

Seasonal and annual variations in fish and macro-crustacean fauna in the shore seine fishery of Karwar, Karnataka.

A. P. Dineshbabu*¹, T. Senthil Murugan², Narayan G. Vaidya and Sonali Mhaddolkar².

¹Mangalore Research Centre of ICAR-Central Marine Fisheries Research Institute, Mangaluru - 575 001, Karnataka.

²Karwar Research Centre of ICAR-Central Marine Fisheries Research Institute, Karwar, Uttara Kannada-581 301, Karnataka

E-mail: *dineshbabuap@yahoo.co.in

Introduction

Karwar coast of Karnataka is known for sandy beaches, and these beaches apart from providing the aesthetic beauty, are supporting traditional fishermen of the coast for finding their livelihood avenues. Traditionally the beaches of Karwar is known for shore-seine operations, known as rampani fishery. Rampani nets were made of coir ropes and the nets were operated from October to March, exclusively targeting mackerel and sardines. With advent of introduction of synthetic fiber in net making, the traditional rampani fishery were replaced by a series of shore-seines made of synthetic materials locally known as yendi and the yendi operation became an year round practice targeting finfishes and macro-crustaceans especially prawns and crabs. The catch data from yendi is a good record of the biodiversity of the shoreline. Composition of the species available up to a depth of 6m from the shoreline is represented in the yendi catch. Present study is based on long term observation of the yendi fishery from Karwar coast of north Karnataka. It analyses the database on catch effort and species composition of yendi operated along Karwar beaches during 2013 to 2017 to understand seasonal variations in abundance and species composition of fish and macro-crustaceans. Stretches of Karwar beach 14.8904°N;74.0974°E in the north to 14.8262°N;74.1231°E in the south were surveyed for data collection. Since finfishes and macro-crustaceans like penaeid prawns and crabs determined the success of the commercial fishery, these two groups were focused in the present study.

Fishery trends

Catch and effort data and species composition were collected from the shore-seines operated along Karwar beach during June 2013 to March 2017. The length of the net varied from 400 to 1000 m. The height of the net in the middle is approximately 25-26 feet and decreases to 13 feet at both ends. The shore seines made nylon netting each weigh between 200 and 300 kg and is operated from shore upto 6m depths. After loading the net on to a small canoe (dhoni) (8.5-10.7 m overall length), it sails in a semicircular fashion, paying out the net, to a point at approximately 350-400 m from the starting point within 15-20 minutes. The net is hauled immediately after the dhoni reaches the end point with the hauling process completed within 2 hours. For seasonal analysis data of monsoon (June-September) Pre-monsoon (February-May) and post-monsoon (October-January) periods were used from 4,299 yendi operations carried out during June 2013 to March, 2017 period.

During the period 970t of fishes and other fauna were caught. The yendi operations were found round the year with higher intensity during Monsoon months. The monthly average catch ranged from 4.4 t in April to 54.3 t in August (Figs.1 & 2). Fin fishes and macro-crustaceans, like penaeid prawns, crabs and stomatopods formed major commercial part of the shore seine fishery in Karwar. Among 147 macro fauna recorded, 116 species (78%) were finfishes belonging to 52 family while 17 species (12%) were macro-crustaceans belonging to 7 families. The finfishes formed 729 t (75% in weight) followed by macro-crustaceans 171 t (18%) with average Catch Per Unit Effort or CPUE for these two groups being 170 and 40 kg respectively. Season wise fishery group composition

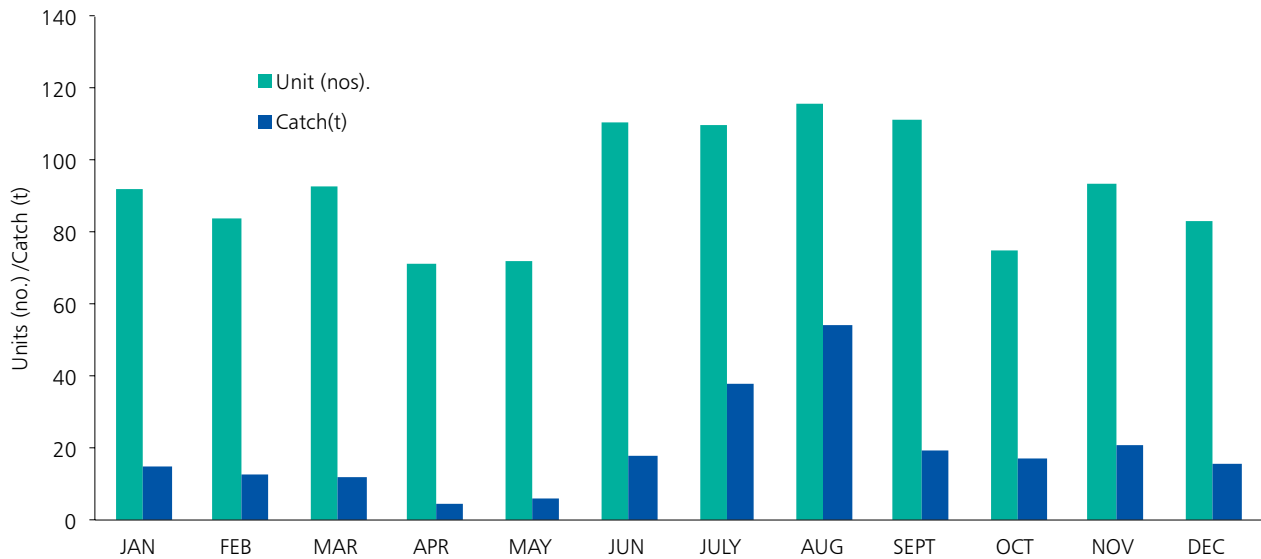


Fig.1. Average monthly effort and catch from yendi operations during 2013-2017.

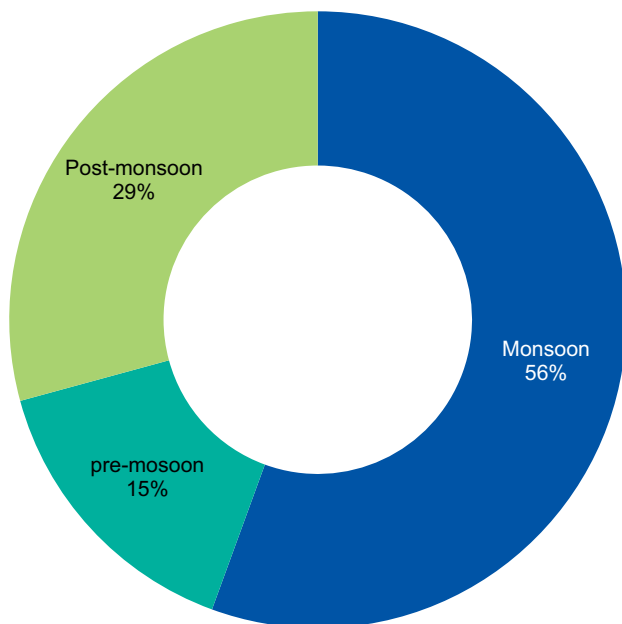


Fig.2. Seasonal catch contribution in yendi operations during 2013-2017.

indicated that during pre-monsoon months 101 species were observed in “yendi catch” of which 73 species (72%) were finfishes and 16 species (16%) were macro-crustaceans. During monsoon months of the 115 species observed in the catch, finfishes and macro-crustaceans were 91 and 13 respectively and during post- monsoon, these were 87 and 15 respectively (Fig.3).

Among 147 finfish species recorded, only 15 species

contributed more than one percent to the fishery (by weight). *Trypauchen vagina*, *Sardinella longiceps*, *Rastrelliger kanagurta*, *S. gibbosa* and *S. fimbriata* were the major contributors in terms of quantity. The catch of *Trypauchen vagina* was mostly restricted to monsoon season during which 98% (175t) of the catch was recorded. Due to its low demand in the market, fishermen are not benefitted by the high catch of these species. This fish can however be used as a supplementary feed for culturing carnivorous fishes in marine cages. Sardines like *Sardinella gibbosa*, *S. fimbriata* and *S. longiceps* contributed to the fishery during all three seasons and *S. longiceps* dominated the fishery during pre-monsoon and post-monsoon months. Indian mackerel, *Rastrelliger kanagurta* was also available in all the seasons. Catch rates of 116 finfish species recorded during three seasons are given in the Table 1.

Penaeid prawns, *Metapenaeus dobsoni*, *Penaeus indicus* and *M. affinis* together contributed 68% of the crustacean fishery. Contribution of *M. dobsoni* was maximum during post monsoon-months (40t) while *P. indicus* was dominant during monsoon months (36t). Being highly valued in market, these species serves as economic backbone of the ‘yendi’ fishery of Karwar. Species like *Parapenaeopsis styliifera* (5%) *P. monodon* (4%), *P. merguensis*, *P. canaliculatus* and *P. semisulcatus* also formed a part of the penaeid prawn fishery while the dominant non-penaeid prawn was *Acetes* spp. Among commercial crabs, *Portunus pelagicus*, *P. sanguinolentus*

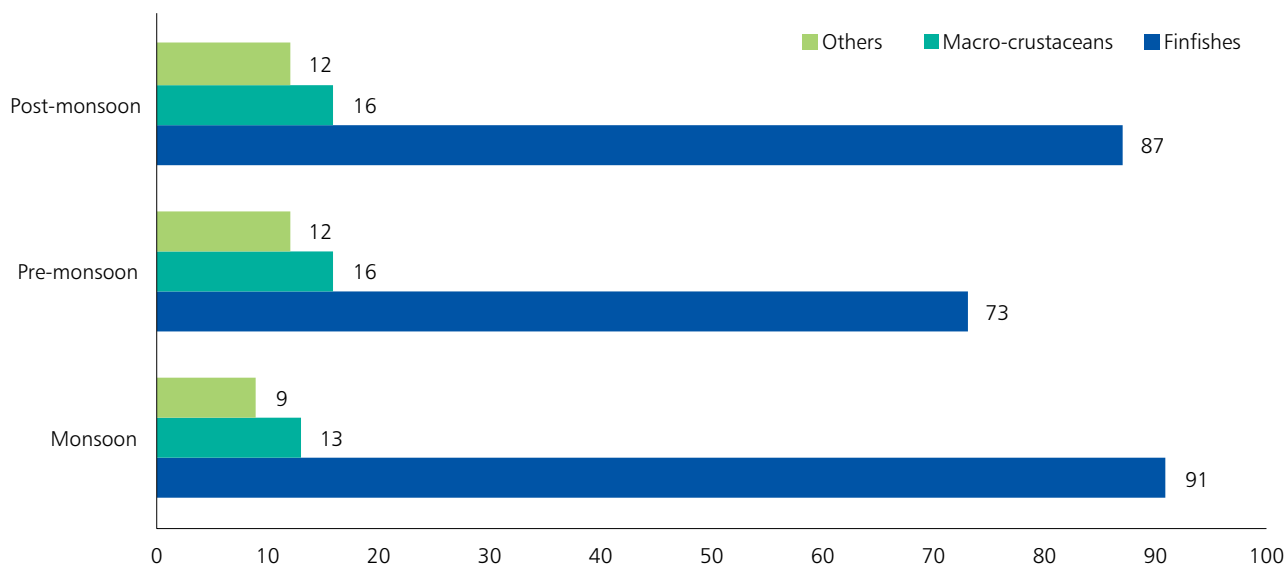


Fig.3. Average season wise fishery group composition during 2013-2017.

Table 1. Catch per unit effort of finfish species recorded in different seasons

SPECIES	PRE-MONSOON	MONSOON	POST-MONSOON
<i>Acanthopagrus berda</i>	0.000	0.288	0.547
<i>Acanthopagrus latus</i>	0.000	0.009	0.000
<i>Alectis indicus</i>	0.000	0.013	0.000
<i>Alepes djeddaba</i>	1.089	0.353	3.446
<i>Alepes kleinii</i>	0.738	0.370	1.517
<i>Ambassis gymnocephalus</i>	0.541	9.587	1.087
<i>Ambassis urotaenia</i>	0.856	7.466	2.681
<i>Apogon quadrifasciatus</i>	0.000	0.000	0.010
<i>Anadontostoma chacunda</i>	0.035	0.048	0.000
<i>Arius arius</i>	0.012	0.120	0.006
<i>Arius jella</i>	0.526	7.270	1.738
<i>Atherinomorus lacunosus</i>	0.000	0.120	0.000
<i>Atropus atropus</i>	0.000	0.000	0.007
<i>Batrachthys felinus</i>	0.035	0.035	0.022
<i>Caranx heberi</i>	0.252	0.000	0.018
<i>Caranx ignobilis</i>	1.432	1.304	0.716
<i>Caranx sem</i>	0.511	0.389	0.122
<i>Congresox talabonoides</i>	0.000	0.000	0.060
<i>Ctenotrypauchen microcephalus</i>	0.000	1.567	0.000
<i>Carcharhinus melonopterus</i>	0.060	0.000	0.000
<i>Carcharhinus sorrah</i>	0.056	0.000	0.000
<i>Cynoglossus arel</i>	0.225	0.162	0.111
<i>Cynoglossus macrostomus</i>	0.776	2.264	10.195
<i>Cynoglossus puncticeps</i>	0.419	1.534	1.625
<i>Cypselurus poecilopterus</i>	0.000	0.000	0.372
<i>Decapterus russelli</i>	0.000	0.000	5.033

SPECIES	PRE-MONSOON	MONSOON	POST-MONSOON
<i>Diodon hystrix</i>	0.000	0.000	0.007
<i>Drepane punctata</i>	0.022	0.011	0.018
<i>Dussumieria acuta</i>	0.063	0.016	0.025
<i>Epinephelus diacanthus</i>	0.046	0.000	1.284
<i>Epinephelus malabaricus</i>	0.000	0.002	0.000
<i>Epinephelus tauvina</i>	0.000	0.002	0.000
<i>Escualosa thoracata</i>	0.043	0.225	0.122
<i>Fistularia petimba</i>	0.000	0.003	0.006
<i>Gerres filamentosus</i>	0.226	0.947	1.293
<i>Gerres limbatus</i>	0.000	0.011	0.000
<i>Gnathanodon speciosus</i>	0.525	0.691	0.291
<i>Gymnothorax javanicus</i>	0.000	0.016	0.000
<i>Gymnothorax pseudothyrsoides</i>	0.000	0.037	0.000
<i>Hemiramphus lutkei</i>	0.009	0.054	0.000
<i>Himantura imbricata</i>	0.009	0.004	0.000
<i>Johnieops sina</i>	0.000	0.027	0.000
<i>Johnius belangeri</i>	0.737	0.546	0.159
<i>Johnius carutta</i>	0.000	15.813	0.043
<i>Johnius dussumieri</i>	0.000	0.223	0.000
<i>Johnius glaucus</i>	0.041	0.845	0.006
<i>Lactarius lactarius</i>	0.562	3.844	0.472
<i>Lates calcarifer</i>	0.256	0.121	0.000
<i>Leiognathus bindus</i>	1.926	1.502	0.778
<i>Leiognathus blochi</i>	0.082	0.000	0.009
<i>Leiognathus brevisrostris</i>	0.000	0.588	0.039
<i>Leiognathus duara</i>	2.327	1.371	0.545
<i>Leiognathus splendens</i>	0.000	0.543	0.043
<i>Lethrinis lentjan</i>	0.000	0.006	0.000
<i>Liza parsia</i>	0.000	0.031	0.009
<i>Lutjanus johni</i>	0.100	0.031	0.050
<i>Lutjanus russellii</i>	0.000	0.009	0.238
<i>Megalaspis cordyla</i>	0.671	0.022	0.005
<i>Megalops cyprinoides</i>	0.000	0.000	0.005
<i>Monodactylus argenteus</i>	0.027	0.013	0.030
<i>Mugil cephalus</i>	0.459	0.907	1.768
<i>Muraenesox cinereus</i>	0.000	2.064	0.225
<i>Opistopterus tardoore</i>	0.246	0.864	0.000
<i>Nemipterus japonicus</i>	0.000	0.000	0.005
<i>Otolithes cuvieri</i>	0.196	0.420	0.023
<i>Otolithes ruber</i>	0.000	0.022	0.000
<i>Pampus argenteus</i>	0.060	0.102	0.027
<i>Parachaeturichthys polynema</i>	0.049	5.125	0.000
<i>Parastromateus niger</i>	0.008	0.128	0.070
<i>Pellona ditchela</i>	0.000	0.005	0.000
<i>Pisodonophis cancrivorus</i>	0.000	0.583	0.041

SPECIES	PRE-MONSOON	MONSOON	POST-MONSOON
<i>Pempheris mangula</i>	0.020	0.000	0.000
<i>Platycephalus crocodilus</i>	0.116	0.666	0.025
<i>Platycephalus indicus</i>	0.000	0.000	0.012
<i>Polynemus sextarius</i>	0.000	0.004	0.005
<i>Pomadasys maculatus</i>	0.022	0.007	0.008
<i>Pomadysis hasta</i>	0.016	0.000	0.000
<i>Psettodes erumei</i>	0.006	0.000	0.007
<i>Pseudorhombus javanicus</i>	0.147	0.021	0.102
<i>Pseudorhombus triocellatus</i>	0.056	0.161	0.117
<i>Pseudotriacanthus strigilifer</i>	0.000	0.000	0.006
<i>Rastrelliger kanagurta</i>	28.033	8.907	55.157
<i>Sardinella albella</i>	0.183	0.223	0.198
<i>Sardinella fimbriata</i>	1.451	15.390	2.411
<i>Sardinella gibbosa</i>	0.000	9.889	19.403
<i>Sardinella longiceps</i>	64.445	1.072	55.170
<i>Saurida tumbil</i>	0.032	0.000	0.005
<i>Scatophagus argus</i>	0.018	0.054	0.082
<i>Scomberoides lysan</i>	0.000	0.000	0.006
<i>Scomberoides commersonianus</i>	0.006	0.078	0.000
<i>Scomberoides tol</i>	0.000	0.021	0.016
<i>Scomberomorus commersoni</i>	0.762	0.994	0.430
<i>Secutor insidator</i>	0.728	0.392	0.092
<i>Secutor ruconius</i>	1.183	1.098	0.287
<i>Siganus canaliculatus</i>	0.000	0.012	0.000
<i>Siganus oramin</i>	0.000	0.000	0.097
<i>Sillago sihama</i>	0.093	0.107	0.464
<i>Solea elongata</i>	0.047	0.374	0.106
<i>Sphyreana barracuda</i>	0.032	0.101	0.046
<i>Stolephorus commersoni</i>	2.297	5.654	4.116
<i>Strogylura strongylura</i>	0.037	0.000	0.013
<i>Strongylura leiura</i>	0.005	0.000	0.046
<i>Synoptura commersonianus</i>	0.272	0.290	0.194
<i>Telescopium telescopium</i>	0.005	0.000	0.000
<i>Terapon puta</i>	0.000	0.000	0.140
<i>Tetraodon inermis</i>	1.579	5.226	0.759
<i>Terapon jarbua</i>	0.155	0.097	0.566
<i>Thyrsoidea macrura</i>	0.000	0.298	0.129
<i>Thyssa malabarica</i>	0.491	0.816	0.013
<i>Thyssa mystax</i>	0.176	0.282	0.050
<i>Thyssa setirostris</i>	0.319	1.965	0.275
<i>Thyssa vitirostris</i>	0.000	0.540	0.112
<i>Trachinotus blochi</i>	0.033	0.000	0.020
<i>Trichiurus lepturus</i>	0.651	4.487	0.331
<i>Trypauchen vagina</i>	0.000	98.221	0.054
<i>Upeneus moluccensis</i>	0.000	0.019	0.000

and *Charybdis feriata* contributed 6, 5 and 4% of the crustacean fishery respectively. *Scylla serrata* also were seen during all seasons. Other crabs caught were not of commercial significance. Stomatopod, *Oratosquilla nepa*

which is dried and used as fertilizer was also recorded. Season-wise catch rate of 17 species of macro-crustacean fauna is given in Table 2.

Table 2. Catch per unit effort of macro-crustaceans recorded during different seasons

SPECIES	PRE-MONSOON	MONSOON	POST-MONSOON
<i>Acetes johni</i>	0.490	0.000	0.000
<i>Charybdis feriata</i>	1.459	1.961	1.985
<i>Charybdis lucifera</i>	1.458	0.000	0.524
<i>Clibanarius padavensis</i>	0.005	0.000	0.000
<i>Penaeus indicus</i>	5.544	20.064	7.378
<i>Penaeus merguensis</i>	0.113	0.307	0.059
<i>Matuta lunaris</i>	0.124	0.038	0.132
<i>Melicertus canaliculatus</i>	0.000	0.000	0.034
<i>Metapenaeus affinis</i>	0.243	4.718	3.248
<i>Metapenaeus dobsoni</i>	1.812	6.918	39.202
<i>Oratosquilla nepa</i>	2.154	0.036	4.583
<i>Parapenaeopsis stylifera</i>	0.638	4.065	0.404
<i>Penaeus monodon</i>	0.112	3.142	0.408
<i>Penaeus semisulcatus</i>	0.094	0.015	0.180
<i>Portunus pelagicus</i>	1.759	3.091	2.209
<i>Portunus sanguinolentus</i>	2.325	2.847	3.892
<i>Scylla serrata</i>	0.037	0.003	0.008

From fisheries management perspective, judicious suggestions on the fishing operations can ensure sustainability of the fishery on long term basis, thereby ensuring the livelihoods of the coastal fishermen of Karwar. In climate change perspective shore-seine fishery

is highly vulnerable fishing method as extensive changes are occurring in the beach topography due to sea level rise and also by sea erosion. Hence, fishermen of the coast who are depending exclusively on shore-seine operations for their livelihood, have to be empowered with avenues of alternate vocations also.