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IDENTIFICATION AND MORPHOLOGY OF SELECTED FISHES AT BABDRABHAN (NARMADA AND TAWA RIVER SANGAM AREA) HOSHANGABAD M. P

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AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration between both authors. Author QJS designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Author MR managed the analyses of the study. Author MR managed the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

The current study was carried out to explore the diversity and abundance of fishes in the Narmada and Tawa River connecting area in Madhya Pradesh. For the measurement of diversity different characteristics were calculated and observed of different families like total length, length of head, length of eye, length of snout, height of head, width of head, length of maxillar barbells, total pairs of barbells and so on. The present data was compared to the previously published data it showed that the overall diversity is still conserved but there is massive decrease in the number of particular species. The effluent effect on living organisms and the assessment of pollution is essential. The present study have been undertaken to see the effect of pollutants on the distribution of occurrence and abundance of fishes at Narmada and Tawa River connecting area at Hoshangabad MP.

Keywords: Fresh water; Hoshangabad; morphological measurement, Tawa River; Narmada.

1. INTRODUCTION

Water is vital molecule for life to survive. It possesses a number of physical and chemical properties that help the molecule to act as best suited medium for life activities. The movement of water from earth surface to atmosphere through hydrological cycle appears to be a close system. Water is the most abundant substance on the earth's surface. The oceans cover approximately 71 % of the planet, glaciers and ice caps cover additional areas; and water is also found in lakes and streams, in soils and underground

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reservoirs, in the atmosphere and in the bodies of all living organisms [1-2]. Thus water in all its forms - ice, liquid and vapour - is very familiar. Humans use water in the home, in industry, in agriculture and for recreation. These applications differ widely in the quantities and qualities of the water that they require. In one way or another, we use all available sources - inland water, ground water and even ocean water. Globally, the daily demand for water has been increasing widly, though pure fresh water availability is on the decline. It may be even more essential than crop land, range land and fisheries. Without water, after all nothing can survive. Signs of water scarcity are now pervasive. Most of the biochemical reactions that occur in the metabolism and growth of the living cells involve water, which has often been referred to as the universal solvent. Water is not only a major component but also the best solvent and a medium on which all organisms depend for their existence. Indeed the economics of all life processes and living communities are hinged on this most vital element [3].

As powerful solvent water is an excellent medium for the chemical processes of living systems. It is hard to imagine life having any other basis than water. Movements by living organisms depend on fluidity of water [4]. Hence, conservation of this precious resource is assuming great significance as the increasing demand for water has been exceeding its availability due to population explosion and industrial revolution. Since time immemorial, fresh water has always been of vital importance to man and it is interesting to note that his early habitations were within easy reach of lakes and rivers [5]. Man's primary concern with water was thought to be for drinking, food and as a means of cleaning, but with the passing of time man realized the inherent mysteries of aquatic phenomenon and water as the basis for all life activities. Invention of simple and compound microscopes gave a new platform to the study of aquatic organisms, opening this so far concealed world for scientific investigations. The present research work entitled "Identification, morphometry and blood profile of selected fishes at Babdrabhan (Narmada and Tawa River Sangam area) Hoshangabad M.P."

2. MATERIAL AND METHODS

The present work deals with the seasonally various parameters which were divided into three parts. The first parameter includes the identification of fishes. The second part encompasses the most important part of the present research work i.e. the blood profile, blood biochemistry and enzyme-logical (tissue) parameters of fishes. The third part deals with the limnological or hydro-biological indices of test water and quantitative analysis of phyto and zooplankton. The last part concludes the statistical analysis of outcome data.

2.1 Collection of Fishes and Preservation

The present study was conducted on the Babdrabhan (Narmada and Tawa River sangam area) Hoshangabad (M. P.) India, the fishes were collected from Babdrabhan (Narmada and Tawa River sangam area) Hoshangabad with the help of local fisherman using different type of nets namely gill nets, cast nets and drag nets. Immediately photographs were taken prior to preservation since formalin decolorizes the fish colour on long preservation. Formalin solution was prepared by diluting one part of concentrated formalin or commercial formaldehyde with nine parts of water i.e. 10 % formalin. Fishes brought to the laboratory were fixed in this solution in separate jars according to the size of species. Smaller fishes were directly placed in the formalin solution while larger fishes were given an incision on the abdomen before they were fixed. The fishes collected and fixed were labelled giving serial numbers, exact locality from where collected; date of collection, the common local name of fish used in the region was labelled on each jar. The identification of fishes was carried out with the help of standard literature day (1878), Datta Munshi and Shrivastava (1988), Talwar and Jhingran (1991), Jayaram (1999), and their abundance also estimate. The identification of the species was done mainly on the basis of the colour pattern, specific spots or marks on the surface of the body, shape of the body, structure of various fins etc.

Throughout the work the identification of fishes Babdrabhan (Narmada and Tawa River sangam area) Hoshangabad, the fishes were collected alive. The damaged, cut and spoiled fishes were not taken for study but only the fresh specimens were preserved for the purpose of present study.

2.2 General Structure of Fish

1. The fishes are cold blooded vertebrates and their body is suitable for aquatic mode of life.
2. They have stream lined body with few exceptions.
3. They have a combination of median and paired fins.
4. There are median dorsa-anal and caudal fins.
5. There is a fins of pectoral fin and pelvic fin, located pictorially.
6. The body is covered by dermal scales, denticles or bony plates.

7. In the most primitive jawed fishes there is auto stylic jaw suspension. In the primitive sharks it was amphistylic and in the later shark and bony fishes the jaw suspension is of hypostylic type.
8. Gills are the chief respiratory organs but some time accessory respiratory accessory respiratory organs may be present.
9. Gills slits may be covered by operculum as in teleosts. The maxium number of gills is 7 pairs.
10. In the bony fishes, the spiracle is much suppressed or it disappears completely.
11. It has one auricle and one ventricle. The venous blood is pumped to the gills for aeration.
12. There are 10 pairs of cranial nerves.
13. Their lateral line system and receptors are well developed.
14. The adult kidney is mesonephric.
15. Paired nostrils are present. The first pair forms the upper and lower jaws, the second forms suspensorium and the rest supports the gills.
16. They are widely distributed.

2.3 Identification of Fish

Fish identification is a process of matching the diagnostic features with the specimens of a species which is named thereafter. Identification of a fish is based on three types of characters:

2.4 Morphological Bases

The term suggests that it is the extreme measurement of the fish body. Various parts of the body are measured in the form of body length ratio. Since the older description of fishes is based on ratios, it is necessary to work out ratios in our material so that they can be easily compared. The ratios are worked out by simple division of one measurement by the other. For example a specimen with 100mm. total length, the length of head 20mm. the ratio of the later in relation to the total length comes to five times in the total length (i.e. 100-20). Similar method can be used for calculating other body ratios.

2.5 Morphological Characters are Divided into 4 Types

2.5.1 Descriptive characters

They are about the profile of the body, shape, size, colour. Barbells, lips, scales, lateral line etc.

Profile of the body: It is a curvature of the body from dorsal to the ventral side.

Shape of the body: Fishes exhibit a great variation in the shape of the body. Body shapes of the following types have been mentioned.

(1) **Compressed form:** the body profile is laterally compressed. Example- butter fish.
(2) **Elongated or serpentine form**: the body is snake like i.e. cylindrical elongated and sub cylindrical in cross section. Example Eel.
(3) **Horse like:** the body is horse shaped and the tail is apprehensible example, Hippocamous.
(4) **Filiform:** The body is thread like i.e. highly attenuated profile.
(5) **Giobiform:** The profile of the body is globe like, example putters (Tetradonts)
(6) **Ribbon like form:** the body is elongated but compressed laterally. Example Ribbion fish.
(7) **Fusiform:** the fish has a contour of a torpedo, i.e. it is stream lined or boat shaped, the contour gently sweeps back from a maximum girth in cross section at about 1/3 of the length from the anterior end.
(8) **Depressed form:** the body is flat dorsoventrally, example catfish.
(9) **Symmetrical body:** Majorty of fish has a bilatrral symmetrical body.
(10) **Asymmetrical body:** Some fishes are exceptional in having a bilaterally asymmetrical body.
(11) **Snake head type:** the body is elongated and head snake shaped the best example is Channa.
(12) **Pipe like:** The body is elongated. Example- Syngnathus.

Coloration: Fishes exhibit a variety of beautiful colours. The coloration is imparts due to the different chromatophores and idiocytes. The true colour pigments are biochromes contained in different chromatophores lack of these results in albino.

A) Melanophores gives black color
B) Leucophores gives white color
C) Xanthophores gives yellow color
D) Erythrophores gives red orange color
E) Guanine and purine gives white and silvery color
F) Flavin gives yellow green color
G) Carotenoid gives yellow color
H) Indi gold gives blue, red and green.
I) Chromo lipoid gives yellow to brown color
J) Melanin gives black color
K) Pterine gives white
L) Porphyrins and bile gives red, yellow, green and brown colour.

Mouth: Mouth may be terminal, superior or inferior.
Lips: Lips may be continous, discontionus thick and fringed.
Snout: Snout may be pointed, rounded, tubular and over hanging the mouth.

Jaws: Jaws may be normal, projecting or modified when projecting, either both jaws or projecting or only one of the jaws.
Teeth: Teeth on one jaw may be cardiform (short and pointed), villiform (large and pointed), canine (piercing), incisor (sharp, cutting), comb like or molariform (crushing and grinding), teeth may be vomerine, palatine, pharyngeal and tongue teeth when found on sites other than jaws.
Pores: Small pores may or may not be present on snout.
Barbels: They are thin, thread like sensory extension of the skin. Their number varies from one to four pairs. They are named on the basis of their origin and are known by the different names.

- Nasal when originates from nostrils.
- Rostral when originates from snout.
- Maxillary when originates from upper jaws.
- Mandibular when originates from lower jaws.

They are mostly present around the mouth in cat fish and carps with different length.

Scales: Scales are integumentary derivatives, they may be small rudimentary or prominent in size, they may be cycloid, ctenoid, placoid, cosmoid and ganoid types. Scale counts have diagnostic value in taxonomy. Scales may undergo modification beyond recognition.

Lateral line: A sensory lateral line may be complete, incomplete or broken it may be shifted upwards and downwards.

Special marking of the body: Special marking may be present on the body, in the form of the spot, bloch, strips, lines, bands etc.

Shapes and types of the median fins: Fins may be paired (pectoral and pelvic fin) or median (dorsal, caudal and anal fin). A fin may be supported by the fin rays or spines or both. It may be without fin rays (adipose fin). The counting of fin rays is a diagnostic character of a fish species.

(a) **Dorsal fin:** It may be one, two or even three. The dorsal fin may be modified into a sucker (*Echinies*) or bait (*Lophius*) or all together absent (*notopterus*) an elongated (Balistis).
(b) **Anal fin:** It may be normal sized or greately enlarged or completely absent. The anal fin may be modified into an intermittent organ called gonopodium.
(c) **Pectoral fin:** Generally of normal size.
(d) **Caudal fin:** The caudal fins exhibits a variation in shape. It may be forked, truncated, emergent, paddle shaped, rounded, notched, ovate, lanceolate etc.

Sexual dimorphism: The fish may be male or female depending on the shape of the belly.

2.5.2 ***Morphometric charecters***

They are linear measurement of the body and its parts.

Total length: It is measured from the tip of the snout to the tip of the caudal fin and is denoted by T.L.

Fork length: It is the distance between the anterior most part of the body and the point of bifurcation of the forked caudal fin.

Standard length: It is measured from the tip of the snout to the base of caudal fin and is denoted by S.L.

Head length: It is measured from the tip of the snout to the posterior most, bony extremity of the operculum and is denoted by H.L.

Diameter of eye: Measurement taken between the anterior and posterior walls of the bony orbit.

Girth length: It is the distance covering the circumference of the body and its deepest level.

Pre-dorsal fin length: Measured from the tip of the snout up to the origin of dorsal fin.

Pre pelvic / ventral fin length: It is the distance from the tip of the snout up to the origin of pelvic fin.

Pre anal fin length: It is measured from the tip of the snout up to the origin of anal fin.

Pre pectotal fin length: It is the distance from the tip of snout up to the origin of the pectoral fin.

Caudal fin length: It is measured from the base of the caudal fin and the near point to the caudal fin SL-TL. Body ratio can be calculated on percentage basis as follows [6].

$$\text{\% of length of head in total length} = \frac{\text{head length}}{\text{total length}} \text{ X } 100$$

Snout Length: It is the distance in a straight line between the anterior most part of the snout or upper lip whichever is extending farthest forward and the posterior most edge of the opercular bone.

Post orbital length: It is the distance in a straight line between the posterior margin of the orbit and posterior most edge of the opercular bone.

Head depth: It is the distance between the occiput and the ventral side of the head .

Least depth of caudal penducle: It is the shortest of distance of height of the caudal penducle.

Nape: It is the back of the neck.

Isthamus: It is the inter space which separates the gills openings of the left and right side and which lies anterior to the breast.

Occiput: It is the point on the mid dorsal line which joins the head with the trunk occipital occiput head depth pectoral fin operculum suborbital depth.

Occipital: It is the distance between the two perpendicular lines touching the posterior end of the orbit and the occiput.

3. Meristic Character: The character depicted by number are considered as meristic character. These include the number of branchiostegal rays, scales, barbells, gillrackers etc. Standard abbreviations are used as follows:

1) **Branchio-stegal rays**: - these are curved bony rods attached to the hyoid cornea. A definite number of branchio- stegal rays present on either side of ventral side of the head . I t is an important parameter in fish taxonomy and it designated as B iii or B xi in fin formula.
2) **Fin rays:** The fins normally have undivided and divided rays. An Oblique (/) stroke is used to separate the two kinds of rays in the fin formula. The undivided rays are designed by roman numerals and the divide rays by Arabic numeral. As for instance dorsal fin has 3 undivided and 7-8 divides rays it will be depicted as D.III or /7-8. If there are two dorsal fins, the first and the second dorsal fin are shown as D1 VI-VIII. D2 1/10-15, which means that the first is composed of all spines and second of the undivided and 10-15 divided rays. Sometimes there is an adipose dorsal fin also, such as in siluriformes (Cat fishes) and salmoniformes (Trout), which has no bony rays. In such cases the formula is written as D-1/7-8/0. Usually in dorsal and anal fins, the last divided rays longitudinally divided upto the base and therefore, both the branches should be counted as one.

- **Pectoral:** Fin (1/8) has fin rays, out of which the first one is spinous and the rest 8 are soft ones.

- **Ventral:** Or pelvic fin (6) possesses 6 fin rays of the one type only.
- **Anal fin:** 11 (2/9) consists of 11 fin rays out of which 2 are spinous and the rest 9 are soft ones.
- **Caudal fins: (17)-** all 17 fin rays are single type only.

2.5.3 Scale counts

A row of performed scales between the upper corner of the gill opening and the base of caudal fin, in the longitudinal series is counted and their number is shown after the abbreviation. L.1. If the lateral line is absent or interrupted and the number of scales in the longitudinal series is denoted L.r. The scales in the transverse series are counted between the base of the dorsal fin to the row of scale in the mid ventral line and their number is written after the abbreviation L.Tr. For example L.Tr. 21, which may also be written as 8/0 12/0, or 8/1/12. In the former "0" scale is shown on both sides of the lateral line while in the later "1" scale shown in that of the lateral line. Here an oblique (/) stroke seperates the rows of scales above and below the lateral line. Scales counts are made with a particular reference to the lateral line, used in taxonomy, for example-

(a) LI 30:-means the number of scales along the lateral line of trunk is 30.
(b) Ltr 16:-It means the number of lateral line transverse scales. These scale arise from the base of dorsal fin. The origin of pelvic / ventral fin. Number of scales is 16.
(c) Ltr 6/1/4 :- It is mark of stroke. If the Ltr is 6/1/4. It means that there are 6 scales above the lateral line and 4 scales present below the lateral line.

Standard abbreviations used as fin rays and fin formula.

A = Anal Fin.
B = Number of branchiostegal rays.
C = Caudal fin.
D = Dorsal fin.
L1 = Lateral line scales.
Ltr = Lateral line ,transverse scales.
Lr = Lateral line interrupted or found in scaleless fish.
0 = Adipose fin.
P = Pectoral fin
V = Ventral / Pelvic fin.

2.5.4 Diagnostic characters

Species is confirmed on basis of fin formula and scale count.

Fin formula:- The fin ray formula express the count of fin ray or in different fins of the body or numbers of fin rays in particular fins. The spine count is expressed in the Roman numerals while the soft rays count is expressed in Arabic numerals. Different type of fins posses the definite fine number of fin rays. The fin rays may be spiny or soft. Spines are the rays that are single shafted, soft rays are the rays that are bilaterally paired. For examples:

(1) D 11- 18:- means that the dorsal fin has strong spines and eighteen soft rays.
(2) D11- 18:- means the dorsal fin has two weak spines and eighteen soft rays.
(3) D12-14:- means that there are only rays present in the dorsal fin whose number may vary from twelve to fourteen.
(4) D iv-v, 14-16:- means that the number of weak spines in the dorsal fin varies from four to five and that of the soft rays from fourteen to sixteen.
(5) DI-1-4 means the first dorsal fin has one strong spine and four soft rays.
(6) D 2-5: Means the dorsal fin has soft rays alone.
(7) D II- 15/0:- Means the first dorsal fin has two weak spines and fifteen soft rays but the

2.6 Identificaton Keys

Different kinds of keys to the identification of fishes are employed, such as the running key, dichotomous key, open or closed key etc. But it has seen that the dichotomous key is more helpful for both, a beginner as well as an advanced student of fisheries. Each key mentions such characters of differentiation which closely separate the different taxa from one another.

3. RESULTS AND DISCUSSION

The results of present research work focus on the morphological measurement and identification of fresh water selected fish at Bandrabhan (Hoshangabad) MP on the basis of various parameter, the results of the present experiment could lead to amazing findings. The research work also incorporated the seasonal variation of certain species of several groups during January to December, session of 2015.

Morphological characters includes total length, length of head, length of caudal fin, height of body, diameter of eye, length of snout, inter orbital width, no. of pre-ventral serration, no. of LI scales, no. of vertical scales, no. of dorsal fin rays, no. of pectoral fin rays, no. of pelvic fin rays, no. of anal fin rays and no. of caudal fin rays.

Identification of fishes includes their habit and their local name. General characters of fish incorporated the body shape, size and their physiology. On morphological basis identification is divided into two parts

a. Descriptive Characters
b. Morphometric Characters

Table 1. Morphological measurement (in cm) of fresh water selected fish at bandrabhan

Charecters studied	No of specimens					Range	Mean±sd
	I	II	III	IV	V		
Total length	20.00	19.00	19.20	18.90	18.80	18.8-20.0	19.18±0.482
Length of head	4.30	3.90	3.80	4.20	4.00	3.8-4.3	4.04±0.207
Length of caudal fin	1.80	1.70	1.80	1.70	1.70	1.7-1.8	1.74±0.055
Hight of body	6.20	6.60	6.50	6.20	6.20	6.2-6.6	6.34±0.195
Diameter of eye	7.00	6.20	6.30	5.80	5.70	5.7-7.0	6.20±0.515
Length of snout	0.80	0.70	0.60	0.80	0.60	0.6-0.8	0.70±0.100
Inter orbital width	0.60	0.50	0.60	0.50	0.40	0.4-0.6	0.52±0.084
No. Of preventral serration	45.00	48.00	48.00	46.00	46.00	45-48	46.60±1.342
No. Of li scales	155.00	158.00	168.00	160.00	169.00	155-169	162.00±6.205
No. Of vertical scales	32/70	32/70	31/70	31/70	32/70	31/70-32/70	32/70±0.010
No. Of dorsal fin rays	9.00	8.00	9.00	9.00	8.00	8.0-9.0	8.60±0.548
No. Of pectrol fin rays	16.00	15.00	15.90	15.80	16.00	15.0-16.0	15.74±0.422
No. Of pelvic fin rays	6.00	6.00	5.00	5.00	6.00	5.0-6.0	5.60±0.548
No. Of anal fin rays	110.00	118.00	120.00	120.00	118.00	110-120	117.20±4.147
No. Of caudal fin rays	12.00	13.00	12.00	12.00	12.00	12.0-13.0	12.20±0.447

Table 2. Morphological measurement (in cm) of fresh water selected fish at bandrabhan

Charecters studied	No of specimens					Range	Mean±SD
	I	II	III	IV	V		
Total length	10.50	10.40	9.00	10.40	10.40	9.00 – 10.00	10.14±0.639
Length of head	1.90	2.00	2.00	2.20	2.00	1.90 - 2.20	2.02±0.110
Length of snout	0.55	0.56	0.60	0.52	0.55	0.52 - 0.60	0.56±0.029
Hight of body	1.68	1.70	1.70	1.69	1.70	1.68 - 1.70	1.69±0.009
Diameter of eye	0.50	0.50	0.60	0.50	0.50	0.50 - 0.60	0.52±0.045
Inter orbital width	0.60	0.60	0.60	0.60	0.60	0.60 - 0.60	0.60±0.000
No. Of lateral line scales	93.00	92.00	98.00	93.00	95.00	92.00 – 98.00	94.20±2.387
No. Of li scales	17/6	17/6	17/6	17/6	17/6	17/6	17/6±0.000
Length of caudal fin	2.00	2.00	1.90	2.00	2.00	1.90 - 2.00	1.98±0.045
No. Of dorsal fin rays	9.00	9.00	10.00	10.00	10.00	0.90 - 1.00	9.60±0.548
No. Of pectrol fin rays	12.00	130.00	12.00	12.00	12.00	12.00 - 13.00	35.60±0.447
No. Of pelvic fin rays	9.00	9.00	9.00	9.00	9.00	9.00 - 9.00	9.00±0.000
No. Of anal fin rays	15.00	15.00	17.00	15.00	17.00	15.00 -17.00	15.80±1.095
No. Of caudal fin rays	19.00	19.00	19.00	19.00	19.00	19.00 - 19.00	19.00±0.000

Table 3. Morphological measurement (in cm) of fresh water selected fish at Bandrabhan

Charecters studied	No of specimens					Range	Mean±SD
	I	II	III	IV	V		
Total length	18.80	21.50	22.40	22.40	21.50	18.8-22.4	21.32±1.479
Length of head	3.70	4.20	4.10	4.20	4.40	3.7-4.4	4.12±0.259
Length of caudal fin	4.30	4.20	4.40	4.50	4.30	4.2-4.4	4.34±0.114
Hight of body	4.00	4.10	4.40	4.40	4.30	4.0-4.4	4.24±0.182
Diameter of eye	0.70	0.80	0.80	0.90	0.80	0.7-0.9	0.80±0.071
Length of snout	1.20	1.30	1.40	1.30	1.30	1.2-1.4	1.30±0.071
Inter orbital width	1.70	1.30	1.50	1.50	1.40	1.3-1.7	1.48±0.148
Width of mouth	1.30	1.40	1.70	1.60	1.40	1.3-1.6	1.48±0.164
Hight of dorsal fin	2.80	3.40	3.60	3.60	3.20	2.8-3.6	3.32±0.335
No. Of li scales	43.00	41.00	42.00	42.00	42.00	41.0-43.0	42.00±0.707
No. Of ltr scales	6.5/6.5	7.5/6.5	7.0/6.5	7.0/6.5	7.0/6.5	6.5/6.5-7.5/6.5	7.5/6.5±0.000
No. Of dorsal fin rays	15.00	15.00	16.00	15.00	15.00	15.0-16.0	15.20±0.447
No. Of pectrol fin rays	18.00	18.00	18.00	18.00	18.00	18.0-18.0	18.00±0.000
No. Of ventral fin rays	9.00	9.00	9.00	9.00	8.00	8.0-9.0	8.80±0.447
No. Of anal fin rays	7.00	7.00	8.00	8.00	8.00	7.0-8.0	7.60±0.548
No. Of caudal fin rays	19.00	20.00	19.00	19.00	19.00	19.0-20.0	19.20±0.447
No. Of barbels	2.00	2.00	2.00	2.00	2.00	2.0-2.0	2.00±0.000

Table 4. Morphological measurement (in cm) of fresh water selected fish at bandrabhan

Charecters studied	No of specimens					Range	Mean±SD
	I	II	III	IV	V		
Total length	17.20	15.20	18.30	15.30	14.50	14.5-18.3	16.10±1.586
Length of head	3.60	3.20	3.00	3.40	3.50	3.0-3.6	3.34±0.241
Length of snout	1.10	1.40	1.00	1.10	1.20	1.0-1.4	1.16±0.152
Hight of body	3.80	3.20	3.30	3.20	3.60	3.2-3.8	3.42±0.268
Diameter of eye	0.70	0.80	0.70	0.80	0.70	0.7-0.8	0.74±0.055
Inter orbital width	2.00	1.40	1.90	1.60	1.50	1.4-2.0	1.68±0.259
Greatest width of head	2.10	2.30	1.90	1.90	2.30	1.9-2.3	2.10±0.200
Head excluding the snout	2.40	2.50	2.30	2.20	2.60	2.2-2.6	2.40±0.158
Gape of mouth	1.00	0.80	0.90	0.90	0.90	0.8-1.0	0.90±0.071
Length of pectoral fin	2.70	2.40	2.30	2.20	2.30	2.2-2.7	2.38±0.192
Length of caudal fin	3.80	3.70	3.20	3.30	3.20	3.2-3.8	3.44±0.288
Rows of scales between lateral line and base of ventral fin	13.00	12.00	13.00	12.00	13.00	12.0-13.0	12.60±0.548
No. Of li scales	78.00	84.00	83.00	82.00	81.00	78.0-84.0	81.60±2.302

Charecters studied	No of specimens					Range	Mean±SD
	I	II	III	IV	V		
No. Of ltr scales	16/17	16/17	16/17	16/17	16/17	16/17-16/17	16/17±0.000
No. Of dorsal fin rays	15.00	16.00	16.00	16.00	16.00	15.0-16.0	15.80±0.447
No. Of pectrol fin rays	17.00	17.00	17.00	16.00	17.00	16.0-17.0	16.80±0.447
No. Of ventral fin rays	9.00	9.00	9.00	9.00	9.00	9.0-9.0	9.00±0.000
No. Of anal fin rays	7.00	7.00	6.00	7.00	7.00	6.0-7.0	6.80±0.447
No. Of caudal fin rays	19.00	19.00	19.00	20.00	19.00	19-20.0	19.20±0.447

Table 5. Morphological measurement (in cm) of fresh water selected fish at bandrabhan

Charecters studied	No of specimens					Range	Mean±SD
	I	II	III	IV	V		
Total length	10.60	11.20	11.30	11.50	11.20	10.6-11.5	11.16±0.336
Length of head	4.00	3.90	3.50	3.20	3.80	3.2-4.0	3.68±0.327
Hight of body	4.20	4.20	4.90	4.20	4.60	4.2-4.9	4.42±0.319
Length of snout	0.80	0.70	0.90	0.80	0.90	0.7-0.9	0.82±0.084
Head excluding the snout	2.30	2.40	2.40	2.30	2.40	2.3-2.4	2.36±0.055
Diameter of eye	3.20	3.30	3.50	3.20	3.30	3.2-3.5	3.30±0.122
Inter orbital width	0.80	0.90	0.90	1.00	0.90	0.8-1.0	0.90±0.071
Rows of scales between lateral and ventral fin	36/2	36/2	36/2	36/2	36/2	36/2-36/2	36/2±0.000
No. Of pre dorsal scales	11.00	12.00	12.00	12.00	11.0	11-12	11.60±0.54
No. Of li scales	23.00	24.00	24.00	24.00	23.0	23-24	23.60±0.54
No. Of ltr scales	5/4	5/4	5/4	5/4	5/4	5/4-5/4	5/4±0.000
Length of caudal fin	2.00	1.90	2.00	2.50	2.50	1.9-2.5	2.18±0.295
No. Of dorsal fin rays	9.00	10.10	11.00	10.20	10.2	9.0-11.0	10.10±0.71
No. Of pectrol fin rays	14.00	14.20	15.00	14.40	14.00	14.0-15.0	14.32±0.41
No. Of ventral fin rays	8.00	7.00	9.00	9.00	8.00	7.0-9.0	8.20±0.837
No. Of anal fin rays	7.00	6.00	6.00	7.00	7.00	6.0-7.0	6.60±0.548
No. Of caudal fin rays	19.00	19.00	19.00	19.00	19.00	19.0-19.0	19.00±0.000
Number of barbels	2.00	2.00	2.00	2.00	2.00	3.0-3.0	2.00±0.000
Branchiostegeal rays	2.00	3.00	3.00	3.00	3.00	2.0-2.0	2.80±0.447

Table 6. Morphological measurement (in cm) of fresh water selected fish at Bandrabhan

Characters Studied	No of specimens			Range	Mean±Sd
	I	II	III		
Total length	20.50	22.40	22.40	20.5-22.4	21.77±1.097
Length of head	4.00	4.80	4.90	4.0-4.9	4.57±0.493
Length of snout	0.70	0.80	0.80	0.7-0.8	0.77±0.058
Inter orbital width	1.00	1.20	1.20	1.0-1.2	1.13±0.115
Width of gape of mouth	0.70	0.70	0.60	0.6-0.7	0.67±0.058
Length of caudal fin	2.70	2.70	2.60	2.6-2.7	2.67±0.058
Length of pectoral spine	1.80	1.90	1.90	1.8-1.9	1.87±0.058
Length of dorsal spine	1.20	1.20	1.30	1.2-1.3	1.23±0.058
No. Of dorsal fin rays	12.00	12.00	12.00	12.0-12.0	12.00±0.000
No. Of pectrol fin rays	18.00	18.00	19.00	18.0-19.0	18.33±0.577
No. Of ventral fin rays	9.00	9.00	9.00	9.0-9.0	9.00±0.000
No. Of anal fin rays	7.00	8.00	8.00	7.0-8.0	7.67±0.577
No. Of caudal fin rays	19.00	19.00	19.00	19.0-19.0	19.00±0.000
Number of barbels	4.00	4.00	4.00	4.0-4.0	4.00±0.000
Hight of body	4.20	5.00	5.00	4.2-5.0	4.73±0.462
Diameter of eye	5.30	5.40	5.40	5.3-5.4	5.37±0.058
No. Of li scales	25.00	26.00	26.00	25.0-26.0	25.67±0.577
No. Of ltr scales	4.5/4.5	4.5/4.5	4.5/4.5	4.5/4.5-4.5/4.5	4.5/4.5±0.000
Pelvic fin rays	8.00	8.00	8.00	8.0-8.0	8.00±0.000

Table 7. Morphological measurement (in cm) of fresh water selected fish at bandrabhan

Charecters studied	No of specimens					Range	Mean±SD
	I	II	III	IV	V		
Total length	6.50	6.70	12.80	13.80	12.90	6.5-13.8	10.54±3.618
Length of head	1.80	1.80	1.90	2.90	2.80	1.8-3.5	2.24±0.559
Hight of body	1.00	1.20	2.70	2.90	2.80	1.0-2.9	2.12±0.936
Length of snout	0.70	0.90	1.20	1.30	1.30	0.7-1.3	1.08±0.268
Hight of head	1.00	1.10	1.80	2.90	2.70	1.0-2.3	1.90±0.880
Greatest width of head	1.50	1.30	2.60	2.90	2.70	1.3-2.9	2.20±0.742
Diameter of eye	0.30	0.20	0.40	0.30	0.30	0.2-0.4	0.30±0.071
Inter orbital width	0.50	0.50	1.20	1.40	1.30	0.5-1.4	0.98±0.444
Width of mouth	1.00	0.90	1.70	2.00	1.90	0.9-2.0	1.50±0.515
Length of caudal fin	1.90	1.90	2.30	2.80	2.60	1.9-2.8	2.30±0.406
Length of base of adipose fin	0.30	0.40	1.80	1.20	1.90	0.3-1.9	1.12±0.753
Length of dorsal ray	0.80	0.80	2.00	2.90	1.90	0.8-2.9	1.68±0.893
Length of interspace between The two dorsal	0.50	0.50	1.70	2.00	1.80	0.5-2.0	1.30±0.738
Length of pectoral spine	0.60	0.70	0.80	2.30	0.90	0.6-2.3	1.06±0.702
Length of dorsal spine	0.70	0.80	2.50	2.90	2.40	0.7-2.9	1.86±1.031
No. Of dorsal fin rays	1/6	1/6	1/6	1/6	1/6	1/6-1/8	#VALU±E!
No. Of pectrol fin rays	1/7	1/8	1/8	1/8	1/8	1-7/1/8	#VALUE!
No. Of ventral fin rays	7.00	8.00	8.00	8.00	8.00	7.0-8.0	7.80±0.447
No. Of anal fin rays	10.00	11.00	11.00	13.00	11.00	10.0-13.0	11.20±1.095
No. Of caudal fin rays	18.00	19.00	19.00	19.00	19.00	19.0-19.0	18.80±0.447
Number of barbels	6	6	6	6	6	6.0-6.0	6.00±0.000

Table 8. Morphological measurement (in cm) of fresh water selected fish at bandrabhan

Charecters studied	No of specimens					Range	Mean±SD
	I	II	III	IV	V		
Total length	15.00	16.50	11.75	16.90	18.60	11.75-18.6	15.75±2.577
Length of head	2.20	3.00	2.20	2.30	2.00	2.2-3.0	2.34±0.385
Hight of body	2.80	2.70	2.70	2.80	2.80	2.7-2.8	2.76±0.055
Length of snout	1.10	1.10	0.90	1.50	1.10	0.9-1.5	1.14±0.219
Diameter of eye	0.80	0.80	0.90	1.00	0.80	0.8-1.9	0.86±0.089
Inter orbital width	1.70	1.80	1.70	1.80	1.80	1.7-1.8	1.76±0.055
Length of nasal barbel	0.70	0.70	0.70	0.60	0.70	0.6-0.7	0.68±0.045
Length of outer Mendibular barbles	2.60	2.50	2.00	2.00	2.00	2.0-2.6	2.22±0.303
Length of inner Mendibular barbles	3.30	3.00	2.90	3.20	3.30	2.9-3.3	3.14±0.182
Length of pectoral spine	3.20	2.90	3.10	3.00	3.10	2.9-3.2	3.06±0.114
Length of dorsal spine	1.95	2.00	2.20	1.95	1.95	1.95-2.2	2.01±0.108
No. Of dorsal fin rays	1/7-	1/7-	1/7-	1/7-	1/7-	1/7-1/7	#VALUE±!
No. Of pectrol fin rays	1/11-	1/11-	1/11-	1/11-	1/11-	1/11-1/11	#VALUE!
No. Of anal fin rays	32.00	32.00	32.00	32.00	32.00	32-32	32.00±0.000
No. Of caudal fin rays	17.00	17.00	17.00	17.00	17.00	17-17	17.00±0.000
No. Of barbels	8.00	8.00	8.00	8.00	8.00	8.0-8.0	8.00±0.000
Length of dorsal fin	0.50	0.50	0.50	0.50	0.50	0.5-0.5	0.50±0.000
Length of pectrol fin	1.00	1.10	1.00	1.10	1.10	1.1-1.0	1.06±0.055
Length of anal fin	29.00	29.00	29.00	29.00	29.00	29.0-29.0	29.00±0.000
Length of caudal fin	3.30	3.30	3.30	3.30	3.30	3.3-3.3	3.30±0.000

Table 9. Morphological measurement (in cm) of fresh water selected fish at bandrabhan

Charecters studied	No of Specimens					Range	Mean±SD
	I	II	III	IV	V		
Total length	15.90	14.50	12.20	11.90	14.00	11.9-15.9	13.70±1.663
Length of head	3.40	3.20	2.90	2.80	3.20	2.8-3.4	3.10±0.245
Length of caudal fin	2.60	2.50	2.00	1.90	1.40	1.4-3.4	2.08±0.487
Hight of body	3.12	3.15	2.90	2.80	2.50	2.5-3.15	2.89±0.265
Diameter of eye	0.50	0.60	0.50	0.60	0.60	0.5-0.6	0.56±0.055
Length of snout	1.10	0.90	0.80	0.80	0.70	0.7-1.1	0.86±0.152
Inter orbital width	1.80	1.80	2.00	1.60	1.70	1.6-2.0	1.78±0.148
Length of head behind The angle of mouth	2.40	1.30	2.00	1.90	1.90	1.3-2.4	1.90±0.394
Length of maxillary barbles	5.20	5.80	3.90	4.20	4.20	3.9-5.8	4.66±0.805
Length of mendibular barbles	0.80	1.40	0.90	0.90	0.80	0.8-1.4	0.96±0.251
Width of gaps of mouth	1.70	1.40	1.40	1.30	1.20	1.2-1.7	1.40±0.187
No. Of barbels	0.40	4.00	4.00	4.00	4.00	4.0-4.0	3.28±1.610
Post orbital length of head	1.70	1.50	1.30	1.80	1.80	1.3-1.8	1.62±0.217
Pre dorsal length	4.00	4.30	4.80	3.20	3.30	3.2-4.8	3.92±0.676
Length of pectoral spine	1.50	1.70	1.50	1.40	1.30	1.3-1.7	1.48±0.148
No. Of pectrol fin rays	13.00	14.00	14.00	14.00	14.00	13.0-14.0	13.80±0.447
No. Of dorsal fin rays	4.00	4.00	4.00	4.00	4.00	4.0-4.0	4.00±0.000
No. Of ventral fin rays	8.00	8.00	7.00	8.00	8.00	7.0-8.0	7.80±0.447
No. Of anal fin rays	56.00	54.00	54.00	55.00	54.00	54.0-56.0	54.60±0.894
No. Of caudal fin rays	17.00	17.00	17.00	18.00	18.00	17.0-18.0	17.40±0.548

Table 10. Morphological measurement (in cm) of fresh water selected fish at bandrabhan

Charecters studied	No of specimens					Range	Mean±SD
	I	II	III	IV	V		
Total length	19.80	20.20	21.20	20.40	21.60	19.8-21.6	20.64±0.740
Length of head	7.20	8.00	7.40	8.30	7.60	7.2-8.3	7.70±0.447
Hight of body	1.90	1.50	2.00	1.90	2.20	1.5-2.2	1.90±0.255
Diameter of eye	0.70	0.80	0.90	0.80	0.90	0.7-0.9	0.82±0.084
Inter orbital width	0.70	0.80	1.00	0.90	1.00	0.7-1.0	0.88±0.130
Distance between hind end of Opercle to posterior margin of eye	2.00	2.20	2.80	2.30	2.90	2.0-2.9	2.44±0.391
Length of caudal fin	1.80	2.00	2.00	1.90	2.20	1.5-2.2	1.98±0.148
No. Of dorsal fin rays	17.00	17.00	17.00	17.00	17.00	17.0-17.0	17.00±0.000
No. Of pectrol fin rays	11.00	11.00	11.00	11.00	11.00	11.0-11.0	11.00±0.000
No. Of ventral fin rays	0.60	0.60	0.60	0.60	0.60	0.6-0.6	0.60±0.000
No. Of caudal fin rays	15.00	15.00	15.00	15.00	15.00	15.0-15.0	15.00±0.000
No. Of anal fin rays	16.00	17.00	17.00	17.00	17.00	16.0-17.0	16.80±0.447

Table 11. Morphological measurement (in cm) of fresh water selected fish at bandrabhan

Charecters studied	No of specimens					Range	Mean±SD
	I	II	III	IV	V		
Total length	30.50	30.00	28.20	28.20	28.20	28.2-30.5	29.02±1.137
Length of head	3.30	3.20	3.40	3.40	3.30	3.2-3.4	3.32±0.084
Hight of body	3.80	3.70	3.40	3.60	3.60	3.4-3.8	3.62±0.148
Length of snout	0.95	0.95	0.82	0.95	0.95	0.82-0.95	0.92±0.058
Diameter of eye	3.80	3.70	3.40	3.60	3.60	3.4-3.8	3.62±0.148
Inter orbital width	1.50	0.90	1.00	1.00	0.90	0.9-1.5	1.06±0.251
Length of caudal fin	2.50	2.40	2.50	2.60	2.50	2.4-2.6	2.50±0.071
Length of pectoral fin	2.30	2.00	2.30	0.90	2.00	2.0-2.3	1.90±0.579
Length of ventral fin	1.90	1.80	1.80	1.70	1.80	1.7-1.9	1.80±0.071
No. Of dorsal fin rays	38.00	39.00	42.00	42.00	42.00	38.0-42.0	40.60±1.949
No. Of pectrol fin rays	16.00	16.00	18.00	18.00	18.00	16.0-18.0	17.20±1.095

Charecters studied	No of specimens					Range	Mean±SD
	I	II	III	IV	V		
No. Of ventral fin rays	6.00	6.00	6.00	6.00	6.00	6.0-6.0	6.00±0.000
No. Of anal fin rays	23.00	22.00	22.00	24.00	26.00	22.0-26.0	23.40±1.673
No. Of caudal fin rays	13.00	13.00	13.00	13.00	13.00	13.0-13.0	13.00±0.000
Length of caudal fin	2.50	2.40	2.50	2.60	2.50	2.4-2.6	2.50±0.071
No. Of predorsal scales	18.00	19.00	18.00	19.00	18.00	18.0-19.0	18.40±0.548
No. Of lateral line scales	49.00	50.00	50.00	50.00	60.00	49.0-60.0	51.80±4.604
No. Of ltr. Scales	7/10	7/10	7/10	7/10	7/10	7/10-7/10	7/10±0.000

Table 12. Morphological measurement (in cm) of fresh water selected fish at bandrabhan

Charecters studied	No of specimens					Range	MEAN±SD
	I	II	III	IV	V		
Total length	12.80	11.90	12.50	12.80	12.70	11.9-12.8	12.54±0.378
Length of head	3.50	4.10	4.10	3.50	3.50	3.5-4.1	3.74±0.329
Hight of body	4.70	4.70	4.60	4.70	4.80	4.6-4.7	4.70±0.071
Length of snout	1.80	1.80	1.80	1.70	1.80	1.7-1.8	1.78±0.045
Diameter of eye	0.70	0.80	0.80	0.80	0.80	0.7-0.8	0.78±0.045
Inter orbital width	1.40	1.40	1.40	1.40	1.40	1.3-1.4	1.40±0.000
Length of pectoral fin	2.80	2.70	2.80	2.80	2.80	2.7-2.8	2.78±0.045
Length of caudal fin	2.70	2.60	2.70	2.70	2.70	2.6-2.7	2.68±0.045
Length of ventral fin	6.90	6.80	6.80	6.90	6.80	6.8-6.9	6.84±0.055
Hight of dorsal fin	1.25	1.25	1.50	1.50	1.50	1.25-1.50	1.40±0.137
Length of dorsal fin	7.00	7.20	7.20	7.20	7.20	7.0-7.2	7.16±0.089
Lateral line interruptal scales	18.00	18.00	18.00	18.00	18.00	18.0-18.0	18.00±0.000
Number of ltr. Line scales	29.00	29.00	29.00	29.00	29.00	29.0-29.0	29.00±0.000
Number of ltr. Scales	4/9	4/9	4/9	4/9	4/9	4/9-4/9	4/9±0.000
No. Of dorsal fin rays	17/9	17/9	17/9	17/9	17/9	17/9-17/9	17/9±0.000
No. Of pectrol fin rays	16.00	16.00	16.00	16.00	16.00	16.0-16.0	16.00±0.000
No. Of ventral fin rays	1/5	1/5	1/5	1/5	1/5	1/5-1/5	1/5±0.000
No. Of anal fin rays	10/10	10/10	10/10	10/10	10/10	10/10-10/10	10/10±0.000
No. Of caudal fin rays	17	17	17	17	17	17.0-17.0	17.00±0.000

Table 13. Morphological measurement (in cm) of fresh water selected fish at bandrabhan

Charecters studied	No of specimens					Range	MEAN±SD
	I	II	III	IV	V		
Total length	9.50	12.50	12.00	10.00	10.00	9.5-10.0	10.80±1.351
Length of head	3.00	5.00	4.70	4.00	3.90	3.0-5.0	4.12±0.779
Hight of body	2.40	4.90	4.40	2.30	2.70	2.3-4.9	3.34±1.218
Diameter of eye	0.50	1.90	0.90	0.60	0.80	0.5-1.9	0.94±0.559
Length of snout	0.60	1.40	1.30	0.80	1.10	0.6-1.3	1.04±0.336
Inter orbital width	0.50	1.30	0.70	0.80	0.70	0.5-1.3	0.80±0.300
Length of base of soft dorsal	1.30	2.50	1.90	1.60	1.80	1.3-2.5	1.82±0.444
Length of total dorsal fin	4.80	8.90	7.90	5.20	6.30	4.8-8.9	6.62±1.751
Length of base spinous Portion of dorsal fin	3.30	6.40	6.00	3.20	4.20	3.2-6.4	4.62±1.501
Lateral line interruptal scales	32.00	35.00	33.00	31.00	34.00	31.0-35.0	33.00±1.581
No. Of dorsal fin rays	13/13	13/13	13/13	13/13	13/13	13/13-13/13	13/13±0.000
No. Of pectrol fin rays	15.00	16.00	15.00	15.00	15.00	15.0-15.0	15.20±0.447
No. Of ventral fin rays	1/5	1/5	1/5	1/5	1/5	1/5-1/5	1/5±0.000
No. Of anal fin rays	3/7	3/7	3/7	3/7	3/7	3/7-3/7	3/7±0.000
No. Of caudal fin rays	15.00	15.00	15.00	15.00	15.00	15.00	15.00±0.000
Length of caudal fin	1.80	3.20	3.30	2.80	2.00	1.8-3.3	2.62±0.687
Lateral fin line scales	46.00	50.00	48.00	48.00	54.00	46.0-54.0	49.20±3.033
No. Of ltr scales	6/17	6/17	6/18	6/17	6/20	6/15-6/20	6/18-±0.014

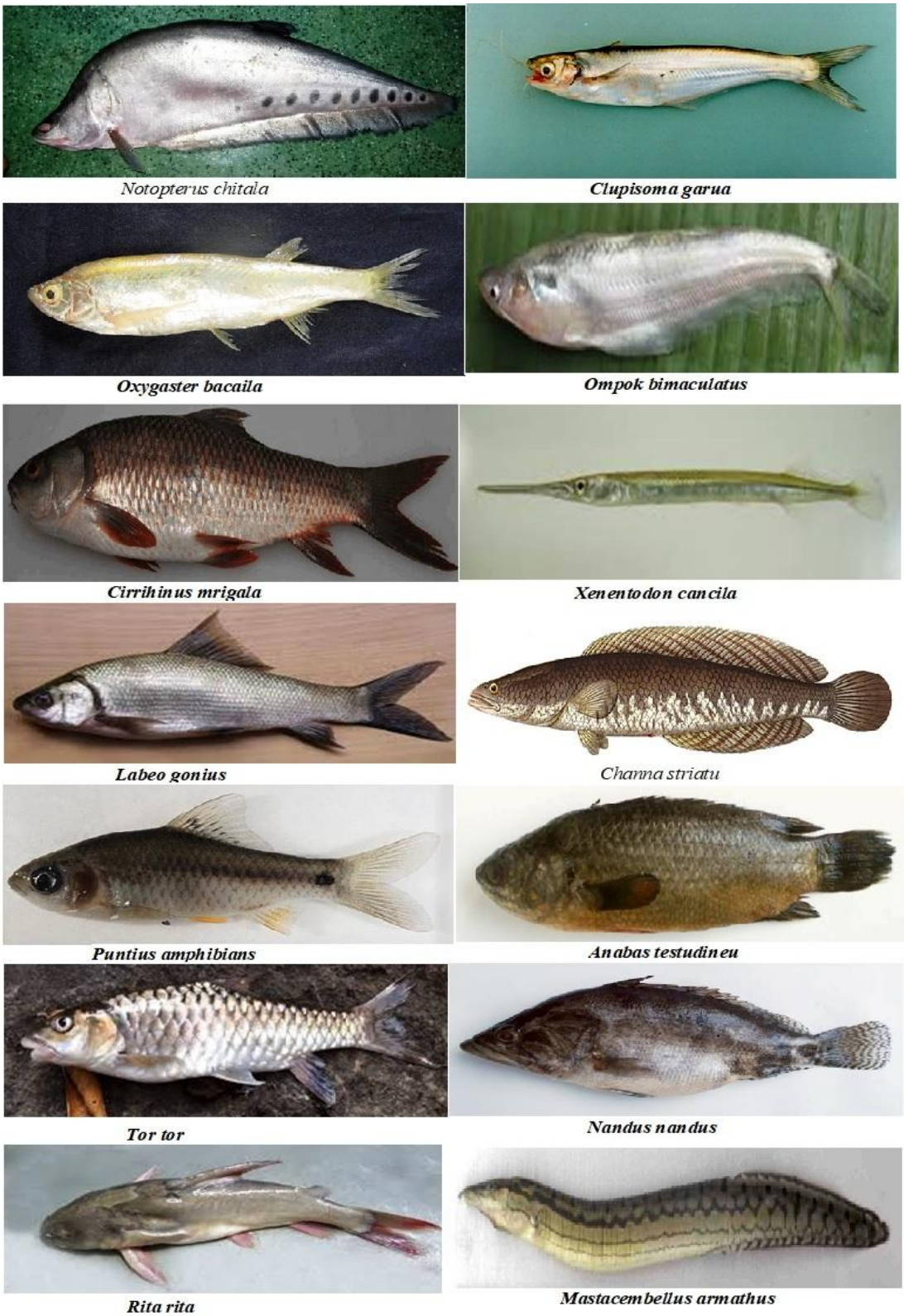

Fig. 1. Morphology of different fishes collected

Table 14. Morphological measurement (in cm) of fresh water selected fish at bandrabhan

Charecters studied	No of specimens					Range	Mean±SD
	I	II	III	IV	V		
Total length	24.00	25.60	25.90	26.00	25.60	24.0-26.0	25.42±0.814
Length of head	3.90	4.00	4.10	4.80	4.10	3.9-4.8	4.18±0.356
Hight of body	2.10	2.50	2.50	2.40	2.50	2.1-2.5	2.40±0.173
Length of snout	1.50	1.60	1.70	1.60	1.50	1.5-1.7	1.58±0.084
Gape of mouth	0.50	0.60	0.60	0.70	0.50	0.5-0.7	0.58±0.084
Hight of head	1.70	1.80	1.40	1.30	1.30	1.3-1.8	1.50±0.235
Width of head	1.60	1.40	1.40	1.30	1.60	1.3-1.6	1.46±0.134
Diameter of eye	0.50	0.50	0.40	0.50	0.50	0.4-0.5	0.48±0.045
No. Of dorsal fin rays	37/80	37/80	37/80	37/80	37/80	37/80-37/80	37/80±0.000
No. Of pectrol fin rays	23.00	23.00	23.00	23.00	23.00	23.0-23.0	23.00±0.000
No. Of ventral fin rays	0.00	0.00	0.00	0.00	0.00	0.00	0.00±0.000
No. Of anal fin rays	3/76	3/69	3/74	3/78	3/76	3/74-3/78	3/78±0.014
No. Of caudal fin rays	0.00	0.00	0.00	0.00	0.00	0.00	0.00±0.000
Post orbital length of head	2.40	2.40	2.50	2.40	2.50	2.4-2.5	2.44±0.055
Inter orbital width	0.40	0.50	0.50	0.50	0.40	0.4-0.5	0.46±0.055
Lateral line & the base of 1st dorsal ray	28.00	29.00	28.00	28.00	28.80	28.2-29.0	28.36±0.498

The Narmada River is a west flowing river of central india which has extensively studied for its ecological aspects. Ichthyofaunal diversity of Narmada has been documented by various workers [7,8,9,6]. Most of these studies were confined to the main river but tributaries have not been studies.

A few recent works on different aspects of fish diversity were also confined main stream in central part of Narmada [6]. Later Tawa and Barna tributaries were dammed to form reservoir and studies were done on these reservoirs [6] worked on Ganjal River which joins Narmada river near the backwater of Indra Sagar.

All fishes species diversity is a property of the population level while the functional diversity concept is more strongly related to ecosystem stability and stress, physical and chemical factors for determining population dynamic in the lentic ecosystem [10]. Looking into species diversity, among all taxonomic level and have the maximum species which is equal to the other entire vertebrate combine together. In all types of water, fish population appears to fluctuate in abundance and in species composition from year to year [11].

The river Narmada has received little attention from botanists, ecologists and specially algologists as such and moreover the scientific approach was not holistic. Even in dealing with the floristic pattern, habbits of various algal groups were overlooked. Algal play an important role to purity the water by photosynthesis. In order words it helps in the process of rejuvenation of rivers [12, 13].

Among various natural resources water is an important resource and is one of the prime necessities of the life. Due to rapid industrialization and urbanisation quality of this precious fluid has been deteriorated considerably undesirable change in the physiochemical characteristics of water bring about water pollution, which is in turn affects the planktenic flora. The biological parameters have greatest importance for ecological point of view. All natural water and soil contains a variety of organisms both plants and animals as they made up of the natural flora and fauna.

4. CONCLUSION

Among various natural resources water is an important resource and is one of the prime necessities of life. Due to rapid industrialisation and urbanisation quality of this precious fluid has been deteriorated considerably undesirable changes in the physicochemical characterization of water bring about water pollution, which is in turn affects the planktenics flora. The biological parameters have greatest importance for ecological point of view. All natural water and soil contains a variety of organisms both plants and animals as they made up of the natural flora and fauna. The biological analysis is used mainly in finding out. Bio-indicators of water pollution and to understand the ecological disturbances caused by pollution.

The effluent effect on living organisms and the assessment of pollution is essential. The present study have been undertaken to see the effect of pollutants on

the distribution of occurrence and abundance of fishes of Narmada River at Hoshangabad MP.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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