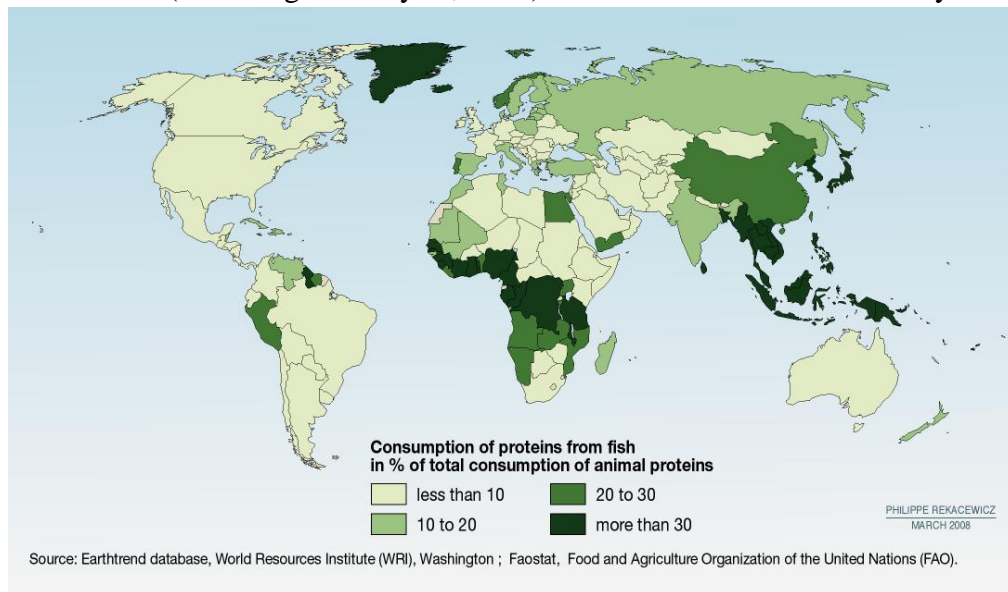


## Sustainable Fish: Wild- caught or Farm- raised?

Jen Snyder

The world's current fishing practices are unsustainable. Potential solutions such as aquaculture have been researched and implemented to rectify the overfishing problem, but questions still remain as to which practice is more sustainable: commercial fishing or aquaculture. It is partially the responsibility of the consumer to decide which is a more sustainable product to buy: farm-raised or wild caught fish. Pros and cons are inherent in each product. The sustainability of both relies on how each method is practiced. However, current trends suggest that farm-raised fish will be much more sustainable than wild-caught given the decreasing population of the world's fish supply.

According to an article written for the Ecological Society of America: “commercial fishing has wiped out 90% of large fish, including swordfish, cod, marlin, and sharks” (Goldburg and Naylor, 2005). The International Food Policy Research



Institute states, “from 45 million metric tons in 1973, total fish

**Figure 1**

consumption jumped to more than 91 million tons in 1997. This enormous growth signals changes in who is consuming fish and where” (Delgado et. al., 2003). This increase in demand has occurred primarily in developing countries (Delgado et. al., 2003) where fish provides a good source of protein for poorer people who are unable to get it elsewhere. Figure 1 above taken from UNEP, illustrates percent consumption around the world of fish as a source for protein. In addition to the increase in demand that has

already occurred, the demand for fish is expected to double in the next 30-50 years (Pullin et. al., 2007). Already, “most stocks of wild fish today are classified as fully exploited, and an increasing number are overexploited, in decline, or in recovery” (Delgado et. al., 2003).

Aside from destruction to fish populations caused by overfishing, the practice of fishing in itself can prove very destructive. Fishermen readily catch undersized fish with undesirable characteristics as part of their targeted catch. While these fish can still be utilized for food or for fish meal, they are frequently discarded and wasted. Also, the method of bottom trawling which involves dragging weighted nets across the seafloor undoubtedly disturbs seafloor ecosystems (Delgado et. al., 2003). Another destructive repercussion of overfishing is its effect on the food chain from removing high quantities of fish species from an ecosystem (Delgado et. al., 2003).

While aquaculture solves the problem of withdrawing massive amounts of fish species from the wild, it has also proved detrimental to the environment in some respects. It has facilitated the accidental spread of disease amongst fish and other marine organisms, it has decreased the water quality in surrounding areas, forests have been decimated in order to clear the land for it, and farm-raised fish have been known to escape and taint the wild populations (Delgado et. al., 2003).

The concept of sustainability serves as a tool for evaluating the more sustainable product, a farm-raised fish, or a wild-caught fish. Determining which product is more sustainable relies on the knowledge of how the fish was caught or how the fish was raised. The Technical Advisory Committee of the Consultative Group on International Agriculture Research defines sustainability as “successful management of natural resources... to satisfy human needs while maintaining or enhancing the quality of the environment and conserving natural resources” (Pullin et. al., 2007). Fishing at the rate humans do now undoubtedly does not practice the conservation of natural resources. It satisfies human needs, but that is the only way it meets the above definition. Aquaculture on the other hand satisfies human needs and conserves natural resources, but it is questionable whether or not certain types of aquaculture maintain or enhance the quality of the environment.

According to Five Winds International, an environmental consulting firm (Five Winds International),

Life cycle assessment (LCA) is a decision making tool to identify environmental burdens and evaluate the environmental consequences of a product, process or service over its life cycle from cradle to grave... covering resource acquisition, product manufacturing, use and end of life.

In terms of sustainability, life cycle assessment considers it throughout all stages of the product or service's "life." Some main questions to ask when assessing the life cycle of a product is where it originates, how much energy it consumes, what materials comprise it, and how one can dispose of it (UNEP, 2004). Both commercial fishing and raising fish via aquaculture apply to this concept.

Obviously, fish come from either the sea or a lake stream, or other body of water. In terms of their disposal and what it is made of, these issues do not quite apply when discussing fishing in the wild. However, energy consumption does apply. Fishing vessels consume energy in traveling to and from their destination. Aside from energy used in traveling to the fishing site, energy is used throughout the trophic levels in the production of fish in the wild. Aquaculture utilizes energy through trophic levels as well, but studies have shown that "assuming a canonical value of a 10% energy flow between trophic levels, producing 1 unit of predatory fish requires 10 units of food (largely small pelagic fish) compared with 2-5 units to produce a unit of farmed fish" (Naylor et. al., 2000).

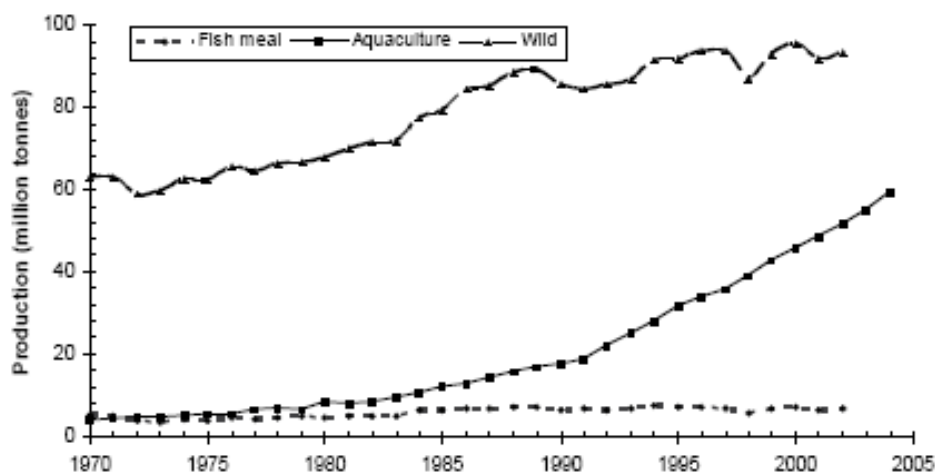
In terms of aquaculture, the life cycle assessment questions apply more since it is a process dictated by humans. These fish come from tanks or pens. Part of evaluating the fish's origin is determining the site of the aquaculture facility. In coastal Thailand, approximately 65,000 ha of mangroves have been converted to shrimp ponds (Naylor et. al., 2000). Thus, if habitats are decimated to implement an aquaculture facility, the origin part of the life cycle equation is not sustainable.

The energy consumed depends on whether or not the fish are raised in tanks, separated from the body of water. If so, then energy is required to regulate any necessary temperature or lighting. In terms of disposal, this is usually in the form of consumption, which like fishing, does not really apply in this situation.

Evidently, pros and cons exist for both catching fish in the wild and for farm raising them. What truly depends on the sustainability of a wild caught fish or a farm raised fish is the practices involved in the obtainment. As previously mentioned, the rate that humans are fishing from the seas is not sustainable. The increase in demand for fish inevitably correlates with the increase in fishing. Thus, if humans continue to fish at the rate they are, instead of just some species of fish being overfished, all will be eventually. Sustainable forms of aquaculture are thus more sustainable than overfishing.

There are a number of characteristics that could make aquaculture more environmentally sustainable. One method of sustainable aquaculture is integrated aquaculture. For example, some Chileans raise salmon with a type of red algae which naturally removes the nitrogen and phosphorus from the salmon pens (Goldburg and Naylor, 2005). The resulting effluent is then used to fertilize seaweed (Goldburg and Naylor, 2005). Thus, no materials are wasted, and the waste produced from the fish is utilized and will not affect the surrounding environment.

Another method that improves the sustainability of aquaculture is using vegetable products for fishmeal instead of food derived from other fish. According to Greenpeace, “in 2003, the industry used 53% of the total world’s fishmeal production and 86% of the world’s fish oil production” (Allsop et. al., 2008). Some researched alternatives to fishmeal are: soybean, barley, canola, corn, and cottonseed (Allsop et. al., 2008). Figure



**Figure 2** Total annual production of fish meal, aquaculture (including aquatic plants) and wild (capture) fisheries 1970-2004 (data from FAO, 2006a,b and IFFO, 2006).

2 below illustrates the plateau in production of fishmeal. The use of vegetable products instead of fishmeal to feed farm fish will relieve pressure on the world’s fish stocks.

In sum, the

main concerns regarding the sustainability of aquaculture tend to be its potential habitat destruction, released effluent into the surrounding environment, escaping farm fish that affect the genes of the fish outside the facility, and what is fed to the raised fish. These concerns can be easily addressed. If the aquaculture is conducted in a closed system that does not allow the escape of farmed fish or effluent into the wild, and if the fish are fed plant products opposed to fishmeal, then it is a sustainable endeavor

The main concerns with commercial fishing is overfishing and destruction of habitat. The overfishing issue is hard to solve. According to the International Food Policy Research Institute (Delgado et. al, 2003):

Of all the environmental impacts caused by the fish sector, overfishing poses by far the greatest environmental threat. Wild fish stocks are notoriously difficult to manage for a variety of reasons, including complicated and uncertain access issues and the difficulty of assessing the state of this complex biological resource.

Thus, to rectify overfishing, access rights must be taken into consideration which is a difficult undertaking. While insuring that aquaculture is sustainable may be costly, once the method is perfected, it will set a precedent and the cost will drop. When confronted with the option of purchasing a farm-raised fish or a wild-caught fish in the supermarket, the consumer must take into consideration that current fishing practices are unsustainable in terms of the availability of world's fish stocks. While some forms of aquaculture may be as well, it will be perfected and is still more favorable than depleting the world's fish.

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Pictures:

Figure 1: Earthland database, World Resources Institute, FAO, Figure 2: FAO

