

routine. 'The juvenile sandfish can be produced within 3–4 months at relatively low cost because they do not need expensive food like prawns', said Susan Dance. 'They actually grow well by eating only the algae and bacteria that grows on surfaces of the tanks used to raise them', she said.

The release of the juvenile sandfish at Boe Boe is the first time that ICLARM has put back large numbers of this species in the wild. ICLARM paid special attention to returning the juveniles to the place where the adults used for spawning were collected. Dr Johann Bell, the Officer-in-Charge of ICLARM's operations in Solomon Islands, explained that this was a precaution to maintain the genetic diversity of stocks within Solomon Islands. 'At this stage, we do not know whether there are different stocks of sandfish in Solomon Islands and so it is best not to mix sandfish from different areas until we find out', he said.

ICLARM will use the results of the release at Boe Boe to help design a new project on sandfish. The new project is also funded by ACIAR and aims to develop the best methods for releasing cultured juveniles into the wild in the Pacific region. 'Now that we know how to produce the juveniles in hatcheries, we need to learn how, where and when to let them go into lagoons so that they survive in large numbers', said Dr Bell.

Ms Michelle Lam from the Fisheries Division in Honiara and Lionel Laka who is the Provisional Fisheries Officer for the Western Province assisted with the release of the young sandfish at Boe Boe. Fisheries Division has given their full support to ICLARM during the project on the breeding of sandfish. When the ICLARM staff was having difficulty finding enough sandfish to breed, Fisheries

Division realised that stocks of this important species had been over-harvested. In 1997, Fisheries Division amended the Fisheries legislation to put a total ban on the export of sandfish. The regulation makes catching, retaining, selling, buying or exporting of sandfish a criminal offence.

The ban on exports will be in place until stocks throughout Solomon Islands have been restored to levels where they can support good levels of harvest each year. Michelle said that the problem with the sandfish at the moment was the low numbers of breeding animals. 'There simply are not enough adult sandfish to provide sufficient juveniles to support a good fishery. We need to allow the total number of animals to build up to the point where the offspring they produce each year provide us with a good harvest', she said. Lionel added 'The great thing about the ICLARM project is that it should help stocks in Vona Vona Lagoon to recover even faster because the released animals should spawn within a couple of years. Their babies will then grow-up and spawn and, eventually, sandfish would be plentiful again. The Government could then consider reopening the fishery'.

The Fisheries Division would be making regular checks on the exporters of marine products to ensure that they did not buy, store or ship sandfish and remind them that anyone caught breaking the law will be liable for severe penalties, including imprisonment for three months. Michelle added 'We want the people of Solomon Islands to realise that a lot of money and effort is being spent to restore the stocks of sandfish so that coastal dwellers will have a source of income in the years ahead. We want people to understand and respect the process and to see the ban as an investment in the future, not a penalty'.

New Zealand collaborates with Japan on sea cucumber farming

Andrew Morgan¹

In January this year, Kunihiro Masaki, chief researcher of the Saga Sea Farming Center in Japan visited the Leigh Marine Laboratory and offered some valuable insights into the farming of sea cucumbers. A meeting with Andrew Morgan, Kunihiro Masaki, Dr. Russ Babcock (scientist in charge) and John Croft, research director for McFarlane Laboratories, a pharmaceutical company (now Healtheries).

The purpose of this meeting was to discuss ways of developing a sustainable industry and a viable commercial venture for the sea cucumber *Stichopus mollis* in New Zealand. The production of seed to alleviate the pressure such a venture may have on wild stocks; the sustainable and renewable harvesting of the gut for export to Japan; and the development of food supplements from pharmacologically active compounds known to exist in this animal, were discussed.

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Scientists at the Saga Sea Farming Center have been restocking commercial amounts of sea cucumber seed (*Stichopus japonicus*) for a number of years now. Using standard hatchery procedures they produce thousands of juvenile sea cucumbers, which are settled in primary grow-out tanks (16-tonne rectangular concrete tanks). Kunihiko commented on the nature of the hatchery set up that has been designed and developed at Leigh Laboratory. The improvement of sea cucumber culture and grow-out techniques was discussed as was spawn induction and diatom films for settlement and primary grow-out.

At the other end of the scale product development and the sourcing of raw materials was discussed. Researchers in Japan successfully farm sea cucumbers with sea urchins and abalone. Seed (1 to 5 cm) is also placed out on artificial reef structures made of rocks and boulders (40 by 20 metres). An industry partner in New Zealand is farming wild caught adult sea cucumbers in raceways containing the effluent water from raceways containing abalone (10,000 to 50,000 sea cucumbers at full scale). This is proving successful and the nutritional benefits of waste and effluent from abalone in polyculture with *S. mollis* and how this may affect the quality of products produced from this animal are being assessed.

Farming practices are being developed and refined while raw materials are being provided to develop pharmacological products and commercial products from the gut. John Croft commented that the source of raw materials was critical in obtaining the backing of commercial partners. Incentive for

industry to support this venture is given further impetus by the claim that raw materials are sourced from environmentally friendly and sustainable farming and fishing practices.

The development of pharmacological compounds from sea cucumbers is relatively new. For hundreds of years anecdotal evidence has suggested that extracts of sea cucumber were have been used to treat inflammation and joint problems, arthritis and various other ailments. Initial tests by McFarlane Laboratories (Healtheries) have been positive and with ongoing research, we hope to develop a marketable product.

The issues outlined above are being developed and strategies implemented to ensure this new industry is successful. Continued collaboration with Japan and industry both locally and internationally is ensuring that the refinement of commercial scale production and product development occurs alongside research. Both Kunihiko Masaki and John Croft have indicated their willingness to see this venture come to fruition.

From the Solomon Islands to Australia and New Zealand restocking and/or farming is seen as an alternative to overexploited fisheries. The Great Barrier Reef sea cucumber fishery is non-sustainable as are other tropical sea cucumber fisheries. A lucrative market exists for products from sea cucumbers and in addition to protecting the environment, sea cucumber farming will help lead the way in sustainable and renewable marine farming practices.



Kunihiko Masaki and Andrew Morgan at Leigh Marine Laboratory