A preliminary taxonomic checklist of Zooplankton in the Karnaphuli River Estuary

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ABSTRACT
The present study was conducted to identify phytoplankton occurrence in 6 sites (15 No Jetty, Marine Fisheries Academy, Bridge Ghat, Nazirchar, Halda Mouth and Karnaphuli River above Halda’s Confluence) from the Karnaphuli River Estuary. In the investigation, a total of 25 major taxa were identified under Arthropoda (19 order), Cnidaria (2 order), Chaetognatha (1 order), Porifera (1 order), Ciliophora (1 order), Mollusca (1 order). Further 6 genus of cladocera were also identified, namely: Daphnia, Bosmina, Diaphanosoma, Moina, Ilyocryptus and Penilia. The highest peak of zooplankton during monsoon and pre-monsoon season were 423.54 indivs/m³ and 437.39 indivs/m³ at same site near Karnaphuli River above Halda’s confluence. Whereas, during post-monsoon highest 654.40 indivs/m³ zooplankton were recorded at Nazirchar site between the sites. During monsoon, post-monsoon and pre-monsoon seasons maximum 15, 17 and 19 major taxa were identified from Karnaphuli River above Halda’s confluence, near Nazirchar and Marine Fisheries Academy sites respectively.

Key words: Preliminary, Taxonomic, Checklist, Zooplankton, Karnaphuli River-Estuary
1. INTRODUCTION
Zooplankton is the heterotrophic drifting aquatic fauna in oceans, seas, and other water bodies. Most of them are usually tiny, few are large and some are detectible with the naked eyes (https://en.wikipedia.org/wiki/Zooplankton). Zooplankton plays a very significant role in the upper stages of the food chain as it is the primary or main food choice of many organisms (Taylor et al. 2002). Most of the zooplankton holds short life cycle and its community structure is capable to reveal real-time scenario as it is less enforced by the constancy of individuals from forgoing years (Richardson, 2008). Many of them are well recognized as the best indicators of environmental changes (Sipkay et al. 2009). Zooplankton is now subjected to the affect by global change phenomenon. The diverse type of long-term result of global changes, events on zooplankton community, might have deep and wide profound impacts.

Bagirov (1989) reported almost 200 zooplankton taxa in the northern Caspian Sea with 70 taxa of Protista, 50 taxa of Rotatoria, 30 taxa of Cladocera, and 20 taxa of Copepoda. Hossieni et al. (1998) recorded 36 taxa of zooplankton community including Cladocera (24 taxa), Copepoda (7 taxa), and meroplankton (2 taxa) along the Iranian coastal area of the Caspian Sea while Sabkara et al. (2011) reported over 50 zooplankton taxa.

The taxonomic baseline information is often lacking, so it becomes difficult to forecast how environmental changes affect species, communities and the stability of the affected ecosystems (Danielsen, 1997; Fjeldsa and Lovett, 1997; Gray, 2001; Piraino et al., 2002). This lacking of information about community and species diversity of each geographic area must be filled up that could be vital for designing new scientific programmers’ (Agosti and Johnson, 2002; Godfray, 2002). The present study will be a preliminary baseline for zooplankton study in the Karnaphuli River.

2. MATERIALS AND METHODS
Study Area
Zooplankton occurrences and distribution was studied from six sites in the Karnaphuli River. The sampling sites count started from the Karnaphuli River mouth towards upstream. The sampling positions are site-1, site-2, site-3, site-4, site-5 and site-6 are locally named as Jetty No. 15, Marine Fisheries Academy, Bridge Ghat, Nazirchar, Halda Mouth and Karnaphuli River above Halda’s Confluence respectively (Map 1). The salinity, temperature, pH, DO, TDS were recorded during the investigation.

Map 1 The sampling sites in the Karnaphuli River on Google map
Collection
Zooplankton samples were collected from the subsurface water using a zooplankton net of 300 μm mesh during the monsoon, post-monsoon and pre-monsoon season. A flow meter was attached at the mouth of the net. Weight was attached as required to keep the net at subsurface level while towing. The net was towed for about 15 minutes and the samples were kept in a labeled container for identification. The collected samples were immediately preserved in 70% ethanol and transferred to the laboratory for analysis.

Staining and sorting
The collected samples were stained with rose Bengal for efficient sorting and left for overnight. All the zooplankton rendered pink color that made the sorting effortless. The stained plankton was sorted out from debris with fine brush, needle, forceps and a magnifying glass. The sorted organisms were preserved in 70% ethanol again for identification.

Identification and counting
The sorted organisms were brought under microscope and identified following Mizuno (1976); Yamazi (1952, 1955, 1972, 1974); Pennak (1978); Davis (1955); APHA (1975); Santham and Srinivasan (1994); Newell and Newell (1973,1979); Sterrer (1986); Parsons et al. (1985); Mahmood (1990); Pinkin et al.(1977); Wickstead (1965); Suess (1982); Rahman (1977); Ahmed (1984); Islam (1982); Elias (1983); Ahmed (1983); Zafar (1986); Mohi (1977) etc.

3. RESULTS AND DISCUSSION
The taxonomic checklist of zooplankton along with their occurrence and distribution in the Kamaphuli River was studied. Over-all 25 major taxa of zooplankton were identified belonging from phylum Arthropoda (19 order), Cnidaria (2 order), Chaetognatha (1 order), Porifera (1 order), Ciliophora (1 order) and Mollusca (1 order). Further, 6 genus of cladocera namely Daphnia, Bosmina, Diaphanosoma, Moina, Ilyocryptus and Penilia were also identified. Again 3 Sub-order of copepod namely Calanoida, Cyclopoidea and Harpacticoida were record in the investigation. The occurrence and distribution of zooplankton major taxa are shown (Table 1).

Table 1
Table showing seasonal (monsoon, post-monsoon and pre-monsoon) zooplankton major taxa (Indivs/m³) occurrence at the Kamaphuli River sites
The highest peak of zooplankton during monsoon and pre-monsoon season were 423.54 indivs/m$^3$ and 437.39 indivs/m$^3$ at site 6 (the Karnaphuli River above Halda’s Confluence). Whereas, during post-monsoon highest 654.40 indivs/m$^3$ were recorded at site 4 (beside Nazirchar). During monsoon, post-monsoon and pre-monsoon seasons maximum 15, 17 and 19 major taxa were identified from site 6 (the Karnaphuli River above Halda’s confluence), site 4 (near Nazirchar) and site 2 (near Marine Fisheries Academy) respectively.

Copepoda was recorded as dominating in all sites in three sampling seasons. Cladocera, copepoda, crab zoea, Caridean shrimp larvae and fish larvae were most common in the study area round the year. Acetes, Isopoda, Lucifer, Sagitta, Penaidae and Caridean shrimp larvae were identical at site 1 and site 2 near the Karnaphuli River mouth sites. On the other hand site 4, site 5 and site 6 were abundant in compare to other sites. The taxonomic classification of zooplankton is presented with reference to photograph (photographic plates 1, 2, 3 & 4).

### Taxonomic checklist of Zooplankton and photograph in photo plates

**Phylum: Arthropoda**

**Class: Crustacea**

**Sub-class: Branchiopoda**

**Order: Cladocera**

**Family: Daphnidae**

*Genus: Daphnia* (PL. 1 & Fig.14)

**Family: Bosminidae**

*Genus: Bosmina* (PL. 1 Fig. 11 & 13)

**Family: Moinidae**

*Genus: Moina* (PL. 1 Fig. 17)

**Family: Holopedidae**

*Genus: Diaphanosoma* (PL. 1 Fig. 9, 15)

**Family: Macrothricidae**

*Genus: Ilyocryptus* (PL. 1 Fig. 16, 18)

**Family: Sididae**

*Genus: Penilia* (PL. 4 Fig. 12)
Order: Copepoda

Sub-order: Calanoida (PL. 1 Fig. 1, 2, 3, 5 & 8)

Sub-order: Cyclopoida (PL. 1 Fig. 4, 6)

Sub-order: Harpacticoida (PL. 1 Fig. 7, 12)

Order: Isopoda

Sub-order: Anthuridea: (PL. 2 Fig. 7 & 8)

Sub-order: Flabellifera: (PL. 4 Fig. 9)

Order: Ostracoda (PL. 4 Fig. 2)

Order: Amphipoda (PL. 4 Fig. 6, 7, 8)

Order: Mysidacea (PL. 2 Fig. 6)

Order: Cumacea (PL. 3 Fig. 6)

Order: Tanaidacea

Family: Tanaidae (PL. 2 Fig. 13) & (PL. 4 Fig. 11)

Order: Decapoda

Class: Malacostraca

Order: Decapoda

Family: Sergestidae

Genus: Acetes (PL. 3 Fig. 10)

Sub-order: Dendrobranchiata

Family: Luciferidae

Genus: Lucifer (PL. 2 Fig. 1) & (PL. 3 Fig. 11)

Suborder: Dendrobranchiata

Family: Penaeidae (PL. 2 Fig. 2, 3, 4)

Family: Carideans (PL. 2 Fig. 3)

Order: Stomatopoda

Family: Squillidae

Genus: Alima (PL. 4 Fig. 5)

Class: Insecta

Order: Diptera (PL. 3 Fig. 13)

Subclass: Pterygota
Order: Odonata (PL. 1 Fig. 19)

Order: Coleoptera

Family: Carabidae

Genus: Brachinus (PL. 2 Fig. 9, 10; PL. 3 Fig. 4; PL. 4 Fig. 10)

Class: Arachnida

Subclass: Acari (PL. 3 Fig. 7 & 8)

Class: Maxillopoda

Order: Sessilia

Suborder: Balanomorpha

Family: Balanidae

Genus: Balanus (PL. 3 Fig. 3)

Phylum: Cnidaria

Class: Hydrozoa

Order: Hydroida (PL. 4 Fig. 3)

Order: Hydromedusae (PL. 3 Fig. 2)

Phylum: Chaetognatha

Class: Sagittoidea

Order: Aphragmophora

Family: Sagittidae

Genus: Sagitta (PL. 2 Fig. 11)

Phylum: Porifera (PL. 3 Fig. 12)

Phylum: Ciliophora (PL. 4 Fig. 4)

Phylum: Annelida

Class: Clitellata

Subclass: Oligochaeta (PL. 4 Fig. 10)

Phylum: Mollusca

Class: Gastropoda

Gastropod larvae (PL. 3 Fig. 14)

Class: Bivalvia

Bivalve larvae (PL. 3 Fig. 15)
Photograph plate 1

Fig 1. Calanoida  
Fig 2. Calanoida  
Fig 3. Calanoida  
Fig 4. Cyclopoidea

Fig 5. Calanoida  
Fig 6. Cyclopoidea  
Fig 7. Harpacticoida  
Fig 7. Calanoida

Fig 8. Diaphanosoma  
Fig 9. Crab Zoea  
Fig 10. Bosmina  
Fig 11. Harpacticoida

Fig 12. Bosmina  
Fig 13. Daphnia  
Fig 14. Diaphanosoma  
Fig 15. Ilyocryptus

Fig 16. Moina  
Fig 17. Ilyocryptus  
Fig 18. Odonata  
Fig 19. Shrimp Zoea
Photograph plate 2

Fig 1. Lucifer
Fig 2. Penaeid Juvenile
Fig 3. Caridean Mysis
Fig 4. Penaeid mysis
Fig 5. Penaeid mysis
Fig 6. Mysidacea
Fig 7. Anthuridea
Fig 8. Anthuridea
Fig 9. Crab Juvenile
Fig 10. Shrimp Zoea
Fig 11. Sagitta
Fig 12. Unidentified
Fig 13. Tanaidae
### Photographic plate 3

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4. CONCLUSION
This taxonomic checklist with photographic plates will provide preliminary information and support as baseline for further study of zooplankton in the northern Bay of Bengal and its estuaries.
REFERENCE


