



MARINE ORNAMENTAL MOLLUSCS

V. Venkatesan

Mandapam Regional Centre of Central Marine Fisheries Research Institute
Mandapam Camp-623 520, Tamil Nadu

Introduction

The molluscs recorded from the world range from 80,000 to 1,00,000, out of which 50,000 are gastropods, 15,000 bivalves, 500 polyplacophora, 400 cephalopods, 130 aplacophora and 5 monoplacophora. There are 31,463 marine, 8,765 fresh water and 24,503 land molluscs reported from different parts of the world. Humans have valued marine mollusc shells since prehistoric times. Shells have been used for currency, jewellery, ornaments, tools, horns, games, medicine and as magical or religious symbols (Claassen 1998). Even though tropical bivalves and gastropods have lost much of their historical meaning as medicine, tools or religious symbols, they may be used in even larger quantities today. Shell-craft industries in Southeast Asia may still use thousands of tons of shells annually for mother-of-pearl products (Wells 1989). The ornamental shell trade, which primarily includes shells exploited for their decorative or rareness value, is also substantial. The ornamental shell trade might even have intensified in recent years with the rise of the Internet. Abbott (1980) estimated that some 5000 mollusc species are involved in the ornamental shell trade.

Tourism has become an important economic activity in many tropical countries. The tourists' interest in 'portable memories' has also brought a curio trade into existence, often involving gastropod and bivalve shells, corals, shark teeth and other parts of marine species (Poulsen 1995; Vorlaufer 1999). Shells seem highly demanded souvenirs because of their varied forms, attractive colouring or smoothness. However, they may also be symbols of freedom and leisure.

It is difficult to categorise shells satisfactorily according to their uses as many are collected for several purposes. The main categories are shown in the table -1.

Table.1 : Some uses of molluscs shells

	Examples of molluscs	Out lets / products
Ornamental shells	Mostly large, colorful, relatively cheap, plentiful, mostly gastropods, some bivalves including giant clams	Whole shells used as a souvenirs and decorations
"Rare " or specimen shells	Few in trade; expensive; mostly narrow endemics & / or deep water gastropods.	Collector's items
Shell crafts	<i>Strombus spp</i> , <i>Cassis spp</i> , <i>Cyprea spp</i> , <i>Lambis spp</i> , <i>Conus spp</i> , <i>Xanachus pyrum</i> Small shells such as <i>Cowries spp</i> , <i>Oliva spp</i> , <i>Arca spp</i> , <i>Babylonia spp etc</i> .	Table lamps, lamp shades, domes, dolls, garlands, pendants for chains, necklaces, ear drops, beads for the neck, hair pin, fancy flower sculptures of gods, pen stand, bangles, flower vases, shell screens for windows and door curtains
Mother of pearls or commercial shells	<i>Trochus niloticus</i> (commercial trochus), <i>Turbo marmoratus</i> – (green snail) and <i>Pinctada spp</i> .	Buttons, Inlay works, jewellery, Shell crafts
Industrial shell	Giant clam (<i>Tridachnidae</i>)	Constituents of pottery glazes; manufacture of floor tiles.



With certain species for example Spider shells, *Lambis spp*, the queen conch *Strombus spp* and Giant clams both shells and flesh can be used. Shells of some species have several alternative uses for example the entire giant clams shell is used in the ornamental trade while the broken pieces are used for jewellery. Ground up giant clam shell is used as constituents of pottery glazes and manufacture of floor tiles.

Marine ornamental shell industry

Majority of the gastropod and bivalve species that have been reported all along the south east coast of India are known to occur in Ramanathapuram coast. The availability of a variety of shells in good abundance have led to the development of ornamental shell industry at keelakarai and Rameswaram. Several species of shell animals which occur in the Gulf of Mannar and Palk Bay constitute the raw materials for these industries. Apart from very rare species, 15-20 important species are regularly exploited for these purposes.

The methods of exploitation of these shells depend on the size, behaviours and habitats in which they occur. This may be divided into 1.) Hand picking 2) Skin diving 3.) Hand dredging and 4.) By different types of nets viz. trawl, gill and dragnets employed mainly to catch fin fishes, lobster and crabs. A wide variety of shells like chanks, species of *Arca*, *Hemifusus*, *Natica*, *Strombus*, *Babylonia*, *Conus*, *Murex*, *Harpa*, *Cymbium* etc. form a portion of the by catch in trawl nets operated for shrimps and fish.

The ecological habitat surrounding Mandapam-Rameswaram-Keelakarai coastal belt is ideally suitable for growth of a variety of gastropod and bivalve shell species. The 21 island system in the Gulf of Mannar provides suitable areas serving as breeding ground for many of the gastropod shells which form the important components supporting the shell industries in this region.

Shell processing

The important centers where the shells are processed are Pampan, Mandapam, Rameswaram, Thirupalaikudi, Devipattanam, Mullaimunai and Thondi. Shells are procured from Thoothukudi, Cuddalore and Andaman and Nicobar Islands. After drying the shells in the open yard for 4-5 days, they are soaked in either fresh and sea water for 3-5 days in cement tanks, depending on the size and variety of the shells. This enables the removal of dirt and decayed soft part of the animal. Then the shells, are placed in the bleaching powder solutions for 24 hrs in cement tanks followed by immersing the shells in caustic soda solutions in another tank for 1-2 hours. Depending on the thickness, colour and quantity of the shells they are polished by allowing them to remain in 5% HCL for 10 sec to 4 min. In order to remove colours of the shell, shells are soaked in hot palm oil for half an hour.

The commercial important shells used by shell industries of Keelakarai & Rameswaram are listed in the table-2

Table -2: Commercial important shells by shell industries of Keelakarai and Rameswaram.

Species	Vernacular name
<i>Xancus pyrum</i>	Sanku
<i>Hemifusus pugilinus</i>	
<i>Lambis lambis</i>	Aiviral Sanku
<i>Arca spp</i>	Sippi/Kilinjai
<i>Umbonium vestiarium</i>	Poochi koodu
<i>Tibia spp</i>	Ezuthani
<i>Cypraea spp</i>	Sozhi/Mani/Mowri
<i>Oliva spp</i>	Kovanchu
<i>Conus spp</i>	Vazhvi poo
<i>Chicoreus ramosus</i>	Yanai Mulli
<i>Murex haustellum</i>	Vellai Poodu
<i>Cymbium melo</i>	Suvappu pathiram
<i>Harpa spp</i>	Sarpa koodu
<i>Cypraea talpa</i>	Anil sozhi
<i>Fusinus spp.</i>	Vellai Chavai
<i>Strombus spp</i>	Veranjan
<i>Babylonia spp</i>	Puramuttai
<i>Dentalium spp</i>	Vellai Mooku
<i>Cymatium spp</i>	Pillayar Sanku



Molluscan shell trade

The scale of international trade in ornamental shell has recently become a subject of considerable concern; more than 5000 species may be involved and international trade in unworked ornamental shell amounts to thousand of tonnes annually. Many invertebrates other than corals are popular in the aquarium trade. Main molluscan species in the trade are *Turbo spp.*, *Tridacna spp.*, and *Trochus spp.* The Philippines, Mexico, Indonesia, Singapore, Fiji, Sri Lanka, and Vanuatu are the major exporters of shells; United States and Japan are the major importers followed by the United Kingdom, Netherlands, France, Germany, Italy, Taiwan, and Canada.

Giant clams, *Tridachnidae*, represent an increasingly large proportion of the exports of live invertebrates for aquarium trade. It is the largest bivalve in the world. The more brightly coloured *Tridachna maxima*, *T. crocea*, and *T. derasa* are more popular ones in the marine ornamental trade. Unsustainable exploitation of giant clam species has led to the local extinctions of some species such as *T. gigas* in some areas (Hestinga *et al.*, 1984). The CITES provides a mean of controlling international trade in species considered to be serious threatened. At present only marine molluscs listed is the giant clam.

In India, a notification dated May, 28, July 21, and December, 5, 2001, the Ministry of Environment and Forest, Government of India has included 24 ornamental mollusc species in Schedule I of the Wild Life Protection Act, 1972. These ornamental molluscs are protected by the Act.

Fisheries for the commercial shells exists in many Southeast Asian and Pacific countries and in most cases are well documented. Southeast Asia is the center of the Mother of pearls and button industries. Taiwan export around 30 tonnes of worked mother of pearls and 200 tonnes of mother of pearl articles annually and Japan has similarly large exports.

Volume of Trade

A clear picture of the volume of trade in shells is difficult to obtain for several reasons,

- a) Shell are often combined with other good or marine products (especially corals) in official statistics
- b) Trade statistics seldom differentiate between species, except for commercial or mother of pearl species, and it is difficult to calculate the relative volume of each species in trade, number of individuals involved; and
- c) International trade statistics do not include domestic trade (example through gift shops in the country of origin) so that export figures cannot necessarily be equated with total exploitation.

Disruption of ecological balance

Little attention has been paid to the consequences of the selective removal of shells in the ecosystem as a whole, but problem can arise in a long run. Destructive collection practices, over-exploitation, the lack of scientific information on many species collected and threat of extinction of target species are the major problems of the marine ornamental molluscs trade. It has been suggested, for example that over – collection of the giant triton, *Charonia tritonis* which preys on a large starfish, has contributed to population explosion of the thorny starfish *Acanthaster planci*. Plagues of the starfish have caused extensive damage to coral reef in many parts of the Indo-pacific.

Mariculture

One way of relieving pressure on stocks on wild shells is to use cultivated molluscs instead. Although mariculture programmes have been developed for many edible molluscs, they have only recently been attempted with species used in the shell trade; *Strombus gigas*, *Trochus niloticus*, *Haliotis spp*, *Pinctada spp* and *Tridachnidae*



Marine Molluscan Aquarium

Marine gastropods are very beneficial in the reef aquarium. As they burrow and dig through the aquarium substrate, they will clean and aerate the bottom and will eat perishable organic matter in your marine aquarium thereby, preventing your tank water from being contaminated. These cleaner species are particularly important in controlling algae growth and parasites. Most gastropods and bivalves are herbivores but some marine ones are omnivores.

Habit & Habitat

Gastropods are nocturnal in habit. They are solitarily found near rocky reefs, grass beds, and sandy bottoms around the coastal areas of Indian Ocean.

Ideal marine aquarium environment

Gastropods require a pH value of around 8.10-8.40, and temperature at around 72-80° F, in the tank. Stable pH & temperature levels, and minimal or zero copper and nitrates are desirable in the aquarium to avert any lethal shocks to the shelled animals in there. Keep ample live rock, caves, corals, and sand to hide in and graze upon.

Aquarium Feeding

Most gastropods are algae eaters and hence keep the aquarium free from unwanted algal growth. Most shelled animals are omnivores and scavengers in feeding habit. They are known for eating away the meaty bits of brine shrimp, mysis shrimp, fish, & scallop, and scavenge on detritus and fish waste. In the search of food, shelled animals also plough the sand, thereby cleaning and aerating it.

Important Acclimation Information

All gastropods are very sensitive to changes in salinity and water chemistry from one aquarium system to another. It is vital to slowly acclimatize all shelled animals to your marine aquarium environment using the slow drip method. The slow acclimation process needs to be done over a minimum time period of at least two hours to avoid your shelled animals dying over the first few days from water chemistry shock.

Sand Conch

The Sand conch such as *Strombus canarium* and *S. marginatus* is a hardy member of the Strombidae family. Despite their name, they are peaceful toward other tank mates. They are excellent sand sifter and are very beneficial in the reef aquarium. They are hardy algae eater. They also love the brown diatoms found on the surface of live sand beds. They will stir and clean upper layers of the sand bed. As they burrow and dig through the aquarium substrate, they clean and aerate the bottom.

Abalone

Abalone such as *Haliotis varia* is generally nocturnal, finding refuge in holes or crevices in the rocks or coral during the day, and coming out to forage at night, using its foot to glide over the substrate and coral rubble. The foot attaches very firmly, so use extreme caution if attempting to remove it from glass or rocks. While its diet is almost exclusively algae, it would benefit from supplementation with dried seaweed, lettuce, spinach, or Spirulina sheets/tablets.

Banded Trochus snail

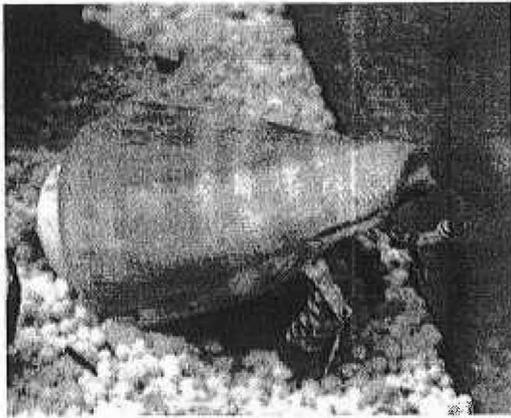
Trochus snail move very slowly but leave nothing behind, eating filamentous algae, slime algae, green algae, diatoms, and cyanobacteria. Add to this the fact that they often are able to right themselves if they fall on their backs. Extremely hardy, as long as water quality remains good they have a very long life.

Turbo Snail

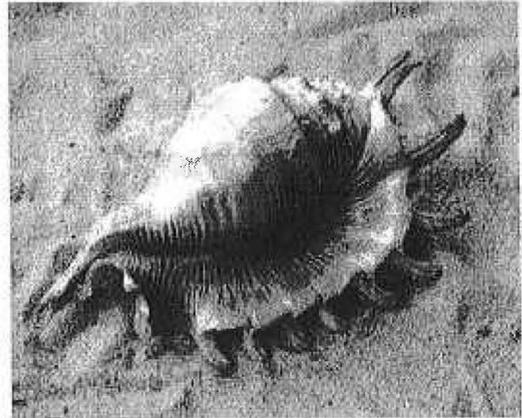
Turbo Snail is a beautiful algae removing machine. Like the other members of the Turbinidae family, the turbo snail has a voracious appetite for algae. Turbo snails are found in crevices and holes within the reefs during the day, and at night they come out to forage. In the home aquarium, the turbo snail prefers ample hiding places among the live rock for the day time, and will come out to graze on algae on the rock and glass during the evening hours



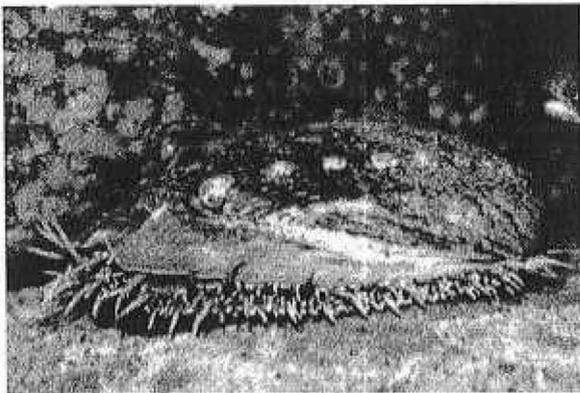
Fig.1: Marine ornamental molluscan species in Aquria



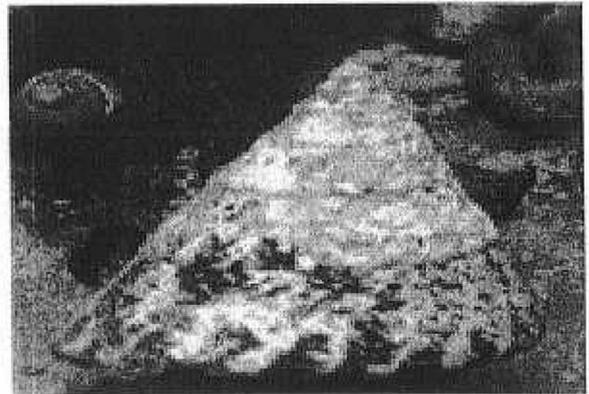
Strombus marginatus



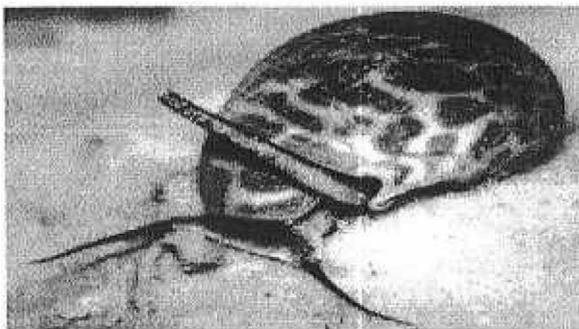
Lambis lambis



Haliotis varia



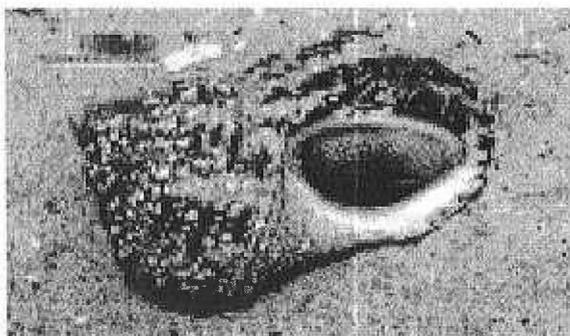
Trochus radiatus



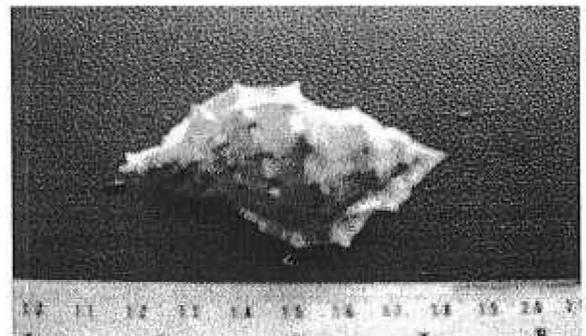
Babylonia spirata



Netita spp.



Turbo intercostalis



Bursa spinosa



Apart from above mentioned species, other gastropods such as *Babylonia spp.*, *Nerita spp.*, *Natica spp.*, *Bursa spp.*, *Hemifusus spp.*, *Nassarius spp.* etc. can also be maintained in aquarium.

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