

Indian Cephalopod Resources: Distribution, Commercial Exploitation, Utilization and Trade

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Cephalopods are purely marine in habitat, and there are about 600 living species. They are considered as the fastest marine invertebrates. The cuttlefishes come under the order Sepioidea and are characterized by the presence of a shell (chitinous or calcareous), 10 circum oral appendages and the tentacles are retractile into pockets. Suckers have chitinous rings. Posterior fin lobes are free and not connected at midline. The cuttlebone is internal and located dorsally underneath the skin.

The squids come under the order Teuthoidea. The shell is internal and is known as gladius or pen. It is chitinous and feather or rod shaped. There are 8 sessile arms and 2 tentacular arms which are contractile but not retractile. Suckers are stalked, and with or without hooks. Fin lobes are fused posteriorly. Eyes are without lids and either (1) covered with a transparent membrane, with a minute pore (Myopsida) or (2) completely open to the sea, without a pore (Oegopsida).

Octopuses are members of the order Octopoda. There are 8 circumoral arms and tentacles are absent. Fins are sub-terminal (on sides of mantle), widely separated or absent. Shell is reduced, vestigial, "cartilaginous", or absent. Suckers are without chitinous rings and are set directly on the arms without stalks.

Cephalopods are by far the most important group with an average annual production of about 1,12,000 tonnes and in 2008, the production has touched an all-time high of 1,54,000 t. They are landed as by-catch and as a targeted fishery mostly in mechanized trawlers operating up to 200 m depth, and beyond in some areas. The dominant species occurring in commercial catches are *Uroteuthis (P) duvauceli*, *Sepia pharaonis*, *S. aculeata* and *Amphioctopus negelectus*. A list of neretic species commercially exploited is given in Table below.

Table 9.1 List of commercially exploited cephalopods from Indian Seas

Species	Common Name	Distribution
Squids		
<i>Uroteuthis (Photolologo) duvauceli</i>	Indian squid	All along Indian coast
<i>Loliolus (Nipponlologo) uyii</i>	Little squid	Madras & Visakhapatnam
<i>U. (P) edulis</i>	Needle squid	SW and SW coast
<i>Loliolus (Loliolus) hardwickei</i>	Investigator squid	All along Indian coast
<i>Sepioteuthis lessoniana</i>	Palkbay squid	Palk bay & Gulf of Mannar
<i>Sthenoteuthis oualaniensis</i>	Oceanic squid	Oceanic Indian EEZ
<i>Thysanoteuthis rhombus</i>	Diamond squid	Oceanic Indian EEZ
Cuttlefishes		
<i>Sepia pharaonis</i>	Pharaoh cuttlefish	All along Indian coast
<i>S. aculeata</i>	Needle cuttlefish	All along Indian coast
<i>S. elliptica</i>	Golden cuttlefish	Veraval & Cochin
<i>S. prashadi</i>	Hooded cuttlefish	SW & SE coast
<i>S. brevimana</i>	Shortclub cuttlefish	Madras & Visakhapatnam
<i>Sepiellainermis</i>	Spineless cuttlefish	All along Indian coast
Octopuses		
<i>Amphioctopus neglectus</i>	Webfoot octopus	SW & SE coast and islands
<i>A. marginatus</i>	Veined Octopus	SW & SE coast and islands
<i>A. aegina</i>	Marbled octopus	SW & SE coast and islands
<i>Octopus vulgaris</i>	Common octopus	SW & SE coast and islands
<i>Cistopus indicus</i>	Old woman octopus	SW & SE coast and islands

Methods of Exploitation

Although about 40 per cent of the world's cephalopod catches are taken by squid jigging and 25 per cent by trawling, in India, cephalopods are principally caught by bottom trawlers operating upto 200m depth zones. While most of the catch is brought in as by-catch from the shrimp and fish trawls employed by the trawlers, of late, there is a targeted fishery for cuttlefishes during the post monsoon period (Sep-Dec) using off bottom high opening trawls along the SW and NW coast. Prior to the seventies traditional gears like shore seines, boat seines, hooks and lines and spearing were the principal gear employed to capture cephalopods. These traditional gears continue to be used especially for cuttlefishes at Vizhinjam, where there is no trawl fishery. Experimental squid jigging has been tried with Japanese expertise along the west coast by GOI vessels with considerable success (Nair et al., 1992a). However, commercial squid jigging is not practised in India.

Cephalopod Production

Cephalopod production, which remained at very low level upto the early seventies, has shown a remarkable increase crossing the 100,000 tonne mark in 1994. From 1973 onwards the commencement of export of frozen cephalopod products to several countries saw the transition of the resource from a discard to a quality resource fetching high foreign exchange (Silas, 1985). Thereafter its production showed a steep increase. The west coast

maritime states, Gujarat (GUJ), Maharashtra (MAH), Goa (GOA), Karnataka (KAR) and Kerala (KER) contribute to the bulk (86 per cent) of the production. While the production from the east coast amounts to only 14 per cent, of which, Tamil Nadu (TN) contributes the maximum followed by Andhra Pradesh (AP). The states of West Bengal (WB), Orissa (OR) and Pondicherry (PON) contribute only a small percentage. Overall, KER ranks first contributing a third of the all India production followed by MAH, GUJ and KAR. The cephalopod production (t.km⁻²) in different maritime states indirectly this indicates the relative abundance in the continental shelf and level of exploitation of cephalopods in the different maritime states. Maximum productivity (0.699 t/km²) was observed in Kerala, followed by Tamil Nadu, Karnataka, Maharashtra and Goa.

At the national level, Jan-Mar and Oct-Dec were the most productive period. Along the upper east and west coast, the above months were the most productive, while in KAR, KER, TN and AP Jul-Sep was also equally productive.

Species-wise Production

The neretic squid *U. duvauceli* followed by the pharaoh cuttlefish *S. pharaonis* and the needle cuttlefish *S. aculeata* together contribute to 84 per cent of the total cephalopod production from India. Along the west coast, *U. duvauceli* contributes to more than 50 per cent of the landings, followed closely by *S. pharaonis* and *S. aculeata* (47 per cent). Among squids, *U. edulis* and among cuttlefishes, *S. elliptica* form significant part of the catch from Kerala and Gujarat respectively. A number of octopus species, chiefly, *A. neglectus* forms 5-6 per cent of the catch mainly from Kerala.

The dominant species in landings from the east coast is *S. pharaonis*, followed by *U. duvauceli* and *S. aculeata*. The diversity of squid and cuttlefish species exploited in commercial quantities is more along east coast as compared to west coast. *U. edulis* and *S. lessoniana* are also caught in considerable quantities from TN and AP. Octopus species, which were formerly discarded, has gained importance in recent years. The major production is from Kerala State. Their proportions in the landings from both the coasts are increasing considering the export value of the same.

Utilization and Marketing

About 15-20 per cent (Rs 1,393 Crores) of our marine products export earnings (Rs. 8,608 Cr.) is from cephalopods, comprising of coastal squids, cuttlefishes and octopuses in 2008-09. The squid export from India increased from 34,172 tons in 2007-08 to 57,125 tons in 2008-09 registering an increase of 67 per cent. Existing destination markets for the currently exploited squids from India are in EU, US, Japan and Mediterranean countries such as Spain, Greece, Italy and Portugal.

The squids products presently exported from India are presented in the below figure. Among the 44 varieties, the frozen (Fr.) squid (SQ.) whole (W.) and frozen squid whole cleaned (W.C.) contributed more than 60 per cent to the exports.

In spite of upsurge in the demand for ready-to-eat and ready-to-cook products in international and domestic markets, our export of value-added squid product such as frozen squid rings breaded (Fr. SQ. Rings (breaded)) and frozen squid stuffed is less than 1 per cent.

Table 9.2 Unit value realized for squid products exported from India

ITEM	Product Form	Grade	Price (US \$)	Market	Origin
Coastal Squid	Fillet	2/4	8.90	JAPAN	Tuticorin
		5/7	8.50		
		8/12	6.60		
		13/20	5.90		
	Wings	U/10	1.85	JAPAN	Tuticorin
		10/20	1.85		
		20/up	1.85		
	Whole, cleaned	10/20	2.20	USA	Kollam
		20/40	1.65		
	Whole	3/6	1.85 (Euro)	SPAIN	Kollam
		6/10	1.70 (Euro)		
		10/20	1.35 (Euro)		
Whole Cleaned	6/10	3.00	EU	Veraval	
	10/20	2.60			
	20/40	2.50			
WC Tray pack	20/40	2.65	ITALY	Mumbai	
Rings blanched IQF	40/60	2.50	ITALY	Kochi	
	60/up	2.80			
Tentacles blanched IQF	60/up	2.15	ITALY	Kochi	
Rings blanched IQF	60/up	2.30	FRANCE	Kochi	
	60/up	2.20			
Tentacles blanched IQF	60/up	2.20	FRANCE	Kochi	
	Broken	1.80			
Whole	10/20	1.95	UAE	Mangalore	
	20/40	1.35			
	40/60	0.90			

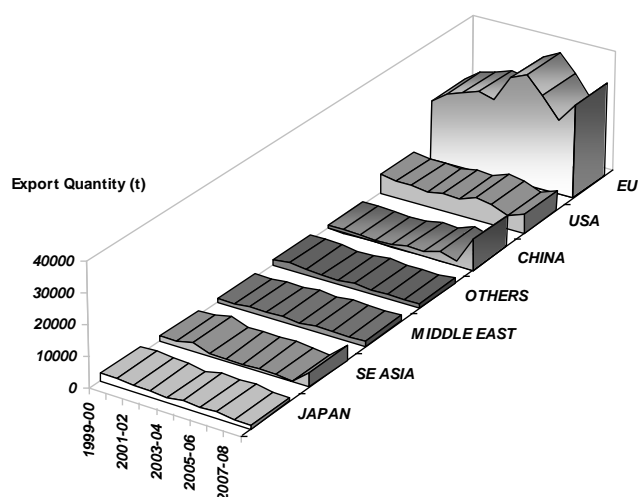


Fig 9.1 Quantity of neretic squid exported to different international destinations from India

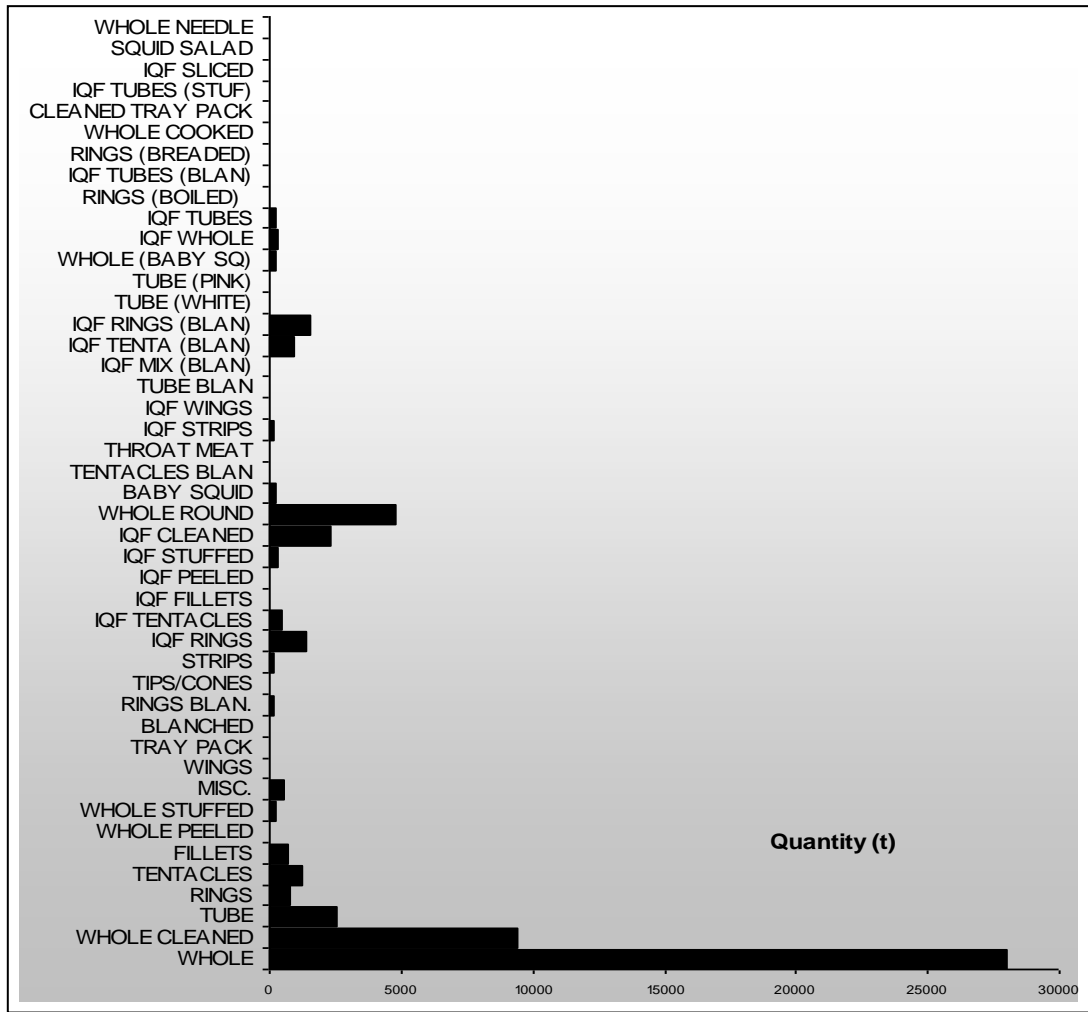


Figure 9.2. Coastal Squid products exported from India

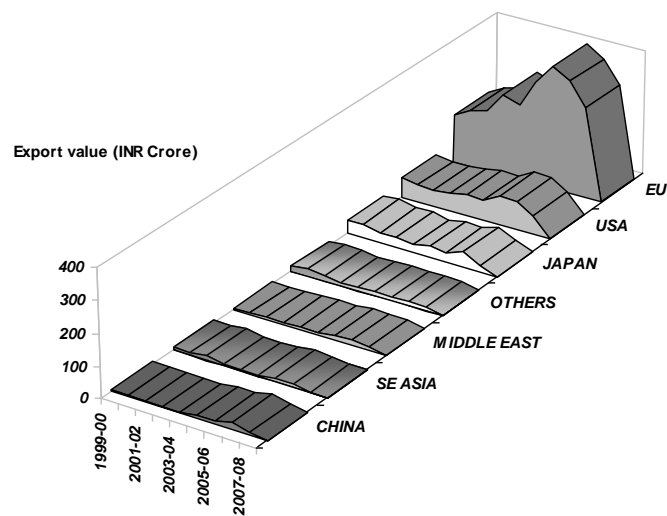


Figure 9.3 Export value realized from neretic squid exports

Oceanic Squids

The purpleback flying squid *Sthenoteuthis oualaniensis* (Lesson, 1830) is distributed in the tropical and sub-tropical areas of the Pacific and Indian Oceans. The Arabian Sea is considered as one of the richest regions for these oceanic squids in the Indian Ocean. These squids are pelagic animals living in the open ocean, usually absent over the continental shelves (<200 m), and first appear over continental slopes at depths above 250-300 m. The species has been called as the master of the Arabian Sea due to its high abundance, large size, short life-span, fast growth and near monopoly of the higher trophic niche. The estimated squid stock in the Arabian Sea varies in the range 0.9-1.6 million t. In recent years, the species has been found to occur in hook and line and gillnet catches in Cochin (Mohamed et al., 2006) and Veraval (Moorthy et al., 2009) and Mohamed et al. (2006) has worked out its population characteristics as $L_{\infty} = 49.1$ cm; $K = 0.83$ yr⁻¹ and $t_0 = -0.06$ yr. A major programme is currently underway to exploit this resource using squid jigging [official website of the project: www.oceanicsquids.naip.org.in]

The emergence of cephalopods as an important marine fishery resource of the country with almost cent per cent export potential warrants careful monitoring and appropriate management particularly because we are exploiting above the revalidated potential yield. Several gaps exist in our knowledge of these valuable resources, especially on the life histories of our species, and these need to be addressed on a priority basis.
