Sandfish (*Holothuria scabra*) to boost inshore fisheries opportunities in Kiribati

*The overexploitation of sea cucumber fisheries in Kiribati from the mid-1990s to the mid-2000s has led to the complete and indefinite closure of this export fishery in 2014. Processed beche-de-mer exports peaked at 268.5 tonnes (t) in 2007 with the high-value black teatfish (*Holothuria nobilis*) and white teatfish (*H. fuscogilva*) being the main target species. By 2012, volumes had dropped to just 68 t, which by then were made up largely of the low-value lollyfish (*H. atra*). Efforts at managing the fishery included the hatchery production of sea cucumbers for restocking, which started in 1997 mainly with white teatfish. The project was funded by the Overseas Fishery Cooperation Foundation, and while hatchery production was successful, restocking on its own never became an effective management strategy for the fishery.*

To build on this early work, and in a renewed effort to restore the beche-de-mer sector, the Kiribati Ministry of Fisheries and Marine Resources Development (MFMRD), in collaboration with the Aquaculture Section of the Pacific Community (SPC) Fisheries, Aquaculture and Marine Ecosystems (FAME) Division, have been producing juvenile sea cucumbers sandfish (*H. scabra*) under the Australian Centre for International Agricultural Research-funded project "Improving Community-based Aquaculture in Fiji, Kiribati, Samoa and Vanuatu".

How does this project differ from previous attempts?

Sandfish juveniles have been produced in Kiribati since August 2015 as part of the first phase of the project. In the second phase, which started in 2016, MFMRD and SPC teams have actively engaged with village communities in North Tarawa and Abaiang where juvenile sandfish are to be released. Community involvement in and their ownership of the project, and of the batches of juveniles that are transferred to them, is critical to the long-term viability of the project as community members become sandfish farmers and eventually harvest a saleable product. The project will integrate findings and a methodology from another SPC project on community-based fisheries management to create synergies between the two concurrent activities and incorporate aquaculture commodities such as sandfish in the suite of options available for coastal communities to derive food and income from. In particular, the project will use sandfish farming as an incentive for the application of measures such as protected areas and rotational closures for the management of other coastal resources.

Sandfish are not present in Kiribati and had to be introduced as part of the project. The introduction of exotic species is rare these days, due mostly to the risk — real or perceived — of introducing pests. The importation of live sandfish broodstock from Fiji was conducted following a thorough import risk analysis by the FAME-Aquaculture team to assess the potential disease and ecological risks and develop strict sanitary transfer measures.

Figure 1. Juvenile sandfish ready to be released in Tabuki, North Tarawa (image: Michel Bermudes).

The choice on sandfish instead of a local sea cucumber species is, like community engagement, a way to maximise the project's impact and its long-term viability. Sandfish is, among all tropical sea cucumbers, the species for which most research related to culture and propagation has been done. The well-established culture technology was readily transferrable to Kiribati with minimal research effort and capacity required. Sandfish is also one

Figure 2. Pen culture at Tabuki, North Tarawa (image: Michel Bermudes).

of a few sea cucumber species that have the main traits for aquaculture on isolated atolls: 1) easy to breed and fast growing; 2) easy to process and store; 3) has a high value; and 4) there is a strong market demand for it.

Progress to date

Since August 2015, MFMRD staff, with the assistance of SPC, has carried out repeated sandfish spawning at the Tanaea hatchery to produce juveniles destined for community-based farming trials in North Tarawa and Abaiang. Practice makes perfect, and with each spawning run and the training provided onsite and overseas at the Southeast Asian Fisheries Development Center in Bangkok, Thailand, local fisheries staff have grown in confidence by honing their skills in all aspects of hatchery production: from spawn induction techniques to the rearing of larvae or juvenile sandfish in a land-based facility. From a couple of hundred juveniles produced at the first attempt, MFMRD staff are now producing several thousand juveniles at each spawn. Hatchery production of sandfish in Kiribati is now conducted with a great degree of confidence and protocols have been refined to optimise local resources. Developing strategies to maximise juvenile production will be one of the outputs of the project.

Moving to the next step and releasing the juveniles they had nurtured in the hatchery, was very exciting for MFMRD staff because they could see the progression of the production cycle. The first seeding in lagoon and pond settings was carried out in February 2016. Around 100 juveniles (Fig. 1) were placed in a 50 m^2 circular pen at Tabuki village, North Tarawa and another 70 juveniles were released in a 35 m^2 circular pen in one of the ponds at EcoFarm, South Tarawa. The circular pens were made from fine 1.2 mm black mesh and were held with wooden stakes to form an enclosure to keep the sandfish juveniles from escaping (Fig. 2).

Six weeks post-release, observations indicated a high survival rate (>85%) and good growth for the juvenile sandfish released in a lagoon pen at Tabuki, North Tarawa (Fig. 3). Observing the cryptic sandfish in the EcoFarm pond has been difficult, possibly because the site is shallower than at Tabuki. Predators in the ponds (mostly crabs) have also been harder to control. Crab traps will be used to minimise predation. Comparing

different sites will enable MFMRD staff to determine optimal growing conditions and rearing techniques in the future.

Alongside the transfer of technical hatchery and grow-out culture techniques, community engagement and participation has been the key to a successful first release of sandfish in Kiribati, with regular snorkel surveys to inspect the pen and remove predators proving very effective in this environment.

To boost private sector development, the SPC/ACIAR community-based project is also engaging Atoll Beauties with the propagation of sandfish. Atoll Beauties is a privately-owned aquaculture company that mainly cultures giant clams, in collaboration with communities, for the aquarium market. Atoll Beauties is actively collaborating with MFMRD through a memorandum of understanding, and is providing support to project activities. Their current role involves raising surplus larvae from the Tanaea hatchery to serve as back-up in case of high mortalities at the Tanaea hatchery. Atoll Beauties is also involved with grow-out at Tabuki in North Tarawa, which is proving to be a very good site for juvenile growth and will be tested as a broodstock reserve for future breeding programmes.

The project is an exercise in supply chain capacity building from seed production to harvest. Further improvements will be required both in the hatchery and lagoon nursery to farm sandfish on a larger scale. Project plans for 2016 are to: 1) improve on late nursery culture in the hatchery to increase production of sandfish juveniles; 2) grow some sandfish to adult size so they can be used for the breeding programme instead of relying on the importation of broodstock; and 3) establish community farms in other parts of North Tarawa and in Abaiang.

For more information:

Beero Tioti
Community-based Aquaculture Officer, SPC
beerot@spc.int

Michel Bermudes
Mariculture and Aquatic Biosecurity Specialist, SPC
michelbe@spc.int

Figure 3. Healthy juvenile sandfish in Tabuki, North Tarawa, just weeks after release (image: Michel Bermudes).