Marine Algae and Aquaculture

An interview with John Forster

September 2010

About John Forster

Aquaculture consultant, John Forster works in Port Angeles in the USA, providing guidance to private and public sector clients on aquaculture business and policy, best aquaculture practices in salmon farming and analysis of new aquaculture opportunities. This work has prompted him to think about aquaculture in the broader context of global food supply and whether the current controversy about an embryonic aquaculture industry is obscuring wider consideration of its huge potential. Core to his work is an interest in how and where aquaculture, especially marine aquaculture, fits with the rest of our food production as regards its life cycle efficiency and potential. Through guidance to clients, publications, presentations, articles, correspondence and interviews, John hopes to encourage deeper thinking about aquaculture amongst diverse communities.

What do you see as the big questions for the food and climate research community?

Though the oceans cover 70% of the Earth's surface and contain 97% of its water, how is it that we derive only 1.7% of our food from them – 120 million tonnes out of a total supply of about 7.1 billion tonnes?

The answer has to with the nature of the marine food web, compared to that on land, and that we have not yet intervened in it to make the oceans more productive. Necessarily, such intervention requires farming in the sea, specifically, farming of marine plants (seaweeds) as a primary source of biomass.

Extrapolation is dangerous, but based on current levels of seaweed (*Laminaria japonica)* production from farms in China; we could double the supply of plant biomass grown for food in the world by farming less than 1% of the Oceans' surface. Of course, this is still a huge area and we cannot do it now; it will take decades, even centuries, before it might be possible, if it is ever possible.

However, such a huge increase in the biomass available to us wouldn't need land or freshwater and may even

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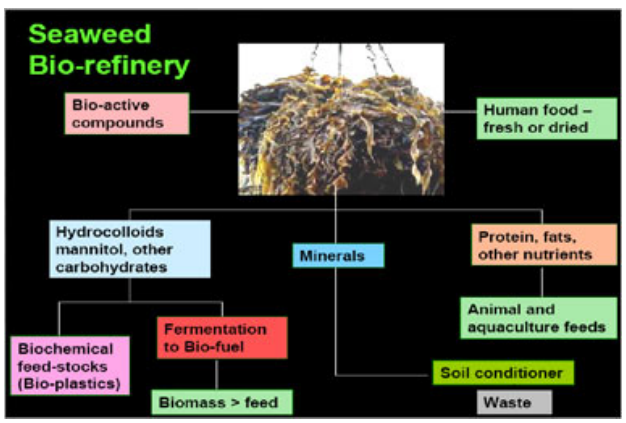
To receive FCRN mailings, debate the issues with other FCRN members and have the chance to be interviewed by us, click **here** benefit from 'free' nutrients if done in the right places. Even if the extrapolation from China is out by a factor of x5, it seems that this is something the food climate research community and the policy makers they advise should take seriously. There is a useful presentation on aquaculture in China **here**.

This is not a new idea. Howard Wilcox dreamed of 'food and energy farms' off the coast of California in the 1960's (Bird and Benson 1987). Duarte and colleagues (2009) published a paper in BioScience entitled 'Will the Oceans Help Feed Humanity?' The Biomara project in the UK (**www.biomara.org**) will look at seaweed production for biofuel. Scientists at Wageningen University in Holland are studying the feasibility of offshore seaweed farming in the North Sea (Koning and van Lttresum, 2009). There is also much going on in Asia. There was a report recently that Japanese scientists have found a way to make ethanol from seaweed – see **here**.

Marine aquaculture's long-term goal is to be 'self-sustaining', like agriculture, where some of the plants we grow serve to provide feed ingredients for the animals we choose to grow, while the rest we can eat directly or process for other uses. That can only happen if the idea is embraced as a public policy priority and I don't think that can be said to be the case presently in most western countries and certainly not in the USA.

Aquaculture can include many different processes; how might they be linked?



The diagram is an illustration of processes that might be linked together in order to extract the maximum value from seaweed biomass. Some of these things, like extraction of marine colloids, are done already and humans already eat considerable quantities of seaweed directly. The question is: can it all be done economically on a much larger scale and, if so, might it impose less of an environmental burden than some of the terrestrial processes on which we presently depend? And might it be necessary anyway as we push our terrestrial resources to their limits?

In the context of food carbon, it is relevant to note also that, as poikilotherms, the animals grown by aquaculture burn less carbon to live and grow than their terrestrial counterparts. As regards bio-fuel, this leads to the idea that extraction of the carbohydrate fraction from seaweeds by fermentation would leave concentrated protein and oil fractions as nutrients for fish. So the poikilotherms grown in aquaculture may be good compliments to bio-fuel production from biomass. This potential advantage of fish as farm animals has not been something on which the food carbon research community has engaged up to now, yet it seems like it might be important.

For many years, FAO has been a leader and an advocate for aquaculture. In March, 2010 FAO sponsored a workshop in which I participated as part of an Offshore Aquaculture Initiative to 'collect global information on the potential for mariculture development (including offshore farming) considering technical, biological, spatial, environmental, socio-economic, legal and policy issues (opportunities and obstacles)'. Review papers prepared for this workshop will be published by FAO soon; meantime further information is available from **Alessandro Lovatelli**

More information on the FAO's work on Aquaculture can be found **here**.

Can people contact you to collaborate?

For such a diverse and far-reaching goal, I lack expertise in many areas; and stature in circles that make decisions about such issues. But that doesn't stop me feeling strongly about the idea and I welcome collaboration because that is the only way we can build a coalition strong enough to be heard.

Where can people read more?

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