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Research Article

Miscellaneous Marine Fishes Caught under PFZ and Non-PFZ Realm off Ratnagiri Coast, Maharashtra State, India

Abstract

Potential Fishing Zones connote where Chlorophyll Concentration and Sea Surface Temperature together constitute better environment for the healthy growth of fish and food abundance. Fishing was done in both within and outside PFZ zones after validating PFZ advisory in time and firsthand information is also collected from the fish catch in different gears by following generated PFZ advisory and feedback in the standard format developed by INCOIS. Within PFZ means potential and good number of fish catch is obtained as compared to outside PFZ means fishing is done away 2-3km without using PFZ advisory. Identical boats were selected at the same time from the same landing centers going one in within and other for outside PFZ fishing boats separately carried fishing operations in accordance with the PFZ area provided by the satellite. The availability of food is an important factor that controls their occurrence, abundance and migrations in the sea. Sea Surface Temperature (SST) is the most easily observed environmental parameter and is quite often correlated with the availability of fish, especially pelagic fish. A better understanding of the behavior and dynamics of fish populations including their response to environmental and anthropogenic pressures is essential for effective management of marine fisheries. In spite of the vast scope and potentials for development of marine fishery along Ratnagiri coast, significant and tangible progress needs to be achieved so far through INCOIS-DOD which is leading to benefit the fishermen community in obtaining high fish catch with less efforts and time and fuel saving from PFZ, still much is needed to work based on a few drawbacks and gaps as seen (a) lack of sufficient understanding PFZ, (b) failure to recognize the PFZ during fishing, (c) lack of modernizing or upgrading the mechanized boats, and (d) little infrastructure and equipment in fishing. The INCOIS-DOD Mission activities should be thoroughly and critically is followed both by fishermen and their societies on the Ratnagiri coast region for which the expansion of this Mission and extension of research activities. The successful validation on PFZ advisory from the three fish landing centers were conducted during the study tenure.

Introduction

The Indian National Center for Ocean Information Services (INCOIS) get SST contour obtained from National Oceanic and Atmospheric Administration (NOAA) satellite using Advanced Very High Resolution Radiometer (AVHRR) data and chlorophyll images produced from the Indian satellite using Ocean Color Monitor (OCM) sensor, to identify potential fishing zones [1]. Maharashtra states on the west coast contribute over 65% of the national marine landings. Although Maharashtra accounts for 14-20 percent of the total marine fish production of India. Marine fish production contribute 45% of the total fish production of the country in 2010 [2]. Along Ratnagiri coast this marine fish production contribute mostly 10% resources [3]. In an aquatic ecosystem, physic-chemical environment

has profound influence on its biotic components. In the long run it controls diversity, biomass and spatial distribution of biotic communities in time and space. Potential Fishing Zone Advisories in respect of these coastal states are being produced by using the satellite data sets from NOAA, AVHRR, IRS P4, OCM and MODIS-AQUA satellite based Sea Surface Temperature (SST) images are being used as an firsthand input in order to locate PFZ of productivity and therefore fish availability for commercial fishing operations [4]. As stated by [5], whatever is metabolic and physiological movements and life sustain processes viz. feeding, reproduction etc. of aquatic organisms are by far affected by water temperature. Ocean Color Remote Sensing Offers firsthand valuable information in terms of space and time variability towards near surface chlorophyll a, concentration, imperative to explore oceanic

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primary production, global carbon and biogeochemical cycles [6]. Ocean and atmosphere form part and parcel constituents of the climate systems. The Sea Surface Temperature (SST) is one of the imperative parameters that exert the tropical atmosphere ocean interaction [7]. In implementing ocean information and advisory services under the Mission, INCOIS-DOD has been conducting meetings of the P.I. associated with renowned scientist from ISRO, NRSA, FSI, and others from marine fisheries discipline. These occasions are providing opportunities to review the progress and free exchange of scientific and other relevant ideas for improvement and application of satellite information system in marine fisheries development [8].

Materials and Methods

Mirkarwada is one of the famous and topical in respect of marine fishery resources landing. Although overall progress based on the feedback of the users has been quite satisfactory from certain major fish landing centers of Ratnagiri district, in total 93 fish species are found they have been categorized based on their species habitat, migratory behavior and occurrence in fishing crafts and gears employed with their maximum length in fish catches. The study were performed during 2006 to 2012 based on PFZ advisory validation and accurate firsthand information procured form the fishermen. The establishment of Electronic Digital Display Boards at major fishing harbors, intense interaction between the researchers under the project of INCOIS-project, scientist, officials of Port Offices of Maritime Board, Govt. of Maharashtra and Department of Fisheries, Govt. of Maharashtra, and fishing community at the fishing harbors, and use of a wide range of media such as fax, telephone, radio, internet and print media have to be expanded in local language on these coastal areas. During these activities it is essential at present to examine and step in the existing marine fishery and formulate corrective steps for up gradation and modernization in order to make it responsive to the socio-economic realities through INCOIS-DOD Mission.

Result

The PFZ beneficiary boat owners has got benefit much more throughout the PFZ validation study in terms of total fish catch, percent success and reduction in search time for within and outside PFZ area. In such a way that they can reform their standard of living. The study showed better fish catch in all the way. However purse-seine gets large fish catch than trawlers. Finally fish catch success could get by operating main purse-seine and trawl fishing gears for establishing scientific facts based on PFZ validation experiment. All the marine fishes listed below is found at the depth range between 10 to 55m.

The list indicates common name, local name, and scientific name with authority, habitat, and occurrence in gear, migratory category and maximum length in catches:

- Spotted catfish (Shingti/Shingala) Arius maculatus (Thunberg) Demersal, Trawl net, Oceanodromous, Length 15-20 cm.

- Giant marine catfish (Shingala) Arius thalassinus (Ruppel) Demersal, Trawl net, Oceanodromous, Length 50-60 cm

- Indian conger eel (Vam/Eel) Anguilla bicolor (Mc Clelland) Demersal, Trawl net, Oceanodromous, Length 40-50 cm

- Black mouth croaker (Dhodi) Atrobucca nibe (Jordon and Thompson) Demersal, Trawl net, Oceanodromous, Length 10-15 cm

- One finlet scad Alepes mate (Cuvier) Demersal, Trawl net, Oceanodromous, Length 10-15 cm

- Long spine sea bream (palu) Argyrops spinifer (Forsskal) Demersal, Trawl net, Oceanodromous, Length 10-15 cm

- Malbar trevally (Koker) Carangoides malabaricus (Bloch) Demersal, Trawl net, Oceanodromous, Length 20-25 cm

- Gold spotted grenadier anchovy (Mandeli) Coilia dussumieri (Valenciennes) Demersal, Trawl net, Oceanodromous, Length 10-15 cm

- Indian conger eel (Vam) Conger cinereus (Richardson) Demersal, Trawl net, Oceanodromous, Length 50-60 cm

- Malabar sole (Lape) Cyanoglossus macrolepidotus (Norman) Demersal, Trawl net, Oceanodromous, Length 10-15 cm

- Milk fish Chanos chanos (Forsskal) Demersal, Trawl net, Oceanodromous, Length 10-15 cm

- Spotted drepan (Chand) Drepane punctata (Linnaeus) Demersal, Trawl net, Oceanodromous, Length 10-15 cm

- Tropical two-wing flying fish (Pakhru masa) Exocoetus volitans (Linnaeus) Pelagic, Purse-seine net, Diadromous, Length 30-40 cm.

- Greasy grouper (Hekaru/Gobra) Epinephelus tauvina (Forsskal) Demersal, Trawl net, Oceanodromous, Length 20-30 cm

- Spade fish (Chandwa) Ephippus orbis (Bloch) Demersal, Trawl net, Oceanodromous, Length 10-15 cm

- Pearl spot (Tavji) Etroplus suratensis (Bloch) Demersal, Trawl net, Diadromous, Length 15-20 cm

- Eastern little tunny (Gedar) Euthynnus affinis (Cantor) Pelagic, Purseseine and Gill net, Oceanodromous, Length 35-40 cm

- Malbar reef cod (Gobra) Epinephelus malabaricus (Schneider) Demersal, Trawl net, Oceanodromous, Length 20-25 cm

- Bleeker's grouper (Gobra) Epinephelus bleekeri (Vaillant and Bocourt) Demersal, Trawl, Oceanodromous, Length 20-25 cm

- Areolated grouper (Gobra) Epinephelus areolatus (Forsskal) Demersal, Trawl net,Oceanodromous, Length 15-20 cm

- Deep body moira (Charbat) Gerres abbreviatus (Bleeker) Demersal, Trawl net, Oceanodromous, Length 10-15 cm

- Deep body moira (Charbat) Gerres filamentosus (Cuvier) Demersal, Trawl net, Diadromous, Length 15-20 cm 51

- Bombay duck (Bombil) Harpadon nehereus (Hamilton and Buchanan) Demersal, Trawl net, Oceanodromous, Length 10-16 cm

- White tail sting ray (Waghali) Himantura bleekri Demersal, Trawl net, Diadromous, Length 40-50 cm

- Short toothed hammer croaker (Dhodi/Dhoma) Johnius volgeri (Bleeker) Demersal, Trawl net, Oceanodromous, Length 15-20 cm

- Bearded croaker (Dhodi) Johnius amblycephalus (Bleeker) Demersal, Trawl net, Oceanodromous, Length 15-20 cm

- Dussumier's croaker (Dhodi) Johnius dussumieri (Cuvier) Demersal, Trawl net, Oceanodromous, Length 30-40 cm

- Kirocentrus noods (Karli) (Blyth) Demersal, Trawl net, Oceanodromous, Length 30-40cm

- Whitefin wolf-herring Kirocentrus noods (Swainson) Demersal, Trawl net, Diadromous, Length 40-50 cm

- Skipjack tuna (Gedar) Katsuwonus pelamis (Linnaeus) Pelagic, Purse seine and Gill net, Oceanodromous, length 55-60 cm

- False trevally (Saundala) Lactarius lactarius (Schneider) Demersal, Trawl net, Oceanodromous, Length 18-25 cm

- Snapper (Tambosa) Lutjanus bleekeri (Bloch) Demersal, Trawl net, Diadromous, Length 15-20 cm

- Russell's snapper (Tambosa) Lutjanus russelli (Bleeker) Demersal, Trawl net, Oceanodromous, Length 12-18 cm

- Black spot snapper Lutjanus fulviflammus (Forsskal) Demersal, Trawl net, Diadromous, Length 12-18 cm

- Emperor red snapper (Tambosa) Lutjanus sebae (Cuvier) Demersal, Trawl net, Diadromous, Length 10-15 cm

- Blooded snapper (Tambosa) Lutjanus sanguineus (Cuvier) Demersal, Trawl net, Diadromous, Length 12-16 cm

- Orange bony fish (Kap) Liognathus lineolatus (Valenciennes) Demersal, Trawl net, Diadromous, Length 10-15 cm

- Giant seapearch (Khajura) lates calcarifer (Bloch) Demersal, Trawl net, Oceanodromous, Length 15-20 cm

- Flat headed grey mullet (Boir) Mugil cephalus (Linnaeus) Demersal, Trawl net, Diadromous, Length 10-15 cm

- Japanese thread-fin bream (Rani) Nemipterus japonicus (Bloch) Demersal, Trawl net, Oceanodromous, Length 10-14 cm

- Bloched croaker (Dhodi) Nibea maculata (Schneider) Demersal, Trawl net, Oceanodromous, Length 10-15 cm

- Tiger toothed croaker (Dhodi) Otolithes rubber (Schneider) Demersal, Trawl net, Oceanodromous, Length 10-15 cm

- Sciaenids (Dhoma) Otolithoides argenteus (Cuvier) Demersal, Trawl net, Oceanodromous, Length 10-15 cm

- Sciaenids (Koth) Otolithoides brunneus (Cantor) Demersal, Trawl net, Oceanodromous, Length 10-15 cm

- Small headed ribbon fish (Bala) Lepturacanthus savala (Cuvier) Demersal, Trawl net, Oceanodromous, Length 40-50 cm

- Horse mackerel (Kat/Kharba bangada) Magalaspis cordyla (Linnaeus) Demersal, Trawl net, Oceanodromous, Length 30-40 cm

- Moon fish (Chandva) Mene maculata (Bloch) Demersal, Trawl net, Oceanodromous, Length 10-15 cm

- Spotted croaker (Ghol) Protonibea diacanthus (Lacepede) Demersal, Trawl net,Oceanodromous, Length 10-15 cm

- Silver pomfret (Paplet) Pampus argenteus (Euphrasen) Demersal, Trawl net, Oceanodromous, Length 30-35 cm

- Chinese pomfret (kapri paplet) Pampus chinensis (Euphrasen) Demersal, Trawl net, Oceanodromous, Length 30-35 cm

- Black pomfret (Halwa/Saranga) Parastromateus niger (Bloch) Demersal, Trawl net, Oceanodromous, Length 35-45 cm

- Silver grunt (karkara) Pomadasys argenteus (Forsskal) Demersal, Trawl net, Oceanodromous, Length 10-15 cm

- Indian-threadfin (Dadha) Polydactylus indicus (Shaw) Demersal, Trawl net, Diadromous, Length 15-20 cm

- Indian halibut (Bhakas) Psettodes erumei (Schneider) Demersal, Trawl net, Oceanodromous, Length 10-14 cm

- Double lined tongue sole (Lep/Lepbhakas) Paraplagusia bilinaeata (Bloch) Demersal, Trawl net, Oceanodromous, Length 15-20 cm

- Indian salmon (Rawas) Polynemus tetradactylum (Linnaeus) Demersal, Trawl net, Oceanodromous, Length 15-20 cm

- Lobster (Shevand) Pamulirus homarus (?) Demersal, Trawl net, Oceanodromous, Length 15-20 cm

- Indian mackerel (Bangda) Ratsrelliger kanagurta (Cuvier) Pelagic, Pelagic, Oceanodromous, Length 25-30 cm

- Javanese cow ray (Wagli) Rhinoptera javanica (Muller and Henle) Demersal, Trawl net, Oceanodromous, Length 50-60 cm

- Black king fish (madusa) Rachycentron canadus (Linnaeus) Demersal, Trawl net, Oceanodromous, Length 10-15 cm

- Indian dog shark (Mushi) Scoliodon laticaudus (Muller and Henle) Pelagic, Purse-seine, Oceanodromous, Length 30-45 cm

- Narrow barred Spanish mackerel (Suramai/Taur) Scomberomorus commerson (Lacepede) Pelagic, Gill net, Oceanodromous, Length 30-35 cm

- Streaked Spanish mackerel (Suramai/Taur) Scomberomorus lineolatus (Cuvier) Pelagic,Gill net, Oceanodromous, Length 45-50 cm

- Indo-pacific Spanish mackerel (Taur) Scomberomorus guttatus (Bloch and Schneider) Pelagic, Gill net, Oceanodromous, Length 30-35 cm

- Oriental bonito (Gedar) Sarda orientalis (Temminck and Schlegel) Pelagic, Purse-seine and Gill net, Oceanodromous, Length 18-25 cm

- Banded barracuda (Karli) Sphyraena jello (Cuvier) Demersal, Trawl net, Oceanodromous, Length 40-50 cm

- Croaker (Dhodi) Sciaena anaeus (Bloch) Demersal, Trawl net, Oceanodromous, Length 10-15 cm

- Leather skin (Passcut) Scomberoides lysan (Forsskal) Demersal, Trawl net, Oceanodromous, Length 15-20 cm

- Black banded trevally (Butter fish) Seriolina nigrofasciata (Ruppel) Demersal, Trawl net, Oceanodromous, Length 10-15 cm

- Silver silllago (Renvi) Sillago sihama (Forsskal) Demersal, Trawl net, Diadromous, Length 15-20 cm

- Round tail needle fish (Tol) Strongylura Strongylura (van Hasselt) Demersal, Trawl net, Oceanodromous, Length 30-40 cm

- Indian oil sardine (Tarli) Sardinella longiceps (Valenciennes) Demersal, Trawl net, Oceanodromous, Length 10-14 cm

- Deep bodied sardine (Tarli) Sardinella brachysoma (Bleeker) Demersal, Trawl net, Oceanodromous, Length 10-12 cm

- Commersons anchovy (kati) Stolephorus commersoni (Lacepede) Demersal, Trawl net, Oceanodromous, Length 10-13 cm

- Goldstripe sardenella (Pedwa) Sardinella gibbosa (Bleeker) Demersal, Trawl net, Diadromous, Length 10-15 cm

- Obtuse barracuda (Ganjya/Badwi/Karli) Sphyraena obtusata Demersal, Trawl net, Oceanodromous, Length 25-35 cm

- Lizzard fish (Chor Bombil) Saurida undosquamis Demersal, Trawl net, Oceanodromous, Length 25-30 cm

- Bigeye tuna (Gedar) Thunnus obesus (Lowe) Pelagic, Purse-seine and Gill net, Oceanodromous Length 35-40 cm

- Yellow fin tuna (Gedar) Thunnus albacares (Bonnaterre) Pelagic, Purse-seine and Gill net, Oceanodromous, Length 40-50 cm

- Tiger perch (Gava/Hajam) Terapon jarbua (Forsskal) Demersal, Trawl net, Oceanodromous, Length 15-20 cm

- Large headed ribbon fish (Bala) Trichiurus lepturus (Linnaeus) Demersal, Trawl net, Oceanodromous, Length 50-60 cm

- Hilsa shad (Pala/palu) Tenulosa ilisha (Hamilton and Buchanan) Demersal, Trawl net, Oceanodromous, Length 10-15 cm

- Blue spot grey mullet (Boir) Valamugil seheli (Forsskal) Demersal, Trawl net, Diadromous, Length 15-20 cm

- Spiny lobster/Rock lobster (Shevand) Scyarus sordidus (?) Demersal, Trawl net, Oceanodromous, Length 15-20 cm

- Tiger prawn (Kolambi) Penaeus monodon (Fabricius) Demersal, Trawl net, Diadromous, Length 10-15 cm

- Brown prawn (Kolambi) Metapenaeus monoceros (Fabricius) Demersal, Trawl net, Diadromous, Length 10-15 cm

- King prawn (Kolambi) Metapenaeus affinis (H. Milne Edwards) Demersal, Trawl net, Diadromous, Length 10-15 cm

- White prawn (Chalu) Penaeus indicus (Fabricius) Demersal, Trawl net, Diadromous, Length 10-15 cm

- Green tiger prawn (Kolambi) Penaeus semisulcatus (De-Haan) Demersal, Trawl net, Diadromous, Length 10-15 cm

- Cuttle fish Sepia spp. Demersal, Trawl net, Diadromous, Length 10-15 cm

- Squid (Mhakul) Loligo duvaucelli (Rafinesque) Demersal, Trawl, net Diadromous, Length 25-35 cm

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- Arabian red shrimp (Kolambi) Aristeus alcocki (Ramadan) Demersal, Trawl net, Diadromous, Lengt 10-15 cm

- Lobster (Shevand) Palynurus polyphagus (?) Demersal, Trawl net, Oceanodromous, Length 15-20 cm

Discussion

The fishing vessels were hired for conducting all the PFZ experiment for within and outside PFZ areas from all the selected and most important fish landing centers where pomfrets fish catch have been landed in less quantity especially in trawl and gill net. Though PFZ advisory depend upon SST and Chlorophyll mainly for pelagic resources to be exploited. An attempt has been made to carry PFZ validation experiment for within and outside PFZ area for the exploitation of demersal resource like pomfrets. In biochemical composition results more or less variation is occurred in both the late post-spawning and early pre-spawning season. The present study tried to establish more important data to conclude scientific variable results. Each one fishing boat for within and other for outside going PFZ areas were hired from each fish landing centers off Ratnagiri coast. Boat hiring for within PFZ validation and outside non-validated PFZ from different fish landing centers throughout the study period.

Firstly it was imagined how PFZ will be helpful for trawlers to obtain the fish catch, when this was employed for trawler for within and outside PFZ then study report trawl comprise different fish verities which is more valuable than purse-seine fishery. Though PFZ forecast being based on surface temperature like SST and chlorophyll, but when we tried to conduct PFZ advisory on pomfrets in the specified area from trawl net and to some extent for gill net the good results was obtained in getting pomfrets fish catch, however it was less in quantity thereafter we continued and conclude in the long run to successfully operate these nets would give better implication to establish scientific facts. Since no such study was previously conducted, so that by keeping in mind these studied were performed to get the concrete results for conducting PFZ validation experiments.

Conclusion

Many fisher from different landing centers which concerned with motorized and mechanized sector are not using PFZ data, however they used to be fishing traditionally. At some place fisher have been illiterate in understanding PFZ properly and ultimately lead to their socio-economic plight. As PFZ is an important initiative for distribution of information to the society. Also PFZ advisory services as one of the important benefits of Indian space program where the society is directly being benefitted. Scientific project must contribute both to disseminating the information as well as to have a research component which will only provide sustenance for the future.

It will be pointed out that major fishing crafts and gears and major fish species landed must be noted and threats such as fish depletion, fall in CPUE, degradation of habitats, predators, migration of fish etc. be essentially identified in the view of increasing marine fish production under the Mission. An effort should be put into intensifying the validation campaigns and acquiring real-time feedback from fishing vessels is an imperative. There is a need to establish collaborative / cooperative approach with rural population including youths, Fisheries Department, and educational / research institutes in order to effectively operate PFZ validation projects and modernize fishing. It is very essential to understand the magnitude of the importance from PFZ resources contributing to the fisheries.

Acknowledgement

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