

Constructed mangrove wetland project

by Chris Robertson

This three-year DPI /Natural Heritage Trust project commenced in March 1999 and will investigate the ability of a constructed mangrove wetland (CMW) to reduce nutrient levels in prawn farm discharge. The project leader Chris Robertson and biologist David Foster are both based at the DPI Northern Fisheries Centre in Cairns. The project steering committee includes staff from CSIRO, the Australian Institute of Marine Science, EPA and Southern Cross University in NSW.

The April 1999 edition of 'Queensland Aquaculture News' announced the start of the CMW project. Almost a year later, Queensland's first constructed mangrove wetland is now operational at the Fortune Prawn farm in Mission Beach. Some 2 500 mangroves of 7 different species (representing four genera) have been planted in replicated 5m x 5m plots throughout the site. The mangroves have been developing well and a few of the more mature plants have produced seedlings this year.

After this initial establishment period, the second year of the program will see the installation of a programmable gate system that will cycle prawn farm discharge through the wetland on a simulated tidal basis.

The year 2000 will also see the commencement of phase 2 of the project at the recently expanded Pacific Reef Fisheries Pty Ltd prawn farm at Alva Beach near Ayr. This site is expected to be much larger, with an 8.5 hectare CMW as part of approximately 14 hectares of treatment area. It is hoped that more than 40 000 trees will be planted in the CMW over the next 18 months by a tree planting team employed by the company. Mr Tony Deans, Director of Pacific Reef Fisheries expects the project will have big benefits for his company. 'We would like the farm to be recognised as an industry leader in terms of environmental sustainability and see this project as a cost effective method of water treatment, with plenty of spin-offs for us'.

An important consideration when designing the CMW's is the provision for the removal of suspended solids.

Mangroves efficiently remove suspended particles but without pre-treatment would be inundated with silt. Pre-treatment is achieved by running water through a settlement pond. Disturbance to both plants and sediments through silt removal would unnecessarily disturb the bio-remediation process. Both Pacific Reef Fisheries and Fortune Pty Ltd have installed settlement ponds to promote the settlement of suspended particles before water enters the their respective CMW's.

The aims of the project are 3 fold;

- * Gauge the nutrient assimilation capacity of the constructed wetland to give a more accurate estimation of the treatment area to production area required on a farm.
- * Determine the sustainability of the tested mangrove species and make recommendations for optimal inundation regimes.
- * Develop a working model for similar applications around Australia.

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Recirculation prawn farming project approved

by Chris Robertson

A DPI project (Project Leader - Chris Robertson) with Natural Heritage Trust funding of \$250,000 will further investigate the methods for zero water discharge prawn farming, using a recirculating pond system to be constructed on a prawn farm at Yorkeys Knob near Cairns.

The project aims to examine whether such closed systems can be used to produce prawns cost effectively with no change in yield or prawn quality.

The two-year project will be based at the Northern Fisheries Centre (NFC), Cairns, and conducted in collaboration with Pacific Blue Technologies prawn farm. Three ponds will drain in to a treatment pond, with a pumping system established to enable recirculation of all pond water back to the growout ponds.

A series of crops will be grown in the ponds and managed on a minimal water exchange basis; any pond water discharged in to the treatment pond will

be re-used after settlement and biological treatment. The success of these crops and overall water quality management in the closed system will be compared to three other control ponds on the farm.

There is no strict definition of the concept of 'zero water discharge' in prawn farming. However, it essentially refers to the day-to-day operation of the ponds, where the crop is managed on the basis of not requiring water to be flushed through the pond system to improve water quality (ie without water discharge from the farm).

The ponds may need top-up to counter evaporation effects, and freshwater may be added to avoid an increase in salinity but only to refill to the original level. On the other hand, tropical rains can cause a pond or an entire farm to fill and eventually overflow, or a farm may be emptied for a dry out as part of normal disease prevention.

Zero water discharge therefore refers to daily operation of a closed system, even

though climatic or other factors may cause the pond to discharge water at certain irregular times.

The project can be considered an extension of the earlier DPI work on minimal water exchange methods, completed in partnership with Sam and Joe Coco at their Mourilyan prawn farm in 1997. It also matches well with a Churchill Fellowship awarded to Chris Robertson to investigate similar recirculating systems in prawn farms overseas in May and June 2000.

Andrew Fenton, General Manager of Pacific Blue Technologies Pty Ltd, has said 'the project will further increase our knowledge about pond management using very low exchange techniques, as well as further advance the development of complete recirculation systems'. The project starts on the first of March 2000 and will include monitoring of crops through to the end of 2001.