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Current status of ichthyofaunal diversity of various water sources of western Uttar Pradesh, India

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Abstract
Fishes constitute an economically important group of vertebrate. These constitutes an important group and are very useful in biological researches. The present study has been conducted on different water bodies of Western Uttar Pradesh, India. The aim of this investigation was to identify fish diversity in water bodies (ponds, river& its tributaries) and also documentation of all the available species inhabiting this region. The results revealed the occurrence of 61 fish species belonging to 38 different genera, 19 different families and 9 different orders. The order Cypriniformes was dominant with 23 species followed by Siluriformes with 15 species, Perciformes (8 species), Clupeiformes (4 species), Ophiocephaliformes (4 species), Beloniformes (2 species), Mastacembaliformes (2 species), Tetrodontiformes (2 species) and Mugiliformes (one specie). Cyprinids and Silurids found to be numerically abundant and also showed high species richness. There is no documentary record available of the present study area till date regarding its aquatic fauna.

Keywords: Ichthyofaunal diversity, aquaculture, biological research, water bodies

1. Introduction
Fishes have been recognized as an excellent food source for human beings and is preferred as a perfect diet not only due to its good taste and high digestibility but also because of having higher proportions of unsaturated fatty acids, essential amino acids and minerals for the formation of functional and structural proteins. In India there are about 2,500 species of fishes of which 930 live in freshwater and 1,570 are marine [1]. Day [2] describes 1418 species of fish under 342 genera from British India. 742 fresh water species of fishes coming under 233 genera, 64 families and 16 orders from the Indian region were also listed includes all the known fresh and brackishvwater fishes both indigenous and exotic found within the political boundaries of India, Pakistan, Bangladesh, Burma and Sri Lanka. Most of the species belonging to the following families Elopidae, Megalopidae, Moringuidae, Muraenidae, Muraenosocidae, Ophichthidae, Clupeidae (Subfanlilies: Dorosonlatinae, Pristigasterinae), Engraulidae (Subfamilies : Engraulinae, Coilinae), Ariidae, Plotosidae, Syngnathidae, Leiognathidae, Pomadasyidae, Sciaenidae, Mugilidae, Polynemidae, Gobiidae, Stromateidae and Tetraodontidae are either visitors or inhabitants of estuaries. They do occur in freshwater zone of the rivers and may even extend beyond that zone [3]. About 2546 species of fish belonging to 969 genera, 254 families and 40 orders from India were recorded [4]. Recently, Jayaram [5] grouped and estimated 852 species of fishes belonging to 71 families and 16 orders from the Indian region**.** Dey *et al.,* [6] reported that 46 indigenous ornamental fish species belonging to 11 orders, 21 families, 29 genera were collected and identified from Ghargharia river. Dey *et al.* [7] reported that about138 fish species were recorded in the Kaljani river which belonged to 31 families. A total of 20 fish species belonging to 11 genera, 8 different families of 4 different orders were recorded from various water sources of Mawana [8]. The fish diversity of Western U P is still unexplored and not documented.

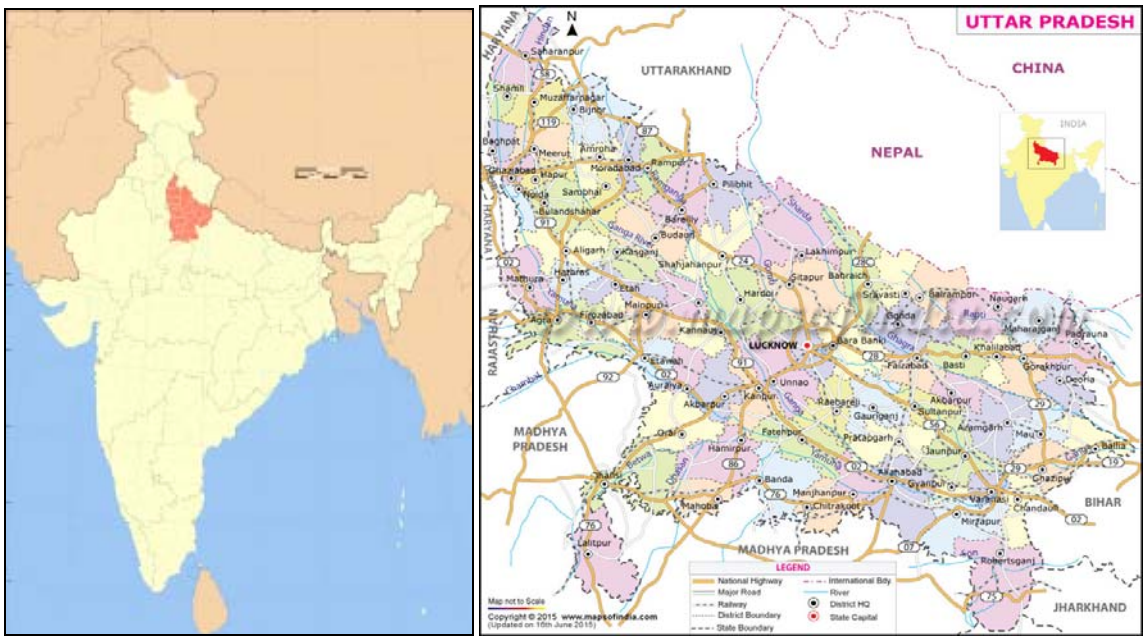
1.1 Aim of the Study
The aim of the present study was to identify fish diversity in water bodies (ponds, river& its tributaries) and also documentation of all the available species inhabiting this region.

2. Materials and Methods

The present study was conducted for collection and identification of the fish species in Western Uttar Pradesh, India on alternate days in alternate water bodies, covering all the four seasons– winter, summer, spring, autumn, in following steps-

2.1 Survey of the Western Uttar Pradesh

Various areas of Uttar Pradesh (27° 40' N , 80° 00' E) were surveyed before starting the investigation. Western Uttar Pradesh, is a region in India that comprises the western districts of Uttar Pradesh state. On the bases of survey few water bodies of Western Uttar Pradesh were selected for sample collection. Map of the study area is shown in Figure (Figure 1).



(A) (B)

Fig 1: (A) Location of U. P in India [9] and (B) Map of the U. P

Western U.P. carries a geographical area of 82.192% sq. km which Western Uttar Pradesh includes nearly 26 districts in six divisions

1. Meerut division
2. Saharanpur division
3. Moradabad division
4. Bareilly division
5. Agra division
6. Aligarh division

2.2 Districts

Meerut, Bulandshahr, GautamBuddhaNagar, Ghaziabad, Hap ur, Baghpat, Saharanpur, Muzaffarnagar, Shamli, Moradabad, Bijnor, Rampur, Amroha,Sambhal, Bareilly, Badaun, Pilibhit, Shahjahanpur, Agra, Firozabad, Mainpuri, Mathura, Aligarh, Etah, Hathras, Kasganj and Baghpat

2.3 Selection of the sites

The selected water bodies include ponds, lakes, rivers (Ganga River, Ram Ganga).

2.4 Sample Collection and Preservation

Samples were collected and identified at species level. Fishes were collected from the water bodies with the help of local fishermen using different types of nets, viz., gill nets, cast nets and drag nets. Fishes were captured during the study and some of them (living fish) were released in the pond/ river/ lake. Identification of large fishes was done in the field itself. Fish samples were collected from various sampling sites and much other valuable information were collected from the local fisherman and resident adjacent to the selected sites of Western Uttar Pradesh. As soon as the small fishes were collected, they were directly placed in a wide mouth jar having 2 litre capacity with 10% formalin solution and brought to the laboratory for identification. Identified fishes were preserved for further identification in Museum, Department of Zoology, R G P G College, Meerut.

2.5 Taxonomic identification of fish

All the available specimens from the study area were collected. Species were identified with the help of standard literature [10, 11, 12, 13, 14, 15, 16, 17, 18] using various morphometric and meristic characters.

2.6 Data collection

The specific features (various characteristics) and presence/absence of fishes were noted in data tables. All the data were collected during survey.

3. Results

The results revealed the occurrence of 61 fish species belonging to 38 different genera, 19 different families and 9 different orders. The order Cypriniformes was dominant with 23 species followed by Siluriformes with 14 species, Perciformes (8 species), Clupeiformes (4 species), Ophiocephaliformes (4 species), Mastacembaliformes (3 species), Beloniformes (2 species), Tetrodontiformes (2 species) and Mugiliformes with one species (Figure 2).

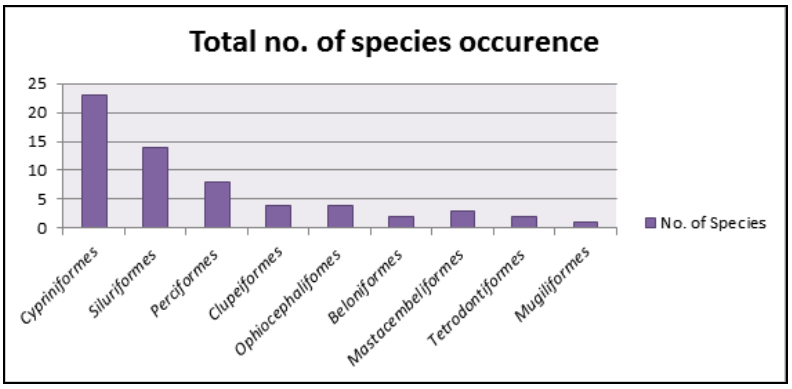


Fig 2: Total number of species occurrence of different orders in all selected sites.

Of all total number of species occurrence Cyprinids and Silurids found to be numerically abundant and also showed high species richness (Table 1).

Table 1: Occurrence of all species in all survey sites

S. No.	Common name	Zoological name	Family	Order
1	Suhia	*Gudusia chapra*	Clupeidae	Clupeiformes
2	Hilsa	*Hilsa ilisha*	Clupeidae	Clupeiformes
3	Moya	*Notopterus chitala*	Notopteridae	Clupeiformes
4	Patra	*Notopterus notopterus*	Notopteridae	Clupeiformes
5	Dhawai	*Amblypharyngodon mola*	Cyprinidae (Sub Family-Rasborinae)	Cypriniformes
6	Jaya	*Aspidoparia jaya*	Cyprinidae (Sub Family-Rasborinae)	Cypriniformes
7	Kenwachi/ Harda	*Aspidoparia morar*	Cyprinidae (Sub Family-Rasborinae)	Cypriniformes
8	Bhola	*Barilus bendelisis*	Cyprinidae (Sub Family-Rasborinae)	Cypriniformes
9	Nayer	*Raimas bola*	Cyprinidae (Sub Family-Rasborinae)	Cypriniformes
10	Bhakur/ Catla	*Catla catla*	Cyprinidae	Cypriniformes
11	Nain	*Cirrhinus mrigala*	Cyprinidae	Cypriniformes
12	Nain	*Cirrihinus reba*	Cyprinidae	Cypriniformes
13	Patukari	*Devario devario*	Cyprinidae	Cypriniformes
14	Dendua	*Esomus danricus*	Cyprinidae (Sub Family-Rasborinae)	Cypriniformes
15	Thuthunahia Raia	*Labeo angra*	Cyprinidae	Cypriniformes
16	Karaunchar	*Labeo calbasu*	Cyprinidae	Cypriniformes
17	Arangi	*Labeo dero*	Cyprinidae	Cypriniformes
18	Kursi and Bata	*Labeo gonius*	Cyprinidae	Cypriniformes
19	Rohu	*Labeo rohita*	Cyprinidae	Cypriniformes
20	Gurda	*Osteobrama cotio*	Cyprinidae	Cypriniformes
21	Chalhawa	*Oxygaster bacaila*	Cyprinidae	Cypriniformes
22	Sidhari	*Puntius chrysopterus*	Cyprinidae	Cypriniformes
23	Sidhari/Darahii	*Puntius sarana*	Cyprinidae	Cypriniformes
24	Darahii	*Puntius sophore*	Cyprinidae	Cypriniformes
25	Darahii	*Puntius ticto*	Cyprinidae	Cypriniformes
26	Dendua	*Rasbora daniconius*	Cyprinidae (Sub Family-Rasborinae)	Cypriniformes
27	Mahaseer	*Tor tor*	Cyprinidae	Cypriniformes
28	Jalkapoar	*Ompok bimaculatus*	Siluridae	Siluriformes
29	Sutahawa Tengra	*Wallago attu*	Siluridae	Siluriformes
30	Tengra	*Mystus bleekeri*	Bagridae	Siluriformes
31	Tengra	*Mystus cavasius*	Bagridae	Siluriformes
32	Tengra	*Mystus tengra*	Bagridae	Siluriformes
33	Tengra	*Mystus vittatus*	Bagridae	Siluriformes
34	Dariai Tengra	*Mystus aor*	Bagridae	Siluriformes
35	Tengra	*Mystus seenghala*	Bagridae	Siluriformes
36	Hunna & Rita	*Rita rita*	Bagridae	Siluriformes
37	Gonch	*Bagarius bagarius*	Sisoridae	Siluriformes
38	Baikari/Karahi	*Clupisoma garua*	Schilbeidae	Siluriformes
39	Payas	*Pangasius pangasius upiensis*	Schilbeidae	Siluriformes
40	Singhi	*Heteropneustes fossilis*	Saccobranchidae	Siluriformes
41	Mangur	*Clarias batrachus*	Clariidae	Siluriformes
42	Kauwa	*Xenontodon cancila*	Belonidae	Beloniformes
43	Kauwa ka Bachha	*Hemiramphus gorakhurensis*	Hemiramphidae	Beloniformes
44	Hunra	*Rhinomugil corsula*	Mugilidae	Mugiliformes
45	Chanaga	*Channa gachua*	Ophiocephalidae	Ophiocephaliformes
46	Sauli	*Channa marulius*	Ophiocephalidae	Ophiocephaliformes

47	Girai	*Channa punctatus*	Ophiocephalidae	Ophiocephaliformes
48	Saur	*Channa striatus*	Ophiocephalidae	Ophiocephaliformes
49	Chanari	*Chanda baculis*	Centropomidae	Perciformes
50	Chanari	*Chanda nama*	Centropomidae	Perciformes
51	Chanari	*Chanda ranga*	Centropomidae	Perciformes
52	Sumha	*Badis badis*	Nandidae	Perciformes
53	Dhebari	*Nandus nandus*	Nandidae	Perciformes
54	Kawai & Sumha	*Anabas testudineus*	Anabantidae	Perciformes
55	Khosti	*Colisa fasciatus*	Anabantidae	Perciformes
56	Bulla	*Glossogobius giuris*	Gobiidae	Perciformes
57	Matga & Pataya	*Macrognathus aculeatus*	Mastacembelidae	Mastacembaliformes
58	Baam	*Mastacembelus armatus*	Mastacembelidae	Mastacembaliformes
59	Matga & Pataya	*Mastacembelus pancalus*	Mastacembelidae	Mastacembaliformes
60	Galphulani	*Tetradon cutcutia*	Tetrodontidae	Tetrodontiformes
61	Machharia	*Tetradon fluviatilis*	Tetrodontidae	Tetrodontiformes

The observation also revealed that some of the species were restricted in distribution. The most abundant species were *Catla catla, Labeo rohita* and *Channa* sps. and these species are also cultured on a large scale.

Of all these 61 species were found in water bodies the percentage composition of total number of species 38% of Cypriniformes followed by Siluriformes with 23% species, Perciformes (13%species), Clupeiformes (6% species) Ophiocephalifomes (7% species), Mastacembaliformes (5% species), Beloniformes (3% species), Tetrodontiformes (3 %species) and Mugiliformes with 2% species composition (figure 3).

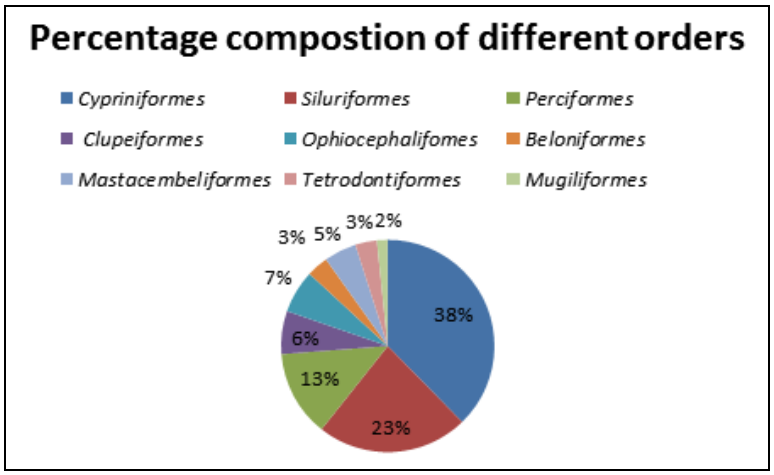


Fig 3: Total percentage occurrence of different orders of Fishes.

The dominant sequence is as follows:

Cypriniformes >Siluriformes >Perciformes > Clupeiformes > Ophiocephalifomes > Mastacembaliformes > Beloniformes > Tetrodontiformes >Mugiliformes

Ichthyofaunal diversity comprised of 19 families namely Clupeidae (2species), Notopteridae (2species), Cyprinidae (23species), Siluridae (2species), Bagridae (7species), Sisoridae (1 species), Schilbeidae (2species), Saccobranchidae (1species), Clariidae (1species), Belonidae (1species), Hemiramphidae (1species), Mugilidae (1species), Ophiocephalidae (4 species), Centropomidae (3species), Nandidae (2 species), Anabantidae (2 species), Gobiidae (1species), Mastacembelidae (3species), Tetrodontidae (2species).

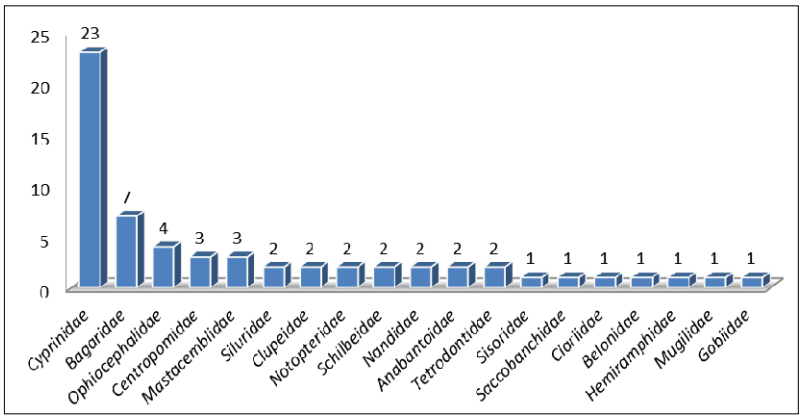


Fig 4: Total number of families found during the study.

The highest number of these species was occurred during their breeding season *e.g., Mystus seenghala* breeds in river and pond from April to July. *Clarias batrachus* was cultured from April to June. It is considered to be a delicious fish so it is in great demand. The highest diversity of genus *Mystus* of family Bagridae was noted. The study reveals that the most abundant genus was *Mystus* with 6 species. Figure 5 showed the abundance of different genera. The study also revealed that one species of genus *Catla, Puntius, Wallago, Heteropneustes, Clarias*, *Chanda, Colisa* two of *Cirrhinus* and *Labeo,* five of *Mystus* and four of *Channa* were found. All of these species were noted in different ponds. The observation revealed that *Catla catla, Cirrhinus mrigala, Cirrhinus reba, Labeo rohita, Mystus vittatus, Mystus seenghala, Heteropneustes fossilis, Channa marulius,* and *Channa punctatus* were present in all selected study area. These fishes were frequently found in the survey area and their presence was also noted during the survey. These species were cultured at the large scale for the purpose of commercial fish production. Whereas *Labeo calbasu, Puntius sophore, Mystus bleekeri, Mystus aor* and *Colisa fasciatus* were only found in few areas and *Wallago attu, Clarias batrachus*, were found in ponds *Mystus cavasius* was only found in Ganga River and *Channa striatus*, *Channa gachua* and *Chanda baculis* was only found in Ganga River and Ponds.

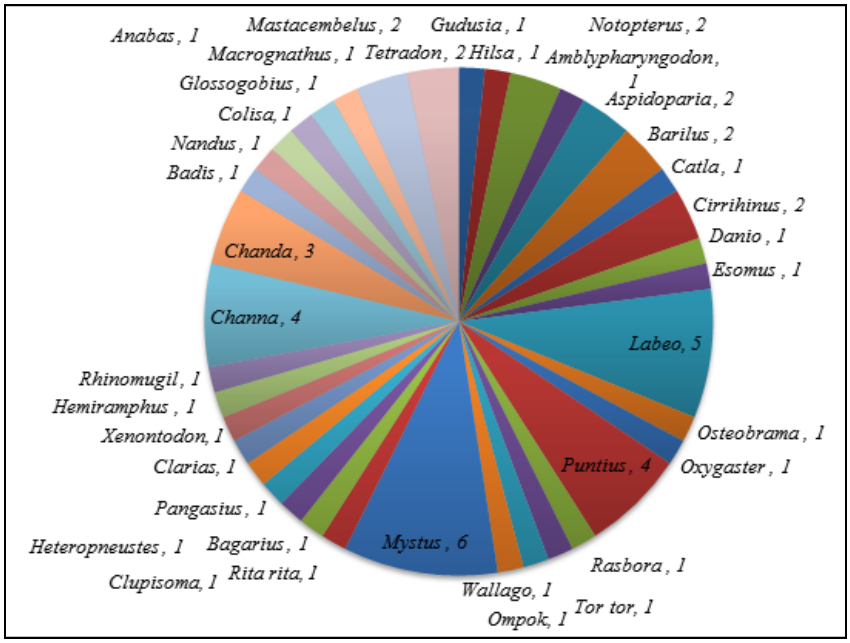


Fig 5: Abundance of different genus.

4. Discussion

The present results revealed the occurrence of 61 fish species belonging to 38 different genera, 19 different families and 9 different orders. 20 fish species belonging to 11 genera, 8 different families of 4 different orders were recorded from various water resources of the Mawana [8]. The identified fishes were important because of their economic importance and consumer demand in Indian psiciculture. Sakhare [19] reported 23 species belonging to 7 orders from Jawalgon reservoir Solapur district Maharashtra. Khedkar and Gynanath [20] have reported 37 species from Issapur dam in district Yavatmal where Cyprinidae family was dominant with 20 species. Battul *et al.,* [21] have reported 18 species from Ekruckh lake Solapur district. Shinde [22] observed 11 species under 10 genera under the Cyprinidae family from Harsul Savangi dam in the district Aurangabad (Maharashtra). Ubarhande *et al,* [23] have reported 27 species belonging to 11 families where Cyprinidae family was dominant with 13 species from Ambadi dam in the district of Aurangabad (Maharashtra). Kumar *et al.,* [24] reported 33 fish species belonging to 6 different orders and 14 families. Out of the total 33 species recorded from Shershah Suri pond, 14 species belonged to family Cyprinidae, 3 species each to Bagridae and Channidae, 2 species each to Siluridae and Paleomonidae, and 1species each to Notopteridae, Clariidae, Heteropneustidae, Cobitidae, Nandidae, Belonidae, Tetradontidae, Anabantidae and Mastacembelidae from Bihar. Xavier Innocent [25] investigated 18 fish species belonging to 14 genera and 8 families in the Suthamalli pond. Cyprinids which constitute major and minor carps were found to be numerically abundant and also showed high species richness. Singh [26] reported 28 species belonging to 14 families from Suthamali pond, Siwan Bihar. Nagma and Khan [27] reported 36 species belonging to 6 order, 11 families and 23 genera from Bijnor district of Western Uttar Pradesh.

5. Conclusion

The aim of this investigation was to identify fish species in the study area and also document these species. Based on the present study, it may be concluded that the rivers and ponds of the region hosts a number of fish species. However, the fish fauna in Western U.P. is at risk due to several anthropogenic activities like deforestation, overfishing, sand mining, recreational activities and organic and inorganic pollution. In the present study, it was observed that anthropogenic activity altering the fine tune of the river ecosystem and established as a major cause of habitat alteration and fish stock depletion and thus many of the species were rare. To this all concerned conservationists, government and non governmental agencies have a major role to play in creating public awareness and support for the conservation mechanisms for the fish species.

6. References

1. Kar D, Nagarathna AV, Ramachandra TV, Dey SC. Fish diversity and conservation aspects in an aquatic ecosystem in North Eastern India. Zoo's Print Journal. 2006; 21(7):2308-2315.
2. Day F. Fauna of British India, Including Ceylon and Burma, Fishes and Taylor and Francis, London. 1989.
3. Jayram KC. The Fresh water fishes of India, Pakistan, Bangladesh, Burma and Sri Lanka, A Hand Book Edited by Zoological survey of India Calcutta. 1981, 12.
4. Talwar PK, Jhingram AG. Inland Fishes of India and Adjacent Countries New Delhi: Oxford and IBH co Private limited. 1991, 1158.
5. Jayaram KC. The Fresh water Fisheries of Indian Region New Delhi: Narendra Publishing House. 1999.
6. Dey A, Mukherjee A, Sarkar D, Ray N. Status of Indigenous Ornamental fish diversity and abundance in Ghargharia river in Cooch Behar district of WB Int. J. of Pure and App. Bio. sci. 2015; 3(1):133-137.
7. Dey A, Nur R, Sarkar D, Barat S. Ichthyofauna Diversity of River Kaljani in Cooch Behar District of West Bengal India Int. J. Pure. App Bio. Sci. 2015; 3(1):247-256.
8. Jain S, Rana N, Varma M. Ichthyofaunal Survey Of Various Fish Ponds Of Mawana Region Of District Meerut (U.P.), India. Int. J. of Fish. and Aq. Sci. 2014; 4(1):81-91. ISSN 2248-9975.
9. www.mapofindia.com
10. Day F. The Fishes of India: being a natural history of the fishes known to habitat the seas and fresh water of India Burma and Ceylon Text and Atlas in 4 parts London. 1875-78; 20:778.
11. Day F. The Fishes of India Being A Natural History of the Fishes Known to Inhabit the Seas and Fresh Waters of India Burma and Ceylon Today and Tomorrow's Book Agency. 1986; 1(2):778.
12. FAO Species identification sheet for fishery purposes Eastern Indian Ocean (fishing area 57) and Western Central Pacific (fishing area 71)" Vol1 (Eds Fischer W and Whitehead P J P. 1974, C1-22.
13. Jayaram KC. The Freshwater Fishes of the Indian Region Narendra Publishing House New Delhi. 1999; 27:551.
14. Jayaram KC. The Freshwater Fishes of the Indian Region Second Edition Narendra Publishing House Delhi. 2010, 616.
15. Talwar PK, Jhingran AK. Inland fishes of India and adjacent countries Oxford and IBH Publishing Co Pvt Ltd New Delhi. 1991; 2(19):1158.
16. Talwar PK, Jhingran AK. Inland fishes of India and adjacent countries AA Balkema / Rotterdam. 1992; 1:1177.
17. Shrivastava G. Fishes of U. P. and Bihar. Vishwavidyalaya Prakashan, Varansi. 2006. ISBN:81-7124-013-5.
18. Jain S. A study of Indian Rasborinae in Relation To Taxonomy. PhD Thesis Garhwal University Srinagar, Garhwal (U.P.). 1987.
19. Sakhare VB. Ichthyofauna of Jawalgaon reservoir in Solapur district of Maharashtra J. Aqua. Biol. 2001; 16(1):31-33.
20. Khedkar GD, Gynanath G. Biodiversity and Distribution of the Fishes from the Back Waters of Issapur Reservoir District Yeotmal Maharashtra State India" Trends in Life Science (India). 2005; 20(2):117.
21. Battul PN, Rao RA, Navale KR, Bagale MB, Shah NV. Fish Diversity from Ekrukh Lake Near Solapur Maharashtra J Aqua Biol. 2007; 22(2):68-72.
22. Shinde SE, Paithane RY, Bhandare, Sonawane DL. Ichthyofaunal diversity of Harsool Savangi Dam district Aurangabad (MS) India World J Fresh Mar Sci. 2009; 3:141-143.
23. Ubarhande SB, Jagtap JT, Sonawane SR. Ichthyofanal Diversity from Ambadi Dam Taluka Kannad District Aurangabad (Maharashtra) Recent Research in Science and Technology. 2011; 3 (6):34-37.
24. Kumar P, Wanganeo R, Wanganeo A, Sonaullah F. Preliminary Study On Ichthyofaunal Diversity Of Shershah Suri Pond Sasaram Bihar Int. J. of Eng. Sci. and Tech. (IJEST). 2011, 3(2). ISSN: 0975-5462.
25. Xavier Innocent B, Karuthapandi M, Syed Ali Fathima M. In Fish faunal diversity of Suthamalli pond Tirunelveli District Tamilnadu International journal of Advance life Science. 2012, 1. ISSN2277-758X.
26. Singh RK, Kumari R, Pandey MK. Study on Fish Species Diversity of Mahendranath pond Siwan Bihar" Int. J. of Pharm. & Bio. Arch. 2012; 3(4):950-951. ISSN 0976-3333.
27. Nagma, Khan MA. Studies On Freshwater Fish Fauna Of District Bijnor In Western Uttar Pradesh India Int. J. Life Sc. Bt. & Pharm. Res. 2013; 2(3). ISSN 2250-3137.