

## News prepared by J.-F. Hamel and A. Mercier

### International collaboration for the study and restoration of *Holothuria scabra* populations in the Solomon Islands

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Of the approximately 1400 sea cucumber species that live on sea floors all over the world, less than 20 possess all the physical characteristics that make them attractive to the major buyers. The Solomon Islands are blessed with all of the most prized species, including the white teatfish *Holothuria fuscogilva* and the sandfish *Holothuria scabra*, which currently hold the highest value on the market. Unfortunately, both species have been fished heavily by local populations, especially in recent years and the stocks are experiencing a drastic decline throughout the archipelago. While the demand for sea cucumber products increases insatiably, sizeable animals are also becoming difficult to find in many other areas, including the Philippines, India, Maldives, Papua New Guinea and Fiji.

The fact that the wholesale price for high value species of beche-de-mer has more than doubled over the last four years is good news for Pacific Islanders who often have few products they can trade for hard currency. But for them to benefit from this trade, the present beche-de-mer crisis must first be resolved.

Stock enhancement appears as one of the most promising avenues for increasing and stabilising sustainable sea cucumber harvests. The possibility of restoring populations of tropical sea cucumbers is in fact being assessed in a number of countries, including Ecuador, India, Kiribati, Maldives and Marshall Islands. However, proper seeding of natural habitats, which have been heavily depleted, with cultured juveniles requires long hours of laboratory and field testing.

In Solomon Islands, scientific researchers and villagers have pulled together to learn how to manage sea cucumber populations and build a future for the beche-de-mer industry. A research team from the International Centre for Living Aquatic Resources Management (ICLARM) based at the Coastal Aquaculture Centre (CAC) near Aruligo on Guadalcanal is currently working on a stock enhancement project. During the course of this project, ICLARM hopes to develop expertise in the

ecology and rearing of valuable sea cucumber species and test whether it is possible to enhance sea cucumber stocks through release of hatchery produced juveniles.

Dr Stephen Battaglione, an aquaculture scientist from Australia, was appointed head of ICLARM's beche-de-mer project in Solomon Islands, funded by the Australian Centre for International Agricultural Research (ACIAR). His main objectives were to induce spawning of mature adults and develop cost-effective techniques to rear the larvae into juveniles hardy and large enough to survive release.

The research, focused on the sandfish and white teatfish, began in August 1996, when eggs obtained from ripe sandfish produced over 10 000 juveniles of 20 mm in size. Since then, Dr. Battaglione and his team have successfully produced numerous batches of young sea cucumbers and they have now produced over 200 000 juveniles. ICLARM has thus reared thousands of young sea cucumbers ranging from 1 to 250 mm, which were used in experiments aimed at determining the best way to grow them. Researchers were able to find out what was the most suitable food, substrate, rearing density, and salinity, for each of the species.

The second part of the beche-de-mer project was focused on the study of the juveniles' ecology, essentially to provide useful information about where and when the young should be released in the natural habitat. For this work, Dr Battaglione has sought our collaboration and a joint project was prepared by ICLARM and two Canadian institutions : Institut des Sciences de la Mer de Rimouski (ISMER; formerly INRS-Océanologie) and the Society for the Exploration and Valuing of the Environment (SEVE). The three-year venture obtained financing from the Canadian International Development Agency under CGIAR-Canada Linkage Fund. Beginning in July 1998, our work focused on studying the behaviour, settlement, recruitment, distribution and migration of juvenile and adult *H. scabra*, both in the wild and under laboratory conditions.

The residents of New Mala on the Vonavona lagoon in the Western Province know a great deal about the harvested and processing of sandfish. In fact, some parts of the lagoon have been severely overfished, a pattern that reflects what is happening throughout the nation. The villagers of New Mala agreed to stop sandfish collection and processing around their village to allow us to conduct part of our fieldwork in this area. Adult sandfish can reach 400 mm in size; they occur mostly on sand or mud in areas that are influenced by terrigenous inputs, often associated with seagrass beds and mangrove swamps. We spent a lot of hours scanning these habitats to study their spatial distribution and population structure. We eventually found out where the small juveniles occurred and investigated their migration patterns, preferred habitats and susceptibility to predation. During the first year, data were also gathered on the burrowing habits and daily activities of juvenile *H. scabra* (recently published in JEMBE 239: 125–156), as well as on their settlement preferences and recruitment in the field. For this, we had to find a way to identify newly-settled sea cucumbers collected from the wild. A study of ossicle change in *H. scabra* was thus conducted in collaboration with Dr Claude Massin from the Institut Royal des Sciences Naturelles de Belgique, allowing us to pinpoint the unique skeletal features of larvae and young specimens.

Another important member of the beche-de-mer team, Christain Ramofafia, is currently doing a Ph.D. on the reproductive ecology of valuable sea cucumber species under the supervision of Dr Maria Byrne in Australia. Originally from Malaita (Solomon Islands), Chris joined ICLARM five years ago as a research assistant. He has conducted three years of monthly field sampling during his study of *H. scabra*'s reproductive cycle. In doing so, he has allowed us to examine hundreds of individuals collected from different sites and to identify a

new species of pea crab that lives encysted in the respiratory tree of *H. scabra* adults from a single bay in the Solomon Islands. The symbiont was named and described in collaboration with Dr Peter K.L Ng from the University of Singapore. We have also investigated its reproductive biology and invasive patterns. These results will be published shortly in *Ophelia* Vol. 51.

We are now in the final year of the joint Solomon Islands-Canada project, which is mainly dedicated to publishing the data and presenting them at symposia and conferences. The collaboration has been very productive and we hope that the knowledge gathered on adult and young *H. scabra*, aside from increasing our general knowledge of holothurian ecology, will provide useful tools to stock enhancement programs aimed at restoring the depleted sandfish populations in Solomon Islands and elsewhere.

Fortunately, the Government of Solomon Islands has recognised that stocks of sandfish have been fished down too far and that ICLARM's project represents a sustainable way of restoring and enhancing stocks of this species. Accordingly, the government has introduced legislation to ban the export of sandfish. However, all other species of beche-de-mer can still be sold. Other measures that could help to improve the resource management in Solomon Islands and elsewhere include establishing a minimum size limit for collection, upgrading the skills of processors to lower the proportion of rejected products and restrict collection to free diving only. Provided that all goes well, scientists are hoping to begin the restoration of sustainable sea cucumber stocks in the year 2000. If their work is successful and if the local communities and government join hands in this project, future generations of Solomon Islanders can look forward to improved and reliable harvests of beche-de-mer.

