

## Commentary

# Salmon farming: The risks outweigh the benefits

Inka Milewski

Aquaculture does have the potential to drive us forward, but not for the reasons and the manner suggested by Brian Lee Crowley, the managing director of the Macdonald-Laurier Institute in Ottawa. In his commentary, which was circulated in various media outlets last week, Mr. Crowley suggested that feeding a growing world population can be met through a blue revolution which calls for an intensification of aquaculture in our oceans.

Farmed fish represents a very small portion (six per cent) of per capita global protein consumption. According to the most recent data from the UN Food and Agriculture Organization, plants and animals still represent about 80 per cent of the primary source of protein for most of the world's population. Globally aquaculture is dominated (89.1 per cent) by seaweeds, crustaceans and freshwater fish production which is land-based. Open net pen farmed salmon represents only 2.8 per cent of global aquaculture production.

The same kind of enthusiasm and optimism expressed by Mr. Crowley for the blue revolution and the promise of industrial aquaculture was heard decades earlier during the green revolution in agriculture.

Prompted by a series of famines in the 1940s and concerns about a growing world population, the green revolution began putting to use new an emerging science and technology to develop high-yielding cereal grains, genetically modify crops, produce synthetic fertilizers, build massive irrigation infrastructure and manufacture an arsenal of pesticides and herbicides.

Mr. Crowley says that the green revolution “super-charged” our ability to produce food. It also displaced small-scale mixed farms and replaced them with large-scale monoculture operations owned by vertically-integrated corporations. There has been a decline in agricultural biodiversity where only a few varieties of high-yielding crops are now grown world-wide. This type of agriculture required a massive increase in the use of synthetic fertilizers which have polluted coastal and freshwater ecosystems. Farmlands have been turned into deserts and insects and diseases have developed resistance to pesticides and antibiotics.

Similar issues now plague industrial aquaculture.

Open net pen fish farms operate like industrial feedlots in coastal waters. They generate large quantities of wastes (200 metric tonnes (MT) for every 1000 MT of production) and the cost of waste disposal is paid by the environment, not the industry. All the science and technology being pressed into the service of expanding industrial salmon feedlots have not succeeded in

keeping fish or the environment healthy. It has failed to prevent the desertification of sea bottoms, eliminate the release of chemical pollutants, prevent interactions between farmed and wild salmon populations and prevent the outbreak and spread of pests and diseases.

Like industrial agriculture, the fish farming industry has enlisted the power of science and technology to make improvements in their operations. Most of their effort has been directed to improving production and efficiency. Automated feeding has reduced the number of workers needed to operate a single farm. Underwater cameras have helped to improved feed efficiency. And, a genetically modified salmon that will grow faster has been developed but not approved for commercial production.

As for addressing their environmental impacts, changes to the composition of feed pellets have reduced (not eliminated) the use of wild fish and the development of vaccines has reduced the use of antibiotics. In some jurisdictions, management practices similar to those used in intensive agriculture such as fallowing and a form of crop-rotation referred to as bay management have been introduced.

Any benefits gained from these improvements have been offset by an increase in farm sites and the number of fish produced per feedlot. Feedlots which once raised 100,000 now raise 300,000 to 700,000 fish and where there were once three or four feedlots, there are now 20. Fallowing and bay management have failed to stop disease and sea lice epidemics or to prevent many salmon farms from routinely requiring some kind of remediation because the sea bottom under their net pens has become so toxic that 60 to 70 per cent of biological diversity has been lost.

A more recent proposal to manage fish farm waste is integrated multi-trophic aquaculture (IMTA), the process of growing shellfish and seaweeds next to salmon farm to gobble up the excess nutrient and organic wastes. To date, all scientific studies have failed to demonstrate IMTA's effectiveness.

The future of aquaculture is not in displacing wild fisheries with industrial feedlots that foul coastal ecosystems.

In Canada, traditional fisheries still economically and socially out-perform the aquaculture industry. In 2010, Canada's exports of wild capture fish and seafood products were worth more than \$3.4 billion, three times the value of aquaculture exports. Lobster exports alone almost equal that of aquaculture export. In Atlantic Canada, for every job in aquaculture there are at least 10 jobs in the traditional fisheries.

Fish farming does have a place in the economic mix of communities but it is on land where, as with other industrial operations, the real and total cost of production is paid by the industry and not the environment and traditional fisheries.

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