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A REVIEW OF THE SCIAENID FISHERY RESOURCES OF THE INDIAN OCEAN*

R. S. LAL MOHAN**
Central Marine Fisheries Research Institute, Cochin 682 031

ABSTRACT

The sciaenid fishery of the Indian Ocean is reviewed. Coastal areas of the Indian Ocean are divided into various geographical zones such as east coast of Africa, Red Sea, Arabian and Persian Coast, Pakistan and Indian Coast, Burma and west coast of Malaya, west coast of Indonesia and the western coast of Australia. The sciaenid fish landings of each zone is studied.

34 species of sciaenid fishes are considered commercially important among the 48 species of sciaenids occurring in the Indian Ocean. Species composition of the sciaenid fishes in each of the above zone is discussed in detail. The landings of each species is estimated and tabulated. The total landing of the sciaenids in the Indian Ocean is estimated to be about 198,480 tonnes. *Otolithes cuvieri* is considered to be the most abundant sciaenid forming about 14% (27,533 t) of the sciaenid landing of the Indian Ocean. The next important species was *Pterotolithes lateoides* with 12.7% (25,464 t). The northwest coast of India was the most productive area for the sciaenids contributing about 26% of the sciaenid catch of the Indian Ocean. Burma Coast was also another rich area accounting 16.0% of the catch.

INTRODUCTION

THE SCIAENID fishes are one of the important components of the fish landings along the coasts bordering the Indian Ocean. It formed nearly 25% of the demersal catch in some areas.

Fortyeight species of sciaenids belonging to 27 genera are distributed in the Indian Ocean. They are found in deep waters, coastal areas, estuaries and fresh waters. Some species are localised while others have a wide range of distribution. The sciaenid fish resources have attained importance in recent years due to the advent of trawling. Though the early works on the group was mainly concentrated on the taxonomic studies, the recent investigations have given more attention to the resource potential. The contributions of Lacépède (1802), Cuvier (1816), Bleeker (1845), Day (1885), Weber and de Beaufort (1936) Chu, Lo and Wu (1963), Talwar (1970), Mohan (1972, 1976, 1982, 1984), Druzhinin (1972) and Trewavas (1977) have enriched our knowledge on the group and have established a firm base for the taxonomy of the species occurring in the Indian Ocean. The recent study of Mohan (1984) on the sciaenids of the Indian Ocean based on the otoliths and airbladders have clarified some of the ambiguities on the identity of a few sciaenids. The distribution of various species of the Indian Ocean sciaenids was dealt by Druzhinin (1972), though his attempt was handicapped by the lack of knowledge of sciaenid fishes occurring in the western and Central Indian Ocean.

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** *Present address*: Research Centre of CMFRI, Calicut 673 005.

The species-wise quantitative estimates of the sciaenids and their present status in the demersal fishery remained to be studied in detail. Being a multispecies fishery, they are categorised as 'sciaenids' or 'bottom fishes' or 'trash fishes', without mentioning the species. This is a serious problem in the analysis of data and to estimate the resource potentials of the sciaenid species. The estimated potential of annual catch of finfishes from the Indian Ocean was about 14 million tonnes (Gulland, 1971). According to him 0.346 million tonnes of Basses and Sciaenids were landed from the Indian Ocean, of which 0.129 million tonnes of sciaenids were caught from the Western Indian Ocean.

The author is thankful to Mrs. Koumudi Menon for the help rendered in the preparation of this paper.

Distribution of species

Weber and de Beaufort (1936) recorded 27 species of sciaenids from the Indo-Pacific, while Druzhinin (1972) listed 45 species from the Indian Ocean. But his account required to be amended as he included some of the doubtful species like *Johnius australis*, *Johnius hypostomus* and *Dendrophysa hoogliensis*. Further the species such as *Pseudosciaena goldmani*, *P. microlepis*, *P. polycladis* and *Nibea albiflora* which were not recorded from the Indian Ocean were also included. Chan *et al.* (1974) described and illustrated 30 species of sciaenids from the Eastern Indian Ocean. While describing 65 species of sciaenids from the Indo-Pacific region, Trewavas (1977) clarified the ambiguities on the taxonomy and the distribution of some of the Indo-Pacific sciaenids. Mohan (1984) described and illustrated 39 species of sciaenids from the Western Indian Ocean.

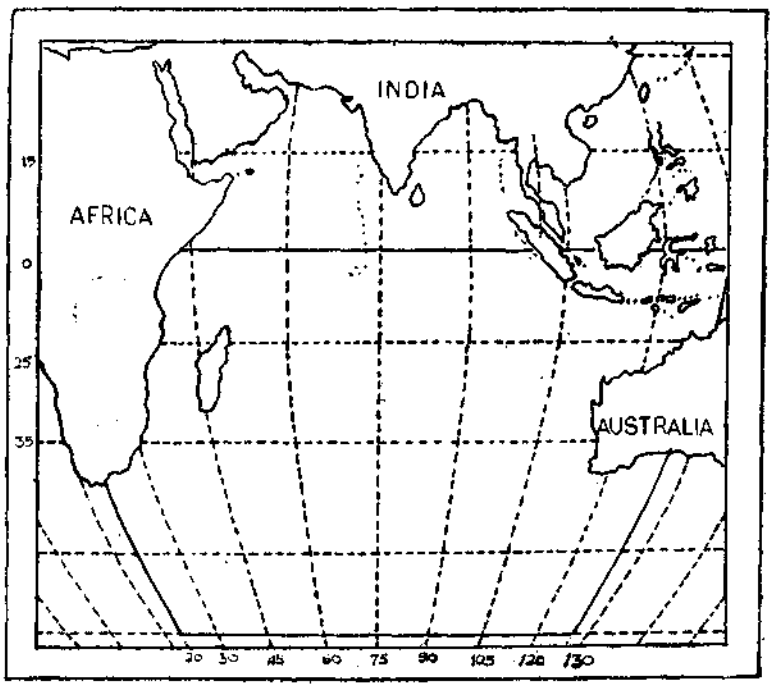

Fig. 1. The Indian Ocean.

In the present account the distribution of 48 species of scianids belonging to 21 genera in the Indian Ocean are considered. For the detailed study, the coastal area of the Indian Ocean is divided into various sectors such as east coast of Africa, Red Sea, Arabian Coast and Persian Gulf, coasts of Burma, Thailand, Malaya, Indonesia and western coast of Australia, Pakistan, India, Sri Lanka.

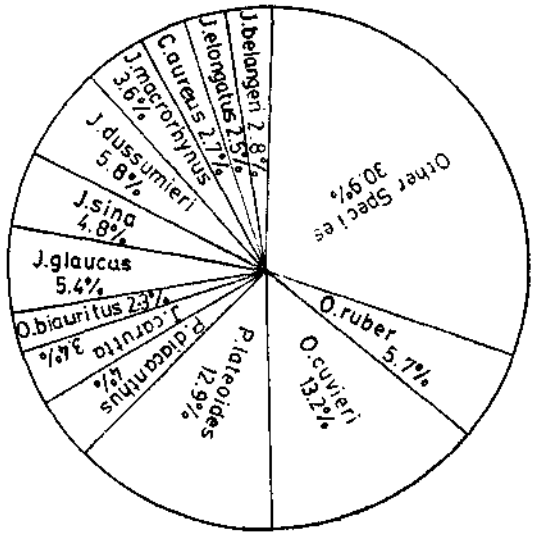

Fig. 2. Important sciaenids of the Indian Ocean.

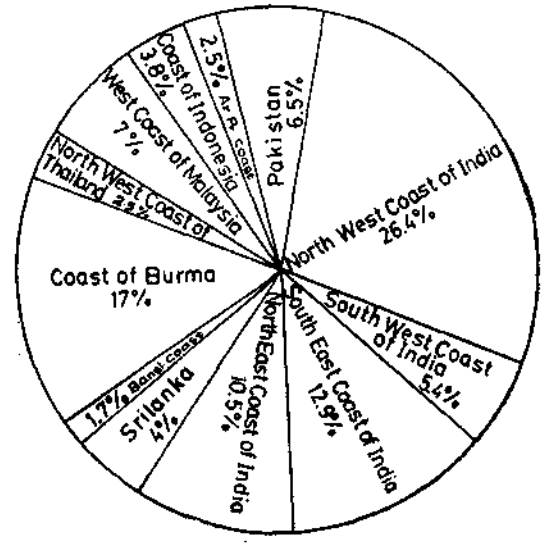

Fig. 3. Contribution of sciaenids in the coastal areas of the Indian Ocean.

The exploited sciaenid fish resources, with respect to individual species, is also attempted based on the published information and personal observation along the Indian Coast.

Resource Potential of Sciaenids

East coast of Africa

This Sector of the Indian Ocean extended from South Africa to Somalia Coast. The shelf area (0-200 m) covered about 390,000 km². However, these areas are not good for trawling mainly due to the extensive coral growth and the narrow continental shelf (Gulland, 1971).

The important sciaenid species occurring in the area were *Umbrina canariensis*, *U. ronchus*, *Atractoscion aequidens*, *Argyrosomus hololepidotus*, *Atrobucca thorpei*, *A. marlayi*, *Otolithes ruber*, *Johnius macropterus*, *J. dussumieri*, *Johnieops sina*, *Johnieops dussumieri* and *N. soldado* (Fig. 4).

The sciaenid landings along the coast were estimated to be 1,000 t. The landings of (*Otolithes ruber* (250 t), *J. sina* (180 t) *Argyrosomus hololepidotus* (130 t), *Atractoscion aequidens* (100 t), *N. soldado* (190 t), *Umbrina canariensis* (50 t). The landings of others sciaenid species may be about 100 t (FAO, 1987). The distribution and abundance, of sciaenid fishes along the coast was poor.

Red Sea

The shelf area of the Red Sea was about 180,000 km² with a coastline of 2,200 km. Though the northern sector was shallow where trawling could be carried out, most of the Red Sea was deep with coral growth. The continental shelf widens towards the south for about 100 km.

Though bottom trawls were operated along the Somalia Coast in southern part of Red Sea, the sciaenid catches were poor here. The only sciaenid reported from the Red Sea was *Argyrosomus regius*. But even this was not caught in commercial quantity.

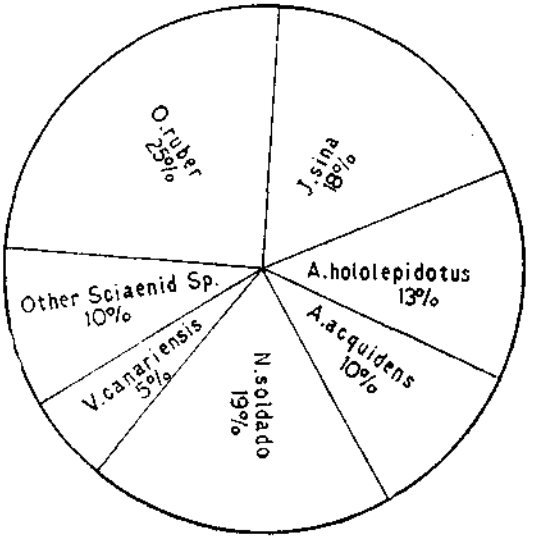

Fig. 4. Contribution of sciaenids from the east coast of Africa.

Arabian Coast and the Persian Gulf

The shelf of the Arabian Coast and the Gulf of Aden covered 80,000 km². Out of this, the area suitable for trawling was about 35,000 km².

The sciaenid fish resources of the Arabian Coast was poor as most of the coastal areas were with coral reefs and sand banks. The common species occurring in the area were *Umbrina canariensis, U. ronchus, Pennahia macrophthalmus, Argyrosomus amoyensis, A. beinii, Otolithes ruber, O. cuvieri, Johnieops aneus, A. hololepidotes, Protonibea diacanthus, Dendrophysa russelli, Paranibea semiluctousa, Nibea maculata, Johnius carutta* and *J. belangeri*. The sciaenids that formed the fishery along the coast were *A. holoepidotus* (840 t), *A. amoyensis* and *P. semiluctousa* (790 t each) *P. diacanthus* (651 t) *Otolithes cuvieri* and *Johnius carutta* (465 t each) *J. belangeri* (232 t) and other sciaenid (420 t) (Fig. 5).

Pakistan, India, Sri Lanka and Bangladesh Coasts

The area covered about 510,000 km² extending from Mekran Coast to Bangladesh. It is one of

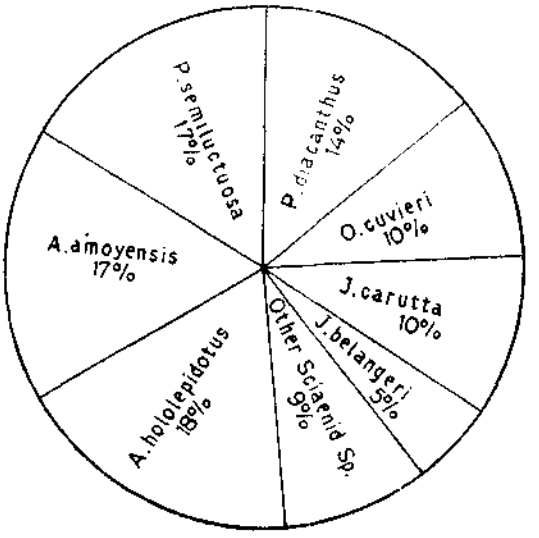

Fig. 5. Contribution of sciaenids from the Arabian Coast and the Persian Gulf.

the most productive sciaenid fishing areas. About 37 species of sciaenids are distributed here. The following sub areas were considered.

(*a*) *Pakistan Coast*

Pakistan Coast has 54,935 km² area upto 200 metre depth. According to Bianchi (1985) the commonly occurring sciaenids were *Argyrosomus amoyensis, A. hololepidotus, D. russelli, Johnieops aneus, J. sina, J. belangeri, J. carutta, Johnius dussumieri, J. glaucus, J. macrorhynus, Otolithes cuvieri, O. ruber, Protonibea diacanthus, Paranibea semiluctousa, Otolithoides biaurites* and *A. nibe*.

The sciaenid catch was 12,578 t which was about 10% of the demersal catch. The pre-

dominant species that contributed to the sciaenid landings were *O. cuvieri* (3,312 t), *J. belangeri* (2,120 t), *J. macrorhynus* (1,192 t), *A. amoyensis* (662 t), *P. diacanthus* (1,325 t), *J. sina* (1,980 t), *O. biauritus* and *P. semiluctousa* (662 t each) and other sciaenid species (1,325 t) (Fig. 6).

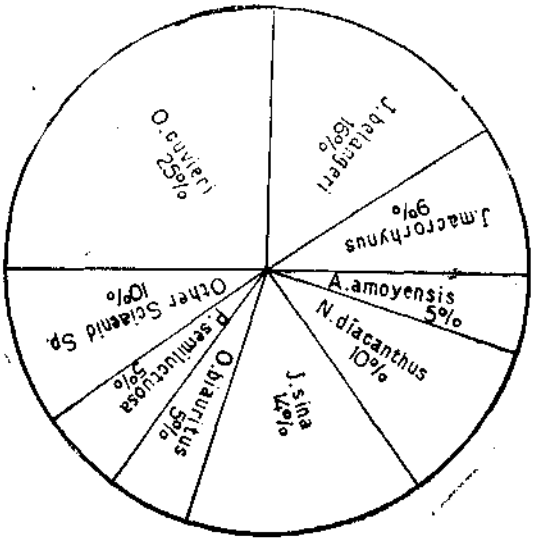

Fig. 6. Contribution of sciaenids from the Pakistan Coast.

(*b*) *North west coast of India*

It is one of the rich grounds for the sciaenid fish resources. It covered the coasts of Gujarat, Maharashtra and Goa with a coastline of 2,210 km. It has an area of 21,445 km² upto 200 m depth.

The sciaenid catch of the coast was shared by *Otolithes cuvieri*, *O. ruber*, *Protonibea diacanthus*, *N. soldado*, *N. chui*, *Paranibea semiluctousa*, *Otolithoides biauritus*, *Johnius glaucus*, *J. elongatus*, *J. macrorhynus*, *J. belangeri*, *J. dussumieri*, *J. aneus*, *J. sina* and *Atrobucca nibe*. The sciaenid fishery was mainly supported *O. cuvieri* (18,644 t), *J. glaucus* (10,540 t), *P. diacanthus* (5,269 t), *J. elongatus* (4,743 t), *J. macrorhynus* (4,215 t), *O. biauritus* (2,434 t), *J. dussumieri* (1,580 t) and other sciaenids (5,269 t). The larger sciaenids formed an important component of the sciaenid fish landings of the area (Fig. 7).

(*c*) *Southwest coast of India*

This sector covered an area of 21,349 km² upto 50 m depth along the coasts of Karnataka

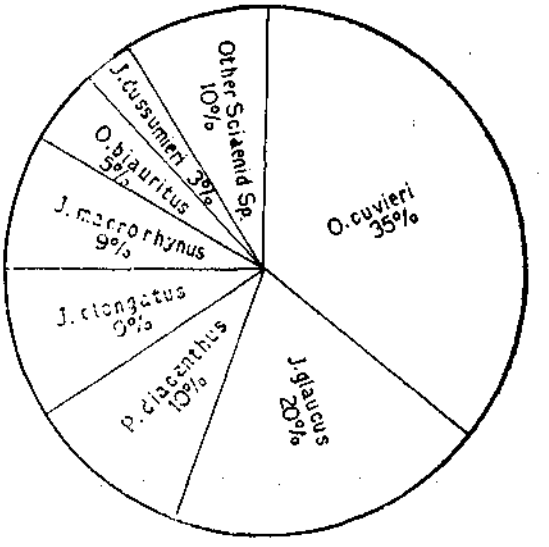

Fig. 7. Contribution of sciaenids from the Northwest coast of India.

and Kerala. The area upto 200 m depth was 69,210 km² (Jones and Banerji, 1973). The length of coastline was 830 km. The sciaenid fish landing along the coast was 10,757 t during 1985.

The common species of sciaenids occurring along the coast were *Otolithes cuvieri*, *O. ruber*, *J. elongatus*, *J. belangeri*, *J. glaucus*, *J. carouna*, *J. sina*, *J. macrorhynus*, *J. aneus*, *J. dussumieri*, *J. vogleri*, *Protonibea diacanthus* and *N. albida*. The species which formed a fishery along the coast were *J. aneus* and *J. macrorhynus* (1,735 t each), *O. cuvieri* (1,299 t), *J. sina*, *J. belangeri* (866 t each), *J. vogleri*, *N. albida* *J. carouna* (430 t each) and other sciaenids (860 t) (Fig. 8).

(d) Southeast coast of India

The southeast coast of India covered an area of 64,600 km² upto 200 m depth and 39,018 km² upto 50 m depth. The coastline included that of Tamil Nadu and Andhra Pradesh with 1,930 km. The landing of sciaenid along the coast was 25,264 t.

(e) Northeast coast of India

The area covered 46,258 km² upto 200 m depth and 27,000 km² upto 50 m depth along the coast of Orissa and West Bengal. The coastline was about 680 km. In the Orissa Coast there was a steep increase in sciaenid landings in recent years contributing about

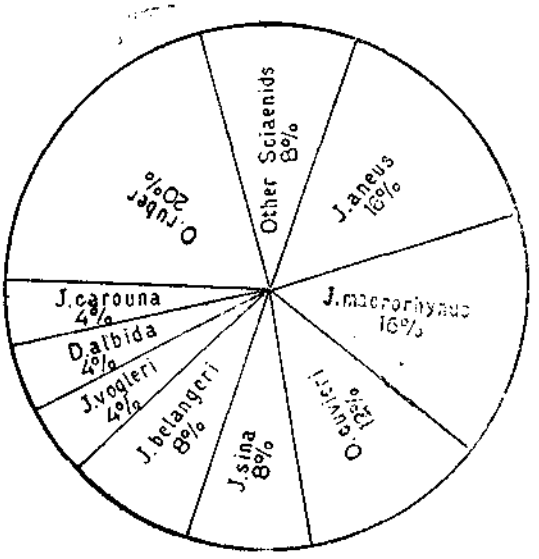

Fig. 8. Contribution of sciaenids from the Southwest coast of India.

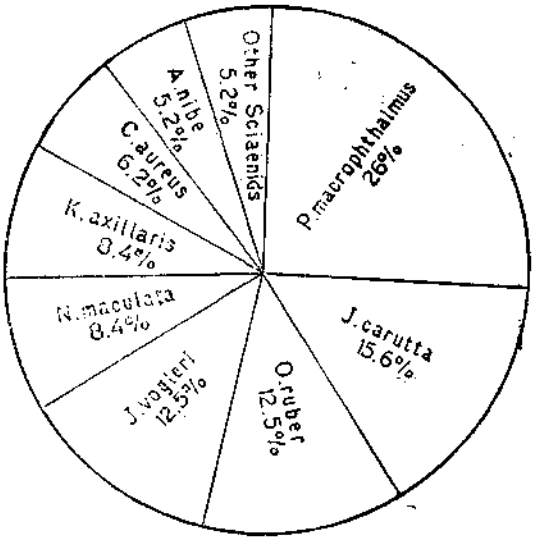

Fig. 9. Contribution of sciaenids from the Southeast coast of India.

The common species of sciaenids occurring in this sector were *Otolithes ruber, Pennahia macrophthalmus, Johnius carutta, O. belangeri, J. elongatus, J. dussumieri, Johnieops sina, J. vogleri, J. dussumieri, Protonibea diacanthus, Nibea albida, N. maculata, N. soldado, Dendrophysa russelli, Chrysochir aureus, Atrobucca nibe, Kathala axillaris and Panna microdon.*

The species that contributed to the sciaenid fishery were *P. macrophthalmus,* (6,578 t), *J. carutta* (3,950 t), *O. ruber* and *J. vogleri* (each 3,157 t), *N. maculata* and *K. axillaris* (each 2,106 t), *C. aureus,* (1,578 t), *A. nibe* (1,316 t) and other sciaenids (1,316 t) (Fig. 9).

90% of the demersal catch. The landing of sciaenids in the area in 1986 was about 20,894 t (CMFRI, 1986).

The common species occurring in the coast were *Otolithoides pama, Bahaba chaptis, Macrospinosa cuja, Otolithoides biauritus, Atrobucca niba, Otolithes ruber, Pennahia macrophthalmus, Dendrophysa russelli, Johnius belangeri, Johnius coitor, Johnieops sina, Chrysochir aureus* and *Nibea albida.*

The fishery was contributed by *J. carutta* (580 t), *P. macrophthalmus* (4,570 t), *C. aureus* (3,810 t), *O. ruber* (2,539 t), *J. coitor* (1,780 t), *O. biauritus* (1,270 t), *O. pama* (1,015 t), *A. nibe* (1,015 t) and other sciaenids (2,539 t) (Fig. 10).

(f) Sri Lanka Coast

The shelf area of Sri Lanka upto 100 m depth as about 30,000 km². The coastline was 1,770 km. The sciaenid landing along the coast was about 9,000 t.

The common sciaenids along this coast were *Otolithes ruber, Johnius carutta, J. belangeri, J. macropterus, Johnieops sina, J. volgeri, J. macrorhynus, J. aneus, Nibea maculata-Nibea soldado, Protonibea diacanthus, Dendrophysa russelli* and *Pennahia macrophthalmus.*

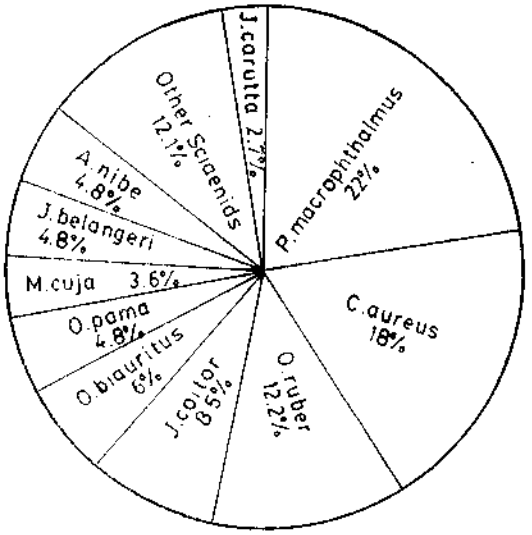

Fig. 10. Contribution of sciaenids from the Northeast coast of India.

The species that contributed to the fishery of the coast were *O. ruber* (1,200 t), *J. carutta* (1,600 t), *J. belangeri* (1960 t), *J. macropterus* (800 t), *J. sina* (560 t), *J. aneus* (480 t), *P. macrophthalmus* (640 t), *N. maculata* (400 t), *D. russelli* (560 t) and other sciaenids (800 t) (Fig. 11).

(g) Bangladesh

The shelf area of Bangladesh covered 65,555 km² upto 200 m depth and 37,255 km² upto 50 m depth. The sciaenid fish landing was 3,500 t. The common sciaenid species contributing the fishery along the coast were *O. pama* (700 t), *N. albida* (630 t), *J. coitor* (455 t), *M. cuja* (350 t), *J. dussumieri* (210 t), *J. sina* (280 t), *D. russelli, O. biaurites* (245 t) and other sciaenids about 350 t (Fig. 12).

Burma, Malay Peninsula and Indonesia

Burma : The shelf area upto 200 m covered an extent of 550.000 km². The sciaenid fish catch of Burma was estimated to be 31,795 t. The important species of sciaenids occurring

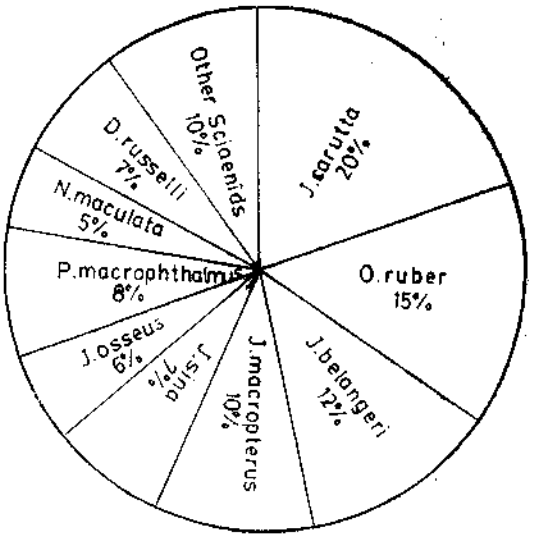

Fig. 11. Contribution of sciaenids from Sri Lanka Coast.

along the coast were *Pterotolithes lateoides, P. maculatus, Otolithes ruber, J. dussumieri, Protonibea diacanthus, O. biaurites, Panna microdon, Otolithoides pama, J. belangeri, J. carutta, Johnieops sina, J. aneus Chrysochir aureus* and *Dendroprysa russelli* (Tussing, 1974).

The fishery was mainly contributed by *Pterotolithus lateoides* (22.242 t), *Johnieops dussumieri* (6.340 t), *Protonibea diacanthus* (653 t) and *Otolithus ruber* (654 t). The rest of sciaenid catch of 1906 t was shared by other species. (Fig. 13).

West coast of Thailand : The shelf area of the west coast of Thailand and Malay Coast was about 170,000 km². The coastline of west coast of Thailand was about 650 km. The sciaenid catch of the coast was estimated to be 4,760 t (Tussing, 1974).

About 20 species of sciaenids occurred here. The common species were *Otolithes ruber*, *Pterotolithus maculatus*, *P. lateoides*, *Otolithoides biaurites*, *O. pama*, *C. aureus*, *J. belangeri*, *J. dussumieri*, *N. diacanthus*, *Johnieops sina* and *Pennahia macrocephalus*.

lateoides, *Pennahia macrocephalus*, *Chrysochir aureus*, *J. belangeri*, *J. dussumieri*, *J. macropterus* and *Otolithoides biauritus*. Other sciaenids contributed about 1,332.

The species that formed a fishery along the coast were *J. sina* (3,330 t), *J. dussumieri* (2,664 t), *O. cuvieri* (3,063 t), *P. lateoides* (932 t), *P. macrocephalus* (1,332 t), *P. macrophthalmus* (750 t) and other sciaenids (1,250 t) (Fig. 15).

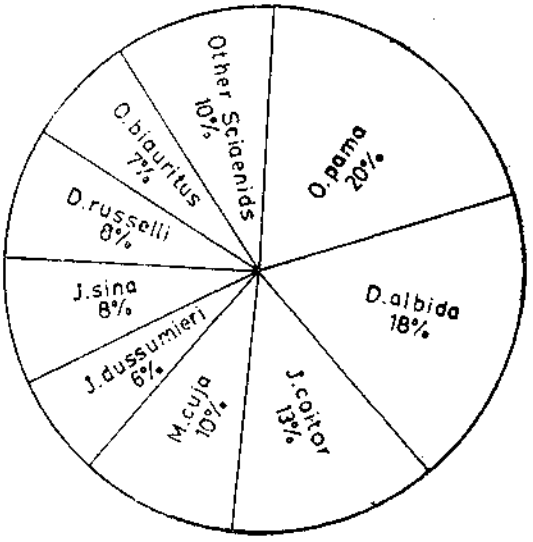

Fig. 12. Contribution of sciaenids from Bangladesh Coast.

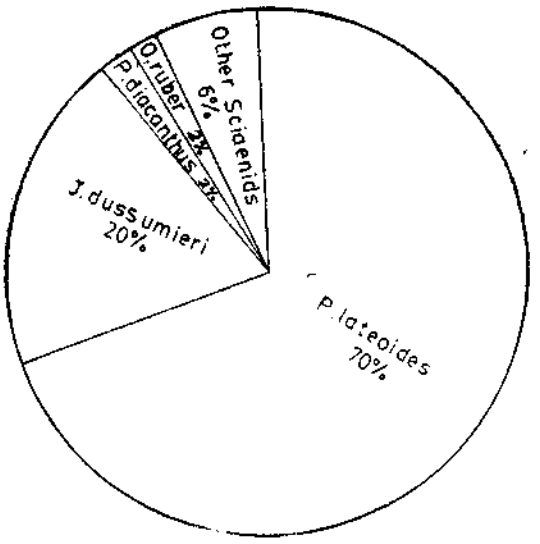

Fig. 13. Contribution of sciaenids from Burma Coast.

The species that formed the part of commercial catches were *P. lateoides* (1,110 t), *J. dussumieri* and *O. cuvieri* (750 t each), *J. sina* (900 t), *P. macrocephalus* (500 t) and other sciaenid species (750 t) (Fig. 14).

West coast of Malaya : The sciaenid fish catch was about 13,320 t (Tussing, 1974).

Nearly 32 species belonging to 15 genera occurred in the area. The common species found in the area were *Johnieops sina*, *Otolithes ruber*, *O. cuvieri*, *Pterotolithus maculatus*, *P.*

West coast of Indonesia

The shelf area of Indonesia bordering the Indian Ocean was about 130,000 km². The sciaenid landing was 15% of the estimated catch of about 7,602 t (Chullasorn and Marto subroto, 1986). Of this, *Dendrophysa russelli* contributed 1,793 t, *Johnieops sina* 1,467 t, *Otolithes ruber* 1,324 t, *Pterotolithus lateoides* 980 t, *Johnius coiter* 815 t, *J. belangeri* 410 t, *P. macrocephalus* 400 t and other sciaenids about 415 t (Fig. 16).

Western Australian Coast

The western Australian shelf bordering the Indian Ocean has an area of 380,000 km². It is not rich in sciaenid fish resources. Though 11 species were reported from here, none of them formed a commercial fishery. The common species were *Otolithes cuvieri*, *O. ruber*, *J. belangeri*, *J. carutta*, *A. hololepidotus*, *Nibea albida* and *Protonibea diacanthus*. Contribution of all these species was about 100 t.

Otolithes cuvieri constituted 13.9% of the catch ranking as the most abundant sciaenid fish of the Indian Ocean followed by *Pterotolithes lateoides* with 12.7%. *Johnieops dussumieri*, *Johnius glaucus* and *Otolithes ruber* constituted 5.3 to 5.8% of the sciaenid fishery. The larger sciaenids, *Protonibea diacanthes* and *Otolithoides biaurites* formed 4% and 2.3% of the landings respectively. The smaller sciaenids *Johnieops sina* contributed about 4.8%, while the other sciaenids *Johnius belangeri*, *Johinus elongatus*, *J. carutta*, *Johnieops macrorhynus* and

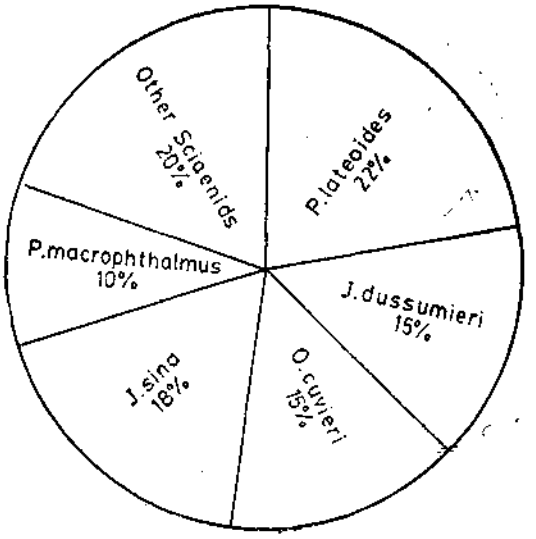

Fig. 14. Contribution of sciaenids from the west coast of Thailand.

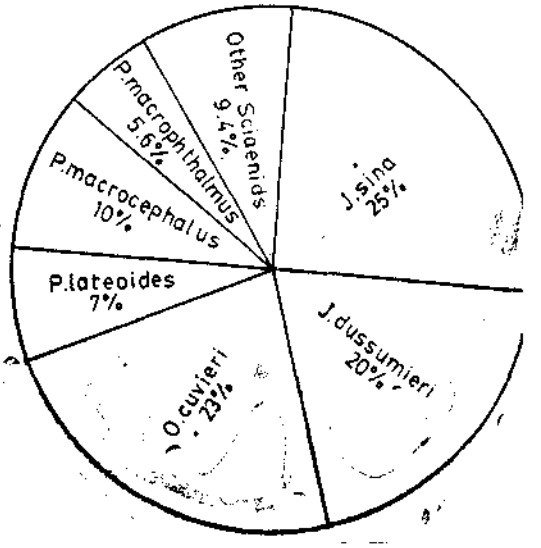

Fig. 15. Contribution of sciaenids from the west coast of Malaysia.

Discussion

The estimated landings of basses and sciaenids of the Indian Ocean was about 350,000 t (Gulland, 1971). During 1984 the landings of croakers from the Western Indian Ocean was 129,000 t, mainly from Pakistan and India. Eastern Indian Ocean landed 35,000 t of sciaenids (FAO, 1984). The sciaenid fish landing from the Indian Coast was estimated to be 102,623 t during 1986 (CMFRI, 1986). In the present study the sciaenid fish landing of the Indian Ocean is estimated to be 198,480 t.

Chrysochir aureus constituted 2.5 to 3.6% of the landings. 30.9% of the catch was formed by the other 34 species, some of which formed occasional regional fishery (Fig. 2).

On the generic level *Otolithes* formed 19.4% of the sciaenid catch of the Indian Ocean followed by *Johnieops* with 17%. The other important genera occurring in the Indian Ocean were *Johnius* (16.4%) and *Pterotolithes* (12.7%). *Pennahia* also shared about 7.4%, while other genera constituted less than 5% of the sciaenid landing.

When the distribution of the sciaenid fishes in the Indian Ocean was reviewed, it was observed that some of the species such as *Atractoscion aequidens*, *Umbrina canariensis*, *Afroscion thorpei* were restricted to the east coast of Africa and the sciaenids like *Pennahia macrocephalus*, *Pterolithes lateoides*, *Johnius trachycephalus* were found in the eastern part of the Indian Ocean bordering the countries like Burma, Malayasia and Indonesia. Certain areas like northwest coast of India, Burma and Indonesia were rich in sciaenid fishes whereas the areas like Red Sea and east African Coast were characterised by the poor sciaenid fish resources. The local bathymetric conditions and nature of the ground may be the reasons. When the shelf was shallow and wide the sciaenid fish resource was observed to be rich.

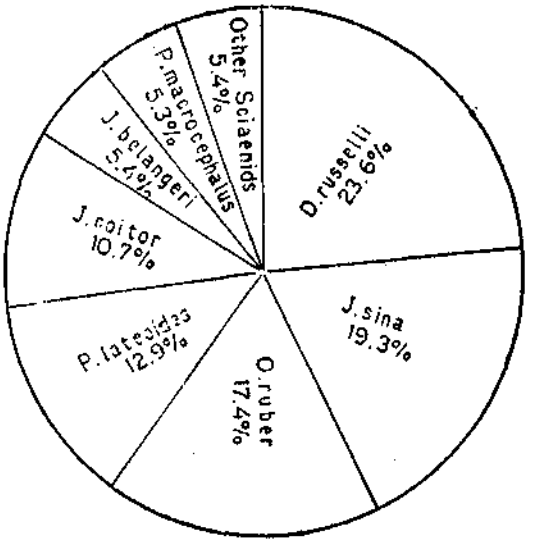

Fig. 16. Contribution of sciaenids from the west coast of Indonesia.

A few species such as *Johnius glaucus*, *Paranibea semiluctousa*, *Johnius elongatus* have very limited distribution. But the species like *Paranibea diacanthus*, *Nibea chui*, *Argyrosomus hololepidotus*, *A. amoyensis*, *Otolithes ruber*, *Pennahia macrophthalmus* have wide distribution. It may be observed that some of the above-mentioned species are larger sciaenids and migrate in shoals. For instance *Paranibea diacanthus* occurred in large shoals in the Gulf of Kutch and the Gulf of Mannar during the colder months. Similarly *Atrobucca nibe* are also found in Indonesia, east coast of India and along the Gujarat Coast.

Atrobucca marlayi, *A. trewavasi* and *A. nibe* are the deep water species trawled at a depth of 100-200 m. They have well developed ramifying branches in the air bladder. Species of *Johnius* and *Johnieops* are shallow water forms. *Johnius belangeri*, *Johnius elongatus*, *Johnius carutta*, *Johnius glaucus*, *Johnius macroptera*, *Johnieops sina*, *Johnieops macrorhynus* and *Johnieops aneus* were found in shallow trawling grounds of 5-30 m depth.

Though sciaenid are represented by 48 species in the Indian Ocean only 35 species formed a fishery in different regions. Of this only 2 species contributed to more than 20,000 t. 27,533 t of *Otolithes cuvieri* was landed followed by 25,264 t of *Pterotolithes lateoides*. Landings of other species namely *Pennahia macrophthalmus*, *Otolithes ruber* and *Johnieops dussumieri* were in the range of 10,000 to 15,000 t. 12,538 t of *Pennahia macrophthalmus* was landed followed by *Johnieops dussumieri* with 11,334 t and *Otolithes ruber* with 11,228 t. The catch of the following 5 species of sciaenids were in the range of 5,000-10,000 t. *Chrysochir aureus*, *Protonibea diacanthus*, *Johnius carutta*, *J. belangeri* and *Johnieops sina*. The landings of 15 species were in the range of 1,000 to 5,000 t. The landings of other species were less than 1,000 t.

The fishery potential of each species varied from place to place. *Pterotolithes lateoides* formed a fishery mainly along the Burma Coast. Nearly 90% of the catch was contributed by the coast. Rest of the catch was landed from west coast of Thailand, Malay Peninsula and Indonesia. *Otolithes cuvieri* was found in

abundance along the northwest coast of India forming nearly 70% of its catch. Similarly major part of *Pennahia macrocephalus* was landed along the west coast of Malaya. *Otolithes ruber* formed a fishery along the east coast of India. Southeast coast contributed about 30% and another 25% by the northeast coast. They formed a fishery of less magnitude from Bangladesh. *Johnieops dussumieri* was another important sciaenid of west coast of India, Burma and Malay Peninsula. About 60% of it was landed in Burma. 10% of its total catch in the Indian Ocean was landed in northwest coast of India. The abundance of *Johnius glaucus* was found to be localised in the northwest coast of India. *Johnieops sina* was another sciaenid fish forming a fishery in Pakistan to Indonesia in Malay Peninsula. *Protonibea diacanthes* in a larger sciaenid forming a fishery along the coast of Pakistan and northwest coast of India. About 70% of the catch of the Indian Ocean was landed along the northwest coast of India and Pakistan Coast. They occurred in smaller quantities in other parts of the Eastern Indian Ocean also. *Johnius macrorhynus* is another benthic sciaenid with its core population in northwest coast of India spreading along Pakistan and southwest coast of India. About 60% of its total catch was from northwest coast of India. *Johnius belangeri* is another benthic species with a wide range of distribution. About 32% of its total landing of 6 603 t was from northwest coast of India and Pakistan and another 35% of its catch was landed along the northwest coast of India and Bangladesh. *Johnius carutta* is another important benthic sciaenid fish with a landing of about 6,595 t in the Indian Ocean. Nearly 60% of its catch was landed along the southeast coast of India. About 1,600 t of this species was landed in Sri Lanka. It formed a fishery from the Persian Gulf to Bangladesh. *Chrysochir aureus* formed a fishery in southeast and northeast coast of India landing about 5,388 t. 70% of its catch was landed here. It formed a fishery of lesser importance in Burma and Malay Pen insula. *Johnius elongatus* wa caught along the northwest coast of India with a landing of about 4.732 t. Though it was distributed in other parts of India the landings were mainly localised in the northwest coast in India. *Otolitholdes biaurites* was another larger sciaenid forming a fishery in northwest coast and northeast coast of India. Of the 4,611 t of the species landed in the Indian Ocean 60% of it was landed along the northwest coast of India. It formed a fishery of smaller magnitude in Burma and Malaya. *Johnius coitor* was found in estuaries and shallow areas. The core population of the species inhabits northeast coast of India. 60% of the total landings of the species was landed along northeast coast of India and about 25% was from Indonesia. *Dendrophys russelli* formed a fishery along the Eastern Indian Ocean with a total landing 2,633 t. Indonesia contributed about 68% of the catch. Though the species distributed from the west coast of India to Indonesia their favoured habitat appeared to be the coast of Indonesia. *Nibea maculata* was mainly an Eastern Indian Ocean species found along east coast of India, coast of Burma, Thailand and Malaysia. About 2,506 t of it was landed *Atrobucca nibe* formed a fishery along the east coast of India with a landing of about 2,331 t. 56% of its catch was obtained from southeast coast of India. It occurred as a seasonal fishery in Gujarat Coast also. Its population has a wide range of distribution from northeast coast of India to Indonesia. *Kathala axillaris* also occurred mainly along the southeast coast of India. About 2,106 t were landed along the coast.

When the sciaenid fish resources were studied, it was observed that the Red Sea has no sciaenid fish resources and the east coast of Africa accounted for about 1,000 t. The northwest coast of India contributed 52,694 t which formed about 26% of the total sciaenid landings of the Indian Ocean. The coast of Burma also has a rich sciaenid fish resource

forming 16% of the Indian Ocean sciaenid landings. Southeast coast and northeast coasts of India contributed 13% and 10% of the Indian Ocean sciaenid fish catch with 25,264 t and 20,894 t respectively (Fig. 3).

Malaya and Pakistan could be considered as rich in sciaenid fish resources as these coasts landed 13,321 t and 13,240 t of sciaenids respectively, forming about 13.4% of the landings of the Indian Ocean. The sciaenid fish landings of Burma and west coast of Thailand have shown an increase in the landings of sciaenids after the introduction of trawling (FAO, 1987). In most of the areas the exploitation rate of the sciaenid fish resources was in the range of 65 to 71%. But in some areas it has been over exploited (FAO, 1987). The main problem in estimating the resource potential is the lack of precise information on the exploitation of various species. More such information is required from the coasts of Indonesia, Burma, Arabia and Africa. However with the efforts taken by the National agencies, Regional agencies, such as Indo-Pacific Fisheries Council and the Indian Ocean Fisheries Commission and the International agencies such as Food and Agricultural Organisation, more information is being collected on the fish landings and resources potentials. This information would be useful for the formulation of better management policies.

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