Food Insecurity, Aquaculture, and the Nature of Technology

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Food insecurity remains a devastating reality for people across the globe.[1] The problem persists despite multiple, ongoing aid and development programs. One global program recently offered as a part of the solution for food insecurity is modern aquaculture.[2] Its purported benefits for food insecurity are increased food production, employment, and income. However, there is a perspective that views aquaculture as yet another technofix, doomed to fail as other technofixes have.[3] There are those that believe that aquaculture will not alleviate food insecurity, instead it will further entrench corporate or developed-world control.

The reasons for the persistence of food insecurity are diverse. The simple explanation, that starvation is simply a matter of supply or production, has been challenged and overcome. It is now accepted that food supply and production is a factor in causing food insecurity, but that it is not the only, or even the most important factor. Food insecurity is now mostly explained in terms of availability and access to the food supplies. National access to food trade, regional infrastructure to allow transport, local stores of food remaining secure and most importantly, the ability of households to afford to buy the food, all seem more impactful than production problems on food insecurity.[4] Many believe that aquaculture is one solution that can help to address many of these contributing causes[5] Aquaculture can provide nutritious, low-cost food that can be produced in a fairly sustainable way with low labour input. Where aquaculture and agriculture are combined there are significant improvements in production overall, and what is produced is more nutritious.

Aquaculture techniques mix traditional and modern methods of fish rearing at small or large scales. But aquaculture is highly technological. The most basic system involves a source of stockfish, feed, containment and constant monitoring. Modern aquaculture is rapidly adopting biotechnological methods as well, such as, gene modification for increased feed conversion or disease resistance and genetic markers.[6] The technical nature of aquaculture is the source of its potential, but it is also the source of some cynicism. Its nature aligns it with other technofixes (the green revolution and biotechnology for example) which are seen by some as merely ways for the developed world to exploit the developing world.[7] Acquiring land, obtaining access to water, having the money to invest in fish, feed, and permits are all obstacles to people who are suffering from food insecurity. Aquaculture is, therefore, considered by some to be a false promise.

Recently, philosophers have debated whether or not technology-in-general should be understood as a set of neutral tools or whether it should instead be understood as being essentially laden with values such as efficiency, control, power, etc). The most well-known advocates of these opposing positions are Marcuse and Habermas. Habermas, though fairly cynical toward technology, argues, in a way, that technology is neutral, can be used in various ways, and though it is affected by social constraints, technology-as-such does not change. It is and always will be something non-social and instrumental, oriented toward efficiency[8] Habermas's view aligns closely, in some ways, with proponents of aquaculture. Aquaculture they believe, when properly managed, or in Habermas's language, when kept in its proper sphere, can contribute to a positive change in the conditions of the world but there is nothing inherent to the techniques or methods of aquaculture that will determine the outcome.

Marcuse, is much more famously cynical toward technology. He argues, contrary to Habermas, that technology-as-such is historically contingent[9] That is, technologies today are what they are because of the historical contexts out of which they emerged. Indeed not only the technologies of today, but the problems with which our technologies deal and the solutions that are possible, are also dependent upon past technological decisions. The negative aspects of our world are a result of and contribute to the nature of our technology. So, technology, according to Marcuse, is certainly not neutral. Current technology, he would agree, has brought us to the point where there are 853 million people who are food insecure. Aquaculture is a part of modern technology, so the hope that it will have a significant impact on the current state of affairs is naive.

Worse, our continuing reliance on this kind of technofix furthers dehumanization, which is the real source of the problem.

The outlook for food security seems bleak given these alternatives. However, there is a third way. Andrew Feenberg proposes that both the Marcuse/technophobic and the Habermas/technophilic ways are misguided for the same reason: both views mistakenly attribute to technology a constant, non-reflexive essence. Technology is, on the other hand, up for gradual, stepwise change[10] The technophilic claim, therefore, that technology is neutrally applicable to any context, ignores both the embedded values of particular techniques and that these values, in a sense, turn back and condition the context within which they are being applied. The technophobic claim, while perhaps more sensitive to the values embedded in technique, is even more insistent that these values are not specific to context and not subject to change. The technophobe insists that technological methods are essentially controlling, dehumanizing, alienating and so on. This ignores the reality of what Feenberg calls instrumentalization[11]

Instrumentalization refers to the technological stage wherein both the technique itself, and the context within which it is being applied recondition one another. At critical stages, substantive values determine the social trajectory that a technology will both rely upon and ensure. Primary instrumentalization (PI) "is the technical orientation toward reality"[12] PI is the usual way to understand what is happening in technology (though it is beyond the usual understanding in an important way when it points out that there is a technical orientation toward objects). Secondary instrumentalization (SI) has to do not with orientation but with "action in the world"[13] Technologies condition back upon their designers, manufacturers, distributors, users, and of course the objects upon which the technologies act. SI attempts to capture this conditioning as well.

Although aquaculture has a long history[14], there is a modern version of aquaculture that, in places, is still undergoing instrumentalization[15] This modern version, again, hopes to increase production, increase access to food, create jobs, etc. There remain crucial points of ambivalence where aquaculture can be conditioned and will subsequently condition the development of its surroundings. This development will head either toward socially responsible versions of production, consumption, etc. or it will lead further down the path that has lead to widespread food insecurity. If the choice is made to build the capacity to farm highly valuable species the PI will involve a lot of inputs—building a facility, acquiring feed, labour, water etc. These aspects become part of the technique. The SI of this will include a change in the surrounding market, access to trade, a larger environmental impact, and so on. These changes also become part of the technique. The impacts of this particular choice on food insecurity are most likely negative in the long run. High value fish will be too expensive for local people to purchase. The kind of facility required will only be able to be maintained by those who already have access to land and the ability to obtain and keep the permits required, and so on.

If, on the other hand, those involved choose to build the capacity to farm less valuable, though nutritious, species the primary and secondary instrumentalization begins to take on a different character. This character will condition the ends differently. Aquaculture's primary design in this case could involve integrated inputs from farmers (feed and fertilizer), a simple pond, and rainwater input. These techniques become a part of a different trajectory. The SI in this case could involve a stabilization of local markets, an integration of farmers, and a more positive ecological impact. In the end, the impact of this version of aquaculture on food security is more positive. The instrument itself, aquaculture, is conditioned in such a way as to create inexpensive fish, with little input of water, feed, etc.

This story shows the ambivalence of aquaculture. It is unlike the story offered by the 'neutral tool', technophilic outlook because it recognizes the substantive features of the 'technology'. "Aquaculture" in this sense is not an abstract, ahistorical technology, but a located technique, one that is influential and changeable. The story differs from the technophobic view because it shows that there are choices within the design of technology that determine the path, the ends, of that technology. More importantly, the story shows that it is at least possible for technology to head toward socially responsible ends, rather than always, or necessarily driving us toward domination, efficiency, or profit.

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1. Gooloo S. Wunderlich & Janet L. Norwood, eds. *Food insecurity and hunger in the United States: an assessment of the measure* (Washington, D.C.: The National Academies Press, 2006), online: National Academies Press <www.nap.edu>.

2. Bene, C. & S. Heck, Fish and food security in Africa. 2005. Food and Agriculture Organization of the United Nations, The State of Food Insecurity in the World 2006 [*Food Insecurity*]; Minard, S., Aquaculture in West Africa: A Sustainable Source of Food and Income? 2007; Williams, M., World fish supplies, outlook, and food security. 2004.

3. Farmed and Dangerous, "Salmon Farming", online: (2007) <http://www.farmedanddangerous.org/ salmonfarming/firstnations.html>. Marshall, D., Fishy Business. 2003.

4.Dráeze, Jean & Amartya Kumar Sen, *The Political economy of hunger: selected essays* (Oxford: Oxford University Press, 2005). Southgate, Douglas DeWitt, Douglas H. Graham & Luther G. Tweeten, *The world food economy* (Malden, MA: Blackwell, 2007).

5. *Food Insecurity*, *supra* note 2; Halwart, Matthias & Anne A. van Dam, *Integrated irrigation and aquaculture in West Africa : concepts, practices and potential* (Rome: Food and Agriculture Organization of the United Nations, 2006).

6.Rasmussen R & M Morrissey, "Biotechnology in aquaculture: transgenics and polyploidy" (2007) 6:1 Comprehensive reviews in food science and food safety 2.

7. Bene, C., "The Good, the Bad and the Ugly: Discourse, Policy Controversies and the Role of Science in the Politics of Shrimp Farming Development" (2005) 23:5 Development Policy Review 585 ; Flaherty, M. & C. Karnjanakesorn, "Marine shrimp aquaculture and natural resource degradation in Thailan"" (1995) 19:1 Environmental Management 27.

8. Feenberg, A., "Marcuse or Habermas: Two Critiques of Technology" (1996) 39 Inquiry 45.

9. Marcuse, H. , *One Dimensional Man* (Great Britain: Abacus, 1964).

10. *Supra* note 8..

11.*Ibid*.

12.A. Feenberg, *Transforming Technology* (Oxford: Oxford University Press, 2002) at 175.

13. *Ibid*.

14. Beveridge, M.C.M. & D.C. Little, *History of aquaculture in traditional societies* (Oxford: Blackwell Science, 2002).

15.Prein, M., M. Halwart & J. Gonsalves, eds. *Integrated agriculture-aquaculture: a primer* (Rome: FAO, 2001); Sununtar, S., "Environmental and health impacts of integrated fish farming in northeast Thailand" (1997) III:1 Aquaculture Asia; Zwirn, M., "Aquaculture in Egypt: Improving Food Security and Resolving Resource Allocation Conflicts" (2002) 11 The Journal of Environment and Development.