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By

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FISH COMPOSITION AND FOOD HABITS IN MANGROVE FORESTS AT PHANG-NGA BAY AND BAN DON BAY, THAILAND

By

Supap Monkolprasit [1]

ABSTRACT

This study of Mangrove ecosystem of undisturbed and disturbed areas involved sites at Phang-nga and Ban Don Bays respectively. The number of fish species at Phang-nga Bay was higher than that of Ban Don Bay. There were 40 families, 82species, collected from Phang-nga Bay while 26 families, 50 species were collected from Ban Don Bay. The average fish productivity at Ban Don Bay during dry season (March, 1993) was 0.2758 gm/m^2. There was only one determination of fish productivity of Phang-nga Bay (February, 1994), the average productivity was 0.2151 gm/m^2.

The eating habit of some fish from both bays were studied. Stomach contents of thirty-two species were examined. Most specimens of fishes were relatively small, in immature stages of life, none of them proved to be strictly herbivorous, eighteen species (56.25%) were carnivorous while thirteen species(40.63%) were considered omnivorous. One eel was found with an empty stomach. Eleven of the thirty-two species were found to have detritus in the stomach content.

INTRODUCTION

Most mangrove forests are more or less highly productive, the mangrove tides bring the seeds of fishes and shellfishes up stream during high tide. The fish communities of mangrove and adjacent areas are considerably variable in both species composition and productivity. This is not only caused by environmental factors, such as tides, salinity, temperature etc. but also by human activities as well. At present mangrove forests are invaded and disturbed by aqua-farming. This study involving mangrove ecosystems of undisturbed and disturbed forests included the undisturbed forest of Phang-nga Bay area located along Klong Lad Khoa Kao, and the disturbed one of Ban Don Bay located along the Klong Kradare-jare.

Mangroves are recognized as an area of vital resources, they serve as nursery and feeding grounds for many groups of aquatic organisms. It is one of the most fertile ecosystems, it can provide decaying mangrove leaves to the coastal food web. The important energy flow through the mangrove ecosystem is via the route of degradation and protein enrichment of mangrove leaves by animals either large or small; for example crustacea, worms, protozoa etc. Leaves are turned into detritus that can be consumed by different aquatic animals. Both carnivorous and omnivorous fishes such as *Scatophagus*, *Mugil*, *Leiognathus*, *Secutor* and *Dorosoma*, that were caught, usually had detritus in their stomach contents, these fish are all of the large majority in the mangrove tidal stream. We might say that detritus is one of the most important food sources for fish in the mangrove forest. In order to justify a trophic grouping of fishes, the various food components might be one of the indications of the importance

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of and possibly the preference for a particular type of food, however, the food determination does not tell all because stomach contents were digested. Most mangrove fishes are relatively small, in early stages of life, so they always feed on more or less small particles of detritus and small organisms : mysids, penaid shrimps, copepods etc.It is rather difficult to classify feeding type of organisms while still immature.

MATERIALS AND METHODS

The fish specimens for this present study were collected from two bay areas. One of them that is recognized as a disturbed mangrove forest is Klong Kradare-jare, which opens into Ban Don Bay and the undisturbed one is named Klong Lad Khao Kao, opening into Phang-nga Bay.

Collecting sites : Three stations were designated in both the tidal streams of Ban Don and Phang-nga Bays : station no.1 was located at about 200 m. off shore along the mangrove fringe just at the mouth of the tidal stream (= Klong); station no.2 was located in the Klong at about one kilometer up stream from the mouth of the Klong; station no.3 was located in the Klong at about three kilometers up stream.

Fishing operations :

(a) Push nets were used as fishing gear, the size of the push net that was used at Ban Don Bay was 4 m. wide and 1 m. deep while at Phang-nga Bay the net was 14 m. wide and 1.6 m. deep.

(b) Distance of fishing coverage was about 1 km. at each station.

(c) Day and night fish collections were made. Unfortunately some problems occurred at night at station no.3 of Ban Don Bay area, it was not possible to operate, due to the shallowness of water at low tide; and it was not possible to collect at stations no.1 and no.2 of Phang-nga Bay due to heavy rain and thunder storm.

(d) Fishes, shellfishes and other invertebrates were collected at three stations of each bay, (Table 1, 2, 3).

(e) Collecting time : two trips were made at Ban Don Bay area during the dry season, March 1993, and wet season, October 1993, while one trip was made at Phang-nga Bay area in February, 1994. Some previous work on fish fauna of Phang-nga Bay included several collections (Table 4, 5).

Stomach contents determination : Fish specimens from dayand night collections were sampled for studying of stomach contents, in order to determine their diet. The stomach contents of thirty-two species of fishes were examined. Most fish samples were in immature stages, their stomach contents were more or less different from adults. Food determinations are shown in Table 10.

RESULTS AND DISCUSSION

The fish population in mangrove tidal streams may be classified into four groups : partial residents, true residents, tidal visitors and seasonal visitors; so it might be said that the species composition is more or less diversed from time to time and place to place (Table 1, 2 and 3). The present study of undisturbed and disturbed mangrove forests, number of families and species could be counted in this matter. Forty families, 80 species were found in the undisturbed mangrove forest of Phang-nga Bay area, while twenty six families, 50 species were found in the disturbed one of Ban Don Bay (Table 4 and 5). Some shellfish and other invertebrates were also identified. Fish species that were collected during day and night times, could suggest what kinds of fishes are active in searching for food.

With regard to the fishery production of wet and dry seasons; in the wet season the production was 0.5299 gm/m^2 higher than the 0.2758gm/m^2 of the dry season at Ban Don Bay (Table 9). Also the result of study at Phang-nga Bay of only the dry season, the production was 0.2151 gm/m^2. It is not much different from Ban Don Bay in the dry season.

Food from the stomach content of thirty-two species were analyzed. Most specimens of fishes were relatively small (Table 10). They prefered to eat such a small plants and animals : diatoms, foraminifera, algae, invertebrates, especially crustacea. None of them proved to be strictly herbivorous. Eighteen species (52.25%) were strictly carnivorous, such as, *Mystus*, *Arius*, *Plotosus*, *Butis* and *Lutjanus* etc.; thirteen species (40.63%) were considered omnivorous such as *Mugil*, *Drepane*, *Leiognathus* etc. Eleven of the thirty-two species were found to have detritus in their stomach. It is rather difficult to group the fish according to their food at immature stages of life.

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Table 1 List of fish species of day and night collections from three stations at Ban Don Bay (March, 1993)

Family / species	Day-station no.			Night-station no.			Remarks
	1	2	3	1	2	3	
1. Family Clupeidae							X = found
Clupea spp.	x	-	-	x	-	-	— = not found
Clupeoides hypselosoma	-	-	-	x	-	-	
2. Family Engraulidae							
Stolephorus indicus	x	x	x	x	x	-	
Engraulis kammalensis	x	x	-	x	-	-	
E. baelama	-	x	x	x	x	-	
3. Family Bagridae							
Mystus gulio	-	-	-	-	x	-	
M. planiceps	-	-	-	-	x	-	
4. Family Ophichthyidae							
Pisoodonophis boro	-	-	-	x	x	-	
5. Family Belonidae							
Tylosurus strongylurus	-	-	-	x	-	-	
6. Family Hemirhamphidae							
Zenachopterus caudivittatus	-	x	x	-	x	-	
Hemirhamphus gaimardi	-	-	-	x	-	-	
7. Family Bregmacerotidae							
Bregmaceros macclelandi	-	-	-	-	x	-	
8. Family Phallostethidae							
Phenacostethus smithi	-	-	-	-	x	-	
9. Family Mugilidae							
Mugil borneensis	x	x	x	x	x	-	
10. Family Centropomidae							
Ambassis kopsii	x	x	x	x	x	-	
11. Family Theraponidae							
Therapon jarbua	-	x	-	-	x	-	
12. Family Leiognathudae							
Leiognathus lineolatus	x	-	-	x	-	-	
Secutor insidiator	x	-	-	x	x	-	
Gerres sp.	-	-	-	-	x	-	
13. Family Scatophagidae							
Scatophagus argus	x	x	x	x	x	-	
14. Family Carangidae							
Caranx (selar) kalla	x	x	-	x	-	-	
15. Family Stromateidae							
Pampus argenteus	-	-	-	x	-	-	
16. Family Eleotridae							
Butis butis	-	-	x	-	x	-	

Table 1 (cont.)

Family / species	Day-station no.			Night-station no.			Remarks
	1	2	3	1	2	3	
17. Family Gobiidae							
Gobiopterus sp.	x	-	x	x	-	-	
18. Family Synanceidae							
Minous monodactylus	x	-	-	-	-	-	
19. Family Platycephalidae							
Platycephalus pristiger	x	-	-	-	-	-	
20. Family Cynoglossidae							
Cynoglossus versicolor	-	-	-	x	-	-	
21. Family Tetrodontidae							
Tetrodon sp.	x	-	-	-	-	-	
Chelonodon patoca	-	-	-	x	x	-	

Table 1 (cont.) List of some invertebrates accompanied with fish collection at Ban Don Bay (March, 1993)

Phylum	Common names / or Scientific names	Remarks
Coelenterata	jelly fish	very few
Mollusca	*Modiola* sp.	very few
Arthropoda	Crab (Ka-Toy) *Charybdis miles*	few
	Mantis shrimp *Choridopsis immaculata*	very few
	Horseshoe crab *Carcinoscorpius rotundicauda*	few
	Shrimps (Pa-Hair) *Palaemon styliferus*	very many
	Macrobrachium rosenbergii	very few
	Prawn (Share-Buoy) *Penaeus merguiensis*	very many
	Giant Prawn *Penaeus monodon*	few
	Prawn (Ta-Keb) *Parapenaeopsis maxillipeda*	many
	Mangrove Crab *Sesarma versicolor*	few

Table 2 List of fish species of day and night collections from three stations at Ban Don Bay (October, 1993)

Family / species	Day-station no.			Night-station no.			Remarks
	1	2	3	1	2	3	
1. Family Clupeidae							Fishing could not be operated at night time station no.3, because the tide was very low.
Clupea (Harengus) bulan	x	x	-	-	-	-	
Dorosoma chacunda	x	x	-	-	-	-	
2. Family Engraulidae							
Stolephorus indicus	x	-	-	-	-	-	
Stolephorus commersoni	x	x	-	-	-	-	
Engraulis baelama	x	x	-	x	-	-	
E. kammalensis	-	x	-	x	-	-	
3. Family Ariidae							
Arius macrocephalus	-	x	-	-	-	-	
Arius maculatus	x	x	-	-	-	-	
4. Family Plotosidae							
Plotosus canius	x	x	-	x	x	-	
5. Family Bragidae							
Mystus gulio	-	-	-	-	x	-	
M. planiceps	-	-	-	x	x	-	
6. Family Ophichthyidae							
Pisoodonophis boro	x	-	-	-	-	-	
7. Family Hemirhamphidae							
Hemirhamphus gaimardi	x	x	-	x	-	-	
Zenachopterus rasori	x	x	-	-	-	-	
8. Family Phallostethidae							
Phenacostethus smithi	-	-	-	x	x	-	
9. Family Mugilidae							
Mugil dussumieri	-	x	x	x	x	-	
M. borneensis	-	x	x	x	x	-	
M. oligolepsis	x	x	-	x	x	-	
M. subviridis	-	x	x	x	x	-	
10. Family Centropomidae							
Ambassis kopsii	x	-	-	-	-	-	
A. gymnocephala	x	-	-	-	x	-	
11. Family Theraponidae							
Therapon jarboa	-	-	-	-	x	-	
12. Family Silaginidae							
Sillago sihama	-	-	-	x	x	-	
S. maculata	-	-	-	x	x	-	
13. Family Carangidae							
Caranx sp.	x	x	-	-	-	-	
14. Family Leiognathidae							
Leiognathus brevirostris	x	x	x	-	x	-	
L. bindus	x	-	-	x	-	-	

Table 2 (cont.)

Family / species	Day-station no.			Night-station no.			Remarks
	1	2	3	1	2	3	
15. Family Sciaenidae							
Sciaena dussumieri	-	-	-	x	-	-	
16. Family Scatophagidae							
Scatophagus argus	x	x	x	x	x	-	
18. Family Eleotridae							
Butis butis	-	-	x	x	x	-	
19. Family Gobiidae							
Ctenogobius sp.	x	-	-	-	x	-	
Acentrogobius viridipunctatus	-	-	x	-	-	-	
20. Family Periophthalmidae							
Parapocryptes serperaster	x	-	-	-	-	-	
Boleopthalmus boddarti	x	-	-	-	-	-	
21. Family Cynoglossidae							
Cynoglossus versicolor	x	-	-	x	-	-	
C. sibogae	-	-	-	x	-	-	
22. Family Tetrodontidae							
Chelonodon patoca	x	-	-	x	x	-	

Table 2 (cont.) List of some invertebrates accompanied with fish collection at Ban Don Bay (October, 1993)

Phylum	Common names / or Scientific names	Remarks
Coelenterate	jelly fish	very many
Mollusca	*Modiola* sp.	very few
Arthropoda	Crab (Ka-Toy) *Charybdis miles*	very few
	Mantis shrimp *Cloridopsis immaculata*	very few
	Horseshoe crab *Carcinoscorpius rotundicauda*	very few
	Shrimps (Pa-Hair) *Palaemon styliferus*	very many
	Prawn (Share-Buoy) *Penaeus merguiensis*	very many
	Giant Prawn (Kula-dam) *Penaeus monodon*	few
	Prawn (Ta-Keb) *Parapenaeopsis maxillipeda*	many

Table 3 List of fish species of day and night collections from three stations at Phang-nga Bay (February, 1994)

Family / species	Day-station no.			Night-station no.			Remarks
	1	2	3	1	2	3	
1. Family Trygonidae							No fishes could be collected at night time station no 2 and 3, because of storm and heavy rain.
Pteroplatea poecilura	x	-	-	-	-	-	
Dasyatis (Himantura) imbricatus	-	x	x	-	-	-	
2. Family Clupeidae							
Dorosoma chacunda	-	x	x	-	x	-	
Clupeoides lile	-	-	-	-	x	-	
Pellona brachysoma	-	-	-	-	x	-	
3. Family Engraulidae							
Engraulis valenciennesi	-	x	-	-	x	-	
Engraulis malabaricus	-	-	-	-	x	-	
Stolephorus indicus	-	x	x	-	x	-	
Stolephorus tri	-	-	-	-	x	-	
4. Family Hemirhamphidae							
Hemirhamphus dussumieri	-	x	x	-	x	-	
Zenachopterus caudivittatus	-	x	-	-	-	-	
5. Family Phallostethidae							
Phenacostethus posthon	-	-	x	-	-	-	
6. Family Mugilidae							
Mugil troscheli	-	-	-	-	x	-	
Mugil borneensis	-	-	-	-	x	-	
7. Family Atherinidae							
Atherina duodecimalis	x	-	-	-	x	-	
8. Family Centropomidae							
Ambassis gymnocephala	-	-	-	-	x	-	
9. Family Serranidae							
Epinephelus sp.	-	x	-	-	-	-	
10. Family Sillaginidae							
Sillago sihama	x	x	-	-	-	-	
11. Family Lutjanidae							
Lutjanus rivulatus	-	x	-	-	-	-	
12. Family Leiognathidae							
Leiognathus blochi	x	x	x	-	x	-	
Leiognathus bindus	-	x	-	-	-	-	
Leiognathus splendens	x	x	-	-	x	-	
Secutor insidiator	x	x	-	-	x	-	
Secutor ruconius	x	x	x	-	x	-	
13. Family Pomadasyidae							
Pomadasys hasta	-	x	-	-	-	-	
14. Family Sciaenidae							

Table 3 (cont.)

Family / species	Day-station no.			Night-station no.			Remarks
	1	2	3	1	2	3	
Pseudosciaena coibor	x	-	-	-	x	-	
Johnius sp.	x	-	-	-	-	-	
15. Family Mullidae							
Upeneus sulphurus	x	x	-	-	x	-	
16. Family Scatophagidae							
Scatophagus argus	-	x	x	-	x	-	
17. Family Trichiuridae							
Trichiurus muticus	x	x	-	-	x	-	
18. Family Drepanidae							
Drepane punctatus	x	-	x	-	-	-	
19. Family Scombridae							
Rastrelliger kanagurta	-	-	-	-	x	-	
20. Family Cybiidae							
Scomberomorus commersoni	-	x	-	-	x	-	
21. Family Periophthalmidae							
Periopthalmus sp.	-	x	x	-	-	-	
22. Family Platycephalidae							
Platycephalus indicus	x	-	-	-	-	-	
23. Family Tetrodontidae							
Sphaeroides lunaris	-	-	-	-	x	-	

Table 3 (cont.) List of some invertebrates accompanied with fish collections at Phang-nga Bay (February, 1994)

Phylum	Common names / or Scientific names	Remarks
Mollusca	Squid *Loligo sp.*	many
	Spineless cuttlefish *Sepiella inermis*	few
Arthropoda	Swimming Crab *Charybdis natator*	few
	Blue Swimming Crab *Portunus pelagicus*	few
	Prawn *Penaeus merguiensis*	few
	Prawns *Metapenaeus sp.*	many
Echinodermata	Sea Urchin *Diadema sp.*	few

Table 4 Families and Species of Fishes found in disturbed mangrove habitat at Ban Don Bay (March & October, 1993)

Family/Species	March 1993	October 1993
1. Family Clupeidae		
Clupeoides hypselosoma	x	-
Clupea (Harengus) bulan	-	x
Clupea sp.	x	-
Dorosoma chacunda	-	x
2. Family Engraulidae		
Stolephorus indicus	x	x
S. commersoni	-	x
Engraulis kammalensis	x	x
E. baelama	-	x
3. Family Bragridae		
Mystus gulio	x	x
M. planiceps	x	x
4. Family Ariidae		
Arius macrocephalus	-	x
5. Family Plotosidae		
Plotosus canius	-	x
6. Family Ophichthyidae		
Pisoodonophis boro	x	-
7. Family Belonidae		
Tylosurus strongylurus	x	-
8. Family Hemirhamphidae		
Hemirhamphus gaimardi	x	x
Zenachopterus caudivittatus	x	-
Z. rasori	-	x
9. Family Bregmacerotidae		
Bregmaceros macclelandi	x	-
10. Family Phallostethidae		
Phenacostethus smithi	-	x
11. Family Mugilidae		
Mugil borneensis	x	x
M. dussumieri	-	x
M. oligolepis	-	x
M. subviridis	-	x
12. Family Centropomidae		
Ambassis kopsii	x	x
A. gymnocephala	-	x
13. Family Theraponidae		
Therapon jarbua	x	-
14. Family Sillaginidae		
Sillago sihama	-	x
S. maculata	-	x

Table 4 (cont.)

Family/Species	March 1993	October 1993
15. Family Leiognathidae		
Leiognathus lineolatus	x	-
L. brevirostris	-	x
L. bindus	-	x
Secutor insidiator	x	-
Gerres sp.	x	-
16. Family Scatophagidae		
Scatophagus argus	x	x
17. Family Carangidae		
Caranx (Selar) kalla	x	-
Caranx sp.	-	x
18. Family Sciaenidae		
Sciaena dussumieri	-	x
19. Family Stromateidae		
Pampus argenteus	x	-
20. Family Eleotridae		
Butis butis	x	x
21. Family gobiidae		
Acentrogobius viridipunctatus	-	x
Acentrogobius sp.	x	-
Ctenogobius sp.	-	x
Parapocryptes serperaster	-	x
22. Family Periophthalmidae		
Boleopthalmus boddarti	-	x
23. Family Cynoglossidae		
Cynoglossus versicolor	x	x
C. sibogae	-	x
24. Family Tetrodontidae		
Chelonodon patoca	x	x
Tetrodon sp.	x	-
25. Family Synanceidae		
Minous monodactylus	x	-
26. Family Platycephalidae		
Platycephalus pristiger	x	-

Table 5 Families and Species of Fishes found in undisturbed mangrove habitat at Phang-nga Bay (July, 1992 and February, 1994)

Family/Species	July 1992	February 1994
1. Family Trygonidae		
Pteroplatea poecilura	-	x
Dasyatis (Himantura) imbricatus	-	x
Dasyatis sp.	x	-
2. Family Clupeidae		
Dorosoma chacunda	x	x
Clupeoides lile	-	x
Pellona brachysoma	-	x
P. ditchoa	x	-
Sardinella albella	x	-
3. Family Engraulidae		
Engraulis valenciennesi	-	x
E. malabaricus	-	x
Stolephorus indicus	-	x
S. tri	-	x
Setipinna melanochir	x	-
S. taty	x	-
4. Family Hemirhampidae		
Hemirhamphus cenifasciatus	x	-
H. dussumieri	-	x
Zenachopterus caudivittatus	-	x
5. Family Plotosidae		
Plotosus canius	x	-
6. Family Ariidae		
Arius sciurus	x	-
A. gagora	x	-
7. Family Bagridae		
Mystus gulio	x	-
8. Family Belonidae		
Tylosurus strongylurus	x	-
Xenentodon cancila	x	-
9. Family Syngnathidae		
Microphis boaja	x	-
10. Family Phallostethidae		
Phenacostethus posthon	-	x
11. Family Sphyraenidae		
Sphyraena jello	x	-
12. Family Mugilidae		
Mugil subviridis	x	-
Mugil troscheli	-	x
M. borneensis	-	x
13. Family Atherinidae		
Atherina valenciennesi	x	-
A. duodecimalis	-	x

Table 5 (cont.)

Family/Species	July 1992	February 1994
14. Family Centropomidae		
Ambassis gymnocephala	x	-
A. kopsii	-	x
Lates calcarifer	x	-
15. Family Serranidae		
Epinephelus malabaricus	-	x
16. Family Sillaginidae		
Sillago sihama	x	x
17. Family Theraponidae		
Therapon jarbua	x	-
18. Family Apogonidae		
Apogon trimaculatus	x	-
19. Family Rachycentridae		
Rachycentron canadus	x	-
20. Family Carangidae		
Alectis indicus	x	-
21. Family Lutjanidae		
Lutjanus johni	x	-
L. russelli	x	-
L. rivulatus	-	x
22. Family Leiognathidae		
Leiognathus blochi	-	x
L. bindus	-	x
L. splendens	x	x
L. brevirostris	x	-
L. fasciatus	x	-
Gazza minuta	x	-
Secutor insidiator	-	x
S. ruconius	-	x
Gerres punctatus	x	-
23. Family Pomadasyidae		
Pomadasys argenteus	x	-
P. hasta	-	x
24. Family Sciaenidae		
Pseudosciaena coibor	-	x
Johnius belengeri	x	-
Johnius sp.	-	x
25. Family Mullidae		
Upeneus sulphurus	-	x
26. Family Toxotidae		
Toxotes jaculator	x	-
27. Family Drepanidae		
Drepane punctata	x	x

Table 5 (cont.)

Family/Species	July 1992	February 1994
28. Family Scatophagidae		
Scatophagus argus	x	x
29. Family Trichiuridae		
Trichiurus muticus	-	x
30. Family Siganidae		
Siganus javus	x	-
31. Family Scombridae		
Rastrelliger kanagurta	-	x
32. Family Cybiidae		
Scomberomorus commersoni	x	x
33. Family Eleotridae		
Butis butis	x	-
Eleotris fuscus	x	-
34. Family Gobiidae		
Acentrogobius canius	x	-
A. cyanomus	x	-
A. viridipunctatus	x	-
Gobius sp.	x	-
35. Family Periophthalmidae		
Boleophthalmus boddaerti	x	-
Periophthalmus chrysospilos	x	-
P. vulgaris	x	-
Periophthalmus sp.	-	x
36. Family Platycephalidae		
Platycephalus indicus	x	x
37. Family Cynoglossidae		
Cynoglossus monopus	x	-
38. Family Tetrodontidae		
Sphaeroides lunaris	x	x
Tetrodon nigroviridis	x	-
39. Family Triacanthidae		
Triacanthus brevirostris	x	-
40. Batrachoididae		
Batrachus grunniens	x	-
Halophryne gangene	x	-

Table 6 Comparison of number of species and productivity from day and night collections at Ban Don Bay, March, 1993

Station no.	no. of species		productivity gm./m²	
	day	night	day	night
1	13	18	0.0328	0.1805
2	9	16	0.0515	1.002
3	8	-	0.1015	-

Table 7 Comparison of number of species and productivity from day and night collections at Ban Don Bay, October, 1993

Station no.	no. of species		productivity gm./m²	
	day	night	day	night
1	22	19	1.8201	0.391
2	17	17	0.1921	0.212
3	7	-	0.0343	-

Table 8 Comparison of number of species and productivity from day and night collections at Phang-nga Bay, February, 1994

Station no.	no. of species		productivity gm./m²	
	day	night	day	night
1	13	-	0.3814	-
2	20	23	0.746	0.3674
3	10	-	0.037	-

Table 9 Average Productivity comparing of wet and dry season

Ban Don Bay	Productivity (g/m²)
Dry season (Mar. 1993)	0.2758
Wet season (Oct. 1993)	0.5299
Phang-nga Bay	
Dry season (Feb. 1994)	0.2151

Table 10 Determination of Stomach contents of mangrove fishes of Ban Don and Phang-nga Bays

Species	Size (mm.)	Algae tissue	Plant	Detritus	Arthropod	Mollusc	Fishes	Others
Scatophagus argus(1-2)**	48-72	x	x	x	x	x	-	diatom, nematode, rotifer, polychaete, insect, foraminifera.
Gobiopterus sp. (1)*	89-141	-	-	-	x	x	x	digested organic matter(DOM)
Butis butis (1-2)*	78-189	-	-	-	x	-	x	DOM, paenied shrimp
Ambassis kopsii (1)*	47-83	-	-	-	x	-	-	DOM
Therapon jarboa (1)**	76-89	x	x	-	x	x	x	DOM
Caranx (Selar) kalla(1)**	45-65	-	-	-	-	-	-	DOM
Engraulis kammalensis(1)*	64-108	-	-	-	x	x	-	DOM
Mystus planiceps (1-2)*	54-93	-	-	-	x	-	-	DOM, Polychaete
Mystus gulio (1)*	48-80	-	-	-	x	-	-	DOM
Pisoodonophis boro (1)	398-696	-	-	-	-	-	-	Empty stomach
Arius macrocephalus (2)*	146-215	-	-	-	x	-	-	Polychaete, DOM
Arius maculatus (2)*	181-220	-	-	-	x	-	-	Polychaete, DOM
Plotosus canius (2)*	83-120	-	-	-	x	-	-	Polychaete, DOM
Engraulis baelama (2)*	35-67	-	-	-	x	-	-	Polychaete, DOM
Mugil borneensis (1-2-3)**	73-132	x	x	x	x	x	-	Diatom, foraminifera
Mugil subviridus (2)**	56-210	-	x	x	x	-	-	Diatom, foraminifera
Mugil troscheli (3)**	63-186	-	x	x	x	-	-	Diatom, foraminifera
Dorosoma chacunda (2-3)**	46-88	x	x	x	x	x	-	DOM

Table 10 (cont.)

Species	Size (mm.)	Algae tissue	Plant	Detritus	Arthropod	Mollusc	Fishes	Others
Acentrogobius sp. (2)**	89-115	-	-	-	-	-	-	DOM, polychaete
Therapon jarboa (2)*	66	-	-	-	x	-	-	mysids
Drepane punctata (3)**	120-191	-	x	x	x	-	-	Echinoderm larvae Polychaete
Scomberomorus commersoni(3)*	130-176	-	-	-	-	-	x	Fish
Leiognathus blochi (3)**	78-86	x	x	x	-	-	-	Polychaete, insect
L. splendens (3)**	60-82	-	-	x	x	x	-	-
Secutor ruconius (3)**	65-88	-	x	x	x	-	-	mysids
Hemirhamphus dussumieri(3)**	160-191	-	-	x	-	-	-	Unidentified organic matter
Lutjanus rivuturus (3)*	190	-	-	-	x	-	-	plenty of paeneid
Trichiurus muticus (3)*	300-435	-	-	-	x	-	-	Unidentified organic matter
Johnius sp. (3)*	105-118	-	-	-	x	-	x	-
Upeneus sulphurus (3)*	100-130	-	-	x	x	x	-	Polychaete, rotifer
Rastrelliger kanagurta(3)*	150	-	-	-	x	-	-	DOM, diatom, rotifer
Engraulis malabaricus (3)*	87-112	-	-	-	x	x	-	Mollusc larvae

Remarks (1) - fishes were examined from collection of Ban Don Bay (March 1993)
(2) - " " " (October 1993)
(3) - " " of Phang-nga Bay (February 1994)
* Carnivorous fish
** Omnivorous fish