

## Short Communication

# Kingdom of seashells: Exploitation and culture of major commercial species

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Received: 29 October, 2020

Accepted: 07 January, 2021

Published: 08 January, 2021

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## Introduction

The beauty of hard outer protective layer of shells is admired by each and everyone. According to Hindu mythology some shells of *Turbunaria sp.* are believed to be the sacred reflection to the God Vishnu. From the ancient days the chank is considered as holy. Seashells are found in wide range of colors, shades, tones and texture.

A soft-boiled animal is present beneath this hard shell. This shell gives the protection to that animal. Marine mollusks such as; clams, oysters, mussels, snails are having exoskeleton which is a hard protective covering layer. These shells are major source of organic decomposition. This layer is so hard by the presence of calcium carbonate with a very less quantity of protein. All the seashells play a very important role for ecology and our human society as well. In ancient days seashells like cowry and tusk shells are used as currency. As these are easy to carry and durable too. For making ornaments, cutting tools, lamps, basins these shells are used world widely. Even in some parts of India for astrological prediction cowries are used. Mostly decoration of seashells started by Portuguese in Goa and more over the near about coastal areas. This unique craft is now familiar in everywhere. Around 50,000 mollusk species are found on earth. Some are used as seafood or in craft industries.

Around 5070 numbers of species are found in India. Among them some are belong to freshwater or marine habitat. In India marine mollusk diversity is rich and abundantly found in coast of Gujarat, Tamilnadu, Andaman and Nicobar island Lakshyadeep island. Various gastropod species are found in India, which is gradually exploited due to its several uses.

## Common gastropods found in India

Gastropoda is the largest molluscan class having a large diversification. In larval stage it going through the process

'torsion'. In this process the entire top of their body twists 180 degree on their foot. This is coiled shape. It maybe left-handed or right-handed. Left-handed coil is known as sinistral (spiraled counter-clockwise) and right-handed coil is known as dextral (clockwise). The marine gastropods are mainly reported in c India, coastal belts of Kerala, Maharashtra, Goa, Gujarat, Tamilnadu, Andaman and Nicobar island Lakshyadeep island and some eastern coastal states. Gulf of Mannar, Tuticorin coast are known as Gastropod resources bed. In Tamilnadu coast sacred chank *Turbunaria sp.* is used to culture. Other important sea shell species are Button shell (*Umbonium sp.*), Winged shell (*Strombidae*), Spider shell/ Scorpion shell (*Lambis sp.*) Cowry (*Cypraeidae*), Helmet crab (*Cassididae*), Hairy triton (*Cymatidae*), Frog shell (*Bursidae*), Murex shell (*Muricidae*), Rock snail (*Thaididae*), Whelk (*Nassaridae*) are having good commercial market price.

Ornamental gastropods are extensively used in craft industry and it has having high international price. Mostly these group of animals lives in coral reef areas like Gulf of Kutch, Gulf of Mannar, Palk bay, Andaman and Nicobar island and some islands of Lakshyadeep. But due exploitation by shrimp trawls and other traditional fishing gears affecting the population of *Babylonia spp.* as well as ornamental chanks such as, Wing shell (*Tibia curta*), Purse shell (*Bursa spinosa*), Screw shell (*Turritella attenuata*), Cone shell (*Conus glans*). Marine gastropods are more ornate than the freshwater. A few gastropods are used as food such as, abalone, limpet, whelk, conch and other different are used as preparation for escargot. Most of the gastropods are act as decomposer as they decompose they decompose the dead plants and animals. In every habitat they act as decomposer community and predator as well.

## Exploitation of gastropods

The shells were always valued by their size. Cephalopods

are having high market price both in national and international market, so irrespective of their size the fishing of cephalopod is going on. Some dominant sp. exploited due to fishing are *Uroteuthis duvaucelli* (Indian squid), *Sepia pharaonis* (Pharaoh cuttle fish), *S. aculeate* (Needle cuttle fish), *Amphioctopus neglectecus* (web footed octopus). These are mostly exploited by bottom trawling. Fishing banned in India of some endangered species like top shell (*Trochus sp.*). Due to less population *Abalone sp.* fishing is almost stop. Most of these are caught by squid jigging and trawling. The bottom trawlers which are operating upto 200m depth are using for cephalopod fishing. Some traditional gears like shore seine, boat seine, hooks and lines are still using to catch cuttle fishes. The outer hard cover is used as art and craft, cowries are used currency. Some religious sentiments attachments towards chank are lead to more exploitation of gastropods irrespective of their size. Considering the intense exploitation of these animals in certain areas as a raw material for shell-craft industry.

### Common bivalves found in India

Bivalves belong to the phylum mollusca. It is the largest phylum of invertebrate animals known as mollusca, secondly only to Arthropods. 'Mollusc' word originates from Latin word, derive from the word 'mollis' which means soft. This successful group of animals is found in a wide environmental range. These are highly diverse found in terrestrial, marine and freshwater habitats. Among them freshwater mussels are coming under class Bivalvia which comprises about 14% of total molluscan species. The organisms like clams, mussels, edible oysters, pearl oysters, window pen oysters, cockles of this group are contributing towards fisheries from marine and brackish water resource. They have two hard outer shells to protect their body and a hinge joint is there to connect the two shells. The wide variety of shape and colours are reflected in diversified species of molluscan family. Bivalves are benthic mollusc found in intertidal and sub tidal region. They are filter feeders mainly feeds on phytoplankton and detritus which is abundantly available in natural water bodies. They are having byssus threads which is using as attachment organ. In distal region silk and proximal region elastin is present. Byssal thread is composed of collagenous proteins. Some of them size varies from as small as thumbnail to others as big as a plate. These bivalves are mostly caught and cultured for its meat and outer shell purpose. The rare pearl production can be done by this pearl oyster. From economic prospective Bivalves are valued for their beauty, shell decoration also. This leads to overharvesting of mussel resources. Marine bivalves are distributed along all Indian coasts. Oysters are used for meat purpose where as pearl oysters are using for pearl production. Among oyster resources *Crassostrea* is found abundantly, window pane oyster *Placenta* is restricted to some region and its getting exploited Indian back water oyster. (*Crassostrea madrasensis*), Indian rock oyster (*Saccostrea cucullata*) found throughout the Indian coast but other *Crassostrea sp* like *C. gryphoides* and *C. rivularis* restricted to north-west coast of India.



### Biological role of mussel

These are labeled as good indicators of biological integrity and water quality by scientists. They can withstand with hydrodynamic environment. It used to assess environmental contamination or pollution. The use of freshwater mussel shells as indicators of ecological integrity and environmental stress has been informally exercised by scientists since early 1900s [1]. Bio-indicator is an organism whose characteristics are used to point out the presence or absence of environmental conditions which cannot be feasibly measured from other taxa or the environment as a whole (Landres, et al. 1988). The Rainbow mussels (*Villosa iris*) have been used extensively as a surrogate to evaluate the effects of various toxic contaminations to freshwater mussels (Mummeer, et al. 2003 Valenti, et al. 2005,2006; Wang, et al. 2007). Some anti-fouling agents like tributyl tin cause shell deformities and making cavities in it. Here the role of mantle is very vital as bioaccumulation of metal and organic contaminants in addition to gills, kidney and digestive glands. Mussels are also treating as excellent indicators of the long term health of aquatic ecosystem. In adverse condition adult mussels cannot respond quickly as they are sluggish in nature and if they disappear from a area then slowly they can recolonize. In adverse environmental condition their growth rate become very slow, either they die or stop reproducing. The stress factors like low dissolved oxygen, chemical contamination and sedimentation are affecting the growth of mussels. When the contaminants such as mercury, lead, dioxin, poly-chlorinated biphenyls, and aromatic hydrocarbons are present in tissue, then it will indicate the exposure risk of entire aquatic community and the ecosystem health. Excessive suspension of sediments affects the mussels because it clogs the gills which interfere both feeding as well as respiration. Therefore, as a biofilter mussel could be used in the early stages of drinking water treatment.

### Exploitation of bivalves

Traditionally mussels are collected by hand picking or scoop nets. This exploitation of mussel is doing on monsoon season. As in that time fishermen have less fishing activities and more numbers of juvenile of mussels are found. These bivalves are underexploited in north-east and north-west region of our country, but it's getting overexploited in south-west and south-east coast. Some bivalves are utilizing more in states of Kerala, Tamilnadu, for which Government of Kerala following some regulation act on fishing of Short-neck clam (*Paphia*



*marabarica*). Ban of fishing season and regulation act on mesh size is there to avoid exploitation. Localized overexploitation of stock is a major drawback in bivalve fisheries. Due to lack of proper data base of bivalve landing is creating obstacles for researchers to conclude population of particular species.

### Use of seashells

Freshwater mussels are important in aquatic ecosystem because they are sedentary suspension feeder so that they can remove a variety of materials from the water column including sediments, organic matters, bacteria and phytoplankton. In short term it can be say that mussels are biofilters or living filters. To remove the suspended matters from drinking water is considered as desirable in order to treatment of the water and reducing algal bloom. British rivers indicate that mussel filtering removes between 7% and 30% of the particulate, after in a parcel of water travelling 10 km downstream. This implies that mussels play an important role in the removal of suspended particulate matter in river ecosystem (McIvor, 2004).

Some part of India molluscan sp. is using as food in their diet. Few molluscan sp are sold in regional market daily.

The shell of bivalves has quantified uses in pharmaceutical, lime, dye industries. Bivalve is a combination of biomaterials. It accounts more calcium carbonate and minerals along with small amount of other elements like; nitrogen, sulfur, phosphorus, potassium and magnesium. This is the reason the bivalve shell is the potential source of lime for use in water treatment. This lime is being used for white washing, tobacco products, cement, bleaching powder, jaggery industries and country liquor distillation units (Naidu and Mishra 1998; Pattanayak and Mishra 2004; Panda and Mishra, 2007) [3,4].

In aquatic food chain bivalves are having a remarkable position. The flesh of the mussel is used as feed ingredient for carnivorous fishes and prawn culture as it is rich in protein and other nutrients.

From the archaeological excavation it has been seen that people were using the bivalves shells to temper pottery, utensils and for the making of sharp tools. Even now-a-day in some part of Odisha the tribal community uses sharpened shells as peeler. North American people making fishing tools, plow blades and hoes for tilling the soil, shovels.

Shell decoration is a distinctive form of decoration. This is easy to handle and this craft is so popular in both rural and urban area. Now it's a trend for decoration material in aquarium. For oil lamp or pen stand it used to use.

### Conservation of seashells

According to IUCN, 2016; only 87 of 283 critically endangered terrestrial gastropods found worldwide. Habitat loss, perturbation, invasive species and pollution may increase the impact of climate change in many species. Some ornamental molluscs has been declared as endangered. Those endangered species are protected and coming under Wildlife Protection Act [5-8].

CMFRI, Summer school bulletin. (Major chank resources occur in the Gulf of Mannar, particularly along the Ramanathapuram – Tirunelveli coast. Other areas are Tanjavur, South Arcot and Chingelpet in Tamil Nadu, Trivandrum coast in Kerala, the Gulf of Kutch in Gujarat and the Andamans. Nayar and Mahadevan (1973, 1974) dealt in detail the chank fisheries while Alagarwami and Meiyappan (1989) gave a general review. Appukuttan, et al. (1980) described the long line fishing for chanks in Kerala and Pota and Patel (1988) reported on the Gulf of Kutch chank fisheries. Unlike pearl oysters, the chanks are regularly fished with few exceptions) [8-11].

Mollusks generally breed almost all around the year but the peak breeding season is monsoon. The juveniles are found more in post monsoon season. At that time fishing for them or their collection should be completely stop. Conservation and stock sustainability strategy for endangered species must be there.

### Conclusion

Now-a-days tourism is interesting hobby and very frequency is for beach areas. Shell collecting avocation is popular all worldwide, for them protection is essential because they are getting over-exploited. Human activity, climate change issues need to take concern for their conservation and balancing the ecology. For biodiversity restoration these benthic organisms are keystones. Some survey has been shown that number of seashells is getting reduce by three fold within ten years. Shells have multiple functions in natural ecosystem so their conservation and protection is essential. Outer hard sea shells provide building material for birds, attachment surface t many marine organisms like, sponges, algae. Some animals like hermit crab take shelter in that exoskeleton which can protect it from predators also. Bivalves are the natural bio-filter which can out the pollutants from the water. The conservation of these biotic components are necessary not just for aesthetic reason but for their vital role in ecosystem. These are important for economic as well as ecological resources.

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