Oil Pollution in Aquaculture

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Abstract: Oil pollution has been clearly established that pollutants enter the aquatic environment, and may be found in the tissues of aquatic vertebrate and invertebrate animals. Illoreover, some pollutants are instrumental in damaging aquatic organisms. However, there is only limited evidence that pollutants are actually responsible for the development of disease. Indeed, there is negative evidence that has demonstrated that the incidence of disease diminishes when pollution ceases.
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Oil Spills in the Marine Environment

The first incident of pollution arising from damage to a ship appears to have occurred in the early eighteenth century **(Cowell, 1976),** but the problem only came into prominence in the 1930's when more and more ships converted their boilers from coal to the oil power. Since then there have been enormous increase in the scale of oil operations as a result of increasing demands for energy. In the last decades, these changes have led to major pollution problems," oil on the surface of the sea ". The changes were gradual and the size of the pollution threat was almost unrecognized until recently when a series of dramatic accidents brought the petroleum into the field of public concern. **Kuwabara (1992**) reported that a major tanker accident was the Torrey Canyon in 1967. About 100,000 tons of crude oils were lost when it ran on the seven stones Rocks of the south west coast of England. In March 1978, Amoco Cadiz grounded of the coast of Brittany, resulted in the loss of 230,000 tons of crude oil (72 million gallons). It was reported that 841 tanker accidents occurred between January 1955 and August 1980. In 1990 there were 583 confirmed instances of oil pollution, among which there were 299 oil spills by accidents **(Kuwabara, 1992).** On March 24, 1990 the tank ship Exxon Valdez ran aground on Bligh Reef in Prince Williams sound, Alaska, and caused spillage of large amounts of oil **(Radam and Bunch, 1992.**

There is considerable confusion over the precise role of pollution on fish health (Bucke **1991, 1997).** Nevertheless, there is good evidence that long-term exposure to certain pollutants has adversely affected the health of some fish species, especially in the North Sea and Great Lakes. A summary of the available information concerning pollution and fish health suggests that:

Pollutants may enter the aquatic environment as a result of natural occurrences, such as the collapse of algal blooms and/or as a result of human endeavours, leading to adverse water quality.

Some pollutants, e.g. pesticides, have been found in the tissues of aquatic animals.

High levels of certain pollutants, e.g. from oil spillages, may be directly responsible for deaths of large numbers of aquatic animals.

The presence of some pollutants may 'stress' aquatic animals possibly leading to greater susceptibility to attack by pathogens.

The presence of organic material, e.g. faecal debris, in water may lead to an increase in microbial populations, some components of which may cause fish diseases.

It should be emphasized that mortalities among populations of aquatic animals do not necessarily imply the presence of a disease in the fish population. Thus, large-scale fish kills resulting from spillage of pesticides or hydrocarbons into water ways do not constitute a disease **as** defined by Campbell *et* al. **(1979).** Furthermore, disease may develop long after the pollutant has been removed from the aquatic environment.

In this circumstance, it would be difficult to prove that the original pollution led to disease.

Pesticides

The presence of pesticides, e.g. DDT and PCB, in the aquatic environment has been associated with many diseases, including 'cauliflower disease', lymphocystis and ulceration (Voigt 1994) and liver neoplasia (Moore ***rt a/.*** 1996). Malformations in

common dab, flounder ***(Plutichthys jlrsus),*** plaice ***(Pleuronrctes plutessu) und*** whiting ***(hlrrlangus*** sp.) embryos from the southern North Sea during 1984-1995 were considered to be linked to pollution with organochlorines (Dethlefsen *rtul.* 1996). Thus as a result of long-term surveys, these authors considered that the malformations resulted possibly from low water temperatures that predisposed the embryos to the effects of organochlorines.

Liver disease, including neoplasia, has been described in winter flounder ***(Pleuronectes americanus)*** from Boston, USA, particularly in the region of a sewage outfall (Moore ***et al.***1996). Of relevance, these workers noted that during 1987-1993, there was a reduction in the incidence of neoplasia concomitant with a decline in output of chemicals, notably DDT and other chlorinated hydrocarbons, into the receiving waters.

Sewage

An association has been made between fish diseases/parasitic infestation and unknown components of sewage dumping (Siddall etal. 1994). For example, in a survey of 16 sites in the Dutch Wadden Sea, a higher incidence of skin ulcers and fin rot was noted in fish caught near fresh water drainage sluices than elsewhere (Vethaak 1992). Pollution by domestic sewage, i.e. leakage from a septic tank, was attributed to a new skin disease, which was characterized by the presence of extensive skin lesions and muscle necrosis, in rainbow trout (otherwise infected with enteric redmouth disease for which there might also be a link with sewage sludge; Dudley ***et al.***1980) in Scotland during 1992 (Austin and Stobie 1992).

From diseased fish, two new pathogens, i.e. ***Serratia*** ply-***muthica*** and ***Pseudomonas pseudoalcaligenes,*** were recovered.

Interestingly, the skin lesions-but not enteric redmouth disease-declined substantially after the leaking septic tank was repaired.

Eutrophic waters associated with faecal pollution and high levels of organic material, have been attributed as the cause of diseases by enteric bacteria, including ***Citrobacter freundii*** (Austin and Austin 1993), E. ***tarda*** (hleyer and Bullock 1973), ***Providencia rettgeri*** (Bejerano ***et*** *al.* 1979) and ***Serratia marcescens*** (Baya ***etal.*** 1992). In addition, poultry faeces, which was used to fertilize fish ponds, was blamed for mass mortality in silver carp ***(Hypophthalmichthys molitrix)*** in Israel (Bejerano ***et*** al. 1979).

Conclusion

Oil pollution has been clearly established that pollutants enter the aquatic environment and may be found in the tissues of aquatic vertebrate and invertebrate animals Illoreover, some pollutants are instrumental in damaging aquatic organisms.

However, there is only limited evidence that pollutants are actually responsible for the development of disease. Indeed, there is negative evidence that has demonstrated that the incidence of disease diminishes when pollution ceases.

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