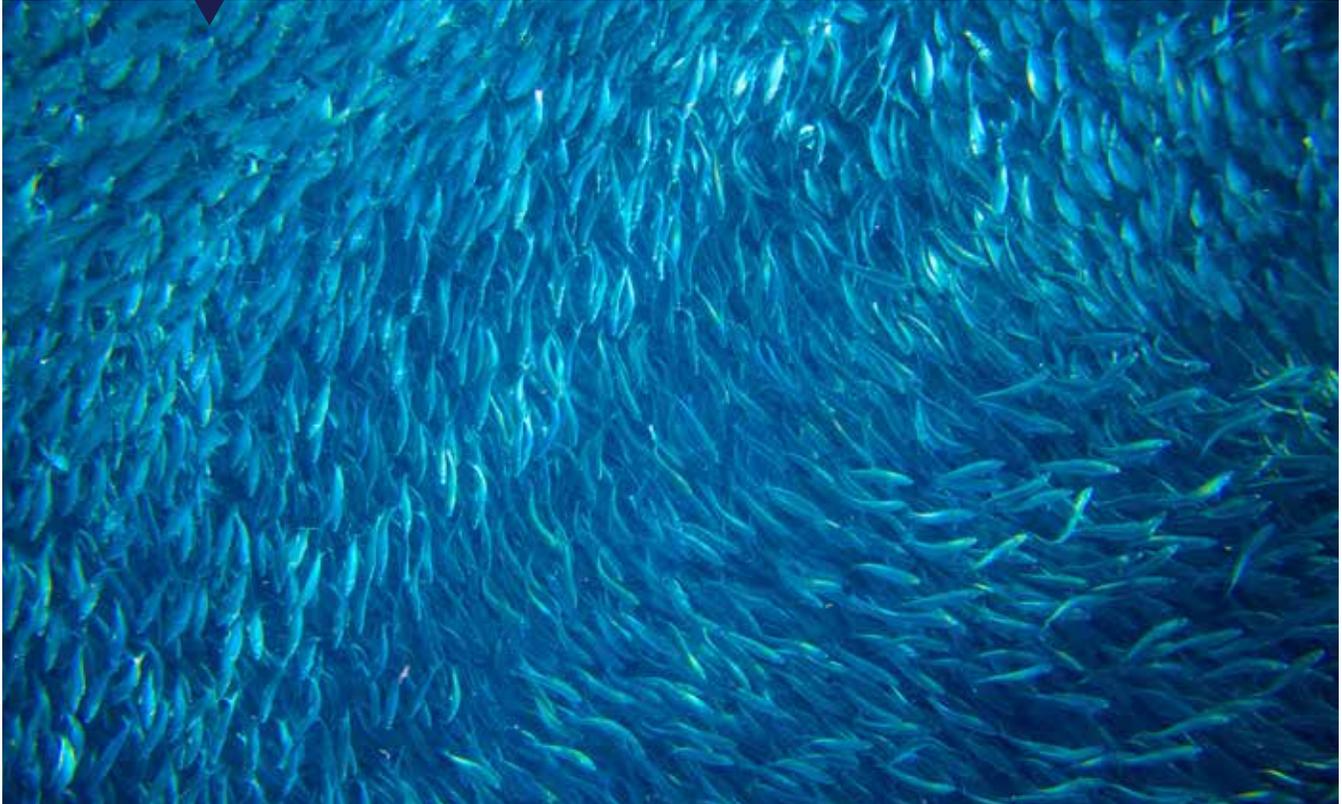


Ask Dr. Pauly

What aquaculture can and cannot do



Following my frequent public lectures on the parlous states of fisheries in the world, I invariably get the question, “Is aquaculture not the answer to all these problems?” This sounds reasonable: If fish populations dwindle in the wild, why not grow fish in coastal areas, or on land, or in ponds or tanks? After all, this is what we do with plants and agriculture.

American journalist H.L. Mencken is supposed to have said: “For every complex problem there is an answer that is clear, simple and wrong.” This is a good example of that. Aquaculture (including mariculture)

actually consists of two subsectors that are as distinct from each other as growing vegetables and raising cattle. I call these two sectors “Aquaculture A” and “Aquaculture B,” with the former being the farming of mussel, oyster, clam and other animals that feed on microscopic algae (i.e. the grass of the sea), and the latter being the raising of carnivorous fish, such as salmon, seabass and groupers.

While the former do not need to be fed animal protein any more than carp, tilapia and other freshwater herbivores, marine carnivores must have animal proteins in the

diet they are given. They get these animal proteins in the form of fishmeal and fish oils, which are made by grinding up millions of tons of sardine, anchovies, herring, mackerel and other fish that are not only perfectly edible, but favored in Europe as well as African and Asian countries, where they often are the only “meat” many people can afford.

Thus, when we speak of “us” needing to increase aquaculture production so “we” have enough fish in the future, the question is who is “us” and “we.” If “we” pertains to the U.S., Canada and Europe, then yes, “we” can increase our

supply of salmon for our sushi and other delicacies. If “we” are people throughout the world, then no, the more carnivorous fish we raise, the less fish there will be both in the water and in the diets of poorer people.

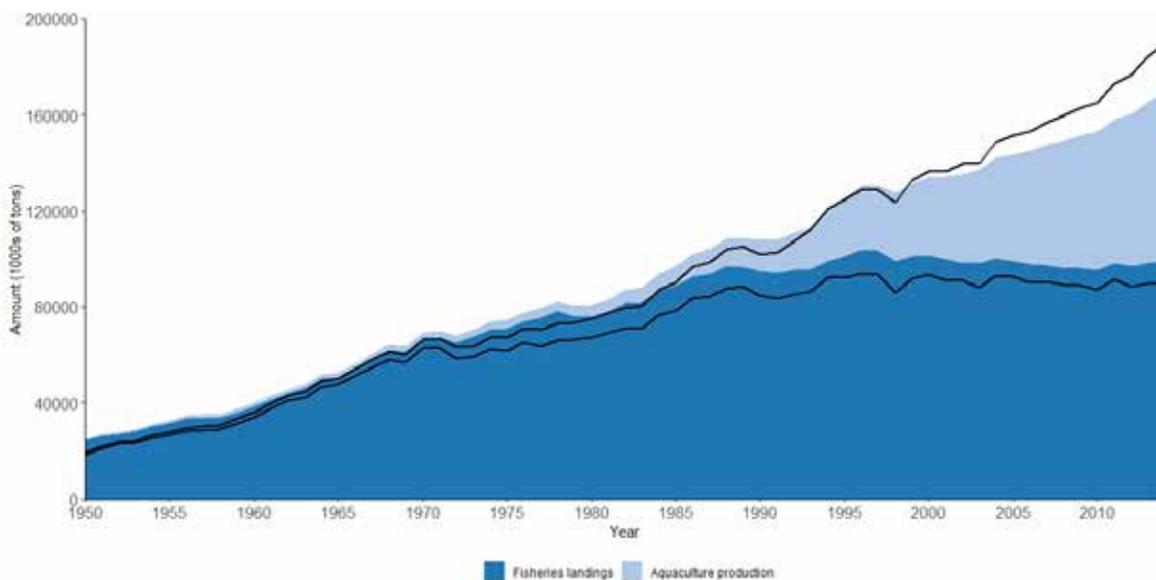
That aquaculture B consumes rather than produces fish is not intuitive. It’s similar to the fact that air conditioners actually warm the world (when accounting for not only the space they cool, but for the space that gets the waste heat), or that our discarded plastic bags do not actually vanish into thin air when we “recycle” them.

of species that has so far remained underexploited in the ocean, which is the reason why yellowfin and other tunas are still able to find some food. However, mesopelagics will probably be turned into fishmeal, as well.

The reason for this fishmeal “hunger” is that soybean meal, long touted as a replacement for fishmeal, cannot fully substitute for it; fish fed soymeal get sick without fishmeal and/or fish oil, and they also taste like tofu. Thus, while fish feed may contain more soymeal than before, the increased



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Thus, fisheries will not be replaced by aquaculture (at least not by Aquaculture B, the one we love in “our” countries). Rather, Aquaculture B, in search of more and more feedstock, is currently exploiting Antarctic krill – the food of penguins and marine mammals – and will soon target tiny lanternfish and other mesopelagic fishes found in shallow waters at night (when tuna feed on them), and at depths of up to 3,000 feet during the day. These fish may be the last group

production of Aquaculture B still raises demand for fishmeal. In the meantime, let’s be wary of people who tell us that aquaculture will solve our fisheries problems. They tend to forget that aquaculture uses an increasing fraction of the limited fishmeal obtained from fisheries and will destroy, in order to grow, the food base of our remaining wild fish – most notably by extracting krill and mesopelagic fishes.

Figure 1. Trends in fisheries catches and aquaculture production, 1950-2014. The black lines are based on marine and freshwater fisheries catch and aquaculture production data from the Food and Agriculture Organization of the United Nations (FAO), as reported by its member countries, and includes edible algae (mainly from China). The trend in dark blue is based on freshwater catch data from FAO, plus marine catch data “reconstructed” by the Sea Around Us, (see www.seaaroundus.org) minus discarded fish (also not included in the FAO data) and the fish used for fishmeal and for aquaculture (to avoid double counting), i.e. 70 percent in the 2010s, declining to 50 percent in the 1980s. The light blue trend shows aquaculture production data from FAO, excluding edible algae.