INT. J. BIOL. BIOTECH., 4 (SPECIAL ISSUE): 101-106, 2007.

SPECIES COMPOSITION IN THE INTERTIDAL FISHING OPERATIONS DURING S. W. MONSOON ALONG BALOCHISTAN COAST

Syed Ajazuddin[1] and Mohammed Moazzam[2]

[1]*Adamjee Government Science College, Karachi, Pakistan*
[2]*Marine Fisheries Department, Government of Pakistan, Karachi, Pakistan*

ABSTRACT

Intertidal fishery plays an important role in the artisanal economy of the coastal communities of Balochistan. During the southwest monsoon, fishing activities in coastal and offshore waters get limited owing to intensive wave action. During this period, some fishermen of coastal areas of Balochistan resort to a specialized fishing activity in the intertidal areas along the sandy beaches which is locally known as "Gir" fishing. Present paper deals with the species composition of the fish catches during operation of "Gir" in the intertidal areas along Pasni and Gwadar coasts. A marked difference was noticed in the species composition and abundance in the two areas. Catfish juveniles (*Arius spp.*) seems to be dominant in Pasni area whereas in Gwadar area, juveniles of tongue sole (*Cyanoglossus bilineatus)* dominates the catch. Main target species i.e. shrimp and any larger food fish, if caught, are retained by the fishermen whereas remaining catch is discarded and dumped back in the sea. Sea snakes (*Enhydrina schistosa* and *Pelamis platurus*) were also observed to be caught in considerable numbers during such operations. Present paper suggests improvement and modification in the fishing operation in the intertidal areas during southwest monsoon which may help in upgrading socio-economic conditions of the coastal communities.

INTRODUCTION

Fishery is the most important economic activity along the coast of Balochistan. Most of the fishing operations carried out in the coastal and offshore areas are still of traditional nature. Fishing gears used in Balochistan has been described by Ahmad and Qureshi (1962) whereas major fish species, fishing seasons and processing practices were described by Anonymous (1953) and Qureshi (1952). Total production of the Balochistan coast is estimated to be 123,073 m. tons consisting mainly of demersal and demerso-pelagic species (Anonymous, 2002). In addition, pelagic species such as tuna, mackerels, dorado, cobia, marlin and sailfishes also contribute about 23.4 % in the total landings whereas shellfishes (shrimp, lobsters and cuttlefishes) contribute about 1.0 % in total landings.

Most fishing operations are carried out throughout the year in coastal waters as well as upto the continental margin using traditional fishing boats. Due to intensive wave action during southwest monsoon (mid May to mid September), a large number of fishing boats are beached rendering the fishermen idle. However, some of these fishermen still continue to carry out fishing in intertidal waters using a technique locally known as 'Gir'. Present paper describes this fishing operation along the coast of Balochistan especially in Gwadar and Pasni areas.

MATERIALS AND METHODS

Area of Study:

Balochistan coast is located on the south-western part of the Pakistan. It is characterized by having a narrow shelf and presence of a number of small bays including Miani Hor and Kalmat Khor which are two major lagoons. There is no major perennial river in the area, however, a few small rivers that flows during the rainy seasons are present in the area. Gwadar, Pasni, Ormara, Jiwani and Damb (Sonimiani) are major fishermen towns. In addition, there are more than two dozens small fishermen settlements along the coastline. Study of 'Gir' fishing was carried out in Pasni and Gwadar (Demi Zur) during June to September, 1984.

Fishing Operation:

For 'Gir' fishing cast net is used. Description of a cast net is given by Ahmad and Qureshi (1962). 'Gir' operation involve two fishermen who get the lower part of the cast net knotted in the thumb of the foot. Top of net and remaining part of the bottom kept outside water to make the net like a bag. Both men walk in the intertidal area dragging the net behind them. One fishermen usually walk in the knee deep waters whereas the other usually walk upto shoulder depth.

The net is towed for about 10 minutes to half an hour depending upon quantity of catch, nature of area of operation and condition of the sea. In those patches where there are rocks in the bottom or receive intensive wave action, this operation is restricted to a shorter duration. Similarly in cases where the net get filled with fish or debris in shorter duration such operations are curtailed and catch is retrieved. The catch, after each operation, is dumped on seashore and important species such as shrimps, soles, silver whitings and any other large food fishes are sorted out and the remaining bycatch is left on the shore or discarded in the sea. The operation is repeated till the adequate quantity of fish and shrimp are harvested. The catch is either sold in local market or used for subsistence purposes.

Collection and Analysis of Samples:

For the purpose of the study, fish catch from at least 10 such hauls were procured *in toto* and brought to laboratory for analysis. Fish, shrimp and other animals were sorted out to species level. Important species were measured and other relevant information was recorded.

RESULTS AND DISCUSSIONS

Catch Analysis:

Analysis of the catch of the 'Gir' fishing revealed presence of a large number of demersal species especially juveniles of some commercially important fishes and shellfishes etc. (Table-1-2). However, a marked variation in the catches were observed in Pasni and Gwadar areas. The fauna at Pasni seems to be more diversed as represented by 35 species whereas at Gwadar only 30 species were found.

Finfishes:

In Pasni, juveniles of catfish (*Arius spp*.) seems to be dominating whereas in Gwadar area juveniles of fourlined toungesole (*Cynoglossus bilineatus*) seems to be dominating. Identification of juveniles of *Arius spp.* to specific levels was attempted but it seems to be difficult to assign them to any species with certainty, therefore, the results were pooled at generic level.

In Pasni, catfish juveniles at times contribute about 90 % of the catch in terms of weight, however, in Gwadar, their contribution was not observed to be higher the 25 %. Catfish is known to spawn on mass scale along the coast of Balochistan in the month of March to May with peak in April where their large school congregate in shallow water (Anonymous, 1986; Bianchi, 1985). Male were observed to carry eggs in their mouth in these months. It seems that the hatchlings attain a size of about 2.3 to 5.4 cm and remain in shallow intertidal areas and are caught in 'Gir' operation. Major spawning sites, in the area, are located in Pasni Bay and to a lesser extent in Sur and Karwat near Gwadar. In Gwadar (Demi Zur) no major spawning congregations were observed. This may be the reason for the less abundance of catfish juveniles in Gwadar area.

Adults of two sea catfishes i.e. *Arius thalassinus* and *Arius maculatus* were found in Pasni and Gwadar areas respectively but only a few specimens were found. Juveniles of striped eel catfish (*Plotosus lineatus*) were found in Gwadar area whereas they were not observed at Pasni area during the present study.

The contribution of juvenile fourlined toungesole (*Cynoglossus bilineatus*) in Gwadar was found to be about 30 to 40 % whereas this species was found to have a percentage of 5 % in Pasni. In addition to juveniles, a few specimens of adult soles were represented in 'Gir' catches. A few specimens of adult and juveniles speckled toungesole (*Cynoglossus puncticeps*) were also represented in the catches both at Pasni and Gwadar. Adults of largetooth flounder (*Pseudorhombus arsius*) were also represented in catches of 'Gir' both at Pasni and Gwadar.

Mullets are reported to be abundantly found in monsoon months (Khan, 1963; Moazzam and Niaz, 1978), however, their less abundance and representation by one species i.e. Klunzinger's mullet (*Liza klunzingeri*) in Pasni and Gwadar and an additional species i.e. greenback mullet (*Liza subvirdis*) in Gwadar in the catches of 'Gir' is surprising. In both places mullets were not dominating in the catches which may be attributed to slow movement of the gear and water which provide adequate time for mullets to evade the net.

Grunts were represented by saddle grunt (*Pomadasys maculatum*) and smallspotted grunt (*Pomadasys commersonni*); the former being more abundant. Saddle grunt locally known as 'Tantar' is used in live bait fisheries for catching large requiem sharks along Balochistan coast. It is commonly found along the shoreline throughout the year especially during monsoon months (Anonymous, 1986). Larger specimens of smallspotted grunt is locally consumed. Among croakers, Belanger's croaker (*Johnius belangerii*), bearded croaker (*Johnius dussumieri*) were caught in 'Gir' net in both Pasni and Gwadar. Larger specimens of these species are consumed locally.

Table 1. Species with size range found in 'Gir' catches in Pasni Area.

S. No.	Species	Size Range (cm)
1.	*Arius* spp.	3.2-5.4
2.	*Arius thalassinus*	29.0-38.2
3.	*Cynoglossus bilineatus*	5.7-29.2
4.	*Pseudorhombus arsius*	17.4-21.3
5.	*Cynoglossus puncticeps*	11.9-22.7
6.	*Polynemus similis*	10.2-12.6
7.	*Acathopagrus berda*	8.2-12.9
8.	*Acathopagrus latus*	7.5-11.4
9.	*Liza klunzingeri*	9.2-11.2
10.	*Johnius belangerii*	6.6-17.2
11.	*Johnius dussumieri*	12.4-19.1
12.	*Muraenesox cinereus*	30.6-47.2
13.	*Secutor insidiator*	2.5-5.4
14.	*Drepane punctata*	11.2-21.3
15.	*Gerres filamentosus*	5.2-6.1
16.	*Torpedo sinuspersici*	20.2-28.6
17.	*Gymnura poecilura*	11.3-22.8
18.	*Ilisha megaloptera*	21.2-22.9
19.	*Minous monodactylus*	4.2-5.7
20.	*Cociella crocodila*	25.4-33.2
21.	*Platycephalus indicus*	14.1-19.0
22.	*Terapon puta*	9.0-11.7
23.	*Sillago sihama*	15.6-19.9
24.	*Trachinotus mookalee*	4.6-5.3
25.	*Pomadasys maculatum*	10.3-16.9
26.	*Pomadasys commersonni*	22.1-23.7
27.	*Lagocephalus lunaris*	6.9-10.7
28.	*Parapenaeopsis stylifera*	5.8-6.9
29.	*Parapenaeopsis hardwickii*	6.6-7.3
30.	*Metapenaeus affinis*	8.6-11.9
31.	*Peneaus marguiensis*	9.2-11.2
32.	*Babylonia valentiana*	3.6-6.1
33.	*Cistopus indicus*	32.1-33.9
34.	*Enhydrina schistosa*	79.3-98.1
35.	*Pelamis platurus*	44.5-77.1

Threadfins were represented in 'Gir' catches by *Polynemus similis* both at Pasni and Gwadar. This species was recently described from Beruwala, Sri Lanka by Feltes (1991) and known to occur in Pakistan. Juveniles of picnic bream (*Acanthogarus berda*) and yellowfin bream (*Acanthopagrus latus*) are also of common occurrence in the 'Gir' catches at Pasni, however, latter was not observed at Gwadar.

Considerably large specimens as well as some juveniles of daggertooth pike conger (*Muraenesox cinereus*) were observed in catches of 'Gir' both at Pasni and Gwadar. Usually inhabitant of neritic waters along the coastline, this species possibly venture in shallow coastal waters for feeding purposes. At Gwadar, a few specimens of juveniles Savalai hairtail (*Lepturacanthus savala*) were also encountered in the catches. This is also a predatory fish which feeds on smaller fishes in shallow waters. Stomach content analysis of one specimen during present study revealed presence of *Secutor insidiator* in appreciable number.

Juveniles and adults of pugnose ponyfish (*Secutor insidiator*) were found both at Pasni and Gwadar in 'Gir' catches whereas whipfin silverbiddy (*Gerres filamentosus*) and spotted sicklefish (*Drepane punctata*) were present in catches at Pasni. Juveniles of spotted scat (*Scatophagus argus*) were, however, found at Gwadar only. These species are of common occurrence along the shallow waters throughout the year.

Clupeoids are common inhabitant of shallow coastal waters. Their less representation with the exception of bigeye ilisha (*Ilisha megaloptera*) at both Pasni and Gwadar and Malabar thryssa (*Thryssa malabarica*) in the

catches of 'Gir' was noticeable which may probably because of their pelagic nature and thus escaping the net. *Thryssa mystax* in some operations were found to be common in Gwadar.

Flatheads are represented by two species i.e. crocodile flathead (*Cociella crocodila*) and bartail flathead (*Platycephalus indicus*) in both Pasni and Gwadar. Crocodile flatheads seems to be more abundant in Pasni than Gwadar. Juvenile gray stingfish (*Minous monodactylus*) was present in catches at Pasni only. Because of their venomous nature, these were discarded from and catch and thrown back in the sea. Another poisonous species which was thrown back in the sea was lunartail puffer (*Lagocephalus lunaris*) which was represented both in Pasni and Gwadar.

Juveniles and adult smallscaled terapon (*Terapon puta*) and juveniles of Indian pompano (*Trachinotus mookalee*) were observed in catches of 'Gir' at Pasni. Absence of ubiquitous jarbua terapon (*Terapon jarbua*) both at Pasni and Gwadar is quite noticeable in the catches of 'Gir'. Commercially important silver sillago (*Sillago sihama*) was found both at Pasni and Gwadar. This species is abundantly found during monsoon in the coastal areas (Bianchi, 1985; Anonymous, 1986), however, it was not particularly abundant in the catches of 'Gir' nets.

Table 2. Species with size range found in 'Gir' catches in Gwadar Area.

S. No.	Species	Size Range
1.	*Cynoglossus bilineatus*	4.4-7.3
2.	*Pseudorhombus arsius*	22.1-25.1
3.	*Cynoglossus puncticeps*	22.1-31.6
4.	*Arius spp.*	3.4-6.3
5.	*Arius maculates*	21.1-35.2
6.	*Plotosus lineatus*	6.1-7.9
7.	*Acathopagrus berda*	5.5-11.2
8.	*Liza subviridis*	11.5-25.4
9.	*Liza klunzingeri*	5.2-11.3
10.	*Thryssa malabarica*	15.2-16.4
11.	*Johnius belangerii*	6.1-11.2
12.	*Johnius aneus*	5.3-7.2
13.	*Lepturacanthus savala*	27.9-33.6
14.	*Muraenesox cinereus*	32.1-41.8
15.	*Secutor insidiator*	3.2-4.7
16.	*Scatophagus argus*	11.0-14.6
17.	*Torpedo sinuspersici*	25.4-33.1
18.	*Pastinachus sephen*	22.6-39.2
19.	*Gymnura poecilura*	11.3-24.1
20.	*Ilisha megaloptera*	19.1-23.1
21.	*Cociella crocodile*	22.6-33.6
22.	*Sillago sihama*	14.2-15.9
23.	*Pomadasys maculatum*	9.1-15.7
24.	*Lagocephalus lunaris*	6.1-8.0
25.	*Parapenaeopsis stylifera*	5.5-6.1
26.	*Parapenaeopsis hardwickii*	5.2-6.9
27.	*Metapenaeus affinis*	8.8-9.2
28.	*Paneus penicillatus*	9.6-11.9
29.	*Babylonia valentiana*	4.6-7.1
30.	*Enhydrina schistose*	69.1-92.9

Elasmobranchs were represented by marbled torpedo (*Torpedo sinuspersici*) and butterfly ray (*Gymnura poecilura*) both at Pasni and Gwadar. However, juveniles of fantail stingray (*Pastinachus sephen*) were also represented at Gwadar. With the exception of marbled torpedo, other species were not common in the catches of 'Gir'. Mishandling of marbled torpedo or stepping on it during operation of 'Gir' at times results in excruciating electric shocks to fishermen.

Shellfishes:

Shellfishes in the catches of 'Gir' are represented by shrimp, octopus and whelk. Three species of shrimp i.e. kiddi shrimp (*Parapeneopsis stylifera*), spear shrimp (*Parapeneopsis hardwickii*) and jinga shrimp (*Metapenaeus monoceros*) were found both at Pasni and Gwadar whereas banana shrimp (*Penaeus marguiensis*) was found at Pasni and redtail prawn (*Penaeus penicillatus*) was represented in catches at Gwadar. However, none of the shrimp was found to be abundant in the catches. One operation of 'Gir' for about half and hour may results in entrapment of 10 to 20 shrimp specimens.

Molluscs in the 'Gir' catches were represented by a gastropod i.e. *Babylonia valentiana* and a cephalopod i.e. *Cistopus indicus*, however, they were not found to be abundant. Dead shells of *Scapharca indica*, *Anadara ehrenbergi*, *Turicula tornata fulminata*, *Turicula javanica* and *Neverita* (*Glossaulax*) *didyma* were found abundantly in the catches of 'Gir' net.

Reptiles:

Reptiles in the 'Gir' catches are represented by sea snakes. Two species i.e. beaked sea snake (*Enhydrina schistose*) and pelagic sea snake (*Pelamis platurus*) are commonly encountered in the catches. *Enhydrina schistosa* was found both at Pasni and Gwadar whereas *Pelamis platurus* was found at Pasni only. *Enhydrina schistosa* which is the common sea snake found in Pakistan, is almost present in all the operations, mostly of adult size. *Pelamis platurus* was seldom seen in catches. Sea snakes, being considered as venomous are immediately discarded and thrown back in the sea. Although generally docile in nature, these snakes were found to be aggressive because of their entrapment in the net. On one occasion a sea snake bit one fisherman while he was trying to throw it back into sea.

Utilization of Commercially Important Species:

Main target species of 'Gir' operation are shrimp and any larger food fish. Small shrimp are used principally as bait for catching seabream which is an important fishery of the area during monsoon. Larger sized shrimp are sold for onward transportation to Karachi for processing. Along Balochistan coast shrimps are sold by numbers and not by weight. A fisherman can daily earn about Rs. 50 or 200 through the sale of shrimp caught from 'Gir" operation. In addition to shrimp, adult specimens of *Sillago sihama*, *Liza subviridis*, *Johnius belangerii*, *Johnius aneus*, *Johnius dussumieri*, *Muraenesox cinereus*, *Cociella crocodila*, *Pseudorhombus arsius* and *Cynoglossus bilineatus* are retained for subsistence purposes or, if in substantial quantity, for sale in local market. Soles and silver sillagoes are sometime sold to fish traders for transportation to Karachi for further processing and export.

Suggestions for Modified Operation:

Although 'Gir operation is not a major fisheries along Gwadar and Pasni, still it provides livelihood for some fishermen families. The operation is highly inefficient and time consuming. There is traditional ban on use of any trawl, dredge or purse seine along Balochistan coast, therefore, the use of thes nets seems to be impossible. However, fishermen can be convinced for use of beach seine without bag or pocket. A similar seine (locally known as 'Bhan') is being used along Sindh coast.

Beach seine without bag or pocket suggested here may be small enough for operation by two men. It may consist of a 15.5 m x 1.8m net. The seine may have 75 stretched meshes. It may have single top and double bottom lines of 5/16" diameter braided polypropylene to resist kinking and untwisting and to keep seines from rolling up. Floats may be placed every 2 or 3 feet and lead sinkers may be placed at every foot. Net with this design can be utilized to catch small fishes at a depth upto 2 m depth along the coastline. This beach seine can be held in place by two fishermen who may walk slowly along the shore and after covering reasonable distance may be pivoted and walked in toward the shore. Considering its larger mesh, shrimp may not be caught in this net, therefore, if fishermen are desirous to target shrimp then smaller mesh net can be operated.

Operation of suggested beach seine will help in easing the operation as well as may be helpful in catching shrimp and food fishes more efficiently. However, considering its smaller overall length, it will not lead to sweeping of coastline and thus may safely provide livelihood to fishermen during monsoon. The fishermen, thus can earn a reasonable income which will help in upgrading their socio-economic condition.

REFERENCES

Ahmad M and M.R. Qureshi (1962). Fishing gears of Makran coast. *Agric. Pak.* 13: 582-602.

Anonymous (1953). *Fisheries of the Makran Coast (Investigation Report No. 4).* Government of Pakistan Publication. 28 pp.

Anonymous (1986). *Survey of Fish and Shellfish (Mollusca and Higher Crustacea) of Baluchistan Coast. Final Progress Report.* Directorate of Fisheries, Government of Baluchistan, Karachi. 707 pp.

Anonymous (2002). *Handbook of Fisheries Statistics of Pakistan*. Marine Fisheries Department, Karachi. 18: 251 pp.

Bianchi, G. (1985). *Field Guide to the Commercial Marine and Brackish-Waters Species of Pakistan.* Food and Agricultural Organization of the United Nations, Rome. 200 pp.

Feltes, R.M. (1991). Revision of the polynemid fish genus *Filimanus*, with the description of two new species. *Copeia* (1991):302-322.

Khan, I. (1963). Occurrence and distribution of mullets of the family Mugilidae on Sind-Karachi coast. *Proc. 15th Sci. Conf.* B-20-B-21.

Moazzam M and S.H.N. Rizvi (1980). Fish entrapment in the sea water intake of a power plant at Karachi. *Environ. Biol. Fish*. 5: 49-57.

Qureshi M.R (1952). Fishes of Makran coast. *Agric. Pak.* 3: 237-256.

(*Accepted for publication March 2007*)