Identification of Marine Ornamental Fishes in Northern Part of the Persian Gulf, Iran

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Abstract: In the past decade, the investment in fisheries development has grown remarkably in the Persian Gulf region. A 1800 km of northern coastline of the Persian Gulf, the Oman Sea and more than 14 islands belong to Iran have provided great possibilities of economic activities. In-shore marine islands such as Kish, Farour, Hendurabi, Tonb made a good apportunity for fishing and harvesting of ornamental fishes living on coral reefs.

The Kish island have a plenty of coral reefs in around. The study was conducted on the Kish islands to identify various species of reef fishes on October 1997 to November 1998. Experiment was carried out at 77 stations around the islands. Samples were collected by under water purse_seining , scuba diving, and using anesthetizes by injection around the fish hiding area. Results conducted that overall 113 species belong to 47 families were identified of which Pomacentridae, Acanthuridae, Scaridae and Lutjanidae are the most important in terms of number of species represented. 4 species of Apogonidae, 6 species of Lutjanidae, 11 species of Pomacentridae, 6 species of Nemipteridae, 6 species of Serranidae, 3 species of Teraponidae, 3 species of Sparidae, 3 species of Scorpaenidae, 3species of Scaridae, 3 species of Lethrinidae, 4 species of Labridae, 4 species of Gobiidae, 4 species of Chaetodontidae, 4 species of Carangidae, 2 species of Belonidae, 2 species of Balistidae, 2 species of Acanthuridae, 2 species of Tetraodontidae, 2 species of Siganidae, 2 species of Ostraciidae, 1 species of Monacanthidae, 1 species of Leiognathidae, 1 species of Atherinidae are the species presented in coral reefs at Kish island.

Key Words: Ornemental fish, Persian Gulf, Iran

Introduction

Coral reefs are shallow – water, tropical marine ecosystems, characterized by a tremendous variety of plants and animals and by high rate of production in nutrient–poor and plankton impoverished oceans (Lewis, 1981 ; Sale, 1991). Fish and living reef corals interact in numerous ways.

In the Indo-pacific region, several types of fishes feed directly on living corals either biting off individual polyps, scraping the coral surface, or biting off the tips of coral branches. In the West India, no significant amount of corals are eaten by fish were observed. Although, many small fish shows the diet into branching corals, while a few species have lived within coral branches. (Jones & Endean, 1976).

Many fishes are too large for hobbyists and some juveniles are different from adults in color and shape. Aquarium and trading centers prefer to have some of marine fish juveniles as an ornamental fishes (Burgess *et al.*, 1990 ; Axelrod & Vorderwinklir, 1962).

The ersian Gulf and its existing islands contain valuable ecosystems for growth of marine organisms (Horger, 1984).

The Persian Gulf is located in 26° , 30′ N and 36° , 20′ E (Tajalipour, 1975). Water temperature and mean salinity are 13.8-36.5 °C and 38 ppt, respectively.

There are few experiences about fresh water ornamental fishes in Iran and the most of them are exotic and imported from the abroades (Shikhian & Shikhian, 1997). Only an effort on trading of marine ornamental fishes was carried out in north of Iran during last 2 decades. Some ornamental fishes are exported from Bandar-e-Lengeh to European countries in the recent years.

A 1800 km coastal lines in the Persian Gulf and Oman Sea and 14 islands Iran have provided suitable possibilities for considerable economic activities. Inshore marine islands such as Kish, Farour, Hendurabi, Tonb, etc established a favorable opportunity for fishing and harvesting of ornamental fishes as well as aquaculture of marine finfish and shellfishes living among coral reefs (Abrahimi, 1986).

Identification of ornamental fishes, which live on coral reefs, is the most important priorities to investment of aquaculture, fishing and conservation of the ecosystems from different human activities impacts.

Kish island is known as a pearl production region since 1870 (Tajalipour, 1975). Also, coral fish has been recently exported from the island. The aim of this study was to identify common marine ornamental fish species and families in Kish coral reefs.

Materials & Methods

Initial collection and familiarization of the reef fish species were examined in the north and south of the Kish island coasts. The study was conducted from October 1997 to November 1998. Experiment was carried out at 77 stations around the island according to topography of the inshore substrate. Each station was covered from 2 up to 15 meters depth.

Stations were covered by skin diving (and if necessary with SCUBA diving) for determining the fish position and their situation at day and night times. Fishes were captured by using under water purse-seining, hook and line, using anesthetizes injection around the fish hiding area and traps according to their behavior and habitat (Randall, 1987). In some sandy stations bottom trawl were used for fish collecting. They were immediately transferred to laboratory for identification and the further studies (stomach contents & gonadal status). Fishes were fixed on 12% formalin plus 5% glycerin solution.

Identification of fishes have done by using morphometric and meristic counts according to international and local keys (Sivasubramanian & Ibrahimi, 1982 ; Bianchi, 1985 ; Allen, 1985 ; Smith & Phillip, 1986 ; Kuronuma & Abe, 1986 ; Burgess, *et al*,. 1990 ; Pandey & Sandhu, 1992 ; Haemstra & Randall, 1993 ; Deprun, *et al*., 1994 ; Assadi & Dehghani, 1977 and Carpenter, *et al*., 1997). Excele programs were used for distribution of species.

Results

Present Fauna:

A 783 specimens belong to 113 species and 48 families were captured. Table 1 shows the identified species and their families with some remarkable knows. Results showed that in the 113 species, Pomacentridae (9.8%), Serranidae (5.3%) Nemipteridae (5.3%), Lutjanidae (5.3%) and Labridae (3.5%) were the most abundant in the number of species.

Chaetodontidae, Lutjanidae, Pomacentridae, Scaridae, Labridae, Gobiidae and Serranidae were the most families numbers of individuals, which captured during sampling (Plate 1).

Serranidae

Gobiidae

Plate 1: Most families in Kish Island

Chaetodontidae

Scaridae

Plate 1 continued:

A 13 families consists of Apogonidae, Lutjanidae, Pomacentridae, Nemipteridae, Serranidae, Teraponidae, Sparidae, Scorpionidae, Scaridae, Lethrinidae, Labridae, Gobiidae and Chaetodontidae were account for 57% of all 48 families.

Using computer models for scattered diagram revealed that some species such as *Zebrostoma xanthurum, Rhinecanthus assasi, Ecsenius bicolor, Gobiodon citrinus, Thalassoma lunare, Cheilinus lunulatus, Lutjanus russelli, Lutjanus malabaricus, Himantura walga, Chaetodon melapterus, Pomacantus striatus, Abudefduf sexfaciatus, Scarus ghobban, Scarus persicus, Terapon jarbua and Terapon theraps* were distributed in all part of coral communities around the Kish Island (table 1).

Table 1: List of families, species and some specifications related to reproduction and feeding reported during Oct.1997 to Nov. 1998 from Kish Island fishes (Persian Gulf)

No.	Family	Spacies	Remark
1	ACANTHURIDAE	*Acanthurus sohal*	O., H.
2	" "	*Zebrasoma xanthurum*	O., H.
3	APOGONIDAE	*Apogon cyanosoma*	O., H.
4	" "	*Apogon nigripinnis*	O., H.
5	" "	*Apogon quadrifasciatus*	O., C.
6	" "	*Cheilodipterus quinquelineatus*	O., H.
7	ATHERINIDAE	*Atherinomorus lacunosus*	O.
8	BALISTIDAE	*Abalistes stellatus*	O., C.
9	" "	*Rhinecanthus assasi*	O., C.
10	BATRACHOIDIDAE	*Austrobatrachus dussumieri*	O.
11	BELONIDAE	*Ablennes hians*	O., C.
12	" "	*Tylosurus crocodilus*	O., C.
13	" "	*Ecsenius bicolor*	O., H.
14	" "	*Ecsenius pulcher*	O., H.

Table 1 Continued:

No.	Family	Spacies	Remark
15	BOTHIDAE	*Pseudorhombus arsius*	O., C.
16	CARANGIDAE	*Alectis indicus*	O., C.
17	" "	*Carangoides bajad*	O., C.
18	" "	*Caranx sexfasciatus*	O., C.
19	" "	*Parastromateus niger*	O., H.
20	" "	*Seriolina nigrofasciata*	O., C.
21	CARCHARHINIDAE	*Carcharhinus dussmieri*	OV., C.
22	CENTRISCIDAE	*Centriscus scuttatus*	O., H.
23	CHAETODONTIDAE	*Chaetodon sp.*	O., C., H.
24	" "	*Chaetodon melapterus*	O., C.
25	" "	*Chaetodon obscurus*	O., H., C.
26	" "	*Heniochus acuminatus*	O., C.
27	CIRRHITIDAE	*Cirrhitus pinnulatus*	O., C.
28	DASYATIDAE	*Himantura walga*	OV. , C.
29	DREPANIDAE	*Drepane punctata*	O., C.
30	EPHIPPIDAE	*Ephippus orbis*	O., C.
31	GERREIDAE	*Gerres oyeni*	O., C.
32	" "	*Gerres poieti*	O., C.
33	GOBIIDAE	*Eviota sp.*	O., H.
34	" "	*Gobioon citrinus*	O., H.
35	" "	*Istigobius decoratus*	O., C., H.

Table 1 Continued:

No.	Family	Spacies	Remark
36	GOBIIDAE	*Paragobiodon xanthosomus*	O., H., C.
37	HAEMULIDAE	*Diamagramma pictum*	O., C.
38		*Plictorhinchus gaterinus*	O., C.
39	HEMIRAMPHIDAE	*Hyporhamphus affinis*	O.,
40	LABRIDAE	*Cheilinus lunulatus*	O., C.
41	" "	*Choerodon robustus*	V., C.
42	" "	*Halichoeres dussumieri*	O., C.
43	" "	*Thalassoma lunare*	O., C.
44	LEIOGNATHIDAE	*Leiognathus brevirostris*	O., C.
45	LETHRINIDAE	*Lethrinus crocineus*	O., C.
46	" "	*Lethrinus lentjan*	O., C.
47	" "	*Lethrnus microdon*	O., C.
48	" "	*Lethrinus nebulosus*	O., C.
49	LUTJANIDAE	*Lutjanus malabaricus*	O., C.
50	" "	*Lutjanus fulviflammus*	O., C.
51	" "	*Lutjanus lutjanus*	O., C.
52	" "	*Lutjanus quinquelineatus*	O., C.
53	" "	*Lutjanus russelli*	O,. C.
54	" "	*Panjalo pinjalo*	O., C.
55	MENIDAE	*Mene maculata*	O., C.

Table 1 Continued:

No.	Family	Spacies	Remark
56	MONACANTHIDAE	*Stephanolepis diaspros*	O., C.
57	MUGILIDAE	*Oedalechilus labiosus*	O., C., H.
58	MULLIDAE	*Parapeneus cyclostomus*	O., C.
59	" "	*Upeneus sulphureus*	O., C.
60	MURAENIDAE	*Gymnothorax kidako*	O., C.
61	MYLIOBATIDAE	*Aetomylaeus nichofii*	O., C.
62	NEMIPTERIDAE	*Nemipterus japonicus*	OV., C.
63	" "	*Scolopsis binaculatus*	O., C.
64	" "	*Scolopsis cansellatus*	O., C.
65	" "	*Scolopsis ghanam*	O., C.
66	" "	*Scolopsis taeniatus*	O., C.
67	" "	*Scolopsis vosmeri*	O., C.
68	OSTRACIIDAE	*Ostracion cubicus*	O., C.
69	" "	*Tetrosomus gibbosus*	O., H.
70	PALACIDAE	*Platax orbicularis*	O.,
71	POMACANTHIDAE	*Pomacanthus striatus*	O., H.
72	" "	*Pomacanthus maculosus*	O., H.
73	" "	*Abudefduf sexfasciatus*	O., H.
74	" "	*Abudefduf sordidus*	O., H.
75	" "	*Amphiprion clarkii*	O., H., C.

Table 1 Continued:

No.	Family	Spacies	Remark
76	POMACANTHIDAE	*Amphiprion allardi*	O., C., H.
77	" "	*Chromis nigrura*	O., H.
78	" "	*Dascyllus trimaculatus*	O., H.
79	" "	*Paraglyphidodon meals*	O., C., H.
80	" "	*Pomacentrus tripunctatus*	O., H., C.
81	" "	*Pomacentrus violascens*	O., H., C.
82	" "	*Stegastes sp.*	O., H., C.
83	PRIACANTHIDAE	*Priacanthus tayenus*	O., C.
84	PSEUDOCHROMIDAE	*Pseudochromis dutoiti*	O., H.
85	" "	*Pseudochromis pesi*	O., H.
86	RHINOBATIDAE	*Rhinobatos granulatus*	V., C.
87	SCARIDAE	*Scarus ghobban*	O., H.
88	" "	*Scarus persicus*	O., H.
89	" "	*Scarus sordidus*	O., H.
90	SCATOPHAGIDAE	*Scatophgus argus*	D., C.
91	SCORPAENIDAE	*Minous monodactylus*	O., C.
92	" "	*Pterois russelli*	O., C.
93	" "	*Pterois volitan*	O., C.
94	SERRANIDAE	*Cephalopolis hemistiktus*	O., C.
95	" "	*Epinephelus areolatus*	O., C.

Table 1 Continued:

No.	Family	Spacies	Remark
96	SERRANIDAE	*Epinephelus beleekeri*	O., C.
97	" "	*Epinephelus chlorostigma*	O., C.
98	" "	*Epinephelus coioides*	O.,C.
99	" "	*Epinephelus stolizkae*	O., C.
100	SIGANIDAE	*Siganus javus*	O., H.
101	" "	*Siganus sutor*	O., H.
102	SILLAGINIDAE	*Sillago sihama*	O., H.
103	SOLEIDAE	*Pardachirus marmoratus*	O., C.
104	SPARIDAE	*Acanthopagrus bifasciatus*	O., C.
105	" "	*Argyrops spinifer*	O., C.
106	" "	*Diplodus kotschyi*	O., C.
107	SYNGNATHIDAE	*Trachyrhamphus bicoarctatus*	O., H.
108	TERAPONIDAE	*Trapon jarbua*	O., C.
109	" "	*Terapon puta*	O., C.
110	" "	*Terapon theraps*	O., C.
111	TETRAODONTIDAE	*Arothron alboreticulatus*	O.
112	" "	*Chelonodon potoca*	O.
113	" "	*Triacanthus biaculeatus*	O., C.

O. :Oviparous
V. :Viviparous
OV. :Ovoviviparous
H. :Herbivores
C. :Carnivores
D. :Detrivores

Relationship of fauna with reef structures:

The main structure of substrate in 1-3, 3-5, 5-10, and >15m depth were sand and dead corals with some algae, scattered corals, concentrated corals and sandy clay respectively. The most numbers of the fish species in this area were observed in 3-5m depths. In the south and west parts from 1 to 15 meter depths, the main structure of substrate is sand with scattered giant, small rocks and gravels. Above the 15-25 meters and more the sandy clay substrate was observed. Most of the fish species were gathered close to the rocks. They aggregated in the upper parts of the rocks at the day, while some species such as Pomacentridae, Labridae, Scaridae, Balistidae and Chaetodontidae were stayed near the lower parts of the rocks at the mid-night.

There were different categories of substrate in the East of the Kish islands. The dominance of the northeast shores was sand with a few species of small pelagic such as, Clupeidae, Hemiramphidae and demersals like Dasyatidae, Lutjanidae and Soleidae. In the east, the main structure of substrate consists of sand and large gravels (1-3m), scattered corals (3-5m), concentrated corals (5-10m), dead corals (10-15m) and sandy clay (more than 18 meter depths. The most of the species were observed in 5-10 meters. The southeast was similar to the south of the Kish island.

Discussion

Identification of different species is one of the most important priorities for sustainable yield as well as their conservation. Several studies were carried out to identifiy fish species in Indo-pacific regions (Jones & Endean, 1976 ; Carlson, 1981 ; Saski, 1995). Although, there are few studies on the marine fish identification in the Persian Gulf (White & Barvani, 1971 ; Kuronuma & Abe, 1986 ; Assadi & Dehghani, 1997 and Al-Daham, 1979 ; Belgvad & Lopenthin, 1949), there are no enough researches on the diversity of fish species especially relative in the coral reefs.

According to the species diversity, many islands in the Persian Gulf are unique. The Kish island have plenty of corals which provide suitable habitat for fish living.

A 48 Families were identified, while the family numbers in the previous studies were 23 (Assadi & Dehghani, 1997). Baharna (1986) reported 238 species and 48 families of ornamental fishes in Bahrain. Although, this study covered the commercial species from industrial fisheries by trawlers and set nets. It seems that the Kish coral reefs is a suitable media for existing more families living compare with other areas.

The Pomacentridae was the major family in this area (9.8%), while Serranidae (5.3%), Nemipteridae (5.3%), Lutjanidae (5.3%) and Labridae (3.5%) were the most abundant families around the Kish Island. The most of Pomacentridae species is widespread in all coral communities. Species belongs to this family are oviparous and herbivores, which live in all types of substrates covered with algae. These characteristics may lead to the reasons for their wide range of distribution and adaptation.

Low frequency of 71 families in the coral reefs showed that these species are not able to adapted in biological characters such as feeding, reproduction and antipredator behaviors (Jones & Gudean, 1976). Experimental results showed that 13 families out of 48 families were the most important by the frequencies. Many species of these families have small sizes, therefore it was concluded that the large species had not chance for adaptation by means of species numbers. In some cases, the run away from nursery grounds (coral reef) have depends on reproductive and feeding behaviors. Also it is important to select appropriate capturing gears to obtain random sizes of each species.

Although the coral species and their communities have had a significant variation in different parts of the Kish island, there was no significant differences between species like *Zebrostoma xanthurum, Rhinocanthus assasi, Ecseniusbicolor, Goboidon citrinus, Thalassoma lunare, Cheilinus lunulatus, Lutjanus russelli, Lutjanus malabaricus, Chaetodon melapterus, Pomacantus striatus, Abudefduf sexfaciatus, Scarus ghobban, Scarus persicus, Terapon jarbua and Terapon theraps* in this island. *Zebrostoma xanthurum,Ecsenius bicolor, Chaetodon melapterus, Abudefduf sexfaciatus and Scarus persicus* were common species in coral communities (Lewis, 1981 ; Sivasubramanian & Ibrahimi, 1982 ; Allen, 1985 ; Kuronuma & Abe's, 1986 ; Pandey & Sandhu, 1992 ; Assadi & Dehghani, 1977).

Experimental results showed that the most of fish species were accumulated in the 3-15 meter depths. It will correlate with existence of corals in these depths. As the light is necessary for corals life, it penetrations is limited below the 20 meter water levels (Barnes & Hughes, 1987). Moreover, some species belongs to the families such as Pomacentridae, Labridae, Scaridae, Balistidae and Chaetodontidae were observed in the lower parts of the coral communities in each depth. This may be as a result of their adaptation behavior to the bottom as well as their avoidance behavior (Keenleyside, 1979). 4 species of Apogonidae, 6 species of Lutjanidae, 11 species of Pomacentridae, 6 species of Nemipteridae, 6 species of Serranidae, 3 species of Teraponidae, 3 species of Sparidae, 3 species of Scorpaenidae, 3species of Scaridae, 3 species of Lethrinidae, 4 species of Labridae, 4 species of Gobiidae, 4 species of Chaetodontidae, 4 species of Carangidae, 2 species of Belonidae, 2 species of Balistidae, 2 species of Acanthuridae, 2 species of Tetradontidae, 2 species of Siganidae, 2 species of Ostraciidae, 1 species of Monocantidae, 1 species of Leiognathidae, 1 species of Atherinidae are the most abundant fishes presented in coral reefs at the Kish Island. The abundance and distribution of this species may be affected by some factors (Carpenter *et al.*, 1997):

a) The distance from the world centers of diversity is an impediment to the survival of coral and fish larvae that might be transported to the Persian Gulf.
b) The narrow Strait of Hormuz restricts the flow of seawater into and out of the Persian Gulf.
c) Extremes in environmental conditions may be beyond the physiological tolerance limits of some species in this area.
d) There are relatively few large reef systems developed in the Persian Gulf, which limits the area of suitable habitat available to reef organisms
e) The Persian Gulf is a relatively young body of water, having dried out during the period of low sea level about 20,000 years ago and then reestablishing as sea levels rose (Sheppard, 1993).

To understand more about the ecological relationships between The Persian Gulf Islands and fishes further studies needed.

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