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Ichthyofaunal Survey Of Various Fish Ponds Of Mawana Region Of District Meerut (U.P.), India

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Abstract

The present study has been conducted on 6 different ponds situated near Mawana town (29°05`7.2"N; 77°55`06.5"E) of district Meerut at National Highway (N. H.119) during January 2013 to January 2014. The aim of this study was to assess the variety and abundance of the important fish fauna inhabiting this region. Presence and absence of these fish species were also recorded in all the ponds on the basis of survey. The results revealed the occurrence of 20 fish species belonging to 11 genera, 8 families and 4 orders. The order Siluriformes was dominant with 8 species followed by Cypriniformes 6 species, Ophiocephaliformes 4 species, and Perciformes 2 species. Cyprinids and Silurids found to be numerically abundant and also showed high species richness. Out of the total 20 species recorded from all ponds, 6 species belonged to family Cyprinidae, 5 species to Bagridae, 4 species to Channidae, 1 species each to Siluridae, Heteropneustidae, Clariidae, Centropomidae and Anabantidae. There is no documentary evidence available in present study area till date regarding its aquatic fauna.

Keywords: Abundance, aquatic fauna, Ichthyofaunal diversity, richness, aquaculture.

Introduction

Fishes constitute an economically important group of vertebrates and are found in almost all aquatic habitats. These are successful group and are very useful in biological researches. India has rich nature of heritage and nutures a unique biodiversity, placing it among the 12 most biodiversity rich countries. In Asia, the dominant source of supply of fishes is from traditionally based pond aquaculture integrated into wider farming systems. The freshwater environment have varied

faunal community and composition and are interrelated to each other, among this fishes are well known species and it serves as good source of food, in the form of rich protein. According to Karr et al., (1986) fishes are on the top of the food chain and these can serve as indicators of balanced environment; also environmental quality and anthropogenic stress in aquatic ecosystem (Fausch et al. 1990). Studies on taxonomy, ichthyofaunal diversity have been of immense interest to researchers of all times. Historical documentation is available on fish species in India (Day, 1875-78; Jayaram, 1999; Talwar and Jhingran, 1991, 1992) and still continuing by the Zoological Survey of India with less explored freshwater habitats, including ponds and also in temporary pools. India is one of the mega biodiversity rich countries in the world and occupies the ninth position in terms of freshwater mega biodiversity (Shinde et al., 2009). Lakes, rivers and streams are now facing several environmental trouble throughout the world largely associated with anthropogenic activities in their catchment area (Young et al., 2004).

Survey of the ponds

The surveys were conducted to know reliable estimate index of the population size of the fish species of the particular ponds and also for identifying that species number in a given area. The survey were conducted for a number of reason e.g., to know how many species of a particular genus of fish are present and also to know baseline information for an area, or species that are poorly known. The repeated intervals, the count allow us to track changes in fish population. Information on population size of individual species can also be used to set priorities, allowing conservation efforts to be focused on those species most in need of attention. In general, smaller population size is associated with greater risk of extension locally, regionally or globally. Such information is collected by undertaking surveys over varying geographical areas.

Aim of the investigation

The aim of this investigation was to identify and document these fish species in the study area.

MATERIALS AND METHODS

The present study was conducted for identifying the fish species in the local ponds during the period of one year (January 2013 to January, 2014) covering all the four seasons – winter, summer, spring, autumn. This investigation was carried out on following steps-

1. Survey of the area
2. Selection of the ponds
3. Sample Collection
4. Taxonomic identification of fish
5. Data collection

1. Survey of the area

Various ponds of Meerut [District - Meerut (29°01`N; 77°45`E), UP] region were surveyed before starting the investigation, especially Mawana region. Mawana(29°05`7.2"N; 77°55`06.5"E) is located near the historical place Hastinapur at National Highway (N.H.-119).

2. Selection of the ponds

On the basis of the survey 6 different ponds (sites) were selected for sample collection. These ponds were located near Mawana. Some of these were in villages and some were located on NH-119. All of these were marked as Pond 1, Pond 2, Pond 3, Pond 4, Pond 5 and Pond 6 to create the difference during documentation. Location of these ponds was as follows (Figure1).

Survey Sites		**Location and distance from Meerut**
Pond 1	(depth 20 feet, area 2 hectare)	Mawana Khurd, 20 K.m.
Pond 2	(depth 20 feet, area 2.75 hectare)	Kheri Manihar, 28 K.m
Pond 3	(depth 20 feet, area 2.5 hectare)	Kheri Manihar, 28 K.m
Pond 4	(depth 20 feet, area 1.5 hectare)	Niloha, 32 K.m
Pond 5	(depth 20 feet, area 2.5 hectare)	Behjadka, 34 K.m
Pond6	(depth 20 feet, area 2 hectare)	Pilona, 36 K.m

3. Sample Collection

Samples were collected for identification of fishes at species level. Fishes were collected from the ponds with the help of local fishermen using different types of craft and gear like various types of nets, viz., gill nets, cast nets and drag nets. The collected samples were preserved in formalin 10% and brought to laboratory for identification; some of them (living fish) were released in the pond. Identification of large fishes was done in the field itself.

4. Taxonomic identification of fish

All the specimens collected from Mawana region were identified with the help of standard literature of Day (1875-78, 1986), FAO-Fisheries Identification Sheets (1974), Talwar and Jhingran (1991), and Jayaram, (1999, 2010) and identification keys; using various morphometric and meristic characters.

5. Data collection

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

OBSERVATION AND RESULT

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. The identified fishes were economically important and had good consumer demand in Indian market. The identified species and their economic value are given in the table (Table 1).

The dominant order was Siluriformes with 5 genera; Cypriniformes with 4 genera and Ophiocephaliformes and Perciformes with 2 genera each. On the basis of percentage composition and species richness, Siluriformes was dominant with 8 species followed by Cypriniformes (6 species), Ophiocephaliformes (4 species) and Perciformes (2 species) (Figure 2).

Ichthyofaunal diversity comprised of 8 families namely Cyprinidae (30%), Siluridae (5%), Bagridae (5%), Heteropneustidae (5%), Clariidae (5%), Channidae (20%), Centropomidae (5%) and Anabantidae (5%) (Figure3). The highest number of these species were recorded during their breeding season *e.g.*, *Mystus seenghala* breeds in river and pond from April to July. *Clarias batrachus* from April to June and 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 dominant family was Cyprinidae with 6 members, Bagridae with 5 members, Channidae with 4 members whereas Siluridae, Heteropneustidae, Centropomidae, Anabantidae with only one member. In the present investigation, of all total 20 species, 9 different fish species were observed in all ponds.

The study also revealed that one species each of genus *Catla*, *Puntius*, *Wallago*, *Heteropneustes*, *Clarias*, *Chanda*, *Colisa* and two each 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 6 ponds. These fishes were frequently found in survey area and their presence was also noted during the survey in all 6 sites. These species were cultured in 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 pond 3, and *Wallago attu*, *Clarias batrachus*, were found in pond 1, 3, 4. *Mystus cavasius* was only found in pond 1, 3 and *Channa striatus*, *Channa gachua* and *Chanda baculis* was only found in pond 2, 3.

Of all the ponds --12 species were found in pond 1; 11 in pond 2 ; 20 in pond 3; 11 in pond 4; 9 in pond 5 and 9 in pond 6. The percentage composition of total number of species 17% were found in pond 1, 15% in pond 2, 27% in pond 3, 15% in pond 4, and 13% in pond 5, 13% in pond 6. (Figure 4).

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 were cultured on a large scale.

DISCUSSION

A total of 20 fish species belonging to 11 genera and 8 different families of 4 orders were observed. Presence and absence of these fish species were also recorded in all the ponds on the basis of survey. Fish has been recognized as a good food source for human beings for centuries and is used as a perfect diet not only due to its excellent taste and high digestibility but also because of having high proportions of unsaturated fatty acids, essential amino acids and minerals for the formation of functional and

structural proteins (Kumar, 1992). Sakhare (2001) reported 23 species belonging to 7 orders from Jawalgon reservoir Solapur district Maharashtra. Khedkar and Gynanath (2005) reported 37 species from Issapur dam in district Yavatmal where Cyprinidae family was dominant with 20 species. Battul et al., (2007) reported 18 species from Ekruckh lake Solapur district. Shinde (2009) observed 11 species under 10 genera under the Cyprinidae family from Harsul Savangi dam in the district Aurangabad (Maharashtra). Ubarhande et al (2011) observed 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, (2011) 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.

The study of Jakhar revealed that the protein content of catla, rohu, magur and pangas was 10.11%, 9.53%, 14.87% and 13.6% (% of wet weight), respectively. The total lipid content was generally high, ranging from 1.2 % to 7.9 % and crude ash ranged from 1.25% to 2.7%. Saturated fatty acids (SFA) were most abundant in catla (60.92%) while in rohu (52.28%), pangas (47.15%) and magur (39.85%) respectively. Magur was rich in polyunsaturated fatty acids (PUFA) (25.56%) than pangas (23.37%), rohu (15.84%) and catla (12.5%). The omega 3 and 6 ratio (3/ 6) was ranging from 0.706 to 6.544 and catla showed the highest ratio. The most abundant fatty acid in all fishes was C16:0, ranging from 32.2% to 38.23%. The other major fatty acids detected were C18:0, C18:1 and C18:3. This result shows that the importance of fish nutrition in the human diet for combating the diseases like heart problems, cholesterol and many nervous related problems.(Jakhar et al., 2012). Xavier Innocent (2012) 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 (2012) reported 28 species belonging to 14 families from Suthamali pond, Siwan Bihar. Nagma and Khan (2013) reported 36 species belonging to 6 order, 11 families and 23 genera from Bijnor district of Western Uttar Pradesh.

CONCLUSION

Based on the study it may be concluded that the rivers and ponds of the region hosts a number of fish species. During the study it was also observed that urbanization; industrialization and farming activities around the pond were the factors that are probably responsible for low fish production and diversity. However, the fish fauna in Mawana is at risk due to several anthropogenic activities like deforestation, overfishing, sand mining, recreational activities and organic and inorganic pollution. It is suggested that more studies should be undertaken to generate the basic biological information on the ichthyofauna of the region.

Table 1: Survey table of ponds 1, 2, 3, 4, 5 and 6 (Site wise occurrence of species)

S. No.	Common name	Zoological name	Family	Order	Present (P) \Absent (A)	Economic value
1.	Bhakur	*Catla catla*	Cyprinidae	Cypriniformes	Pond-1, 2, 3, 4, 5, 6 (P)	Food fish, commercially important
2.	Nain	*Cirrhinus mrigala*	Cyprinidae	Cypriniformes	Pond-1, 2, 3, 4, 5, 6 (P)	Cultivatable food fish
3.	Raia	*Cirrhinus reba*	Cyprinidae	Cypriniformes	Pond-1, 2, 3, 4, 5, 6 (P)	Cultivatable food fish
4.	Karaunchar	*Labeo calbasu*	Cyprinidae	Cypriniformes	Pond -3 (P); -1, 2, 4	Non classified ornamental fish, Food fish, commercially important
5.	Rohu	*Labeo rohita*	Cyprinidae	Cypriniformes	Pond-1, 2, 3, 4, 5, 6 (P)	Food fish, commercially important
6.	Sindhari	*Puntius sophore*	Cyprinidae	Cypriniformes	Pond-3 (P); Pond -1, 2, 4 (A)	classified ornamental fish
7.	Padhani, Barari	*Wallago attu*	Siluridae	Siluriformes	Pond -1, 3, 4 (P); Pond -2 (A)	Food fish, commercially important
8.	Tengra	*Mystus tengra*	Bagridae	Siluriformes	Pond -3 (P); Pond -1, 2, 4 (A)	classified ornamental fish
9.	Sutahawa Tengra	*Mystus cavasius*	Bagridae	Siluriformes	Pond -1, 3 (P); Pond -2, 4 (A)	classified ornamental fish, Food fish, commercially important

10.	Tengra	*Mystus vittatus*	Bagridae	Siluriformes	Pond-1, 2, 3, 4, 5, 6 (P)	Food fish, commercially important, classified ornamental fish,
11.	Tengra	*Mystus aor*	Bagridae	Siluriformes	Pond -3 (P); Pond -1, 2, 4 (A)	classified ornamental fish, Food fish, commercially important
12.	Tengra	*Mystus seenghala*	Bagridae	Siluriformes	Pond-1, 2, 3, 4, 5, 6 (P)	classified ornamental fish, Food fish, commercially important
13.	Singhi	*Heteropneustes fossilis*	Saccobranchidae Heteropneustidae	Siluriformes	Pond-1, 2, 3, 4, 5, 6 (P)	Food fish, commercially important
14.	Mangur	*Clarias batrachus*	Clariidae	Siluriformes	Pond -1, 3, 4 (P); Pond -2 (A)	Food fish, commercially important
15.	Saur, Chanaga	*Channa gachua*	Ophiocephalidae / Channidae	Ophiocephaliformes	Pond-2, 3, (P); Pond1,4,5,6(A)	Food fish
16.	Sauli	*Channa marulius*	Ophiocephalidae / Channidae	Ophiocephaliformes	Pond-1, 2, 3, 4, 5, 6 (P)	Food fish
17.	Sauli Girai	*Channa punctatus*	Ophiocephalidae / Chanidae	Ophiocephaliformes	Pond-1, 2, 3, 4, 5, 6 (P)	Food fish, commercially important
18.	Momil, Sauli	*Channa striatus*	Ophiocephalidae / Channidae	Ophiocephaliformes	Pond-2,3 (P); Pond -1, 4 (A)	Food fish

19.	Chanari	*Chanda baculis*	Centropomidae	Perciformes	Pond-2,3 (P); -1, 2, 4 (A)	Non classified ornamental fish
20.	Khosti	*Colisa fasciatus*	Anabantidae	Perciformes	Pond-3 (P); Pond -1, 2, 4 (A)	Non classified ornamental fish

- **Note: P** shows presence and **A** shows absence of species.

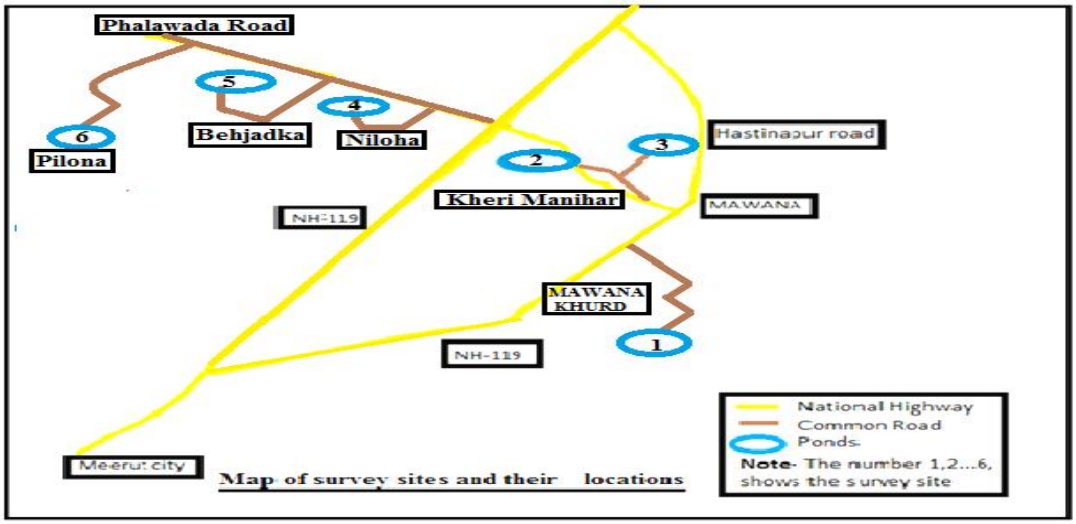

Figure1 - Map of survey sites and location of all six ponds in Mawana.

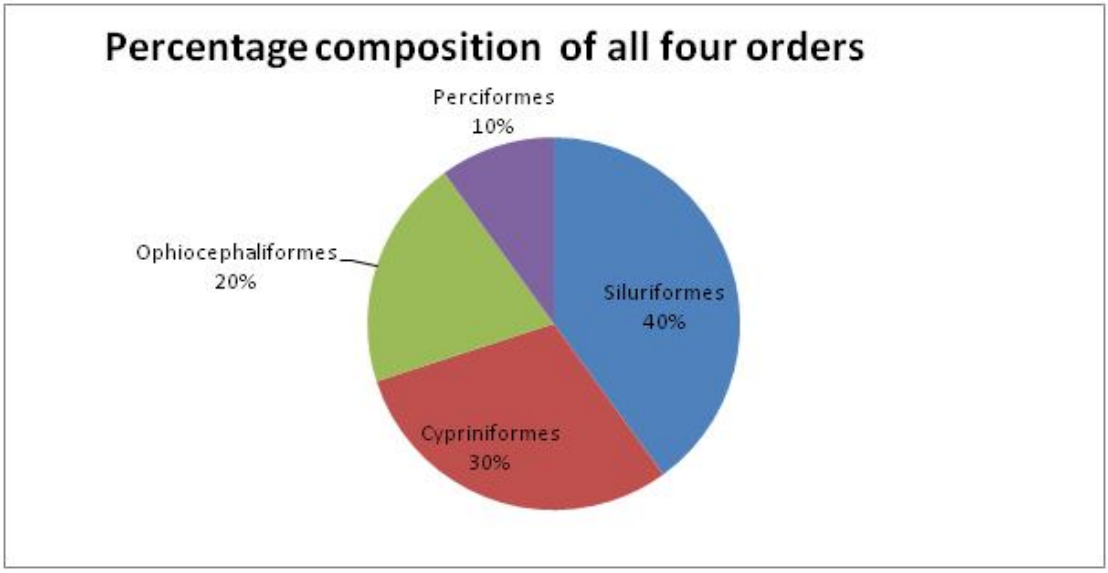

Figure2: Total percentage occurrence of different orders of Fishes in all 6 ponds

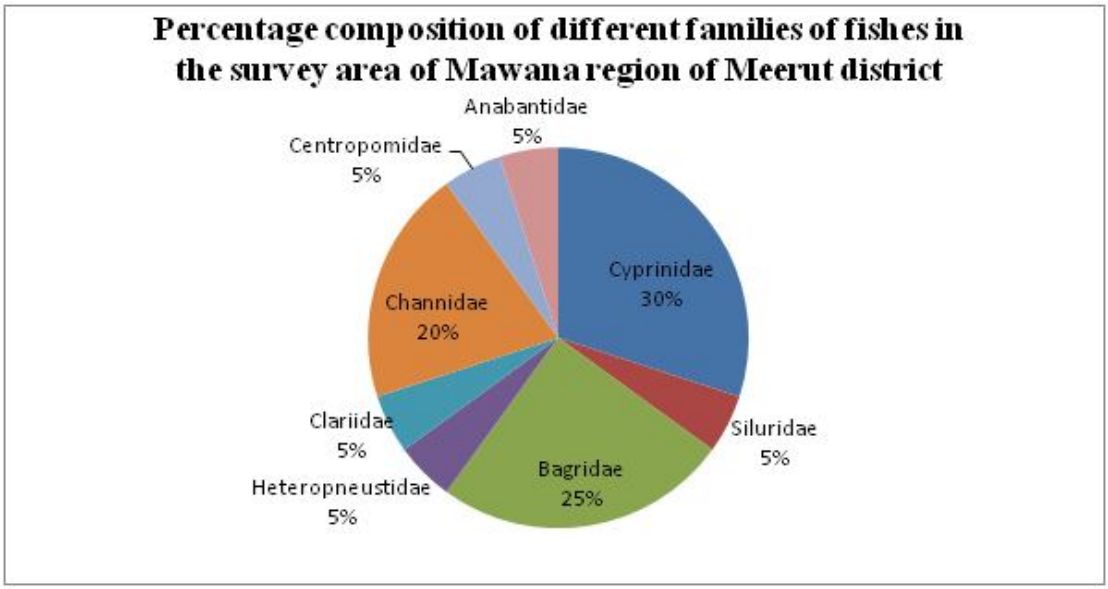

Figure3: Total number of families found during the study in all 6 ponds (%value).

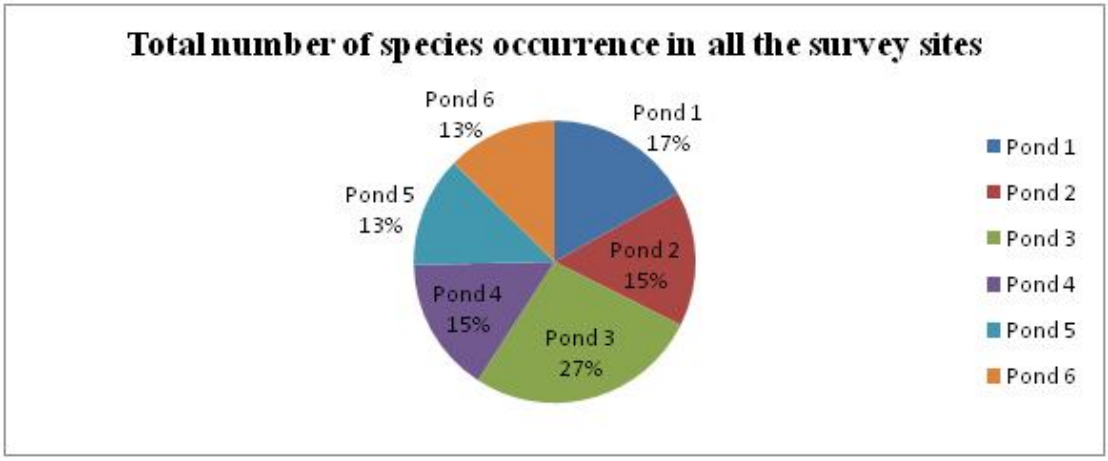

Figure 4: Total number of species (%value) occurred in different study area.

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