



Elevating the aquaculture debate

Monday, 19 September 2011 | [farming](#) | John Forster

Harvesting plants from the sea is an essential part of successful marine agronomy, says John Forster.



Aquaculture has been the subject of two recent high profile reports. The first, entitled [Blue Frontiers](#), begins by asserting ‘There is a pressing need to elevate the debate on the future of aquaculture and to place this in the context of other animal food production systems, including wild capture fisheries’. The [second report](#) made the front cover of [Time Magazine](#) and poses the question ‘Can farming save the last wild food?’

Both reports make important points. Between 1970 and 2008, global aquaculture [production grew \(PDF\)](#) at an average rate of 8.4% per year, and aquaculture remains one of the fastest growing food producing sectors measured in terms of year-on-year percentage gain. Furthermore, because the world’s fisheries are yielding all they can, there is simply no option but to farm seafood if growing human demand for animal protein is to be met.

Both reports also emphasize that fish and shellfish are intrinsically more efficient converters of food than terrestrial animals, because they do not maintain high body temperature or grow heavy skeletons to support themselves against gravity, prompting the comment in the Blue Frontiers report that ‘because vegetarianism is unlikely to ever be a voluntary choice for the overwhelming majority of people, as global demand for food rises, finding ways to be more ecologically efficient consumers of animal food will become increasingly important’.



Harvest of kelp *Laminaria japonica* in Rongcheng, Shandong Province, China. Image: Professor Chen Jiabin

Limited horizons

However, animals have to eat and when they are farmed intensively this usually means feeding them ingredients that might otherwise serve as food for people. Such inputs are not necessary for less intensive farming methods, where livestock graze on natural pasture or are fed on agricultural wastes but, as [Simon Fairley](#) points out on this blog, there are natural limits to how much can be produced in this way. He describes this as ‘default livestock production’, beyond which, he argues, that feeding ‘grain to livestock to provide luxury goods for consumers in industrialized countries is manifestly unjust when a billion people in the world are undernourished.’

When it comes to seafood, I think harvesting fish from the world’s wild fish stocks might be thought of as the aquatic equivalent of default livestock production and this has already reached its natural limit. Aquaculture can supplement it by farming its own grazers, like the filter feeding mussels and scallops and by growing certain fish (mostly species of carp) in freshwater ponds fertilized with agricultural wastes to stimulate production of natural feed. Such methods contributed well over half the 52 million tonnes of fish and shellfish [produced by aquaculture in 2008](#), with further growth possible in many undeveloped and developing countries.

However, rightly or wrongly, most recent developments in aquaculture have been driven by consumer demand in industrialised countries for seafood that supplements or substitutes for products from natural fisheries. Carp do not meet this standard, while fish like salmon, sea bass, tilapia and Pangasius (‘tra’ and ‘basa’) do, as do shellfish like shrimp, and the intensive methods used to farm them use feeds that, in turn, violate Fairlie’s standard for nutritional justice.

From which the question follows: given the intrinsic metabolic efficiency of aquatic animals, could their intensive farming ever be ecologically efficient enough to put such concerns to rest?

Advance, aquaculture

In part, the answer has to do with another point made in the Time article, namely that ‘farmers have had thousands of years to improve agricultural methods and breed domesticated animals like cows and pigs with maximum efficiency. Modern aquaculture is just a few decades old, and as producers have become more experienced, they’ve cut down on pollution and bred more-efficient fish’.

Could future advances in aquaculture breeding, nutrition and husbandry ever lead to intensive animal farming that allays concerns about ecological efficiency? And could the well demonstrated nutritional benefits of seafood help to tip the scales when making this evaluation?

But another part of the answer is something that neither report considers, namely the development of a future [marine agronomy](#), which I detailed in my previous post.

The potential for the large-scale farming of marine plants (macroalgae or seaweeds) is vast. Decades from now, production of marine biomass for processing into food for people, feed for farm animals and biofuel could equal or exceed the biomass produced by terrestrial agriculture today. It could do this without using land or freshwater and, by tapping the vast resources of nutrients in the deep oceans, it might also do it without fossil fuel-based fertilizers. And again, because aquatic animals do not need to burn carbohydrate to keep themselves warm, there is a natural synergy between extracting protein and fat from biomass for aquaculture feeds and carbohydrate for bioenergy.

The concept holds the promise of self-sustaining, ecologically efficient production of aquatic animal and plant food, and offers the prospect of correcting today's human nutritional injustices. The call in the Blue Frontiers report for an elevated debate on aquaculture's future is timely and the need for it is urgent.

About John Forster

John Forster has worked as an aquaculture scientist, manager, fish farm owner and consultant since 1965. He moved to Port Angeles, Washington, from the UK in 1984 to start salmon and sturgeon farming operations for Stolt Sea Farm before founding his consulting practice and Columbia River Fish Farms Inc. in 1994.

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