

## CHAPTER 4

### RESULTS

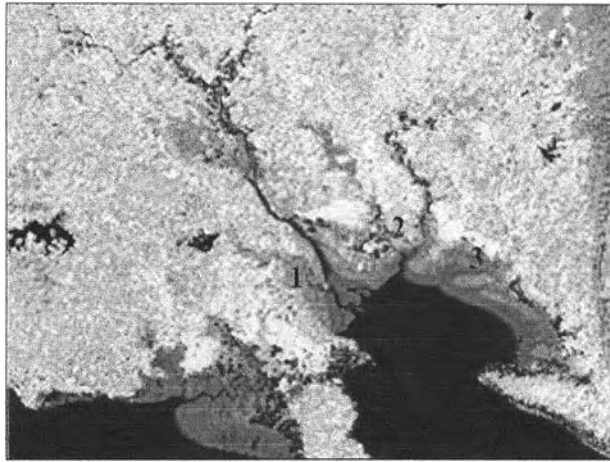
#### 4.1 Coastal land use

Coastal area of Trat Bay covering 395.2 km<sup>2</sup> of 7 sub-districts, Wang Krajae, Nong Samed, Nong Khansong, Thaprik, Takang, Chamrak and Laemklad, was classified by the visual interpretation of the image of LAND SAT-TM 1: 50,000 in 1987, 1992 and 1997 (Figure 4.1). From the overlay technique for estimating of LAND SAT-TM in 1997, land use could be classified into 10 classes. They were (1) 102.71 km<sup>2</sup> of paddy field, (2) 63.58 km<sup>2</sup> of rubber plantation, (3) 32.76 km<sup>2</sup> of perennial crop (4) 95.75 km<sup>2</sup> of forest land (5) 58.74 km<sup>2</sup> of mangrove (6) 0.27 km<sup>2</sup> of deforested area (7) 5.42 km<sup>2</sup> of bush fallow (8) 20.96 km<sup>2</sup> of shrimp farm (9) 12.09 km<sup>2</sup> of urban and built up land and (10) 2.92 km<sup>2</sup> of water body.

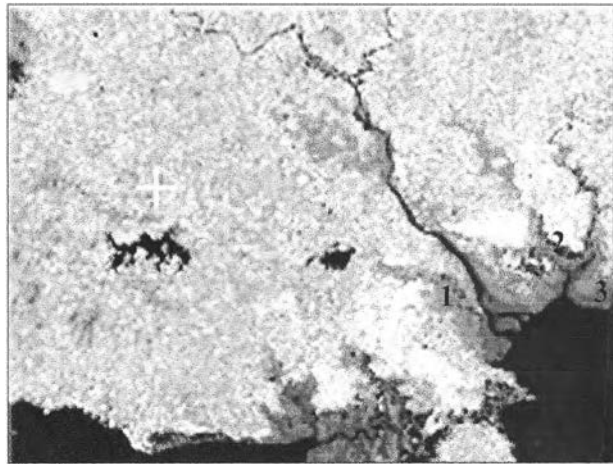
The classification on land use in 1987, 1992 and 1997, showed that paddy field had been decreased from 119.13 km<sup>2</sup> in 1987 to 102.71 km<sup>2</sup> in 1997 and perennial crop had been decreased from 36.14 km<sup>2</sup> in 1987 to 32.76 km<sup>2</sup> in 1997. Forest land and mangrove had been decreased from 96.18 km<sup>2</sup> and 68.13 km<sup>2</sup> in 1987 to 95.75 km<sup>2</sup> and 58.74 km<sup>2</sup> in 1997, respectively. Meanwhile, bush fallow had been decreased from 10.43 km<sup>2</sup> in 1987 to 5.42 km<sup>2</sup> in 1997. All decreasing mangrove (13.78 %) and 11.57 km<sup>2</sup> (9.71 %) of all decreasing paddy field was replaced by shrimp farms (Figure 4.2).

In contrast, rubber plantation, shrimp farm, water body and urban and built up land were risen. Rubber plantation had been increased from 51.96 km<sup>2</sup> in 1987 to 63.58 km<sup>2</sup> in 1997. Shrimp farm had been increased from 1.99 km<sup>2</sup> in 1987 to 20.96 km<sup>2</sup> in 1997. Urban and built up land had been increased from 9.57 km<sup>2</sup> in 1987 to 12.09 km<sup>2</sup> in 1997 and water body had been increased from 1.44 km<sup>2</sup> in 1987 to 2.92 km<sup>2</sup> in 1997 (Figure 4.3).

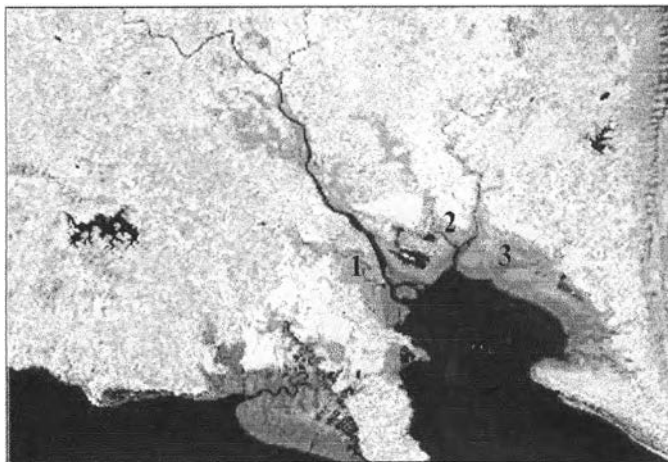
The maximum increase of shrimp farms was at Thaprik and Nong Khansong, respectively. Shrimp farms raised from 1.03 km<sup>2</sup> in 1987 to 4.67 km<sup>2</sup> in 1997 at Nong Khansong sub-district. At the same time, shrimp farm areas increased from 0.96 km<sup>2</sup> in 1987 to 4.80 km<sup>2</sup> in 1997 at Thaprik sub-district.



(A) Year 1997



(B) Year 1992



(C) Year 1987

 Mangrove       Paddy field       Shrimp farm

1 = Bangphra Canal   2 = Thaprik Canal   3 = Thaleuan Canal

Figure 4.1: LAND SAT-TM covering 7 sub-districts of Trbat Bay (supported by National Research Council of Thailand, 1997)

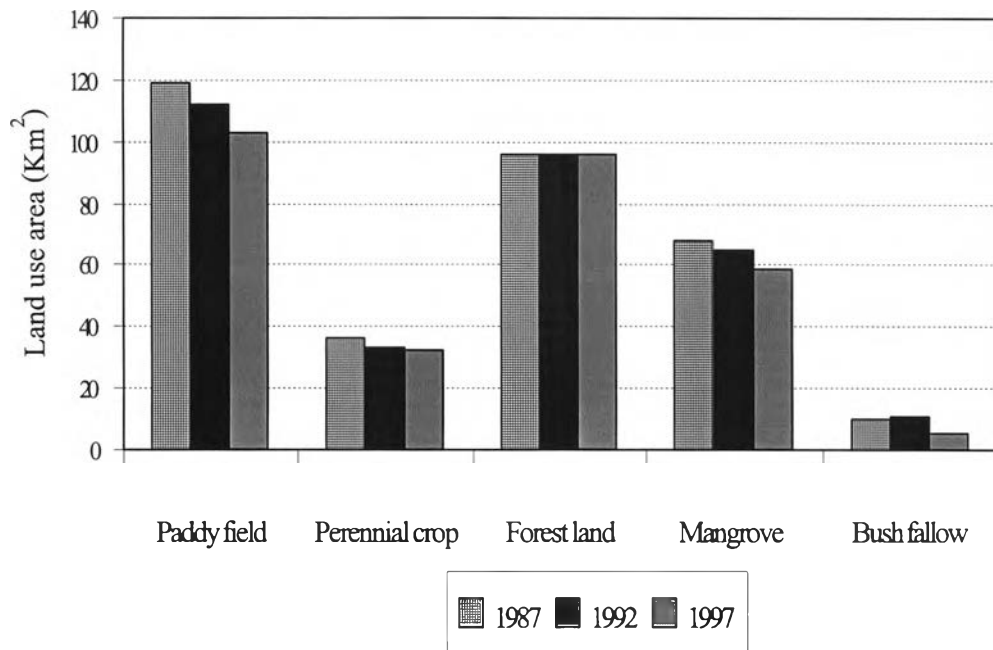


Figure 4.2: Classes of decreasing land use from 1987 to 1997

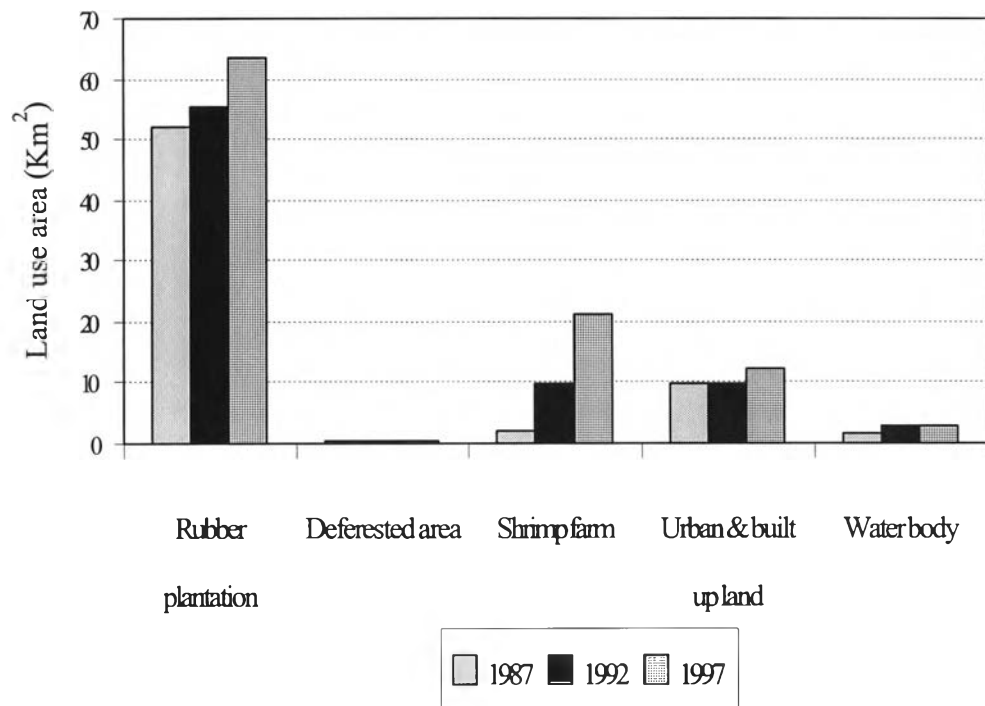


Figure 4.3: Classes of increasing land use from 1987 to 1997

Focus on coastal land use along both sides of Bangphra Canal, the mangrove was the densest at station 1 (the mouth of canal). Mangrove expanded into the land about 2 and 0.5 km on the left and the right side, respectively. About 30 households of local fisherfolks of Dankao village located on the right side of the river mouth.

Station 2 (midstream) of Bangphra Canal was covered with mangrove, about 1 km spread into the land on the left side and about 0.2 km spread into the land on the right side. Coconut plantation and local households were adjacent to mangrove on the right side. The density of mangrove on both riversides was the thinnest at station 3 (upstream), about 0.2 km long into the land while most area was residential area and paddy field. The inner part of station 3 (upstream) linked with the Bang Rakam Reservoir.

At Thaprik Canal, most mangrove area along riversides was encroached by shrimp farms. The station 1 covered with destructive mangrove, which expanded into the land about 0.5 km on the right side while only thin stripe of mangrove was found on the left side. Adjacent area of mangrove on both sides was shrimp farm. Mangrove strip was also found on the right side of station 2 while the rest area covered by shrimp farms and paddy field.

Mangrove was not found at station 3, which many areas were covered with shrimp farms. Thaprik village was settled on the left side of station 3 and adjacent area was paddy field as same as on the right side. From the visual interpretation of LAND SAT-TM in 1997, showed that all 4.8 km<sup>2</sup> of shrimp farm area in Thaprik sub-district were converted from 4.2 km<sup>2</sup> of paddy field and 0.6 km<sup>2</sup> of mangrove area along both sides of Thaprik Canal.

The most fertile mangrove was found at Thaleuan Canal. On the right side of station 1 was covered with about 3 km of mangrove expanding into the land. About 2 km of mangrove route expanded into the land on the left side. Density of mangrove was declined at station 2 and station 3 of the canal. About 2.5 km of mangrove route was widespread into the land on the right of station 2. On the left, 1 km of mangrove dense expanded into the land and adjacent area was paddy field.

Only mangrove stripes were found on both sides of station 3 of Thaleuan, which most areas were paddy field and the residences of Thaleuan village. The inner part of station 3 was blocked by water gate of Thaleuan irrigation project. The water gate will be closed in dry season to block the estuarine water from mixing with freshwater in upper reservoir, however, it will be opened in wet season to discharge the freshwater from that reservoir into the canal.

## 4.2 Environmental condition

### Physical parameters

The depth of each canal in wet season was not different from in dry season. At the same time, the depth and the width of 3 canals were not different either. In each canal, station 1 of Bangphra Canal was the deepest, 6.4 metres, and station 2 was the shallowest, 3.5 metres. Station 3 of Thaprik was the deepest, 2.5 metres, and station 1 was the shallowest, 2.2 metres. Station 3 of Thaleuan was the deepest, 3.4 metres, and station 2 was the shallowest, 2.6 metres. Station 1 of Bangphra Canal was the deepest resulting from the excavation of the bottom of canal for entering and parking of medium and large fishing boats of local villagers.

The turbidity was converted from the transparency, high transparency causes low turbidity. The water of all canals was more turbid in wet season than in dry season. The turbidity of 3 canals was not different in wet season. However there was significant difference in dry season, Bangphra canal had the lowest turbidity and Thaprik had the highest (Figure 4.4).

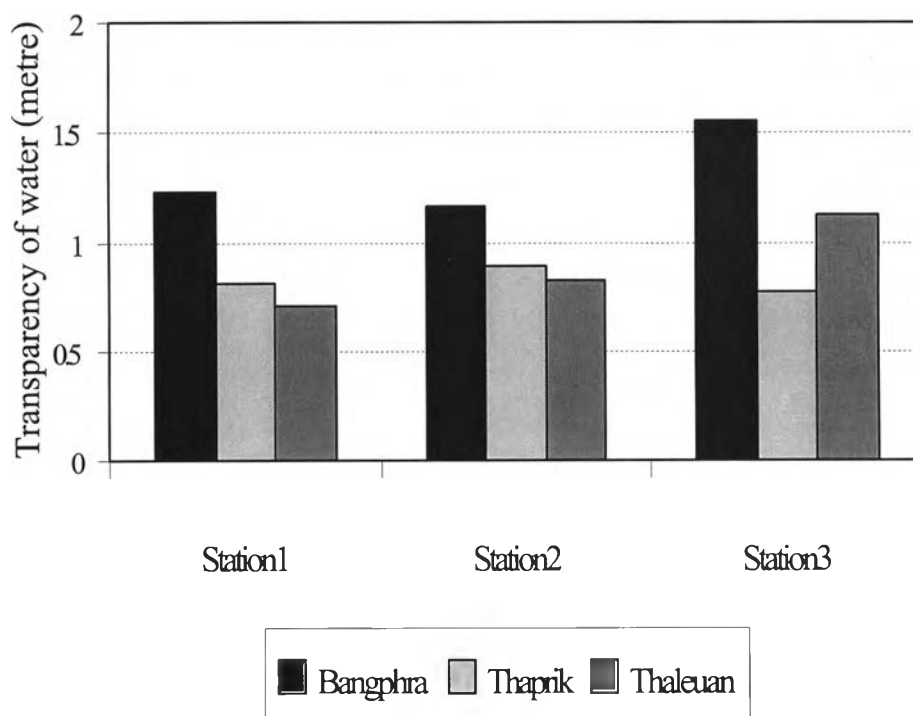


Figure 4.4: Transparency of water of 3 canals in dry season

Both surface and bottom temperature of water of 3 canals was not different in wet and dry season. In wet season, average surface temperature of 3 canals was 28.7-30.3 °C while average bottom temperature was 28.7-29.7 °C. In dry season, average surface temperature was 27.8-29.7 °C while average bottom temperature was 27.7-29.3 °C.

### Chemical parameters

Surface and bottom salinity of water in each canal was higher in dry season than in wet season. In wet season, both surface and bottom salinity of water of 3 canals were not different with the range of 0.0-5.3 ppt. However, there was significant difference in dry season. The highest average surface and bottom salinity in dry season was 32.7 and 33.0 ppt, respectively at station 1 of Thaleuan Canal while the lowest average surface and bottom salinity was 17.0 and 19.3 ppt, respectively at station 3 of Bangphra Canal (Figure 4.5). Nevertheless, average surface and bottom salinity in each station of 3 canals was not different in wet season as well as in dry season.

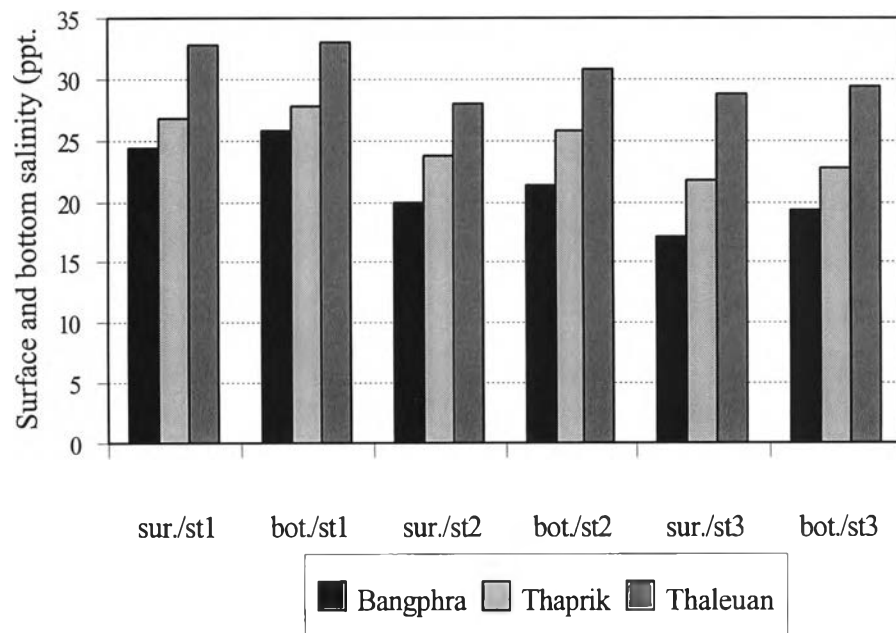


Figure 4.5: Surface and bottom salinity of water of 3 canals in dry season

Surface pH of water in each canal was higher in dry season than in wet season but surface pH of 3 canals was not different. In wet season, surface pH of 3 canals was 6.56-7.09 and it was 7.41-7.80 in dry season. Meanwhile, surface pH of 3 stations in each canal was significantly different in dry season, the highest average surface pH was at station 1, 7.70-7.80, and the lowest was at station 3 of each canal, 7.41-7.63.

At the same time, surface DO of 3 canals was not different in wet season and it was 5.3-6.5 mg/l while bottom DO of 3 canals was significantly different. The highest average bottom DO in wet season was 6.0 mg/l at station 1 of Thaleuan Canal and the lowest was 5.0 mg/l at station 3 of Thaprik Canal and throughout Bangphra Canal. In dry season both surface and bottom DO of 3 canal was not different and it was 4.0-6.9 mg/l. In addition both surface and bottom DO of 3 canals in both seasons were not different.

Bottom  $\text{NO}_3^-$  between seasons, among canals and stations was not different. The bottom  $\text{NO}_3^-$  of 3 canals was 56.7-103.3  $\text{NO}_3^-$ -N/l in wet season and it was 30.0-120.0  $\text{NO}_3^-$ -N/l in dry season. However, surface  $\text{NO}_3^-$  was higher in dry season than in wet season. In addition, surface  $\text{NO}_3^-$  of 3 canals was significantly different in each season.

The maximum average surface  $\text{NO}_3^-$  in wet season was 123.3  $\mu\text{g NO}_3^-$ -N/l at station 3 of Thaprik Canal and the minimum was 20.0  $\mu\text{g NO}_3^-$ -N/l at station 1 of Thaleuan Canal (Figure 4.6).

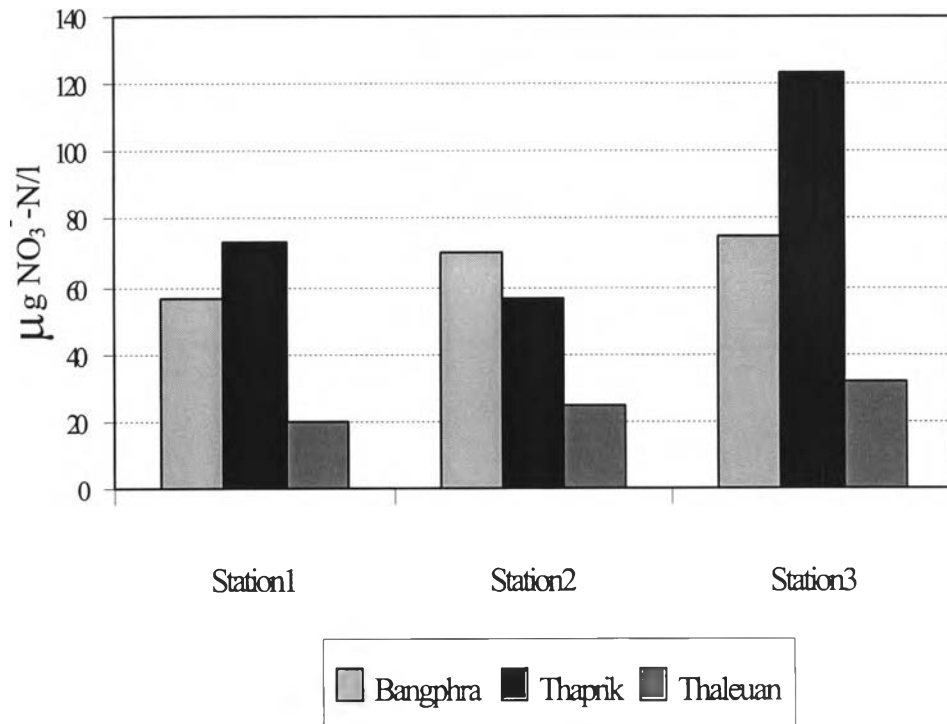


Figure 4.6: Concentration of surface  $\text{NO}_3^-$  in water of 3 canals in wet season

In dry season, the highest average surface  $\text{NO}_3^-$  was 140.7  $\mu\text{g NO}_3^-$ -N/l at station 3 of Thaprik Canal and the lowest was 45.0  $\mu\text{g NO}_3^-$ -N/l at station 2 of Thaleuan Canal (Figure 4.7).

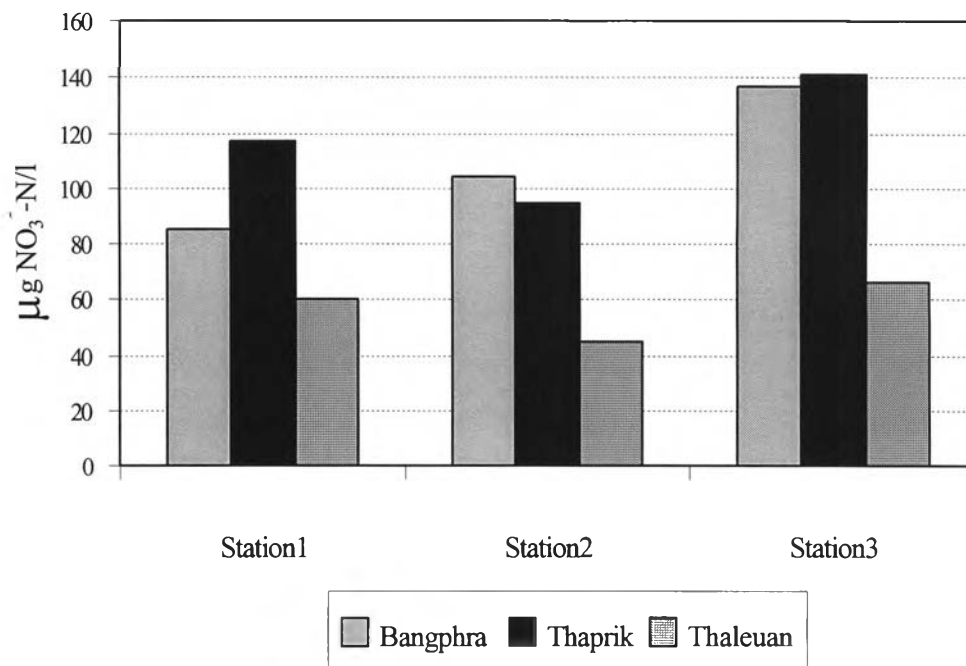


Figure 4.7: Concentration of surface  $\text{NO}_3^-$  in water of 3 canals in dry season

Surface  $\text{PO}_4^{3-}$  was higher in dry season than in wet season. However, surface  $\text{PO}_4^{3-}$  of 3 canals and among stations was not different in each season. Surface  $\text{PO}_4^{3-}$  was 1.2-12.5  $\mu\text{g/l}$  in wet season and 2.9-28.3  $\mu\text{g/l}$  in dry season. The bottom  $\text{PO}_4^{3-}$  between seasons was not significantly different but it was significantly different when comparing of 3 canals in wet season. The highest average bottom  $\text{PO}_4^{3-}$  was 12.7  $\mu\text{g/l}$  at station 2 of Thaprik Canal while the lowest was 1.1  $\mu\text{g/l}$  at station 2 of Thaleuan Canal. However, the bottom  $\text{PO}_4^{3-}$  of 3 canals was not different in dry season with the range of 2.0-33.6  $\mu\text{g/l}$ .

### Biological parameters

Surface chlorophyll a between canals, among stations in each canal and between seasons was not significantly different. The concentration of surface chlorophyll a of 3 canals was 1.24-4.79  $\text{mg/m}^3$  in wet season and 2.08-6.32  $\text{mg/m}^3$  in dry season. Zooplankton samples were compared in volume between seasons, canals and among stations. The volume of zooplankton was higher in dry season than in wet season. However, the volume of zooplankton of 3 canals and among stations was not different in each season. It was 1.4-2.2  $\text{ml/m}^3$  of water in wet season and 2.2-3.4  $\text{ml/m}^3$  of water in dry season.

Twenty-two groups from 8 phyla of zooplankton were found from 3 canals. Seventeen groups were found in wet season and 20 groups were found in dry season. Calanoid and cyclopoid



copepod, brachyuran, caridean and bivalve larvae, five groups, were found from all canals in both seasons. Two major groups, cladoceran and gastropod, were found more in wet season than in dry season. Four major groups found from all canals in dry season were lucifer, cirripede nauplii, fish larvae and medusae.

Two groups, harpacticoid copepod and polychaete, were found from all canals only in wet season and 4 groups, chaetognath, siphonophore, ctenophore and brittle star larvae, were found from all canals only in dry season. Mysid and stomatopod were found from Thaprik and Thaleuan Canal but not found from Bangphra Canal while euphasid (*Pseudoeuphasia latifrons*), stomatopod and fish egg were found from Bangphra and Thaprik Canal but not found from Thaleuan Canal (Table 4.1).

Table 4.1: Zooplankton groups found from 3 canals in both seasons

1 = Station 1    2 = Station 2    3 = Station 3    / = Found    - = Not found

Zooplankton Group	Wet Season (Aug.97-Oct.97)									Dry Season (Dec.97-Feb.98)											
	Bangphra			Thaprik			Thaleuan			Bangphra			Thaprik			Thaleuan					
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3			
<b>Phylum Coelenterata</b>																					
Medusae	-	-	-	-	/	-	-	-	-	/	/	/	/	/	/	/	/	/	/	/	/
Siphonophore	-	-	-	-	-	-	-	-	-	/	/	/	/	/	-	/	/	-			
<b>Phylum Ctenophora</b>																					
Ctenophore	-	-	-	-	-	-	-	-	-	/	/	/	/	/	/	/	/	-			
<b>Phylum Chaetognatha</b>																					
Chaetognath	-	-	-	-	-	-	-	-	-	/	/	/	/	/	/	/	/	/			
<b>Phylum Annelida</b>																					
Class Polychaeta																					
Polychaete larvae	/	/	-	/	-	/	/	/	-	-	-	-	-	-	-	-	-	-			
<b>Phylum Arthropoda</b>																					
Subclass Brachiopoda																					
Cladoceran	/	/	/	/	/	/	/	/	/	-	/	-	-	-	/	-	-	-			
Subclass Copepoda																					
Calanoid copepod	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/			

Table 4.1: Zooplankton groups found 3 canals in both seasons (Cont.)

1 = Station 1    2 = Station 2    3 = Station 3    / = Found    - = Not found

Zooplankton Group	Wet Season (Aug.97-Oct.97)									Dry Season (Dec.97-Feb.98)									
	Bangphra			Thaprik			Thaleuan			Bangphra			Thaprik			Thaleuan			
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	
<b>Phylum Arthropoda (cont.)</b>																			
Cyclopoid copepods	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
Harpacticoid copepod	/	/	/	/	/	/	/	/	/	-	-	-	-	-	-	-	-	-	-
Subclass Ostracoda																			
Ostracod	-	-	-	-	/	/	/	/	-	/	-	/	-	-	-	-	-	-	/
Subclass Malacostraca																			
Amphipod	/	/	-	/	/	-	/	/	-	-	-	-	-	/	/	-	-	/	
Isopod	-	-	/	/	/	/	/	-	/	-	-	-	-	/	-	-	-	-	
Mysid	-	-	-	-	-	-	/	-	-	-	-	-	-	-	/	-	-	-	
Stomatopod	-	-	-	-	-	-	-	-	-	-	-	-	-	/	-	-	-	-	
Euphausiid																			
<i>(Pseudoeuphausia latifrons)</i>	-	-	-	-	-	-	-	-	-	/	/	/	/	-	-	-	-	-	
Decapod																			
-brachyuran larvae	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
-caridean larvae	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
-lucifer	-	-	-	/	-	-	/	/	-	/	/	/	/	/	/	/	/	/	/
Subclass Cirripedia																			
Cirripede nauplii	-	/	-	-	-	/	/	-	-	/	/	/	/	/	/	/	/	/	/
<b>Phylum Mollusca</b>																			
Gastropod larvae	/	-	-	/	/	/	/	/	/	-	/	-	/	-	-	/	/	-	
Bivalve larvae	/	/	/	/	/	/	/	/	/	/	/	/	/	-	/	-	/	-	
<b>Phylum Echinodermata</b>																			
Brittle star larvae	-	-	-	-	-	-	-	-	-	/	-	-	/	/	-	/	-	/	
<b>Phylum Chordata</b>																			
Fish larvae	/	-	/	/	/	-	/	/	-	/	/	/	/	/	/	/	/	/	
Fish egg	-	-	-	/	/	-	-	-	-	-	-	/	/	/	-	-	-	-	

The similarity index value of zooplankton groups found from 3 sites, Bangphra:Thaprik:Thaleuan Canal, was 0.578 in wet season and was 0.510 in dry season. In wet season, the value of similarity index comparing between 2 sites of Bangphra:Thaprik, Bangphra:Thaleuan and Thaprik:Thaleuan were 0.897, 0.823 and 0.938, respectively while they were 0.872, 0.882 and 0.811, respectively in dry season (Figure 4.8).

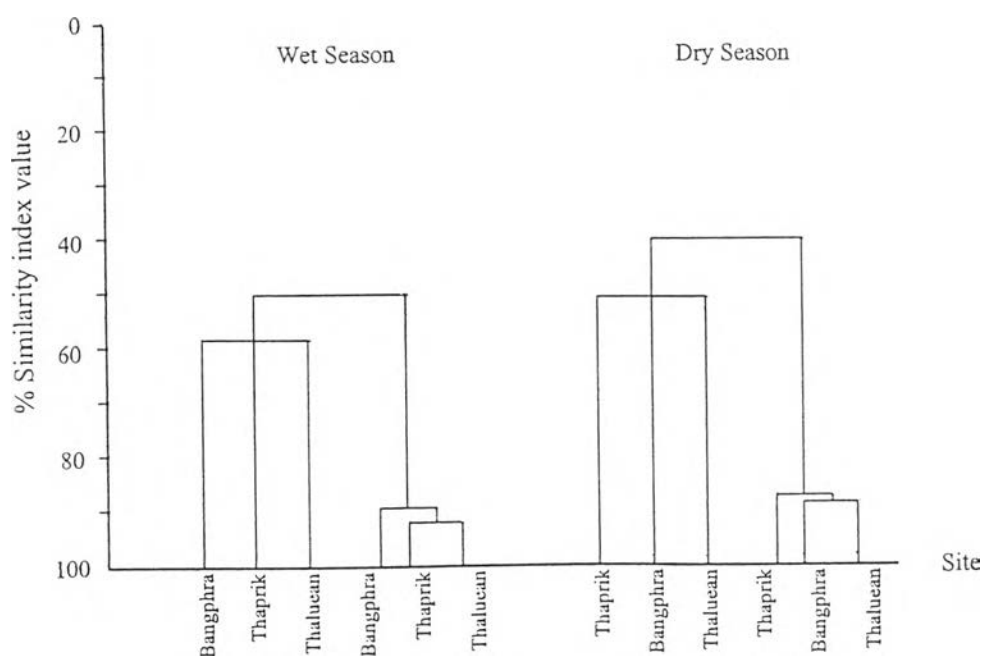


Figure 4.8: Dendrograms showing % similarity index value of zooplankton groups found from the study sites

### 4.3 Species composition of fish

#### Species abundance

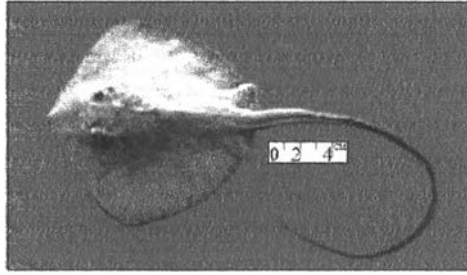
Total 111 species from 47 families were found throughout the study period (Figure 4.9-4.22). Major families found were Cyprinidae (8.1%), Gobiidae (8.1%), Sigaindae (6.3%), Engraulidae (5.4%), Hemiramphidae (4.5%), Carangidae (4.5%), Leiognathidae (3.6%) Lutjanidae (3.6%), Clupeidae (3.6%), Mugilidae (3.6%), Chandidae (3.6%), Eleotridae (3.6%) and Ariidae (2.7%).

All 111 species could be classified into 7 groups based on their feeding behaviour, 7.2% herbivore, 69.4 % carnivore, 16.2 % omnivore, 0.9 % scavenger, 3.6 % mixed between herbivore-detrivore, 0.9 % mixed between carnivore-detrivore and 1.8 % mixed between omnivore-detrivore (Figure 4.23-4.24).

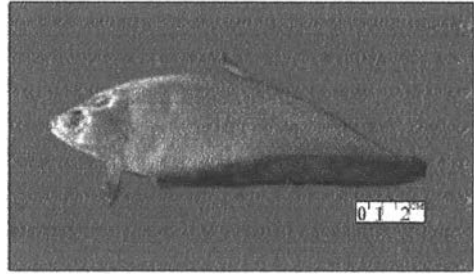
Fish found from Bangphra Canal were 95 species, of which 52 species were found in wet season and 65 species were found in dry season. Seventy-five species were found from Thaprik Canal, consisting of 41 species in wet season and 58 species in dry season. Eighty species were found from Thaleuan Canal, comprising 39 species in wet season and 64 species in dry season. The maximum number of fish species was found at station 1 and the lowest was found at station 3 of all canals.

In wet season, 15 species of all were found only from Bangphra. Five species were found only from Thaprik. Two species were found only from Thaleuan. One species found from Bangphra and Thaprik were not found from Thaleuan. Four species found from Bangphra and Thaleuan were not found from Thaprik. One species found from Thaprik and Thaleuan was not found from Bangphra. Meanwhile, a total of 32 fish species were found from all canals (Table 4.2).

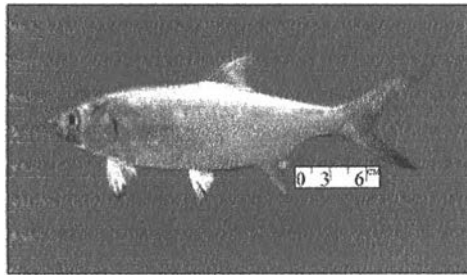
In dry season, 11 species of all fish species were found only from Bangphra. Three species were found only from Thaprik. Eight species were found only from Thaleuan. Two species found from Bangphra and Thaprik were not found from Thaleuan. Two species found from Bangphra and Thaleuan were not found from Thaprik. Three species found from Thaprik and Thaleuan were not found from Bangphra. Meanwhile, 50 species were found from all canals (Table 4.2).



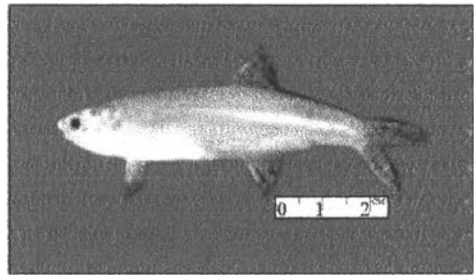
A. *Dasyatis fluviatorum*



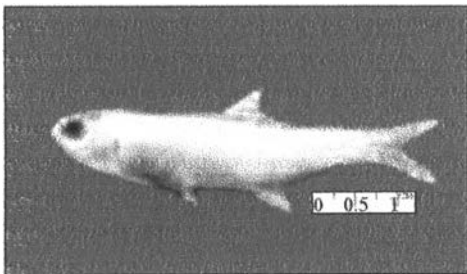
B. *Notopterus notopterus*



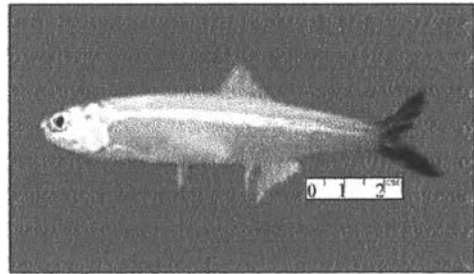
C. *Megalops cyprinoides*



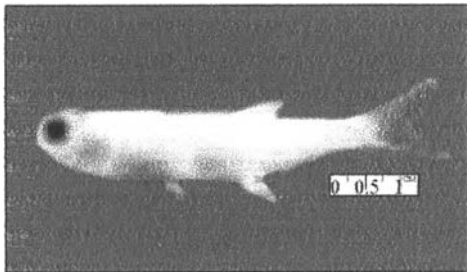
D. *Stolephorus chinensis*



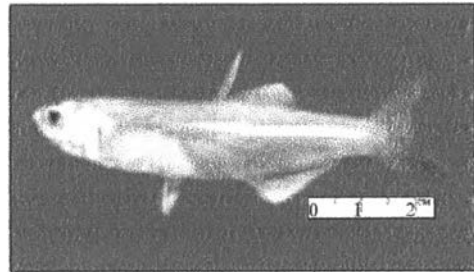
E. *Stolephorus dobiosus*



F. *Stolephorus indicus*



G. *Stolephorus insularis*

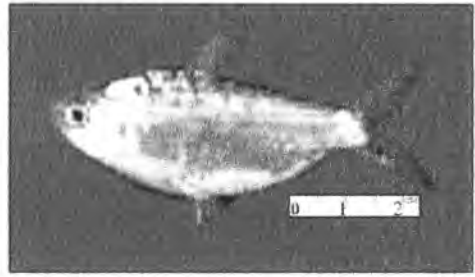


H. *Stolephorus ronquilloi*

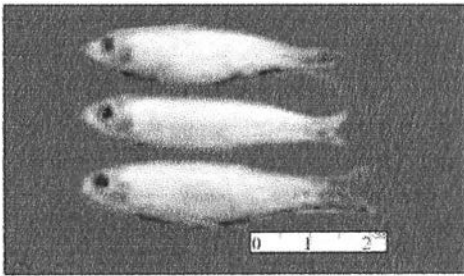
Figure 4.9 : Fish specimens in family of Dasyatidae (A), Notopteridae (B)  
Megalopidae (C) and Engraulidae (D-H)



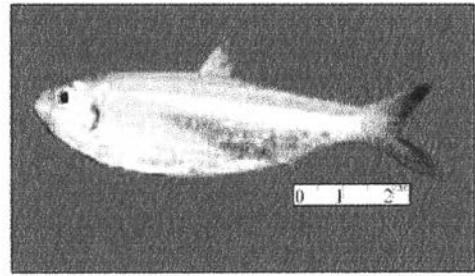
A. *Thyryssa hamiltonii*



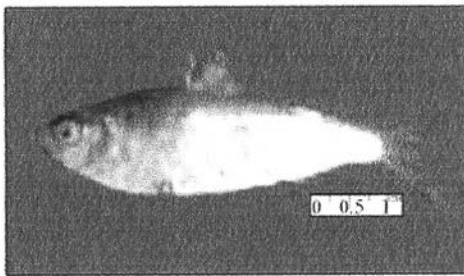
B. *Anodontostoma chacunda*



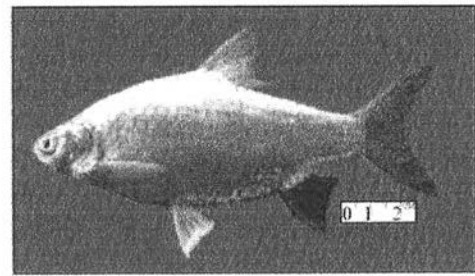
C. *Clupeichthys bleekeri*



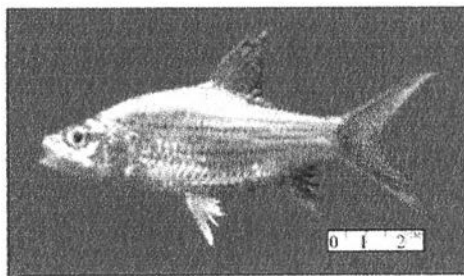
D. *Escualosa thoracata*



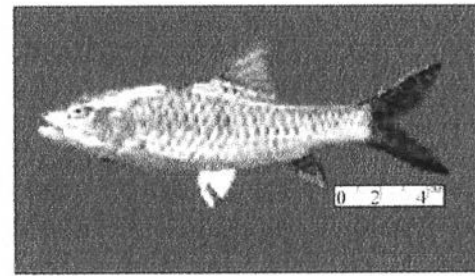
E. *Sardinella albella*



F. *Barbodes gonionotus*

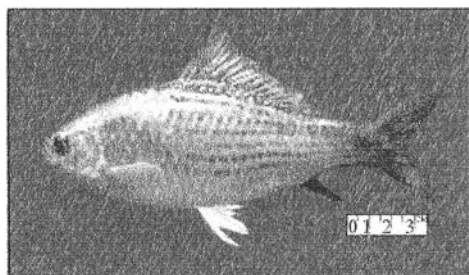


G. *Cyclocheilichthys apogon*

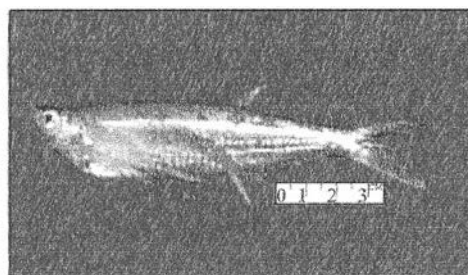


H. *Hampala macrolepidota*

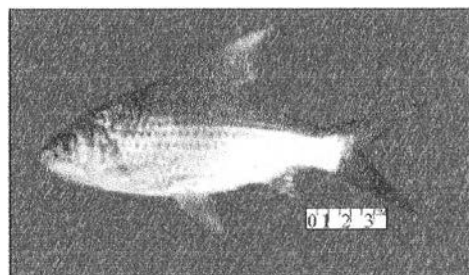
Figure 4.10: Fish specimens in family of Engraulidae (A), Clupeidae (B-E) and Cyprinidae (G-H)



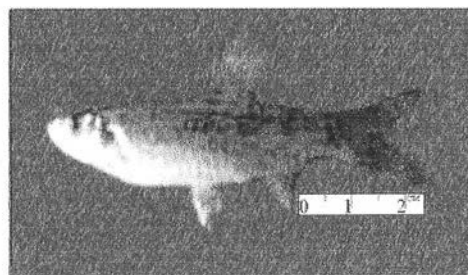
A. *Osteochilus hasselti*



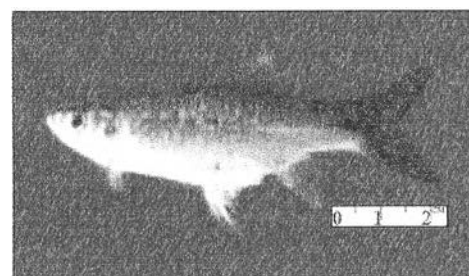
B. *Oxygaster anomalura*



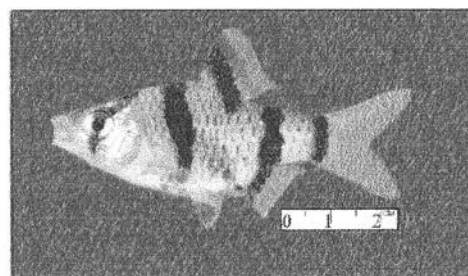
C. *Puntius brevis*



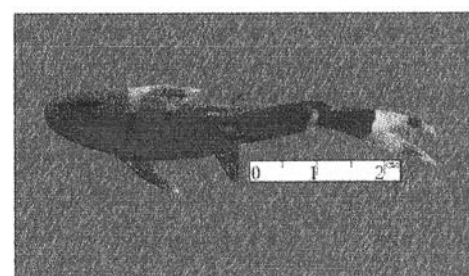
D. *Rasbora dusonensis*



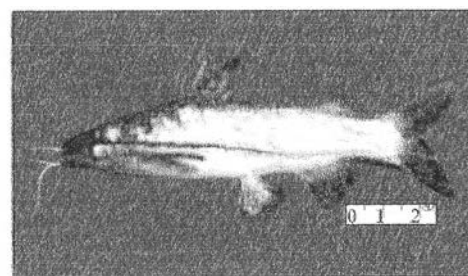
E. *Rasbora paviei*



F. *Systemus partipentazona*  
(Photo by C. Krudpand)

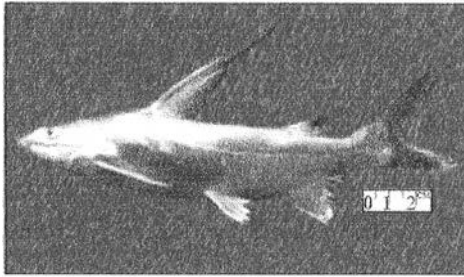


G. *Leiocassis siamensis*

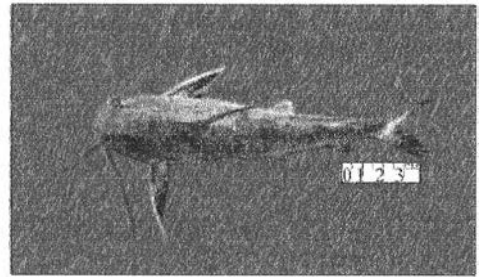


H. *Mystus gulio*

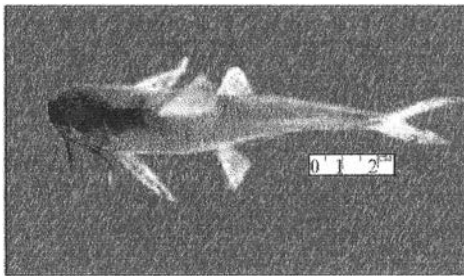
Figure 4.11: Fish specimens in family of Cyprinidae (A-F) and Bagridae (G-H)



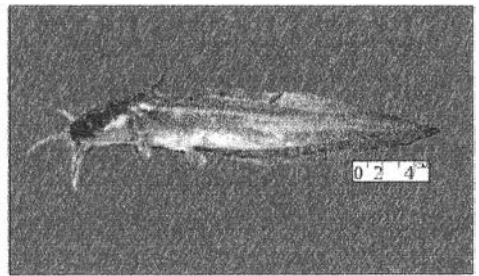
A. *Arius caelatus*



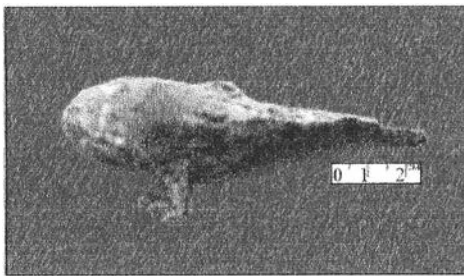
B. *Arius sagor*



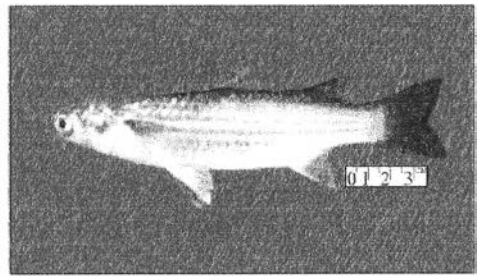
C. *Arius venosus*



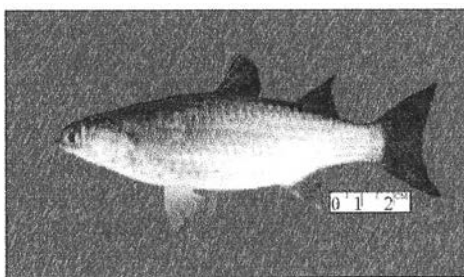
D. *Plotosus canius*



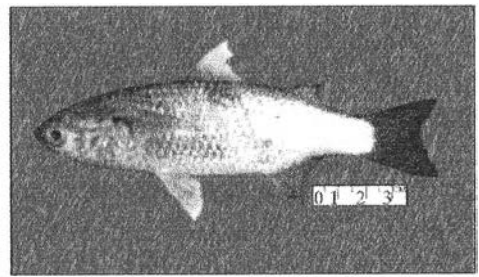
E. *Batrachomereus occidentalis*



F. *Chelon dussumeri*



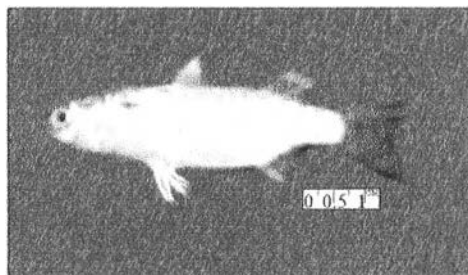
G. *Chelon subviridis*



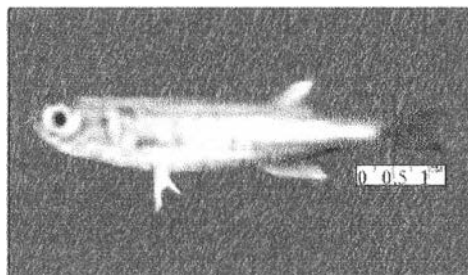
H. *Moolgarda perusii*

Figure 4.12: Fish specimens in family of Ariidae (A-C), Plotosidae (D)  
Batrachoididae (E) and Mugilidae (F-H)

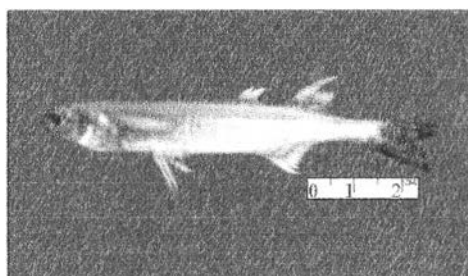




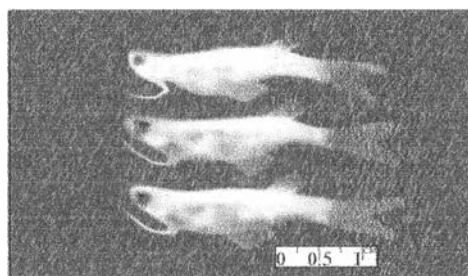
A. *Moolgarda seheli*



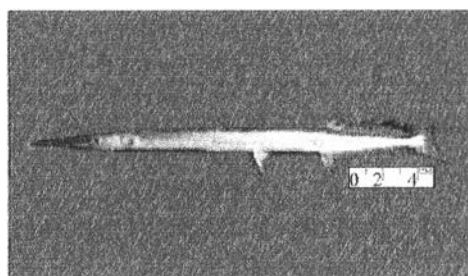
B. *Atherinomorus duodecimalis*



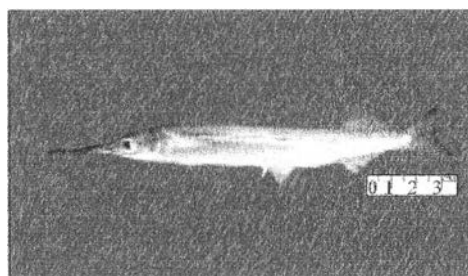
C. *Hypoatherina valencienni*



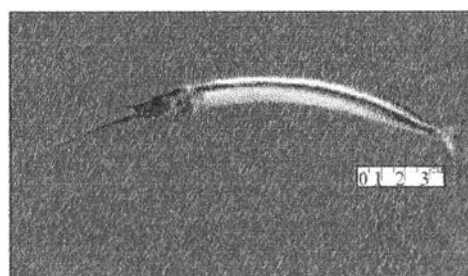
D. *Neostethus lankesteri*



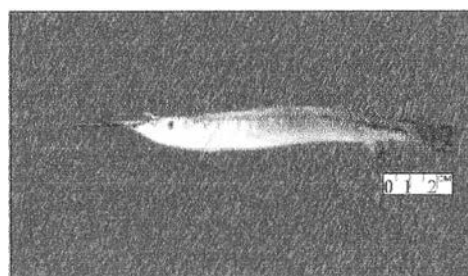
E. *Tylosurus crocodilus crocodilus*



F. *Hyporhamphus limbatus*

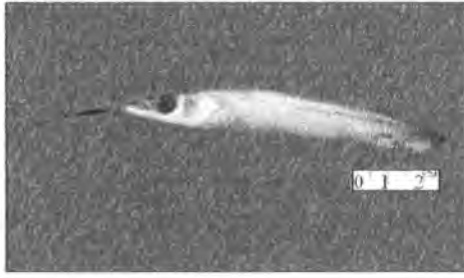


G. *Rhychorhamphus naga*

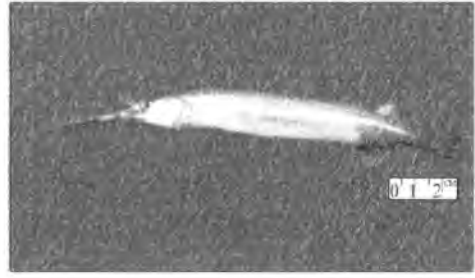


H. *Zenarchopterus buffonis*

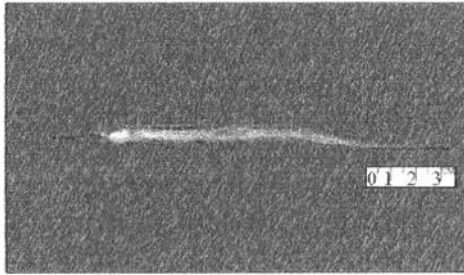
Figure 4.13: Fish specimens in family of Mugilidae (A), Atherinidae (B-C)  
Phallostehidae (D), Belonidae (E) and Hemiramphidae (F-H)



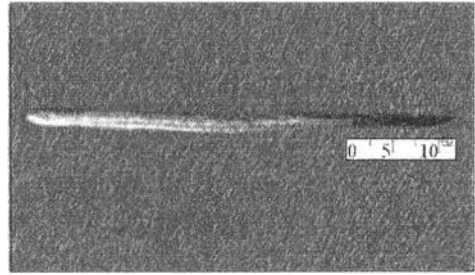
A. *Zenarchopterus dunckeri*



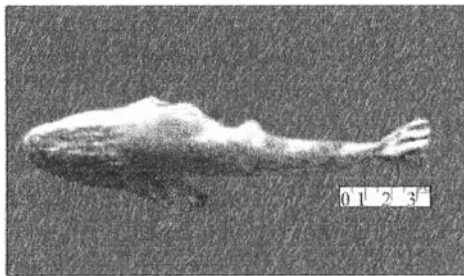
B. *Zenarchopterus ectuntio*



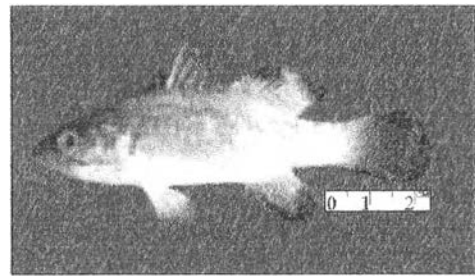
C. *Syngnathoides biaculeatus*



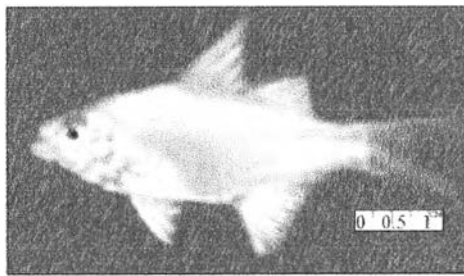
D. *Ophisternon bengalense*



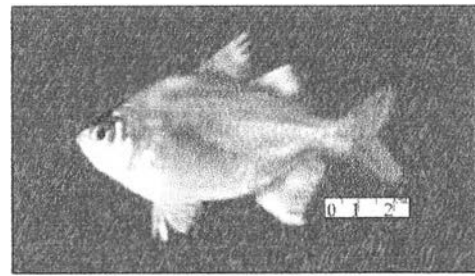
E. *Cociella crocodila*



F. *Lates calcarifer*

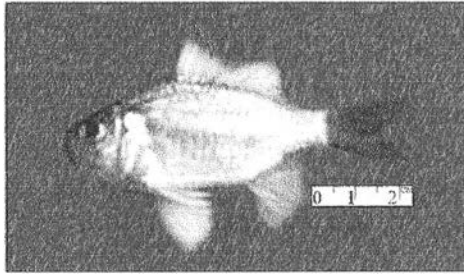


G. *Ambassis gymnocephalus*

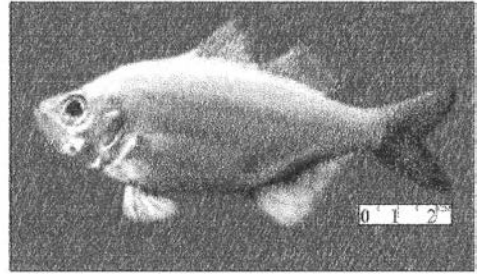


H. *Ambassis interruptus*

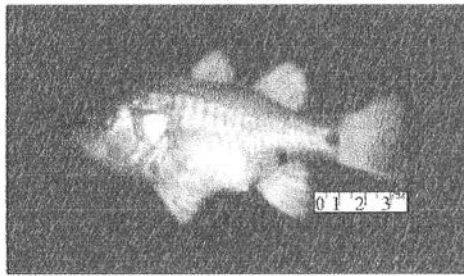
Figure 4.14: Fish specimens in family of Hemiramphidae (A-B), Syngnathidae (C), Synbranchidae (D), Platycephalidae (E), Centropomidae (F) and Chandidae (G-H)



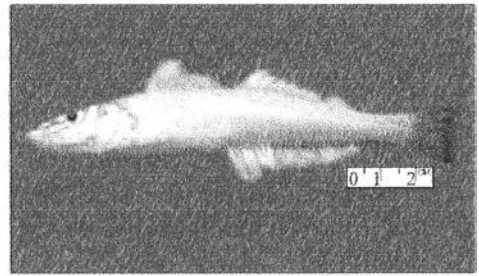
A. *Ambassis kopsi*



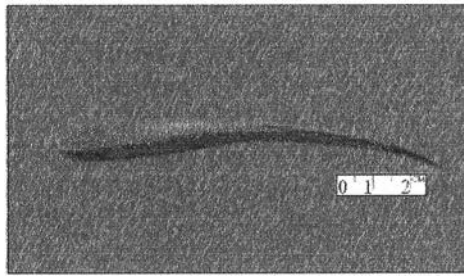
B. *Ambassis macracanthus*



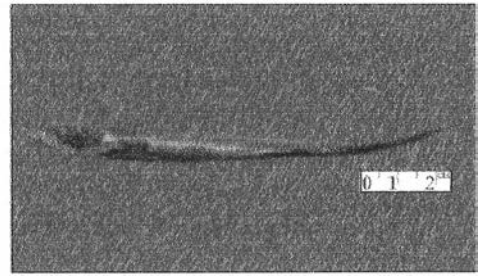
C. *Apogon hyalosoma*



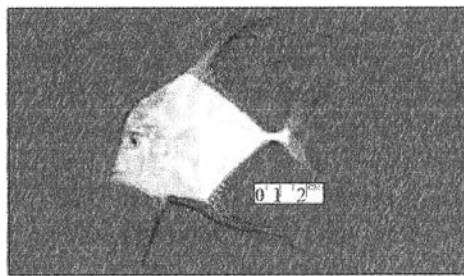
D. *Sillago sihama*



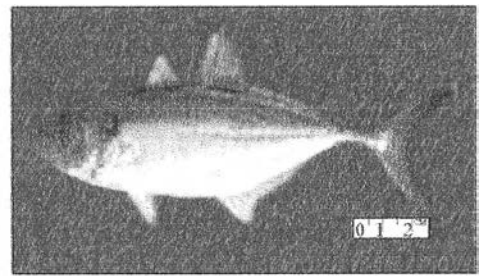
E.1. *Echeneis naucrates* (Top view)



E.2. *Echeneis naucrates* (Side view)

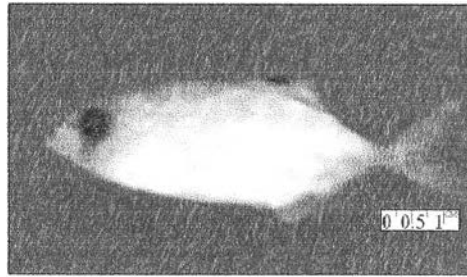


F. *Alectis indicus*

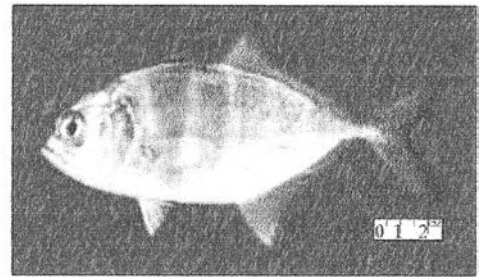


G. *Alepes djedaba*

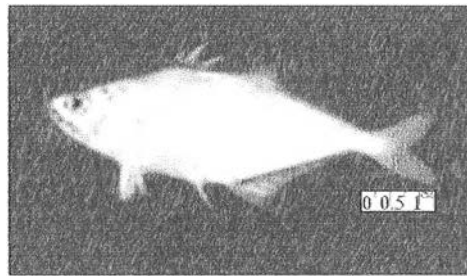
Figure 4.15: Fish specimens in family of Chandidae (A-B), Apogonidae (C), Sillaginidae (D), Echeneidae (E.1-E.2) and Carangidae (F-G)



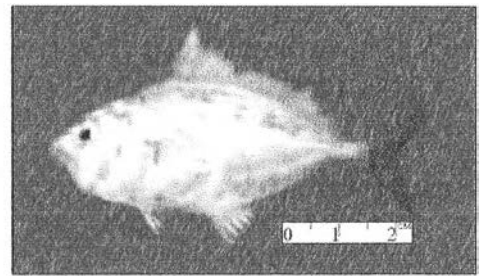
A. *Carangoides praeustus*



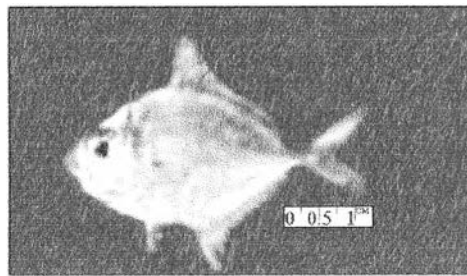
B. *Caranx sexfasciatus*



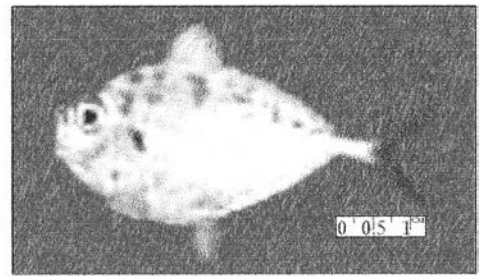
C. *Scomberoides lysan*



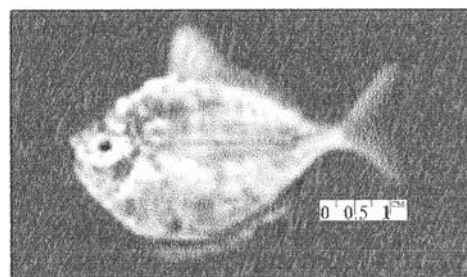
D. *Leiognathus decorus*



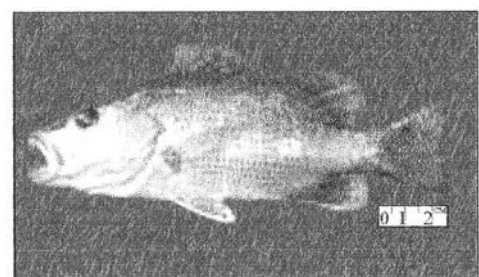
E. *Leiognathus equulus*



F. *Secutor insidiator*

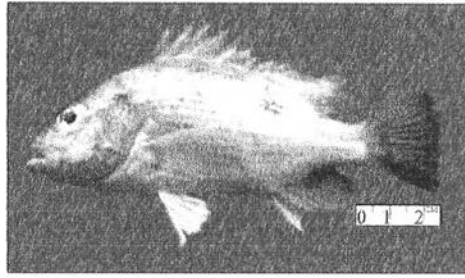


G. *Secutor ruconius*

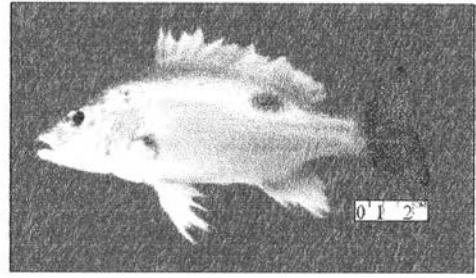


H. *Lutjanus argentimaculatus*

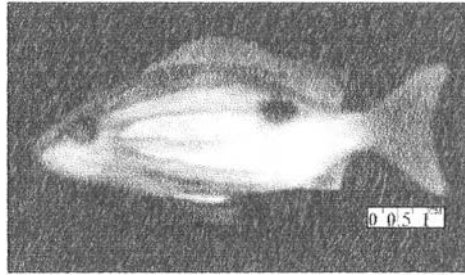
Figure 4.16: Fish specimens in family of Carangidae (A-C), Leiognathidae (D-G) and Lutjanidae (H)



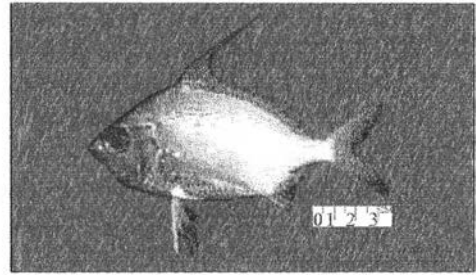
A. *Lutjanus johnii*



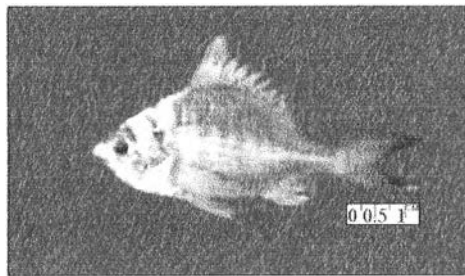
B. *Lutjanus monostigma*



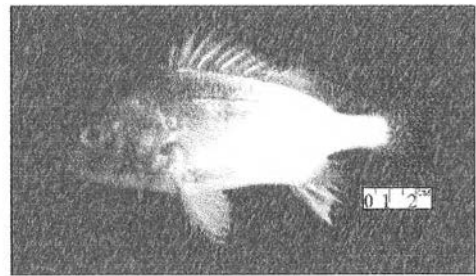
C. *Lutjanus russelli*



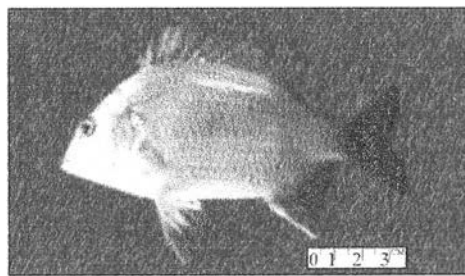
D. *Gerres filamentosus*



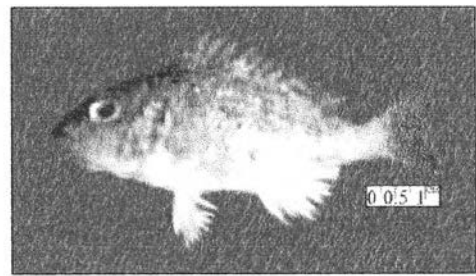
E. *Gerres poietii*



F. *Pomadasys kaakan*



G. *Acanthopagrus berda*



H. *Lethrinus semicinctus*

Figure 4.17: Fish specimens in family of Lutjanidae (A-C), Gerreidae (D-E),  
Haemulidae (F), Sparidae (G) and Lethrinidae (H)

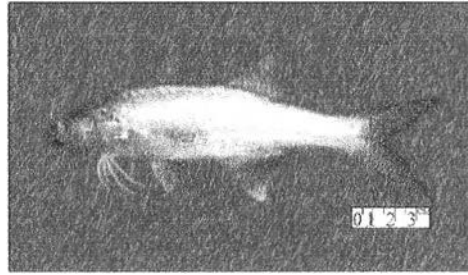
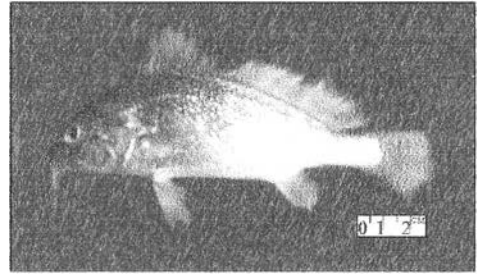
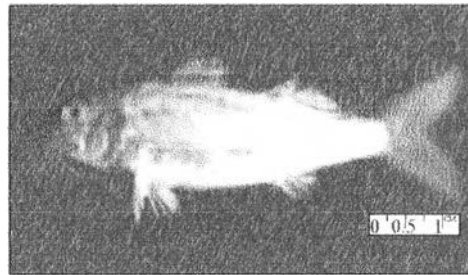
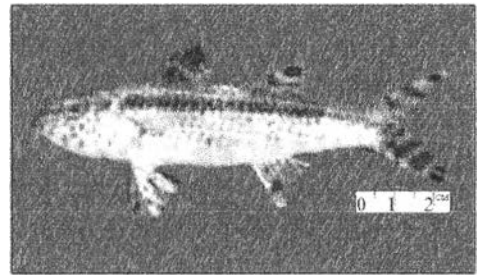
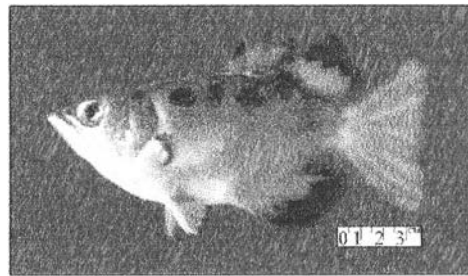
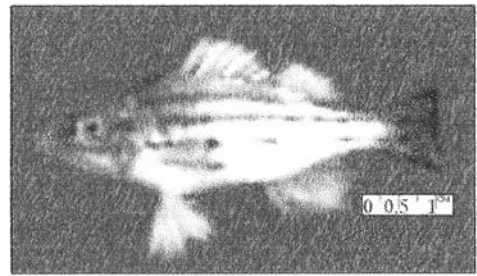
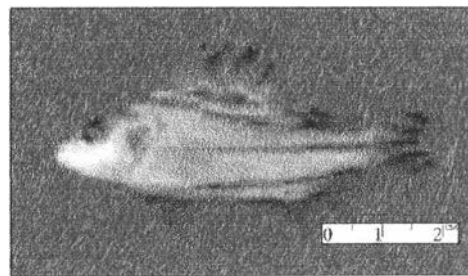
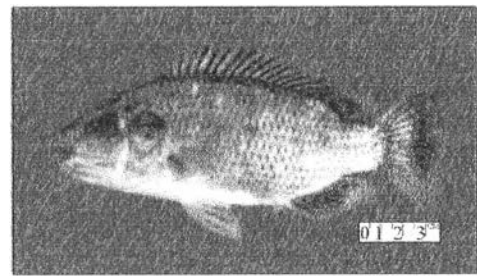
A. *Eleutheronema tetradactylum*B. *Dendrophysa russelli*C. *Upeneus sulphureus*D. *Upeneus tragula*E. *Toxotes chatareus*F. *Pelates quadrilineatus*G. *Terapon jarbua*H. *Oreochromis mossambicus*

Figure 4.18: Fish specimens in family of Polynemidae (A), Sciaenidae (B), Mullidae (C-D), Toxotidae (E), Teraponidae (F-G) and Cichlidae (H)

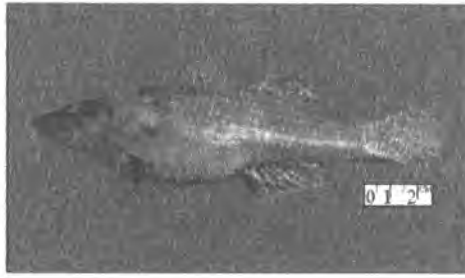
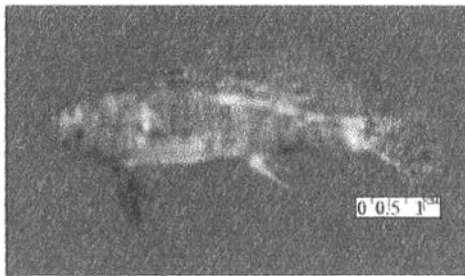
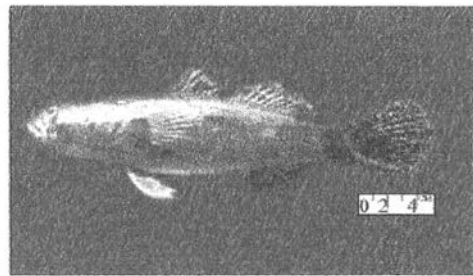
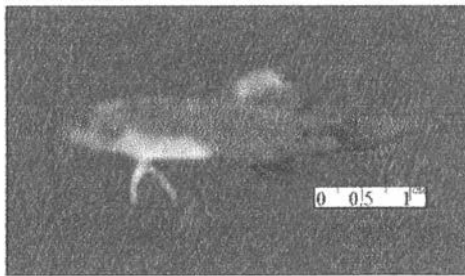
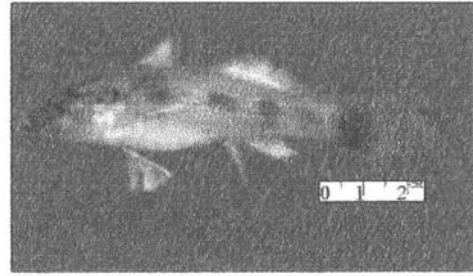
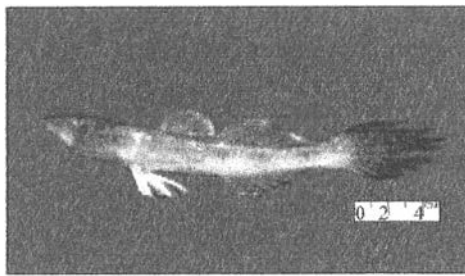
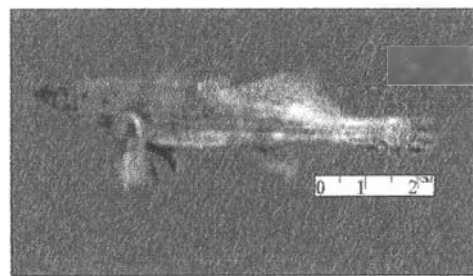
A. *Butis butis*B. *Butis gymnopomus*C. *Butis koilomatodon*D. *Oxyeleotris marmorata*E. *Acentrogobius viganensis*F. *Acentrogobius viridipunctatus*G. *Glossogobius aureus*H. *Glossogobius biocellatus*

Figure 4.19: Fish specimens in family of Eleotridae (A-D) and Gobiidae (E-H)

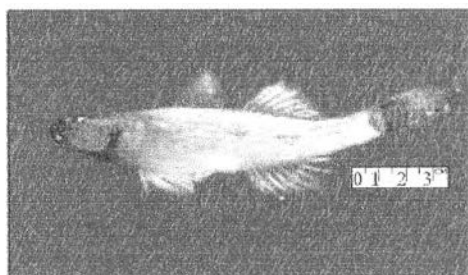
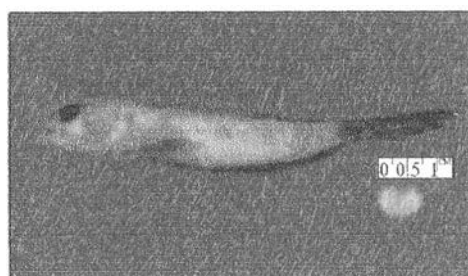
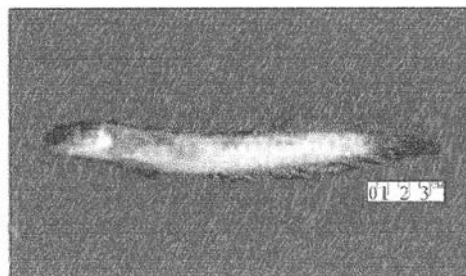
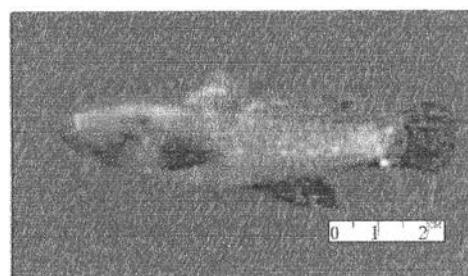
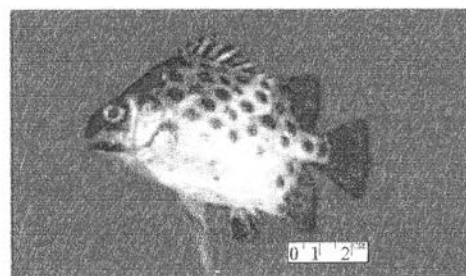
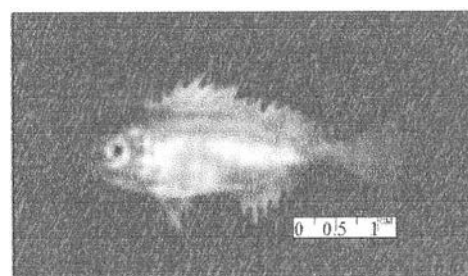
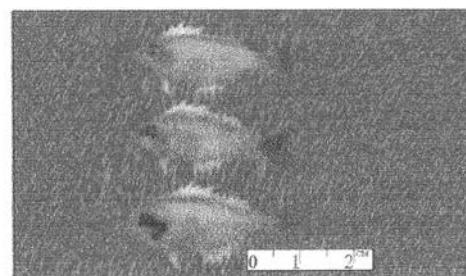
A. *Glossogobius giuris*B. *Mugilogobius chulae*C. *Oxyurichthys microlepis*D. *Pseudapocryptes lanceolatus*E. *Gobiid sp.*F. *Scatophagus argus*G. *Siganus argenteus*H. *Siganus canaliculatus*

Figure 4.20: Fish specimens in family of Gobiidae (A-E), Scatophagidae (F) and Siganidae (G-H)



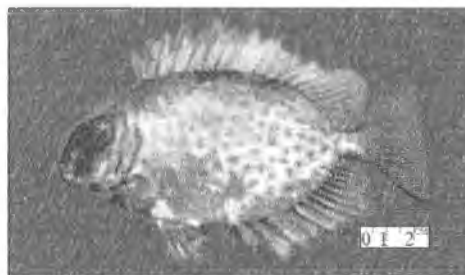
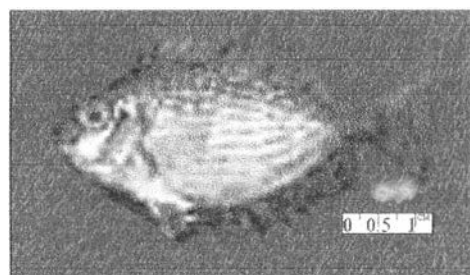
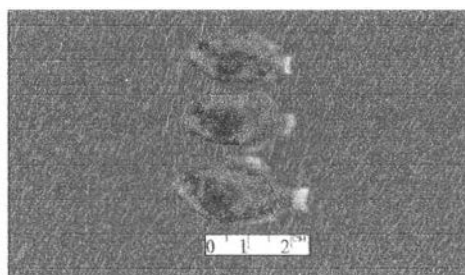
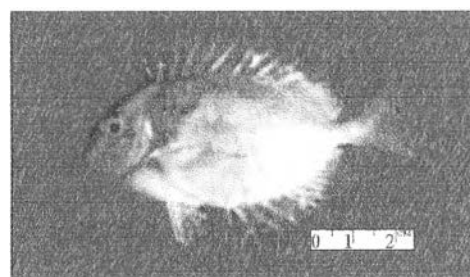
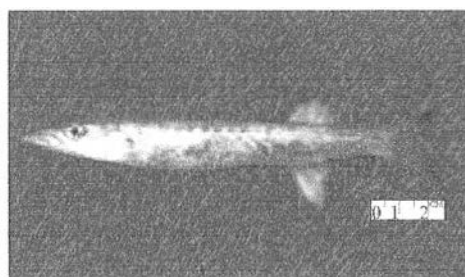
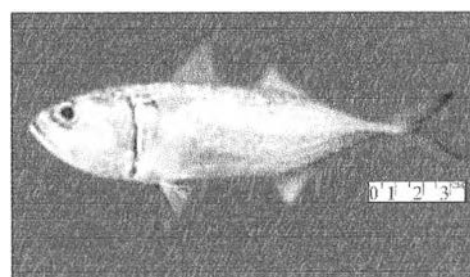
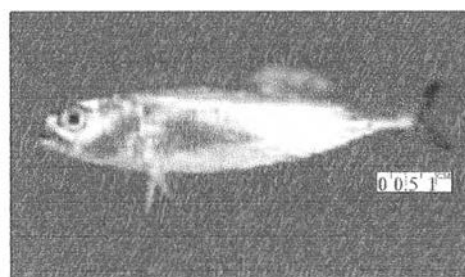
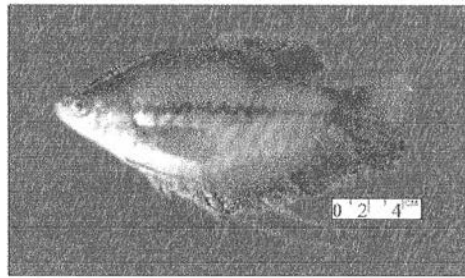
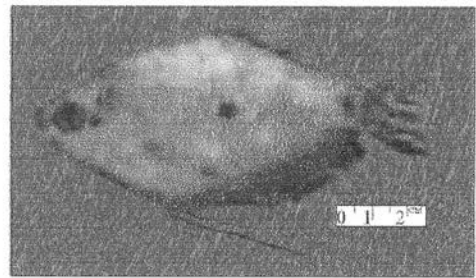
A. *Siganus fuscescens*B. *Siganus guttatus*C. *Siganus javus*D. *Siganus vermiculatus*E. *Siganus virgatus*F. *Sphyraena putnamiae*G. *Rastrelliger brachysoma*H. *Rastrelliger sp.*

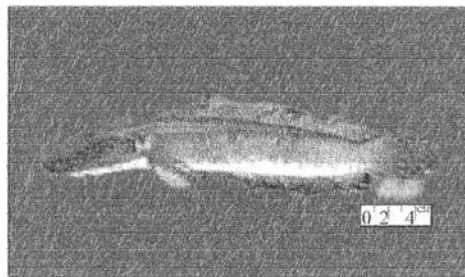
Figure 4.21: Fish specimens in family of Siganidae (A-E), Sphyraenidae (F) and Scombridae (G-H)



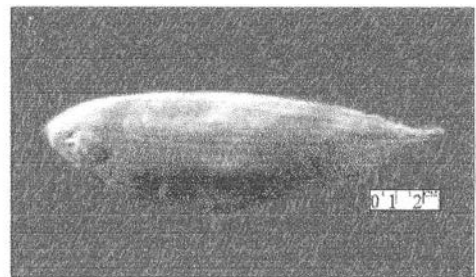
A. *Trichogaster pectoralis*



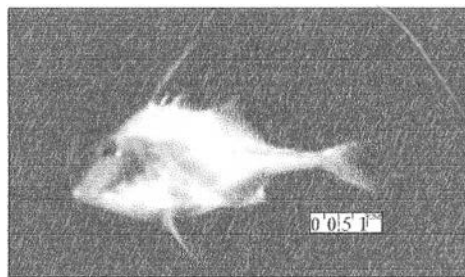
B. *Trichogaster trichopterus*



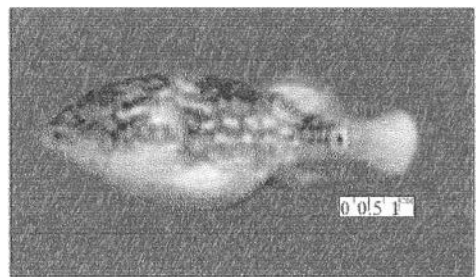
C. *Channa striata*



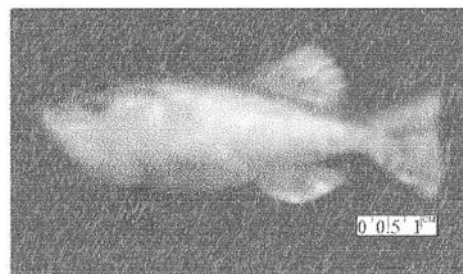
D. *Cynoglossus cynoglossus*



E. *Tripodichthys oxycephalus*



F. *Chelonodon biocellatus*



G. *Chonerhinos nefastus*

Figure 4.22: Fish specimens in family of Belontiidae (A-B), Channidae (C), Cynoglossidae (D), Triacanthidae (E) and Tetraodontidae (F-G)

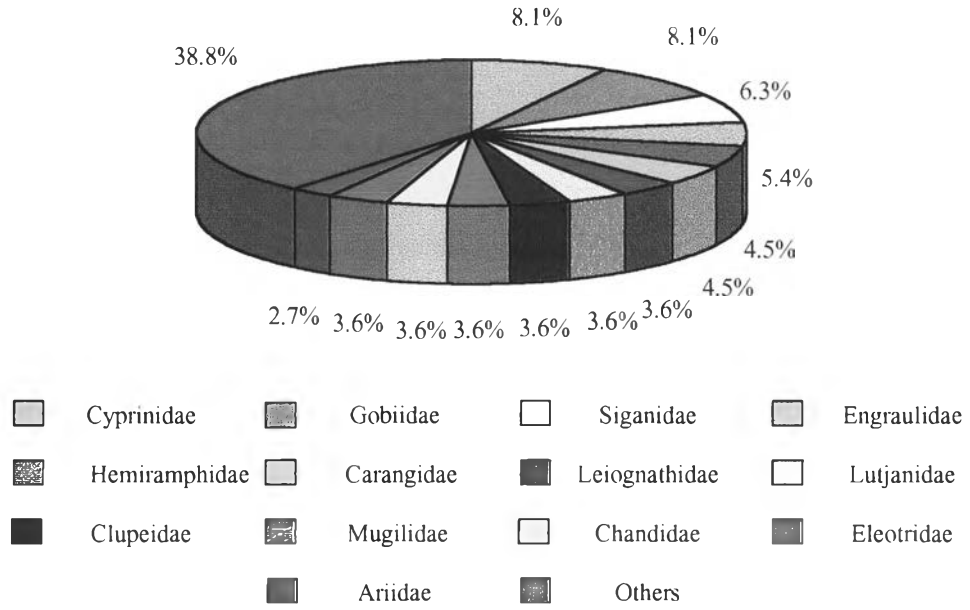


Figure 4.23: Composition of major families of fish found from the study sites

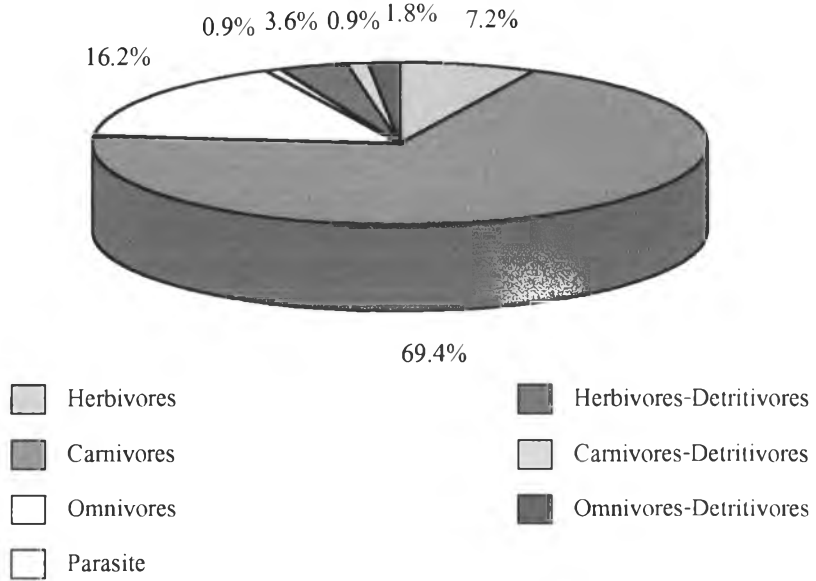


Figure 4.24: The proportion of 7 groups of fish classified by their feeding behavior

Table 4.2: Species of fish caught by push net and drift gill net

Canal 1 = Bangphra Canal    Canal 2= Thaprik Canal    Canal 3 = Thaleuan Canal,  
 W = wet season                      D = dry season                      / = Found                      - = Not found

Family: Taxa	Common name	Canal 1		Canal 2		Canal 3	
		W	D	W	D	W	D
<b>1. Fam. Dasyatidae</b>							
- <i>Dasyatis fluviatorum</i> Ogillby, 1908	<u>Eng.</u> Estuary stingray <u>Thai</u> Kraben (กระเบน)	-	-	-	/	-	-
<b>2. Fam. Notopteridae</b>							
- <i>Notopterus notopterus</i> (Pallas, 1780)	<u>Eng.</u> Bronze feather- back <u>Thai</u> Salad (สลัด)	/	-	-	-	-	-
<b>3. Family Megalopidae</b>							
- <i>Megalops cyprinoides</i> (Broussonet, 1782)	<u>Eng.</u> Tenpounder <u>Thai</u> Ta Lueksan (ตาเหลือกสั้น)	/	-	-	-	-	-
<b>4. Fam. Engraulidae</b>							
- <i>Stolephorus chinensis</i> (Günther, 1880)	<u>Eng.</u> China anchovy <u>Thai</u> Ka Tak (กะตัก)	-	/	-	/	-	/
- <i>Stolephorus dubiosus</i> Wongratana, 1980	<u>Eng.</u> Thai anchovy <u>Thai</u> Ka Tak (กะตัก)	-	/	/	/	/	/
- <i>Stolephorus indicus</i> (van Hasselt, 1823)	<u>Eng.</u> Indian anchovy <u>Thai</u> Ka Tak Khai (กะตักควาย)	-	/	-	/	-	/
- <i>Stolephorus insularis</i> Hardenberg, 1933	<u>Eng.</u> Hardenberg's anchovy <u>Thai</u> Ka Tak (กะตัก)	-	/	-	/	-	/
- <i>Stolephorus ronquilloi</i> Wongratana, 1980	<u>Eng.</u> Rongquillo's anchovy <u>Thai</u> Ka Tak (กะตัก)	-	/	-	/	-	/
- <i>Thryssa hamiltonii</i> (Gray, 1835)	<u>Eng.</u> Hamilton's thryssa <u>Thai</u> Maew (แมว)	/	/	/	/	/	/
<b>5. Fam. Clupeidae</b>							
- <i>Anodontostoma chacunda</i> (Hamilton-Buchanan, 1822)	<u>Eng.</u> Chacunda gizzard <u>Thai</u> Khok (โศก)	-	/	/	/	/	/
- <i>Clupeichthys bleekeri</i> (Hardenberg, 1938)	<u>Eng.</u> - <u>Thai</u> -	/	/	/	/	/	/
- <i>Escualosa thoracata</i> (Valenciennes, 1847)	<u>Eng.</u> White sardine <u>Thai</u> Ka Tak Khao (กะตักขาว)	/	/	/	/	/	/

Table 4.2: Species of fish caught by push net and drift gill net (Cont.)

Family: Taxa	Common name	Canal 1		Canal 2		Canal 3	
		W	D	W	D	W	D
<b>5. Fam. Clupeidae (Cont.)</b>							
- <i>Sardinella albella</i> (Valenciennes, 1847)	<u>Eng.</u> White sardinella <u>Thai</u> Lang Kheaw (หลังเขี้ยว)	-	/	-	/	-	/
<b>6. Fam. Cyprinidae</b>							
- <i>Barbodes gonionotus</i> (Bleeker, 1850)	<u>Eng.</u> Tawes <u>Thai</u> Tapien Khao (ตะเพียนขาว)	/	-	/	-	/	-
- <i>Cyclocheilichthys apogon</i> (Valenciennes, 1842)	<u>Eng.</u> Beardless <u>Thai</u> Nham Lang (หนามหลัง)	/	-	/	-	/	-
- <i>Hampala macrolepidota</i> (Valenciennes, 1842)	<u>Eng.</u> Transvrse Bar Barb <u>Thai</u> Krasoob Kheed (กระسوبซัด)	/	-	/	-	/	-
- <i>Osteochilus haselti</i> (Valenciennes, 1842)	<u>Eng.</u> Silver shark- minnow <u>Thai</u> Sroy Nokkhao (สร้อยนกเขา)	/	-	/	-	-	-
- <i>Oxygaster anomalura</i> Van Hasselt, 1823	<u>Eng.</u> - <u>Thai</u> Paeb (แปบ)	/	-	-	-	/	-
- <i>Puntius brevis</i> (Bleeker, 1860)	<u>Eng.</u> Swamp barb <u>Thai</u> Tapien Sai (ตะเพียนทราย)	/	-	/	-	/	-
- <i>Rasbora dusonensis</i> (Bleeker, 1851)	<u>Eng.</u> Rosefin rasbora <u>Thai</u> Siew Hang Lueng (ชีวหางเหลือง)	/	-	-	-	/	-
- <i>Rasbora paviei</i> (Tirant, 1885)	<u>Eng.</u> Sidestripe rasbora <u>Thai</u> Siew Khai (ชีวควาย)	/	-	/	-	/	/
- <i>Systemus partipentazona</i> (Fowler, 1934)	<u>Eng.</u> Sumatran Tiger Barb <u>Thai</u> Sua Sumatra (เสือสุมาตรา)	-	-	/	-	-	-
<b>7. Fam. Bagridae</b>							
- <i>Leiocassis siamensis</i> Regan, 1913	<u>Eng.</u> Asian bumblebee catfish <u>Thai</u> Khayaeng Hin (แขยงหิน)	/	-	-	-	-	-
- <i>Mystus gulio</i> (Hamilton, 1822)	<u>Eng.</u> Long-whiskered catfish <u>Thai</u> E-Kong (อีกง)	/	-	/	-	/	/

Table 4.2: Species of fish caught by push net and drift gill net (Cont.)

Family: Taxa	Common name	Canal 1		Canal 2		Canal 3	
		W	D	W	D	W	D
<b>8. Fam. Ariidae</b>							
- <i>Arius caelatus</i> Valenciennes, 1840	<u>Eng.</u> Engraved sea catfish <u>Thai</u> Kod Daeng (กอดแดง)	/	-	-	-	-	-
- <i>Arius sagor</i> (Hamilton, 1822)	<u>Eng.</u> Sagor sea catfish <u>Thai</u> Kod Khan Lai (กอดข้างลาย)	-	/	-	-	-	-
- <i>Arius venosus</i> Valenciennes, 1840	<u>Eng.</u> Veined catfish <u>Thai</u> Kod Lueng (กอดเหลือง)	-	/	-	-	-	/
<b>9. Fam. Plotosidae</b>							
- <i>Plotosus canius</i> Hamilton, 1822	<u>Eng.</u> Canine eel catfish <u>Thai</u> Duk (ดุ๊กทะเล)	/	-	-	-	/	/
<b>10. Fam. Batrachoididae</b>							
- <i>Batrachomereus</i> <i>occidentalis</i> Hutchins	<u>Eng.</u> Toadfish <u>Thai</u> Auk (อูก)	-	/	-	-	-	-
<b>11. Fam. Mugilidae</b>							
- <i>Chelon dussumeri</i> (Hamilton-Buchanan, 1822)	<u>Eng.</u> Goldspot mullet <u>Thai</u> Krabok Hua Siem (กระบอกหัวเสียม)	/	/	/	/	/	/
- <i>Chelon subviridis</i> (Valenciennes, 1836)	<u>Eng.</u> Greenback mullet <u>Thai</u> Krabok Dam (กระบอกดำ)	/	/	/	/	/	/
- <i>Moolgarda perusii</i> (Valenciennes, 1836)	<u>Eng.</u> Longarm mullet <u>Thai</u> Lamo Hua Klom (ละมาะหัวกลม)	-	/	-	-	-	/
- <i>Moolgarda seheli</i> (Forsskål, 1775)	<u>Eng.</u> Bluespot mullet <u>Thai</u> Krabok Khao (กระบอกขาว)	-	/	-	/	-	/
<b>12. Fam. Atherinidae</b>							
- <i>Atherinomorus</i> <i>duodecimalis</i> , (Cuvier, 1835)	<u>Eng.</u> Robust hardyhead <u>Thai</u> Khang Ngen (ข้างเงิน)	-	/	-	/	-	/
- <i>Hypoatherina valenciennei</i> Bleeker	<u>Eng.</u> Robust hardyhead <u>Thai</u> Hua Takua (หัวตะกั่ว)	-	/	-	/	-	/

Table 4.2: Species of fish caught by push net and drift gill net (Cont.)

Family: Taxa	Common name	Canal 1		Canal 2		Canal 3	
		W	D	W	D	W	D
<b>13. Fam. Phallostethidae</b>							
- <i>Neostethus lankesteri</i> (Regan, 1916)	<u>Eng.</u> - <u>Thai</u> Boo Sai (บูไซ)	/	/	/	/	/	/
<b>14. Family Belonidae</b>							
- <i>Strongylura strongylura</i> (van Hasselt, 1823)	<u>Eng.</u> Banded needle fish <u>Thai</u> Kratung Hew Khai (กระทิงเหวดควาย)	-	-	-	-	/	-
- <i>Tyosurus crocodilus crocodilus</i> (Peron and LeSueur, 1821)	<u>Eng.</u> Hound needlefish <u>Thai</u> Kratung Hew Tale (กระทิงเหวดทะเล)	-	-	-	/	-	-
<b>15. Fam. Hemiramphidae</b>							
- <i>Hyporhamphus limbatus</i> (Valenciennes, 1846)	<u>Eng.</u> Silver-line halfbeak <u>Thai</u> Khem Pak Daeng (เข็มปากแดง)	/	/	/	/	/	/
- <i>Rhychorhamphus naga</i> Collette	<u>Eng.</u> Long bill halfbeak <u>Thai</u> Kratung Pak Yao (กระทิงปากยาว)	-	-	/	-	-	-
- <i>Zenarchopterus buffonis</i> (Valenciennes, 1845)	<u>Eng.</u> Buffon's garfish <u>Thai</u> Khem (เข็ม)	/	/	/	/	/	/
- <i>Zenarchopterus dunckeri</i> Mohr, 1926	<u>Eng.</u> Halfbeak <u>Thai</u> Khem (เข็ม)	/	-	/	-	/	-
- <i>Zenarchopterus ectuntio</i> ) (Hamilton, 1822)	<u>Eng.</u> Halfbeak <u>Thai</u> Khem Pak Khao (เข็มปากขาว)	/	/	/	/	/	/
<b>16. Fam. Syngnathidae</b>							
- <i>Syngnathoides biaculeatus</i> (Bloch, 1785)	<u>Eng.</u> Double ended pipefish <u>Thai</u> Jim Fan Jorake (จิมฟันจระเข้)	-	-	/	-	-	-
<b>17. Fam. Synbranchidae</b>							
- <i>Ophisternon bengalense</i> (M'Clelland, 1845)	<u>Eng.</u> Bengal mud eel <u>Thai</u> Lai (ไหล)	/	-	-	-	-	-

Table 4.2: Species of fish caught by push net and drift gill net (Cont.)

Family: Taxa	Common name	Canal 1		Canal 2		Canal 3	
		W	D	W	D	W	D
<b>18. Fam. Platycephalidae</b> <i>-Cociella crocodila</i> (Tilesius, 1812)	<u>Eng.</u> Crocodile flat head <u>Thai</u> Hang Khay (หางควาย)	-	/	-	/	-	/
<b>19. Fam. Centropomidae</b> <i>-Lates calcarifer</i> (Bloch, 1790)	<u>Eng.</u> Barramundi <u>Thai</u> Krapong Khao (กะพงขาว)	-	-	-	/	-	-
<b>20. Fam. Chandidae</b> <i>-Ambassis gymnocephalus</i> Lacepède, 1802	<u>Eng.</u> Bald glassy perchlet <u>Thai</u> Khawmao Hue lan (ข้าวเม่าหัวล้าน)	-	/	-	/	-	/
<i>-Ambassis interruptus</i> Cuvier & Valenciennes, 1828	<u>Eng.</u> Glassperchlet <u>Thai</u> Khawmao (ข้าวเม่า)	/	-	/	-	/	-
<i>-Ambassis kopsi</i> Bleeker, 1851	<u>Eng.</u> Singapore glassy perchlet <u>Thai</u> Khawmao (ข้าวเม่า)	/	/	/	/	/	/
<i>-Ambassis macracanthus</i> Bleeker, 1849	<u>Eng.</u> Glassy perchlet <u>Thai</u> Khawmao (ข้าวเม่า)	/	/	/	/	/	/
<b>21. Fam. Apogonidae</b> <i>-Apogon hyalosoma</i> Bleeker, 1825	<u>Eng.</u> Cardinal fish <u>Thai</u> Om Khai (อมไข่)	/	-	-	-	-	-
<b>22. Fam. Sillaginidae</b> <i>-Sillago sihama</i> (Forsskål, 1775)	<u>Eng.</u> Silver whiting <u>Thai</u> Hed Khon Ngen (เห็ดโคนเงิน)	-	/	-	/	-	/
<b>23. Fam. Echeneidae</b> <i>-Echeneis naucrates</i> Linnaeus, 1758	<u>Eng.</u> Sharksucker <u>Thai</u> Hao Chalam (เหาฉลาม)	-	/	-	-	-	-
<b>24. Fam. Carangidae</b> <i>-Alectis indicus</i> (Rüppell, 1830)	<u>Eng.</u> Indian threadfish <u>Thai</u> Phom Nang (ผมนาง)	-	/	-	-	-	-



Table 4.2: Species of fish caught by push net and drift gill net (Cont.)

Family: Taxa	Common name	Canal 1		Canal 2		Canal 3	
		W	D	W	D	W	D
<b>24. Fam. Carangidae (Cont.)</b>							
- <i>Alepes djedaba</i> (Forsskål, 1775)	<u>Eng.</u> Shrimp scad <u>Thai</u> Seekun Khaem Dam (สีกุนแก้มดำ)	-	/	-	/	-	/
- <i>Carangoides praeustus</i> (Bennett, 1830)	<u>Eng.</u> Brownback travally <u>Thai</u> Seekun Khrib Dam (สีกุนครีปดำ)	-	/	-	/	-	/
- <i>Caranx sexfasciatus</i> Quoy and Gaimard, 1825	<u>Eng.</u> Bigeye travally <u>Thai</u> Hangkew Moh (หางกิวหม้อ)	-	/	-	/	-	-
- <i>Scomberoides lysan</i> (Forsskål, 1775)	<u>Eng.</u> Doublespotted queen fish <u>Thai</u> Chaleab (ฉะลิยบ)	/	/	/	/	-	/
<b>25. Fam. Leiognathidae</b>							
- <i>Leiognathus decorus</i> De Vis, 1884	<u>Eng.</u> Decorated pony fish <u>Thai</u> Pan Jamook San (แป้นจมูกสั้น)	/	/	/	/	/	/
- <i>Leiognathus equulus</i> (Forsskål, 1775)	<u>Eng.</u> Common ponyfish <u>Thai</u> Pan Yak (แป้นยักษ์)	-	/	-	/	-	/
- <i>Secutor insidiator</i> (Bloch, 1787)	<u>Eng.</u> Pugnose ponyfish <u>Thai</u> Pan Pak Moo (แป้นปากหมู)	-	/	-	/	-	/
- <i>Secutor ruconius</i> (Hamilton, 1822)	<u>Eng.</u> Deep pugnose ponyfish <u>Thai</u> Pan Bia (แป้นเบีย)	-	/	-	/	-	/
<b>26. Fam. Lutjanidae</b>							
- <i>Lutjanus argentimaculatus</i> (Forsskål, 1775)	<u>Eng.</u> Mangrove red snapper <u>Thai</u> Kapong Daeng (กะพงแดง)	/	-	-	-	-	-
- <i>Lutjanus johnii</i> (Bloch, 1792)	<u>Eng.</u> John's snapper <u>Thai</u> Kapong Kledhang (กะพงเกล็ดห่าง)	-	/	-	/	-	/
- <i>Lutjanus monostigma</i> (Cuvier, 1828)	<u>Eng.</u> Onespots snapper <u>Thai</u> Kapong Daeng (กะพงแดง)	-	/	-	/	-	/

Table 4.2: Species of fish caught by push net and drift gill net (Cont.)

Family: Taxa	Common name	Canal 1		Canal 2		Canal 3	
		W	D	W	D	W	D
26. <b>Fam. Lutjanidae</b> (Cont.) - <i>Lutjanus russelli</i> (Bleeker, 1849)	<u>Eng.</u> Russell's snapper <u>Thai</u> Kapong Khangpand (กะพงข้างปาน)	-	/	-	/	-	/
27. <b>Fam. Gerreidae</b> - <i>Gerres filamentosus</i> Cuvier, 1829	<u>Eng.</u> Whipfin silver-biddy <u>Thai</u> Dokmak Kradong (ดอกหมากกระโดง)	/	/	/	/	/	/
- <i>Gerres poitei</i> Cuvier, 1829	<u>Eng.</u> Strongspine silver-biddy <u>Thai</u> Dokmak (ดอกหมาก)	/	/	/	/	/	/
28. <b>Fam. Haemulidae</b> - <i>Pomadasys kaakan</i> (Cuvier, 1830)	<u>Eng.</u> Javelin grunter <u>Thai</u> Kapong Samae (กะพงแสม)	-	-	-	-	-	/
29. <b>Fam. Sparidae</b> - <i>Acanthopagrus berda</i> (Forsskål, 1775)	<u>Eng.</u> Picnic seabream <u>Thai</u> E-Kud (อีคุด), Jan (จาม)	/	-	-	-	-	-
30. <b>Fam. Lethrinidae</b> - <i>Lethrinus semicinctus</i> Valenciennes, 1830	<u>Eng.</u> Black blotch emperor <u>Thai</u> Moosee (หมูสี)	-	/	-	/	-	-
31. <b>Fam. Polynemidae</b> - <i>Eleutheronema tetradactylum</i> (Shaw, 1804)	<u>Eng.</u> Fourfinger threadfin <u>Thai</u> Kurao Seesen (กูเราสี่เส้น)	-	-	/	-	-	/
32. <b>Fam. Sciaenidae</b> - <i>Dendrophysa russelli</i> (Cuvier, 1830)	<u>Eng.</u> Goatee croaker <u>Thai</u> Juad Nakhuen (จวดหน้าขึ้น)	-	/	-	-	-	-
33. <b>Fam. Mullidae</b> - <i>Upeneus sulphureus</i> Cuvier, 1829	<u>Eng.</u> Sulphur goatfish <u>Thai</u> Paelueng (แพะเหลือง)	-	-	-	-	-	/
- <i>Upeneus tragula</i> Richardson, 1845)	<u>Eng.</u> Frecked goatfish <u>Thai</u> Paelai (แพะลาย)	-	/	-	-	-	-

Table 4.2: Species of fish caught by push net and drift gill net (Cont.)

Family: Taxa	Common name	Canal 1		Canal 2		Canal 3	
		W	D	W	D	W	D
<b>34. Fam. Toxotidae</b>							
- <i>Toxotes chatareus</i> (Hamilton, 1822)	<u>Eng.</u> Largescale archerfish <u>Thai</u> Sua Pon Nam (เสือพ่นน้ำ)	/	-	-	-	/	-
<b>35. Fam. Teraponidae</b>							
- <i>Pelates quadrilineatus</i> (Bloch, 1790)	<u>Eng.</u> Fourlined terapon <u>Thai</u> Khanglai (ข้างลาย)	-	-	-	-	-	/
- <i>Terapon jabua</i> (Forsskål, 1775)	<u>Eng.</u> Jarbua terapon <u>Thai</u> Khang Tapao (ข้างตะเกา)	/	-	/	-	/	-
<b>36. Fam. Cichlidae</b>							
- <i>Oreochromis mossambicus</i> (Peters, 1852)	<u>Eng.</u> Mozambique cichlid <u>Thai</u> Moh Tes (หมอตีศ)	-	-	/	/	/	/
<b>37. Fam. Eleotridae</b>							
- <i>Butis butis</i> (Hamilton, 1822)	<u>Eng.</u> Crimson topped flathead sleeper <u>Thai</u> Boo Jak (บูจก)	/	/	/	/	/	/
- <i>Butis gymnopomus</i> (Bleeker)	<u>Eng.</u> Sleeper <u>Thai</u> Boo (บู)	/	-	-	-	-	-
- <i>Butis koilomatodon</i> (Bleeker, 1849)	<u>Eng.</u> Sleeper <u>Thai</u> Boo (บู)	-	-	-	-	-	/
- <i>Oxyeletris marmorata</i> (Bleeker, 1852)	<u>Eng.</u> Marbled sleeper <u>Thai</u> Boo Sai (บูทราย)	/	/	/	-	/	-
<b>38. Fam. Gobiidae</b>							
- <i>Acentrogobius viganensis</i> (Steindachner)	<u>Eng.</u> Goby <u>Thai</u> Boo (บู)	/	/	/	/	/	/
<i>Acentrogobius viridipunctatus</i> (Valenciennes, 1837)	<u>Eng.</u> Spotted green goby <u>Thai</u> Boo Hua To (บูหัวโต)	/	-	/	-	/	-
- <i>Glossogobius aureus</i> Akihito and Meguro, 1975	<u>Eng.</u> Golden tank goby <u>Thai</u> Boo Thong (บูทอง)	-	-	-	-	-	/
- <i>Glossogobius biocellatus</i> (Valenciennes, 1837)	<u>Eng.</u> Goby <u>Thai</u> Boo Hin (บูหิน)	-	/	-	-	-	-

Table 4.2: Species of fish caught by push net and drift gill net (Cont.)

Family: Taxa	Common name	Canal 1		Canal 2		Canal 3	
		W	D	W	D	W	D
<b>38. Fam. Gobiidae (Cont.)</b>							
- <i>Glossogobius giuris</i> (Hamilton, 1822)	<u>Eng.</u> Gangetic tank goby <u>Thai</u> Boo Sai (บูทราย)	/	/	/	/	/	/
- <i>Mugilogobius chulae</i> (Smith, 1932)	<u>Eng.</u> Yellowstripe goby <u>Thai</u> Boo (บู)	-	/	-	/	-	/
- <i>Oxyurichthys microlepis</i> (Bleeker, 1849)	<u>Eng.</u> Maned goby <u>Thai</u> Boo Kled Lek (บูเกิ้ลี้ดเล็ก)	-	-	/	-	-	-
- <i>Pseudapocryptes lanceolatus</i> (Bloch and Schneider, 1801)	<u>Eng.</u> Goby <u>Thai</u> Khua (เขือ)	/	-	/	/	/	/
- <i>Gobiid sp.</i>	<u>Eng.</u> Goby <u>Thai</u> Boo (บู)	/	/	-	-	-	-
<b>39. Fam. Scatophagidae</b>							
- <i>Scatophagus argus</i> (Bloch, 1788)	<u>Eng.</u> Spotted scat <u>Thai</u> Ta krub (ตะกรับ)	/	/	/	/	/	/
<b>40. Fam. Siganidae</b>							
- <i>Siganus argenteus</i> (Quoy and Gaimard, 1825)	<u>Eng.</u> Silver spinefoot <u>Thai</u> Salidhin (สลิดหิน)	-	/	-	/	-	/
- <i>Siganus canaliculatus</i> (Park, 1797)	<u>Eng.</u> White-spotted spinefoot <u>Thai</u> Salidhin Judkhao (สลิดหินจูดขาว)	-	/	-	/	-	/
- <i>Siganus fuscescens</i> (Houltyun, 1782)	<u>Eng.</u> Black spinefoot <u>Thai</u> Salidhin (สลิดหิน)	-	/	-	/	-	/
- <i>Siganus guttatus</i> (Bloch, 1787)	<u>Eng.</u> Golden-spotted spinefoot <u>Thai</u> Salid Taledang (สลิดทะเลต่าง)	-	/	-	/	/	/
- <i>Siganus javus</i> (Linnaeus, 1766)	<u>Eng.</u> Streaked spinefoot <u>Thai</u> Salidhin Khaek (สลิดหินแขก)	-	/	-	/	-	/
- <i>Siganus vermiculatus</i> (Valenciennes, 1835)	<u>Eng.</u> Vermiculated spinefoot <u>Thai</u> Salid Tale Laikhao (สลิดทะเลลายขาว)	-	/	-	/	-	/

Table 4.2: Species of fish caught by push net and drift gill net (Cont.)

Family: Taxa	Common name	Canal 1		Canal 2		Canal 3	
		W	D	W	D	W	D
<b>40. Fam. Siganidae (Cont.)</b>							
- <i>Siganus virgatus</i> (Valenciennes, 1835)	<u>Eng.</u> Doublebarred spinefoot <u>Thai</u> Salid Tale Lai Namtan Khwang (สลิดทะเลขนน้ำตาลขวาง)	-	-	-	/	-	/
<b>41. Fam. Sphyrænaidae</b>							
- <i>Sphyræna putnamiae</i> Jordan and Seale, 1905	<u>Eng.</u> Sawtooth Barracuda <u>Thai</u> Namdok Mai (น้ำดอกไม้)	-	/	-	/	-	/
<b>42. Fam. Scombridae</b>							
- <i>Rastrelliger brachysoma</i> (Bleeker, 1851)	<u>Eng.</u> Short Mackerel <u>Thai</u> Too (ทู)	-	/	-	-	-	-
- <i>Rastrelliger sp.</i>	-	-	/	-	/	-	/
<b>43. Fam. Belontiidae</b>							
- <i>Trichogaster pectoralis</i> Regan, 1909	<u>Eng.</u> Snakeskin gourami <u>Thai</u> Salid (สลิด)	/	-	-	-	-	-
- <i>Trichogaster trichopterus</i> (Pallas, 1770)	<u>Eng.</u> Threespot gourami <u>Thai</u> Kradee Moh (กระดี่หม้อ)	/	-	-	-	-	-
<b>44. Fam. Channidae</b>							
- <i>Channa striata</i> (Bloch, 1795)	<u>Eng.</u> Chevron snakehead <u>Thai</u> Chon (ช้อน)	/	-	-	-	-	-
<b>45. Fam. Cynoglossidae</b>							
- <i>Cynoglossus cynoglossus</i> (Hamilton, 1822)	<u>Eng.</u> Gangetic tonguesole <u>Thai</u> Lin Mah (ลิ้นหมา)	/	/	/	/	/	/
<b>46. Fam. Triacanthidae</b>							
- <i>Tripodichthys oxycephalus</i> (Bleeker)	<u>Eng.</u> - <u>Thai</u> Wua (วัว)	-	/	-	-	-	-
<b>47. Fam. Tetraodontidae</b>							
- <i>Chelonodon biocellatus</i> (Tirant, 1885)	<u>Eng.</u> Eyespot pufferfish <u>Thai</u> Puk Pao Selon (ปักเป้าซีลอน)	/	-	-	-	-	-
- <i>Chonerhinos nefastus</i> Roberts, 1982	<u>Eng.</u> Greenbottle pufferfish <u>Thai</u> Puk Pao (ปักเป้า)	/	-	-	-	-	-

The results of the regression and correlation coefficient analysis showed that species number of fish had relationship with the environment of the canals including surface and bottom salinity, bottom DO, surface pH, concentration of surface  $\text{PO}_4^{3-}$  and zooplankton volume. At the same time, species number of fish comparing between seasons, tides and periods was significantly different when they were tested by ANOVA at 95 % confidential level.

Fish found from every canal were more abundant in dry season than in wet season. Total 62 species were found in wet season and 80 species were found in dry season. All 94 species of fish were collected during spring tide while 84 species were collected during neap tide. The 97 species of fish were collected at night while 79 species were collected during the day (Table 4.3).

Based on fishing gears used, 94 species of fish were caught by push net, of which 60 and 79 species were caught in wet and dry season, respectively. Only 25 species were caught by drift gill net, of which 22 and 18 species were caught in wet and dry season, respectively. In wet season, 16 species of all were caught by both fishing gears while 2 species of all were caught only by drift gill net. In dry season, 13 species of all were caught by both fishing gears while one species of all was caught only by drift gill net (Table4.3).

### **Weight**

Total weight of fish species collected by push net from Bangphra, Thaprik and Thaleuan Canal, in both seasons, were 16.37, 14.74 and 15.21 kg, respectively. Total weight of fish collected by drift gill net, in both seasons, were 13.48 kg from Bangphra, 9.47 kg from Thaprik and 6.75 kg from Thaleuan.

The catching throughout study period was 216 times by each fishing gear used and each time of the catch was about a half an hour. Therefore, the catch per unit of effort (CPUE), converting from total weight of fish caught, by push net was 0.15 kg/hr. from Bangphra, 0.14 kg/hr. from Thaprik and 0.14 kg/ hr from Thaleuan Canal. The CPUE by drift gill net was 0.12 kg/hr. from Bangphra, 0.09 kg/hr from Thaprik and 0.06 kg/hr from Thaleuan Canal.

Table 4.3: Occurrence and feeding behavior of fish found from the study sites

Station 1 = Downstream Station 2 = Midstream Station 3 = Upstream

W = wet season D = dry season Sp. spring tide Ne = neap tide

Gr.1 = Push net Gr.2 = Drift gill net /= Found - = Not found

Fish species	Feeding behavior	Station			Season		Tide		Period		Fishing gear	
		1	2	3	W	D	Sp.	Ne.	night	day	Gr.1	Gr.2
1. <i>Dasyatis fluviorum</i>	carnivore	-	-	/	-	/	/	-	/	-	/	-
2. <i>Notopterus notopterus</i>	omnivore	-	-	/	/	-	/	-	-	/	/	-
3. <i>Megalops cyprinoides</i>	carnivore	/	-	-	/	-	-	/	/	-	-	/
4. <i>Stolephorus chinensis</i>	omnivore	/	/	/	-	/	/	-	/	/	/	-
5. <i>Stolephorus dubiosus</i>	omnivore	/	/	/	/	/	/	/	/	/	/	-
6. <i>Stolephorus indicus</i>	carnivore	/	/	/	-	/	/	/	/	/	/	-
7. <i>Stolephorus insularis</i>	carnivore	/	/	/	-	/	/	/	/	/	/	-
8. <i>Stolephorus ronquilloi</i>	carnivore	/	/	/	-	/	/	/	/	/	/	-
9. <i>Thryssa hamiltonii</i>	carnivore	/	/	/	/	/	/	/	/	/	/	/
10. <i>Anodontostoma chacunda</i>	omnivore- detritivore	/	/	/	/	/	/	/	/	/	/	-
11. <i>Clupeichthys bleekeri</i>	omnivore	/	/	/	/	/	/	/	/	/	/	-
12. <i>Escualosa thoracata</i>	carnivore	/	/	/	/	/	/	/	/	/	/	-
13. <i>Sardinella albella</i>	carnivore	/	/	/	-	/	/	/	/	/	/	-
14. <i>Barbodes gonionotus</i>	omnivore	/	/	/	/	-	/	/	/	/	/	/
15. <i>Cyclocheilichthys apogon</i>	omnivore	/	/	/	/	-	/	/	/	/	/	/
16. <i>Hampala marolepidota</i>	carnivore	/	/	/	/	-	/	/	/	/	/	/
17. <i>Osteochilus hasselti</i>	herbivore	/	-	-	/	-	/	-	-	/	/	-
18. <i>Oxygaster anomalura</i>	carnivore	/	/	-	/	-	/	/	/	/	/	-
19. <i>Puntius brevis</i>	omnivore	/	/	/	/	-	/	/	/	/	/	-
20. <i>Rasbora dusonensis</i>	omnivore	/	/	-	/	-	/	/	/	/	/	-
21. <i>Rasbora paviei</i>	carnivore	/	/	/	/	/	/	/	/	/	/	-
22. <i>Systemus partipentosa</i>	carnivore- detritivore	-	-	/	/	-	/	-	-	/	/	-
23. <i>Leiocassis siamensis</i>	carnivore	/	-	-	/	-	-	/	-	/	/	-
24. <i>Mystus gulio</i>	carnivore	/	/	/	/	/	/	/	/	/	/	/
25. <i>Arius caelatus</i>	carnivore	/	-	-	/	-	/	-	/	-	/	-
26. <i>Arius sagor</i>	carnivore	/	-	-	-	/	-	/	-	/	/	-

Table 4.3: Occurrence and feeding behavior of fish found from the study sites (Cont.)

Fish species	Feeding behavior	Station			Season		Tide		Period		Fishing gear	
		1	2	3	W	D	Sp.	Ne.	night	day	Gr.1	Gr.2
27. <i>Arius venosus</i>	carnivore	/	-	-	-	/	/	/	/	-	/	-
28. <i>Plotosus canius</i>	carnivore	/	/	-	/	/	/	/	/	/	/	-
29. <i>Batrachomereus occidentalis</i>	carnivore	-	/	-	-	/	/	-	/	-	/	-
30. <i>Chelon dussumeri</i>	herbivore- detritivore-	/	/	/	/	/	/	/	/	/	/	/
31. <i>Chelon subviridis</i>	herbivore- detritivore-	/	/	/	/	/	/	/	/	/	/	/
32. <i>Moolgarda perusii</i>	herbivore- detritivore-	/	-	/	-	/	/	/	/	-	/	-
33. <i>Moolgarda seheli</i>	herbivore- detritivore-	/	/	/	-	/	/	/	/	/	/	-
34. <i>Atherinomorus duodecimalis</i>	carnivore	/	/	/	-	/	/	/	/	/	/	-
35. <i>Hypoatherina valenciennesi</i>	carnivore	/	/	/	-	/	/	/	/	/	/	-
36. <i>Neostethus lankesteri</i>	carnivore	/	/	/	/	/	/	/	/	/	/	-
37. <i>Strongylura strongylura</i>	carnivore	-	-	/	/	-	/	-	-	/	/	-
38. <i>Tylosurus crocodilus</i> <i>crocodilus</i>	carnivore	/	-	-	-	/	/	-	/	-	/	-
39. <i>Hyporhamphus limbatus</i>	carnivore	/	/	/	/	/	/	/	/	/	/	-
40. <i>Rhychorhamphus naga</i>	carnivore	/	-	-	/	-	/	-	-	/	-	/
41. <i>Zenarchopterus buffonis</i>	carnivore	/	/	/	/	/	/	/	/	/	/	-
42. <i>Zenarchopterus dunckeri</i>	carnivore	/	/	/	/	-	/	/	/	/	/	-
43. <i>Zenarchopterus ectuntio</i>	carnivore	/	/	/	/	/	/	/	/	/	/	-
44. <i>Syngnathoides biaculeatus</i>	omnivore	/	-	-	/	-	-	/	-	/	/	-
45. <i>Ophisternon bengalense</i>	carnivore	/	-	-	/	-	-	/	/	-	/	-
46. <i>Cociella crocodila</i>	carnivore	/	/	/	-	/	/	/	/	-	/	-
47. <i>Lates calcarifer</i>	carnivore	/	-	-	-	/	/	-	/	-	/	-
48. <i>Ambassis gymnocephalus</i>	omnivore	/	/	/	-	/	/	/	/	/	/	/
49. <i>Ambassis interruptus</i>	carnivore	/	/	/	/	-	/	/	/	/	/	/
50. <i>Ambassis kopsi</i>	carnivore	/	/	/	/	/	/	/	/	/	/	/
51. <i>Ambassis macracanthus</i>	carnivore	/	/	/	/	/	/	/	/	/	/	/
52. <i>Apogon hyalosoma</i>	omnivore	-	-	/	/	-	-	/	/	-	/	-



Table 4.3: Occurrence and feeding behavior of fish found from the study sites (Cont.)

Fish species	Feeding behavior	Station			Season		Tide		Period		Fishing gear	
		1	2	3	W	D	Sp.	Ne.	night	day	Gr.1	Gr.2
53. <i>Sillago sihama</i>	omnivore	/	/	-	-	/	/	/	/	-	/	-
54. <i>Echeneis naucrates</i>	Scavenger	/	-	-	-	/	/	-	/	-	/	-
55. <i>Alectis indicus</i>	carnivore	/	-	-	-	/	-	/	/	-	/	-
56. <i>Alepes djedaba</i>	carnivore	/	-	-	-	/	/	/	/	/	/	/
57. <i>Carangoides praeustus</i>	omnivore	/	/	/	-	/	/	/	/	/	/	-
58. <i>Caranx sexfasciatus</i>	carnivore	/	-	-	-	/	-	/	-	/	/	-
59. <i>Scomberoides lysan</i>	carnivore	/	/	/	/	/	/	/	/	/	/	/
60. <i>Leiognathus decorus</i>	omnivore	/	/	/	/	/	/	/	/	/	/	/
61. <i>Leiognathus equulus</i>	carnivore	/	/	/	-	/	/	/	/	/	/	-
62. <i>Secutor insidiator</i>	carnivore	/	/	/	-	/	/	/	/	/	/	-
63. <i>Secutor ruconius</i>	carnivore	/	/	/	-	/	/	/	/	/	/	-
64. <i>Lutjanus argentimaculatus</i>	carnivore	/	/	-	/	-	-	/	/	/	/	-
65. <i>Lutjanus johnii</i>	carnivore	/	/	/	-	/	/	/	/	/	/	-
66. <i>Lutjanus monostigma</i>	carnivore	/	/	-	-	/	/	-	/	/	/	/
67. <i>Lutjanus russelli</i>	carnivore	/	/	-	-	/	/	/	/	/	/	-
68. <i>Gerres filamentosus</i>	carnivore	/	/	/	/	/	/	/	/	/	/	/
69. <i>Gerres poieti</i>	carnivore	/	/	/	/	/	/	/	/	/	/	/
70. <i>Pomadasy kaakan</i>	carnivore	/	-	-	-	/	/	-	/	-	/	-
71. <i>Acanthopagrus berda</i>	carnivore	/	-	-	/	-	/	-	-	/	/	-
72. <i>Lethrinus semicinctus</i>	carnivore	/	/	-	-	/	/	-	/	-	/	-
73. <i>Eleutheronema tetradactylum</i>	carnivore	/	-	-	/	/	/	/	/	/	/	/
74. <i>Dendrophysa russelli</i>	carnivore	/	/	-	-	/	/	-	/	-	/	-
75. <i>Upeneus sulphureus</i>	carnivore	/	-	-	-	/	/	-	/	-	/	-
76. <i>Upeneus tragula</i>	carnivore	/	-	-	-	/	-	/	/	-	/	-
77. <i>Toxotes chatareus</i>	carnivore	/	/	/	/	-	/	/	/	/	/	/
78. <i>Pelates quadrilineatus</i>	carnivore	/	-	-	-	/	/	-	/	-	/	-
79. <i>Terapon jarbua</i>	carnivore	/	/	/	/	-	/	/	/	/	/	-
80. <i>Oreochromis mossambicus</i>	omnivore	/	/	/	/	/	/	/	/	/	/	-
81. <i>Butis butis</i>	carnivore	/	/	/	/	/	/	/	/	/	/	/
82. <i>Butis gymnopomus</i>	carnivore	-	-	/	/	-	-	/	-	/	/	-
83. <i>Butis koilomatodon</i>	carnivore	-	-	/	-	/	-	/	/	-	/	-

Table 4.3: Occurrence and feeding behavior of fish found from the study sites (Cont.)

Fish species	Feeding behavior	Station			Season		Tide		Period		Fishing gear	
		1	2	3	W	D	Sp.	Ne.	night	day	Gr.1	Gr.2
84. <i>Oxyeleotris marmorata</i>	carnivore	/	/	/	/	/	/	/	/	/	/	-
85. <i>Acentrogobius viganensis</i>	carnivore	/	/	/	/	/	/	/	/	/	/	/
86. <i>Acentrogobius viridipunctatus</i>	carnivore	/	/	-	/	-	/	/	/	/	/	-
87. <i>Glossogobius aureus</i>	carnivore	-	/	-	-	/	-	/	/	-	/	-
88. <i>Glossogobius biocellatus</i>	carnivore	-	-	/	-	/	/	-	/	-	/	-
89. <i>Glossogobius giuris</i>	carnivore	/	/	/	/	/	/	/	/	/	/	/
90. <i>Mugilogobius chulae</i>	carnivore	/	/	/	-	/	/	/	-	/	/	-
91. <i>Oxyurichthys microlepis</i>	carnivore	/	-	-	/	-	-	/	/	-	/	-
92. <i>Pseudapocryptes lanceolatus</i>	carnivore	/	/	/	/	/	/	/	/	/	/	/
93. <i>Gobiid sp.</i>	carnivore	/	-	-	/	/	/	-	/	-	/	-
94. <i>Scatophagus argus</i>	omnivore- detritivore	/	/	/	/	/	/	/	/	/	/	-
95. <i>Siganus argenteus</i>	herbivore	/	/	/	-	/	-	/	/	/	/	-
96. <i>Siganus canaluculatus</i>	herbivore	/	/	/	-	/	/	/	/	/	/	-
97. <i>Siganus fuscescens</i>	herbivore	/	/	/	-	/	-	/	/	/	/	-
98. <i>Siganus guttatus</i>	herbivore	/	/	/	/	/	/	/	/	/	/	/
99. <i>Siganus javus</i>	herbivore	/	/	/	-	/	/	/	/	/	/	-
100. <i>Siganus vermiculatus</i>	herbivore	/	/	/	-	/	/	/	/	/	/	-
101. <i>Siganus virgatus</i>	herbivore	/	-	/	-	/	/	/	/	-	/	-
102. <i>Sphyaena putnamiae</i>	carnivore	/	-	/	-	/	/	/	/	/	/	-
103. <i>Rastrelliger brachysoma</i>	omnivore	/	-	/	-	/	/	-	/	-	/	-
104. <i>Rastrelliger sp.</i>	omnivore	/	/	/	-	/	/	/	/	-	/	-
105. <i>Trichogaster pectoralis</i>	omnivore	-	-	/	/	-	/	-	/	-	/	-
106. <i>Trichogaster trichopterus</i>	carnivore	-	-	/	/	-	-	/	/	-	/	-
107. <i>Channa striata</i>	carnivore	-	-	/	/	-	/	-	-	/	/	-
108. <i>Cynoglossus cynoglossus</i>	carnivore	/	-	/	/	/	/	-	/	-	/	-
109. <i>Tripodichthys oxycephalus</i>	carnivore	/	-	-	-	/	/	-	/	-	/	-
110. <i>Chelonodon biocellatus</i>	omnivore	-	-	/	/	-	/	-	/	/	/	-
111. <i>Chonerhinos nefastus</i>	carnivore	-	/	-	/	-	/	/	-	/	/	-

In wet season, total weight of fish collected by push net from Bangphra, Thaprik and Thaleuan was 10.89, 8.77 and 9.54 kg, respectively and was 5.48 kg from Bangphra, 5.97 kg from Thaprik and 5.68 kg from Thaleuan in dry season. The CPUE by push net in wet season was 0.10 kg/hr. from Bangphra, 0.08 kg/hr. from Thaprik and 0.09 kg/hr. In dry season, the CPUE by push net was 0.05 kg/hr. from Bangphra, 0.06 kg/hr. from Thaprik and 0.05 kg/hr/ from Thaleuan.

Total weight of fish collected by drift gill net from Bangphra, Thaprik and Thaleuan was 7.66, 5.12 and 3.10 kg, respectively in wet season and was 5.82 kg from Bangphra, 4.36 kg from Thaprik and 3.69 kg from Thaleuan in dry season. The CPUE by drift gill net in wet season was 0.07 kg/hr. from Bangphra, 0.05 kg/hr. from Thaprik and 0.03 kg/hr. In dry season, the CPUE by drift gill net was 0.05 kg/hr. from Bangphra, 0.04 kg/hr. from Thaprik and 0.03 kg/hr/ from Thaleuan.

Total weight of fish collected by push net from 3 canals in both seasons was not different. However, total weight of fish collected by drift gill net in both seasons comparing between Bangphra and Thaprik Canal, Bangphra and Thaleuan Canal, and Thaprik and Thaleuan Canal was significantly different ( $P < 0.05$ ). Meanwhile, weight of fish collected by each fishing gear throughout the study period was greater in wet season than in dry season but there was no difference between tides and periods. Meanwhile weight of fish collected by each fishing gear was the greatest at station 1 and the lowest at station 3 of each canal.

### **Species diversity and dominance index**

The highest value of species diversity index of fish was 2.54 in wet season and 3.10 in dry season at Bangphra Canal. The next was Thaprik Canal of which the value of species diversity index was 2.41 in wet season and 3.02 in dry season. Thaleuan Canal had the lowest value of 2.24 and 2.83 in wet and dry season, respectively.

In contrast, the highest value of dominance index of fish species was 0.18 in wet season and 0.12 in dry season at Thaleuan Canal. The next was at Thaprik Canal, of which the dominance index was 0.15 in wet season and 0.08 in dry season. The dominance index of Bangphra Canal was the lowest. It was 0.12 in wet season and 0.07 in dry season (Figure 4.25).

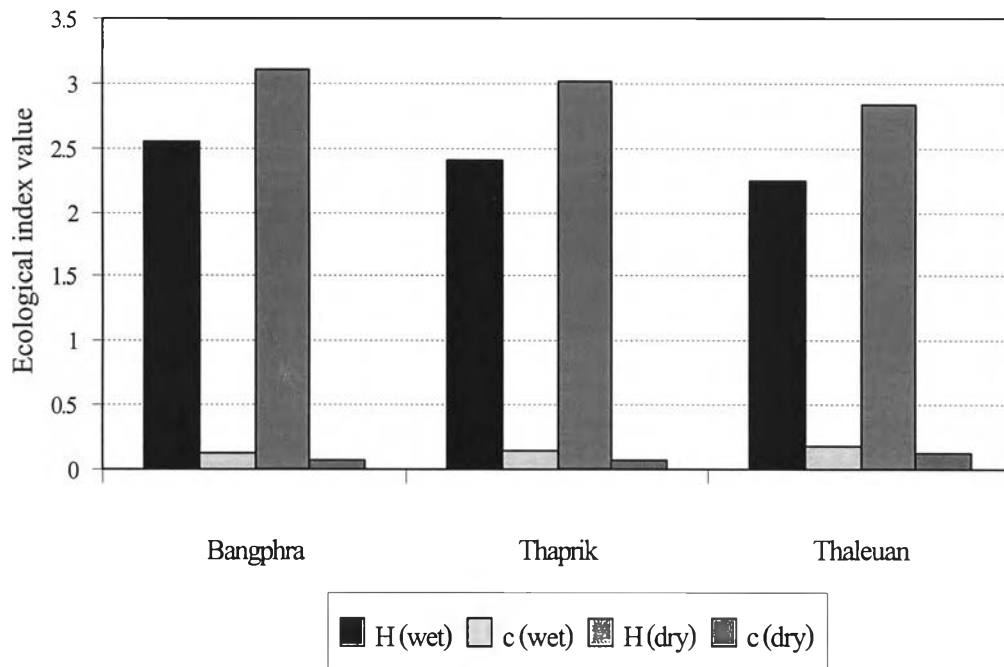


Figure 4.25: Species diversity and dominance index value of fish found from 3 canals

At Bangphra canal, the value of species diversity index was the highest at station 2, 2.44, and the lowest at station 3, 2.19, in wet season while the highest value was 2.88 at station 3 and the lowest was 2.81 at station 1 in dry season. At the same time, the highest dominance index value of Bangphra Canal was 0.20 at station 3 and the lowest was 0.13 at station 2 in wet season while the highest was 0.11 at station 2 and the lowest was 0.07 at station 3 in dry season (Figure 4.26)

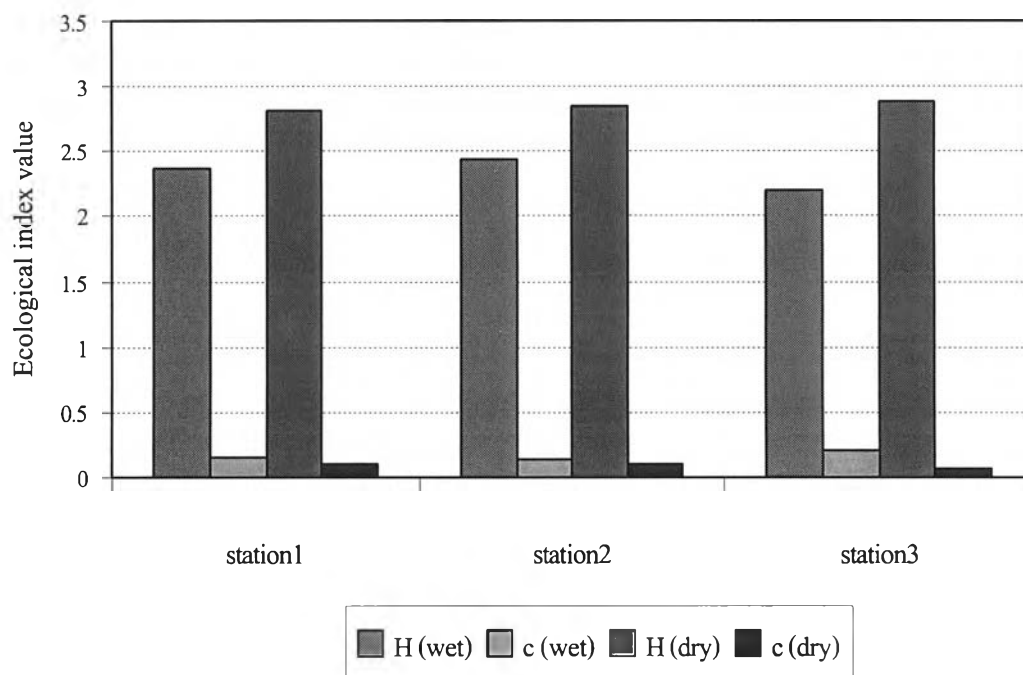


Figure 4.26: Species diversity and dominance index value of fish found from 3 station of Bangphra canal

Thaprik Canal had the highest value of species diversity index, 2.33, at station 3 and the lowest, 2.22, at station 2 in wet season while the highest value was 2.93 at station 1 and the lowest value was 2.62 at station 3 in dry season.

Meanwhile, the highest dominance index value was 0.18 at station 1 and the lowest was 0.13 at station 3 in wet season while the highest was 0.14 at station 3 and the lowest was 0.08 at station 1 in dry season (Figure 4.27)

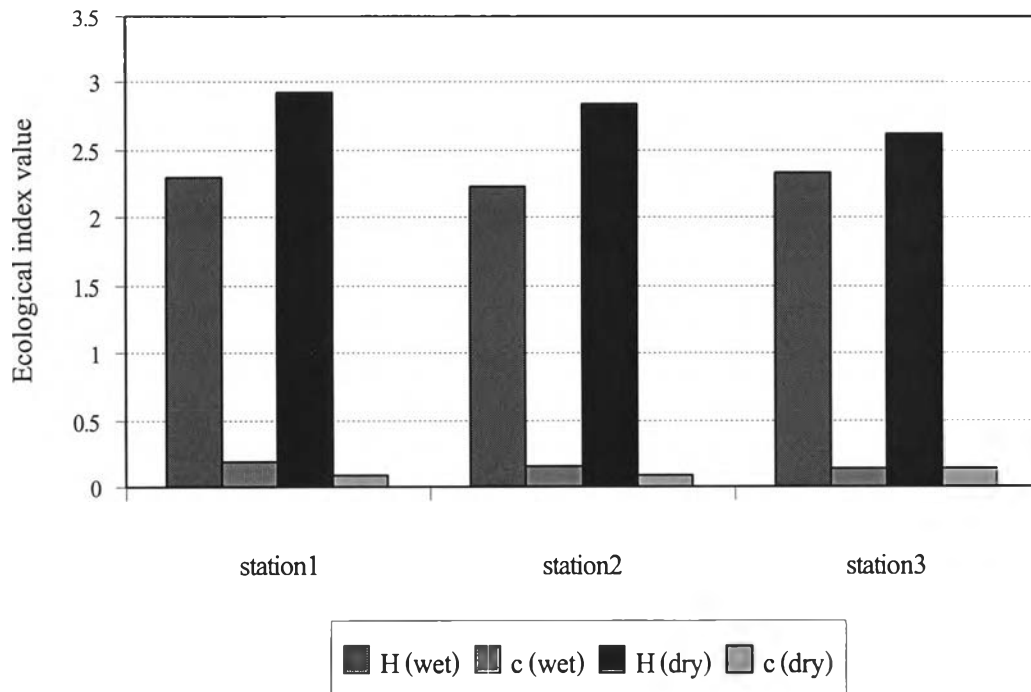


Figure 4.27: Species diversity and dominance index value of fish found from 3 station of Thaprik canal

Thaleuan Canal had the highest species diversity index value, 2.25, at station 2 and the lowest value, 2.01, at station 1 in wet season while in dry season the highest value was 2.80 at station1 and the lowest was 2.50 at station 2.

At the same time, the highest dominance index value of Thaleuan Canal was 0.23 at station 1 and the lowest was 0.15 at station 3 in wet season while the highest was 0.16 at station 2 and the lowest was 0.10 at station 3 in dry season (Figure 4.28).

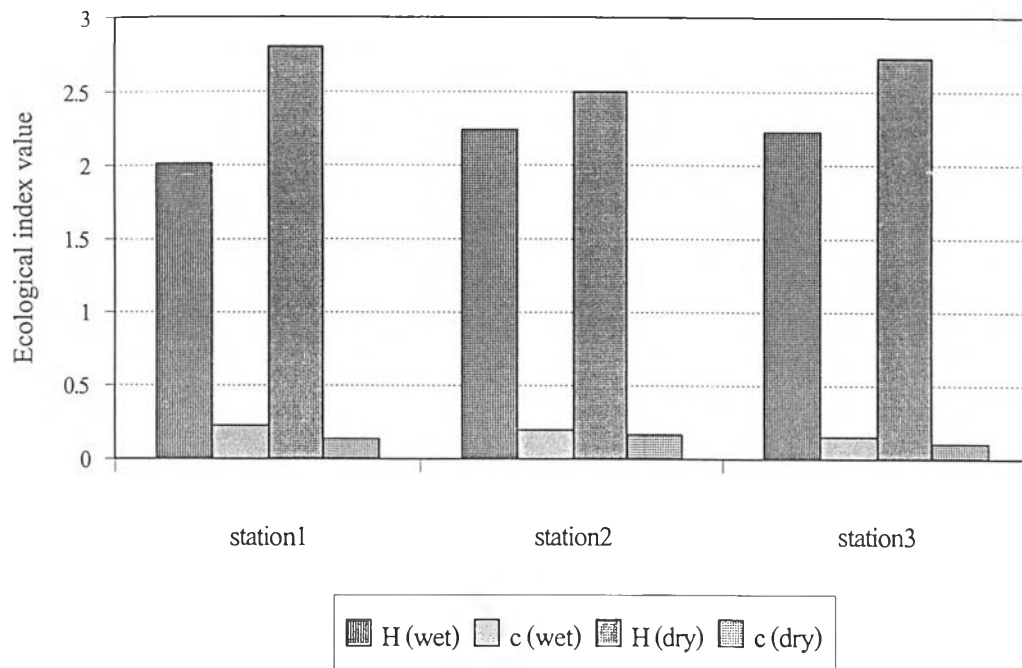


Figure 4.28: Species diversity and dominance index value of fish found from 3 station of Thaleuan canal

**Similarity index**

The value of similarity index of fish of 3 sites, Bangphra:Thaprik:Thaleuan Canal, was 0.443 in wet season and 0.524 in dry season. In wet season, the value of similarity index between Bangphra:Thaprik, Bangphra:Thaleuan and Thaprik:Thaleuan was 0.710, 0.733 and 0.810, while it was 0.846, 0.806 and 0.852, respectively in dry season (Figure 4.29).

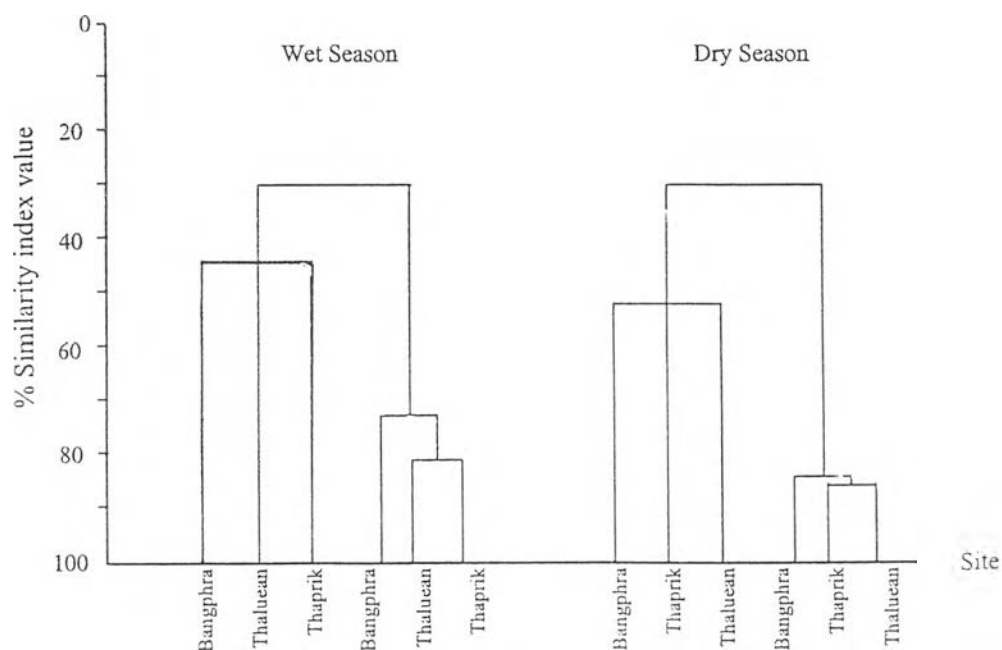


Figure 4.29: Dendrogram showing % similarity index value of fish of 3 canals in each season

The highest similarity index value between stations of Bangphra Canal was 0.754 at station 1:station 2 in wet season and 0.710 at station 2:station 3 in dry season. The lowest value was 0.384 and 0.357 at station 1:station 2:station 3 in wet and dry seasons, respectively. The highest value of similarity index between stations of Thaprik Canal was 0.754 and 0.809 at station 1:station 2 in wet and dry season, respectively. The lowest value was 0.370 and 0.397 at station 1:station 2:station: 3 in wet and dry season, respectively.

The highest value of similarity index value between stations of Thaleuan Canal was 0.825 at station 1:station 2 in wet season and 0.789 at station 2:station 3 in dry season. The lowest value was 0.452 and 0.412 at station 1:station 2:station 3 in wet and dry season, respectively (Table4.3 and Figure 4.30).

Table 4.4: Similarity index value of fish comparing between stations of each canal in each season

Comparison	Similarity index value	
	Wet season	Dry season
<b>Bangphra Canal</b>		
station 1:station 2	0.754	0.688
station 1:station 3	0.588	0.629
station 2:station 3	0.656	0.710
Station 1:station 2:station 3	0.384	0.357
<b>Thaprik Canal</b>		
station 1:station 2	0.754	0.809
station 1:station 3	0.596	0.674
station 2:station 3	0.682	0.727
Station 1:station 2:station 3	0.370	0.397
<b>Thaleuan Canal</b>		
station 1:station 2	0.825	0.696
station 1:station 3	0.679	0.681
station 2:station 3	0.816	0.789
station 1:station 2:station 3	0.452	0.412

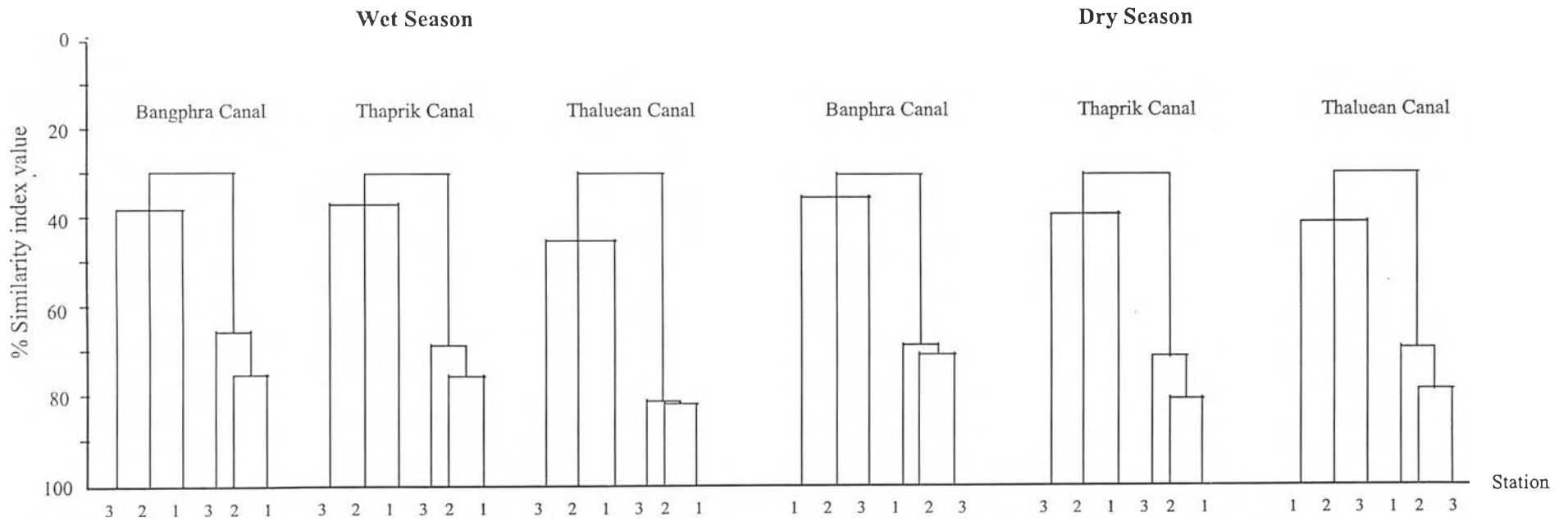


Figure4.30 : Dendrograms showing % similarity index value of fish comparing between stations in each study site in each season



## 4.4 Coastal fisherfolks

### Socio-economics

Ninety-one households equivalent to 15 % of all 599 households from 7 sub-districts of coastal fisherfolks at Trat Bay were interviewed. They were 38 from 250 households of Laemklad, 7 from 45 households of Chamrak, 1 from 9 households of Takang, 9 from 60 household of Thaprik, 23 from 152 households of Nong Khansong, 4 from 25 households of Nong Samed and 9 from 58 households of Wang Krajae (Table 4.5).

The 52.7 % of 91 households had 4-5 members per family and 30.8 % had more than five members per family. Most of them, 62.6 % of fisherfolks were more than 35 years old and as a result of 57.1 % of all had more than 10 years of fishing experience. From fishing, 40.6 % of local fisherfolks earned 1,000-5,000 baht per month while 31.9 % and 27.5 % earned about 5,100-10,000 and more than 10,000 baht, respectively (Table 4.5).

### Coastal fishery

Main types of fishing gear used in 7 sub-districts at Trat Bay comprised 29.7 % of bottom gill net (crab net), 28.6 % of push net, 23.1 % of fish and crab trap, 14.3 % of trawl, 8.8 % of drift gill net and 13.2 % of others. The common fishing gears used by fisherfolks in sub-district of Laeamklad were trawl and bottom gill net. Push net was used mostly in sub-district of Chamrak, Takang, Thaprik, Nong Khansong and Wang Krajae. Bottom gill net and fish and crap trap were the next popular fishing gears used in Nong Samed, Nong Khansong and Wang Krajae sub-district.

Most of fisherfolks spent 8-12 hours a day and 20-25 days a month for fishing. Those who used trawl, fish and crap trap and others spent 10-19, 26-30 and 20-30 days per month for fishing, respectively (Table 4.6). The catch of coastal fisheries depended on the types of fishing gear used. Push net could catch 6-30 kg of shrimp, 1-5 kg of crabmeat after taken out of the shell and 1-30 kg of fish per day.

Trawl could catch more than 30 kg of fish, 6-15 kg of shrimp and 1-15 of crabmeat per day. Bottom gill net could catch 1-5 kg of fish and crabmeat per day while 1-5 kg of shrimp, fish and crabmeat were caught per day by fish and crab trap (Table 4.7).

From the interview, 96 % of fisherfolks pointed out that the quantity of catch in Trat Bay was decreasing from the past. However, 57 % of them thought that the species composition of the catch was still the same as in the past, while 42 % indicated that species diversity of the catch was lower than the past (Table 4.8). The 18.7 % of local fisherfolks thought that there was an increase in the number of fisherfolks and it was the main cause of decline of the catch, while 15.4 % believed that it was due to the operation of trawl and push net. Besides, 12.1 % indicated that it was the result from the increasing of fisherfolks, the trawl and push net. Another 12.1 % pointed out that the decrease of the catch was a result of an increasing of fisherfolks and wastewater discharged from coastal shrimp farms (Table 4.9).

#### **Mangrove related to coastal fishery**

The 75 % of coastal fisherfolks believed the mangrove was useful for their coastal fishing. Mangrove was as the shelter, nursery, breeding and feeding ground of coastal species. On the contrary, 25 % thought that mangrove was not useful for their fishing because they could not see the relationship between mangrove and fishery. Some of them said that coastal mangrove obstructed their fishing. All most all, 93 %, noticed that the present condition of mangrove was poorer than in the past. They, 59 %, thought that the main cause of mangrove deterioration was shrimp farming, 20 % believed that it was from shrimp farming and charcoal production. Meanwhile, 7 % thought that it was from shrimp farming and expansion of urban and built up area (Table 4.10).

Table 4.5: General data of coastal fisherfolks in 7 sub-districts of Trat Bay, 1998

Sub-district	Number of household	Number of member (persons/household)			Number of fisherfolks (persons/household)			Age of fisherfolks (years)			Fishery experience (years)			Fishery income (baht/month/household)		
		1-3	4-5	>5	1-2	3-4	>4	15-25	26-35	>35	1-5	6-10	>10	1,000-5,000	5,100-10,000	>10,000
Laemklad	38	2	16	20	34	3	1	3	9	26	9	10	19	17	12	9
Chamrak	7	0	6	1	7	0	0	1	5	1	0	4	3	3	2	2
Takang	1	0	1	0	1	0	0	0	0	1	0	0	1	1	0	0
Thaprik	9	3	5	1	8	1	0	1	2	6	1	2	6	3	4	2
Nong Khansong	23	8	12	3	19	2	2	2	7	14	7	1	15	12	3	8
Nong Samed	4	1	3	0	3	1	0	0	1	3	1	0	3	1	3	0
Wang Krajae	9	1	5	3	8	1	0	1	2	6	2	2	5	0	5	4
Total	91	15	48	28	80	8	3	8	26	57	20	19	52	37	29	25
Percent (%)	100	16.5	52.7	30.8	87.9	8.8	3.3	8.8	28.6	62.6	22	20.9	57.1	40.6	31.9	27.5

Table 4.6: Time used in catching and major fishing gears used by coastal fisherfolks in 7 sub-districts of Trat Bay

Others\* = Other fishing gears used, such as surrounding net, lift net, cast net, bamboo stake trap, handline and longline

Sub-district	Push net						Drift gill net						bottom gill net						Trawl						Fish and crab trap						Others*					
	Hours/Day			Days/Month			Hours/Day			Days/Month			Hours/Day			Days/Month			Hours/Day			Days/Month			Hours/Day			Days/Month			Hours/Day			Days/Month		
	3-7	8-12	13-15	10-19	20-25	26-30	3-7	8-12	13-15	10-19	20-25	26-30	3-7	8-12	13-15	10-19	20-25	26-30	3-7	8-12	13-15	10-19	20-25	26-30	3-7	8-12	13-15	10-19	20-25	26-30	3-7	8-12	13-15	10-19	20-25	26-30
Laemklad	0	0	0	0	0	0	2	3	0	1	4	0	7	13	0	4	7	9	0	12	1	7	4	2	2	2	0	1	1	2	0	3	0	0	1	2
Chamrak	1	3	2	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0
Takang	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thaprik	0	7	0	3	4	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	1	0	0	0	0	0	0
Nong Khansong	0	7	0	4	3	0	1	0	0	1	0	0	0	4	3	1	5	1	0	0	0	0	0	0	2	4	0	2	3	1	3	2	0	0	2	3
Nong Samed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	2	1	0	0	2	0	0	2	0
Wang Krajae	1	4	0	1	2	2	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	1	4	2	0	0	2	0	0
Total	2	22	3	11	13	2	4	4	0	3	4	1	7	17	3	5	12	10	0	12	1	7	4	2	4	16	1	6	6	9	5	7	0	2	5	5
Percent (%)	28.6						8.8						29.7						14.3						23.1						13.2					
Max.Frequency	8-12 Hours/Day						8-12 Hours/Day						8-12 Hours/Day						8-12 Hours/Day						8-12 Hours/Day						8-12 Hours/Day					
Max.Frequency	20-25 Days/Month						20-25 Days/Month						20-25 Days/Month						10-19 Days/Month						26-30 Days/Month						20-30 Days/Month					

(Total of 91 households)

Table 4.7: The catch by various fishing gears used of coastal fisherfolks at Trat Bay

Other aquatic animals\* = Shrimp paste, lobster, shellfish and squid      Other gears\* = lift net, cast net and etc.

Fishing gear	Shrimp (kg/day)				Crab meat (kg/day)				Fish (kg/day)				Other aquatic animals*			
	1-5	6-15	16-30	>30	1-5	6-15	16-30	>30	1-5	6-15	16-30	>30	1-5	6-15	16-30	>30
Push net	2	10	11	2	9	4	0	0	3	3	3	8	5	0	0	0
Drift gill net	2	0	0	0	0	0	0	0	5	0	2	1	0	0	0	0
Bottom gill net	0	0	0	0	20	5	2	0	2	0	0	0	8	1	0	0
Fish and Crab trap	5	1	0	0	8	6	1	0	5	0	0	0	7	0	0	0
Trawl	3	6	3	1	2	2	0	0	1	0	2	4	0	0	0	0
Surrounding net	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
Bamboo stake net	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Hand and longlines	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0
Other gears*	1	0	0	0	2	0	0	1	2	0	0	2	0	0	0	2
Total	13	17	14	3	41	17	3	1	19	4	7	19	21	1	0	3

(Total of 91 households)

Table 4.8: Attitude of coastal fisherfolks on the richness of the catch comparing between the past

And at present

Sub-district	Species of aquatic animals			Quantity of aquatic animals		
	present > past	present < past	present ~ past	present > past	present < past	present ~ past
Laemklad	1	23	14	1	36	1
Chamrak	0	1	6	0	7	0
Takang	0	0	1	0	1	0
Thaprik	0	3	6	0	9	0
Nong Khansong	0	2	21	0	23	0
Nong Samed	0	2	2	0	4	0
Wang Krajae	0	7	2	0	7	2
Total	1	38	52	1	87	3
Percent (%)	1	42	57	1	96	3

(Total of 91 households)

Table 4.9: Attitude of coastal fisherfolks on the causes of decreasing catch of aquatic animals at Trat Bay

- One household of fisherfolks thought that the catch at present was more than in the past

- Three households of fisherfolks thought that the catch at present was the same as in the past

1 = The increasing of fisherfolks    2 = The operation of push net and trawl    3 = The polluted water discharged from shrimp farms

4 = The mangrove deterioration    5 = The modern fishery technology    6 = The fishing in breeding season of aquatic animals

Sub-district	The causes of decreasing of aquatic animals																	
	1	2	3	4	1+2	1+3	1+4	1+5	2+3	3+4	1+2+3	1+2+5	1+3+4	1+3+5	2+3+4	2+3+6	1+2+3+4	1+2+3+5
Laemklad	5	8	2	0	7	0	1	1	1	1	4	1	0	0	1	0	4	0
Chamrak	1	0	2	0	0	3	0	0	0	0	0	0	0	0	0	1	0	0
Takang	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Thaprik	2	0	0	0	0	3	0	1	0	0	0	0	1	1	0	0	0	0
Nong Khansong	5	5	2	1	2	4	0	1	1	0	0	0	2	0	0	0	0	0
Nong Samed	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	0	0
Wang Krajae	4	1	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1
Total	17	14	6	1	11	11	2	3	2	1	6	1	3	1	2	1	4	1
Percent (%)	18.70	15.40	6.60	1.10	12.10	12.10	2.20	3.30	2.20	1.10	6.60	1.10	3.30	1.10	2.20	1.10	4.40	1.10

(Total of 91 households)

Table 4.10: Attitude of coastal fisherfolks on the situation of mangrove at Trat Bay

1 = Residential area    2 = Nursery ground    3 = Breeding area    4 = Feeding area    5 = Shelter area    6 = Waste absorption area  
 7 = No have relationship    8 = Fishery obstruction    9 = Shrimp farming    10 = Construction of residence and building    11 = Chacoal production

Sub-district	Advantage of mangrove														Disadvantage of mangrove		Mangrove condition (present:past)		The causes of mangrove deterioration						
	1	2	3	4	5	6	1+2	1+3	1+4	1+5	2+3	3+4	1+3+5	1+2+3+4+5	7	8	Not change	Deterioration	9	10	11	9+10	9+11	10+11	9+10+11
Laemklad	5	8	1	1	0	1	2	2	1	0	2	2	1	2	10	0	1	37	26	2	0	5	2	0	2
Chamrak	3	1	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	7	3	0	1	0	2	0	1
Takang	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0
Thaprik	4	1	2	0	0	0	0	1	0	0	0	0	0	0	1	0	1	8	4	0	1	0	2	0	1
Nong Khansong	6	0	3	0	0	0	0	2	1	1	0	0	0	0	9	1	4	19	14	1	0	1	2	0	1
Nong Samed	2	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	4	0	0	0	0	4	0	0
Wang Krajae	2	0	3	0	1	0	0	3	0	0	0	0	0	0	0	0	0	9	3	0	1	0	4	1	0
Total	22	10	9	1	1	1	3	9	3	1	2	3	1	2	21	2	6	85	50	3	3	6	17	1	5
Sum	68														23		6	85	50	3	3	6	17	1	5
Percent (%)	75														25		7	93	59	3.5	3.5	7	20	1	6

( Total of 91 households)