

The impact of disease on the sustainability of aquaculture

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Disease is a way of life for all multicellular species on the planet – from plants to fish to terrestrial mammals. In terms of aquaculture, there is inevitably a large number of individuals, usually of the same species, within confined spaces in an aqueous medium that enables the rapid proliferation and spread of pathogens. Thus, the aquaculture environment is ideal for the transmission and spread of disease, which results in global losses of ~US\$6 billion, annually. It is not uncommon that separately owned and/or managed aquaculture facilities are located close to each other. Therefore, the effluent from one site would be the inflow to the next. This facilitates the rapid dissemination of pathogens. Moreover, farmed species are often in close proximity with wild animals, and thus there may be an exchange of microflora, including potential pathogens. This situation is exacerbated when species, which are exotic to an area, are introduced to aquaculture and acquire pathogens from native animals. Unfortunately, the introduced species may have little or no resistance leading to higher levels of clinical disease and mortalities than recorded in native animals. Certainly, sites are dependent on the vagaries of the surrounding aquatic environment, namely water flow, aeration, pollutants and indigenous organisms/pathogens, which may impact on the health of the farmed species. In short, there may be issues with poor hygiene, overcrowding, inadequate water flow, pollution, hypoxia and suboptimal temperatures, any of which may impact adversely on health. Notwithstanding the economic problems of mortalities, visibly diseased animals with deformities or lesions may be unsaleable. Moreover, the presence of some diseases may result in poor feed conversion leading to reduced/stunted growth, which will adversely affect production costs. In addition to these concerns, there is the concern about climate change/global warming and its impact on disease. Arguably, higher temperatures would stress many animals making them more susceptible to disease. Unlike their wild counterparts, farmed animals would be unable to move to more acceptable water temperatures. Then, there is the unknown factor about the impact of higher temperatures on pathogen virulence. However, the awareness of problems leads to solutions, and mitigation involves:

- better site selection to avoid polluted areas, the proximity to other farms, and/or areas of poor water supply.
- a sensible choice of the species/strain to be farmed, if possible involving stock resistant to diseases known to occur in the general area
- the use of sensible disease control strategies, emphasising preventative [= prophylaxis] rather than curative measures [= therapy] encompassing vaccines, nonspecific immunostimulants, probiotics and/or medicinal plant products.

In terms of sustainability, the aquaculture industry must adopt realistic stocking levels in well managed sites with good water supplies and nutritious feed to obtain more healthy animals with good sales potential.