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***Short Communication***

# Finfish constituents of shrimp trawl low value by-catch off Visakhapatnam, India

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With the increase in number of shrimp trawlers operating in Visakhapatnam waters at depths ranging from 20 to 100 m and occasionally even upto 200 m, the problem of by-catch also gradually increasing in this region. Thus it is important to know the finfish species composition in the trawl by-catches in order to develop appropriate management and conservation programs for juvenile finfishes. A total of 280 species of low value finfishes belonging to 80 families and 28 Orders were reported in the trawl by-catches off Visakhapatnam during the study period 2014-17. Moreover, two cardinalfishes namely *Apogonichthyoides uninotatus* is reported as a new record to the Indian waters and *A. pseudotaeniatus* has been recorded for the first time from east coast of India. The present paper also compares the constituents of finfish reported during early 90s thus reflecting the changes in species composition. About 112 species of finfishes belonging to 14 families *viz*. Rhinobatidae, Elopidae, Ophichthidae, Muraenesocidae, Kurtidae, Pomacentridae, Blenniidae, Acropomatidae, Cepolidae, Ephippidae, Datnioidae, Lactariidae, Citharidae and Plueronectidae were represented in by-catch of 1990, and now the representatives of these families have become very rare and could not be collected during the present study period. This study is useful in examining the factors influencing the structure of fish communities and fish species that are important indicators of ecological health.

[**Keywords**: By-catch, New record, Non-target species, Shrimp trawl]

## Introduction

During the last decades, the assessment and management of fisheries has progressively changed from a single species to an ecosystem approach[1]. This is mainly due to over exploitation of marine fisheries and related resources through increase in the number of fishing vessels/crafts, indiscriminate fishing in hitherto unexploited waters and related anthropogenic disturbances. One of the most harmful techniques among these is bottom trawling and the resultant capture of by-catch in trawl nets poses a great threat to species diversity and ecosystem health because this part of the catch is usually unregulated.

A total of 228 finfish species were reported in trawl by-catches off Visakhapatnam[2]. During early 1990's the seaward range of operation of trawlers was not beyond 50 m isobath, because fishers were interested mainly in the exploitation of the penaeid prawn stocks. In Visakhapatnam, the gradual increase in mechanization and fleet size over the years from 1985 to 2013 has taken a toll on the health of marine fisheries, with all fishes now either in "fully exploited" or "overexploited" state[3]. With the increase in number of shrimp trawlers operating at depths ranging from 20 to 100 m and occasionally even up to 200 m, the problem of by-catch also has increased gradually in this region. The large scale capture of non-target finfish species through trawl nets has posed a threat to species diversity and ecosystem health as this part of the catch is usually unregulated. Thus it is important to know and evaluate the finfish species composition and landings of trawl by-catches. The data on trawl by-catches will be useful to examine the factors influencing the structure of fish communities as fish species and their associations also act as important indicators of ecological health. The present paper provides the list of low value finfish species from the shrimp trawl by-catches of Visakhapatnam, central east coast of India.

## Materials and Methods

Shrimp trawl low value by-catch samples were collected from Visakhapatnam fisheries harbour where catches from shrimp trawlers (13-15 m OAL) operating in coastal waters off Visakhapatnam (Lat. 16.98° N – 20.2° N to Long. 82.19° E – 86.53° E), central east coast of India, at a depth ranging from 20 to 200 m are landed. Shrimp trawls with 20 mm cod end mesh size scrap the bottom with 5 m height mouth opening. The present study is based on random samples collected thrice a week from fish landing centers during the period 2014 to 2017. The collected samples were immediately brought to the laboratory where they were washed and total length data was obtained from the fish measured to the nearest mm from the tip of the mouth to the tip of the caudal fin ray and weighed to the nearest gram. Thereafter, the fish samples were identified upto species level using recent literature of fish taxonomy and subsequent

revisions. Classification was done following standard taxonomic works[4]. After identification, photo vouchers were prepared and specimens were stored in 5 to 10 % formalin depending on the size of the specimens and were kept in the Ocean and Atmospheric Science and Technology Cell (OASTC) and Department of Marine Living Resources, Andhra University as reference vouchers.

## Results

During the present study the total of 280 species of finfishes were identified belonging to 80 families and 28 Orders from the trawl by-catches off Visakhapatnam (Table S1). Data of finfish species represented in trawl by-catches of Visakhapatnam during the period 1989-1990 was obtained from published literature[2] and is compared with current study. The present paper thus reflects the changes in species composition and occurrence of low value finfish species in shrimp trawlers during 1990 and in 2014 to 2017. Most of the previously occurring dominant species have now become rare or absent. Species that were common to both 1990 and current lists are marked with "*" in Table S1. Among the identified species, *Apogonichthyoides uninotatus* is reported as a new record from Indian waters and *A. pseudotaeniatus* has been recorded for the first time from east coast of India. These species were identified following standard taxonomic works of genus *Apogonichthyoides*[5].

**Systematics (Cardinalfishes)**

Order: Kurtiformes Jordan, 1923
Family: Apogonidae Gunther, 1859
Genus: *Apogonichthyoides* Smith, 1949

**1. *Apogonichthyoides uninotatus* (Smith and Radcliffe, 1912)**

*Amia uninotata* Smith and Radcliffe, 1912, *Proc US Natl Mus*, 41 (1868), p. 436, plate 34 (Fig. 3) (type locality: Philippines).

*Material examined*: Single specimen measuring 66 mm TL (Fig. 1) was collected from trawl by-catches off Visakhapatnam in June 2015. Major distinguishing characters of this species are presence of a faint horizontal post ocular mark, body spot midway between pectoral and lateral line larger than pupil of the eye.

*Distribution*: This species is recorded from Indo-West Pacific to Persian Gulf to Philippines. The present study extends its distributional record to Indian waters.

Fig. 1 — *Apogonichthyoides uninotatus* (66 mm TL)

Fig. 2 — *Apogonichthyoides pseudotaeniatus* (90 mm TL)

**2. *Apogonichthyoides pseudotaeniatus* (Gon, 1986)**

The species was identified based on 16 specimens of length range 30-105 mm TL collected from trawl by-catches of Visakhapatnam (Fig. 2). Major distinguishing characters from other related species includes two dark bands across the body arising from base of first and second dorsal fin origin upto base of pelvic and anal fin origin; a faint black blotch or spot on caudal peduncle.

*Distribution*: Previous distributional records are from Indo-West Pacific to Red Sea and Persian Gulf to Indo-Malayan region, north to Japan and from west coast of India[6]. The present study extends its distribution to east coast of India.

Apart from these two new records, *Cynoglossus capensis*, *Upeneus tragula*, *Neomerinthe amplisquamiceps*, and *N. erostris* were found rarely in the trawl by-catches and the present study confirms their distributional records to the central east coast of India.

## Discussion

About 112 finfish species belonging to 14 families *viz*., Rhinobatidae, Elopidae, Ophichthidae,

Muraenesocidae, Kurtidae, Pomacentridae, Blenniidae, Acropomatidae, Cepolidae, Ephippidae, Datnioidae, Lactariidae, Citharidae and Plueronectidae that were represented in the catches of year 1990, have now became very rare and could not be collected during the present study period. Among these, the benthic fishes like species of Muraenesocidae, Cepolidae, Plueronectidae and Citharidae might have got affected due to habitat destruction caused during disasters like tsunami as these events disturb the benthic community structure resulting in temporal displacement of these species. Contrasting to this, about 39.4 % (116 species) of the fish species are common and were reported during 1990s and in the present study.

The changes in species composition and availability of species that were not reported during 1990s may be mainly due to increase in the range of operation of trawlers to deeper waters. In addition to this, the shift in climate regimes, large scale tropical cyclones and storms like Tsunami in 2004, Hudhud in 2014 that occurred during the last two and a half decades might have caused lot of impact on marine ecosystems. These might have led to changes in current patterns that are responsible for dispersal of eggs, larvae and even distribution of adult species. This could have led to colonization of new areas from their original habitats by many species as reported from Andaman waters[7].

## Conclusion

In conclusion, control over degradation of ecosystems is required for the sustainability of marine ecosystems and fisheries, taking into account not only the target species of the fisheries, but also the other components of the ecosystem such as non-target species and vulnerable species, trophic linkages, environmental conditions etc. and also by elucidating habitats critical to species for vital population processes[8]. Knowledge on species composition of by-catch is absolutely required to design, use and operate effective by-catch reduction devices. It also helps fishery managers and policy-makers to scrutinize the fishing activity. This is required to maintain the ecological balance and productivity of the fishery which in turn is needed for long term sustainability of fishing industry. Thus this study indicates the change in fishery resources related to environmental alterations due to natural disasters. Proper management plan is the basic need of hour to preserve these living resources for future.

## Supplementary Data

Supplementary data associated with this article is available in the electronic form at http://nopr.niscair.res.in/jinfo/ijms/IJMS_50(02)165-167_SupplData.pdf

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## Conflict of Interest

Authors have no conflict of interest.

## Author Contributions

Authors state that KS had contributed towards conceptualization, funding acquisition, supervision and guidance. VID, SJ and VR contributed towards data collection and analysis. KS, VID, VR and SJ contributed towards manuscript drafting. VID and KS contributed in editing and incorporating modifications as per the suggestions of reviewers.

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