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Short Communication: Fishing inside Qeshm Island's MPA, A tortuous approach

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Abstract. *Chamanara V, Kamrani E, Zahirinia M, Máñez KS. 2016. Short Communication: Fishing inside Qeshm Island's MPA, A tortuous approach. Nusantara Bioscience 8: 169-173*. Incremental pressure of population growth in coastal areas has led to loss in many mangrove areas. Although these areas are fish nursery grounds and are very important in stock assessments, there is no accurate and up-to-date available data about them. In this research the catch data in the Qeshm Island Marine Protected Area (MPA) of Iran was investigated using 11 stake nets. Totally, 81 specimens belonging to 69 genus and 63 families were caught, which majority of them were discards. The commercial fish were young which were mostly smaller than LM_{50}. In case of White Pomfret as well, only 15.3% of the caught individuals were in the legal catch size. Hence, this catch composition would be a potential threat to fish stocks. The major numerical and weight based specimens were *Dussumieria acuta* (10.05%) and *Arius maculatus* (5.9%), respectively. Containing 7 species, the Clupeidae was the most abundant family in the catch composition. Eventually, total annual catch by abovementioned stake nets within the mangrove forests in the Qeshm Island marine protected area was estimated to be 186.77-188.75 tonnes, approximately.

Keywords: Catch, stake net, marine protected area (MPA), mangrove, Qeshm Island, Persian Gulf

INTRODUCTION

Population growth in coastal areas has caused many mangrove forests to be used in another ways or to be repurposed, being exploited by inappropriate practices or even be destroyed totally. Although there is no accurate and up to date information on the current status and extent of these areas, there is consensus that a large part of this valuable resource is being destroyed every year. Overall, there are about 124 places in the world that are covered by mangrove forests (FAO 2007). Iran, as one of these areas has an important role in the management and conservation of this unique ecosystem. Mangrove forests or mangroves, are special ecosystems that grow in direct relation with sea tides (Aburto-Oropeza et al. 2008; Giri et al. 2011), furthermore, these mangroves in Iran are the last limit of mangroves distribution in Southwest Asia (Polidoro et al. 2010). Accordingly, they are critically important. Being pure and homogenous, these Mangrove forests lack plant variety, nevertheless they are of great faunal diversity (Carpenter, et al. 1997; Wells, et al. 2006). On the other hand; as a nursery for marine fishes, they are highly significant. Having a wide range of shallow waters; regular sedimentation and a lot of ecological shelters, this area is a suitable habitat for variety of fishes (Sheppard et al. 1992; Reynolds 1993). Besides this area is under protection by Iranian Environmental Organization, it is also in the list of International Wetlands in the Ramsar Convention. Mangrove forests are the nursery ground for fisheries reserves in the Persian Gulf, moreover spawning period or infancy and adolescence of most aquatic species are often associated with this region. So, beside to the current usual management strategies which are originally based on reserves, it is necessary to include this vital area itself to the management strategies.

Any negligence regarding evaluation and conservation of the nursery ground of the commercial species can be led into error in calculations of stock assessments, as well as reduction or loss of many endangered species generations. Hence, gathering proper information on the status of the nursery ground should be a top priority. In this regard lack of information on catch composition and especially about the incidents within the Marine Protected Area (MPA), as well as fishing inside MPA, despite unlicensed-fishing ban in it; the catch composition of artisanal fishermen's stake nets as one of their fishing gear was investigated. The results firstly report the fishing status in the protected area, and secondly they depict a clear illustration of the status quo in order to pave the way for further researches to strengthen the foundations for decision-makers in fisheries, environment and natural resources. In addition to the above-mentioned issues, presenting catch compositions of stake nets in 3 zones within MPA along Northwestern coast of Qeshm Island is of the objectives of this research.

MATERIALS AND METHODS

Study area

Although the exact number of stake nets within

mangrove protected area is not clearly defined, 11 stake nets in three areas on the northwestern coast of the Qeshm Island from the Laft to Goran were used to sampling for one year (2013-2014). The mostly sandy shorelines of Qeshm Islands, especially the shorelines along the mangroves which are mostly muddy and sandy, as well as favorable bed slope, proper water depth and proximity to the coves provide desirable conditions for establishing stake nets.

In this study 5 stake nets in the zone of Laft, 3 stake nets in the zone of Tabl and 3 stake nets in the zone of Durbeni and Guran were investigated. Distribution of these stake nets was chosen in such a way that the samples could be investigated along the borders of the MPA in 3 zones including northern zone (Laft), Central zone (Tabl) and western zone (Durbeni and Guran) (Figure 1).

Procedures

In the absence of coherent and updated data and in order to gather required information about the activities inside MPA, field samplings and observations, determining the abundance and composition of the catch, as well as interviews with fishermen have been done. In addition the total annual catch of stake nets inside Qeshm MPA has been calculated using Monte Carlo simulation method based on 1000 replications using Bootstrapping method. Based on the amount of catches for each stake net, the whole or part of the catch were recorded and used to assessment. Identification of species chiefly done in place and the local name or the Persian/English name of samples have been asked from the fishermen to being used in further processes of identifications. In the difficult situations, some samples were transferred to laboratory and identified using identification keys.

Data analysis

The data were processed and analyzed in the Microsoft Excel v.2013 and IBM SPSS v.23.

RESULTS AND DISCUSSION

In this study total numbers of 34 discharges of stake nets were investigated. The results showed that the mesh size were between 15 to 40 mm bar for the bunt and 20 to 60 mm bar for the rest of the net. Also total of 81 species belonging to 69 genera and 63 families of fish were caught by stake nets which some of the most important ones are shown in Table 1. Studies showed that diversity of caught fishes by the stake net has 67 species belonging to 55 genera in the northern region and 42 families, 73 species belonging to 60 genera and 58 families in the central region, and 55 species in the 46 genera and 40 families in the western region. As well as 6 species of crustacean, 6 species of cartilaginous fishes, two species of cephalopods, one species of sea turtles and three bird species were observed and recorded; Among which the largest numerical and weight percentage of fishes belonged to the small discard species (Figure 2). The results showed that most of the fish caught were belonged to bony fishes (Figure 3). The total length or fork length of some of the most important commercial fish are given in Table 2.

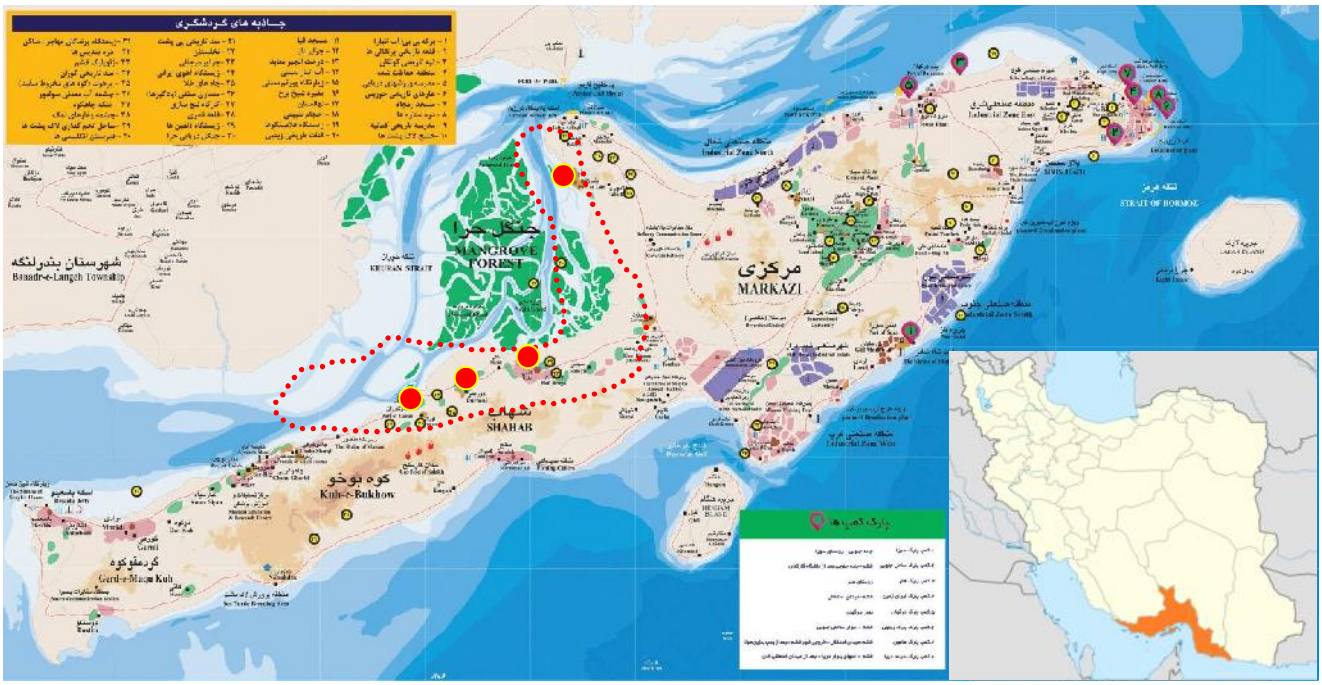

Figure 1. Studied area in Qeshm Island northern shoreline of Hormozgan Province, Iran; northern zone (Laft), central zone (Tabl) and western zone (Durbeni and Guran) (red dots)

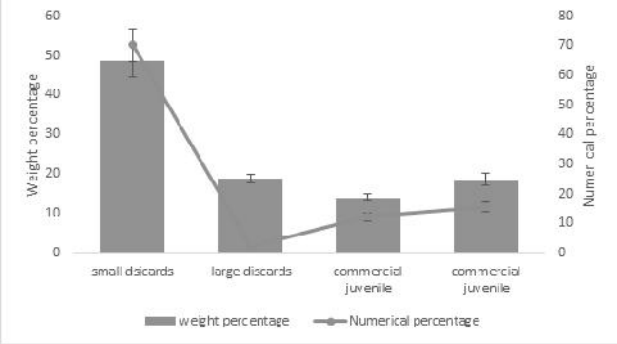

Figure 2. Weight/numerical percentage of catch in studied stake nets

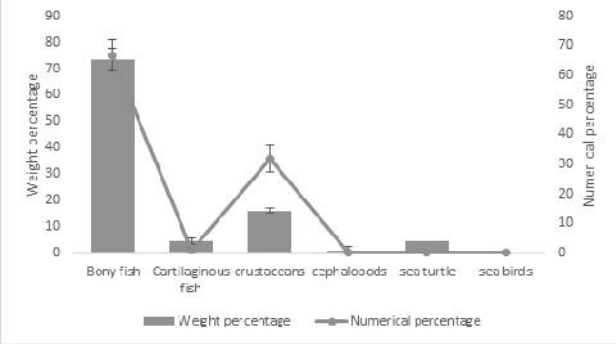

Figure 3. Weight/numerical percentage of forming groups of catch in studied stake nets

Table 1. Some aquatic living organisms caught in mangrove protected area of Qeshm Island, Iran

Common name	Scientific name	Family	Weight %	Numerical %
Indian oil sardine	*Sardinella longiceps*	Clupeidae	1.06	4.1
Plotosus lineatus	*Plotosus lineatus*	Plotosidae	0.21	0.01
White sardinella	*Sardinella albella*	Clupeidae	0.97	5.08
Ilisha	*Ilisha melastoma*	Clupeidae	1.97	5.1
Bigeye ilisha	*Ilisha megaloptera*	Clupeidae	1.5	2.2
Rainbow sardine	*Dussumieria acuta*	Clupeidae	2.6	10.05
Spotted catfish	*Arius maculatus*	Arridae	5.9	2
Giant catfish	*Arius thalassinus*	Arridae	1.7	0.05
Bloch's gizzard shad	*Nematalosa nasus*	Clupeidae	0.2	0.19
Chacunda gizzard shad	*Anodontostoma chacunda*	Clupeidae	<0.01	<0.01
White pomfret	*Pampus argenteus*	Stromateidae	0.31	1.1
Shrimp scad	*Alepes djedaba*	Carangidae	0.44	0.12
Largehead hairtail	*Trichiurus lepturus*	Trichiuridae	4.2	3.1
Smallhead hairtail	*Eupleurogrammus muticus*	Trichiuridae	1.66	0.9
Flower crab	*Portunus pelagicus*	Portunidae	0.8	3.3
Pickhandle barracuda	*Sphyraena jello*	Sphyraenidae	1.4	0.22
Shrimps/prawns	Peneidae	Peneidae	5.5	21.54
Sea turtle	*Chelonia mydas*	Cheloniidae	2	0.04
Bigeye barracuda	*Sphyraena forsteri*	Sphyraenidae	4.4	0.7
Yellowfin seabream	*Acanthopagrus latus*	Sparidae	0.43	0.6
Longfin trevally	*Carangoides armatus*	Carangidae	0.6	0.55
Needlescaled queenfish	*Scomberoides tol*	Carangidae	3.1	1.1
Crab	*Charybdis feriata*	Portunidae	<0.01	<0.01
Spanish mackerel	*Scomberomorus commerson*	Scombridae	0.64	<0.01
Spiny turbot	*Psettodes erumei*	Psettodidae	1.65	2.9
Fourlined tonguesole	*Cynoglossus bilineatus*	Cynoglossidae	0.66	0.4
Snappers	*Lutjanus sp.*	Lutjanidae	1.1	1.12
Largescale tonguesole	*Cynoglossus arel*	Cynoglossidae	1.7	1.2
Razorbelly scad	*Caranx para*	Carangidae	0.4	1.1
Oriental sole	*Euryglossa orientalis*	Soleidae	2.8	1.8
Indian threadfish	*Alectis indicus*	Carangidae	2.1	0.88
False trevally	*Lactarius lactarius*	Carangidae	0.92	0.21
Northern whiting	*Sillago sihama*	Sillaginidae	2.15	4.2
Spotfin flathead	*Grammoplites suppositus*	Platycephalidae	2.8	0.8
Bartail flathead	*Platycephalus indicus*	Platycephalidae	1.2	0.6
Pharaoh cuttlefish	*Sepia pharaonis*	Sepiidae	0.65	0.68
Persian mullet	*Liza persicus*	Mugilidae	1.03	0.32
Gerres filamentosus	*Gerres filamentosus*	Gerreidae	0.66	0.95
Longfin mojarra	*Pentaprion longimanus*	Gerreidae	1.8	0.34
Crescent bass	*Terapon jarbua*	Teraponidae	3.4	1.7
Fourlined terapon	*Pelates quadrilineatus*	Teraponidae	0.21	0.23
Bluespot mullet	*Valamugil seheli*	Mugilidae	1.2	0.05
Seabream	*Acanthopagrus cuvieri*	Sparidae	0.15	0.03
Indian mackerel	*Rastrelliger kanagurta*	Scombridae	2.6	1.1
Mero	*Epinephelus sp.*	Serranidae	0.4	<0.01
Greyfin croaker	*Pennahia macrophthalmus*	Sciaenidae	0.3	0.35
Keeled mullet	*Liza carinata*	Mugilidae	1.9	0.87
Daggertooth pike conger	*Muraenesox cinereus*	Muranososidae	0.07	<0.01

Table 2. Length for some of the most important captured commercial fish (length in cm)

Common name	Min. Length	Max. Length	LM_{50}	Mode	% Mode	% shorter than LM_{50}
White pomfret	8.15	24.16	18-20	16.61	4.73	84.7
Yellowfin seabream	10.5	19.80	23.7	14.23	8.25	100
Barracuda	19.28	55.4	74.2	37.85	15.63	100
Mero	18	40.55	43.5-64	27.32	14.21	100
Spanish mackerel	18.25	42.45	85	39.91	17.64	100

Discussion

According to length of maturity (LM_{50}) as standard length of catch for fishes, in the Persian Gulf, the data in Table 2 showed that stake nets catch the young fishes mainly. Also no fish with length over the LM_{50} were caught, that indicate the most valuable commercial fish at capture were below their optimal size or below length at maturity. Therefore, with regard to the mechanism of fishing by fixed nets such as stake nets, it is suggested that the fish are in their early stage of life when they are caught during their wandering. However, this occurrence is not in order to protect the ecosystem's biological reserves and ecological management purposes. On the other hand the size of the mesh opening in stake nets indicates that the mesh opening in the stake nets constructed in the study area is very small which would lead to entry of a variety of fishes and shrimps in all ages and stages of life into the catch composition.

Generally speaking, in this study the most frequency in number and weight were for the rainbow sardine (10.05%) and the spotted catfish (5.9%), respectively. The Clupeidae family with 7 species was the largest number of species in the catch composition. These results were similar to other researchers in areas outside the range of mangrove forests (Asadi and Akbari 1999; Mahin et al. 2015). Results illustrated that several kind of living organisms and fish with wide range of length caught, also some kinds of predator fish with the average size in mangrove forests are seen that their presence could be possibly because of the nutritional purposes. Small size of caught fishes in the mangrove area could indicate this habitat may be act as nursery ground or the place to growth juveniles for many species. It is also remarkable that the overall number of caught species in this area (81 species) was more than that of the outside areas of the mangrove protected area (Mahin et al. 2015); because the mangrove forests are included in tidal zones and are the biosphere reserves that possess high species diversity and are rich in natural food and ecological shelters for fish (Ricklefs et al. 1993; Yinxia 1995; Feagin et al. 2010). Therefore, the higher number of the caught species could be due to the aforementioned notes. With regard to the catch composition, it is determined that the stake nets inside Qeshm marine protected area generally catch young fishes (Table 2). These results are in agreement with reports from other researchers (Asadi and Akbari 1999).

Given that the study area has been included in the Ramsar Wetlands International Convention (Ramsar Convention Secretariat 2013) and in terms of the protection at the level of national and international is of prime importance, furthermore, Considering the data presented in this study it can be concluded that this type of artisanal fishing gear, however, did not catch a significant amount of fishes in comparison with other fishing gears alike gill nets, because of catching young fish, could cause losses on Persian gulf aquatic reserves. Therefore, it is recommended the decision maker agencies, trustees and residents of the Qeshm marine protected area think to a set of measures in order to preserve and strengthen God-given resources of the Persian Gulf and especially mangrove forests protected area as the biosphere reserve and nursery ground of the most commercial fishes using co-management approach and also be steadfast in doing it. As well as the existing issues and opinions of researchers according to the terms and conditions governing the fisheries reserves and mangrove forest, thinking about alternative livelihoods may be inevitable in the near future.

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REFERENCES

Aburto-Oropeza O, Ezcurra E, Danemann G, Valdez V, Murray J, Sala E. 2008. Mangroves in the Gulf of California increase fishery yields. Proc Natl Acad Sci USA 105 (30): 10456-10459.

Asadi H, Akbari H. 1999. Fishing by weirs in Hormozgan province shoreline (1048). Retrieved from

Carpenter KE, Krupp F, Jones DA, Zajonz U. 1997. Living marine resources of Kuwait, Eastern Saudi Arabia, Bahrain, Qatar and UAE. FAO Species Identification Field guide for Fishery Purposes. FAO Publication, Rome, Italy.

FAO. 2007. The world's Mangroves 1980–2005. FAO, Rome, Italy.

Feagin RA, Mukherjee N, Shanker K, Baird AH, Cinner J, Kerr AM, Jayatissa LP. 2010. Shelter from the storm? Use and misuse of coastal vegetation bioshields for managing natural disasters. Conserv Lett 3 (1): 1-11.

Giri C, Ochieng E, Tieszen L L, Zhu Z, Singh A, Loveland T, Duke N. 2011. Status and distribution of mangrove forests of the world using earth observation satellite data. Global Ecol Biogeogr 20 (1): 154-159.

Mahin M, Bagheri A, Bahri A, Salarpouri A. 2015. Identification and catch composition of fish from set net (Moshta) fishery in Bandar Abbas, Persian Gulf. J Aquat Ecol 4 (3): 90-97.

Polidoro BA, Carpenter KE, Collins L, Duke NC, Ellison AM, Ellison J C, Koedam NE. 2010. The loss of species: mangrove extinction risk and geographic areas of global concern. PLoS One 5 (4): e10095.

Ramsar Convention Secretariat. 2013. The Ramsar Convention manual: a guide to the Convention on Wetlands (Ramsar, Iran, 1971) (6 Ed.). Ramsar Convention Secretariat, Gland, Switzerland.

Reynolds RM. 1993. Physical oceanography of the Gulf, Strait of Hormuz and the Gulf of Oman. Mitchell Expedition. Mar Pollut Bull 27: 35-60.

Ricklefs R E, Latham R E. 1993. Global patterns of diversity in mangrove floras. Species diversity in ecological communities: historical and geographical perspectives. University of Chicago Press, Chicago.

Sheppard CRC, Price ARG, Roberts CM. 1992. Marine ecology of the Arabian region. Academic Press, New York.

Wells S, Ravilious C, Corcoran E. 2006. In the front line: shoreline protection and other ecosystem services from mangroves and coral reefs. UNEP/Earth print.

Yinxia C. 1995. Ecological Effects of the Mangrove on the Environment [J]. Marine Environmental Science, 4.