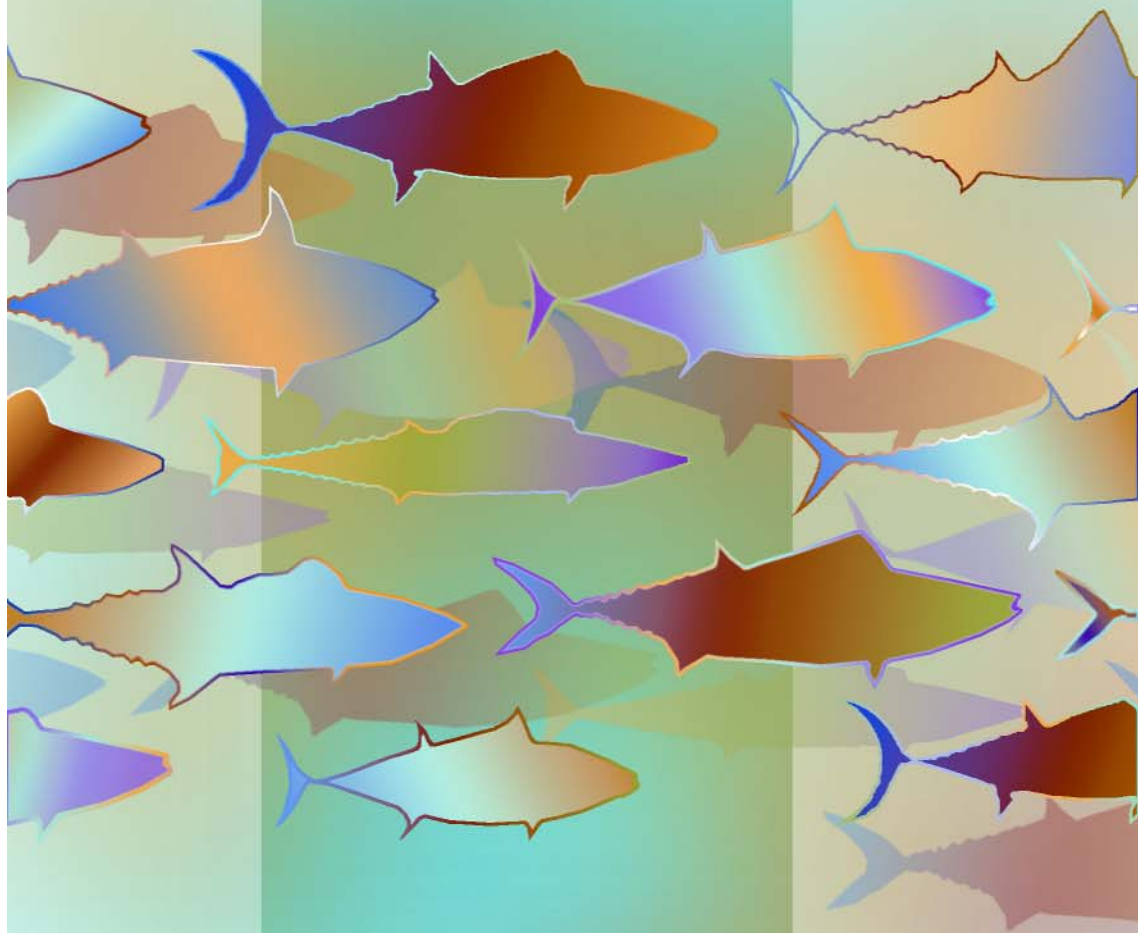


Status of Exploited
Marine Fishery
Resources of India



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RESOURCES OF INDIA**

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Lesser Sardines

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1. Introduction

The lesser sardines comprising several species of *Sardinella* other than *S. longiceps* show wide distribution in the tropics and are one of the major pelagic fishery resources of our country. Though occurring in the landings of all the maritime states, they particularly contribute to a lucrative fishery along the



Fig. 1. *Sardinella albella*



Fig. 2. *Sardinella fimbriata*

southeast and southwest coasts. These shoaling species exhibit all the characteristics of tropical pelagic resources with annual and seasonal fluctuations. Of the 15 species of lesser sardines in the Indo-Pacific region, 12 occur in the Indian waters (Figs. 1,2&3).

Lesser sardines are popularly called Kovallu, Kabala, Kokili and Petnakabala in Orissa; Khaira, Kokila and Hurhurri in

West Bengal; Noonekavallu, Batla, Soodimootikavvallu and Ballakavvallu in Andhra Pradesh; Choodai, Nonalai, Keerimeenchalai, Thattakavalai, Usikavalai, Varikavalai, Nedumkavalai, Neethukavalai, Kodakavalai, Nachalai and Peisalai in Tamil Nadu; Chalamathi, Karichala, parappanchala and Vattamathi in Kerala; Erabai and Pedi in Karnataka; and Pedwa, Washi and Charreeaddee in Maharashtra

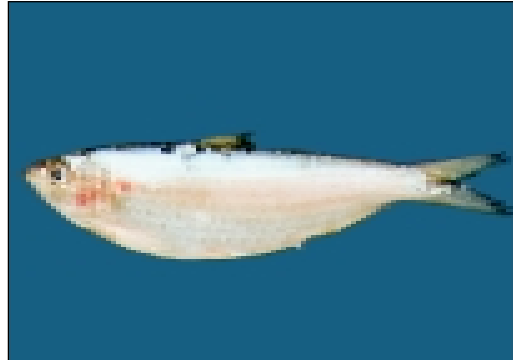


Fig. 3. *Sardinella brachysoma*

2. Production trends

The resource comprised 2.9-7.3% of the total annual marine fish production of the country during 1986-2000 period. It constituted 4.2% of the landings during 1986-90, 4.2% during 1991-95 and 4.8% during 1996-2000. The average annual yields during the above periods were 78,553 t, 94,387 t and 1,22,243 t respectively registering a

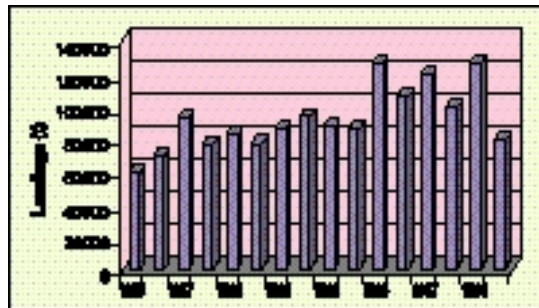


Fig. 4. All India lesser sardine landings during 1986-2000

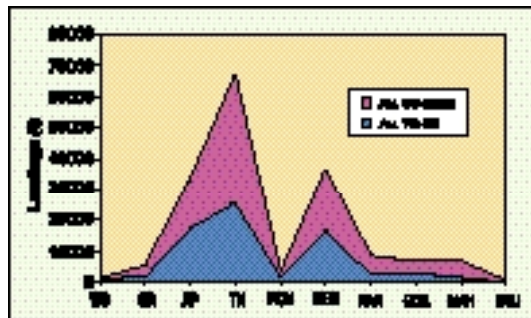


Fig. 5. Sardinella production trends of lesser sardines during 1986-2000

steady increase in production over the years. During the fifteen-year period (1986-2000), the lesser sardine catch ranged from a low of 68,267 t in 1986 to a high of 1,28,021 t in 1995 (Fig. 4). The east coast contributed 65% with an average annual production of 67,172 t during 1986-2000. The annual production along the west coast was 35,449 t comprising 35% of the total annual production. Tamil Nadu with an average annual landing of 42,263t stood first in lesser sardine production among the maritime states. It contributed 43% of the catch of the country. Kerala came next with a contribution of 22% followed by Andhra Pradesh 17% and Karnataka 6% (Fig.5).

Fishing season and species composition

The fishing season, species composition and catch rates vary between and within regions. Along the coastal states of West Bengal, Orissa and Andhra Pradesh on the east coast, the peak season is November to April-May while in the southeast coast of Tamil Nadu and Pondicherry, catches are available almost throughout the year. On the west coast, in Kerala the best catches occur from August to January/February. Along Karnataka coast, the fishery is erratic for most of the year with September-November witnessing better landings. Peak catches occur during September-February period along the Goa coast, while in Maharashtra coast it is between December and April.

More than one species contribute to the lesser sardine fishery of any region and they form a fishery throughout the year. In the Goa-Karnataka coast, *Sardinella gibbosa*, *S. dayi*, *S. fimbriata* and *S. albella* are abundant. Along Kerala coast, *S. gibbosa*, *S. sindensis* and *S. sirm* dominate while *S. clupeioides*, *S. fimbriata*, *S. melanura* and *S. jonesi* occur occasionally. *S. albella* and *S. gibbosa* are dominant in the Palk Bay and the Gulf of Mannar regions while *S. sirm* is common in the peninsular tip between Vizhinjam and Tuticorin. Along the central east coast, *S. gibbosa*, *S. albella*, *S. dayi*, *S. sirm*, *S. clupeioides*, *S. fimbriata* and *S. gibbosa* are abundant.

Means of exploitation

The traditional, motorised and mechanised crafts such as a variety of seines, gill nets and trawls are employed in the lesser sardine fisheries. Along the southeast coast, the small meshed gill nets are effectively used to exploit the lesser sardines. The seines (shore seines, boat seines and ring seines) are popular along the southwest coast. The canoes and plankbuilt crafts with outboard engines operate the boat seines (Ranibale, Mattubale, Kotibale) and ring seines at depths upto 20 to 30 m. The purse seines are operated from the mechanised units at depths upto 60 m. The trawlers operating in the nearshore waters also land sardines in considerable quantities along the Karnataka coast.

Size composition

The 0 and 1-year classes mainly sustain the lesser sardine fishery. The total length of the different species constituting to the fishery range from 4 to 20 cm. The gear used to harvest the resource determines the size of the fish. Shore seines of 9mm, 12mm and 14mm mesh and boat seines with varying mesh sizes are extensively used to harvest the new recruits, fast growing post-recruits and adults. Along the Konkan, North Kanara and Vizhinjam coasts, gill nets with a mesh size of 26mm are used. These nets harvest the 0 and 1-year classes in equal proportions. At Tuticorin, gill net is the major gear harvesting the resource. These large meshed nets land mostly (95%) 1-year class and the rest comprising 0-year class. As fishing by small meshed boat seines and torch fishing has been discontinued, growth overfishing caused by these methods has stopped. The purse seines and trawl nets generally land the one year old fishes.

3. Biology

Most of the lesser sardine species mature in the first year of their life. In most species, fishes measuring above 120 mm in total length are found to be fully mature. *S. fimbriata* attains sexual maturity at a length of 135-185 mm and *S. dayi* at 140 mm. They have protracted spawning period with a peak extending to one or two months. The lesser sardine species occurring along the two coasts show considerable variation in their spawning seasons. *S. albella*, *S. gibbosa* and *S. fimbriata* spawn once whereas *S. sirm* spawns thrice within the same spawning season releasing 3 to 4 broods per year. The spawning seasons of the dominant lesser sardine species contributing to the fishery are given Table 1.

Table 1. Spawning season of lesser sardine

Species	Area	Spawning season
<i>S. albella</i>	Palk Bay	February/March-June/July
	Gulf of Mannar	March-June
	Malabar	September-May
<i>S. gibbosa</i>	Palk Bay and Gulf of Mannar	February/March-June/July
	Lawson's Bay	February-March
	Malabar	January-May
<i>S. fimbriata</i>	Tuticorin (Gulf of Mannar)	October-November
	Vizhinjam	Throughout the year
<i>S. sirm</i>	Tuticorin (Gulf of Mannar)	November-December, February-March, May-June

Lesser sardines feed mainly on a variety of plankters. *S. gibbosa* feed on copepods, Mysis, Lucifer, larvae of prawns and crabs, fish eggs, Acetes, etc., while *S. albella* feed mainly on copepods, Lucifer, Acetes, Mysis, fish and bivalve larvae, etc. *S. fimbriata* feeds mainly on phytoplankton and copepods and *S. dayi* thrives on prawns and other crustacean larvae, Acetes, molluscan larvae, etc.

The lesser sardines exhibit all characteristics of small pelagic tropical fishes like fast growth, short life span (2-3 years) and high natural mortality. Most of the species attain 70% of their maximum length in the first year itself. The length at age of 1-year is 125 mm to 135 mm for *S. albella*, *S. gibbosa* and *S. fimbriata* and 170 mm for *S. sirm*. The growth of these sardines in relation to their life span is fastest with a K value greater than or close to 1. The high values of natural mortality (M) for the stocks of *S. albella*, *S. gibbosa* and *S. fimbriata* are in tune with their fast growth in the first year of life and as a prey for most of the large predatory fishes.

Marketing

All species of lesser sardines found along the Indian coast form a cheap source of animal protein. It is relished both in the fresh/frozen as well as dried form. The

resource is transported with ice to interior places where it fetches a good price. When landed in good quantities, they are salted and sun dried and then sent to interior markets and to neighboring states and countries for consumption. The smaller sized fishes, which do not fetch a good price in the local markets, are dried and used as the major protein source for the preparation of poultry and fish feed.

4. Stock assessment and management

The total annual stock of the lesser sardines is estimated to be 2,80,000t comprising 20,000 t in the Andaman waters, 30,000 t in the northeast, 140,000t in the southeast, 80,000 t in the southwest and 10,000t in the northwest coasts. The MSY was estimated at 1,40,000 t. The average annual production of 80,328 t during 1986-90; 94,387 t during 1991-95 and 1,22,243 t during 1996-2000, though indicated an increasing trend, is still below the estimated MSY. Studies on the stock assessment on *S. gibbosa* indicated that the yield along the southwest coast is considerably lower than the MSY and hence there is further scope of increasing the catch from this area. Along the southeast coast, the present yield is more or less steady. The resource monitoring and research results indicate that the exploitation of this small pelagic fish from the coastal waters is sustainable and that they are easily vulnerable to the traditional sector. As no single species is harvested continuously, there is no excess fishing pressure at present on the lesser sardine group on the whole.

5. Suggested reading

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