



What is mariculture? Marine aquaculture, or mariculture, is the farming of marine animals and plants in salty or brackish water.

Fresh fish, shellfish and sea cucumbers are becoming scarce on many Pacific Island reefs. These commodities are in high demand for their value as traditional foods. Many of them have commercial value, both locally and for export. Supplies from capture fisheries often cannot meet the demand for them. Mariculture can help increase the supply of these valuable commodities.

What kinds of organisms can be farmed by mariculture?

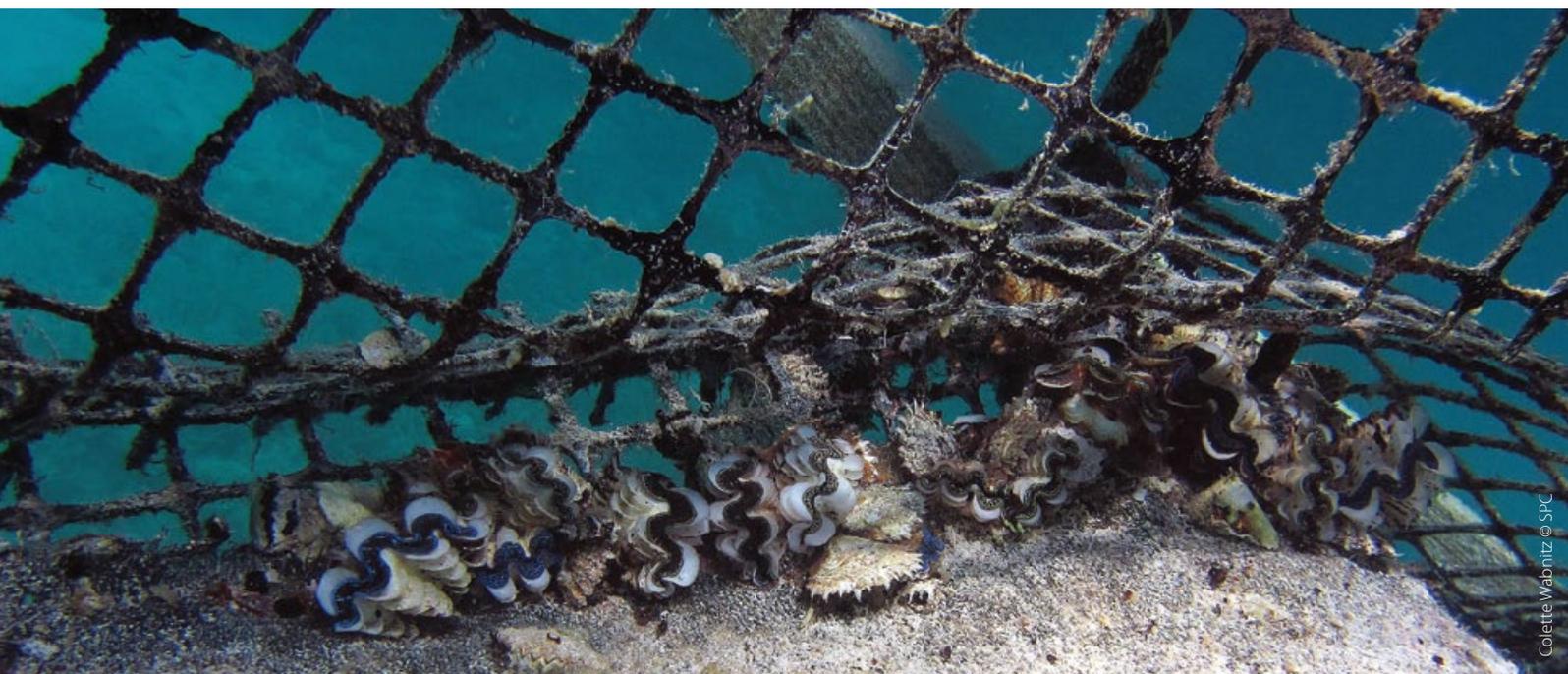
The organisms being farmed may include finfish, or invertebrates such as crustaceans, molluscs and sea cucumbers, or even sponges and seaweed.

In the Pacific islands, the main marine organisms being maricultured for commercial purposes are pearl oyster, marine shrimp and seaweed. Traditionally important food species bred by mariculture for placing in the sea and on reefs (called stocking) are giant clams, trochus, green snail and sea cucumber. Other types of organisms under development for mariculture in this region include mangrove crabs, marine finfish and bath sponges.

- Blacklip pearl oysters (*Pinctada margaritifera*) are the Pacific region's most valuable mariculture product. In French Polynesia, Cook Islands and Fiji, pearl oysters are suspended in the water on ropes and floats. The living oysters are implanted with a round pearl nucleus by a skilled technician. The nucleus sits in a pocket in the oyster's body tissue and becomes coated in the brilliant colours of mother-of-pearl (nacre) over the next two years. The harvested pearls are graded according to size and quality, and used to make valuable jewellery such as earrings and necklaces.
- Marine shrimp (*Penaeus vannamei*) are farmed on land in ponds that are filled with salty water pumped from the sea, and sometimes mixed with river water. Juvenile prawns are bred and reared in special tanks in a hatchery, and grown through

their planktonic (swimming) larval phases until ready to take up a benthic (crawling) existence. As adults, marine shrimp do not mind being crowded closely together. They can be stocked into ponds at quite high densities (about 25 shrimp per square metre of pond bottom). The shrimp are fed on high-protein pellet feed imported from overseas and are ready to harvest in about four or five months. Marine shrimp fetch a good price and are in high demand by restaurants, hotels and supermarkets.

- Seaweed (*Kappaphycus alvarezii*) is farmed on ropes tied to posts on sandy areas of shallow sea bottom in Kiribati, Solomon Islands, Fiji and Papua New Guinea. It is dried in the sun and baled for export to factories in China where it is used to extract carrageenan jelly for use in foods, drinks, cosmetics, lotions, and for industrial uses.
- Giant clams (*Tridacna* spp.), trochus shell (*Tectus niloticus*) and green snail (*Turbo marmoratus*) can be spawned and reared to juvenile size in tanks at a marine hatchery. Giant clams do not like being crowded together and grow too large to be kept in tanks for more than a few months. To complete their growth until ready for harvest, they need to be planted on suitable areas of coral reef. They must then be managed and protected from poaching to give them a chance to grow to a good size. The best places for releasing hatchery-reared clam juveniles into the wild are among communities who have declared marine protected areas and are managing those reefs according to a fisheries management plan.



There are many other marine organisms being farmed by mariculture techniques in other parts of the world. Some of these ideas are now being tried in the Pacific. Mangrove crabs (*Scylla serrata*), tropical groupers such as the humpback grouper (*Cromileptes altivelis*), and bath sponges (*Coscinoderma matthewsi*) are just some of the other marine species that now form the basis of mariculture businesses in the Pacific.

What is needed for mariculture?

1. **Marine space** is the biggest item needed for mariculture, as a place to locate the farm. Permission is needed to use sea space for mariculture. If using ponds on land, then a supply of salty water is needed to fill the ponds. Mariculture farmers need to carry out a feasibility assessment to be sure that the space they are choosing has the correct environmental conditions for the organism they will be farming.
2. **Juvenile fish, shellfish or prawns** will need to be supplied from a hatchery for stocking into the mariculture farm. For marine shrimp the farm owners can operate their own hatchery, or they may choose to import juvenile shrimp from a healthy and disease-free hatchery in another country.
3. **Feed** is needed for animals such as finfish, shrimp and crabs. Pearl oysters will feed themselves by filtering plankton out of the surrounding sea water. Seaweeds are plants, so only need sunlight and nutrients from the water. Giant clams do not need to be fed at all, but they do need sunlight because they have a symbiotic relationship with microscopic plants that live within their tissues.
4. **Skills** are needed by the farmer to keep marine organisms alive when they are in tanks or in ponds on land. A high level of scientific skills is needed to operate hatcheries. When marine organisms are released onto reefs, a management plan must be put in place. The plan must be enforced and respected to protect these organisms until they reach a harvestable size.

