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**OCEAN CULTURE OF GIANT CLAM IN TONGA**

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# OCEAN CULTURE OF GIANT CLAM IN TONGA : AN ASPECT OF MANAGING GIANT CLAM RESOURCES

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## ABSTRACT

A series of surveys was conducted to obtain present situation of the giant clam resources in Tonga. *Tridacna derasa* was found to be most exploited species. In order to enhance the *T. derasa* resource, Ministry's hatchery is producing annually 50,000 seed clams for future release. The aim of the release is to create broodstock population that will reproduce the *T. derasa* resource sustainably. Village ocean nursery is utilized to keep the stock as well as to educate giant clam fishermen to conserve the resources.

## Introduction

Giant clam meat is one of the most favoured sea foods of Tongan people. It has been exploited on a subsistence basis as well as harvested continuously on a commercial basis. Shellfish market statistics data shows clearly its commercial importance: Giant clam accounted for 33.4% out of the whole shellfish catch in 1994 (source: Inshore Fisheries Statistics, Ministry of Fisheries, the Kingdom of Tonga, 1995, draft). It has been said that the giant clam stocks in Tonga or in the other South Pacific countries have been depleted due to over fishing. Under the Tonga-Japan Aquaculture Research and Development Project, a series of surveys and experiments has been conducted to obtain sufficient information for the scientific management of the giant clam resources in Tonga.

## Which species of giant clams has been over-exploited?

At present, four species of tridacnid clams, *Tridacna maxima*, *T. squamosa*, *T. derasa* and *T. tevoroa*, occur in Tongan waters. *Hippopus hippopus* is extinct in Tonga but it is not clear whether this has come about as a result of over-exploitation or not. Fishing pressure upon *T. maxima*, the most abundant species in Tongan waters, was stronger in 1992-94 than it was in 1979. However, the speed of depletion of this stock seems not to be critical so far, as the fishermen still enjoy reasonable harvests (Kava et al., 1995). On the other hand, the stocks of large sized giant clams such as *T. derasa*, face rapid depletion. The broodstock of this species lives in deeper waters and therefore it has escaped collection from traditional skindivers before. However, the recent introduction of hookah gear has led to over-exploitation of this species (Tu'avao et al., 1995). It seems that the high commercial value of *T. derasa* in the market has accelerated those fishing efforts. *T. squamosa* is scattered widely and also common among live staghorns. Such place is unusual fishing ground of the other species of giant clams and, therefore, fishing pressure upon this species seems to be relatively low. *T. tevoroa* is quite a rare species.

Thus the Tonga-Japan joint project concentrates its efforts on producing *T. derasa* seedlings, along with public education programs to conserve giant clam resources.

### **Stock enhancement of *T. derasa***

As one of the strategies of managing the *T. derasa* resource, the Tonga-Japan joint project considered enhancing stock by releasing hatchery-produced clams. The aim of the release is not to create directly an exploitable resource through release of a huge number of seedlings, but to create broodstock population that will reproduce the *T. derasa* resource sustainably. It is expected that the offsprings of *T. derasa* will be distributed in Tongan waters by its own natural dispersal. In the past the same kind of effort to enhance recruitment of natural population had been attempted in Tonga. The clam circle was a giant clam sanctuary established in front of the village by translocating a large number of wild broodstock clams to maximize spawning potential (Chesher, 1993a, 1993b).

### **How can we get the giant clams for releasing?**

A method of the giant clam seed production has been already established in Tonga. At present, the Ministry operated hatchery can produce 50,000 seed clams (2cm SL) every year. The young clams are planted onto concrete plates in the land tanks then stocked in the ocean nurseries. A central ocean nursery located near the hatchery is given the role of the development of techniques for giant clam rearing and releasing in the sea while village ocean nurseries apply those techniques in the field. The former is also stocked with a large number of giant clams for the future release.

### **Village ocean nursery**

Two village ocean nurseries were established at 'Atata Island and Kolonga, both of the villages where most of the giant clam fishermen live. Two thousand clams are planned to be supplied to each village for five consecutive years beginning two years ago (1993). The condition of supply is that 100 clams out of the 2,000 clams must be kept in the nurseries as future broodstock population and the remaining ones can be utilized by the villagers for their own consumption or for sale at markets. Under such a long running project, some incentives must be given to keep the villagers interested in it. A warning was given by Chesher (1993a) who reported that when the villagers abdicated their responsibility to look after the clams, the clams began to vanish.

#### **a. 'Atata village trial**

There are 189 villagers (census in 1989) in 'Atata Island. The main sources of income of them are from fisheries (including giant clams fishing) and tourism.

The giant clam ocean nursery is generating some economic benefit to the villagers, as the ocean nursery has become one of the tourist attractions in the island. Therefore, villagers maintain the ocean nursery in very good conditions and keep watch for poaching. In addition, in line with the current project's policies, 'Atata villagers hold broodstock clams of large species such as *T. derasa* and *T. tevoroa* around the island as another tourist attraction. The Ministry's hatchery borrows the broodstock from them to conduct seed production.

#### **b. Kolonga village trial**

Kolonga ocean nursery has been established in an unnatural habitat for giant clams and is almost free from typical predators on the clams. Therefore, giant clams can be grown without intensive care by villagers. Successful results obtained from this trial may be applied to giant clam farming practices in Tonga. The farming using artificial seeds, as an alternative of harvesting from natural stock, is one of the other strategies of managing giant clam resources.

#### **Giant clam sanctuary**

The marine parks and reserves were initiated in early 1979 in Tonga under the Ministry of Lands, Survey and Natural Resources. However, fishing activities have not been regulated well because of lack of management measures. Today these parks and reserves are being reassessed so they can be actively used as a conservation measure in the marine environments. Therefore, the Tonga-Japan joint project is planning to stock hatchery-produced clams in those marine parks in collaboration with the relevant authorities.

#### **Status of clam circles**

Chesher (1993b) reported that a public environmental improvement project to enhance the stocks of giant clams in Vava'u has proved highly successful. The first juvenile *T. derasa* appeared eight months after the sanctuary was installed. The numbers of juveniles increased on reefs adjacent to the sanctuary and extending up to 8 kilometers away. We are really interested in the results of the clam circle project in Vava'u Island Group, however, we have not confirmed details of the result.

#### **Conclusion**

In Tongan waters, giant clams grow slower when compared with the same species of clam in other tropical waters. Furthermore hatchery-produced *T. derasa* is still immature at the age of 5 years old. At present, it is not sure when the released clams will start reproduction in the wild and it is not clear whether the hatchery-produced clams can contribute to the natural recruitment systems. If our stock enhancement strategies are correct, it will still take a long period to establish new broodstock population. However, it is really important to inform

Tongan people about the fact of inferior growth of Tongan giant clams and the present danger of losing those clams. It is necessary to let giant clam fishermen know the time and labour required to raise giant clams through village ocean nursery trials. Such experience by fishermen will make enforcement of the fishing regulation effective.

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