition Program in Hawaii. "Fish farming could decrease pressure on fisheries and feed the world's growing population. That's why it is so important to proceed on a sustainable path."

Consumer markets ultimately dictate the type of fish farming that farmers will employ. The scientists recommended that consumers look for vegetarian fish that feed



*Salmon spawning in a Pacific Northwest hatchery  
(Photo courtesy OAR/National Undersea Research Program)*

low on the food web including catfish, tilapia, oysters and other shellfish. Shellfish farming can actually purify the water by filtering out algae and waste, Naylor noted.

"People should be aware that they are not doing the environment a favor at all by eating farmed salmon," Naylor said.

Aquaculture also needs new policies that will reward the aquaculture industry for engaging in best sustainable practices, the scientists noted.

"To date, fish farming has been separated from ocean fisheries in regulation, management and mindset," said Naylor. "It is high time both public and private interests think of these sectors jointly. Without sound ecological practices, the expanding aquaculture industry poses a threat not only to ocean fisheries, but also to itself."

More information on sustainable fisheries is available  
at: <http://www.fao.org/fi/default.asp>

More information on health risks from wild fish is available  
at: <http://ens.lycos.com/ens/feb2001/2001L-02-20-06.html>

Link: <http://ens-news.com/ens/feb2001/2001-02-21-06.html>