Preliminary Study on the Faunal Diversity of Narmada and Tapi Estuaries, Gujurat

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Introduction

The state of Gujarat is one of the coastal states in western India with a coastline of 1,600 km and it is bestowed with large number of major and minor river systems with complicated net work of tributaries opening into the Arabian Sea. Narmada and Tapi are the two most major rivers in the state and are among the three major rivers that run from east to west in Indian subcontinent. Bharuch and Surat are two big cities of State Gujurat situated on the bank of Narmada and Tapi rivers respectively. The Narmada River flows through Madhya Pradesh, Maharashtra and Gujarat and meets with the Arabian Sea at Gulf of Khambat near Bharuch city and form the Narmada estuary. Bharuch district lies at the southern part of the state of Gujarat at the mouth of the river Narmada. It is the major shipping building center and sea port of India. It lies between 21 43'28 21" N and 73 00'04 16" E. Surat district is situated on the left bank of the Tapi river and lies between 21°11'42.00" N and 72° 49' 10.00" E. It is one of the fastest growing cities in India with lots of industries like Essar, Kribhco, Shell, Larson & Tubro , NTPC, ONGC, GAIL, Gujurat state petroleum corporation etc.

Materials and method

5 collection sites were identified for the inventory survey for Narmada estuary (Fig 1). Similarly 6 sites were identified for survey in Tapi Estuary (Fig 2).

Four surveys were carried out during 2012 - 2013 seasonally. The selected sites for Narmada estuary were Jhadeswar, Bhadbhut, Narmada Bridge, Mehgaon, Jageswar (Figure 1). Similarly the site chosen for Tapi estuary are *i.e.* Abrahma, Hazira, Hazira bridge, Panitanki and Dumas etc. in Surat (Figure 2). The collection and preservation were made as per the standardized methods of estuarine fauna collection. Birds were identified at the Survey site. The identification of the collected species has been done by the standard literature on each group.

Fig. 1 : Survey sites at Narmada

Fig. 2: Survey sites at Tapi Estuary, Surat

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Result

Specimens collected from the surveys were systematically studied by consulting with various standard books. The preliminary study comprised of 19 species of aquatic insects accommodated under 6 families, 7 species of fishes accommodated under 6 families, 7 species of crabs accommodated under 4 families. 61 species of mollusca under 38 families from Narmada and Tapi estuaries were reported during the studies. Also 10 species of dragon flies under 10 genus has been observed During the survey 24 species of aquatic and migratory birds along with local one were sighted. The list of species observed is listed below.

Insects

1. *Limnogonus fossarum fossarum* (Fab.)
2. *Limnogonus nitidus* (Mayr)
3. *Pseudovelia sexualis* (Paiva)
4. *Aquarius adelaidis* (Dohm)
5. *Asclepios annandelai*
6. *Anisops bouveri*
7. *Neogerris sps.*
8. *Laccophilus sps.* Leach
9. *Dryops, Olivier*
10. *Spheridinae dactylosternum*
11. *Onectochilus orissaensis*
12. *Onectochilus sps.*
13. *Anisops kuroiwae*
14. *Anisops cavifrons*
15. *Anisops exigera*
16. *Anisops paranigrolineata*
17. *Anisops barbatus*
18. *Anisops campbelli*
19. *Neogerris sps.*

Fishes

1. *Osteobrama cotio cotio* (Hamilton)
2. *Puntius sophore* (Hamilton)
3. *Wallago attu* (Schneider)
4. *Parambassis ranga* (Hamilton)
5. *Polydactylus mullani* (Hora)
6. *Upeneus moluccensis* (Bleeker)
7. *Nandus nandus* (Hamilton)8.
8. *Clarias batrachus* (Lin)
9. *Ootopterus notopterus* (Pallas)

Molluscs

1. *Cryptozona semirugata* (Beck)
2. *Macrochlamys* spp.
3. *Assiminea brevicula*
4. *Rhachis punctatus (Anton)*
5. *Cerastua moussonianus* (Petit)
6. *Corbicula striatella Deshayes*
7. *Donax incarnatus* Gmelin
8. *Ellobium* spp.
9. *Laternula truncate* (Lamarck)
10. *Lymnaea (Pseudusuccinea) luteola* Lamarck
11. *Neritina (Dostia) violacia* (Gmelin)
12. *Indoplanorbis exustus* (Deshayes)
13. *Gyraulus convexiusculus* (Hutton)
14. *Gulella (Huttonella) bicolor* (Hutton)
15. *Lamellaxis (Allopeas) gracile* (Hutton)
16. *Zootecus insularis* (Ehrenberg)
17. *Macoma (Psammotreta) micans* (Hanley)
18. *Melanoides tuberculata* (Mueller)
19. *Tarebia lineata* (Gray)
20. *Tarebia granifera* (Lamarck)
21. *Melanoides tuberculata* (Mueller)
22. *Thiara (Thiara) scabra* (Mueller)
23. *Umbonium vestiarium* (Linnaeus)
24. *Parreysia corrugata* Muller
25. *Parreysia (Radiatula)cylindrica* (Annandale)
26. *Parreysia (Radiatula) caerulea* (Lea)
27. *Parreysia favidens* (Benson)
28. *Bellamya bengalensis* (Lam) *form eburnea* (Anandale)
29. *Bellamya dissimilis* (Mueller)
30. *Angulyagra microchaetophora* (Annandale)
31. *Cerastua moussonianus* (Petit)
32. *Corbicula striatella* Deshayes
33. *Cypraea (Monetaria) annulus* (Linnaeus)
34. *Donax incarnatus* Gmelin
35. *Ellobium* spp.
36. *Littoraria (Littorinopsis) scabra* (Linnaeus)
37. *Lymnaea (Pseudusuccinea) acuminate* Lamarck
38. *Lymnaea (Pseudusuccinea) luteola* Lamarck
39. *Thais rugosa* (Born)
40. *Polinices (Glossaulax) didyma* (Roeding)

41. *Neritina (Dostia) violacia* (Gmelin)
42. *Crassostrea gryphoides* (Schlotheim)
43. *Physa acuta* Draparnaud
44. *Indoplanorbis exustus* (Deshayes)
45. *Gyraulus convexiusculus* (Hutton)
46. *Cerithidea cingulata* (Gmelin)
47. *Zootecus insularis* (Ehrenberg)
48. *Lamellaxis (Allopeas) gracile* (Hutton)
49. *Tellina (Tellinidis) sinuata* Spengler
50. *Melanoides tuberculata* (Mueller)
51. *Tarebia granifera* (Lamarck)
52. *Thiara (Thiara) scabra* (Mueller)
53. *Calliostoma speciosa* (Adams)
54. *Parreysia corrugata* Muller
55. *Parreysia (Radiatula) caerulea* (Lea)
56. *Parreysia (Parreysia) corrugata* (Mueller)
57. *Lamellidens corrianus* (Lea)
58. *Meretrix meretrix* (Lin)
59. *Angulyagra microchaetophora* (Annandale)
60. *Bellamya bengalensis* (Lamarck)
61. *Bellamya dissimilis* (Mueller)

Crabs

1. *Uca lacteal annulipes* (H. Milne Edwards)
2. *Scylla serrata* (Forskal)
3. *Portunus sanguinolentus* (Herbst)
4. *Varuna litterata* (Fab.)
5. *Uca lactea* (De Haan)
6. *Ashtoret lunaris* (Forskal)
7. *Charybdis feriatus* (Linnaeus)

Dragonfly

1. *Agriocnemis pygmaea pygmaea* (Rambur)
2. *Brachydiplax sobrina* (Rambur)
3. *Brachythemis contaminate*
4. *Ictinogomphus rapax* (Rambur)
5. *Ischnura aurira aurora*(Brauer)
6. *Ischnura senegalensis* (Rambur)
7. *Orthetrum sabina* (Drury)
8. *Ceriagrion coromandelianum* (Fabricius)
9. *Gynacantha dravida* (Lieftinck)
10. *Acisoma panorpoides* (Rambur)

Avifauna observed

1. Little Cormorant
2. Large Egret
3. Indian Peafowl
4. River Lapwing
5. Red wattled Lapwing
6. Spotted Dove
7. Oriental turtle Dove
8. Rose ringed Parakeet
9. Red vented Bulbul
10. White breasted Kingfisher
11. Bank Myna
12. Black Drongo
13. Malabar Tragon
14. Common Hoopoe
15. Blue cheeked Bee eater
16. Indian Roller
17. White bellied Heron
18. Grey Heron
19. Western Reef Egret
20. White Tailed Lapwing
21. Marsh Sandpiper
22. Little Tern
23. Paddy Field Pipit.
24. Silver Billed Munia.

Discussion

Estuaries are the areas were rivers meet the sea. Rivers collected the entire runoff coming along its course and emptied into the seas. Narmada along with Tapi Rivers of Indian subcontinent is included amongst the most polluted rivers of India. Surat and Bharuch districts which are highly industrialized areas are located on the banks of Tapi and Narmada rivers respectively. These two rivers collect the industrial waste coming out from the huge industrial estates located in Bharuch and Surat districts. While surveying the estuarine parts of these rivers the team came across huge industrial sets up one after another in a continuous industrial estate. Hazy atmosphere and dense sky were the common characteristic of the survey areas. The air was so thick that one cannot see through the opposite bank of the river at the time of the survey. The soil textures of the river bank were either muddy or sandy. The colour of

Plate-1

Agriocnemis pygmaea pygmaea (Rambur)

Ictinogomphus rapax (Rambur)

Limnogonus fossarum fossarum (Fabricius)

Anisops paranigrolineata (Brooks)

Anisops kuroiwae (Matsumura)

Orectochilus sp.

Plate-2

Scylla serrata (Forskal)

Varuna litterata (Fab.)

Charybdis feriatus (Linnaeus)

Uca lacteal annulipes (H. Milne Edwards)

Clarias batrachus (Lin)

Notopterus notopterus Pallas

Plate-3

Blue Cheeked Bee Eater

Indian Peafowl

Red Wattled Lapwing

Western Reef Egret

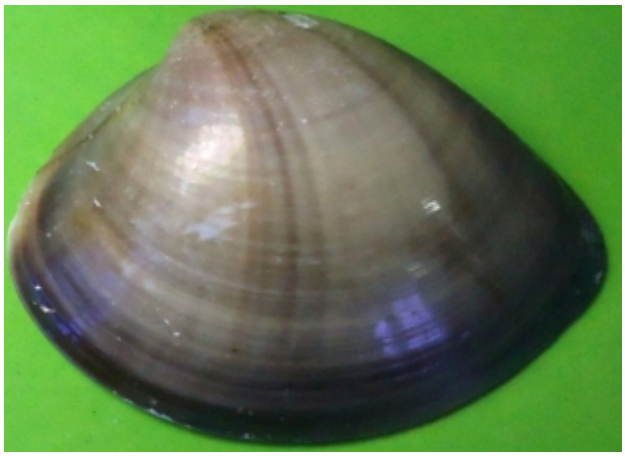
Silver Billed Munia

Black Drongo

Plate-4

Laternula truncate Lamarck

Tarebia lineate Gray



Meretrix meretrix Lin

Lymnaea pseudusuccinea luteola Lamarck

the soil was blackish, slippery, sticky and oily in most of the sampling station which clearly reflected the pollution status of the water of these rivers. Transparency of the river water is almost negligible.

It was also observed that the faunal diversity of both Narmada Tapi were very scanty. Numerous small crab holes were seen at the bay area of the rivers but not a single crab could be found from any of the station. Fishing activities were seen in most of the sampling areas and prawn fishing was the most prominent. Very few dead mollusca shells could be collected with difficulty as there are not much animals present in the sampling stations. Bigger animals like fish and crustacean were more obvious in the area then the smaller animals like insects or mollusca. Presence of minimum faunal diversity in the sampling areas may be due to the high pollution created by the nearby shipyard and industries. More intensive faunal survey spread over different seasons along with effects of pollutions would be required to provide a complete picture on the diversity of this area.

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