Report Code: 025_GBP_IIT_ENB_DAT_02_Ver 1_Jun 2012

Floral and Faunal Diversity in Middle Ganga Segment

Haridwar – Varanasi

GRB EMP : Ganga River Basin Environment Management Plan

by

Indian Institutes of Technology

IIT Bombay | IIT Delhi | IIT Guwahati | IIT Kanpur | IIT Kharagpur | IIT Madras | IIT Roorkee

Preface

In exercise of the powers conferred by sub-sections (1) and (3) of Section 3 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government has constituted National Ganga River Basin Authority (NGRBA) as a planning, financing, monitoring and coordinating authority for strengthening the collective efforts of the Central and State Government for effective abatement of pollution and conservation of the river Ganga. One of the important functions of the NGRBA is to prepare and implement a Ganga River Basin: Environment Management Plan (GRB EMP).

A Consortium of 7 Indian Institute of Technology (IIT) has been given the responsibility of preparing Ganga River Basin: Environment Management Plan (GRB EMP) by the Ministry of Environment and Forests (MoEF), GOI, New Delhi. Memorandum of Agreement (MoA) has been signed between 7 IITs (Bombay, Delhi, Guwahati, Kanpur, Kharagpur, Madras and Roorkee) and MoEF for this purpose on July 6, 2010.

This report is one of the many reports prepared by IITs to describe the strategy, information, methodology, analysis and suggestions and recommendations in developing Ganga River Basin: Environment Management Plan (GRB EMP). The overall Frame Work for documentation of GRB EMP and Indexing of Reports is presented on the inside cover page.

There are two aspects to the development of GRB EMP. Dedicated people spent hours discussing concerns, issues and potential solutions to problems. This dedication leads to the preparation of reports that hope to articulate the outcome of the dialog in a way that is useful. Many people contributed to the preparation of this report directly or indirectly. This report is therefore truly a collective effort that reflects the cooperation of many, particularly those who are members of the IIT Team. Lists of persons who are members of the concerned thematic groups and those who have taken lead in preparing this report are given on the reverse side.

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Contents

1. Introduction

The Ganga river comprises a lotic water series, which originates at Gaumukh and flows down to Gangasagar traversing a distance of 2525 km. During its course through eleven states, the river receives numerous tributaries (with characteristic quality, pollution load and biota) including Bhilangana, Alaknanda, Ram Ganga, Kali, Yamuna, Gomti, Ghaghara, Gandak, and Kosi.

A thorough review of a large number of studies available in the form of student's project reports and the reports produced through sponsored, consultancy, investigatory and Environment Impact Assessment studies, published papers/articles in journals/ conference/ workshop/ symposia proceedings, books, news paper articles, etc. has led to collection of fragmented information on ecology and biodiversity in the Ganga basin. The information is in different time domain and isolated stretches largely governed by the period of the study and the proximity of a river stretch/water body to the investigating institutions, organizations or individuals involved in the study. Due to lack of definitive bio-monitoring programme like river water quality monitoring programmes by the Central Pollution Control Boards, State Pollution Control Boards and National River Conservation Directorate, the analysis is based on extrapolation and interpolation of scattered, mostly qualitative data/information.

The entire stretch of the river Ganga (main stem) can be viewed into three segments:

A.	**Upper Ganga ≈ 294 km**	**Gaumukh to Haridwar**
B.	**Middle Ganga ≈ 1082 km**	**Haridwar to Varanasi**
C.	**Lower Ganga ≈ 1134 km**	**Varanasi to Ganga Sagar**

(The Upper Ganga Segment for all practical purposes and studies carried out, starts at Gangotri as the terrain between Gaumukh to Gangotri is essentially devoid of biota due to hostile conditions).

These three segments not only differ in their geomorphology, ecology and rheology but are different in terms of issues that need to be addressed (refer report 001_GBP_IIT_GEN_DAT_01_Ver 1_Dec 2010). Considering this, floral and faunal diversity of the main stem of Ganga is reported in a series of four reports. This report covers the middle Ganga stretch from Haridwar (Downstream of Bhimgauda Barrage) to Varanasi. From the point of view of aquatic ecology, the middle Ganga segment has been further divided into five sub-stretches stated as follows (Figure 1).

a. Haridwar to Bijnor: MG-1
Distance: 77.39 km
Latitude: 29°58'33.82"N to 29°22'25.82"N
Longitude: 78°11'16.36"E to 78° 2'24.72"E
Altitude: 297-220 m

b. Bijnor to Narora: MG-2
Distance: 156.45 km
Latitude: 29°22'25.82"N to 28°11'44.57"N
Longitude: 78° 2'24.72"E to 78°23'30.93"E
Altitude: 220-177 m

c. Narora to Fatehgarh: MG-3
Distance: 185 km
Latitude: 28°11'44.57"N to 27°23'55.54"N
Longitude: 78°23'30.93"E to 79°37'38.13"E
Altitude: 177-132 m

d. Fatehgarh to Allahabad: MG-4
Distance: 331 km
Latitude: 27°23'55.54"N to 25°25'31.79"N
Longitude: 79°37'38.13"E to 81°53'9.23"E
Altitude: 132-78 m

e. Allahabad to Varanasi: MG-5
Distance: 144 km
Latitude: 25°25'31.79"N to 25°15'16.26"N
Longitude: 81°53'9.23"E to 83° 1'35.49"E
Altitude: 78-72 m

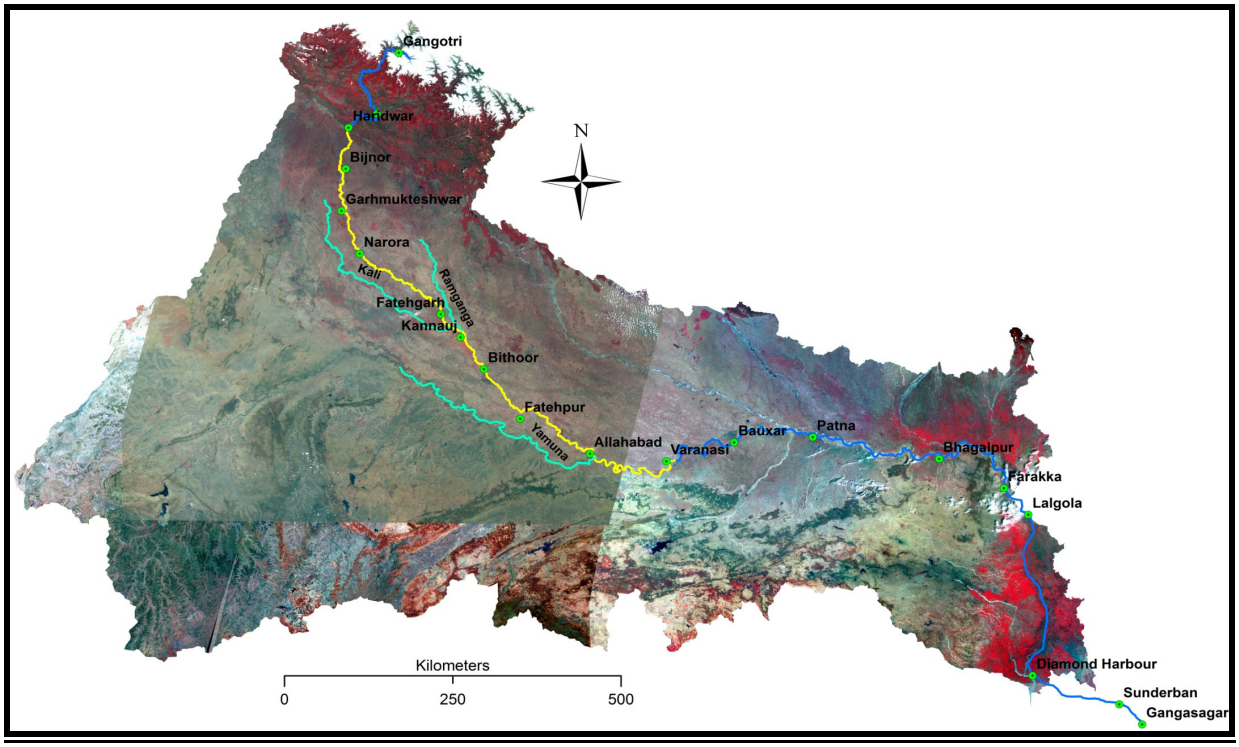


Figure 1: Ganga middle stretch and their major tributaries
(Represented from yellow and green colour, respectively)

The floral and faunal diversity of each of these sub-stretches is described in following sections.

2. Biological Profile

The data of biota in the middle Ganga is very fragmentary. All components have not been reported in all stretches, MG-1 to MG-5. A compilation of the species presented has been prepared on the basis of the information available in different stretches and time domain.

2.1. Phytoplankton

Phytoplanktons are tiny free floating living organisms which drift with the water. They constitute the main autotrophic component of Ganga ecosystem being chief primary producers forming the base of food chain.

Phytoplankton of river Ganga from Haridwar to Varanasi were studied in detail by various workers. An account of phytoplankton profile in middle stretches based on the studies conducted at various centres has been reported by Khan *et al*. (1998b), Khanna and Bhutiani (2003) and Dubey and Boswal (2009). According to the data phytoplankton belonging to seven families, Bacillariophyceae, Chlorophyceae, Cyanophyceae, Dianophyceae, Euglenophyceae, Xanthophyceae and Chrysophyceae were identified. In zone MG-1, MG-3, MG-4 and MG-5 the members of Bacillariophyceae were dominant, followed by members of Chlorophyceae and Cyanophyceae while in MG-2 Chlorophyceae were dominant over Bacillariophyceae and Cyanophyceae. Euglenophyceae were rare from MG-1 to MG-4. Few genera of Dianophyceae were found in MG-4 and MG-5 stretch. The most abundant genera of Bacillariophyceae recorded are *Cyclotella*, *Cymbella*, *Fragillaria*, *Gomphonema, Nitzschia*, *Navicula* and *Synedra.* Common genera of Chlorophyceae were *Cosmarium, Spirogyra, Scenedesmus* and *Pediastrum. Anabena, Oscillatoria, Phormidium* and *Spirulina* are the common genera of Cyanophyceae.

Presence of some algae had been reported by Khanna *et al.* in 1998 from Ganga canal at Haridwar. According to them the population of diatoms were most abundant (87.85%), followed by green algae (10.36%) and by blue-green algae (6.69%). Sinha *et al.* (1997) reported that phytoplankton is dominated by diatoms (*Cyclotella* sp., *Tabellaria* sp., *Synedra* sp. and *Nitzschia* sp.), some seasonal blue green algae (*Microcystis* sp., *Oscillatoria* sp. and *Spirulina* sp.), green algae (*Hormidium* sp. and *Pediastrum* sp.) and yellow green algae (*Tribonema* sp.) at Kanpur.

Total 42 genera and 166 species of Bacillariophyceae, 47 genera and 113 species of Chlorophyceae and 15 genera and 56 species of Cyanophyceae are reported in the middle stretch from Haridwar to Varanasi. While 3 genera and 9 species of Euglenophyceae, 3 genera and 9 species of Dinophyceae were present in MG-4 and MG-5 region. Members of Xanthophyceae and Chrysophyceae were very rare and were represented by a single genus with a single species. Distributions of families with their taxa are represented in Figure 2 and Appendix-1(a).

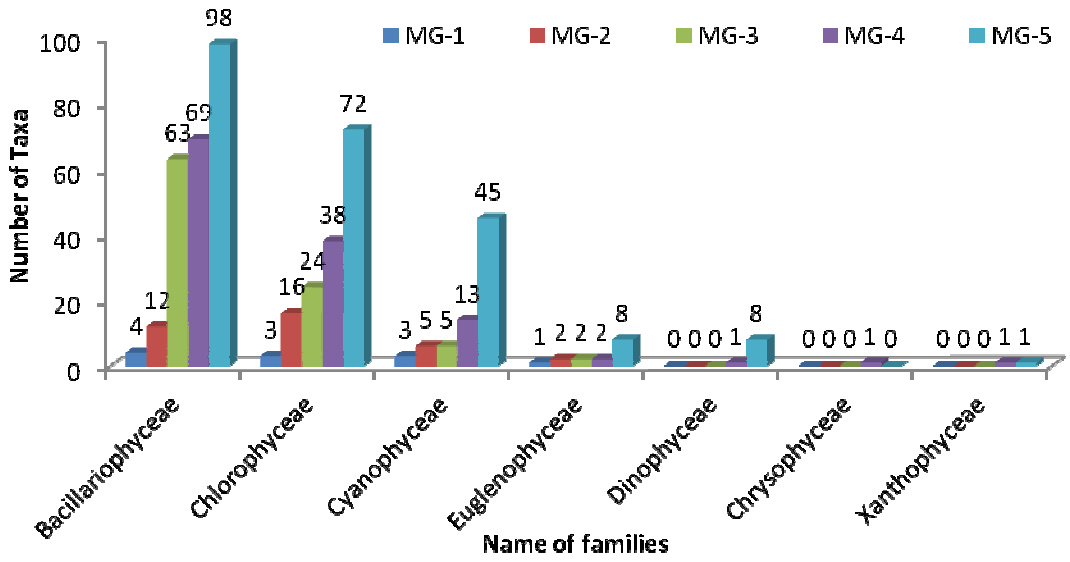


Figure 2: Graphical presentation of phytoplankton from MG-1 to MG-5

2.2. Periphyton

Periphyton is complex of algae, Cyanobacteria, heterotrophic microbes and detritus those are attached to submerged surface in most aquatic system. They are important food source of higher forms in the food chain and also are the indicators of water quality. Diverse group of algae including Bacillariophyceae, Chlorophyceae and Cyanophyceae comprise the periphyton. Total 58 genera and 114 species were reported from MG-1, MG-3 and MG-4. Bacillariophyceae were dominant in every stretch followed by Chlorophyceae and Cyanophyceae. Most common genera were *Achnanthes, Cyclotella, Cymbella, Navicula, Nitzschia, Oscillatoria, Pediastrum, Synedra* and *Merismopedia.* A list of species reported is given in Appendix-1(b).

The periphytonic community depicted almost opposite trend of phytoplankton due to the absence of hard substratum and the low current velocity of river that helps to the growth of planktonic forms in the river (Khanna, 1989; Khan *et al*. 1998a; Khan *et al*. 1998b; Nautiyal *et al.* 2004). The distribution of periphyton is shown in Figure 3.

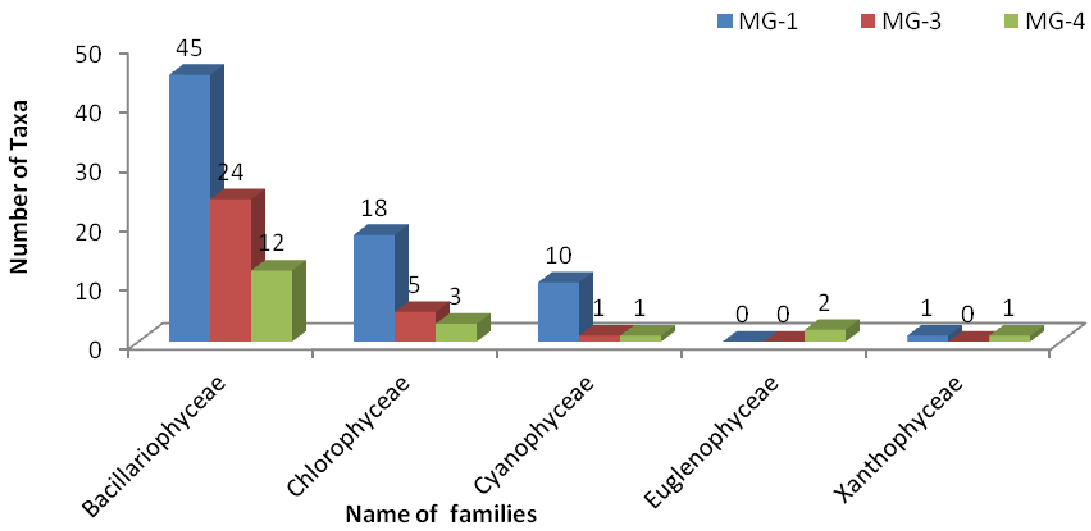


Figure 3: Distribution of periphyton from MG-1 to MG-5

**** The data of MG-2 and MG-5 was not available***

2.3. Zooplankton

Zooplankton is an assemblage of free floating microscopic animal forms including Protozoa, Rotifers, small Crustaceans, Copepods, Cladocerans, larvae and pupae of Insects. Zooplankton's main sustenance depends on bacteria and phytoplankton, making them the second link in the food chain. In the middle stretch of Ganga river, zooplankton were represented by Protozoans, Rotifers, Copepods and Cladocerans. Maximum population of Rotifers was reported at MG-2 followed by MG-4, MG-3 and MG-1. The distribution of zooplankton from MG-1 to MG-4 is represented by 10 genera and 11 species of Protozoa, 14 genera and 28 species of Rotifers, 11 genera and 17 species of Cladocera, 2 genera and 2 species of Copepods and 4 miscellaneous.

Total number of genera and species recorded were 38 and 59, respectively. No data of Zooplankton was however, available from MG-5. Distribution of zooplankton is shown in Figure 4 and list in Appendix-1(c). Zafar and Sultana (2005) also reported the zooplankton fauna belong to different groups (Protozoans, Rotifers, Cladocerans and Copepods) in the Ganga river at Kanpur. The dominant genera at Kanpur were *Paramecium*, *Brachionus*, *Filinia* and *Keratella*. Untoo *et al.* (2003) studied 236 km stretch of Ganga river between Narora to Kannauj and reported the abundance and composition of zooplankton. The order of abundance of various zooplankton groups was found to be Rotifers > Cladocera > Copepoda > Eggs and Nauplii. Sinha *et al.* (1997) reported that the zooplankton is dominated by Rotifers (*Brachionus* sp., *Keratella* sp. and *Anura* sp.) with relatively few Cladocera (*Moina* sp.) and Copepods (*Cyclops* sp. and *Diaptomus* sp.) at Kanpur.

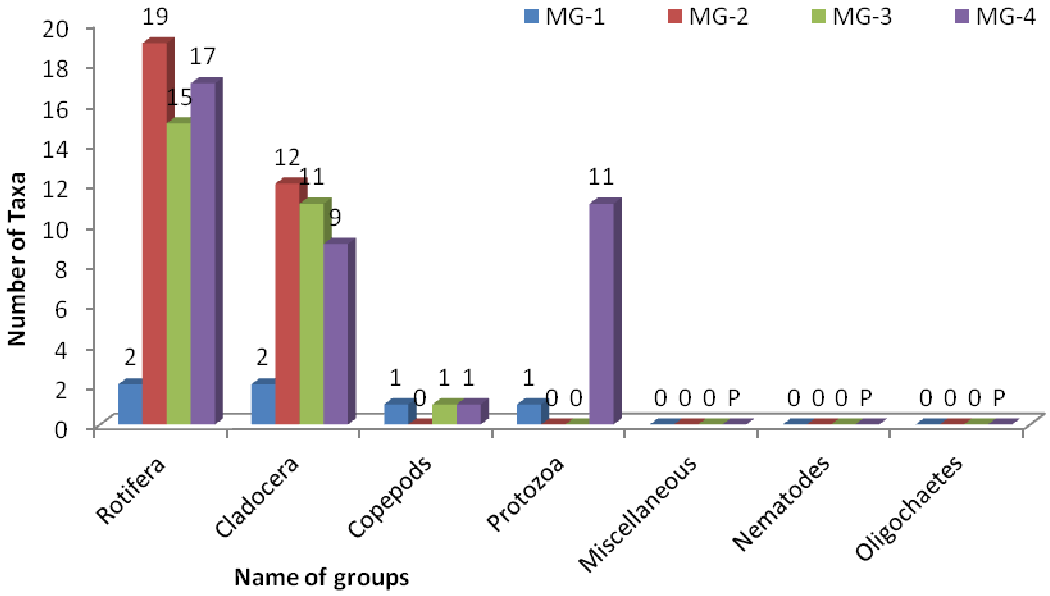


Figure 4: Distribution of zooplankton from MG-1 to MG-4

**** The data of MG-5 was not available***

2.4. Zoobenthos

Zoobenthos represents the community of organisms which live on, in or near the water bed also known as benthos. Many organisms which adapt to deep water pressure are not able to survive in the upper part of the water column. Zoobenthos in the middle Ganga region was represented by 8 orders of Insecta, Annelida and Molluscs. The zoobenthic community was represented by 51 families of Insects, 8 families of Molluscs and assorted group of Annelids. The data about the zoobenthos at MG-2 and MG-5 was not available. Among the various group of organisms, the Insecta population was dominant in the entire middle stretch and represented by Diptera and Trichoptera. Annelids were mainly represented by Oligochaetes and Polychaete. There was a decrease in marcobenthic population from Haridwar to Varanasi which may be due to the absence of hard substratum. Trichoptera, Diptera, Coleoptera and Ephemeroptera have been reported in that order, a few Odonata, Hemiptera and Plecoptera were also observed however the populations change at MG-3 and MG-4. Dipterans were conspicuously followed by Ephemeroptera/ Trichoptera at MG-4 and Gastropods, Pelecypoda and others at MG-3. The shift from insects to molluscs was due to soft substratum (Zafar and Sultana, 2005; Shivam, 2006). Sinha (1997) reported the seasonal occurrence of benthic fauna at Kanpur were *Chironomus* larvae, Oligochaetes and Rhizopods.

The distribution of zoobenthos is shown in Figure 5 and Appendix-1(d).

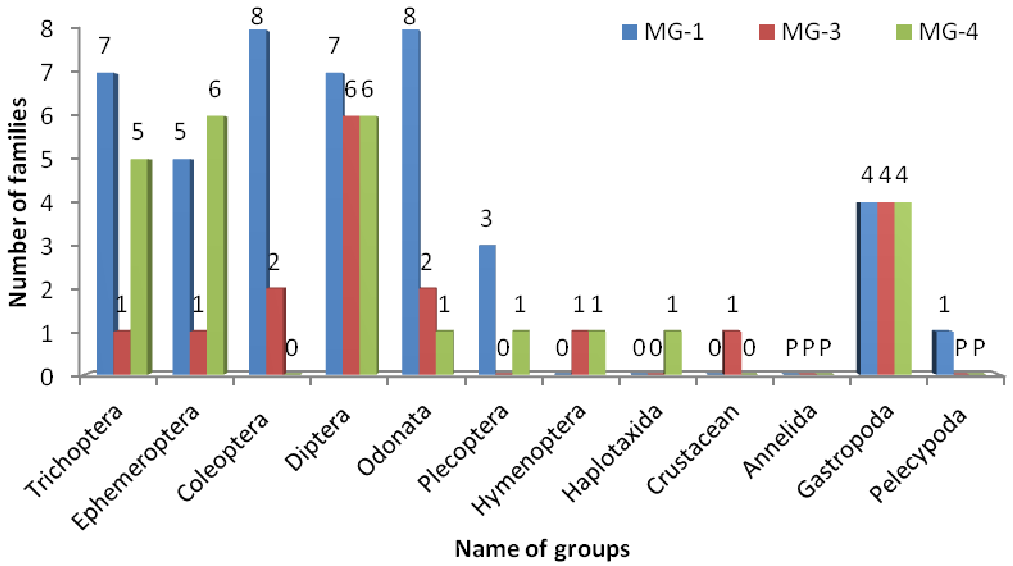


Figure 5: Distribution of zoobenthos from MG-1, MG-3 and MG-4

**** The data of MG2 and MG5 was not available;***

P symbolized the presence of the members of following order

On the basis of data of phytoplaktons, periphytons, zooplanktons and zoobenthos, the characteristics taxa and the ecological preferences of organisms reported above in the middle stretch of river Ganga are given in Table 1.

Table 1: The characteristic taxa of middle Ganga

Characteristic Taxa	Dwelling Habits & Habitat	Feeding/Habits & Habitats	Breeding Ground	Zones
Diatoms (Bacillariophyceae)	Pools, Riffles, runs	Producers grow in open water and on stony substrate, sand and plant debris	Deep pools with sandy substratum	MG-1 to MG-5
Green Algae (Chlorophyceae)	Riffles, Runs, Pools, sand & Plant debris	Producers grow in open water and on stony substrate, sand and plant debris	Deep pools with sandy substratum	MG-1 to MG-5
Rotifers	Pools, Runs, Riffles	Consumers feed on phytoplanktons and *protozoans* on dead or decomposing organic materials	Pools, Runs, Riffles	MG-1 to MG-4
Cladocera	Pools, Runs, Riffles	Pools, Runs, Riffles; Feed on planktonic algae and bacteria, and on detritus	Pools, Runs, Riffles	MG-1 to MG-4
Euglenoids	Runs, Riffles	Mainly feeds on bacteria and debris, also photosynthetic	Runs, Riffles	MG-4
Two Wing Fly (Diptera)	Sand/Silt substratum	Collectors, feeds on FPOM*	Sandy substratum, Breeding season pre-monsoon (May-June)	MG-1, MG-3, MG-4
Caddis Fly (Trichoptera), Beetle (Coleoptera)	Stony substratum	Shedders/Collectors feeds on CPOM* and FPOM	Stony substratum, Breeding season pre-monsoon (May-June)	MG-1

**FPOM is Fine particulate organic matter; *CPOM is Course particulate organic matter*

2.5. Fishes

The middle stretch is very productive in fish resources and is represented by 126 species belonging to 28 families. Three important commercial fish landing centres, Kanpur, Allahabad and Varanasi are located in the middle reach which account for nearly 2000 tons of catch every year. Almost all commercially important fishes viz. Major Carps, other Carps, large and other Catfishes along with a variety of low economical species abound. Hilsa which used to be an important catch at Allahabad and Varanasi has almost disappeared. The distribution of fishes along the entire stretch is shown in Table 2 and Figure 6. Photographs of Major Carps and Cat fishes reported in this stretch are given in Plate 1.

Table 2: Distribution of fish families (MG-1 to MG-5)

Families	MG-1	MG-2	MG-3	MG-4	MG-5
Ambyceptidae	-	-	-	1	-
Ambassidae	-	-	2	2	2
Anabantidae	-	-	1	-	1
Badidae	-	-	1	-	-
Bagridae	3	7	7	9	7
Balitoridae	4	-	8	1	1
Belonidae	1	-	1	1	-
Chacidae	-	-	1	-	-
Channidae	4	3	5	5	4
Clariidae	-	1	1	1	1
Clupeidae	-	1	1	2	4
Cobitidae	4	-	2	1	3
Cyprinidae	37	17	30	21	29
Engraulidae	-	-	-	1	1
Gobiidae	1	-	1	1	1
Heteropneustidae	1	1	1	1	1
Mastacembelidae	2	2	2	1	3
Mugilidae	1	1	-	1	2
Nandidae	1	-	1	1	1
Notopteridae	2	2	2	2	1
Osphronemidae	1	-	2	1	2
Pangasiidae	-	1	1	2	-
Pristigasteridae	-	-	-	-	1
Schilbeidae	2	2	3	5	4
Sciaenidae	-	-	-	1	1
Siluridae	-	1	4	4	-
Sisoridae	4	1	2	3	5
Tetraodontidae	1	-	-	-	-
Total	**69**	**40**	**79**	**68**	**75**

(- not reported)

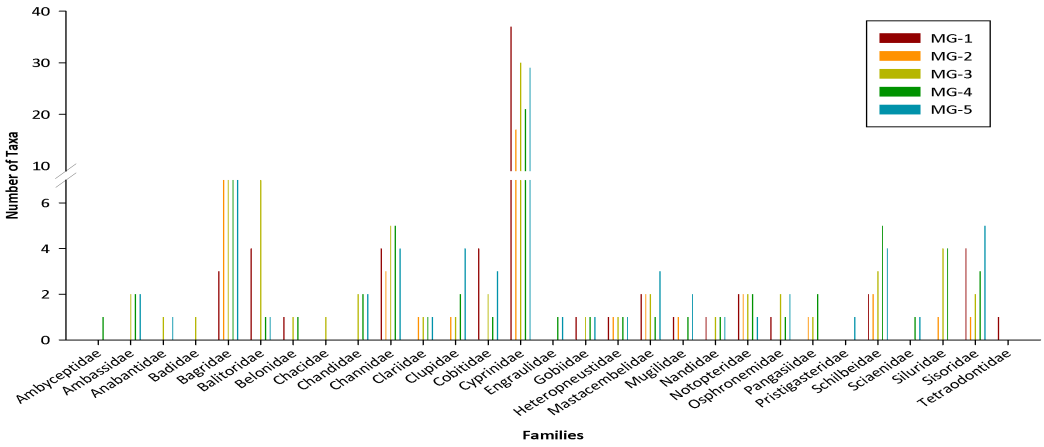
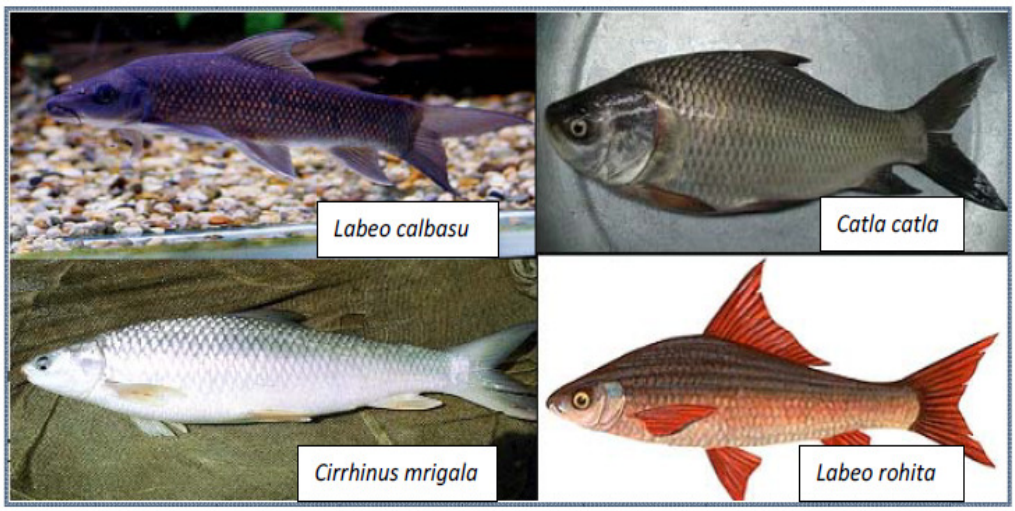


Figure 6: Distribution of fishes from MG-1 to MG-5

Major Carps



Cat Fishes

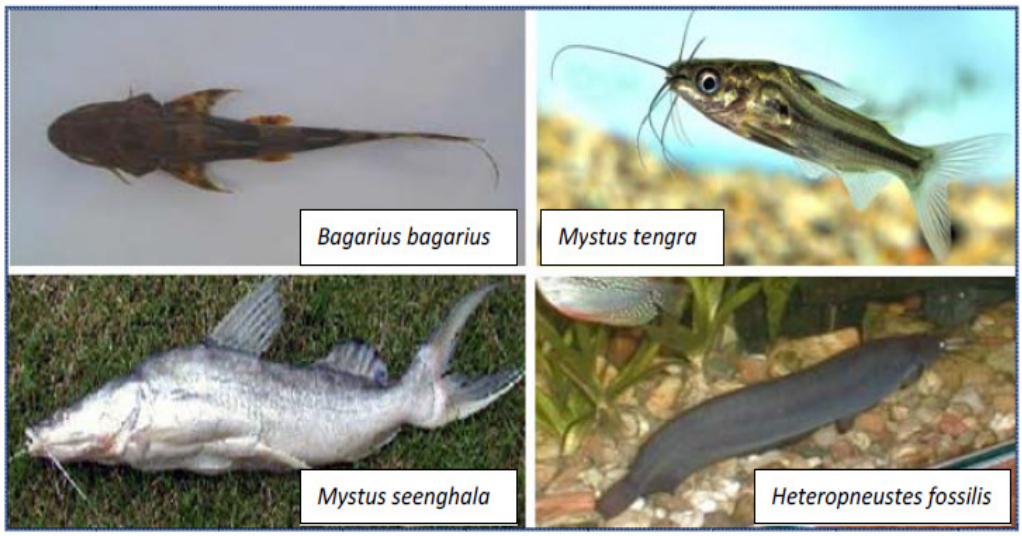


Plate 1: Typical Major Carps and Cat fishes spotted in the stretch Haridwar - Varanasi ***(* all the images were downloaded from internet)***

The important contributing families are Cyprinidae, Sissoridae, Cobitidae, Siluridae, Bagridae, Channidae, Clupeidae, Notopteridae and Mestcembalidae. Cyprinidae alone account for 55% of the fish species and also the catch in the middle Ganga river. The preponderance of the fish species is due to habitat diversity coupled with abundant fish food organism. Since the stretch is rich in nutrients, supports the growth of algae, which in term is consumed by Carps. The important fishes of the stretch are *Labeo rohita, L. calbasu, Cirrhinus mrigala, Catla catla, Sperata seenghala, Sperata aor, Wallago attu, Bagarius bagarius, Eutropiichthys vacha, Notopterus notopterus, Notopterus chitala, Mystus tengara* and *Channa marulius.* Sahgal (1973) reported four Major Carps, *viz. Labeo rohita*, *L. calbasu*, *C. mrigala* and *Catla catla* and 2 large Cat fishes, *M. seenghala* and *W. attu* at Aligarh. Of these *L. rohita* and *W. attu* are most predominant and constitute about 80% of the total fish landing. Payne *et al.* (2004) reported fish yield from Allahabad varied between 5.1-10.6 kg ha^{-1}.

Some fishes of the upper Ganga such as *Schizothorax, Tor and Glyptothorax* found in UG-2, UG-3 have also been recorded at MG-1 and MG-2. Characteristics species of middle Ganga are given in Table 3. A few exotic species viz. *Cyprinus carpio* and *Hypophthalmicthys molitrix* have been recorded downstream of Allahabad (Varanasi). *Cyprinus carpio* has been reported to grow like IMC (*Labeo rohita, L. calbasu* and *Catla catla*), with which it competes for food and growth. A detailed report on fish and fisheries in the Ganga river is contained in fishery report entitled "Status of Fish and Fisheries of River Ganga" of GRB EMP. A compilation of all the fishes recorded stretch wise is given at the end in Appendix-1(e).

Table 3 Characteristic species of middle Ganga

Characteristic Taxa	Dwelling Habitat	Feeding Habits	Breeding Ground	Stretch
Indian Major Carps *Labeo rohita, L. calbasu, Cirrhinus mrigala, Catla catla*	Inhabits fast flowing streams and rivers 1.0-3.0 m deeps water pools, velocities 20- 30 cm/sec. Temp. 15- 25°C feed selectively in upper, column, rank and bottom areas.	Herbivorous, plankton feeders	Migrate to shallow waters 0.5- 1.0m depth for spawning, period July-August	MG-1 to MG-5
Minor Carps *Labeo bata, Salmophasia bacaila, Aspidoparia morar, Puntius* sp.	Column of side waters/ ditches and banks of small streams 0.5- 1.5 m pools shallow waters	Omnivorous small insects, plankton	Breed in shallow waters Feb-Nov	MG-1 to MG-5
Cat Fishes *Sperata aor, Sperata seenghala, Wallago attu, Bagarius bagarius*	Sandy beds with deep waters >1.0 m and slow currents	Carnivorous small insects, zoobenthos, bottom dwellers	Some build nests where eggs hatch and young ones get shelter breeding (Mar-June)	MG-2 to MG-5

2.6. Other Higher Vertebrates

The zoological survey of India (ZSI, 1991) has documented 27 species of reptiles in Ganga river besides an endangered mammal Ganga river dolphin (*Platanista gangetica*). Menon (1963), Jhingran (1974), Jhingran and Ghosh (1978) have given account on the presence of fishes, amphibians and reptiles in Ganga river system. Among the important higher vertebrates reported in middle Ganga are Gangetic dolphin, gharyal, soft and hard shell turtles.

Gangetic dolphin has been reported to be present in the middle stretch MG-2 to MG-5. Dolphin has not been sighted in the stretch Haridwar to Bijnor. In between Ganga barrage at Bijnor and Narora dolphins are reported to be present in large numbers. W.W.F. survey report has put in number around 56. Downstream of Narora upto Kanpur dolphin are spotted rarely and the number between Allahabad and Buxar (downstream of MG-5) in a stretch of 425 km, 172 dolphins have been reported (Sinha *et al*. 2010).

The Gharyals (*Gavialis gangeticus*) was once common in the Ganga system (Whitaker and Basu, 1983; Hussain, 1999). Of late their numbers have greatly reduced attributable to change in land use pattern, reduction in flows, modifications in river morphology and increased mortality in fishing nets. In a survey conducted by Rao (1995), three Gharyals were reported downstream of Narora barrage. A number of Gharyal hatchlings have been introduced from Hastinapur hatchery.

A total of 12 sp. of fresh water turtles have been identified in middle Ganga. Hard shell *Kachuga* include five species (*K. smithii, K. tecta, K. tentoria, K. dhongoka and K. kachuga*) and two species of soft shell turtles (*Aspideretes gangeticus* and *A. hurum*) and one each of *Chitra indica, Lissemys punctata, Hardella thurji, Geoclemys hamiltoni* and *Melanochelys trijuga*.

The turtles are common at Allahabad but have been found in Gangdaspur in Bijnor. The turtles have been reported from Haridwar also (Rao, 1995; Smith, 1933; Das, 1985; Moll, 1987). A comprehensive account of status of higher vertebrates in Ganga river is reported in GRB EMP report entitled “Status of Higher Aquatic Vertebrates in the Ganga River, India”.

The characteristic taxa and the ecological preferences of some important vertebrates from Haridwar-Varanasi are given in Table 4.

3. Summary Remarks

The middle Ganga is biologically very productive due to the presence of higher concentration of nutrients, warm water and meandering river, flood plains and reduced flow velocities. It supports 355 species of phytoplankton, 114 species of periphyton, 58 species of zooplankton, 51 families of Insects, 8 families of Molluscs, assorted group of Annelids as zoobenthos and 126 species of fishes. The characteristic species of the stretch is the Indian Major Carps. Higher vertebrates are also common. Dolphin is also a characteristic and indicator species of the middle Ganga.

The ratio of diatoms (Bacillariophyceae) to green algae (Chlorophyceae) to blue green algae (Cyanophyceae) in the middle Ganga substretches are depicted as MG_1-MG_3 (100:36:15) and MG_4-MG_5 (100:67:36) compared to the ratio of 100:39:18 in the upper Ganga. The Indian Major Carps constitutes about 55% of the fish population and the catch in the middle reach.

Table 4: Characteristic vertebrate taxa of middle Ganga

Characteristic Taxa	Dwelling Habitat	Feeding Habits	Breeding Ground	Zones
Turtles, Kachuga and *Aspideretes* sp.	Shallow waters on sandy banks	Adult turtles feed mainly on insect larvae and decomposing organic materials (Scavengers)	Breed on sand beds Nesting in Dec- Feb hatching in May	MG-1 to MG-5
Gharyals *Gavialis gangeticus*	Less interrupted basking sites, prefer clayey islands from sand of banks	Juveniles feed on small crustaceans insects, frogs. Adults feed on small fish	Nesting in dry season preferred riverine sand banks	MG-1 to MG-3
Dolphins *Platanista gangetica gangetica*	Mid channel depth approx 2- 4.5 m with bank depth greater than 1.5 m. Rocky and muddy substrates velocity 25-30 cm/sec.	Catfish, Small carps, Prawns molluscs and turtles preferred food small fish.	No specific birth period move in pairs and give birth from Oct- March on sand bars	MG-2 to MG-5

Appendix-I

Distribution of all aquatic organisms in the middle stretch of Ganga river from Haridwar to Varanasi.

I (a). Distribution of phytoplankton in the middle stretch of Ganga from Haridwar to Varanasi.

	MG-1	MG-2	MG-3	MG-4	MG-5
Bacillariophyceae					
Achnanthes affinis					+
A. clevei					+
A. crenulata				+	
A. exigua					+
A. lanceolata					+
A. linearis					+
A. microcephala					+
A. minutissima			+	+	+
A. subhudsonis			+		
Achnanthidium biasolettianum			+	+	
Amphora sp.			+		
A. montana		+	+	+	
A. ovalis					+
A. pediculus			+		
A. veneta			+		+
Anomoeoneis spheriophora					+
Asterionella sp.		+	+	+	
A. formosa				+	
Aulacoseira granulata			+		
Bacillaria paradoxa			+	+	
Caloneis amphisbaena					+
C. bacillum				+	
C. bacillaris				+	
C. silicula					+
Ceratoneis arcus			+	+	
Cocconeis placentula			+	+	+
Craticula cuspidata				+	+
C. halophila					+
C. molestiformis				+	
Cyclotella sp.		+	+		
C. antigua					+
C. comta					+
C. glomerata			+	+	+
C. kutezingiana			+		+
C. meneghiniana			+	+	
C. operculata				+	+
C. stelligera				+	
Cymbella sp.				+	

	MG-1	MG-2	MG-3	MG-4	MG-5
C. affinis				+	+
C. cymbiformis					+
C. excisa			+		
C. kolbei			+		
C. lancetuliformis			+		
C. leavis			+	+	
C. parva			+		
C. prostrata					+
C. tumida				+	+
C. turgida					+
C. turgidula			+		
C. ventricosa					+
Cymbopleura sp.			+		
Diatoma sp.	+	+	+	+	
D. elongatum					+
D. mesodon			+	+	
D. moniliformis			+		
D. vulgaris					+
Diploneis intermedia					+
Encyonema minutum			+	+	
E. silisiacum			+		
Epithemia sp.				+	
E. gibba				+	
Fallacia pygmaea				+	+
Fragilaria sp.				+	
F. brevistriata					+
F. capucina					+
F. construens					+
F. crotonensis				+	+
F. intermedia					+
F. virescens				+	
Frustulia sp.		+	+		
Gesslaria decussis			+	+	
Gomphonema angustatum					+
G. augur					+
G. clevei					+
G. constrictum				+	+
G. gracile					+
G. lagenula			+		
G. macropuctatum					+
G. minutum			+	+	
G. olivaceum					+
G. parvulum			+	+	+
G. subclavatum					+

	MG-1	MG-2	MG-3	MG-4	MG-5
Gyrosigma sp.			+	+	
G. accuminatum		+	+	+	+
G. kutzingii					+
G. scalproides			+	+	
Hantzschia amphioxys				+	
Luticola mutica				+	+
Mastogloia danseii				+	
Melosira sp.		+	+	+	
M. ambigua		+			+
M. distans					+
M. exigua					+
M. granulata				+	+
M. variance			+		+
Meridian sp.				+	
Navicula sp.	+		+	+	
N. capitata				+	
N. cari		+	+		
N. caterva				+	
N. cincta					+
N. cocconiformis					+
N. cryptocephala					+
N. cryptofallax			+	+	
N. cryptotenella			+		
N. cryptotenelloides			+		
N. exigua					+
N. gracilis					+
N. gregaria					+
N. krarkei					+
N. microcephala					+
N. minima					+
N. minisculus					+
N. radiosafallax			+	+	
N. rhyncocephala			+	+	
N. rostelata			+		+
N. salinarum					+
N. sculpta				+	
N. seminulum					+
N. simplex					+
Nitzschia sp.			+	+	
N. acicularis		+		+	+
N. amphibia			+		+
N. capitelata				+	
N. communis			+		+
N. commutata					+

	MG-1	MG-2	MG-3	MG-4	MG-5
N. filiformis					+
N. fonticola			+	+	
N. frustulum			+	+	+
N. gracilis					+
N. hungarica			+		+
N. kittonii					+
N. linearis			+	+	+
N. microcephala				+	
N. obtusa			+	+	
N. palea			+	+	+
N. paleaceae					+
N. punctata					+
N. recta			+		+
N. sigma					+
N. subtilis					+
N. sublinearis					+
N. thermalis					+
N. trybonella					+
Pinnularia gibba				+	+
P. maior					+
P. viridis					+
Placoneis elegans			+	+	
Planothidium lanceolatum			+		
Reimeria sinuata			+		
Rhopalodia gibba					+
Sellaphora pupula			+	+	+
Stauroneis sp.				+	
S. anceps					+
Stephanodiscus sp.		+	+		
Surirella elegans					+
Synedra sp.	+	+	+	+	
S. acus				+	+
S. amphirhynchus				+	
S. fasciculata					+
S. minuscula					+
S. rumpens					+
S. ulna			+	+	+
Tabellaria sp.	+			+	
T. fenestrata				+	
T. flocculosa					+
Chlorophyceae					
Actinastrum sp.		+	+	+	
A. hantzschii					+
Ankistrodesmus sp.		+	+		

	MG-1	MG-2	MG-3	MG-4	MG-5
A. acicularis					+
A. angustus					+
A. falcatus				+	+
Botryococcus sp.		+	+		
Bumillaria exilis				+	
Celastrum sp.			+		
Chlamydomonas derenbenji					+
C. laginula					+
C. mirabilis					+
C. truncata					+
Chlorella subsala					+
C. vulgaris				+	+
Chlorobottrys sp.				+	
Chlorococcum humicola				+	
C. infusionum					+
Chlorogonium elongatum				+	
Cladophora sp.		+	+		
C. glomerata					+
Coelastrum sp.			+	+	
Closterium calosporum		+			+
C. cambricum					+
C. incurvatum					+
C. maxima					+
C. microporum					+
C. nitzsch				+	
C. parvulum					+
C. peracerosum					+
C. reticulum					+
C. rostratum					+
C. sphaericum					+
Cosmarium sp.			+		
C. anceps					+
C. denatum					+
C. dentiferum					+
C. granatum					+
C. undulatum					+
Crucigenia sp.		+	+		
C. apiculata					+
C. lanterbornei				+	
C. rectangularis					+
C. tetrapeda					+
C. truncata					+
Desmidium sp.			+		
D. aptogonum					+

	MG-1	MG-2	MG-3	MG-4	MG-5
Dictyosphaerium pulchellum					+
Diaspora cuneiformis					+
Eudorina sp.				+	
Eudorina elegans				+	+
Gonatozygon sp.			+		
G. kinahani				+	
Hormidium sp.				+	
H. suletile				+	
Hydrodictyon sp.		+	+	+	
H. reticulatum				+	+
Kirchneriella contorta					+
K. obesa					+
Micractinium radiatum					+
Microspora sp.	+	+	+		
M. amoena				+	
Mougeotia sp.			+	+	+
Netrium sp.			+		
Oedogonium sp.			+	+	
Oocystis crassa					+
O. marsoni					+
O. parva					+
O. solataria					+
Palmella sp.				+	
Pandorina sp.				+	
P. morum					+
Pediastrum sp.		+	+		
P. boryanum					+
P. clathratum					+
P. constrium					+
P. duplex				+	+
P. simplex			+	+	+
P. tetras				+	+
Pleurodermus sp.				+	
Protococcus sp.		+	+	+	
Scenedesmus sp.			+	+	
S. acuminatus		+			+
S. arcuatus					+
S. bicaudatus					+
S. bijugatus					+
S. denticulatus					+
S. diamorplus					+
S. falcatus					+
S. longus					+
S. quadricauda				+	+

	MG-1	MG-2	MG-3	MG-4	MG-5
Selenastrum sp.		+		+	
S. gracile					+
Sphaerocystis schroeteri				+	
Spirogyra sp.	+	+	+	+	
S. affinis					+
S. decimina					+
S. spingularis					+
S. subsala					+
Staurastrum sp.			+		
Stigeoclonium sp.				+	
Tetrahedron bifidum					+
T. constrictum					+
T. minimum					+
T. muticum					+
Tetraspora sp.		+	+		
Treubaria varia				+	
Tribonema sp.				+	
Ulothrix sp.	+	+	+	+	
U. subtellisma					+
U. zonata					+
Volvox globator				+	
Zygnema sp.		+	+	+	+
Cyanophyceae					
Agmenellum sp.		+	+		
Anabaena sp.	+	+	+	+	
A. circularis					+
A. cylindrica					+
A. laxa					+
A. sphaerica					+
A. torulosa					+
A. variabilis					+
Anacystis sp.		+	+		
Aphanocapsa pulchra					+
Chroococcus dispersus					+
C. turgidus					+
Cylindrospermum sp.				+	
Lyngbya gracilis					+
L. heironymusii					+
L. limnetica					+
L. manifica					+
Merismopedia sp.				+	
M. convulata					+
M. glauca					+
M. marsinii					+

	MG-1	MG-2	MG-3	MG-4	MG-5
M. minima					+
M. punctata					+
Microcystis sp.				+	
M. aeruginosa				+	+
M. flos-aquae					+
M. protocystis					+
Nostoc sp.				+	
N. calcicola					+
Oscillatoria sp.	+		+	+	
O. agardhii		+			+
O. amphibia					+
O. formosa					+
O. irrigua					+
O. limnetica					+
O. limosa				+	+
O. planktonica					+
O. princeps				+	+
O. raciboraki					+
O. subbrevis					+
O. subsalsa					+
O. tenuis				+	+
Phormidium sp.		+	+	+	
P. calcicola					+
P. inundatum					+
P. mucicola					+
Raphidiopsis curvata					+
R. indica					+
R. mediterranea					+
Rivularia sp.	+				
Spirulina sp.				+	
S. laxissima					+
S. maior					+
S. princeps				+	+
S. subsalsa					+
S. subtillisma					+
Euglenophyceae					
Euglena sp.	+	+	+		
E. acus				+	+
E. gracilis					+
E. proxima					+
E. viridis				+	+
Phacus accuminatus		+	+		+
P. pusillus					+
Trachelomonas granulata					+

	MG-1	MG-2	MG-3	MG-4	MG-5
T. planktonica					+
Dianophyceae					
Ceratium sp.				+	
C. digitatum					+
C. evareuatum					+
C. falcatum					+
Peridiriium brevipes					+
P. brochii					+
P. cinatum					+
Gymnodinium album					+
G. variabile					+
Chrysophyceae					
Botryococcus sp.				+	
Xanthophyceae					
Tribonema bombycinum				+	+

I (b). Distribution of periphyton in the middle stretch of Ganga river from Haridwar to Varanasi.

	MG-1	MG-3	MG-4
Bacillariophyceae			
Achnanthes sp.	+		
A. brevipes	+		
A. microcephala	+		
Achnanthidium biasolettianum	+		
A. minutissimum	+		
Amphora sp.	+		
A. montana	+		
A. ovalis	+		
Anomoeoneis serians	+		
Asterionella formosa	+		
Aulcoseira granulata	+		
Caloneis silicula	+		
Cocconeis sp.	+		
C. placentula	+		
Cyclotella sp.		+	
C. glomerata	+		
C. kuetzingiana	+		
C. meneghiniana	+	+	
C. stelligera			+

	MG-1	MG-3	MG-4
Cymbella sp.	+	+	
C. austriaca			+
C. delicatula			+
C. kolbei		+	
C. leavis	+		
C. parva		+	
C. perpusilla		+	
C. prostrata	+		
C. turgidula	+		
Diatoma sp.			+
D. mesodon		+	
D. vulgare	+		
D. vulgaris	+		
Encyonema minutum		+	
Fragilaria sp.	+		
F. crotonensis		+	
F. inflata		+	
Frustulia sp.	+		
Gomphonema sp.		+	+
G. helvaticum			+
G. minutum		+	
Gyrosigma sp.	+		
G. acuminatum		+	
G. distortum	+		
G. scalproides	+		+
Mastogloia danseii	+		
Melosira granulata	+		
Navicula sp.	+	+	
N. constans		+	
N. cryptotenella			+
N. hustedtii	+		
N. lancettula		+	
N. mutica		+	
N. radiosa	+		
N. rostellata			+
N. rynchocephala	+		
N. stagnorum	+		
Nitzschia sp.	+		
N. communis	+		
N. gracilis			+
N. hungarica		+	
N. ignorata	+		
Pinnularia sp.	+		
P. gibba	+		

	MG-1	MG-3	MG-4
P. subcapitata	+		
Placoneis elegans			+
Planothidium lanceolata		+	
Pleurosigma sp.	+		
Stauroneis sp.	+		
Surirella sp.		+	
S. apiculata		+	
S. delicatissima		+	
Synedra sp.	+		
S. ulna	+	+	
Tabellaria sp.			+
T. fenestrata		+	
Chlorophyceae			
Chlorella sp.	+		
Chlorogonium sp.			+
Cladophora sp.	+		
Closterium sp.	+		
Cosmarium sp.	+	+	
Dictyosphaerium ehrenbergianum	+		
Draparnaldia sp.	+		
Hydrodictyon sp.	+		
Kirchneriella sp.	+		
Oedogonium sp.	+	+	
Oocystis elliptica	+		
Pandorina morum	+		
Pediastrum sp.	+		
P. clathratum	+		
P. duplex			+
P. simplex	+		
Scenedesmus sp.	+		
S. dimorphus		+	
S. quadricauda			+
Schizogonium sp.	+		
Spirogyra sp.	+	+	
Ulothrix sp.	+		
Zygnema sp.		+	
Cyanophyceae			
Anabaena sp.	+		
Coelosphaerium naegelianum	+		
Lyngbya sp.	+		
Merismopedia glauca		+	
M. minima	+		
M. tenuissima	+		
Microcystis aeruginosa	+		

	MG-1	MG-3	MG-4
Nostoc sp.	+		
Oscillatoria sp.	+		
O. limosa			+
Phormidium sp.	+		
Rivularia sp.	+		
Euglenophyceae			
Euglena acus			+
E. viridis			+
Xanthophyceae			
Tribonema bombycinum			+
Vaucheria sp.	+		

I(c). Distribution of zooplanktons in the middle stretch of Ganga river from Haridwar to Varanasi.

	MG-1	MG-2	MG-3	MG-4
Protozoa				
Actinophrys sp.				+
Actinosphaerium sp.				+
Amoeba sp.				+
Arcella sp.				+
Colpedium sp.				+
Difflugia sp.				+
Euglena sp.				+
E. viridis				+
Euplotes sp.	+			+
Paramecium sp.				+
Vorticella sp.				+
Rotifera				
Asplanchna sp.		+	+	
A. priodonta				+
Brachionus sp.				+
B. angularis		+	+	
B. calyciflorus		+	+	+
B. caudatus				+
B. forficula		+	+	+
B. quadridentatus		+	+	+
B. rubens		+		+
Euchlanis dilatata		+	+	
Filinia sp.				+
F. longiseta		+		+
F. terminalis		+		
Gastropus sp.		+	+	
Hexarthra sp.				+

	MG-1	MG-2	MG-3	MG-4
Keratella sp.	+			+
K. cochlearis				+
K. procurva		+	+	
K. quadrata				+
K. tropica		+	+	+
K. valga		+	+	
Lecane sp.		+	+	+
Notholca sp.	+	+	+	+
Philodina sp.			+	
Platyias quadricornis		+		
Polyarthra sp.		+	+	+
Rotaria sp.		+		
Testudinella sp.		+	+	
Cladocera				
Anura fissa				+
Bosmina sp.	+	+	+	
B. longirostris				+
Ceriodaphnia sp.		+	+	
C. carinata				+
Daphnia sp.	+	+		
D. carinata		+	+	
Diaphanosoma sp.		+	+	+
Diaptomus sp.		+	+	+
Leydigia sp.		+	+	
Mesocyclops sp.				+
M. hyalinus		+	+	
M. leuckarti		+	+	
Moina sp.		+	+	
M. micrura				+
Moinodaphnia sp.				+
Nauplius larvae		+	+	+
Simocephalus sp.		+	+	
Copepods				
Cletocamptus sp.			+	
Cyclops sp.	+			+
Miscellaneous				
Chironomus larva				+
Mosquito larvae				+
Nematodes				+
Oligochaetes				+

I(d). Distribution of zoobenthos in the middle stretch of Ganga river from Haridwar to Varanasi.

	Taxa	MG-1	MG-3	MG-4
Trichoptera				
Brachycentridae				+
Glossosomatidae		+		+
Helicopsychidae	*Helicopsyche* sp.	+		
Hydropsychidae		+	+	+
Hydroptilidae				+
Limnephilidae	*Hesperophylax* sp.	+		
	Limnephilus sp.	+		
Leptoceridae	*Mystacides* sp.	+		
	Leptocella sp.	+		
	Triaenodes sp.	+		
Polycentropodidae	*Cyrnellus* sp.	+		
Rhyacophilidae				+
Other Trichoptera		+		+
Ephemeroptera				
Baetidae		+	+	+
Caenidae		+		+
Ephemerellidae		+		+
Heptageniidae		+		+
	Epeorus sp.	+		
	Rhithrogena sp.	+		
Leptophlebiidae				+
Neoephemeridae				+
Siphlonuridae		+		
Other Ephemeroptera				+
Coleoptera				
Amphizoidae	*Amphizoa* sp.	+		
Chrysomelidae	*Donacia* sp.	+		
Dytiscidae			+	
	Cybister sp.	+		
	Dytiscus sp.	+		
Elmidae	*Stenelmis* sp.		+	
Gyrinidae	*Dineutus* sp.	+		
Hydrochidae	*Hydrochus* sp.	+		
Hydrophilidae	*Hydrophilus* sp.	+		
Noteridae	*Hydrocanthus* sp.	+		
Psephenidae	*Psephenus* sp.	+		
Other Coleoptera				+
Diptera		+		
Athericidae	*Atherix* sp.	+		
Chironomidae		+	+	+
Culicidae			+	+

	Taxa	MG-1	MG-3	MG-4
	Culex sp.	+		
Dixidae	*Dixa* sp.	+		
Heleidae			+	+
Limoniidae	*Antocha* sp.	+		
Muscidae	*Limnophora* sp.			+
Simuliidae	*Simulium* sp.	+	+	
Syrphidae	*Eristalis* sp.			+
Tabanidae	*Tabanus* sp.	+	+	+
Tipulidae	*Megistocera* sp.		+	
Other Diptera		+		
Odonata				
Aeshnidae	*Aeshna* sp.	+		
Corduliidae	*Epicordulia* sp.	+		
	Helocordulia sp.	+		
	Macromia sp.	+		
Gomphidae			+	+
	Hagenius sp.	+		
Lestidae	*Lestes* sp.	+		
Hemiptera			**+**	
Belostomatidae	*Belostoma* sp.	+		
Corixidae	*Sigara* sp.	+		
Nepidae	*Ranatra* sp.	+		
Notonectidae	*Notonecta* sp.	+		
Plecoptera				
Chloroperlidae	*Alloperla* sp.	+		
Perlidae				+
	Neoperla sp.	+		
Perlodidae	*Isoperla* sp.	+		
Hymenoptera				
Agaonidae			+	+
Crustacean				+
Cyprididae	*Cypris* sp.		+	
	Heterocypris sp.		+	
Annelida		+	+	+
Hirudinea		+	+	+
Haplotaxida				
Glossoscolecidae				+
Unidentified			+	
Mollusca				
Gastropoda		+	+	
Bithyniidae	*Bithynia* sp.	+	+	
Lymnaeidae	*Lymnaea* sp.	+		+
	L. accuminata	+		
Pleuroceridae	*Goniobasis* sp.	+		

	Taxa	MG-1	MG-3	MG-4
Planorbidae	*Gyraulus* sp.	+		
	G. convexiculus	+		
	Indoplanorbis sp.		+	
Subulinidae	*Subulina* sp.		+	
Thiaridae				+
Viviparidae	*Bellamya bengalensis*			+
	Vivipara crassa			+
	V. bengalensis		+	+
Pelecypoda			+	+
Corbiculidae	*Corbicula* sp.	+		

I(e). Distribution of fishes in the middle stretch of Ganga river from Haridwar to Varanasi.

Species	Families	MG-1	MG-2	MG-3	MG-4	MG-5
Ailia coila	Schilbeidae			+	+	+
Amblyceps mangois	Ambyceptidae	+				
Amblypharyngodon melettinus	Cyprinidae			+		
A. mola	Cyprinidae		+	+	+	+
Anabas testudineus	Anabantidae			+		+
Aspidoparia jaya	Cyprinidae				+	
A. morar	Cyprinidae	+			+	+
Badis badis	Badidae			+		
Bagarius bagarius	Sisoridae	+	+	+	+	+
Barilius barila	Cyprinidae	+	+	+		+
B. bendelensis	Cyprinidae	+				+
B. bola	Cyprinidae	+	+	+	+	+
B. dimophicus	Cyprinidae	+				
B. vagra	Cyprinidae	+	+	+		
Botia almorhae	Cobitidae	+				
B. dario	Cobitidae	+		+	+	+
B. dayi	Cobitidae					+
B. lohachata	Cobitidae	+				
Catla catla	Cyprinidae	+	+	+	+	
Chaca chaca	Chacidae			+		
Chagunius chagunio	Cyprinidae	+				+
Chanda nama	Ambassidae			+	+	+
C. ranga	Ambassidae			+	+	+
Channa gachua	Channidae	+		+	+	+
C. marulias	Channidae	+	+	+	+	+
C. punctatus	Channidae		+	+	+	+
C. stewartii	Channidae			+	+	
C. striatus	Channidae	+	+	+	+	+
Chela laubuca	Cyprinidae			+		+
Cirrhinus mrigala	Cyprinidae	+	+	+	+	+
C. reba	Cyprinidae	+	+	+	+	+
Clarias batrachus	Clariidae		+	+	+	+
Clupisoma garua	Schilbeidae	+	+	+	+	+
C. montana	Schilbeidae	+				
Colisa fasciaotus	Osphronemidae	+		+	+	+
C. lalia	Osphronemidae			+		
Crossocheilus latius latius	Cyprinidae	+		+		+
Cyprinus carpio	Cyprinidae					+
Danio devario	Cyprinidae	+		+		+
D. rerio	Cyprinidae	+		+		+
Esomus danricus	Cyprinidae	+	+		+	+
Eutropiichthys murius	Schilbeidae				+	+

Species	Families	MG-1	MG-2	MG-3	MG-4	MG-5
E. vacha	Schilbeidae		+	+	+	+
Gagata cenia	Sisoridae				+	+
Garra gotyla gotyla	Cyprinidae	+		+	+	+
G. prashadi	Cyprinidae			+		
Glossogobius giuris	Gobiidae	+		+	+	+
Glyptothorax dakpathri	Sisoridae	+				
G. indicus	Sisoridae	+				
G. pectinopterus	Sisoridae	+				
Goniolosa manmina	Clupeidae					+
Gudusia chapra	Clupeidae		+	+	+	+
Heteropneustes fossilis	Heteropneustidae	+	+	+	+	+
Hypophthalmichthys molitrix	Cyprinidae					+
Ilisha motius	Pristigasteridae					+
Johnius coitor	Sciaenidae				+	+
Labeo bata	Cyprinidae	+	+		+	+
L. boga	Cyprinidae	+		+		
L. calbasu	Cyprinidae	+	+	+	+	+
L. dero	Cyprinidae	+				
L. dyocheilus	Cyprinidae	+	+			
L. gonius	Cyprinidae	+	+	+	+	+
L. pangusia	Cyprinidae	+		+		+
L. rohita	Cyprinidae	+	+	+	+	+
Laubuca atper	Cyprinidae			+		
Lepidocephalus guntea	Cobitidae	+		+		+
Macrognathus aculeatus	Mastacembelidae		+			+
M. pancalus	Mastacembelidae	+		+		+
Mastacembelus armatus	Mastacembelidae	+	+	+	+	+
Mystus bleekeri	Bagridae		+	+	+	+
M. cavasius	Bagridae		+	+	+	+
M. menoda	Bagridae				+	
M. tengara	Bagridae	+	+	+	+	+
M. vittatus	Bagridae		+	+	+	+
Nandus nandus	Nandidae	+		+	+	+
Nangra nangra	Sisoridae			+		
N. punctata	Sisoridae					+
Nemacheilus bevasni	Balitoridae			+		
N. botia	Balitoridae	+		+	+	+
N. corica	Balitoridae	+		+		
N. montanus	Balitoridae	+		+		
N. multifasciatus	Balitoridae			+		
N. rupecola	Balitoridae	+				
N. savena	Balitoridae			+		
N. scaturingina	Balitoridae			+		
N. zonatus	Balitoridae			+		

Species	Families	MG-1	MG-2	MG-3	MG-4	MG-5
Notopterus chitala	Notopteridae	+	+	+	+	+
N. notopterus	Notopteridae	+	+	+	+	
Ompok bimaculatus	Siluridae			+	+	
O. boopis	Siluridae			+		
O. pabda	Siluridae			+	+	
O. pavole	Siluridae				+	
Ophiocephalus punctatus	Channidae	+				
Osteobrama cotio	Cyprinidae			+	+	+
Oxygaster bacaila	Cyprinidae		+	+	+	
O. gora	Cyprinidae		+			
Pangasius pangasius	Pangasiidae			+	+	
Pseudotropius atherinoides	Schilbeidae				+	
Puntius chagunio	Cyprinidae		+		+	
P. chola	Cyprinidae	+		+		
P. conchonius	Cyprinidae	+				
P. sarana sarana	Cyprinidae	+		+	+	
P. sophore	Cyprinidae	+		+	+	+
P. ticto	Cyprinidae	+		+	+	
Raiamas bola	Cyprinidae	+				+
Rasbora daniconius	Cyprinidae	+		+		
Rhinomugil corsula	Mugilidae	+			+	+
Rita rita	Bagridae	+	+	+	+	+
Salmostoma bacaila	Cyprinidae	+				+
Schizothoracthys progastus	Cyprinidae	+				
Schizothorax plagiostomus	Cyprinidae	+				
S. richardsonii	Cyprinidae	+				
S. sinuatus	Cyprinidae	+				
Sciamugil cascasia	Cyprinidae					+
Securicula gora	Cyprinidae					+
Setipinna phasa	Engraulidae				+	+
Silonia silondia	Schilbeidae		+		+	
Sisor rabdophorus	Sisoridae				+	
Sperata aor	Bagridae		+	+	+	+
S.seenghala	Bagridae	+	+	+	+	+
Tenulosa ilisha	Clupeidae				+	+
Tetraodon cutcutia	Tetraodontidae	+				
Tor putitora	Cyprinidae	+	+	+		
T. tor	Cyprinidae	+		+	+	
Wallago attu	Siluridae		+	+	+	
Xenentodon cancila	Belonidae	+		+	+	

Besides the above list few taxas were reported for which no confirmation was available. The list of the same is given below:

Species	Families	MG-1	MG-2	MG-3	MG-4	MG-5
Amblypharyngodon microlepis	Cyprinidae				+	
Barilius tileo	Cyprinidae					+
Barilus modestus	Cyprinidae			+		
Colisa chuna	Belontidae					+
Glyptothorax telchita	Sisoridae					+
Leiocassis rama	Bagridae				+	
Mugil corsula	Mugilidae		+			
Nangra viridescens	Sisoridae					+
Puntius spp.	Cyprinidae				+	
Rasbora elanga	Cyprinidae			+		

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