Sea cucumber

Name of species/group

Tropical sea cucumbers, particularly sandfish (*Holothuria scabra*).

Primary potential

Aquaculture, stock restoration and enhancement.

Attributes for aquaculture/stock enhancement

- High value and demand.
- Easy to harvest, process and store.
- Widespread distribution.
- Feeds low on food chain (e.g. bacteria) so there is the potential for simple feeds.
- Restricted to inshore habitats and relatively sedentary.
- Low cost, low technology hatchery production.
- Potential fast growth, high density.
- A traditional commodity, so there is local knowledge of ecology and habitats for restocking.

Culture methods

- Broodstock collected from the wild can be induced to spawn, year-round depending on latitude, using temperature and transport shock. Acclimated broodstock in tanks can spawn all year round on a lunar cycle at low latitudes.
- Larvae are reared on a mix of microalgae and settle on diatom-conditioned plates after two weeks.
- Juveniles are reared on hard substrates till 20 mm long then on sand.
- Can be reared to a size suitable for release (~20 to 100 mm) on low cost diets and in low cost tanks or ponds.
- Small wild juveniles are not generally available and recruitment is highly variable.
- Grow-out to market size is in enclosures or ponds. Sea cucumber may be grown in polyculture with prawn.
- Indications are that it will take two years to grow to market size.
- Successful stock restoration and enhancement will require better management than is now practised, but possible environmental impacts are believed to be low.
- Women are traditional harvesters and processors of beche-de-mer in many small island developing states.

Current production status

- Hatchery production of sandfish juveniles is now routine at the experimental level and is being undertaken in India, Indonesia, Australia, Vietnam and New Caledonia among others. Pilot-scale production of juveniles en masse is being undertaken for use in release experiments to test the most appropriate size, time and habitat of release. Companies in Southeast Asia and Australia have proposed commercial hatchery production but none are, to our knowledge, in production.
- Fattening of wild-caught sub-adults is practised in Indonesia and India in enclosures within estuaries or calm waters using low cost feeds such as agricultural byproducts.
- The bottleneck to hatchery production is survival at or shortly after settlement. Control of copepods can be a problem.
- High density cultures of newly settled juveniles have highly variable growth.
- Little is known about the growth of juveniles over 100 mm in length and the density in which they can be successfully grown to market size.
- To date few experimental releases have been made with hatchery-produced juveniles in fully replicated trials. No long-term reseeding trials have been conducted and no tagging method is yet available.

Marketing

- Traditionally a 'boom-and-bust' fishery in small islands developing states.
- The demand for the dried body wall product beche-de-mer is high (some suggest insatiable), mainly through markets in Hong Kong, Taiwan, Singapore and into mainland China.
- Estimates suggest the production of tropical sea cucumbers is USD90 million annually but detailed statistics are difficult to obtain.
- High quality sandfish fetches up to USD100 per kg at the retail level in the bigger markets.
- There are established buyers in most small island developing countries offering lower prices to local collectors.
- Product quality can be a problem. Sandfish are harder to process than other sea cucumbers. Training can lead to better product and better prices.

Comparative advantages/disadvantages (risks) of producing the species in the Pacific

Advantages

- The depletion of stocks, which can take 50 years to recover, has led to increasing prohibition or restrictions on the taking of sea cucumbers leading to support from indigenous people for a solution.

- Aquaculture works on three levels: (1) restoration of depleted stocks, (2) enhancement of existing stocks above historical levels, (3) aquaculture in ponds or enclosures, thus multiplying the advantages.
- A traditional product, collected by hand. Does not require large retraining, capital, or changes to traditional practices. Benefits should flow directly to the village level.
- Hatchery requirements for sea cucumbers are similar to other species such as pearl oysters and giant clams.

Disadvantages

- Small island developing states could probably afford only one centralised hatchery.
- Culture and stock enhancement is not a quick fix and will not work without more research into release strategies and, most importantly, an effective enforcement of harvest regulations, probably administered at the village level.
- Genetic differences between stocks at a local scale necessitate culturing with separate broodstock groups from different areas.