

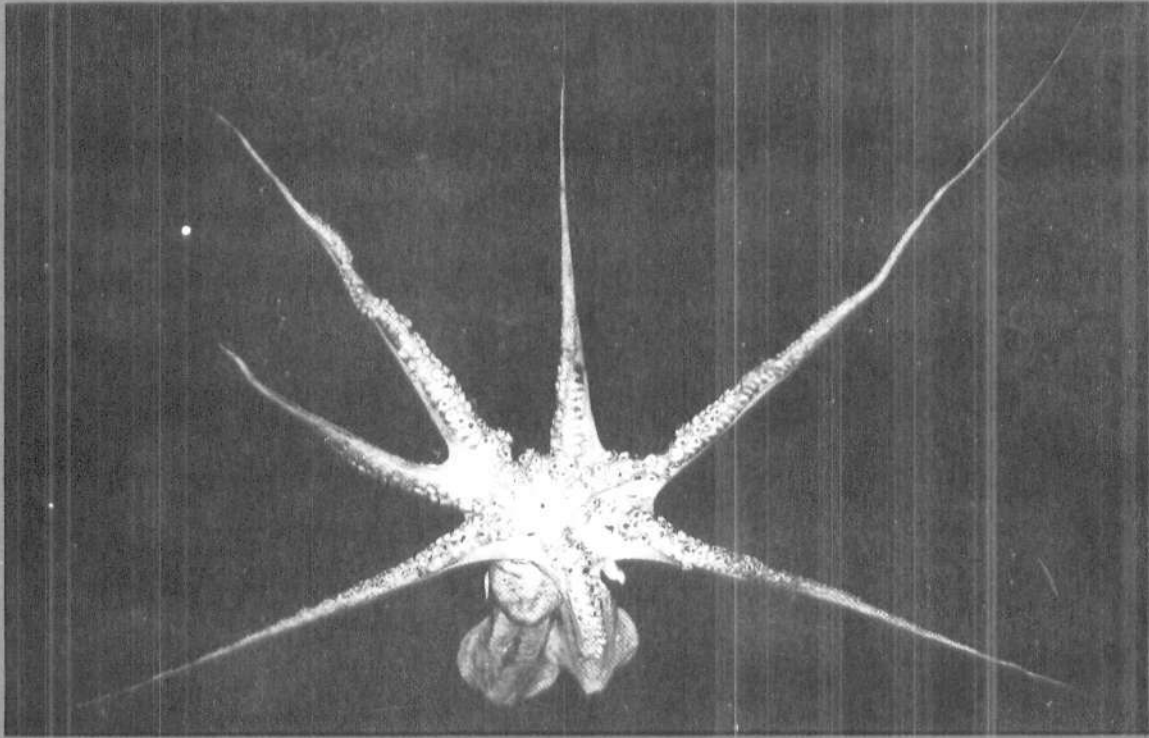


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भारतीय कृषि अनुसंधान परिषद
INDIAN COUNCIL OF AGRICULTURAL RESEARCH

873 THE EELS AND EEL FISHERIES OF INDIA

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Introduction

Traditionally marketable species of eels are caught from conventional fishing grounds of northwest and northeast coasts of India and are largely a by-catch. They are considered a luxury food and consumed as a delicacy by Greeks, Romans, Germans, Japanese and people of several Asian and European countries, whereas in India eels are considered as poor man's food. But their export demand offers scope for culture and live transport to foreign markets, besides increasing their exploitation from all along the distributional range.

Eels are long-bodied, snake like fishes, having a crevice dwelling or sediment-burrowing mode of life, though some live in the pelagic realm of the open oceans. Though they are good swimmers, many eels are rather sedentary and rely on well developed sense of smell and large teeth to capture food, mainly crustaceans and small fishes. Eels are typical denizens of warm waters and are abundant on coral reefs. All eels, even the freshwater species, breed in the open ocean and spend their early part of life in the pelagic realm as flat, transparent, delicate larvae

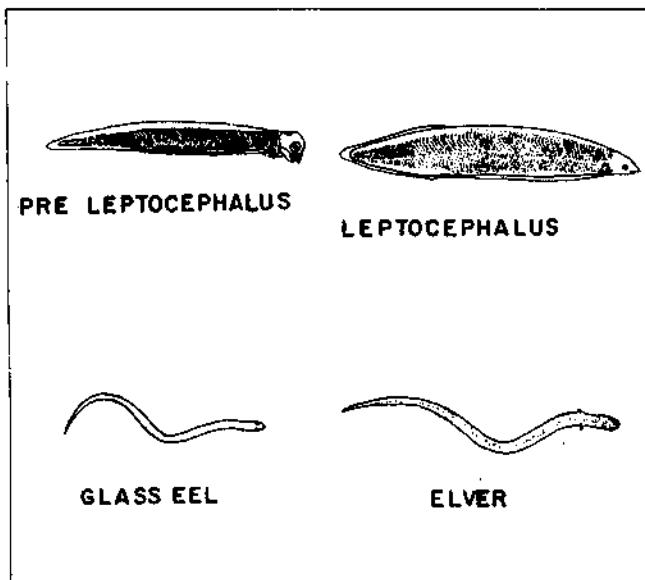


Fig. 1. Larval forms of freshwater eel.

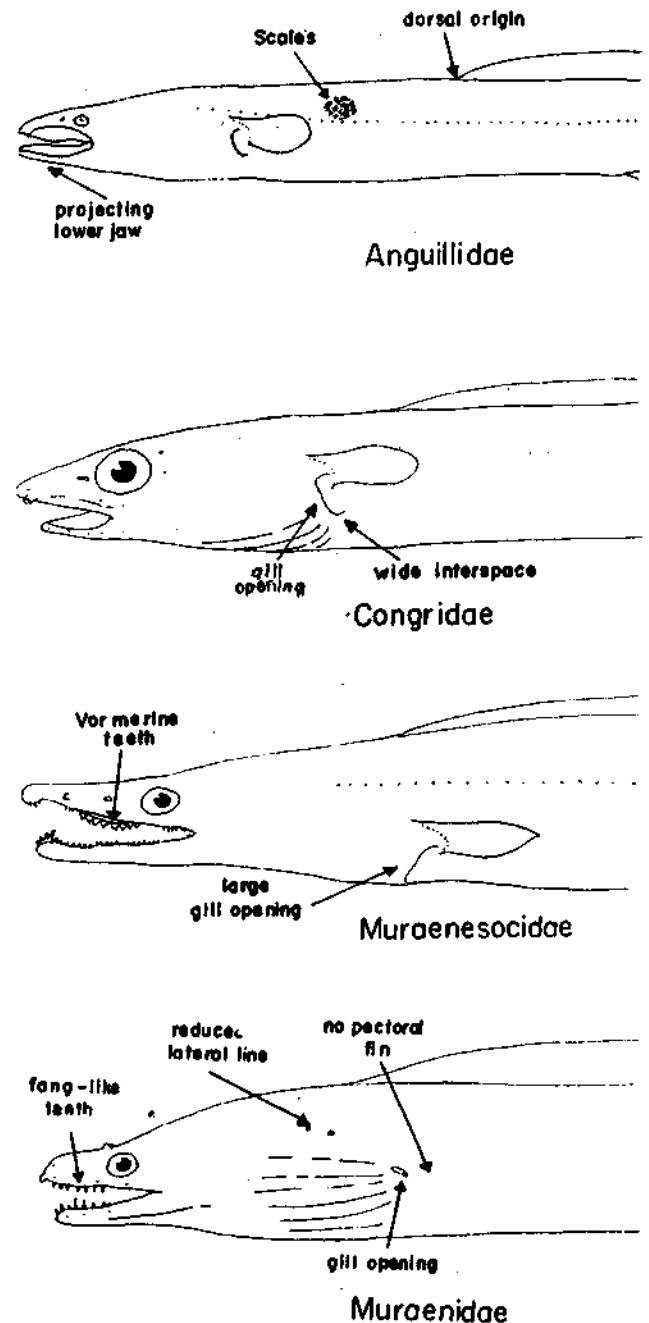


Fig. 2. Representative of major families of eels.

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(leptocephali), which look different from their adults. The larva metamorphoses into elver before becoming adult (Fig. 1). The leptocephali form one of the important groups among the DSL bio-composition of the mesopelagic zone. They are abundant in the Arabian Sea off 1000 m depth zone. Eels belonging to 18 species under 6 families are reported in the Indian waters. The diagrammatic characters of the four commercially important families are depicted in Fig. 2.

Vernacular names

The eels are known as *wam* in Gujarat and Maharashtra; *aarel*, *kariaarel* in Kerala; *vilangu*, *kulivi pambu* or *kadalpambu* in Tamil Nadu; *nal-lapamu*, *talabon*, *tellapamu*, *pasupu pamu* in Andhra; *dantia sapu*, *lahantara*, *panitsapa*, *sata halt* in Orissa and *samudra bera*, *berua*, *bam*, *sona bam* in West Bengal.

Brief biology and ecology

1. Anguillidae : Fresh water eels

Freshwater eels actively forage at night, feeding on a wide range of small bottom-dwelling invertebrates. They breed in the open oceans and the currents drift the young larvae (leptocephali) towards coast, where they metamorphose into tiny, transparent elver stage and enter rivers.

Anguilla bengalensis bengalensis (Gray, 1831) grows to a size of 120 cm and *Anguilla bicolor bicolor* McClelland, 1844 grows to 80 cm are the two species of anguillidae in India.

2. Congridae : Conger eels

Uroconger lepturus (Richardson, 1848) is the only species in this family from Indian waters, which grows upto 40 cm. Conger eels are denizens of tropical to temperate waters from the coast to the deep sea on soft sandy mud bottom feeding mainly on small bottom dwelling crustaceans.

3. Muraenesocidae : Pike congers

Pike congers occur in tropical waters in the soft bottoms upto 100 m depth and in estuaries.

The shallow water species are apparently nocturnal and feed on bottom living fishes and crustaceans. *C. talabonoides* and *M. cinereus* are common in Maharashtra and Gujarat during monsoon months. Four species are recorded in Indian waters and they grow to a maximum length of 80 cm (*Congresox talabori*) (Cuvier, 1829), 250 cm (*C. talabonoides*) (Bleeker, 1853), 180 cm (*Muraenoax bagio*) (Hamilton-Buchanan) and of 80 cm (*M. cinereus*) (Forsskal, 1775)

4. Muraenidae : Morays

The largest known eel, *Thyrsoidea macrura* (Bleeker, 1854), which grows to 400 cm belongs to this family. Morays inhabit shallow waters of tropical seas. Although a few species invaded rather deep water (over 200 m) and some others occur in temperate areas they are most abundant on reefs or in rocky areas where they find protection in holes and crevices. They are scavengers and predators which become active at night in reef flats and feed on small reef animals, particularly crustaceans.

Thyrsoidea macrura (Bleeker, 1854) – 400 cm; *Echidna nebulosa* (Ahl, 1789) – 80 cm; *E. zebra* (Shaw, 1797) – 150 cm; *Lycodontis meleagris* (Shaw & Nodder, 1795) – 120 cm and *Siderea picta* (Ahl, 1789) – 140 cm are the species and their recorded maximum size.

5. Ophichthidae : Snake eels and Worm eels

These are occurring mostly in tropical and sub-tropical waters between the shore line and depths to below 75 m. Many species are benthic and borrow partially or totally in the bottom at least for part of the day. They inhabit estuaries and inshore area of turbid water, lagoons and some species enter fresh water and paddy fields. They feed on small, sand-dwelling invertebrates.

Caecula pterygera Vahl, 1794, *Lamnostoma orientalis* (McClelland, 1844) and *Neenchelys buitondijki* Weber & de Beaufort, 1916 grows to a length of 30 cm. The other two species, *Pisodonophis boro* (Hamilton-Buchanan, 1822) and *P. cancrivorus* (Richardson, 1844) grow to 100 and 75 cm respectively.

6. Ophidiidae : Cusk eels, Brotulas

Only one species, *Brotula multibarbata* (Tem-

minck & Schlegel, 1846) is the representative of this family. Adults are bottom dwelling, on the continental shelf and slopes, down to 650 m depth; early stages are pelagic and are usually found in reef areas. It grows to a size of 50 cm.

Present status of fishery

The catch : the estimated annual landings of eels during 1976-'95 has ranged from 4,309 t to 12,997 t with an average of 7,277 t. Despite the intensification of trawling, the catches have declined in recent years. (Fig. 3). Five yearly average

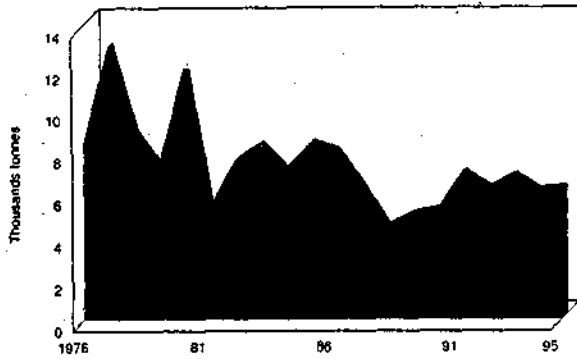


Fig. 3. All India eel catch during 1976-'95.

catch showed that it was high during 1976-'80 (9,832 t) and gradually declined in 1981-'84 (7,234 t) and 1985-'90 (5,676 t) and showed a slight revival in 1991-'95 (6,366 t).

Although eels occur in the landings of almost all maritime states, 82 % of the total catch (1976-'95) comes from the northwest coast (Gujarat and Maharashtra). The northeast coast (Andhra and Orissa) contributes 13% of the catch. The average (1991-'95) catch composition of the maritime states is given in Fig. 4.

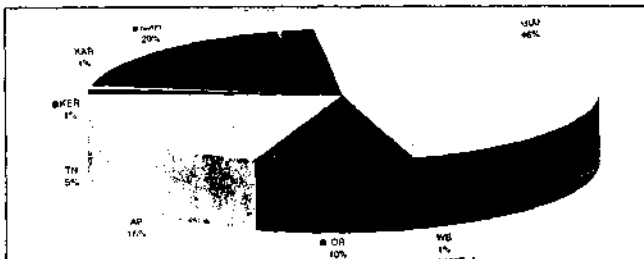


Fig. 4. Statewise eel landings (percentage).

From the landing data, it is evident that the eel production decreases in the northwest while it increases in the northeast (Fig. 5 and 6). Five

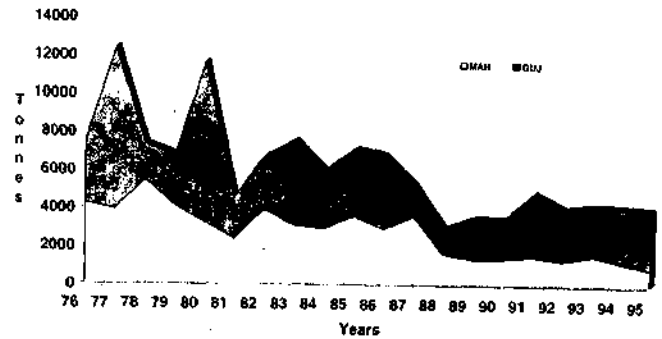


Fig. 5. Eel landings of Maharashtra-Gujarat during 1976-'95.

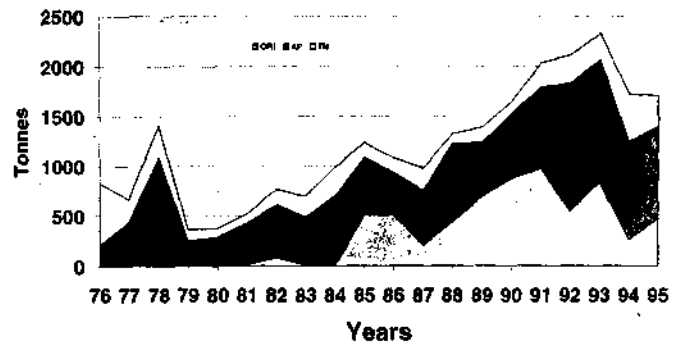


Fig. 6. Eel landings of Orissa, Andhra Pradesh and Tamil Nadu during 1976-'95.

yearly statewise composition showed that the percentage contribution of eel is stable in Gujarat, declined in Maharashtra and increased in Orissa and Andhra (Fig. 7).

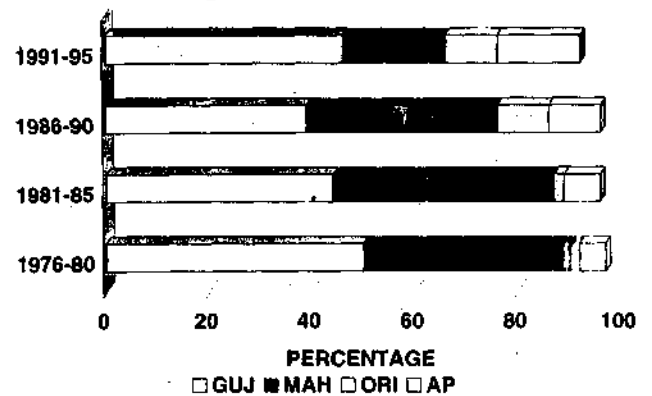


Fig. 7. Five yearly average catch of eels of different maritime states.

Fishing methods : Eels are most commonly fished by trawl net (70 % catch) followed by non-mechanised gear (13 %) (Fig. 8). However, fishing

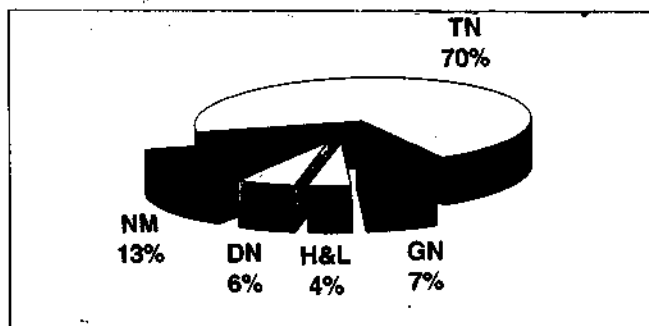


Fig. 8. Gearwise all India eel catch.

methods differ from coast to coast. State wise major gear which contribute the eel catch are given in Fig. 9.

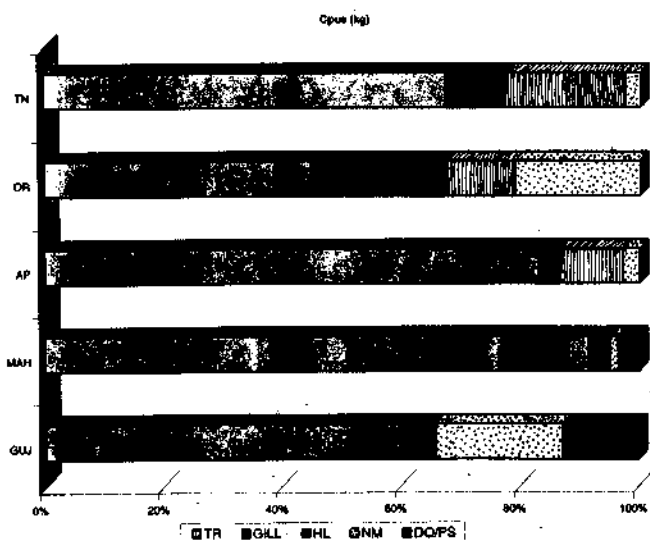


Fig. 9. Statewise eel catch in different gear.

Fishing grounds and season : The eel fishing grounds are located off Cambay, Veraval and Kutch. They are available throughout the year and better catches are realised during May-September.

Depthwise distribution : They prefer the depth range 16-20 m. & 52-60 m Their cpue along the trawling grounds off Gujarat -Maharashtra, based on exploratory survey reports, is given in Fig. 10. Bapat *et al.*, (*Bull. Cent. Mar. Fish. Res. Inst.*, No.33, p. 86, (1982) reported that the depth range 55-90 m was the most productive area in the above mentioned grounds. Pella-

tric trawling yielded a catch rate of 12.8 kg/hr from 55-90 m depth during January and February.

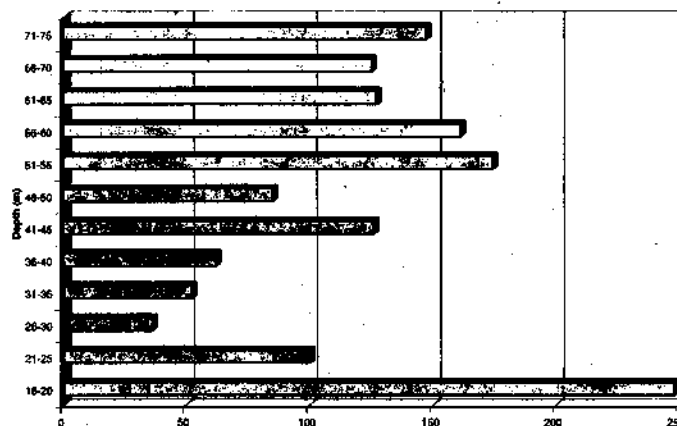


Fig. 10. Depthwise eel catch (Bombay-Gujarat).

Economic Importance

Utilisation : Eels are an important source of food in many parts of the world. Many Asian countries pay significant premiums for live product. The international eel market worth more than 75 million British pounds in 1976. In Europe the trade is categorised into five distinct areas, namely elvers (baby eels); fingerling eels; captured eels; cultured eels and fresh and processed eels. It can be marketed in a variety of value added forms; whole, filleted, steaks, smoked, cured, marinated etc. Fillets individually wrapped in polythene, shrink packs in polystyrene trays, vaccum packs, skin wrapped or packed in a modified atmosphere have a good market in Hongkong. Fillets are also presented in battered and breaded form. "Frozen alive" kept in polythene bags (12 kg), filled with oxygen and ice, have a good market in Hongkong. Eel flesh can also be used as the raw material for manufacturing of fish sausage and ham. The Central Institute of Fisheries Technology has developed technologies for somked eel fillets and smoked and canned eel fillet. Their air bladders yield good quality isinglass.

In Netherlands and Germany, smoked and

jellied eels are considered a great delicacy while in the Far East live eels are preferred. Europe and Far East annually produce about 20,000-25,000 t of eels during 1976. The latter is the main area of eel culture and the former the wild eel capturer.

The small sized live eels are used as a bait for long line and hooks and line, preferably for shark fishing. The colourful spotted or striped eels could be maintained in aquarium as ornamental fish.

Several species are cultured in Asia and Euro-

pe. A suitable culture technology for the Indian short-finned eel, *Anguilla bicolor bicolor* has been developed by CMFRI besides live eel collection and their transportation. The average time taken to fatten the Japanese eels to market size, 5-6 pieces per kilo is 12 months; whereas it needs 14 months for the European eels.

A suitable management strategy is imperative to achieve sustainable harvest from their distribution range. Their live export and development of suitable consumer preferred value added products would facilitate export. □