

LOCATION IS THE KEY TO GREENER FISH FARMS

Environmental impact studies of sea-cage aquaculture in tropical waters are helping identify the most appropriate locations and stocking densities to sustainably manage this expanding industry

BY CATHERINE NORWOOD

Fish farming in cages is a lucrative business for otherwise poor coastal communities throughout the Asian tropics and it is an industry that is growing rapidly. The Australian Institute of Marine Science (AIMS) estimates production in Indonesia alone has tripled in just five years.

Until recently, fisheries managers had little information on the environmental impacts of intensive fish farming in tropical waterways and what constitutes sustainable production. Most of the research relates to caged aquaculture in temperate waters, an industry that has been well established for more than 30 years, particularly for salmon.

An ACIAR project involving collaboration between AIMS and the Indonesian Ministry of Marine Affairs and Fisheries is helping South-East Asian fisheries regulators and fish farmers identify the most appropriate levels and locations for production.

Indonesia is one of the largest aquaculture producers in South-East Asia, producing high-value finfish, such as tiger grouper (flowerly cod) or mouse grouper (barramundi cod), for live trade to the restaurant markets of Hong Kong and Singapore, where the fish fetch up to \$150 per kilogram. The most intensive sea-cage production sites studied as part of the ACIAR project in Indonesia were in Lampung and South Sulawesi.

AIMS research scientist and ACIAR project leader Dr David McKinnon says one of the major challenges associated with growing fish in sea cages is finding the right place to put the cages. "Once cages are established in a location, a cluster quickly develops in that area, so it is important to ensure sites are suitable before that happens," he says.

"Site selection is the biggest factor in determining commercial viability. Identifying a location that has the optimum water quality, water temperature, oxygen, light and nutrient levels—and that is close to where farm workers live and close to markets or suitable transport for the fish—involves a complex range of decisions and there are many local regulators overseeing the development of aquaculture who may have little experience in this area."

The Cage Aquaculture Decision Support (CADS) tool developed through the ACIAR project allows fisheries managers to classify a site, select the best site from several alternatives, calculate its sustainable holding density and perform a basic economic appraisal.

Dr McKinnon says the project has provided new scientific data on the impact of sea-cage aquaculture, which has been used to adapt production models used in temperate waters to tropical waters. This has included an assessment of nutrient levels due to uneaten food and fish excretions.

He says although many of the risks are the same in temperate and tropical regions, there are substantial differences in the biological process, such as the breakdown of wastes, which occurs more rapidly in tropical waters.

His research has found, for instance, that any 'nutrification' of the environment in tropical waters is highly localised, within only tens of metres of the cages. Uneaten food makes up a significant portion of this nutrient-rich waste. In Indonesia the caged fish are usually fed small 'trash fish', which Dr McKinnon describes as "anything the local fishermen can catch". Once caught, these trash fish are cut up and hand-fed to the fish in the cages.

Australian aquaculture operations use feed pellets specifically formulated for the species being raised, which are better consumed by the fish and result in less waste. "However, Australia's tropical sea-cage aquaculture is currently limited to only one or two operations," Dr McKinnon says. "There is some interest in expanding operations in Western Australia and the CADS tool can be used to help evaluate sites there, as well as in South-East Asia."

The CADS tool has already been widely distributed in Indonesia on CD, with accompanying manuals, and can also be accessed through the internet. Dr McKinnon says tracking through the AIMS website indicates it has already been downloaded by operators and managers in a number of South-East Asian countries outside Indonesia.

He says an important part of the project has been developing networks and expertise within Indonesian organisations, including the Directorate General of Aquaculture, the

PHOTOS: MIKE RIMMER



Visiting a commercial farm in Batam, Indonesia, collaborating scientists (from left) Dr Clarissa Marte and Dr Veronica Alava from the Southeast Asian Fisheries Development Center Aquaculture Department, Iloilo, the Philippines, and Mr Syamsul Akbar, head of the Mariculture Development Centre, Batam, Indonesia.

PARTNER COUNTRY: Indonesia

PROJECT DESCRIPTION: FIS/2003/027: Planning tools for environmentally sustainable tropical finfish cage culture in Indonesia and northern Australia

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Research Institute for Coastal Aquaculture in South Sulawesi, the National Seafarming Development Centre in Lampung, Hasanuddin University and Gadjah Mada University.

In conjunction with another ACIAR project focused on land-based aquaculture, Dr McKinnon is helping to map zones appropriate for offshore and land-based aquaculture in Indonesia, allowing for more coordinated regional management of the industry.

The CADS tool can be downloaded from www.aims.gov.au/docs/research/sustainable-use/tropical-aquaculture/cads-tool.html. ■