



Marine fish diversity at Kalpakkam coast sites of Tamil Nadu, India

Amrata Verma*, K. Ponnusamy, Subhashree Das, Sukham Munil Kumar and Asim Kumar Pal
ICAR, Central Institute of Fisheries Education, Panch Marg off Yari Road, Versova, Mumbai 400061, Maharashtra, India
amrata2204@gmail.com

Available online at: www.isca.in, www.isca.me

Received 27th February 2016, revised 24th April 2016, accepted 10th May 2016

Abstract

In present study the marine fish diversity of Kalpakkam coastal sites of Tamil Nadu around Madras Atomic Power Station (MAPS) have been studied. Different families such as *Narcinidae* -(1), *Rhinobatidae*-(1), *Dasyatidae*- (1), *Clupeidae* -(2), *Pristigasteridae*-(2), *Engraulidae*-(4), *Ariidae*-(1), *Platycephalidae*-(2), *Plotosidae*-(1), *Ambassidae*-(1), *Sillaginidae*-(1), *Carangidae*-(7), *Sphyraenidae*-(1), *Scombridae*-(1), *Haemulidae*-(1), *Leiognathidae*-(6), *Lutjanidae*-(3), *Gerreidae*-(2), *Sciaenidae*- (8), *Scatophagidae*-(1), *Mugilidae*-(2), *Ephippidae*-(2), *Mullidae*-(3), *Drepaneidae*-(1), *Siganidae*-(1), *Paralichthyidae* -(2) *Trichiuridae*-(1), *Polynemidae*-(1), *Soleidae*-(1), *Cynoglossidae* -(3), and *Tetraodontidae*-(1) were observed around Kalpakkam coastal sites. The maximum fish collection was done during June to September and minimum during February to March. Among the collected species, order Perciformes was most dominant followed by Clupeiformes and Pleuronectiformes in all seasons. Total 65 predominant species belonging to 10 orders, 31 families and 45 genera were recorded. Among the collected species, order Perciformes was most dominant followed by Clupeiformes and Pleuronectiformes in all seasons.

Keywords: Marine fish, Diversity, Kalpakkam coast, Madras Atomic Power Station.

Introduction

The seawater surrounding east west coasts of the country with salinity more than 30 ppt is designated as marine water. Mariner fisheries resources of the Bay of Bengal, Arabian Sea and Indian Ocean including coastal, offshore and deep sea as well as islands comprising 1,370 taxa including the commercially important species like sharks, rays, Bombay-duck, oil sardine, Malabare sole, parrot fish, perches, white fish, silver bellies,, seer fish, mackerel, tuna, carangids, polynemids, pomfrets, basracuds, red mullet, ribbon fishes, anchovies and catfishes and shellfishes¹.

According to Department of fisheries Government of Tamil Nadu – 2002, Fishing is the single way of employment to 8,65,033 fisher-folk populations². Fishes are one of the important elements in the economy of many nations as they have been a stable item in the diet of several people. They comprise slightly extra than one-half of total number of approximately 54,711 recognized existing vertebrate species; there are metaphors of an estimated 27,977 valid species of fishes³.

The basic facts of diversity through species discovery and description are mostly complete for some areas of the world and for many families of fishes. Fishes constitute more than half of all vertebrates, with over 31,000 valid species, and of these over half are marine fishes⁴. Biodiversity is the life sustaining system and the biosphere has intrinsic value and its components have ecological, social economic, scientific education culture and

aesthetic value. India being the mega diversity country has a vast coastal line 8,500 kms encompassed with estuaries, backwater, sandy beaches near shore environment coral reefs, seagrass, meadows, algal communities mangrove forest and many small island has the huge potential of marine biodiversity⁵.

Materials and Methods

The samples were collected from the scheduled sampling stations covering 30km from north (Lat 12^o35.566' N, 80^o15.138' E) and south (Lat 12^o31.514' N, 80^o02.263' E) (Table-1) of the Kalpakkam nuclear power plant coast side. The sampling was done for one year within 30 kilometer of MAPS. Samples of fishes were collected from selected sampling sites, landing centers and fish market of Kalpakkam coast during July 2013 to June 2014. Photographs were taken with help of digital camera. The collected fish were preserved in 10% formalin in separate specimen jar according to the size of species. Small species directly preserved in 10% formalin solution. The specimens were examined for the various morphological characters. Standard manuals were followed for identification of fish species^{6,7}.

Results and Discussion

In entire study period (Table-2) family Ariidae was represented by under the 1 genus (*Arius*) 1 species *Arius maculatus*, *Ambassidae* was represented by under the 1 genus (*Ambassis*) 1 species *Ambassis gymnocephalus*, *Carangidae* was represented by under the 6 genera (*Alepes*, *Selar*, *Atule*, *Carangoides*,

Megalaspis, Alectis) 7 species *Alepes kleinii*, *Alepes djedaba*, *Selar crumenophthalmus*, *Alectis ciliaris*, *Atule mate*, *Megalaspis cardyla*, *Carangoides chrysophrys*, Cynoglossidae (Tongue fishes) was represented by under the 2 genera (*Cynoglossus*, *Paraplogusia*) 3 species of *Cynoglossus arel*, *Cynoglossus bilineatus*, and *Paraplagusia bilineata* and Clupeidae was represented by under the 1 genera (*Sardinella*) 2 species *Sardinella longiceps* (oil sardine), and *Sardinella gibbosa*. The family Drepanaidae was represented by under the 1 genus (*Drepane*) 1 species *Drepane punctata* (Spotted sickle fish), Dasyatidae 1 genera (*Himantura*) 1 species *Himantura imbricata*. Engraulidae was represented by under the 2 genera (*Stolephous*, *Thryssa*) 4 species *Stolephous indicus*, *Stolephous commersonii*, *Thryssa malabarica* and *Thryssa mystax*, Ephippidae was represented by under the 2 genera (*Platax*, *Ephippus*) 2 species of *Platax orbicularis* and *Ephippus orbis*, Gerreidae was represented by under the 1 genus (*Gerres*) 1 species *Gerres abbreviatus* (Silver Biddy), *Gerres filamentosus*, Haemulidae was represented by under the 1 genus (*Pomadasy*) 1 species *Pomadasy maculatus*. The family Leiognathidae was represented by under the 2 genera (*Leiognathus*, *Secutor*) 6 species *Leiognathus equulus*, *Leiognathus daura*, *Leiognathus dussumieri*, *Leiognathus splenders*, *Secutor ruconius*, *Secutor insidiator*, Lutjanidae was represented by under the 1 genus (*Lutjanus*) 3 species *Lutjanus bohar*, *Lutjanus fulviflamma*, and *Lutjanus rivulatus* (Maori Snapper). The family Mugilidae was represented by under the 1 genus (*Liza*) 2 species *Liza parsia* and *Liza vaigiensis*, Mullidae was represented by under the 1 genus (*Upeneus*) 3 species *Upeneus sulphureus*, *Upeneus moluccensis* and *Upeneus sundaicus* Narcinidae was represented by under the 1 genus

(*Narcine*) 1 species *Narcine timlei*, Paralichthyidae was represented by under the 1 genus (*Pseudorhombus*) 2 species *Pseudorhombus elevatus*, and *Pseudorhombus triocellatus*, Pristigasteridae was represented by under the 2 genus (*Ilisha*, *Opisthopterus*) 2 species *Ilisha megaloptera* and *Opisthopterus tardoore*. Platycephalidae was represented by under the 2 genera (*Platycephalus*, *Thrysaophrys*) 2 species *Platycephalus indicus* and *Thysonophrys chiltonal*, Plotosidae was represented by under the 1 genus (*Plotosus*) 1 species *Plotosus lineatus*. The family Rhinobatidae was represented by under the 1 genus (*Rhinobatus*) 1 species *Rhinobatos granulatus*, Scatophagidae was represented by under the 1 genus (*Scatophagus*) 1 species *Scatophagus argus*, Signaidae was represented by under the 1 genus (*Siganus*) 1 species *Siganus canaliculatus*, Soleidae was represented by under the 1 genus (*Synaptura*) 1 species *Synaptura commersoniana*. The family Sciaenidae was represented by under the 4 genera (*Johnius*, *Nebia*, *Otolithes*, *Pennahia*) 8 species *Johnius amblycephalus*, *Johnius carutta*, *Nebia maculate*, *Nebia soldado*, *Otolithes cuvieri*, *Otolithes argenteus*, *Otolithes ruber*, and *Pennahia anea*, Scombridae was represented by under the 1 genus (*Rastrelliger*) 1 species *Rastrelliger kanangurta* (Indian Mackerel), Sphyraenidae was represented by under the 1 genus (*Sphyraena*) 1 species *Sphyraena obtusata*, Sillaginidae was represented by under 1 genus (*Sillago*) 1 species *Sillago sihama* (Indian Sand Whiting), Trichiuridae was represented by the under 1 genus (*Trichiurus*) 1 species *Trichiurus lepturus*, Tetraodontidae was represented by the under 1 genus (*Tetradon*) 1 species *Lagocephalus lunaris*. Total 65 predominant species belonging to 10 orders, 31 families and 45 genera were recorded (Figure-1 and Figure-2).

Table-1
Showing the sampling details Latitude and Longitude of fixed point on the north and south side of MAPS

S. No	Symbol	Sample location	Latitude	Longitude
1	N5	Kokilamadu Kuppam	12 ⁰ 35.566' N	80 ⁰ 11.352' E
2	N10	Mahabalipuram	12 ⁰ 37.177' N	80 ⁰ 11.930' E
3	N15	Pattipulam	12 ⁰ 41.152' N	80 ⁰ 13.169' E
4	N30	Kovalam	12 ⁰ 47.247' N	80 ⁰ 15.138' E
5	S5	Meyyur	12 ⁰ 31.514' N	80 ⁰ 09.957' E
6	S10	Oyyali Kuppam	12 ⁰ 29.241' N	80 ⁰ 09.484' E
7	S15	Kadalur	12 ⁰ 26.917' N	80 ⁰ 08.668' E
8	S30	Thazhuthalikuppam	12 ⁰ 18.548' N	80 ⁰ 02.263' E

Table-2
List of Predominant families with total no. of genera and species recorded around 30 km of MAPS

Sr. No.	Family	No. of genus	No. of species
1	Ariidae	1	1
2	Ambassidae	1	1
3	Carangidae	5	7
4	Cynoglossidae	2	3
5	Clupeidae	1	2
6	Drepaneidae	1	1
7	Dasyatidae	1	1
8	Engraulidae	2	4
9	Ephippidae	2	2
10	Gerreidae	1	2
11	Haemulidae	1.	1
12	Leiognathidae	2	6
13	Lutjanidae	1	3
14	Mugilidae	1	2
15	Mullidae	1	3
16	Narcinidae	1	1
17	Paralichthyidae	1	2
18	Pristigasteridae	2	2
19	Platycephalidae	2	2
20	Plotosidae	1	1
21	Polynemidae	1	1
22	Rhinobatidae	1	1
23	Scatophagidae	1	1
24	Siganidae	1	1
25	Soleidae	1	1
26	Sciaenidae	4	8
27	Scombridae	1	1
28	Sphyraenidae	1	1
29	Sillaginidae	1	1
30	Tetraodontidae	1	1
31	Trichiuridae	1	1

There were lots of works have been done in fishes diversity of India. Central Marine Fisheries Research institute of Mandapam recorded 569 species of finfishes from southeast coast of India⁸. Fish as a collection, apart from its economic importance, from a biodiversity viewpoint, has the maximum species diversity amongst all vertebrate taxa. It is supposed that out of 61,259 species of vertebrates known world over, 32,300 are fish species; of which 15,170 are fresh water while 16,764 are marine⁹. Analysis of the existing literature on Coastal and Marine Biodiversity showed that only fish has been well catalogued across the countries of the Indian Ocean as

compared to other fauna¹⁰. In a study the author recorded number of 546 fish species from Indian mangroves¹¹. The 115 species of marine fish covering Carangids, Clupeids, Scombrids, Groupers, Sciaenids, Silverbellies, Mullids, Polynemids and Silurids were representing 79 Genera and 37 Families from the Indian Ocean was reported¹². It has been reported that fishes as a group, apart from its economic value, from a biodiversity viewpoint, had the highest species diversity among all vertebrate taxa¹³. The greatly extends recorded fish variety to the Indian Ocean and constitutes a new addition to the fish fauna of India¹⁴.

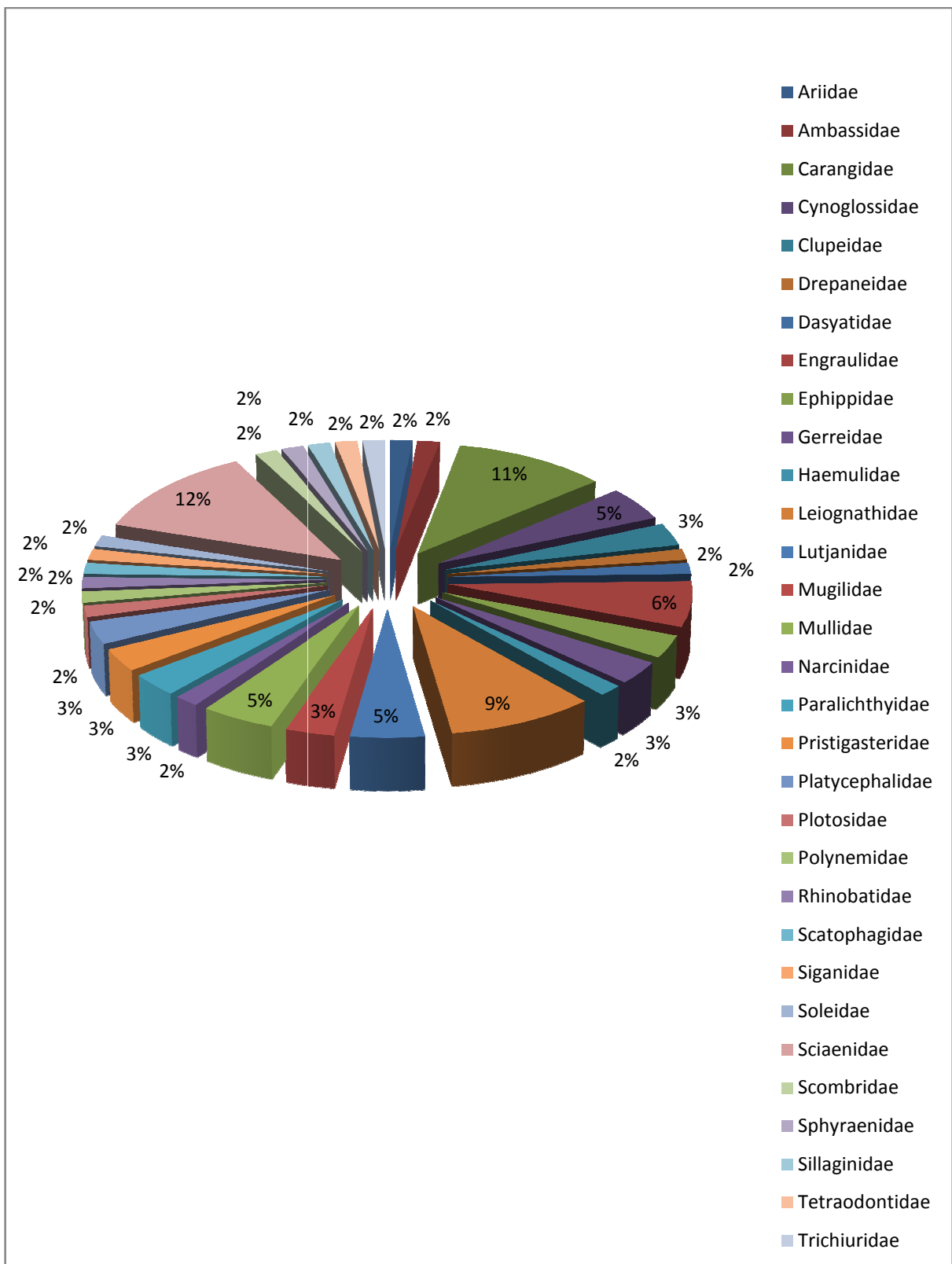


Figure-2
 Family wise distribution for showing percentage of species in total identified fishes around MAPS (2013-2014)

Conclusion

The result showed a checklist of fish diversity currently existing around nuclear power plant which could serve a present status check will help for future assessment and impact of the nuclear plant on fish biodiversity.

Acknowledgements

All the authors are thankful to funding agency, Board of Research in Nuclear Sciences (BRNS) under Department of Atomic Energy (DAE), India for financial support, Shri S. Rajaram, Officer-In-Charge, Smt K. R. Sreedevi, and all staff of Environmental Survey Laboratory, Kalpakkam, Tamil Nadu for their help during field survey. We are highly grateful to Dr. Gopal Krishna (Acting Director) Central Institute of Fisheries Education (CIFE), Mumbai.

Reference

1. Ayyappan S., Jena J.K., Gopalakrishnan A. and Pandey A.K. (2006). Handbook of Fisheries and Aquaculture, 334-35 pp, Indian Council of Agricultural Research, Directorate of Information and Publications on Agriculture. New Delhi, India.
2. Prabhakar. C., Saleshrani K., Dhanasekaran D., Tharmaraj K. and Baskaran K. (2011). Studies on the fish resources in nagapattinam coastal area, Tamil nadu. *India International Journal Current Life Sciences*, 1(6), 026-028.
3. Nelson J.S. (2006). Fishes of the World, 4th Edition. John Wiley and Sons, Inc, 601.
4. Eschmeyer W.N., Fricke R., Fong J.D. and Polack D.A. (2010). Marine fish diversity: *History of knowledge and discovery (Pisces)*. *Zootaxa*, 2525, 19-50
5. Rajasegar M. and Sendhilkumar R. (2009). Finfish Resources of Karaikal, South East Coast of India. *World Journal of Fish and Marine Sciences*, 1(4), 330-332.
6. Fischer W. and P.J.P. Whitehead (eds.) (1974). FAO species identification sheets for fishery purposes. Eastern Indian Ocean (fishing area 57) and Western Central Pacific (fishing area 71). Vols. 1-4. FAO, Rome. pag.var.
7. Nelson J.S. (1994). Fishes of the world. Third edition. *John Wiley and Sons, Inc., New York*. 600 p.
8. CMFRI (1969). Catalogue of fishes. Centra Marine Fishery India., 177. Research Institute publication, 38.
9. William N., Eschmeyer R., Fricke J.D. Frog and R.A. Pollack (2010). Marine fish diversity: *History of knowledge and discovery (Pisces)*. *Zootaxa.*, 2525, 19-50.
10. Wafar M., Venkataraman K., Ingole B., Khan S.A. and Lokabharti P. (2011). State of knowledge of coastal and marinen biodiversity of Indian Ocean countries. *PLoS one.*, 6(1), 1-12.
11. Kathiresan K. and Rajendran N. (2005). Mangrove ecosystem of the Indian Ocean region. *Ind. J Marine Science*, 34, (104-113).
12. Lakra W.S., Verma M.S., Goswami M., Lal K.K., Mohindra V., Punia P., Gopalakrishnan A., Singh K.V., Ward R.D. and Hebert P. (2011). DNA barcoding Indian marine fishes. *Molecular Ecology Resources*, 11, 60-71.
13. Sarkar U.K., Jena J.K., Singh S.P., Singh A.K. and Rebello S.C. (2012). Documenting Coastal Fish Biodiversity of India: Status, Issues and Challenges. (International Day For Biological Diversity Marine Biodiversity) *Uttar Pradesh State Biodiversity Board*, 22-28.
14. Biswas S., Mishra S.S., Satpathy K.K., Das N.P.I., Selvanayagam M. and Nayak L.(2012). A new record of a garden eel, heteroconger tomberua (actinopterygii: anguilliformes: congridae), from the Indian ocean, *Acta Ichthyologica et Piscatoria*, 42(1), 65-68.