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Ichthyofaunal Diversity of *Dol* net fishery at Navabandar, Gujarat

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Abstract

Dolnetters contributed significantly to the fish production in Gujarat. However, *dol* net fishermen usually live in poverty threshold. Available secondary data suggests that overfishing prevails in Indian marine sector. While considering the complexity of *dol* net operations and the importance of fishery along North West coast of India present study done along one of the major *dol* net landing center of Gujarat. Study conducted to estimate the commercially important ichthyofaunal diversity landed along Navabandar coast, Gujarat during the period from 15th August 2012 to 31st April 2013 (one fishing season). The present study revealed that altogether 24 major fish and shellfish species caught by *dol* net along Navabandar coast. There were 312 dolnetters in Navabandar fishing village. There was good variety of marine resource landing observed in *dol* net fishery. Non-penaeid shrimps contributed 40.22% of the total landings, followed by *Harpadon nehereus* (Bombay duck; 15%). Amongst the landed species, six were pelagic while 16 were demersal and the remaining two were miscellaneous (Non-penaeid shrimps). Demersal fishes contributed maximum (66%) to the total catch with contribution of about 72% to the total revenue. Sciaenids and pomfrets were the major as economically important species. Jaw fish fetched the maximum revenue (32%). Therefore, present study concluded that *dol* net fishery supported considerable variation in species composition. Study also revealed that due to usage of small mesh size there was sign of overfishing reported, so management policies must need to implement for conservation of marine fisheries resources for fulfilling present and future needs.

Keywords: Ichthyofaunal diversity, *Dol* net, Navabandar, Gujarat

1. Introduction

Dol netting is a very popular passive technique of fishing practiced from early years. This net is an indigenous version of bag net operated along the northwest coast of India. Bombay duck, *Harpadon nehereus* (Ham) is the main catch at Navabandar situated along Saurashtra coast, Gujarat; contributing about 97% of the total landings of Bombay duck in India (Jhingran, 1982). Consequently, *dol* net fishery has become synonymous with Bombay duck fishery. The report along Navabandar, Rajpara and Jaffrabad coasts of Saurashtra stated Bombay duck landing contributed of around 31.12% to total *dol* net landings (Ghosh et al., 2009). The contribution of catch due to *dol* net has been 8.5% and 9.7% during 2005 and 2006 respectively (Srinivasan et al., 2009). This study has also revealed that the contribution of the mechanized *dol* net has been significant in both the years of study with 30% (194000 tonnes) and 31% (264000 t) during 2005 and 2006 respectively. The fishery of *dol* net has exhibited a significant increase in the production over the years due to an increase in the fishing efforts and mechanization leading to a simultaneous increase in the rate of catch (Mohanraj et al., 2009). Some of the other studies reported that the dominating species of *dol*

net catch along the northwest coast include Bombay duck, clupeids, elasmobranchs, catfishes, croakers, eels, ribbon fishes, threadfins, pomfrets, flat fishes, penaeid shrimps, non-penaeid shrimps, lobsters, etc (Sehara and Karbhari, 1987; Jadhav and Josekutty 2007; Jaydev et al., 2007). Umesh and Sujit (2007) has observed huge landings of the catfish *A. dussumieri* along Gujarat coast by a *Karli* dolnetter.

Gujarat has the longest coastline in the country (1600 km; comprising of 19.71%). The contribution of marine fish catch from Saurashtra has always formed the major share from the state of Gujarat. However, Saurashtra has around 53% coastline of the state, its contribution in terms of marine fish landings amounts to 90%. *Dol* nets are operated mainly in three regions in Gujarat, viz., Umbergaon to Kavi (along the Southern Gujarat), Siyalbet to Diu (along the Saurashtra coast) and Takkara to Modhwa (in the Gulf of Kachchh region). Saurashtra region considered as the most important among these three regions, as it has fishing centers at Jaffarabad, Rajpara, Navabandar and Goghla (Manojkumar and Dineshbabu, 1999). Navabandar is one of the important marine fish-landing centers, which has contributed 10,634 t (1.54%) fish production in 2010–11 (Anon, 2012). Fishing



operations continues throughout the month without any break at Navabandar. Fishing is the main occupation of the residents of this coastal village. About 1395 fishermen families are engaged in fishing and fishery allied activities (CMFRI, 2010).

2. Materials and Methods

2.1. Study area

Navabandar fishing village is located in the Junagadh district of Gujarat, a maritime state situated on the west coast of India. This village situated about 10 km away from Una taluka headquarter.

2.2. Sampling unit

The dolnetters operating along Navabandar coast were the sampling units for the present study. Information regarding the diversity of the landed species of fish along with the catch composition data of 20 dolnetters was collected at fortnightly intervals from randomly selected fishermen of Navabandar fish landing centre.

2.3. Sampling procedure

Fishing season in Gujarat is of nine months i.e., from September to May. The data for the study were collected from 15th August 2012 to 31st April 2013, which considered as one fishing season. Catch composition data recorded at fortnightly interval from 20 dolnetters as described by Sehara and Karbhari (1987). Dolnetters selected randomly on the first come first select basis.

3. Results and Discussion

Dol net fishery of Navabandar coast comprised of Bombay duck, ribbonfish, crockers, seerfish, sole fish, catfish, shark, silver pomfret, thread fin, rays, clupeids, reef cod, eel, squid, penaeid shrimps and non-penaeid shrimps. Apart from these, several other species were also caught, but in lesser quantity.

3.1. Bombay duck

Bombay duck invariably dominated the *dol* net catch. It formed about 15% of the total catch during the period of study. The main species of Bombay duck was *Harpadon nehereus*. It was caught almost throughout the year i.e., from August to April. Its maximum catch was in August (51%) and the lowest in February (about 1%), contributing about 44% of the total pelagic fish landings (Plate 1).

3.2. Seerfish

Seefish contributed less than one per cent to the total catch. The major species of seerfish caught was Spotted seerfish (*Scomberomorus guttatus*). The quantity of its catch was the highest in November (22%) whereas it was the lowest in January (less than one per cent). It contributed about 1% of the total pelagic fish landings (Plate 1).

3.3. Ribbonfish

Ribbonfish contributed about 15% to the total catch. The major species of ribbonfish found in the catch was Silver



a. Bombay duck (*Harpadon nehereus*)



b. Seerfish (*Scomberomorus guttatus*)



c. Ribbonfish (*Lapturecanthus savala*)



d. Golden anchovy (*Colia dussumieri*)

Plate 1: Major species caught by *dol* net at Navabandar coast ribbonfish (*Lapturecanthus savala*). It was available almost throughout the year i.e., from August to April. The quantity of its catch was the highest in August (53%) whereas it was the lowest in March (less than one per cent). Its contribution to total pelagic fish landings was about 44% (Plate 1).

3.4. Clupeids

The fishery of clupeids was fairly good at Navabandar. This group comprised mainly of two species; the commonest being Golden anchovy (*Colia dussumieri*) and the other being Big eye ilisha (*Ilisha megaloptera*). These groups formed about 3% of the total *dol* net fishery. Golden anchovy contributed about 2% while Big eye ilisha contributed only less than one per cent to the total catch (Plates 1 and 2).

3.5. Carangids

Carangids contributed less than one per cent to the total catch. The major carangid caught was Talang queenfish (*Scomberoides commesonianus*). The catch of carangids was the highest in November (27%) whereas it was the lowest in April (6%; Plate 2).

3.6. Sciaenids

Sciaenids formed the major demersal fishery at Navabandar.



a. Big eye ilisha (*Ilisha megaloptera*)



b. Talang queenfish (*Scomberoides commesonianus*)



c. Bearded crocker (*Johnius dussumieri*)



d. Jew fish (*Protonibea diacanthus*)

Plate 2: Major species caught by *dol* net at Navabandar coast

Economically this group was very important. It comprised mainly of three species viz., Bearded crocker (*Johnius dussumieri*), Jew fish (*Protonibea diacanthus*) and Bronge crocker (*Otolithoides biauritus*). They were caught almost throughout the fishing season i.e., from August to April. These species constituted about 8% of the total *dol* net fishery. Bearded crocker contributed about 4%, Jew Fish 2% and Bronge crocker contributed 3% of the total catch. Sciaenids contributed 32% of the total demersal fish landings (Plates 2 & 3).

3.7. Threadfin

Threadfins contributed only less than one per cent to the total catch during the period of study. The major species of threadfin caught was Indian threadfin (*Polynemus indicus*). The catch of the group reached the highest level in October (21%) whereas it was the lowest in February (9%; Plate 3).

3.8. Pomfret

Pomfret is the most sought fish for financial returns and gourmand needs. It contributed about one per cent to total catch. The major species of pomfret caught was Silver pomfret (*Pampus argenteus*). Its maximum catch was in August (69%)

whereas it was the lowest in February (2%; Plate 3).



a. Bronge crocker (*Otolithes biauritus*)



b. Indian threadfin (*Polynemus indicus*)



c. Silver pomfret (*Pampus argenteus*)



d. Catfish (*Arius dussumieri*)

Plate 3: Major species caught by *dol* net at Navabandar coast

3.9. Catfish

Catfishes were one of the important demersal fishes caught in *dol* net. They contributed about 4% to the total catch during the study period. They were caught almost throughout the season i.e., from August to April. The major species of catfish caught was Dussumieri catfish (*Arius dussumieri*). The catch was the highest in April (22%) whereas it was the lowest in January (3%). It contributed about 14% of the total demersal fish landings (Plate 3).

3.10. Reef cod

The contribution of Reef cod to total catch during study period was less than one per cent. It was caught only in winter months. Six barred reef cod (*Epinephus diacanthus*) was the major species of reef cod caught off Navabandar.

3.11. Sole fish

Sole fish was one of the important demersal fish caught in *dol*

net, contributing about 4% to the total catch. It caught almost throughout the fishing season i.e., from August to April. The major catch of Sole fish was (*Cynoglossus macrolepidotus*). Its highest catch was in August (25%) whereas it was the lowest in April (2%). Sole fish contributed about 16% to the total demersal fish landings (Plate 4).



a. Sole fish (*Cynoglossus macrolepidotus*)



b. Indian pike conger (*Congresox talbonoides*)



c. Shark (*Scoliodon laticaudus*)



d. Ray (*Dasyatis zugei*)

Plate 4: Major species caught by *dol* net at Navabandar coast

3.12. Eel

The contribution of eel to the total catch during the period of study was less than one per cent. It caught throughout the period of study, but in lesser quantities (Plate 4). Indian pike conger (*Congresox talbonoides*) was the major species of eel observed in the catch.

3.13. Shark

Sharks contributed less than one per cent to the total catch. Though it caught throughout the year, the quantity of catch was less (Plate 4). The major species of shark observed was Dog shark (*Scoliodon laticaudus*).

3.14. Ray

Rays also contributed less than one per cent to the total catch

during study period (Plate 4). Pale-edged sting ray (*Dasyatis zugei*) was the major species of ray found in the catch.

3.15. Cephalopods

Cephalopods contributed about 0.55% to the total catch. Squid (*Loligo duvaucelli*) was the major species observed in the catch.

3.16. Shrimps

Penaeid shrimps were the major demersal fishery at Navabandar. Economically this group was very important. This group comprised mainly of four species viz., Kiddi prawn (*Parapeneopsis stylifera*), Indian prawn (*Metapenaeus affinis*), Coastal mud prawn (*S. crassicornis*) and Indian white prawn (*Penaeus* spp.). They were caught almost throughout the year i.e., from August to April. These groups formed about 5% of the *dol* net fishery. Shrimps contributed 20% of the total demersal fish landings (Plate 5).

The major portion of *dol* net catch comprised of non-penaeid shrimps, which contributed about 40% to the total catch at Navabandar. Paste shrimp (*Acetes indicus*) and Hunter shrimp (*Hippolysmata ensirostris*) were the species observed in this category. Locally it known as *Kuto*, which considered under miscellaneous group due to their low market value. They were caught almost throughout the fishing season i.e., from August to April. Their maximum catches occurred in August



a. Shrimps



b. Miscellaneous (kuto)

Plate 5: Major species caught by *dol* net at Navabandar coast

(23%) whereas it was the lowest in January (6%). Paste shrimp constituted the major portion of the non-penaeid shrimp (Plate 5).

The *dol* net operations at Versova during one peak season of two months (November and December 1974) revealed that the catch has comprised of Bombay duck (25%), *Coilia* (20%) and shrimps (35%; Rao and Bindu, 1976). About 33 species caught by *dol* net fishery at Sasoon dock (Bombay; Pillai, 1981). Large quantities of small-sized Silver pomfret *P. argenteus* (Eupher) caught in *dol* net during 1979-80 and 1980-81 fishing seasons along Navabandar coast (Khan, 1984). The fishery of Bombay duck *H. nehereus* in Saurashtra waters has constituted about 68 to 77% of the *dol* net landings at Navabandar (Khan, 1985). The other important species have consisted of *C. dussumieri*, ribbonfish, non-penaeid shrimp, viz., *A. indicus*, *Nematopalaemon tenuipes* and *H. ensirostris*. Penaeid shrimps, ghol, wam, pomfret and catfishes have also landed in considerable quantities at Navabandar.

Another study conducted at Sassoon Docks area has revealed unusual heavy landings of catfish by *dol* nets. The catch has consisted of only one species of catfish i.e., *T. dussumieri* (Waghmare, 1987). *Dol* net fishery reported as a multi species fishery comprising fishes, penaeid shrimps and non-penaeid shrimps supporting almost 85% of the fisherman families at Versova, Bombay (Alexander and Narayan, 1992). Kizhakudan (2002) has reported the landing of Black porpoise *Neophocaena phocaenoides* and *G. cuvier* in *dol* net at Seemar, Gujarat. The catch of silver pomfret (89.51%) has attained as the major one followed by *Prastromateus niger*, *P. chinensis*, seerfish, sharks, *Chirocentrus dorab*, catfish and kati, constituting 8-10% of the total landings (Chavan *et al.*, 2004). A recent study on the catch composition of *dol* net along Saurashtra coast has revealed that it mainly consists of *H. nehereus*, *P. diacanthus*, penaeid prawns, non-penaeid prawns, *P. argenteus*, *Trichiurus* sp., carangids and catfishes (Nair *et al.*, 2007). Thangavelu *et al.* (2010) have also observed an unusual heavy landing of the catfish *A. dussumieri* at Rajapara Bay of Gujarat coast.

4. Conclusion

Dol net fishing of Navabandar village is a profitable vocation. Increased fishing efforts reports crafts improvement, which increases voyage period, causes heavy landings of certain commercially important species. This in future will causes overexploitation of fisheries resources. The study stated that because of smaller *dol* net mesh size, small sized fishes caught in large quantities. To avoid such future concerns regarding collapsing of natural resource potential, certain fisheries management measures need to implement. Awareness among the fisherman community must require.

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