

Bioremediation of aquaculture waste

by Dirk Erler

Bioremediation is the term often given to waste treatment systems that employ biological activity as a principal form of pollutant removal. Bioremediation is more commonly associated with domestic effluent treatment where various bacteria systematically purify sewage.

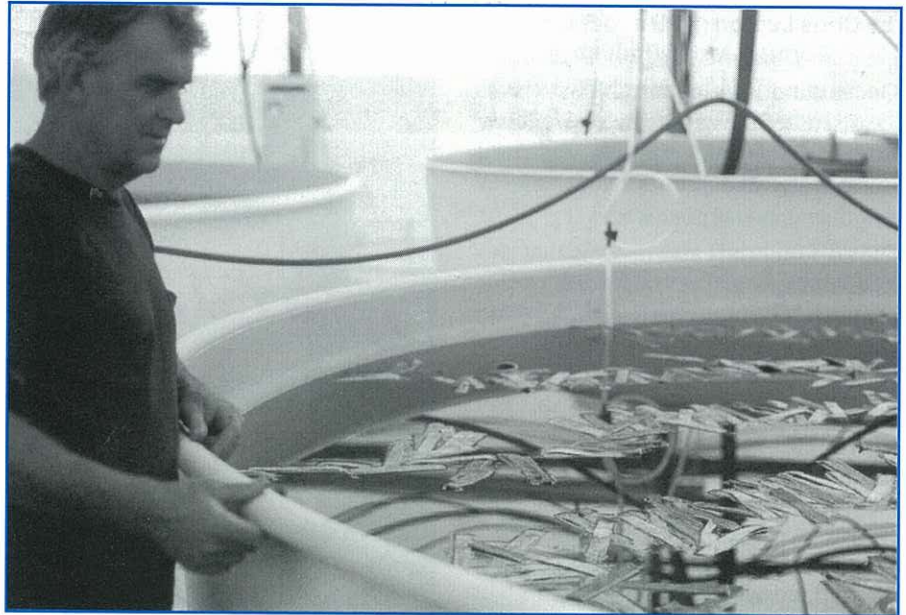
The major objective of the 'Biological remediation of aquaculture waste' project is to examine the effectiveness of finfish, combined with artificial substrates, in assimilating waste nutrients and improving overall water quality of aquaculture discharge.

At the Bribie Island Aquaculture Research Centre (BIARC) we are combining the concepts of bioremediation and aquaculture in an attempt to clean up nutrient rich waste and emulate the multiple water use technology evident overseas.

The first form of waste that we are attempting to remediate is aquaculture effluent. Although at present this is not a critical form of pollution to coastal areas, say compared to sewage discharge, the continued expansion of the industry and the localised development of aquaculture operations is driving the need for industry in general to improve discharge quality.

What we are proposing is that finfish can be successfully cultivated in ponds that receive nutrient rich prawn farm aquaculture waste. No additional feed is used, however the quantity and quality of food available to fish in these systems can be enhanced through the provision of artificial substrates. These substrates also act as a support for the development of bacterial biofilms which are so commonly exploited in sewage treatment.

The experiments involved in this project are currently being conducted at a nearby



Peter Spindler inspecting 'Aquamat' in mullet bioremediation tanks

prawn farm (Bullock Creek Prawn Farm Pty Ltd) operated by Peter Spindler and Judy Butler.

Briefly the experiment involves stocking large fibreglass tanks with various combinations of mullet (*Mugil cephalus*) and artificial substrate.

Analysis of nutrient data is being conducted at BIARC thanks to a recent Natural Heritage Trust grant which has allowed us to purchase an automated Flow Injection Analysis nutrient analyser. Results of this work are expected out in late August.

Another experiment is being conducted in parallel with the mullet trials to assess the growth and survival of rabbit fish (*Siganus fuscescens*) and luderick (*Girella tricuspidata*) that are other potential bioremediation candidates. Milkfish (*Chanos chanos*), a voracious phytoplanktonivorous species, are also to be trialed in the future.

Following this work we aim to move on to larger waste treatment / water re-use systems, in particular a fully recirculating aquaculture system which incorporates finfish, artificial seagrass and other proven remediators (eg. molluscs). We are hoping to trial elements of such a system in the Logan River area (Rocky Point Prawn Farm) in the 2001/2002 prawn season and also in local nutrient rich freshwater lagoons and catchments around the Brisbane metropolitan area.

We also aim to incorporate other species, principally molluscs, into these treatment systems. Ultimately it is envisaged that a complete recycling system can be developed which can sequentially treat nutrient rich wastewater through the cultivation of a series of different aquaculture and agriculture species. Such an integrated system would be a pinnacle achievement in water recycling and water re-use.

Farm mullet trials

by Ross Lobegeiger

The initial trials to assess the effectiveness of using mullet to remove nutrients from water exchanged from marine prawn growout ponds is currently being conducted on a marine prawn farm in Bullock Creek near Donnybrook.

Peter Spindler and Judy Butler from the Bullock Creek Prawn Farm are excited about the potential development of a

bioremediation system to improve the water quality prior to discharge into Bullock Creek.

Peter has had experience with wild mullet entering the long discharge channel for their farm. He said they thrive in this channel and really swarm around the outlet from their settlement pond when water is released into the channel.

This use of hatchery reared fish is a natural

progression in the development of a system that prawn farmers can use in their normal farming operations. He considers that the sale of the mullet for extra cash flow with minimal costs is an added benefit.

Peter said that mullet were a hardy fish that handle a wide range of salinity levels and water qualities and this makes them an obvious species choice for bioremediation.