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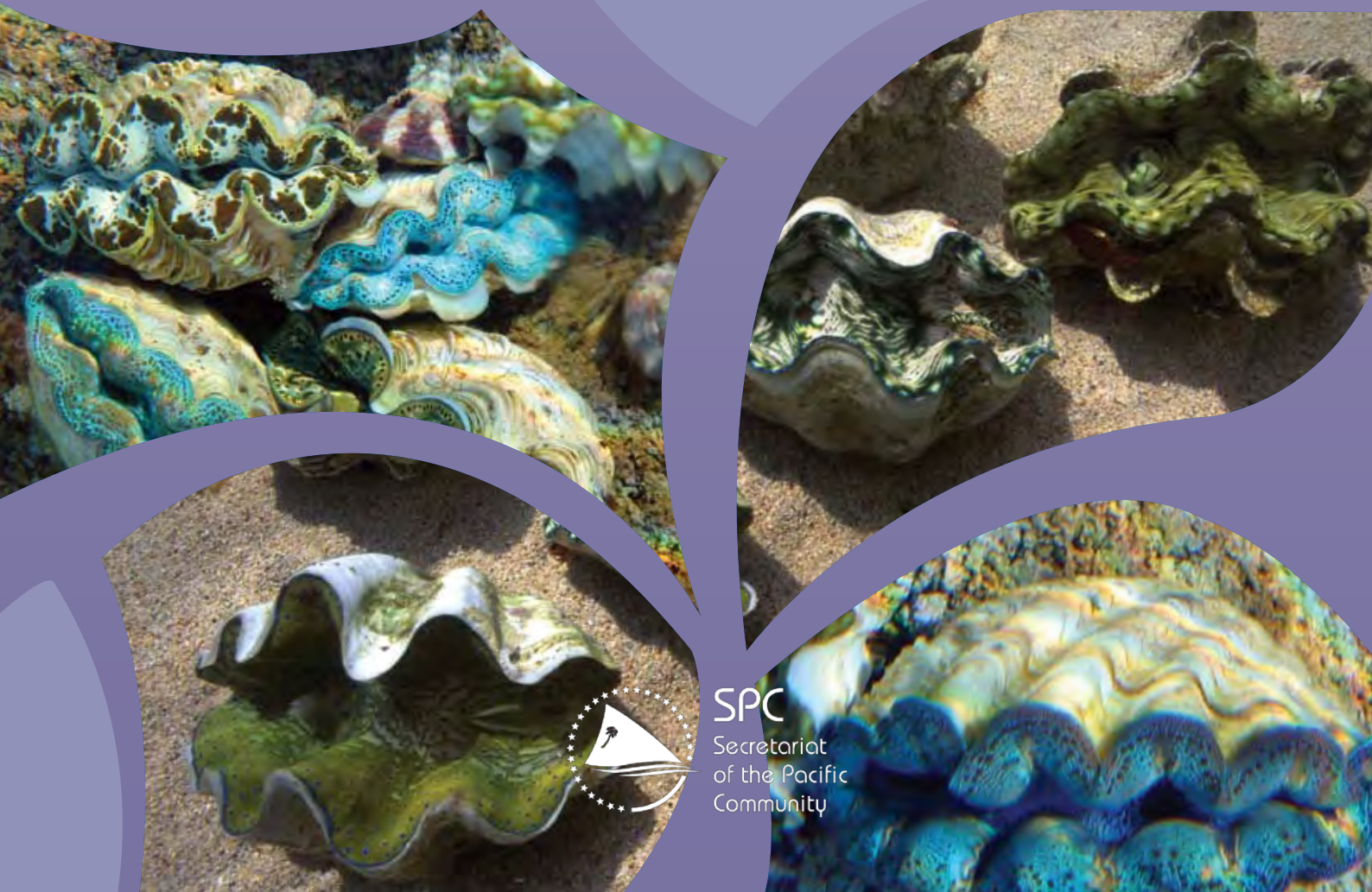
Proceedings of the Regional Workshop on the Management of Sustainable Fisheries for Giant Clams (Tridacnidae) and CITES Capacity Building



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Proceedings of the Regional Workshop on the Management of Sustainable Fisheries for Giant Clams (Tridacnidae) and CITES Capacity Building

4–7 August 2009
Nadi, Fiji

Jeff Kinch and Antoine Teitelbaum

Secretariat of the Pacific Community
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Acronyms

AMRC	Aitutaki Marine Research Centre
CITES	Convention on the International Trade in Endangered Species
CNMI	Commonwealth of the Northern Marianas
CoP	Conference of the Parties
DMWR	Department of Marine and Wildlife Resources
DoF	Department of Fisheries
FSM	Federated States of Micronesia
IUCN	International Union for Conservation Network
JCU	James Cook University
MFMR	Ministry of Fisheries and Marine Resources
MIMRA	Marshall Islands Marine Resources Authority
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OIE	World Organisation for Animal Health
PICTs	Pacific Island Countries and Territories
PMDC	Palau Maricultural Demonstration Center
PNG	Papua New Guinea
RMI	Republic of the Marshall Islands
ROC	Republic of China
SMS	Species Management Specialists
SPC	Secretariat of the Pacific Community
SPREP	Secretariat of the Regional Environment Program
U.S.	United States of America

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The involvement of a wide range of interest groups involved in the management and trade of giant clams, including government representatives, business persons, and specialists has created an invaluable and timely opportunity for the Pacific Region to deliberate the key issues for this very important fishery.

Disclaimer

The opinions expressed herein are those of the individual authors and do not necessarily reflect the views of the CITES Secretariat, SMS, SPC or SPREP.

Six species of giant clams © WorldFish Center

Executive Summary

At its 14th meeting held in the Hague, the Netherlands in June 2007, the Conference of the Parties to CITES adopted decision 14.80 that directed the CITES Secretariat to seek external funding to enable a workshop to be held in the Pacific, in collaboration with appropriate regional organizations, to initiate regional cooperation on the management of sustainable fisheries for giant clams (Tridacnidae).

Subsequently, from the 4–7 August 2009, the Regional Workshop on the Management of Sustainable Fisheries for Giant Clams (Tridacnidae) and CITES Capacity Building was held to identify national and regional initiatives that could ensure the long-term ecological, social and economic sustainability of this important fishery. This is particularly important as Pacific Island Countries and Territories (PICTs) have now been supplying the world's aquarium industry for over 30 years with an increasingly diverse range of wild and cultured commodities, in particular, giant clams. Culture methods are also continuing to evolve for commercial production giant clams for meat or the aquarium trade .

The four-day workshop involved technical consultation between a wide range of stakeholders, including government, private and public sectors; and specialists who are active in the production of giant clams for the global marine aquarium trade in the Pacific Region. Attendance included representatives from the American Samoa, Australia, the Cook Islands, the Federated States of Micronesia (FSM), French Polynesia, Fiji, Kiribati, New Caledonia, Papua New Guinea (PNG), Palau, the Republic of the Marshall Islands (RMI), Samoa, the Solomon Islands, Tonga, and Vanuatu.

All species of giant clams have been listed in Appendix II of CITES since 1985 and international trade in live specimens, meat or shells is thus regulated. In accordance with Article IV of CITES, the export of any specimen requires the prior grant and presentation of a CITES export permit. Permits may only be issued after a non-detrimental finding has been made by Scientific Authority of the State of export. The proper implementation of Article IV is essential for the conservation and sustainable use of Appendix-II species. The IUCN also lists the giant clams as vulnerable.

Currently, Fiji, Palau, PNG, Samoa, the Solomon Islands and Vanuatu are the only sovereign countries in the Pacific that are signatories to CITES. RMI and Tonga are interested in joining because of the difficulties they are experiencing in exporting their cultured giant clams.

Capacity issues experienced by PICTs are impacting on their ability to effectively implement and enforce CITES. They are also experiencing challenges in maintaining sustainable wild harvest fisheries for giant clams; and all would like to be able to promote the culture of giant clams further.

Report Structure

The report is divided into five sections.

The first part provides an introduction to giant clams in the Pacific, while Part II gives details of PICT status of giant clams, Part III outlines organizational interest, Part IV details management activities, whilst Part V provides a summary of issues.

Part I: Introduction To Giant Clams In The Pacific

1.1 Biology and Reproductive Ecology

Giant clams (Tridacnidae) are the largest marine bivalves found in the coastal waters of the Pacific Region, with eight species of giant clam of varying size and habitat preference being described (*Hippopus hippopus* and *H. porcellanus Tridacna crocea, T. derasa, T. gigas, T. maxima, T. squamosa,* and *T. tevora,*) (Table 1).

Colourful smaller boring clams such as *T. crocea* and *T. maxima* are generally found within limestone substrates, whilst larger free living species such as *T. derasa, T. gigas,* and *T. squamosa* are usually recorded near reefs or on sand. *Hippopus spp.* are often found on soft substrata.

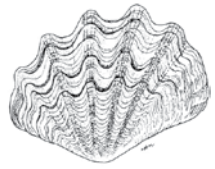
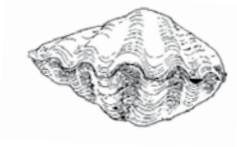
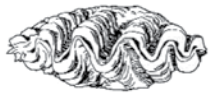
Giant clams are unusual in that they host symbiotic zooxanthellae within their mantle tissue. By-products from photosynthesis by these zoozanthellae provides the giant clam with part of their nutritional requirements. Giant clams are hermaphrodites broadcast spawners.

Giant clam spawning can be seasonal. For example, in the Central Pacific, giant clams can spawn year round but are likely to have better gonad maturation around the new or the full moon. In the Southern Pacific, giant clam spawning patterns are seasonal and clams are likely to spawn at spring and throughout the austral summer months.

When spawning, several millions of eggs are released and when fertilised, hatch into free swimming larvae for 8–15 days before settling on the substrate, according to the species and location. Growth rates after settlement are usually slow and vary amongst species. Giant clams are able to reproduce at around 5–7 years of age.

Table 1: Giant clam species found in the Pacific Region

	Names	Colour	Size	Habitat
	*Hippopus hippopus* (Linnaeus, 1758 Bear paw clam, Horse's choof clam, Strawberry clam	**Shell exterior:** off-white with a yellowish orange coloring, reddish blotches are arranged in irregular concentric bands. **Shell interior:** porcelaneous white, frequently flushed with yellowish orange on the ventral margin. **Mantle**: ranges from a yellowish-brown, dull green or grey.	Maximum shell length is 40 cm, commonly found to 20 cm.	Found on sandy bottoms of coral reefs in shallow water to a depth of 6 m. Smaller specimens (up to about 15 cm in length) are often attached to coral rubble by their byssal strands, while large and heavy specimens are unattached and lack a byssus.
	*Hippopus porcellanus* (Rosewater, 1982) China clam 1758	**Shell exterior:** off-white, occasionally with scattered weak reddish blotches. **Shell interior:** porcelaneous white, more or less flushed with orange on ventral margin. **Mantle**: ranges from a yellowish-brown, dull green or grey.	Maximum shell length is 40 cm, commonly found to 20 cm.	Found in shallow waters on sandy bottoms of coral reefs. Young specimens are often byssally attached to coral heads, whilst mature specimens lack a byssus and lay unattached on the substrate.

	*Tridacna crocea* (Lamarck, 1819) Boring Clam, Crocea Clam, Crocus Clam, Saffron-coloured Clam	**Shell exterior:** greyish white, often suffused with yellow or pinkish orange and frequently encrusted with marine growths near dorsal margins of valves, but clean and nearly smooth ventrally. **Shell interior:** porcelaneous white, sometimes with yellow to orange hues on margins. **Mantle**: often brightly coloured and variable in pattern and colour, including green, blue, purple, brown, and orange.	Maximum shell length is 15 cm, commonly found to 11 cm.	Found deeply burrowed in coral masses of reef flats and coral head (with the free valve margins nearly flush with the substrate's surface) in very shallow water to a depth of about 20 m (when the water is clear).
	*Tridacna derasa* (Röding, 1798) Derasa clam, Southern giant clam	**Shell exterior:** off-white, often partly encrusted with marine growths. **Shell interior:** porcelaneous white, frequently tinged with orange on hinge area. **Mantle**: often a brilliant blue colour.	Maximum shell length is 60 cm, commonly found to 50 cm.	Found on the outer edge of coral reefs in shallow water to a depth of 20 m.
	*Tridacna gigas* (Linnaeus, 1758) Gigas clam, Giant clam	**Shell exterior:** off-white, and is often strongly encrusted with marine growths. **Shell interior:** porcelaneous white. **Mantle**: yellowish brown to olive green, with numerous, small, brilliant blue-green rings.	Maximum shell length is 137 cm, commonly found to 80 cm.	Found on sand, in coral-reef areas, and from depths of 2 to 20 m.
	*Tridacna maxima* (Röding, 1798) Maxima clam, Small giant clam	**Shell exterior:** a grayish-white, often suffused with yellow or pinkish orange and strongly encrusted with marine growths. **Shell interior:** porcelaneous white, sometimes with yellow to orange hues on margins. **Mantle**: often brightly coloured and variable in colour and pattern.	Maximum shell length is 35 cm, commonly found to 25 cm.	Found on reefs, partially embedded in corals in littoral and shallow water to a depth of 20 m.
	*Tridacna squamosa* (Lamarck, 1819) Fluted clam, Fluted giant clam, Scaly clam	**Shell exterior:** greyish white, often with different hues of orange, yellow, or pink to mauve, and with the blade-like scales commonly of different shades or colour. **Shell interior:** porcelaneous white, occasionally tinged with orange. **Mantle**: mottled in various mixes of green, blue, brown, orange, and yellow.	Maximum shell length is 40 cm, commonly found to 30 cm.	Found attached by its byssus to the surface of coral reefs, usually in moderately protected localities such as reef moats in littoral and shallow water to a depth of 20 m.
NO ILLUSTRATION AVAILABLE	*Tridacna tevoroa* (Lucas, Ledua and Braley, 1990) Tevoro Clam	**Shell exterior:** off-white, often partly encrusted with marine growths. **Shell interior:** porcelaneous white. **Mantle**: yellowish brown.		Found on sand, in coral-reef areas.

Source: Poutiers, 1998.

1.2 History of Exploitation

Giant clams are a highly prized food source, and both exports of giant clam adductor muscle tissue to Asian gastronomes, and harvesting by subsistence fishers has been responsible for stock depletion across much of their range in the Pacific. Giant clams are also harvested for their shells, having a wide range of utility as a raw material for tools, containers and ornaments. More recently, giant clams have been exported from the Pacific for live export to the global marine aquarium trade.

During the 1960–1980s, there was a sharp increase in the illegal entry of foreign fishers in the Pacific, mostly by Republic of China's (ROC's) Taiwanese fishing vessels. This activity peaked in the mid-1970s and then subsided in the face of strong international pressure over depleted giant clam stocks, and improved surveillance of PICT territorial waters. Today, wild stocks of giant clams are mostly under pressure from subsistence and semi-commercial (artisanal) fishers.

Fishing methods for giant clams are simple owing to their shallow distribution, conspicuous appearance and sessile nature. Smaller clams are collected opportunistically during reef-gleaning activities and non target-specific fishing, while larger specimens are collected by free diving. The flesh is excised from the shell by slipping a knife or sharpened wooden stick along its inner surface to cut one end of the adductor muscle. Sticks and now-a-days, crow bars, are also used to prise clams from the reef. Giant clams located in deeper water are hauled to the surface using ropes, winches, and chains. The mantle and muscle are then removed and the shell is dropped back into the sea. Hookah gear (diving equipment that uses air supplied through a line from a surface compressor) has also been used in some localities.

Underwater giant clam midden at Abiaolan Island, Milne Bay Province, Papua New Guinea © Jeff Kinch

Giant clams are highly vulnerable to stock depletion because it is a feature of giant clam biology that stocks will become non-sustaining when densities fall below certain undefined levels. Because giant clams maximize fertilization success by spawning in synchrony in response to current-borne pheromones produced by other spawning individuals belonging to the same species, if there are no con-specific clams downstream, eggs will remain unfertilized.

If a reef is entirely depleted of giant clams, re-population will depend on larvae brought in by prevailing currents. If the reef is isolated or the current direction is unfavourable, re-establishment could take hundreds of years. Even in dense natural populations of giant clams, recruitment can be very sporadic.

T. gigas is already reported to be extinct in the Commonwealth of the Northern Marianas (CNMI), FSM (Yap, Chuuk, Pohnpei, and Kosrae), Fiji, Guam, New Caledonia, and Vanuatu; *T. derasa*, at Vanuatu; and *H. hippopus*, at American Samoa, CNMI, Fiji, Guam, Samoa, and Tonga.

1.3 Giant Clam Culture

Giant clam aquaculture in the Pacific was initiated in the early 1980s. All together, 17 PICTs were or still are involved in the artificial propagation, culture and grow-out of giant clams for the global marine aquarium trade or restocking projects. Over the past decade, there has been a resurgence of interest as government projects make way for private investment. Today, there are over 10 private ventures and 15 government linked operations raising giant clams for the global marine aquarium trade.

Giant clam propagation techniques now range from very simple larval rearing practices, whereby fertilised eggs are placed in raceways and left until they settle (e.g. Tonga), to high-end hatchery practices involving regular drain down and feeding of the larvae (e.g. Kiribati, and RMI).

When selecting selecting broodstock for giant clam culture, two selection criteria are important: the overall health of the animal and the ripeness of the gonad. Selecting larger specimens is also likely to generate subsequent good growth abilities of their offspring. For the global marine aquarium trade, the primary marketing criteria is the colour of the giant clams. It is therefore very important to select colourful brooders to maximize chances of obtaining colourful offspring. The brightly coloured species, *T. maxima,* and *T. crocea* are the prime choice for this trade.

Spawning of giant clams artificially is usually obtained by the following techniques:

- heat shocking the giant clams by placing them outside of the water on their side in the sun for a given amount of time;
- dramatically increasing the water temperature of the spawning tank (within non lethal limits);
- introducing gonad concentrate in the spawning tank; and/or
- injecting serotonin into the clam mantel.

Heat shocking *T.squamosa and T.gigas* broodstock in Palau to induce spawning © Kalo Pakoa

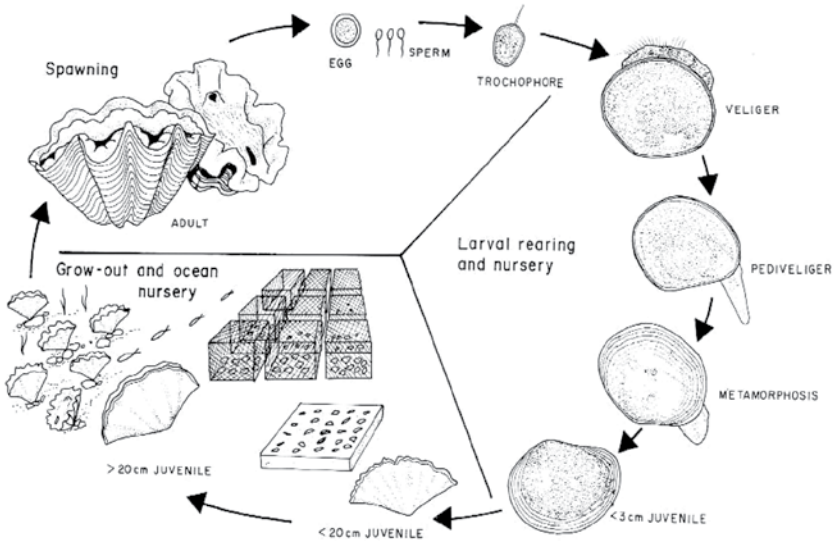
After fertilisation, the eggs released by the giant clams are placed in incubation for 12–24 hrs, depending on temperature until they hatch into free swimming trochophores (i.e. larvae). These are transferred in larval rearing tanks and raised until settlement to spat.

Early nursery culture is usually done on land in tanks or in raceways. During nursery culture, small parasites such as Pyramidellid snails can be problematic and cause high mortality. This problem is usually addressed by keeping young giant clams clean at all times, hygiene of the tanks high and placing small predatory fish (wrasses) in nursery tanks to feed on the parasitic snails without damaging the clams. These practices need to be maintained until the giant clams are big enough to be moved to either land-based or ocean nurseries.

Ocean nurseries can greatly improve the growth of the cultured giant clams and the cost of production. Site selection is essential as clear water with fast flow and turnover and reasonably shallow water must be optimum in order to enhance the growth of the giant clams. Some of the more noticeable predators are Cymatium snails, a highly predatory gastropod that recruits in giant clam culture set ups as larvae, fish such as triggerfish, large wrasses that can either crush shells or nibble on the mantle, or other invertebrates such as crabs or flat worms.

Figure 1 below, details the basic stages in giant clams culture.

Figure 1: The basic stages in giant clams culture (Source: Braley, 1992a).



1.4 Cultured Giant Clam Exports

According to the species, it usually takes 18–24 months before giant clams can be exported for the global marine aquarium trade.

Young giant clams are packed 'dry', wrapped in wet newspaper in cooler boxes, if they are to be shipped short distances. For longer transit times, giant clams are placed in plastic bags filled with water and oxygen and packed in styrofoam boxes. Shipped this way, giant clams can remain alive and healthy for more than 40 hours.

Major producing PICTs exporting cultured giant clams are RMI, Tonga and FSM, producing an average of 15–20,000 pieces of clams per years. Table 2 below details the volume exported and export potential by various PICTs for the year 2007.

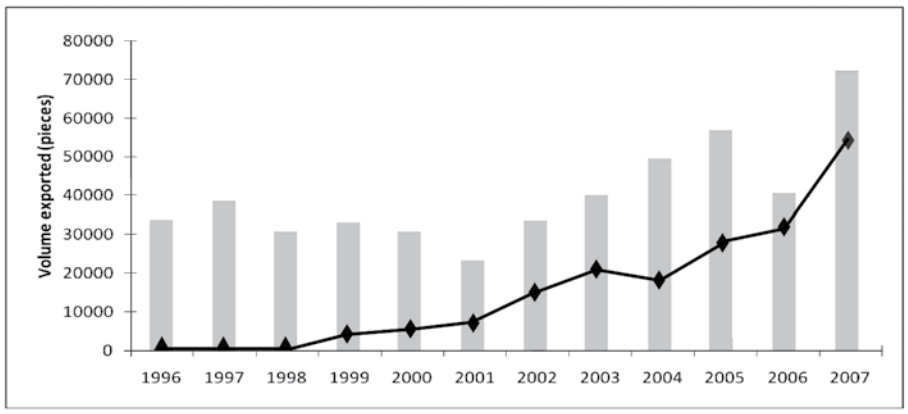
Table 2: Total exports of clams for the aquarium market in 2007 and national export potential (estimated)

Location	Species produced	2007	Potential
Cook Islands	*T. derasa* and *T. maxima*	670	10,000
French Polynesia	*T. maxima*	-	20,000
FSM	*T. derasa* and *T. maxima*	22,638	50,000
Kiribati	*T. maxima*	2,000	10,000
Palau	*T. derasa*	1,950	25,000
RMI	*T. squamosa, T. maxima, T. crocea* and *T. derasa*	18,650	30,000
Solomon Islands	*T. derasa*	4,300	15,000
Tonga	*T. derasa*	13,230	25,000
Vanuatu	*T. squamosa* and *T. maxima*	11,000	15,000
Total		74,438	200,000

Source: Teitelbaum and Friedman, 2008.

Figure 2 below, shows the average regional production of giant clams in the Pacific over the past decade. The black line shows the production that is now generated by private sector operators.

Figure 2: Giant clam volume exported in the past ten years (Source: Teitelbaum and Friedman, 2008)



Note: bars are the total exported, and the black line represents exports by the private sector.

Even though the export of giant clams from the Pacific for the global marine aquarium trade seems to be a promising economic activities, giant clam exporters have to overcome a growing range of issues such as increased fuel costs, infrastructure issues, capacity constraints to comply to international trade mechanisms, such as CITES; and competition by new entrants, which could strongly influence pricing and thus profitability. For example, French Polynesia with their spat-based aquaculture program, have the ability to supply the entire *T. maxima* market with large and colorful specimens that have relatively low production costs. Alternatively; Vietnam has been over the years supplying the market with cheap and colorful wild clams; whilst, other places, such as Myanmar also have the potential for supplying export markets as they open up to this type of business.

1.5 Giant Clam Stock Enhancement

Efforts to re-establish or supplement depleted populations of giant clams in the Pacific have involved protecting and aggregating remaining wild adults, in order to facilitate spawning and fertilisation success and subsequent 'downstream' recruitment. More formal activities during the 1980s, concentrated on breeding and releasing hatchery-reared giant clams (Table 3). Many of these programmes have now turned to culturing giant clams for the global marine aquarium trade.

Table 3: Giant clam aquaculture and/or restocking programmes

Location	Organization(s) involved	Start	Species (translocated species in brackets)
American Samoa	Office of Marine and Wildlife Resources	1986	*(T. derasa), (T. gigas)*
Australia	James Cook University Australian Centre for International Research Centre Private sector (Aquasearch)	1984	*T. gigas, T. derasa,*
Cook islands	Ministry of Marine Resources	1986	*T. maxima, T. squamosa, (T. derasa), (T. gigas) (H. hippopus)*
Fiji	Fisheries Division	1985	*T. maxima, T. derasa, T. squamosa, (T. gigas), (T. tevoroa), (H. hippopus)*
French Polynesia	Service de la Peche	2002	*T. maxima*
FSM	National Aquaculture Centre Marine and Environmental Resource Institute of Pohnpei	1984	*(T. derasa), (T. gigas), (H. hippopus)*
Guam	Department of Agriculture	1982	*(T. derasa), (T. gigas), (T. squamosa)*
Kiribati	Private sector (Atoll Beauties)	2000	*T. maxima, T. squamosa*
RMI	Marshal Islands Marine Resource Authority Private sector (Robert Reimers Enterprises, and Mili Atoll)	1985	*(T. derasa), T. gigas, T. squamosa, H, hippopus*
New Caledonia	IFREMER	1993	*H. hippopus, T. derasa, T. maxima, T. crocea, T. squamosa*
CNMI	Department of Lands and Natural Resources	1986	*(T. derasa), (T. gigas), (H. hippopus)*
Palau	Micronesian Mariculture Demonstration Centre	1970s	*T. derasa, T. gigas, T. squamosa, T. maxima, T. crocea, H. hippopus, H. porcellanus*
PNG	University of Papua New Guinea (Motupore Island Research Centre)	1983	*T. gigas, T. squamosa, T. crocea, H. hippopus*
Samoa	Department of Fisheries	1988	*T. maxima T. squamosa, (H. hippopus), (T. derasa), (T. gigas), (T. squamosa)*
Solomon Islands	WorldFish Centre	1989	*T. maxima, T. squamosa, T. derasa, H. hippopus, T. gigas*
Tonga	Ministry of the Lands, Survey and Natural Resources Japanese International Cooperation Agency EarthWatch	1989	*T. maxima, T. squamosa, T. derasa, T. tevoroa, (T. gigas), (H. hippopus)*
Tuvalu	SPC Department of Fisheries	1989	*(T. derasa)*
Vanuatu	Department of Fisheries Japanese International Cooperation Agency Private sector (Reef Life, and Reef Solutions)	1988	*T. maxima, T. squamosa, T. crocea, H. hippopus, (T. derasa), (T. gigas)*

Source: Teitelbaum and Friedman, 2008; Eldredge, 1994; and Bell, 1999.

1.6 Giant Clam Trans-location

Numerous trans-locations of giant clams occurred during the 1980s-1990s throughout the Pacific. Table 4 below lists giant clam transfers in the Pacific by species and location. More recently, additional transfers of giant clam species has been undertaken in support of further developing the culture of giant clams for the global marine aquarium trade.

Table 4: Trans-location of giant clams by year and location

Species	Movement
Hippopus hippopus	1984 - Palau to FSM (Yap) 1985 - Palau to Fiji 1986 - Palau to Cook Islands 1986 – Palau to CNMI (Saipan) 1988 – Palau to Samoa 1989 – Palau to Tonga 1990 – Palau to FSM (Kosrae) 1990 – Solomon Islands to Samoa 1991 – Palau to CNMI (Saipan), and FSM (Chuuk, Kosrae, and Yap) 1991 – Australia to Cook Islands, Fiji, Samoa, and Tonga 1991 – Pohnpei to FSM (Kosrae) 1992 – RMI to FSM (Kosrae) 1992 – Solomon Islands to Samoa 1997 – American Samoa to Samoa
Tridacna crocea	~2003 – Palau to RMI (Pohnpei) ~2003 – Vietnam (?) to RMI (Majuro) ~2006 – Palau to FSM (Kosrae) 2006 – Vanuatu to Tonga
Tridacna derasa	1984 – Palau to Guam, and FSM (Yap) 1985 – Palau to Fiji, FSM (Yap), and RMI (Pohnpei) 1986 – Palau to American Samoa, Cook Islands, CNMI (Saipan), and FSM (Yap) 1987 – Palau to FSM (Yap) 1988 – Palau to FSM (Chuuk, Kosrae, and Yap), RMI (Majuro, and Pohnpei), and Samoa 1989 – Palau to Guam, and Tuvalu 1990 – Palau to RMI (Pohnpei) 1991 – Palau to American Samoa, CNMI (Saipan), and FSM (Chuuk, Kosrae, and Yap) 1992 – Fiji to Samoa 1992 – RMI (Kosrae) to FSM (Chuuk, and Yap) 1993 – Fiji to Samoa 1993 – Palau to FSM (Yap) 1995 – American Samoa to Samoa 1996 – American Samoa to Samoa 1997 – American Samoa to Samoa 1998 – American Samoa to Samoa 1998 – Fiji to Samoa 1998 – Unknown to Vanuatu 1998 – Tonga to Samoa 1999 – American Samoa to Samoa 1999 – Fiji to Samoa

Tridacna gigas	1982 – Palau to Guam 1984 – Palau to FSM (Yap) 1985 – Solomon Islands to Philippines 1986 – Australia to Fiji 1986 – Palau to CNMI (Pohnpei) 1987 – Australia to Fiji 1988 – Palau to Samoa 1989 – Palau to Tonga 1990 – Australia to Fiji, and Samoa 1990 – Palau to RMI (Pohnpei) 1990 – Solomon Islands to Philippines 1991 – Australia to Cook Islands, Samoa, and Tonga 1991 – Palau to American Samoa, CNMI (Saipan), and FSM (Chuuk, Kosrae, and Yap) 1991 – RMI (Pohnpei) to RMI (Kosrae) 1991 – Solomon Islands to Philippines 1994 – Solomon Islands to Philippines 1995 – Solomon Islands to Philippines 1998 – Unknown to Vanuatu 1999 – Fiji to Samoa 2006 – Tonga to Vanuatu 2007 – Tonga to Samoa
Tridacna maxima	1997 – American Samoa to Samoa
Tridacna squamosa	1982 – Palau to Guam 1988 – Palau to Samoa 1989 – Tokelau to Samoa 1992 – Fiji to Samoa 1993 – Fiji to Samoa 1998 – Fiji to Samoa
Tridaca teveroa	~1992 (1985?) – Tonga to Fiji

Source: Eldredge, 1994; Bell, 1999; Gomez and Mingoa-Licuanan, 2006; Teitelbaum and Friedman, 2008; pers. comm.: Bell, L.; Bell, J.; Ellis, S.; Friedman, K.; Ngaluafe, P.; Oengpepa, C.; Raumea, K.; Teitelbaum, A.

Part II: Country Profiles by Government Representatives

2.1 American Samoa

Alofa Tuaumu
Deputy Director
Department of Marine and Wildlife Resources

Giant clams are important in American Samoa for their subsistence and culture values. In the 1990s, the Department of Marine and Wildlife Resources (DMWR) established a giant clam hatchery for the purpose of re-seeding reefs that had been depleted of giant clam populations.

DMWR is currently requesting a stimulus package to rebuild and relocate the hatchery. The revamped hatchery will be part of a community-based program providing villager with giant clam spat and the extension advice for the construction of ocean based giant clam farms.

Even though American Samoa is a non-party to CITES, because it is a territory of the United States of America (U.S.), and the U.S. is a signatory of CITES, it thus complies with all applicable U.S. federal rules and regulation governing the importation and exportation of all marine and wildlife products.

2.2 Cook Islands

Kori Raumea
Director
Inshore Fisheries and Aquaculture
Ministry of Marine Resources

The Cook Islands is not a party to the CITES Convention, though it still complies with export obligations of CITES-listed organisms, such as giant clams to other countries that are a signatory. In the Cook Islands, the Department of Foreign Affairs is the political focal point for CITES, with the National Environment Service (NES) having responsibility for issuing CITES permits.

In the early-1980s, indiscriminant domestic harvest was responsible for the collapse of the subsistence giant clam fishery in many places in the Cook Islands. Over-harvesting at the time was aided by inter-island shipping, which allowed outer-islands to supply local consumer demand on the main island of Rarotonga.

A number of islands with healthy giant clam populations, such as Aitutaki, Manihiki, Penrhyn, and Takutea have formulated by-laws, and/or Council resolutions banning the inter-island export of giant clams.

Since 2003, the Ministry for Marine Resources has been trialing the export of clams, *T. derasa* and *T. maxima* for the global marine aquarium trade, both of which, are introduced species and are cultured at the Aitutaki Marine Research Centre (AMRC). During the period, 2003–2006, a total of 30,000 giant clams

***T. gigas* in Aitutaki Lagoon, Cook Islands © Emmanuel Malpot**

were exported to the U.S., using Cook Islands Aquarium Ltd as a middleman. However, since 2006–2007, there has been no export of clams due to restrictions imposed by the World Organisation for Animal Health (OIE).

Pearl farmers at Manihiki report thousands of wild clam spats attaching themselves to the ropes in the pearl farm lines, and it has been suggested that these natural occurring spat could be used to supply village producers for grow-out of giant clams for the global marine aquarium trade. For this to happen though, the Manihiki Island Council would need to modify their resolution banning the export of giant clams from the island. The transportation of giant clams would also need to be mitigated to ensure that the production of giant clams was commercial viable for those farmers that would like to participate in the grow-out of giant clams.

2.3 Federated States of Micronesia

Donald David
Administrator
Office of Fisheries and Aquaculture

Previous surveys of giant clams stocks in FSM show evidence of decline in many areas, such as Yap and Chuuk, due to over-fishing and habitat degradation. Currently, some States are developing legislation in their respective jurisdictions to assist in managing subsistence take of giant clams, such as imposing size limits and the establishment of marine managed areas.

Giant clam production in the FSM began in the mid-1990s, but slowly faded out in the early-2000s. During this period, several government-owned hatcheries were established culturing giant clams for the global marine aquarium trade, and enhancing subsistence fisheries through stock enhancement.

FSM is currently a non-Party member of CITES, though government agencies assist the two companies exporting *T. derasa* and *T. maxima* for the global marine aquarium trade to abide with their CITES requirements.

2.4 Fiji

Meli Raicebe
CITES Compliance Officer
Fisheries Division
Ministry of Fisheries and Forestry

Anare Luvunakoro
Fisheries Research Officer
Fisheries Division
Ministry of Fisheries and Forestry

In the early-1980s, the Australian Centre for International Agriculture Research with support from the James Cook University (JCU) initiated a program to evaluate existing giant clam stocks in Fiji, and to investigate the feasibility of giant clam culture, the latter resulting in the establishment of a quarantine facility and hatchery at Makogai in 1984–1985. Initial research centred around the culture of *T. gigas* imported from JCU's Orpheus Island Marine Research Station, which is extinct in Fiji. In 1988, *T. derasa* and *T. squamosa* were successfully spawned, as part of a restocking program.

The Makogai Research Station receives an annual allocation of around FJD 150,000 to continue 'reseeding' programs in six designated marine managed areas. Since the project on restocking began, the status of the wild giant clam stocks has been improving, though stocks outside of the six marine managed areas are still threatened by over-harvesting.

Because giant clams are listed under CITES, the export of giant clam products are prohibited under section 25. B of the Fisheries Regulation, though the export for tourists of three giant clam shells weighing less then 3 kg is exempted from CITES permit requirements. Commercial export of giant clam products requires a Fisheries Export Permit and a CITES Export Permit.

Both *T. derasa* and *T. squamosa* have been exported in the past to supply the global marine aquarium trade, with the last shipment occurring in 2003. These exported giant clams had been cultured by the Fisheries Department, and purchased by Walt Smith International for export. Cultured giant clams are also imported from Tonga and re-exported via Fiji.

2.5 French Polynesia

Georges Remoissenet
Aquaculture Department Manager
SPE (Fisheries Servivces)

Miri Tatarata
Marine Conservation Officer
Environment Department

Despite being considered over-exploited in many islands, in particular, the Society Islands; *T. maxima* is very abundant in some lagoons, reaching densities of up to approximately 550 ind/m² in aggregative giant clam 'reefs' called 'mapiko'. *T. squamosa* was only first described in 2006.

There is a large local demand for giant clam meat in French Polynesia, with approximately 70 t/yr (or an estimated one million ind/yr) harvested from the three major lagoons, Tatakoto, Tubuai, Raivavae; with regular shipments made to the Society Islands. There is also a small handicraft market.

The Fisheries Service is now attempting to impose some legal protection and management for the giant clam fishery, such as the ban on sale and export of giant clams less than 12 cm size across the widest part of the shell, and which, can only be harvested from specific lagoons. .

The grow-out of giant clams for the global marine aquarium trade is just commencing, with the lagoon at Tatakoto now open for giant clam spat collection.

All territories under French sovereignty in the Pacific comply with CITES, as France has been a signatory since 1978.

'Mapiko' at Tatakoto, French Polynesia
© Georges Remoissenet

2.6 Kiribati

Karibanang Aram
Senior Fisheries and Aquaculture Officer
Ministry of Fisheries and Marine Resources Development

Despite efforts to become a member of CITES, this has not been achieved by Kiribati so far. Management and protection of endangered species, currently comes under the Fisheries Act's Section 22, and the Environment Act's Section 24. The Ministry of Fisheries and Marine Resources Development is also working closely with Island Councils on establishing marine managed areas to address the issue of declining marine resources, including giant clam species.

In Kiribati, wild giant clams provide a source of protein, but with changing lifestyles, giant clams have been extensively harvested, resulting the declining of stocks, particularly *T. gigas*, across the three main island groups, especially the Gilbert Group. Currently, two companies are involved in the marketing of giant clams for local consumption.

In 2002, Kiribati started exporting giant clams to Europe as part of the global marine aquarium trade. Of all the companies supplying the global marine aquarium trade, only one is involved in exporting

Small-scale giant clam hatchery set up in North Tarawa, Kiribati © Antoine Teitelbaum

cultured giant clams. These giant clams are hatchery-reared, but grown-out by village farmers who then sell them back to the company. The current annual production of this company is around 2,000 giant clams, but is expected to increase to between 5,000-10,000 ind/yr.

There is also a growing interest in giant clam farming in the Line Group of islands. This group of islands is where most of the fish collection occurs for companies supplying the global marine aquarium trade. The Kiribati government is supportive of this as it sees giant clam farming as one of the potential area for sustainable economic development. High transportation costs and difficulties in entering markets are some of the major constraints that need to be overcome though.

2.7 New Caledonia

Regis Etaix-Bonnin
Fisheries Officer
Department of Maritime Services and Fisheries

Six species of giant clam are currently found in New Caledonia, these include *T. maxima, T. crocea, T. squamosa, T. derasa,* and *H. hippopus; T. tevoroa* has recently been observed in the Loyalty Islands; whilst *T. gigas* is now only found as fossils. *T. crocea* and *T. maxima* are the most abundant species, though all species are under pressure from subsistence fishing, commercial harvest for meat; and shells offered to tourists.

In the Northern Province, bag limits of 5 giant clams/vessel/ trip is allowed for professional fishers, and two giant clams/vessel/trip for others; the Southern Province has similar regulations to the north, but allows a maximum bag limit weight of 40 kg.

Similar to the situation in French Polynesia, New Caledonia is not a member of CITES, but rather comes under the regulatory actions of France. Before 1995, very few CITES permits were issued, since 2003, a greater number of CITES permits have been issued, due in part to the lifting of restrictions to import into the European Union and the export of up to three giant clams/person as personal artifacts.

It is expected that New Caledonia will take on full CITES management through the establishment of a local government management agency, which will be advised by a technical committee, which will also act as the scientific authority. A domestic policy to implement CITES has already been prepared in 2008 by a drafting committee, and this is now awaiting endorsement and appointment by the necessary staff.

***T. maxima* on a reef in New Caledonia © Antoine Teitelbaum**

2.8 Papua New Guinea

Luanah Yaman
Sedentary Resources Fisheries Manager
National Fisheries Authority

There are six species of the giant clam family (Tridacnidae) that inhabit PNG waters; *H. hippopus, T. crocea, T. derasa, T. gigas, T. maxima* and *T. squamosa,* which are all important in the subsistence fishery.

A commercial fishery for giant clams previously operated in the Milne Bay Province, whereby approximately 150 tonnes of giant clam adductor muscle were exported, as well as one large shipment of 16 tonnes of giant clam shells. This fishery has now been closed since 2000.

A giant clam management plan was previously developed for the Milne Bay Province, but was never implemented.

2.9 Palau

John Ngirailild
Mariculture Development Centre
Bureau of Marine Resource
Ministry of Resource Environment and Tourism

Giant clams are important to Palau for their cultural and subsistence values. Due to the vast reduction of giant clam stocks, the Palau National Government established the Palau Maricultural Demonstration Center (PMDC) Program in 2005 under the Bureau of Marine Resources to conducts research on giant clam culture, and to establish community-based giant clam grow-out farms.

This program is 100% supported by the government, and currently has assisted with the establishment of 46 giant clam farms throughout Palau, with over two million giant clam 'seedlings' being disseminated. At least 10 % of all giant clams from each farm are also kept aside to spawn naturally in their own ranched enclosures, thus reseeding nearby areas. In addition, the PMDC also reseeds 23 conservation areas in Palau.

Between 2005–2008, approximately 10,000 cultured giant clams were exported each year to France, Germany, Canada, the U.S., Korea, the ROC's Taiwan Province, Guam and FSM.

Palau has been a party of CITES for the last 10 years. It also has its own laws that regulate exportation of wild giant clams, with customs inspections made at export ports. All marine resources and/or parts exported from Palau are required to be certified with regards to their origin.

2.10 Republic of the Marshall Islands

Doreen Debrum
Fisheries Policy and Planning Advisor
Marine Resources Authority

Melba Angelette White
Aquaculture Development Officer
Marine Resources Authority

Currently, the status of giant clams in the RMI indicates that in the Outer Islands, giant clam stocks remain relatively healthy; however in populated areas, such as Majuro, giant clams have been severely depleted from over-harvesting, pollution, and poor water quality.

Aquaculture has been identified as one of Marshall Islands Marine Resources Authority's (MIMRA's) priority areas to initiate and MIMRA's Community-based Fisheries Management Program promotes aquaculture for outer-island communities to develop a marine managed areas. There are also two fisheries policies relevant to the management of giant clams in the RMI, the first being the Mariculture Issues and Development Plan which regulates the translocation of marine organisms that are considered for cultivation; and the Aquarium Trade Policy which regulates the export of organisms for the global marine aquarium trade.

MIMRA operates a giant clam hatchery on Loto Island at Likiep Atoll. This hatchery provides young giant clams of several species, *T. maxima, T. squamosa,* and *T. gigas* for restocking purposes, supplying local farmers for grow-out and reselling, and for direct marketing to the Marshall Islands Mariculture Farm (MIMF), who also has hatchery facilities. MIMRA also provides training to interested farmers in propagation and management.

The initial intention of these efforts was to export giant clam meat to Asia. However, the extended grow out period of 5 years or more did not make this activity commercially viable, and the objective changed to supplying the global marine aquarium trade. The Loto Hatchery concentrates primarily on spawning and raising the species *T. derasa, T. squamosa* and *T. maxima* (Table 5).

An additional hatchery to raise giant clams was constructed on Arno Atoll in early-2003 with the financial assistance of the Overseas Fisheries Cooperation Foundation of Japan. The hatchery on Arno has also successfully spawned *T. gigas, T. maxima,* and *T. squamosa* (Table 5).

Table 5: Hatchery production of giant clams in the RMI

Facility	Species	Brood stock	Annual spat production
MIMRA Loto	*H. hippopus*		5,000–10,000
	T. derasa	20	20,000–40,000
	T. maxima	50	160,000–180,000
	T. squamosa	50	10,000–20,000
	T. gigas	12	10,000–20,000
MIMRA Arno	*T. maxima*	36	120,000–135,000
MIMF	*T. derasa*	12	2,000–4,000
	T. maxima	28	1,500–21,000
	T. squamosa	14	500–5,000
	T. gigas		0–100

At present, the RMI is not a party to CITES, however it has initiated its intention to becoming a Party to CITES through the Ministry of Foreign Affairs. MIMRA, within the Ministry of Resources and Development, has been named the Competent Authority for CITES.

Typical shipment of several species of cultured giant clams from RMI © Antoine Teitelbaum

2.11 Samoa

Tauvae Faiva
Senior Fisheries and Aquaculture Officer
Fisheries Division
Ministry of Agriculture and Fisheries

Susau Siolo
Conservation Officer
Division of Environment and Conservation
Ministry of Natural Resources and Environment

A 1987 survey conducted by the Fisheries Division, of the Ministry of Agriculture and Fisheries for giant clams identified low densities of the two native species, *T. squamosa* and *T. maxima* due to over-fishing, the use of destructive fishing method, and pollution.

The period, 1998–2000, saw the importation of several giant clams, both larvae and 'yearlings' into Samoa for restocking purposes under the Samoan Community-based Fisheries Management program.

Samoa is a recent party to the CITES. CITES administration is delineated between the Ministry of Foreign Affairs and Trade, which acts as the Management Authority; and the Ministry of Natural Resources and Environment, which is the responsible Scientific Authority. The responsibilities of these two authorities with regards to the CITES operation is not yet clear and there is a need for amelioration and delineation to implement CITES effectively.

2.12 Solomon Islands

Joe Horokou
Director
Department of Environment and Conservation
Ministry of Environment, Conservation and Meteorology

Selina Lipa
Principal Fisheries Officer-Licensing
Ministry of Fisheries and Marine Resources

James Teri
Deputy Director-Inshore
Ministry of Fisheries and Marine Resources

There are seven species of giant clam reported to exist in the Solomon Islands and are known to be targeted heavily for subsistence purposes, though the actually stock status of giant clams is unknown.

Previously, there has been intensive research into giant clam culture in the Solomon Islands previously under the International Centre for Living Aquatic Resource Management, now known as the Worldfish Center. During the 1990s, small-scale farming programmes for rural communities were established, with the Worldfish Center taking the lead in operating a pilot hatchery for giant clams at Nusatupe. *T. gigas* and *T. derasa* continue to be supplied to farmers around the Western Province, for grow-out and eventual sale to Aquarium Arts for export to the global marine aquarium trade.

Solomon Islands is a recent member to CITES, joining in 2007, with the Ministry of Environment, Conservation and Metrology as the Managing Authority, and the Ministry of Fisheries and Marine Resources (MFMR) as the Scientific Authority.

The Wildlife Protection and Management Act provides for the conservation and management of flora and fauna that are subjected to CITES requirements. General management and regulation of the giant clam clams fishery remains under the MFMR under the Fisheries Act 1998, and the Fisheries Regulation 1998, which has provisions for the harvest, export and import of giant clam products. Currently, the harvesting of wild giant clams for commercial sale is banned under the Fisheries Regulation 1998, as a precautionary approach to avoid stock collapse

***T.gigas* at the WorldFish Center station at Nuse Tupe, Western Province, Solomon islands © Antoine Teitelbaum**

2.13 Tonga

Poasi Ngaluafe
Program manager – Research and Aquaculture
Aquaculture Research and Development Section
Fisheries Division
Ministry of Agriculture, Forests and Fisheries

In Tonga, there is a high demand for giant clams to supply the local market, which has resulted in the over-exploitation of giant clam stocks in some areas. Native species of giant clam in Tonga, include *T. derasa, T. squamosa, T. maxima,* and *T. tevoroa. H. hippoppus* is now locally extinct. *T. gigas* and *T. crocea* have been introduced as part of stock enhancement and aquaculture programmes.

Tonga is not yet a member to the CITES Convention, though there is a push by government to become a signatory, in part, driven by the desire to export cultured giant clams to the global marine aquarium trade. Currently, several pieces of legislation are used by the Tongan government to facilitate CITES requirements for the export of giant clams, including the issuance of export permits; as well as the general conservation of giant clam stocks. For example, a new provision under the Fisheries Management Regulation 2008 prohibits the selling of giant clams on the local market without its shell as a way to ensure that the giant clam meets the size limit for each species as prescribed by the Fisheries Management Regulation 2008.

With support from the Australian Centre for International Agriculture Research, and the Japanese International Cooperation Agency, the Fisheries Division has been culturing giant clams in Tonga since the late-1990s. From 2005–2008, just under 50 % of all giant clams cultured by the Fisheries Division was sold to Tongan marine aquarium organism exporters, with the remainder being used for stock enhancement programmes for communities establishing Special Management Areas under co-management arrangements.

***T.tevoroa*, a rare species of giant clam found in Tonga © Kim Friedman**

2.14 Vanuatu

Jason Raubani
Principal Fisheries Resource Officer
Department of Fisheries

Trinison Tari
Acting Director
Department of Environment and Conservation

There are four species of giant clams in Vanuatu, *T. maxima, T. squamosa, T. crocea,* and *H. hippopus*. All four species are widely distributed throughout the country, though stocks are regarded as declining. In 2006, *T. gigas* was re-introduced into Vanuatu from Tonga.

In 2007, the Department of Fisheries (DoF) imposed a ban on the harvest and export of wild giant clams, though cultured giant clams are able to be exported.

There are two hatcheries in Vanuatu currently producing giant clams, and the DoF would like to see greater benefits accruing to community members from the grow-out of cultured giant clams.

Vanuatu became a member of the CITES in 1989, with the administration and implementation of CITES in Vanuatu coming under the International Trade (Fauna And Flora) Act No. 56 of 1989. The act has six parts including general provisions, administration, international trade, permitting and certificates, enforcement and miscellaneous issues. This Act also designates the Department of Environment as the Management Authority, and National Scientific Research Council as the Scientific Authority.

Other relevant legal instruments that contribute to CITES implementation in Vanuatu include the Environmental Management and Conservation Act No.12 of 2000, the Fisheries Act No. 52 of 2005, the Wild Birds protection act of 1962, the Quarantine Act and the National Park Act.

In terms of fisheries policy, the giant clam fishery is management under the Vanuatu National Marine Aquarium Trade Management Plan.

Colorful *T.crocea* ready for export, Vanuatu © Antoine Teitelbaum

Part III: Organisations

3.1 Secretariat of the Convention on International Trade in Endangered Species of Wild Fauna and Flora

Robert Boljesic
CITES Secretariat

CITES (www.cites.org) is an international agreement between governments, which aims to ensure that the international trade in species, or parts thereof, of wild animals and plants does not threaten their survival.

Annually, the international wildlife trade is estimated to be worth billions of U.S. dollars and to include hundreds of millions of plant and animal specimens. The trade is diverse, ranging from live animals and plants to a vast array of wildlife products derived from them.

Levels of exploitation of some animal and plant species are high and the trade in them, together with other factors, such as habitat loss, is capable of heavily depleting their populations and even bringing some species close to extinction. Many wildlife species in trade are not endangered, but the existence of an agreement to ensure the sustainability of the trade is important in order to safeguard these resources for the future. Because the trade in wild animals and plants crosses borders between countries, the effort to regulate it requires international cooperation to safeguard certain species from over-exploitation. CITES was therefore conceived in the spirit of such cooperation. Today, it accords varying degrees of protection to more than 30,000 species of animals and plants.

CITES is an international agreement to which countries adhere to voluntarily. Countries that have agreed to be bound by the Convention (i.e. have 'joined' CITES) are known as Parties. Although CITES is legally binding on the Parties – in other words they have to implement the Convention – it does not take the place of national laws. Rather it provides a framework to be respected by each Party, which has to adopt its own domestic legislation to ensure that CITES is implemented at the national level.

For many years CITES has been among the conservation agreements with the largest membership, and now has 175 Parties. The CITES Secretariat is administered by United Nations Environment Programme and is located at Geneva, Switzerland.

One of goals of the CITES Strategic Vision is to increase cooperation and strategic alliances with international stakeholders and the Secretariat has entered into a number of general cooperation agreements with other organizations.

3.2 Species Management Specialists

Robert (Hank) Jenkins
Species Managment Specialists

SMS (www.speciesms.org) is a non-profit international association of members dedicated to promoting the sustainable use of the world's natural resources. SMS membership consists of a diverse group of representatives from the wildlife, fisheries, forestry and agricultural industries, indigenous people's organizations, responsible organizations and individuals from around the world.

3.3 Secretariat of the Pacific Community

Ben Ponia
Aquaculture Advisor
Aquaculture Section

SPC (www.spc.int) is an intergovernmental agency established in 1947. It has 26 member countries which include 22 PICTs and four metropolitan countries.

SPC has three main technical divisions. The largest is the Social division which covers public health, demography and statistics, human resources development, and culture. The Land division is based in Fiji and has programs covering agriculture, forestry, animal health, biosecurity. The smallest division is the Marine division which is based in New Caledonia and is divided between the oceanic fisheries (tuna and billfish sciences) and coastal fisheries programs.

The coastal fisheries program of the marine division has three main work programs. Firstly is the nearshore and domestic fishery program covering commercial fishing of pelagic and benthic finfish. The second program covers reef resources (science, socio-economics and management). The third program is aquaculture (freshwater and mariculture) which also includes aquatic biosecurity and trade.

Giant clam management and trade and the CITES convention are related to the latter two work program areas of the coastal fisheries program. For example the reef resources program which seeks to understand the resource status of the giant clam invertebrate fishery and its socio-economic interactions, especially at small scale and rural levels. The aquaculture program promotes clam mariculture and restocking technology and also plays an active role in helping to secure and maintain international trade in cultured aquatic products. However the broad platform of technical programs carried out by the SPC all contribute to addressing these issues in some way.

3.4 Secretariat of the Pacific Regional Environment Program

Jeff Kinch
Coastal Management Adviser
Island Ecosystems Program

SPREP (www.sprep.org) is a regional organisation charged with assisting its 21 PICT members to protect and improve the environment and to ensure sustainable development for present and future generations. Australia, France, New Zealand and the United States of America are also metropolitan members.

SPREP is based in Apia, Samoa, and operates two programs, Island Ecosystems and Pacific Futures.

The Pacific Futures program supports member countries and territories with sustainable development policies for improved environmental governance. This program has as its core activities, enhancing the capacity of member countries and territories to respond to climate change, climate variability and sea level rise; as well assisting and enhancing the members' capabilities to manage and respond to marine pollution, hazardous waste, solid waste, sewerage and other land-based sources of pollution. It also supports member countries and territories with renewable energy issues.

The Islands Ecosystems Program focuses on supporting member countries and territories with sustainably managing and conserving the terrestrial, coastal and marine ecosystems, with a particular focus on conserving priority threatened species and the reduction of the impacts of alien, and other invasive species. CITES and issues surrounding giant clam management fit under the Islands Ecosystems Program's sub-program on Coastal Management.

SPREP fully supports the wider implementation of CITES amongst member countries and territories and enhancing member countries and territories ability and capacity to comply with CITES permitting and non-detrimental findings, thus ensuring the sustainable use in trade of the region's marine and terrestrial resources.

3.5 International Union for Conservation of Nature

Helen Pippard
Species and Membership Officer

The International Union for Conservation Network (IUCN, www.iucn.org) was founded in 1948 and is now the world's oldest and largest global environmental network, whose mission is to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable. The Union's headquarters are located in Gland, near Geneva, in Switzerland.

IUCN has more than 1,000 government and NGO members, and almost 11,000 volunteer scientists in more than 160 countries. Volunteer scientists are grouped into six commissions: Education and Communication; Environmental, Economic and Social Policy; Environmental Law; Ecosystem Management; Species Survival and Protected Areas; and are tasked with assessing the state of the world's natural resources and provide IUCN with sound technical and policy advice on conservation issues.

The IUCN Regional Office for Oceania was established in January 2007 in Fiji. IUCN membership in the Oceania Region is diverse, drawing together PICT government agencies and NGOs. Australia has 27 members, New Zealand has nine (both including country membership), whilst the PICTs constitute a total of seven members. These are Fiji's Department of Environment, the National Trust of Fiji Islands, the University of the South Pacific, the Association pour la Sauvegarde de la Nature Néo-Calédonienne, the Direction de l`environnement de la province Sud in New Caledonia, the Te Mana o te Moana in French Polynesia, and the Tonga Community Development Trust.

The IUCN programme in Oceania focuses on the following core programme areas, these are species; water, marine, and energy. Within the Oceania Species Programme, IUCN has secured funding to produce a CITES implementation manual for the CITES Authorities and Customs in Fiji and it is hoped that this can be replicated for other PICTs in the future. Links and collaboration with TRAFFIC are also being explored in order to improve capacity building/technical assistance for implementation of the CITES in PICTs.

3.6 National Oceanic and Atmospheric Administration

Krista Graham
Western Pacific Regional Coordinator for Species of Concern

The National Marine Fisheries Service (NMFS, or NOAA Fisheries Service, www.nmfs.noaa.gov) is under the National Oceanic and Atmospheric Administration (NOAA) of the U.S. NOAA's headquarters office is located in Silver Spring, Maryland (just outside of Washington D.C.), with another six regional offices that work on the federal management and policy side of the marine environment, and another six science centers that work in partnership with the regional offices to provide science advice as a foundation for management and policy.

The Pacific Islands Regional Office, based in Honolulu, Hawaii, oversees Hawaii as well as the U.S. Territories of American Samoa, Guam, and CNMI. There is also oversight in the Pacific Remote Island Areas, such as Wake Atoll, Palmyra Atoll, Johnston Atoll, among others. NOAA Fisheries Service has a number of divisions including Habitat Conservation, International Fisheries, Sustainable Fisheries, and Protected Resources.

With respect to CITES, NOAA Fisheries Service prepares marine species proposals and submits them to the U.S. Fish and Wildlife Service for a possible Appendix listing during CITES' Conference of the Parties (CoPs).

Part IV: Management Convention on the International Trade in Endangered Species

Robert Boljesic
CITES Secretariat
Hank Jenkins
Species Management Specialists

4.1 Convention on the International Trade in Endangered Species

4.1.1 Introduction

4.1.2 Definitions

4.1.3 CITES Authorities

4.1.4 Permits and Certificates

4.1.5 Non-Detriment Findings

4.1.6 Quotas

4.1.7 Trade in Captive-Bred Species

4.2 Convention on the International Trade in Endangered Species in the Pacific

4.3 International Union for Nature Conservation's Red List

4.4 National Legislation for Giant Clam Management

4.1 Convention on the International Trade in Endangered Species

4.1.1 Introduction

CITES establishes an international legal framework with common procedural mechanisms for the prevention of international commercial trade in endangered species, and for the regulation of international trade in others species.

There are three Appendices to CITES. An Appendix I listing offers the highest protection for any species under CITES and includes species that are threatened with extinction and/or potentially at risk from international trade. Trade in wild-collected specimens of these species must be subject to particularly strict regulation and only authorized in exceptional circumstances.

An Appendix II listing of a species does not necessarily mean that it is currently threatened with extinction nor that trade in that species will be limited, however any such trade must be determined not to be detrimental to the survival of the species in the wild, and should only involve specimens that were obtained in compliance with national laws for the protection of fauna and flora. Appendix II includes species that may become threatened if their trade is not effectively regulated.

To ensure that trade in an Appendix II-listed species is non-detrimental, a number of steps must be completed prior to export. First, the Scientific Authority of a country must advise that the export would not be detrimental to the survival of the species. Second, the Management Authority of the same country must be satisfied that the specimens were not illegally obtained. The Scientific Authority may also determine that limits should be placed on the export of a species in order to maintain it throughout its range at a level consistent with its role in the ecosystems in which it occurs. Annual quotas are one example of such limits. The Management Authority is ultimately responsible for the issuing of permits.

In relation to importation of Appendix II-listed species, the importing country must require the prior presentation of the export permit or re-export certificate. Some importing countries, most notably the members of the European Union, have taken stricter measures and require the prior issuance of an import permit before Appendix II specimens can be imported. If a species is re-exported, the re-exporting countries' Management Authority must be satisfied that the species was imported in accordance with CITES provisions.

The main purpose of Appendix III is to provide assistance to a Party in the enforcement of its national regulations for a species subject to exploitation for international trade. In practice this circumstance usually arises when there is a significant level of illegal trade that the Party needs the co-operation of other Parties to address. The listing in Appendix III therefore provides for this co-operation through enabling CITES Parties to apply their domestic laws to ensure that trade in the listed species occurs in a manner consistent with the laws of the State of origin for that species.

Unlike species listed in Appendix II, Parties issuing export permits for Appendix III specimens are not required to ensure that exports are within sustainable levels, i.e. to make a 'non-detriment' finding. Exports from Parties that are range States for the species that have not listed it in Appendix III must be accompanied by a Certificate of Origin.

The CoP is the only body that can decide on the contents of Appendices I and II, and any proposal to amend requires a two-thirds majority. Only Parties may propose amendments to the Appendices. The CoP also adopts Resolutions to guide the interpretation and implementation of the Convention, and Decisions to provide specific short-term time-bound instructions. Currently, there are 82 Resolutions and 150 Decisions in effect.

Being a party to CITES provides mechanisms for effective international regulation of trade in wildlife for conservation and sustainable use; increases international cooperation on trade and conservation, legislation and enforcement, resource management, and conservation science; and assists with participation of Parties in managing and conserving wildlife at the international level.

4.1.2 Definitions

CITES defines a number of terms used for describing organisms or their derivatives and these are listed in Table 6 below.

Table 6: CITES definitions

Part	Definition
Species	A species or subspecies or a geographically separate population (Also applies to all specimens outside the natural range, such as introduced populations or captive specimens)
Specimen	An animal or plant, alive or dead, or any readily recognizable parts or derivatives of plant or animal (e.g. ivory)
Parts	Skins, skeleton or bones, shells, horn, tusks, teeth, feathers, eggs, meat, roots/leaves, and wood
Derivatives	Blood, musk, objects made from parts (e.g. ivory piano keys, handbags, fur coats, belts, shoes, etc.), medicine containing CITES species, perfume from CITES species, and any preparation from meat

4.1.3 CITES Authorities

The Management Authority has two basic roles, that of granting permits and certificates, determining exemption, confiscation, and communicating with the CITES Secretariat. The Management Authority should also prepare and circulate official information on CITES to other government agencies, such as Customs, Police, Health authorities, etc. Management Authorities must consult with and inform their counterpart Scientific Authorities before issuing an export permit for specimens in Appendix I and II.

The Scientific Authority has an essential role for the effective implementation of CITES through its determination that the export of specimens included in Appendix I and II is not detrimental to their existence; the determination whether the intended recipient of live Appendix I specimens is suitably equipped to house the species; the monitoring of export permits granted and actual exports to ensure that the species is maintained at a level consistent with its role in the ecosystems in which it occurs, and the avoidance of any species being listed in Appendix I, which would mean a complete ban on all exports.

Other tasks of the Scientific Authority include the provision of advice in the process of registering scientific institutions; the reviewing of applications of whether facilities are capable of captive breeding or artificial propagation; the gathering and analysis of information pertaining to the biological status of species affected by trade to assist in the preparation of proposals to amend the Appendices; the provision of advice to the Management Authority on the disposal of confiscated live specimens; and the assistance in the preparation and review of proposals to amend the Appendices. Every Party should provide logistical and financial support to enable its Scientific Authorities to do their work.

4.1.4 Permits and Certificates

As noted above, CITES regulates international trade in specimens of species of wild fauna and flora listed in its Appendices on the basis of a system of permits and certificates (Table 7), which are issued only when certain conditions are met, and which must be presented when leaving and entering a country.

Table 7: CITES Permit and certificate types

Type	Definition
Export permits	Only issued when the Scientific Authority has advised that the export will not be detrimental to the survival of the species, and the Management Authority is satisfied that the specimen was legally obtained.
Import permits	Only issued for specimens of Appendix I species, with the assurance that the trade is not detrimental to the survival of the species.
Re-export certificates	Only issued when it is satisfied when there is proof that it was imported legally.
Other	Applies to captive-bred or artificially propagated specimens; pre-convention specimens; traveling exhibitions; introductions from the sea, etc.
Derivatives	Blood, musk, objects made from parts (e.g. ivory piano keys, handbags, fur coats, belts, shoes, etc.), medicine containing CITES species, perfume from CITES species, and any preparation from meat

For Appendix 1 exports, an import permit must be issued before an export permit may be issued; this is to ensure that both the importing and exporting parties agree on the trade of that species; and that they are both confident that the trade will not be detrimental to the survival of the species; and it is not being used for primarily commercial purposes. Once an import permit is obtained an export permit may be issued if the export will not be detrimental to the survival of the species; the specimen was legally acquired; and that any live specimen will be shipped in a manner that will not harm it.

A re-export certificate may be issued for Appendix I-listed specimen if the import was in accordance with the Convention. In the case of live specimens, the preparation and shipment must minimize the risk of injury, damage to health or cruel treatment, and a valid import permit must be granted by the country of destination.

For the export of Appendix II specimens, an export permit can only be issued if CITES does not require an import permit, and any requirement by a Party for an import permit for Appendix II specimens has a stricter domestic measure. Export permits are issued with similar conditions to Appendix I exports.

A re-export certificate may be issued for Appendix II-listed specimens if the Management Authority of the country of re-export is satisfied that the specimen was imported in accordance with the Convention, and any live specimen will be shipped in a manner which will minimize the risk of injury, damage to health or cruel treatment.

For export from the country that included the species in Appendix III, an export permit is required and may be issued only if the Management Authority is satisfied that the specimen was acquired in accordance with national wildlife laws, and the any live specimen will be shipped in a manner which will minimize the risk of injury, damage to health or cruel treatment.

For export from countries that did not include the species in Appendix III a certificate of origin is required. This may only be issued by a Management Authority of the country of origin.

A re-export certificate may be issued only if the Management Authority is in possession of the valid original of the export permit or certificate of origin, or the previous re-export certificate; the import was in accordance with CITES; and the re-export certificate must clearly indicate whether the specimen was processed in the State which is issuing the document.

4.1.5 Non-detriment Findings

An export permit for Appendix I and II specimens can only be granted when the Scientific Authority of a given country of export has advised that such export will not be detrimental to the survival of that species. An import permit shall only be granted for Appendix I specimen when the Scientific Authority of the importing country has advised that the import will be for purposes which are not detrimental to the survival of the species involved. There is no non-detriment findings required for Appendix III listed species. There is only one instance where a non-detriment finding may be made by a Management Authority, and this concerns the disposal of illegally traded, confiscated and accumulated specimens.

Acceptance of a non-detriment finding can also be agreed by the CoPs, based on quotas adopted by the CoP. Proposals to establish or amend such quotas need to be accompanied by supporting information including details of the scientific basis for the proposed quota.

Generally speaking, the most useful 'unit of measurement' in determining whether exports will not be detrimental to the survival of the species is the national population of the country involved. The non-detriment finding is essentially a science-based risk assessment, following an analysis of risks, a determination of exposure, making a decision, and monitoring results.

The causes of unsustainable trade in almost all cases are likely to be complex and closely related to problems in environmental protection, and in national development and governance in general. The two main causes of unsustainable trade in Appendix II species are the unauthorized or illegal trade occurring parallel to legal trade, and inadequately managed legal trade.

4.1.6 Quotas

Quotas in the context of CITES are the maximum amount of specimens that can be exported per year. These can be determined by a Party or by the CoPs to CITES. Quotas have been used to limit the amount of specimens of CITES-listed species entering international trade (e.g. Fiji's coral quotas).

For quotas to be used effectively, the Scientific Authority must monitor the actual levels of export. This is to ensure that the species is maintained throughout its range at a level consistent with its role in the ecosystem, and above the level at which the species might become eligible for Appendix I. Export permits for specimens subject to a quota should indicate the total number of specimens of the species exported to date (including those covered by the permit) and the annual quota for the species. Exceeding an annual quota, even a voluntary quota, is regarded as a serious implementation problem; and this has led to the suspension of trade in some species from certain Parties; and may show an indication of inadequate quota management and administration.

4.1.7 Trade in Captive-bred Species

Species bred in captivity or artificially propagated for commercial purposes, like giant clams for the global marine aquarium trade, must have a certificate issued for export. To comply with the definition of 'bred in captivity', a specimen must have been born or produced in a controlled environment (i.e. maintained without the introduction of wild specimens), with parents mating (or gametes transferred, as is the case for giant clams) in the same or similar controlled environment. Breeding stock has to be established and maintained in accordance with CITES regulations. 'Bred in captivity' also applies to the production of a second generation or subsequent generations, or managed in a manner that has been demonstrated to be capable of reliably producing second-generation offspring in a controlled environment.

First-generation offspring (F1) are specimens produced in a controlled environment with at least one parent taken from the wild or conceived in the wild. Second or subsequent generation offspring (F2, F3, F4 etc.) are specimens produced in a controlled environment by specimens also produced in a controlled environment.

Trade in specimens bred in captivity should be permitted only if specimen is marked appropriately as bred in captivity. For example, putting a F1 species giant clam into the sea for 'grow out' does not satisfy the 'grown in a controlled environment' and thus would not be considered a F2.

4.2 Convention on the International Trade in Endangered Species in The Pacific

At present, several PICTs are members of CITES (Table 8), with the Solomon Islands the youngest member. Many other Pacific countries are wanting to join..

Table 8: PICTs which are signatory to CITES

Country	Signatory Year
Fiji	1997
Palau	2004
Papua New Guinea	1976
Samoa	2004
Solomon Islands	2007
Vanuatu	1989
France (including its Pacific dependents)	1978
New Zealand (including its Pacific dependents)	1989
United States of America (including its Pacific dependents)	1975

CITES currently lists the following marine species, all of which are found in the Pacific Region under Appendix II (Table 9).

Table 9: Aquarium species listed on the CITES appendices

Organism	Common Name	Scientific Name
Fish		
Labridae	Maori Wrasse	*Cheilinus undulatus*
Syngnathidae	Pipefishes, seahorses	*Hippocampus spp.*
Invertebrates		
Tridacnidae	Giant clams	*Tridacnidae spp.*
Corals*		
Scleractinia	Stony corals	*Scleractinia spp.*
Antipatharia	Black corals	*Antipatharia spp.*
Helioporidae	Blue corals	*Heliopora coerulea*
Tubiporidae	Organ-pipe corals	*Tubiporidae spp.*
Milleporidae	Fire corals	*Milleporidae spp.*
Stylasteridae	Lace corals	*Stylasteridae spp.*

** (880 species in 120 taxa)*

4.3 International Union for Nature Conservation's Red List

The IUCN Red List of Threatened Species (www.icunredlist.org) is widely recognized as the most comprehensive, objective global approach for evaluating the conservation status of plant and animal species. The goals of the IUCN Red List are to identify and document those species most in need of conservation attention if global extinction rates are to be reduced; and provide a global index of the state of change of biodiversity.

Currently, *T. derasa, T. gigas,* and *T. tevoroa* are listed as 'vulnerable'. A taxon is 'vulnerable' when the best available evidence indicates that a species is considered to be facing a high risk of extinction in the wild. The remaining species of giant clam, *H. hippopus, H. porcellanus, T. maxima,* and *T squamosa* are all listed as 'lower risk', but 'conservation dependent'; with the exception of *T. crocea* which is listed as having 'least concern'. A taxon is 'least concern' when it has been evaluated against the criteria and does not qualify for incorporation under any of the other listings. Widespread and abundant taxa are often listed as being of 'least concern'.

4.4 National Legislation for Giant Clam Management

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Size limits and complete bans on commercial harvests are the most commonly used fisheries management tools for managing giant clam harvesting in those PICTs that have management regulations (Tables 10 and 11).

Table 10: Size limits imposed by PICTs on the harvest of giant clams

Location	T. derasa (cm*)	T. maxima (cm*)	T. squamosa (cm*)	All Species (cm*)
American Samoa				18
French Polynesia		12		
Guam				18
Niue				18
Samoa		18	16	
Tonga	26	15	18	

** Across the longest part of the shell*

Some PICTs, such as Fiji and New Caledonia, both of which have active high volume tourist trades allow up to three giant clam shells (or six halves), not weighing more then 3 kg to be exported with CITES permits. Other PICTs, such as Guam, New Caledonia, have imposed bag-limits on subsistence and commercial harvest of giant clams. PNG has a ban on the use of night lights to harvest giant clams.

Table11: Management measures adopted by PICTs for the harvest of giant clams

Location	Size limits	Ban on commercial harvest and export (except for aquaculture species)	Bag limits (subsistence)	Bag limits (shells for tourist trade)	Gear Restrictions
American Samoa	✓				
FSM		✓			
Fiji		✓		✓ (3 clams/person)	
French Polynesia	✓	✓			
Guam	✓		✓ (3 clams/person/day)		
Kiribati		✓			
New Caledonia			✓ (3 clams/boat/trip)	✓ (3 clams/person)	
Niue	✓		✓ (10 clams/pers./day)		
PNG					✓ (ban on lights)
Palau		✓			
Samoa	✓				
Solomon Islands		✓			
Tonga	✓				
Vanuatu		✓			
Total	6	7	3	2	1

PART V: ISSUES

5.1 Challenges Facing PICTs with Complying with CITES

5.2 Challenges Facing PICTs with Ensuring Sustainable Giant Clam Management

5.3 Suggested Solutions

During the course of the workshop, several issues and challenges were highlighted by PICT participants, for complying with CITES, but also in ensuring sustainable giant clam management and trade.

5.1 Challenges Facing PICTs with Complying with CITES

The most common challenge to implementing CITES for most PICTs was having adequate knowledge of capacity to implement and enforce it, followed by adequate education and awareness on CITES. Several PICTs gave specific answers to their own situation, such as clarification of roles and responsibilities between the CITES Authorities, adequate stakeholder engagement through appropriate fora, and developing quotas (e.g. Fiji). Responses by PICTs are summarised in Table 12 below.

Table 12: Challenges facing PICTs with complying with the CITES convention

Location	Lack of capacity for the implementation and enforcement of CITES.	Lack of adequate education and awareness on CITES.	Clarification of role responsibilities between the Management Authority and the Scientific Authority.	Lack of capacity for developing appropriate management legislation.	Lack of suitable stakeholder fora.	Lack of capacity for determining non-detrimental findings, and subsequent setting of quotas to boost exports.	Gazettal and harmonization of appropriate management legislations.
American Samoa	✓	✓					
Cook Islands	✓	✓	✓				
Fiji			✓			✓	
French Polynesia							✓
FSM	✓						
New Caledonia	✓				✓		
Palau		✓					
PNG	✓				✓		
RMI	✓			✓			
Samoa	✓	✓	✓	✓			
Solomon Islands	✓	✓					
Tonga	✓		✓				
Vanuatu	✓						
Total	10	5	4	2	2	1	1

5.2 Challenges Facing PICTs with Ensuring Sustainable Giant Clam Management

With regards to ensuring sustainable giant clam management, the biggest challenge facing PICTs was obtaining adequate stock status on wild giant clam populations. Because of the support many PICTs have given to culturing giant clams either as an alternative livelihood and income opportunity, or just for subsistence; the lack of capacity for further promoting giant clam culture; as was enforcing management legislation affecting the harvesting of wild giant clams were also raised as a major challenge. Responses by PICTs are summarised in Table 13 below.

Table 13: Challenges facing PICTs with ensuring sustainable a giant clam management

Location	Lack of capacity for conducting stock assessments and analysis.	Lack of capacity for promoting giant clam culture.	Lack of capacity for enforcing giant clam harvesting regulations.	Lack of capacity for managing and monitoring giant clam harvest.	Lack of adequate education and awareness on sustainable giant clams harvesting.	Gazettal of and harmonization of appropriate management legislations.	Lack of capacity for developing appropriate management legislation.	Lack of international and/or regional collaboration for creating economies of scale to boost exports.
American Samoa	✓						✓	
Cook Islands		✓	✓	✓				
Fiji	✓	✓						
French Polynesia						✓		
FSM	✓						✓	
New Caledonia				✓		✓		
Palau	✓	✓	✓		✓			✓
PNG	✓	✓	✓		✓			
RMI	✓	✓	✓		✓			
Samoa		✓	✓	✓				
Solomon Islands	✓							
Tonga	✓	✓						
Vanuatu			✓	✓				
Total	8	7	6	4	3	2	2	1

5.3 Suggested Solutions

To overcome these issues and challenges, PICT participants identified several suggested solutions whereby CITES could be made more useful for the management of giant clams. These are listed in Table 14 below.

Table 14: Suggested solutions by PICTs for enhancing CITES and giant clam management

Issue	Suggested Solution
Lack of understanding and awareness of CITES.	Create a networking system for PICTs, so that information could be shared between PICTs on CITES issues. Identify PICT focal points and establish CITES committees in each PICT to address CITES issues nationally. Develop an exchange program, whereby experienced officers who are implementing CITES in a specific, assist other PICTs on systems and processes for implementing and enforcing CITES. Produce education and awareness materials that can be used regionally. Improve agency knowledge of how to implement CITES.
In-adequate management regimes.	Strengthen and/or harmonise legislations at the national level to make them compatible with CITES. Seek legal advice on reviewing legislation from regional organizations. Identify resources for effective implementation of management legislation.
Lack of adequate monitoring.	Develop guidelines on standard measures for monitoring of wild harvest of giant clams. Train fishers, and CITES Authorities on the monitoring guidelines. Develop appropriate data management tools. Implement an evaluation and review program to ensure data collection and analysis is working effectively for management and CITES purposes.
Lack of capacity for making non-detriment findings.	Develop a training manual that can used by PICTs for determining non-detriment findings. Provide training on how to conduct non-detriment findings, with a focus on priority species for specific PICTs as training examples.
Lack of market access and trade compliance.	Conduct a market assessment study for giant clams (and associated products). Develop a price database (that can be uploaded to the SPC's website). Continue capacity-building workshops on CITES and OIE trade compliance.
Lack of capacity for stock assessment and analysis.	Collate all available information on giant clam stock status for all PICTs. Produce National Giant Clam Management Plans and strategies in each PICT, where these are currently lacking. Improve giant clam stock assessment methods, and provide training on survey techniques, data collection and analysis (using both scientific and community based surveys).
Inadequate border control and species identification.	Obtain support from the Oceanic Customs Organization (http://www.ocosec.org/). Produce CITES Identification Sheet and distribute to all PICTs. Standardise CITES Permits for PICTs.

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