

Backyard boost

HATCHERIES CREATE NEW INCOME

Marine researchers are turning groupers into a high-value new industry, Sean Murphy of ABC Landline reports

Across Indonesia, ACIAR has 36 ongoing projects in agriculture, horticulture, forestry and fisheries. In each, there is a big emphasis on helping to reduce poverty through sustainable development. Now there is also a growing interest in aquaculture. At Indonesia's premier marine research institute at Gondol in northern Bali, a joint ACIAR project has achieved a breakthrough in breeding high-value groupers. With a world's best success rate of 50 per cent of all eggs reaching juvenile stage, the research is targeting Hong Kong's US\$500 million a year banquet market, but more importantly it has put an end to wild harvesting of groupers using poisons and explosives.

Because of the high demand, many fishermen used to catch grouper illegally, using dynamite and cyanide, destroying coral reef environments.

Now, under the direction of the Jakarta based Dr Ketut Sugama, researchers are developing ways to make grouper an aquaculture industry.

The research is already having a dramatic impact on people living nearby. Ten years ago the residents surrounding the now sprawling research institute were among Indonesia's poorest, but today more than 2000 backyard fish hatcheries provide employment and opportunity.

Fish fry fetch about one Australian dollar for every 500 sold to fish farms, and villagers are paid 50 cents for every bucket of fry they count. It is not enough to live on, but the extra money means they can buy their families much better quality food.

Now that the hatchery owners are breeding groupers they can increase their returns substantially, with some grouper species retailing for up to US\$100 a kilogram.

"Before they had no job, only hunting fish sometimes. Now they have an income," Dr Sugama says. "Also, the young generation can now study, and some have bought motorbikes and cars. Their living conditions are significantly improved."

Having solved the problems with growing groupers to their juvenile stage, the challenge for the Gondol researchers now is quality in the grow-out phase. That is where Australia's expertise comes in.

The collaborative research effort is now focused on nutrition, coming up with low-cost environmentally friendly alternatives to so-called trash fish or 'by-catch', which has been used to feed Gondol's breeding stock. However, its availability is seasonal and prices fluctuate wildly.

CSIRO nutritionist Dr Kevin Williams is part of a new ACIAR research project investigating non-marine feed alternatives.



Building an industry: (top) juvenile tiger and humpback groupers and (above) experimental grow-out sea cages in Bali.



Building an industry: research projects are bringing organisation and knowledge – and income – to Indonesian fishing families.

Capturing shark data to end stock decline

RESEARCH IS NEEDED TO PREVENT SHARKS FROM BEING FISHED TO EXTINCTION IN THE ARAFURA SEA, EXPLAINS ROBIN TAYLOR

Think of sharks and many people think of predators lurking in the water, waiting to catch unwary swimmers. The reality is that many more sharks are in danger than are swimmers. Sharks are economically important, extensively fished and many species are in danger of becoming extinct. The leader of an ACIAR project studying shark and ray fisheries in Indonesia and Australia, Dr Stephen Blaber, says shark numbers have declined alarmingly in recent years.

Sharks and rays (collectively known as elasmobranchs) inhabit the warm northern waters of the Arafura Sea between Indonesia and Australia. Their abundance and their high value (especially for shark fin) make them an attractive target for fishermen and result in large numbers also being taken as bycatch.

“Sharks and rays are particularly vulnerable to overfishing,” explains Dr Blaber. “They are slow-maturing and long-lived but they don’t produce many young. This combination means that over-exploitation of their fisheries can result in quick declines.”

Indonesia’s waters have the highest diversity of sharks and rays in the world, but many species are becoming endangered. Some may even be extinct before they can be described scientifically. Indonesia has depleted its waters, leading to incursions of illegal fishers in Australian waters.

“Most artisanal (smallholder) fishers in Indonesia get most of their income from shark fin,” says Dr Blaber. “If this situation is to be maintained and thus avoid a drastic fall in income, management action is needed. The vulnerable nature of these fishes to overexploitation requires sustainable management as soon as possible.”

Management plans are needed to enhance sustainability and incorporate the needs of fishermen and stakeholders in both countries.

A previous ACIAR project established baseline data on shark and ray fisheries in Indonesian waters, which confirmed the high level of diversity of these species – more than 150 species are now listed. The follow-on project is gathering information to allow Australia and Indonesia to jointly manage shared stocks of sharks and rays on a sustainable basis. The project will also provide technical training in various biological disciplines to enhance Indonesia’s stock assessment capability.

Project staff from the Research Centre for Capture Fisheries (RCCF) and the Directorate General of Fisheries in Indonesia, together with CSIRO in Australia, are gathering available shark and ray catch data from Indonesia and northern Australia to provide information for fisheries managers.

“Management plans can only be carried out with the knowledge gained from projects such as this one,” says Dr Blaber.

A major achievement of the project has been the development of a national plan of action for sharks and ray fisheries as required by the United Nations Food and Agriculture Organisation and the Southeast Asian Fisheries Development Center (SEAFDEC). Part of the project involves establishing which species are shared and which are found in only one country’s waters. About 40 of the approximately 200 species collected in Indonesia are new species and full taxonomic descriptions are being prepared for publication. Negotiations are in progress to incorporate East Timor as a partner in the project and to undertake sampling of shark fisheries on the north coast of East Timor.

The overall results of this research will help in the development of complementary management strategies for shark and ray fisheries.

“We want to overcome these problems by developing cost effective pelleted feed,” he says. “This also has the advantage of providing a complete nutritional package in the feed.

“With by-catch feeding, the quality of the fish is probably less than desirable, and vitamin loss is very rapid. But with a pelleted feed we can achieve two things: we can provide a complete nutritional package, in a way that reduces the amount of food not eaten by the fish and therefore wasted.”

Dr Williams says the research may have major implications for the future of aquaculture: “We need diets that are based on renewable resources such as plant proteins or other plant products, rather than being dependent always on the oceans. As with many other species, groupers can handle plant proteins very well, provided we package it properly.

“Providing the diets are palatable the groupers will eat them and grow very well.”

This said, Dr Williams says that by using new non-marine material for fish feed there was a danger that fish would lose the nutritional qualities – such as omega-3 long-chain fatty acids – that make them important in human diets.

“We recognise that fish need these essential fatty acids, the so-called omega-3s, that we regard as having very beneficial health benefits to us as consumers,” he says. “So we have got to always provide these omega-3s as a component of the diet. If we lean too far away from using fish oils, then we run the danger of producing fish with lower amounts of omega-3s.

“But the fish oil is also coming from the sea, so that is a finite resource. We are looking at ways of overcoming that limitation, either through a bit of technical engineering or, more likely, through mass culture of these small micro-organisms that actually synthesise these omega-3 fatty acids.

“There are micro-algae, or a very primitive form of bacteria fungi, which will actually produce these omega-3 oils, so if we can mass produce those commercially it will provide a source of omega-3s we can use in the fish diets.”