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Limnological Status and Aquatic Planktonic Biodiversity of River Tapti at District Burhanpur, Madhya Pradesh, India

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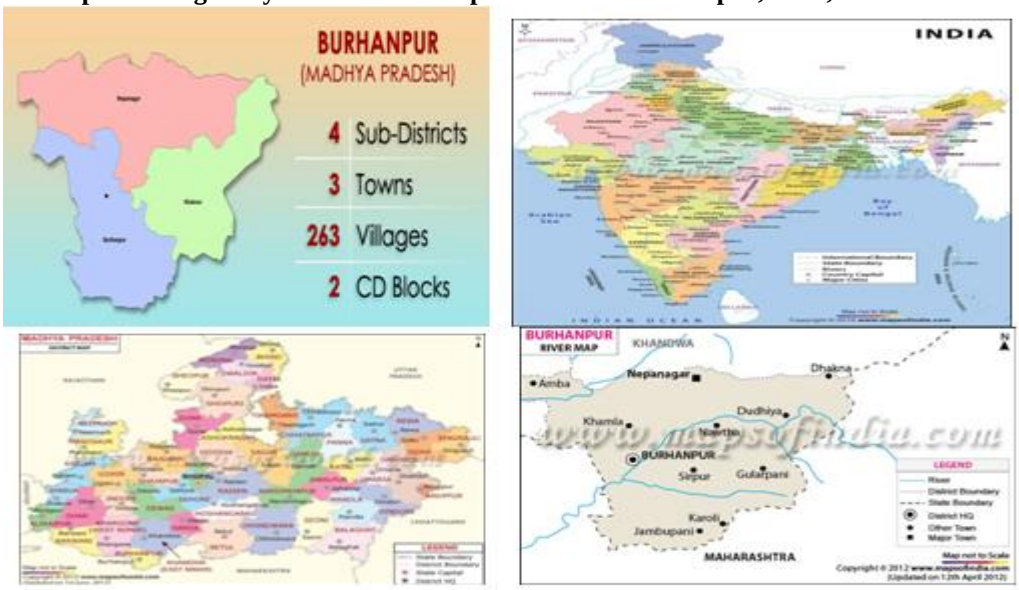
Abstract: ***The diversity of various types of plankton like phytoplankton and zooplankton were studied for river tapti near Burhanpur in M.P. The plankton was collected by a standard planktonnet from three different sites of River Tapti. The phytoplankton was represented by Bacilariophyceae, Chlorophyceae, Cynophyceae and Euglenophyceae, out of which genetics diversity of Bacilariophyceae was more. The zooplankton were identified in various Phyla like Protozoa, Helminthes, Rotifera, Annelida, Arthropoda etc. Diversity of Arthropods was highest. The percentage composition of various groups was calculated for the samples taken from different sites. The composition of plankton as percentage representation was correlated for different sites with sites characteristics. On the basis of different physico-chemical and biological parameters, the status of River Tapti is eutrophic in nature and during period under study 12 fish species, 42 phytoplanktons (15 Bacilariophyceae, 18 Chlorophyceae, 09 Cynophyceae) and 32 Zooplanktons (10 Rotifera, 03 Crustacea, 11 Protozoa, 06 Copepoda, 02 Ostracoda) Genera have been recorded.***

Keywords: Limnology, Phytoplanktons, Zooplanktons, Tapti River, Burhanpur M.P., India

1. Introduction

The Tapti is also one of the sacred rivers of India. Amongst its various names tapti, payoshni, Tapti and Tapti are more commonly known. All these names can note one and the same meaning the Copler of the tap, meaning heat. The general direction of the river in nimar (East) is from north-east to south-west.it enters east Nimar at a distance of 120 mile (193km) from its sources. The diversity of various types of plankton like phytoplankton and Zooplankton were studied for river Tapti near Burhanpur in M.P, India. Planktons are poor swimming but most drifting small organism that inhabit called the water column of ocean and fresh water bodies the name comes from the Greek term, plankton-meaning "wanderer" and drifter plankton is composed of tiny plant called Phytoplankton and animal called Zooplankton, as well as organism that are not easily classified in to those two groups (such as protozoa and bacteria), Planktonic organism are suspended in water and are also small fat even slight current move them about, the occurrence and abundance of Zooplanktons depend on its productivity, which in turn is flow by abiotic factors and the level of nutrients in the water. In a fresh water system, the Zooplanktons from and important faunal group, are most of them life on primary producer and make themselves available to be eat in by higher organism IN FOOD chains including fish and contribute significantly to the biological productivity of this ecosystem (Michael 1973). The Phytoplankton are the primary producers as they trap solar energy and produces organic molecules by consuming CO2, phytoplankton are not only primary producers but also brings out biogenic oxygenation of the water during they time Welch, Wetzel, 1975, 1983).

I. Map. No.01-04: Maps showing study area of River Tapti at District Burhanpur, M.P., India



District Burhanpur is located between 21°. 21.05 - 21°.37 N Latitude and 75°.13 - 76° E Longtitude in Madhya Pradesh. Tapti is one of the major perennial rivers flowing towards west coast of india is an important sources of fresh water to this region. The 720km. Long River originates near Multai in the Betul District of

Madhya Pradesh.The Selected study sites in Tapti River are Bhat kheda, Jainabad, Dariyapur kalan, looking to the importance of subject as research Topic **"Limnological Status And Aquatic Planktonic Biodiversity of River Tapti At District Burhanpur, M.P., India"** has been undertaken.

Image 1: Burhanpur: The cultural heritage city

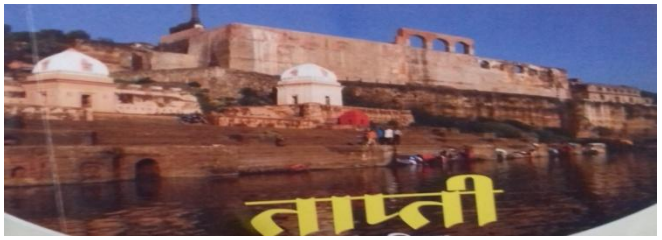


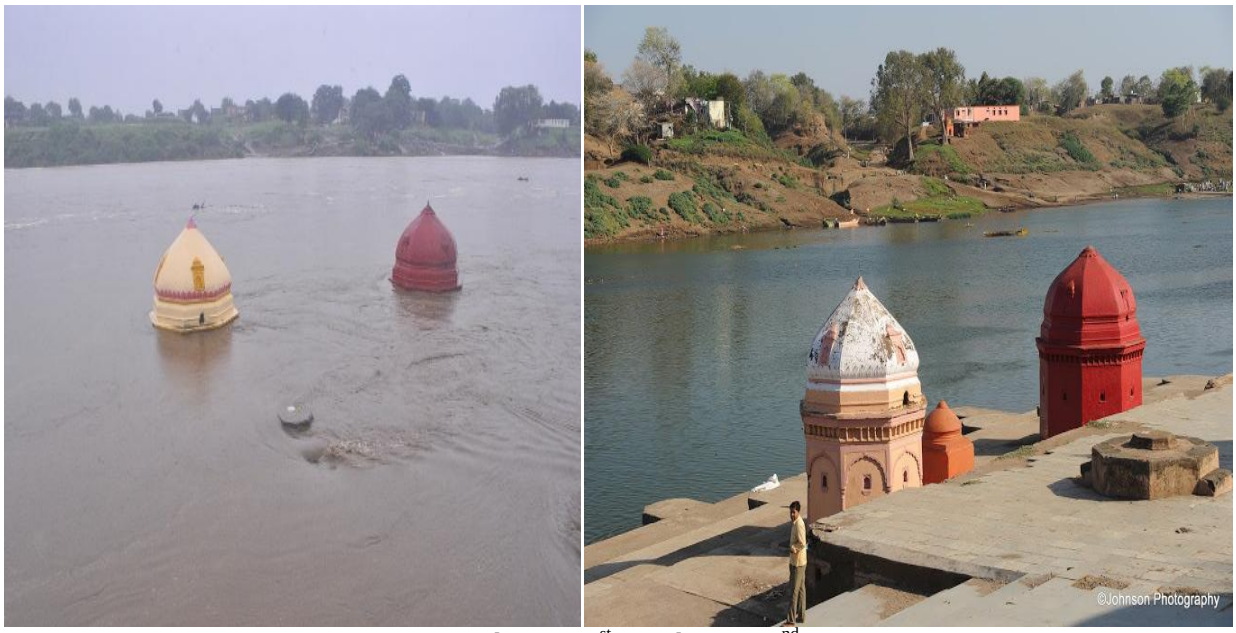
Image 2: Surva putri originates (source-multai, near betul) and Burhanpur Dist. Of M.P.

2. Materials and Research Methodology

Experimental Work

2.1 Sampling sites, culture, observation

Planktonic study is carried out seasonally, for which sampling were done 3-4 times in a month and in each day 3 times sample were taken. In each study site sample taken from 3 places. (The selected study sites in Tapti river are Bhatkheda, Jainabad, Dariyapur Kalan.) sample taken from 2m. Depth below the surface water.



Sampling site 1st Sampling site 2nd

2.2 Biological Estimation

The plankton samples are collected following lind (1979, Welch 1953), Welzel (1975) by filtering 40 liters of water through plankton not having pure size 64 u. concentration plankton samples are fixed in 4%formalin.

Zooplankton are identic with the help of keys provided by pennak (1978), sehgal (1083), Needham and (1962), tonapi (1980), A.P.H.A. (1980).

The phytoplankton will identify with the help of keys given by press cott (1962), smith (1950). Agarkar (1975), edlnondson (1959).

Sampaling site 3rd

Counting of the individual plankton will be done by "lac keys" dropping method (1935) using the formula.

Plankton units /liter =$\frac{N \times C \times 10}{Y}$

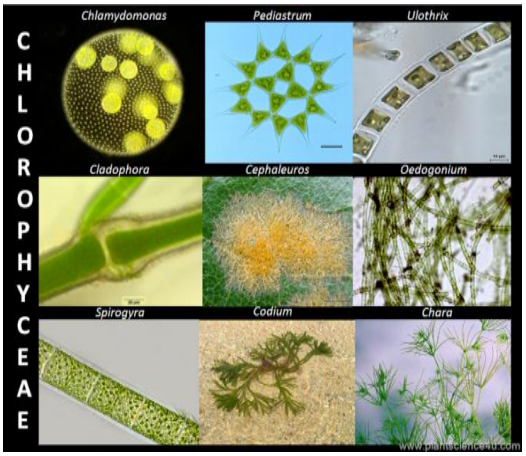
N =Number of phytoplankton counted 0.1 ml concentrate.
E = Total volume of concentrate in ml.
Y = total volume of water filtered for sample in liters

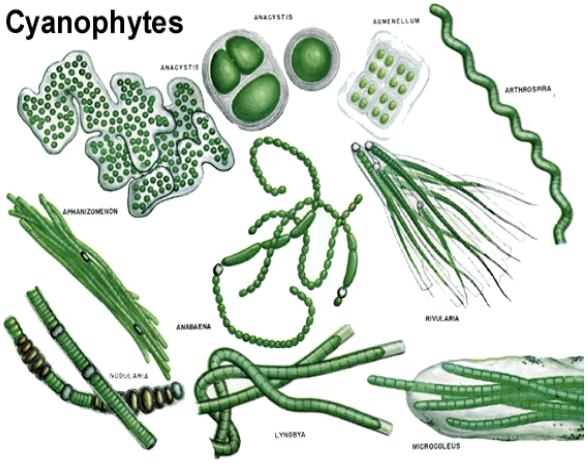
The phytoplankton density was expressed on units / liter and Zooplankton density will expressed in individuals / liter. During the period of study the range of variation in different physico-chemical parameters is as: On the basis of the observations that Tapti River are entropic in nature

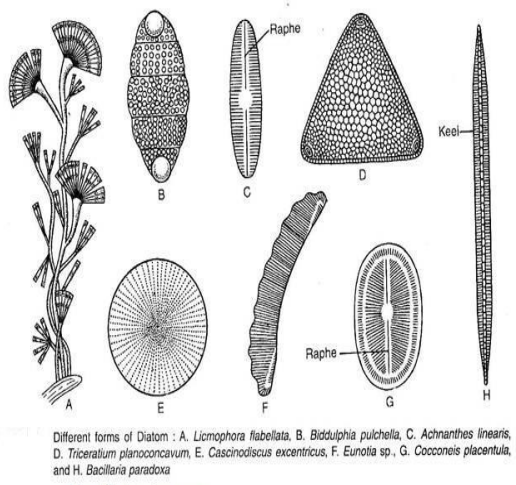
S.No	Parameter	Tapti River
1	PH	7.4-9.4
2	Water Temperature	12-226 c
3	Transparency	20-60.0 cm
4	Dissolved Oxygen	2.2-11.6 mg/Lit.
5	Free CO2	Nil-18.0 mg/Lit.
6	Alkality	120-270 mg/Lit.
7	Total Hardness	100-220 mg/Lit.
8	Chloride	28-90.4 mg/Lit.
9	B.O.D.	8.0-26.3 mg/Lit.
10	Nitrate	0.6-2.2 mg/Lit.

3. Result & Discussion

Among the phytoplankton chlorophyceae species. Cynophyceae species, bacillariophyceae species and Euglenophyceae species were recorded from the Tapti River during sep. 2015 to feb.2016. Monthly variation was recorded among phytoplankton. Half yearly average percentage composition of various groups of phytoplankton at different sites was studied.







Different forms of Diatom : A. *Licmophora flabellata*, B. *Biddulphia pulchella*, C. *Achnanthes linearis*, D. *Triceratium planoconcavum*, E. *Cascinodiscus excentricus*, F. *Eunotia* sp., G. *Cocconeis placentula*, and H. *Bacillaria paradoxa*

Bacillariophyceae

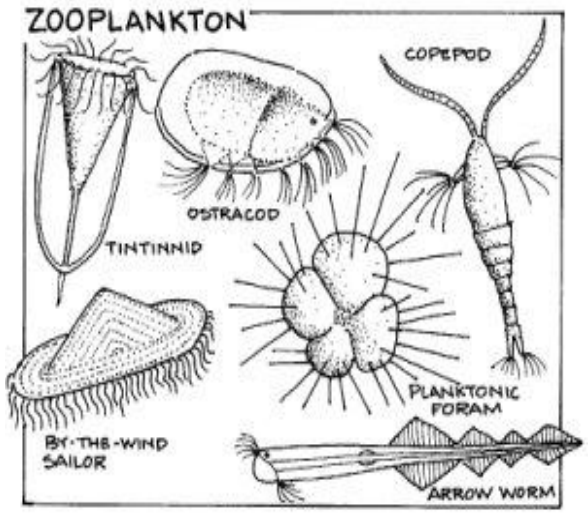


Figure 4: Types of Phytoplankton and Zooplanktons in sampling sites

At site 1st bacillariophyceae and Euglenophyceae were dominant with 30%contribution of each group, at site 2nd chlorophyceae and Euglenophyceae with 35 %of each group were recorded and planktoic from representing chlorophyceae and Cynophyceae species were 30%each recorded from site 3rd. At site 3rd, second dominant group was bacillariophyceae about 25%. Seasonal variation in the amount of Euglenophyceae may be related to the influence of biotic factors (manoj, 1993). From unpolluted sites of several rivers of India, it has been observed that bacillariophyceae was dominating followed by the dominance of chlorophyeeae. Similar observation has been recorded for four sampling sites also.

Protozoa and rotifer Zooplanktons were of nearly equal composition but arthropod more in percent composition at site 2nd whereas, other groups were protozoa and rotifers in decline manner. At site 3rd protozoa and rotifers were more in number as this site has less impact as well as less turbidity.

The diversity and density of Zooplankton certainly get influenced by the physic chemical properties of water (onshore et, ak, 1997)m that the density of Zooplankton remains more in the lower reaches of the rivers and very less density as well as diversity of Zooplanktons community has

been reported from head water and first and second order streams. Further it is a fact that the diversity of Zooplanktons is always less in the flowing fresh water compared estuarine water or tidal influenced zone. The similar observation has been recorded for river like Narmada, Tapti, mahi and Sabarmati (Sharma, 1995. Nanda 2003).

Figure 5: Aquatic Flora (Flowering Plants) in Tapti River at Burhanpur, M.P., India

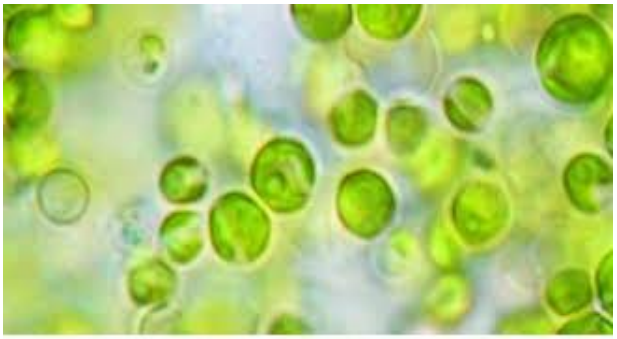


Fig.no-01 CHLORELLA

Fig.no-02 COSMARIUM

Fig.no-03 OEDOGONIUM

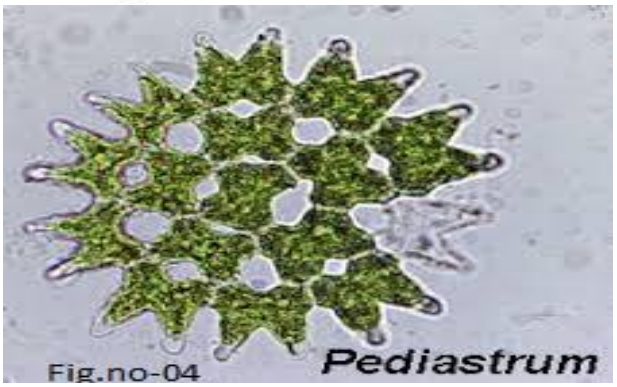


Fig.no-04

Fig.no-05 SCENEDESMUS

Fig.no-06 CHLAMYDOMONAS

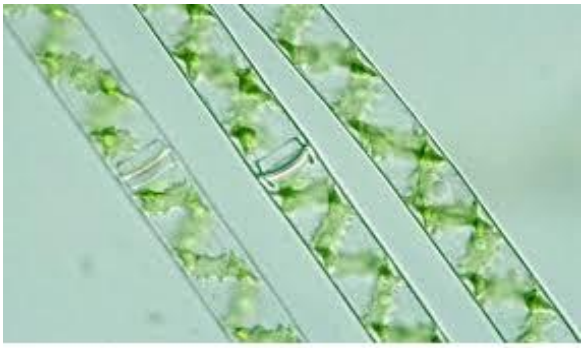


Fig.no-07 SPIROGYRA

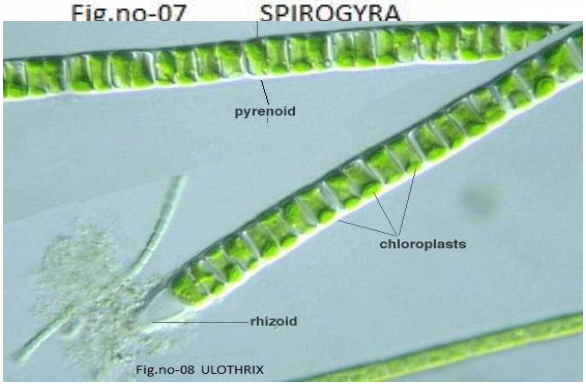


Fig.no-08 ULOTHRIX

Fig.no-09 Hydrodiction

Fig.no.10 CLADOPHORA

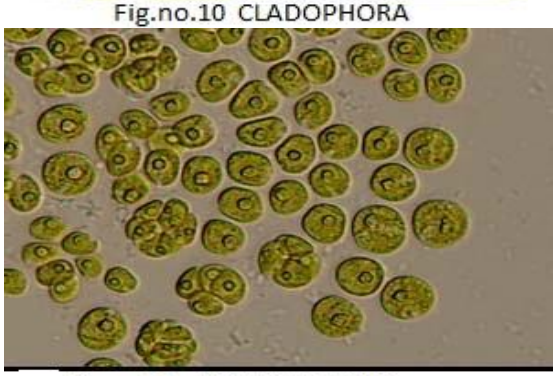


Fig.no-11 CHLOROCOCCUM

Fig.no-12 MICROSPORA

Fig.no-13 DESMIDIUM

Fig.no-14 CHARA

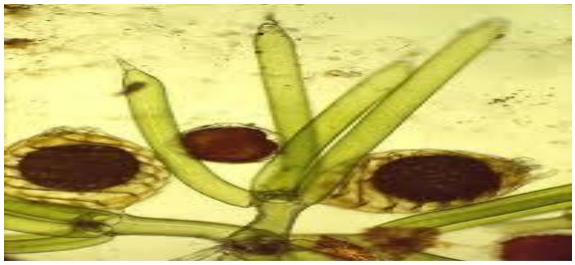


Fig.no-15 NITELLA

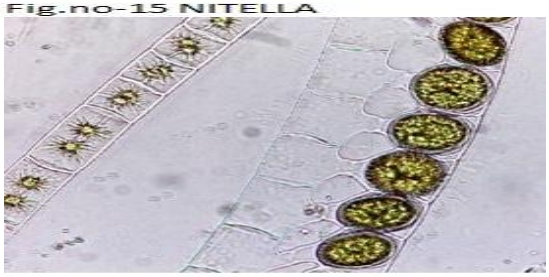


Fig. no- 16 ZYGENEMA

Fig.no-18 VOLVOX

Images Ist– Phytoplanktons (Genera of Chlorophyceae 1 To 18)

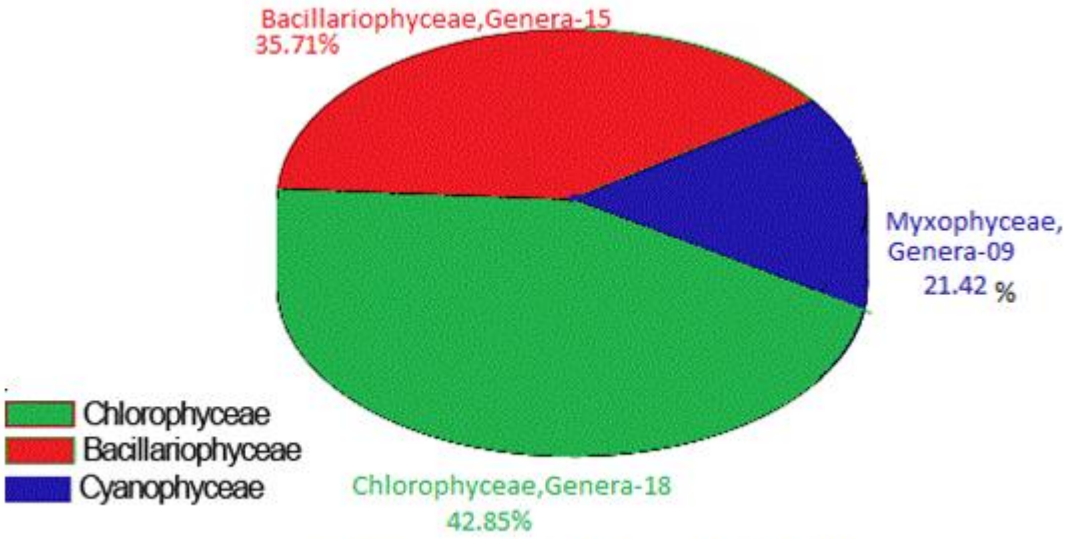
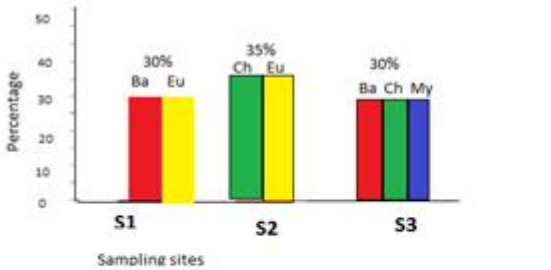


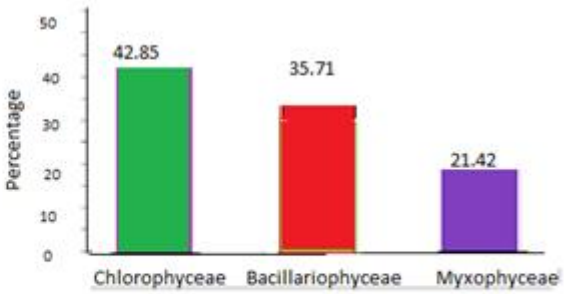
Fig.no- Available Classes Of Phytoplanktons

Phytoplanktons = 42 Genera



Abbreviations:
ph= phytoplankton,ch=chlorophyceae,Ba=bacillariophyceae,Eu=Euglinophyceae, My=Mixophyceae,S1=Sampling site Ist ,S2=Sampling site IInd,S3=Sampling site IIIrd

Graph-no- Showing Phytoplanktons at s1,s2,s3, of River Tapti.



Graph-no- Showing Minimum & Maximum Dominant Classes of Phytoplanktons (Dominant Class-I-Ch,class-II-Ba)

Fig.no-01 - NAVICULA

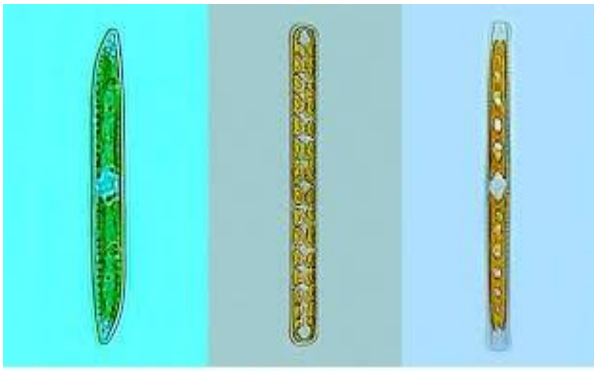


Fig.no-02 - NITZSCHIA

Fig.no-03 FRAGILARIA

Fig.o-04 CERATONEIS

Fig.no-05 AMPHORA

Fig.no-06 CALONEIS

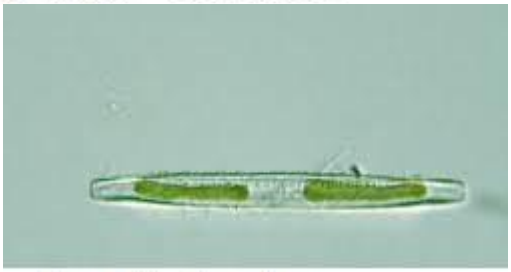


Fig.no-07 Synedra

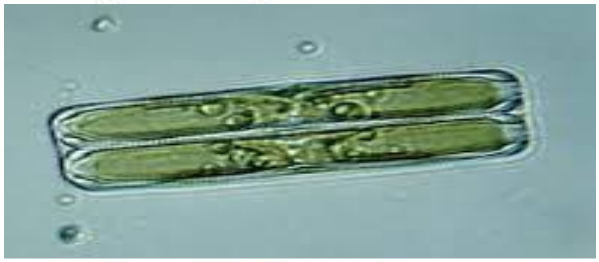


Fig.no-08 DIATOMS

Fig.no-09 GOMPHONEMA

ZFig.no-10 PINNULARIA

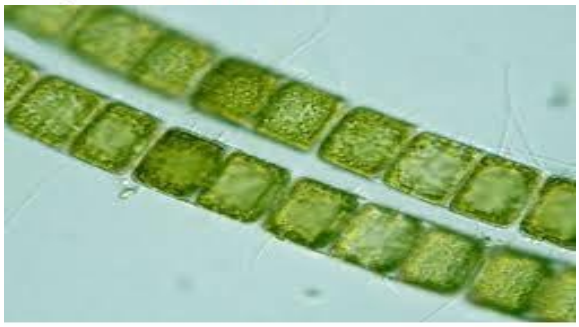


Fig.no-11 MELOSIRA

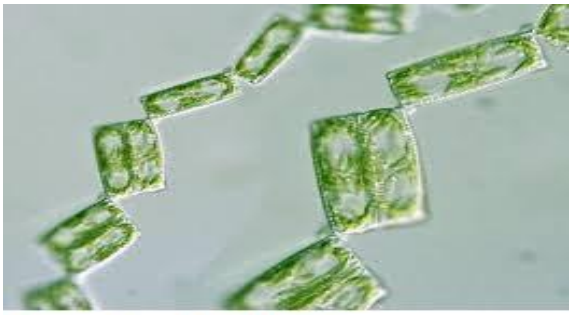


Fig.no-12 TABELLARIA

Fig.no-13 DENTICULA

Fig.no-14 CYMBELLA

Fig.no-15 CYCLOTELLA

Images IInd – Phytoplanktons (Genera Of Bacillariophyceae 1 To 15)

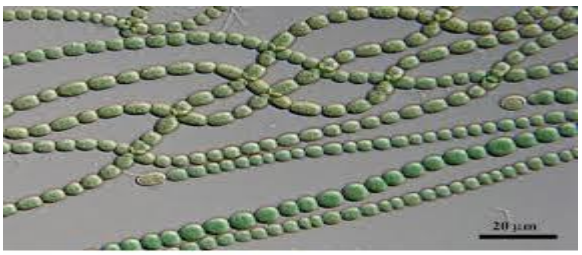


Fig.no-01 ANADAENA

Fig.no- 02 ANACYSTIS

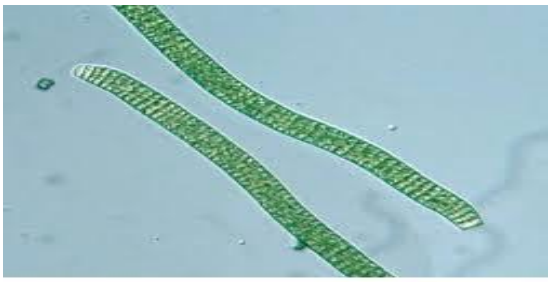


Fig.no-03 OSCILLATORIA

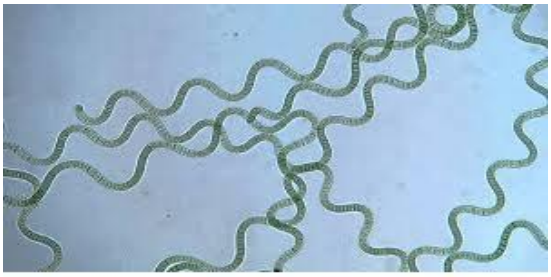


Fig.no-04 SPIRULINA

Fig.no-05 NOSTOC

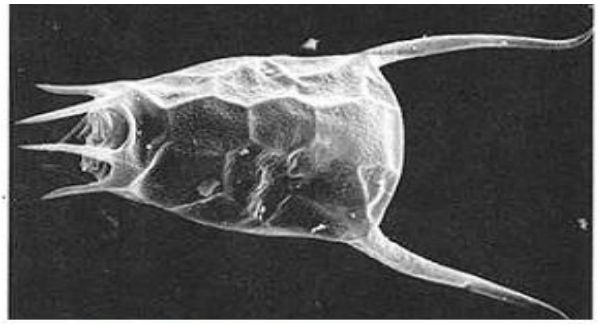


Fig.no-01 KERATELLA

Fig.no-06 RIVULARIA

Fig.no-02 ROTATORIA

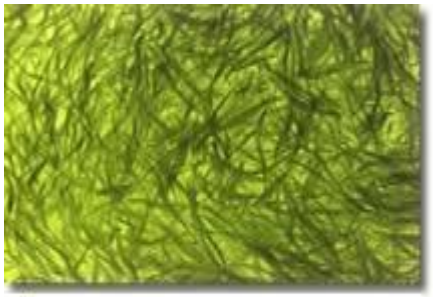


Fig.no-07 APHANIZOMENON

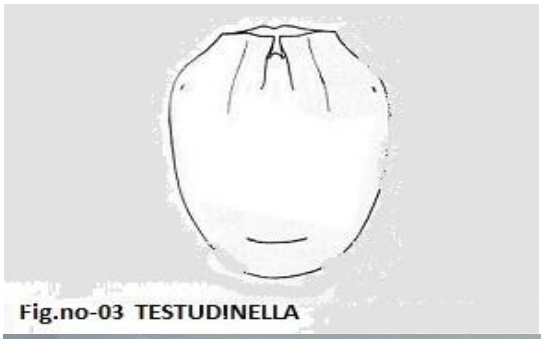


Fig.no-03 TESTUDINELLA

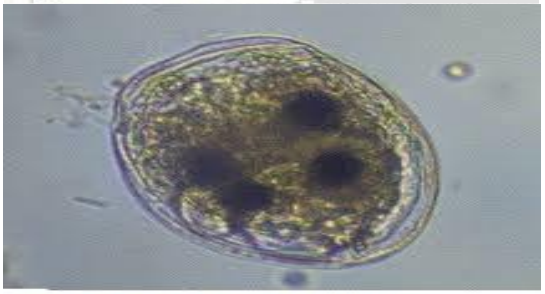


FIG.NO.04 ASCOMORPHA

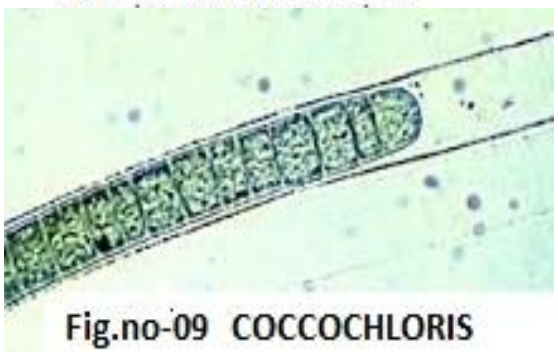


Fig.no-09 COCCOCHLORIS

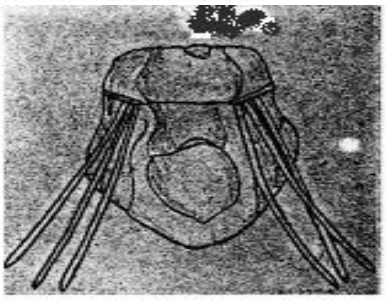


Fig.no-05 POLYARTHRA

Fig.no-09 PHORMIDIUM

IMAGES IIIrd – Phytoplanktons (Genera of Myxophyceae 1 To 09)

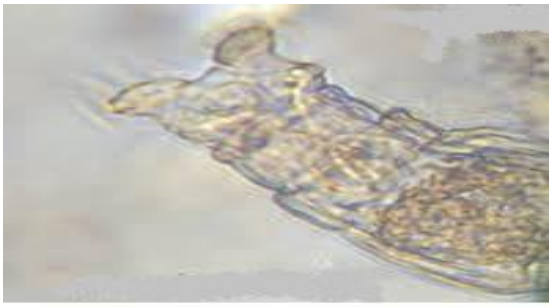


Fig.no-06 PHILODINA

Fig.no-09 BRACHIONUS

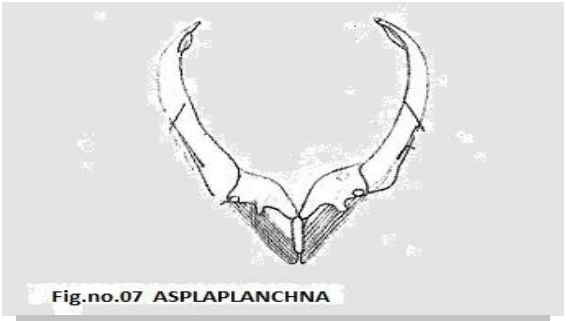


Fig.no.07 ASPLAPLANCHNA

Fig.no-10 TRICHOCERA

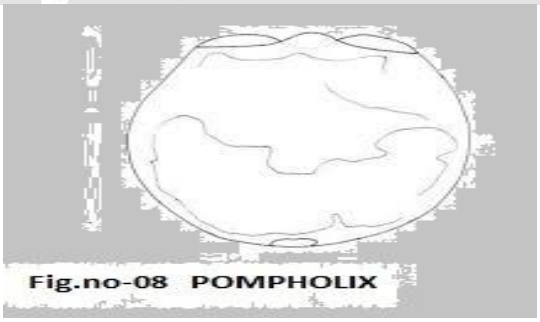


Fig.no-08 POMPHOLIX

IMAGES Ist – Zooplanktons, (Genera of Rotifera 1 To 10)

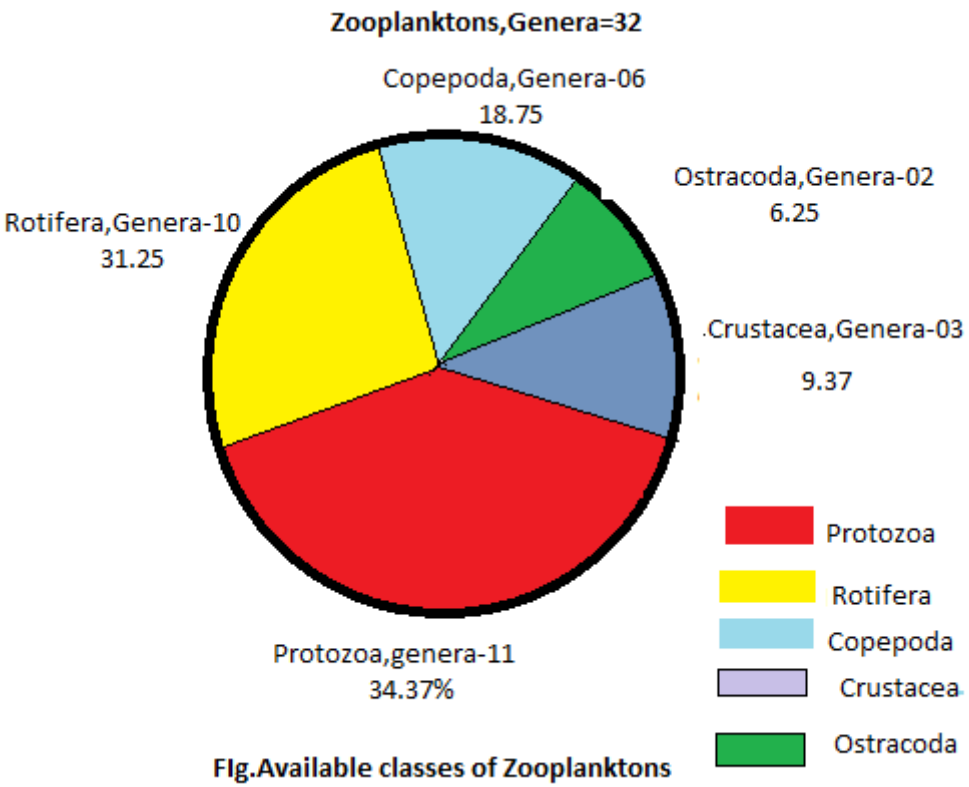
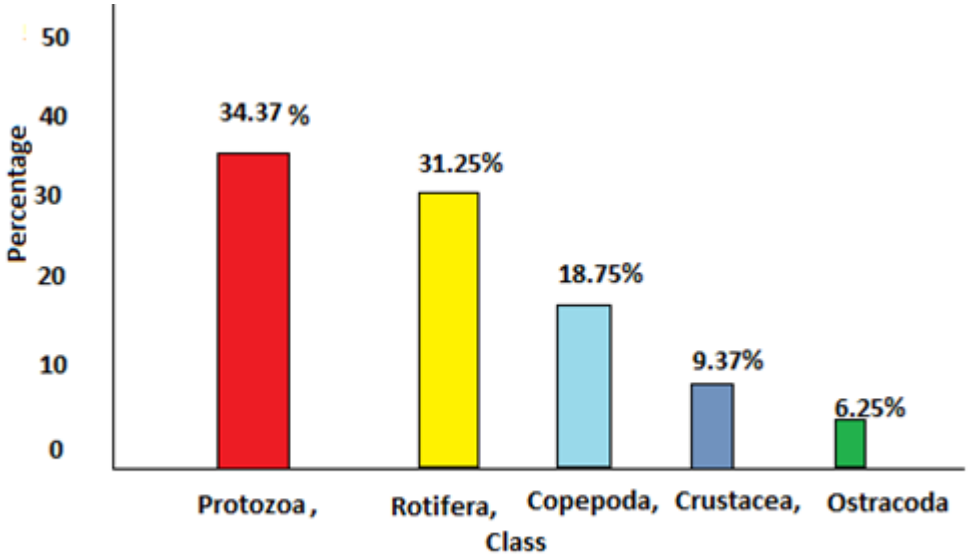


FIg.Available classes of Zooplanktons



Graph no- Showing minimum & maximum dominant classes of zooplanktons

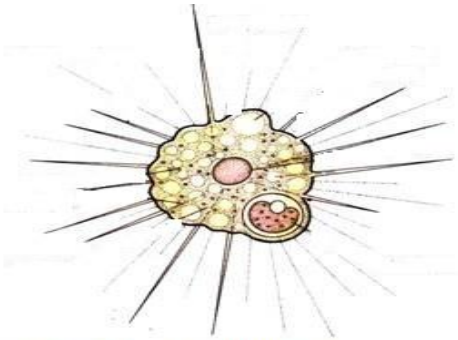


FIG.NO.01 ACTINOPHRYS

FIG.NO.04 PARAMECIUM

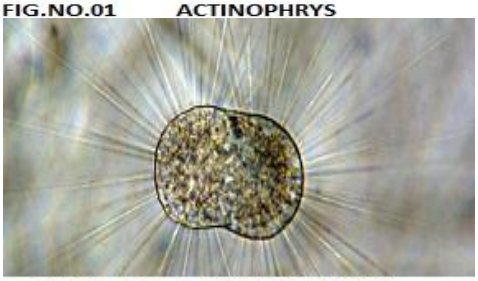


FIG.NO.02 ACTINOSPHAERIUM

FIG.NO.05 PERIDINIUM

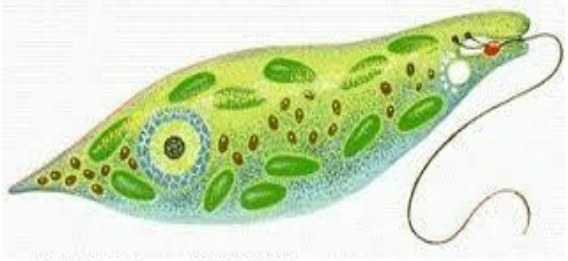


FIG.NO.03 EUGLINA

FIG.NO.06 CAMPENELLA

FIG.NO.07 EPISTYLIS

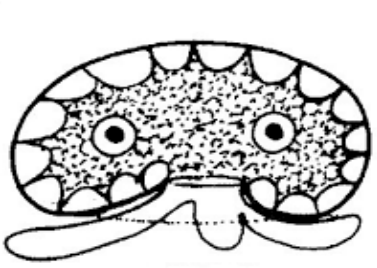


FIG.NO.09 ARCELLA

FIG.NO.08 VORTICELLA

FIG.NO.10 DIFFLUGIA

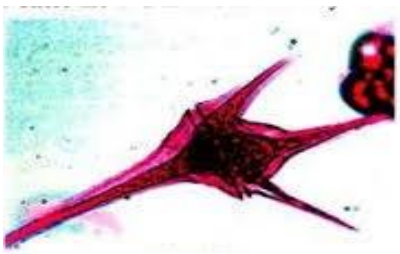


FIG.NO.11 CERATIUM

IMAGES II-nd – Zooplanktons, (Genera Of Protozoa 1 To 11)

FIG.NO.01 EUBRACHIOUNUS

FIG.NO.02 MOINA

FIG.NO.03 NAUPLIUS

IMAGES III-rd – Zooplanktons, (Genera Of Crustacea 01 To 03)

FIG.NO.01 CYPRIS

FIG.NO.02 STENOCYPRIS

Images IV – Zooplanktons, (Genera Of Ostracoda 01 To 02)

FIG.NO.01 CYCLOPS

FIG.NO.02 DIAPTOMUS

FIG.NO.03 DAPHNIA

FIG.NO.04 BOSMINA

FIG.NO.05 HELOBDELLA

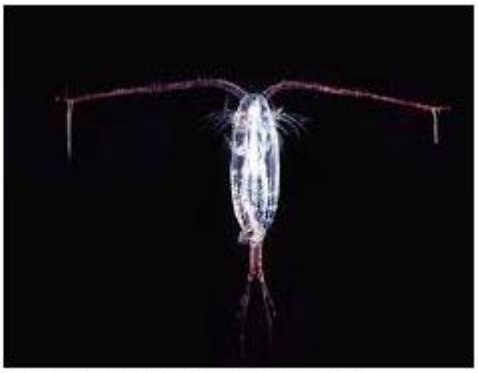


FIG.NO.06 NAUPLIUSTAGES

Images V – Zooplanktons, (Genera Of Copepoda 01 To 06)

Table 1: Biostatistical Estimation of species diversity:

S No.	Types of Planktons	Group & Genera	Name of Genera	Total result)
I	Phytoplanktons (see image no.01-03) +Graph	Chlrophyecac, 18 (see image no.01)	Chlorella, Cosmarium, Oedogonium, Pediastrum, Scenedesmus, Chlamydomonas, Spirogyra, Ulothrix, Hydrodictyon, Cladophora, Chlorococcum, Microspora, Desmidium, Chara, Nitella, Zygenema, Syndesmus and Volvox	42
		Bacillariophyecac, 15 (see image no.02)	Navicula, Nitzschia, Fragilaria, Ceratoneis, Amphora, Caloneis, Synedra, Diatoms, Gomphonema, Pinnularia, Melosira, Tabellaria, Denticula, Cymbella and Cyclotella.	
		Myxophyceac, 09 (see image no.03)	Anabaena, Anacystis, Oscillatoria, Spirulina, Nostoc, Rivularia, Aphanizomenon, Coccochloris and Phormidium	
II	Zooplanktones (see image 01-03)+Graph	Rotifera, 10 (see image no.01)	Keratella, Rotatoria, Testudinella, Ascomorpha, Polyarthra, Philodina, Asplanchna, Pompholix, Brachionus and Trichocera.	32
		Crustacea, 03 (see image no.03)	Eubrachiounus, Moina, Nauplius	
		Protozoa, 11 (see image no.02)	Actinophrys, Actinosphaerium, Euglena, Paramecium, Peridinium, Campenella, Epistylis, Vorticella, Arcella, Difflugia, Ceratium.	
		Copepoda 06 (See image no.04)	Cyclops, Diaptomus, Daphnia, Bosmina, Helobdella and Nauplius- stages	
		Ostracoda 02 (See image no.05)	Cypris and Stenocypris	

III	Aquatic flowering plants	Dicots 48 Monocotes, 33	48 33	81
IV	Types of fishes	Fishes, 12	Carcinus sp. (Crab), Catla catla (Catla), Labeo boggut (Goryo/ger), Mastacembelus pancalus (pancalus), Palaemon sp (Smallprawn), Chonnamarulius (Marulius), Notopterus notopterus (Patola/ patoda), Wallago attu (Padin), Mastacembelus-armatus (Mastacemblus), Labeo-rohita (Rohu/rav), Heteropneustus-fossilis (Singhar), Silonia silondia (Seland)	12

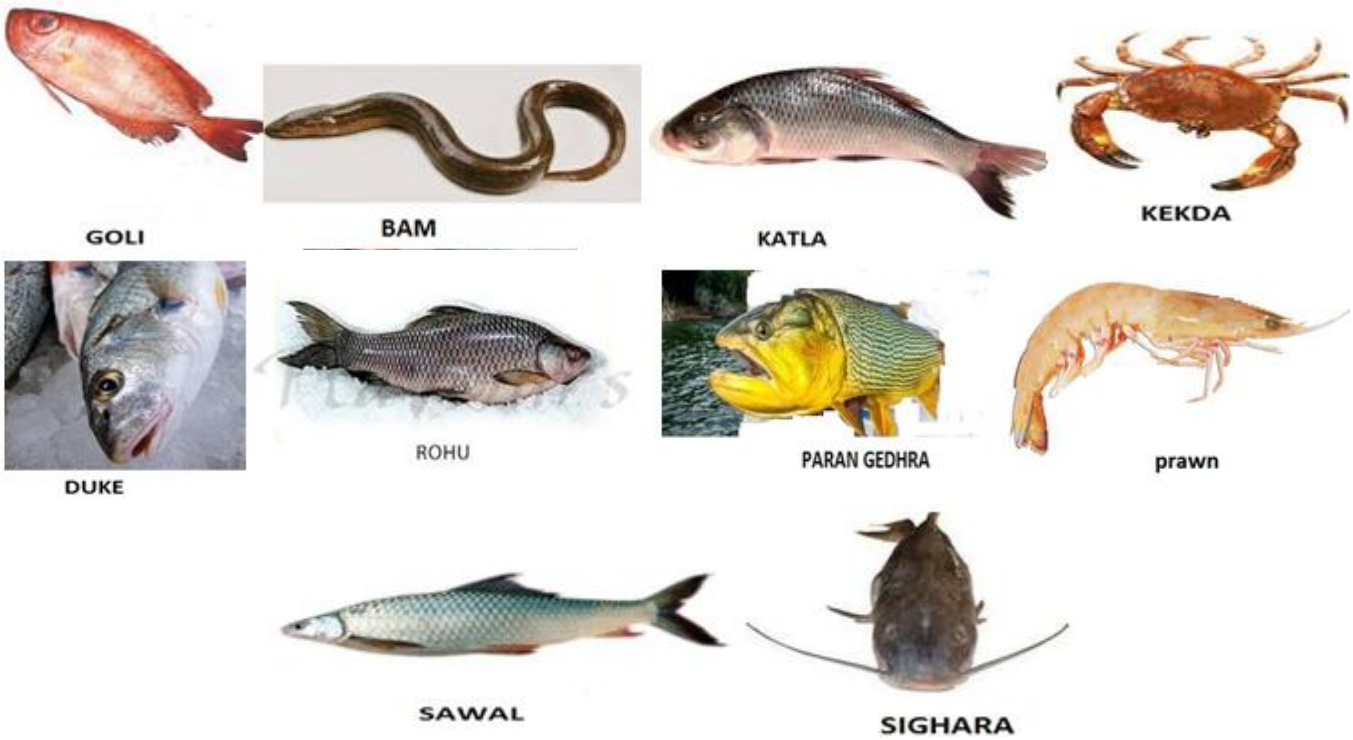


Figure 6: Type of Fauna (Fishes) in Tapti River at Burhanpur, M.P., India

4. Conclusion

On the basis of different physico-chemical and biological parameters, the status of River Tapti is eutrophic in nature and during period under study 12 fish species, 42 phytoplanktons (15 Bacilariophyceae, 18 Chlorophyceae, 09 Cynophyceae) and 32 Zooplanktons (10 Rotifera, 03 Crustacea, 11 Protozoa, 06 Copepoda, 02 Ostracoda) Genera have been recorded. In future with increasing human interference at the same rate, it is possible that the River Tapti will further be polluted. Therefore further studies need to be undertaken to suggest restorative measures, which are of great – socio – economic importance to the region. The current prevailing condition of physico chemical parameters of River Tapti and Aquatic diversity besides acting as potential bio indicators of tropic status requires the management strategies for the conservation of River Tapti at District Burhanpur, Madhya Pradesh, India. (See Table No.1)

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