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FISH DIVERSITY OF PARDESWADI LAKE WALUJ M. I. D. C. AURANGABAD (M. S.) INDIA

V. T. Kamble[1]* and C. A. Jawale [2]

[1]Dept. of Zoology, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.

[2]Shri Madhavrao Patil Mahavidyalaya, Murum, Tq. Omerga, Dist. Osmanabad.

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***Corresponding Author**
V. T. Kamble
Dept. of Zoology, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.

ABSTRACT

Present fish study was carried out during Feb. 2014 to Jan. 2016 at Pardeswadi lake, waluj M.I.D.C. Aurangabad. This is fresh water body especially constructed for drinking, domestic, agriculture and fisheries purposes. The results of present study reveal the fish diversity belong to 2 orders, 02 families, and 6 species. Out of 6 species channaidae family was dominant of all with 05 species. This study could serve as baseline information to assess relevant water bodies in the future management and conservation of fishery resources. It may be concluded that Prdeswadi lake has poor of fish diversity.

KEYWORDS: Fish diversity, pollution, and Prdeswadi lake.

INTRODUCTION

The Earth is the blue planet which holds the precious matter of the universe, water, covered earth's 2/3 surface, comprises both Marine and fresh water ecosystems. Though freshwater habitats occupy relatively small portion of the earth's surface, their importance to man is for greater than their area because they are most conveniant and cheapest source of water for domestic and industrial needs.[1] Biodiversity is essential for stabilization of ecosystem protection of overall environmental quality for understanding intrinsic worth of all species on the earth.[2] The aquatic ecosyatem highly depend on water quality and biological diversity. Physico-chemical parameters of water plays significant role in the biology and physiology of fish.[3] Fish assemblages have widely been used as ecological indicator to assess and evaluate the level of degradation and health of water bodies at various spatial scales.[4] Fishes form one of the most important groups of vertebrate influencing its life in various ways. Millions of human beings suffer from hunger and malnutrition and fishes are a rich source food and

provide a meal to tide over the nutritional difficulties of man. In addition to serving as an important item of food, fishes provide several by products to us. Fishes have formed an important item of human diet from time immemorial and primary caught for this purpose. Fish diet provides proteins, fat and vitamins A and D. A large amount of phosphorous and other element are also present in it. They have good test and easily digestible. Ecomomic importance and scope of fish and fishries especially in Maharashtra, it is essential to study the distrubution and availability of fish from freshwater reservoirs and tanks.[5] Present study was undertaken to study the fish diversity of Pardeswadi lake.

MATERIALS AND METHODS

Study Area

The Pardeswadi lake is 0.5km from Ramrai (Pardeswadi) village to West, 0.5 km from Jogeswari to North, 1.0 km from Kamlapur to East, and 1.5 km from WALUJ (Aurangbad-Pune highway) to South and about 22 km from Aurangabad city. The present study was done for the lake which is situated in WALUJ MIDC, AURANGABAD area and its geographical coordinates are 19°54' 0" North, and 79°29' 0" East.[6]

Sampling

The biodiversity of fish at the Pardeswadi lake was carried out during the period Feb. 2014 to Jan. 2016. The fish samples were collected from the lake from four sampling stations(A, B, C, and D) were selected after survey such as NORTH, SOUTH, EAST and WEST respectively, of the lake area. The fish on monthly basis was collected for a period of 24 month. Fishes were collected with the help of local fishermen. The collected specimens were immediately dipped in 10% formalin in a large container that allowed proper spreading of their fins. Two changes of 10% formalin were adopted during the sampling time. Then the specimens were examined on field and classified into families which were carried in separate containers. Each container was labeled properly against the physical data sheet of sampling and brought to the laboratory for further taxonomic exercise. Identification of fishes was done up to species level at fish landing center to get its natural color, pattern of scales, fins, mouth pattern, identification marks like black spot, bloach on operculum, paired and unpaired fins and body parts with the help of standard literature. Fish species not identified on the field (landing center) were preserved in 10% formalin and brought to Fishery Research laboratory, Department of Zoology, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad for

identification. Morphological characters and fishes were indentified up to the species level, with the help of standard key from books.[7,8,9]

RESULTS AND DISCUSSION

In present study it was observed that the lake was poor in fish diversity. Fishes belong to 2 orders; 02 families were found. The fish collected were, indentified and recorded during course of study period Feb. 2014- Jan. 2016. During study 6 species which were Channa marulius, Channa gaucha, Channa striatus, channa punctut, Clarius batrachus found. These collected fish species are economically important. The order perciformes species, Channa gaucha, Channa striatus, channa marulius, channa punctut, were recorded abundant form, popularly known as snake head murrels. Where as siluriformes in which Clarius batrachus recorded less abundant. Among the collected species order perciformes was most dominant constituting 52.7% at site D followed siluriformes 4.1% at site B during the year 2014-15, where as perciformes 39.3% at site B and then siluriformes 4.8% at site A during the year 2015-16. Fishes are the keystone species which determine the distribution as well as an abundance of other organisms in the ecosystems. They are good indicators of the water quality and health of the ecosystem. Fishing has become a major economical industry, due to several uses of fisheries resources. The environmental degradation is one of the major problem which has great impact on fish diversity. Further, there is a alarming situation to conduct the survey and diversity studies of fish fauna in all varieties of habitats. Industrialization and anthropogenic activities are also disturbing the eco-physiology of aquatic ecosystem.[10] The use of artificial fertilizers, insecticides and pesticides for agriculture which causes water pollution. It also causes loss of breeding ground, eutrophication, increased turbidity of the water, creation of algal blooms which affect many species.[11] The fish production from the wetlands of Assam has been in the decline due to habitat modification, over exploitation and various anthropogenic stresses.[12,13] During the study of fish fauna was higher in summer season (Table 1). Reservoirs having water temperature more than 22 ^{0}C are found to be highly productive.[14] Graph 1 to 8(Fig. 1,2) shows the percentage composition of fish species in Pardeswadi lake during the study period of 24 month from Feb. 2014 to Jan. 2016. The above data were subjected to a software program “PAST”[15], which generates nine diversity indices namely Dominance D, Shannon H, Simpson, Evenness, Menhinick, Margalef, Equitability J, Fisher alpha and Berger-Parker. As diversity increases index value gets smaller. The diversity of fish fauna study has been done in different seasons viz: summer, monsoon and winter. Analysis of the Shannon

Weinner index, Margalef's D index and Simpson 1D index of diversity showed that, diversity of fish fauna was higher in summer season than monsoon (Table-3). The Dominance index in the present study indicates that Pardeswadi lake has maximum dominance at site D (0.7775) and at site C (0.68) has the minimum dominance of fish species during year 2014-15. Where as at site C (0.7696) has the maximum dominance and at site D (0.6306) has the minimum dominance of fish species during year 2015-16. Shannon-Weiner index represents entropy. It is a diversity index into account the number of individuals as well as the number of species.[16] This index can also determine the pollution status of a water body. Normal values range from 0 to 4. Wilham and Dorris concluded that the values of the index greater than 3 indicate clean water, values in the range of 1 to 3 are characterized by moderate pollution and values less than 1 characterized as heavily polluted.[17] According to this index, Pardeswadi lake (0.5561) heavily polluted. The Simpson's index is often used to quantify the biodiversity of the habitats. According to Simpson's index species are not evenly distributed. The values range from a minimum at site D (0.2223) and maximum (0.3200) at site C during year 2014-15, whrere as minimum (0.2309 at site C and maximum(0.3694) at site D during year 2015-16. The Pielou's evenness index is a measure of diversity that quantifies how the distribution of the community is equally.[18] The Evenness in Pardeswadi Lake was (0.8720) during the study period Feb. 2014- Jan. 2016. Menhinick's and C indices measure richness of species in an ecosystem. During study period, Menhinick's index is low at site B (0.09335) and reaches a high value (0.8138) at site D, where as Margalef's index is low (0.1562) at site D and reaches a high value (0.1780) at site C in the year Feb.2014- Jan. 2015, where as it is low (0.1632) at B and high (0.1786) at D during Feb. 2015- Jan. 2016 at Pardeswadi Lake. The Equitability index is a measure of the evenness with which individuals are divided among the texa present. Equitability takes the values between 0 and 1, with 1 being complete evenness. The index when applied to the present study indicates that Pardeswadi Lake has 0.8024. Fisher's alpha index is a mathematical calculation for determining diversity within a population.[19] This index is very low in Pardeswadi Lake (0.2577) at site D and is highest 0.2920 at site C in the year 2014-15, where as it is low(0.2686) at site B high(0.2929) at D during the study year 2015-16. This indicates the abundance of species in the lake. Berger-Parker dominance index is the number of individuals in the dominant texon divided by number of individuals (n).[20] This is high (0.8725) at site D and is low (0.8000) at site C during study year 2014-15. Where as it is high (0.8671) at site C and low(0.7556) at site D during study year 2015-16. in Pardeswadi lake.

Table 1: Seasonal variation of Fish Species during Feb 2014 - Jan 2016.

year	2014-2015							2015-2016						
	Site	ORDER/ SEASON	SUMMER	MONSOON	WINTER	TOTAL	AVERAGE	%AGE	SUMMER	MONSOON	WINTER	TOTAL	AVG.	% AGE
	A	Channidiae	151	35	70	256	64	25.6	141	52	65	258	64.50	25.8
		claridae	23	12	11	46	11.5	4.6	23	15	10	48	12.00	4.8
	B	Channidiae	155	36	71	262	65.5	26.2	255	60	108	393	98.25	39.3
		claridae	20	11	10	41	10.25	4.1	35	15	16	66	16.50	6.6
	C	Channidiae	130	30	60	220	55	22.0	198	56	105	359	84.75	35.9
		claridae	25	15	15	55	13.75	5.5	33	10	12	55	13.75	5.5
	D	Channidiae	235	114	178	527	131.75	52.7	131	30	43	204	57.00	20.4
		claridae	18	09	50	77	19.25	7.7	38	13	15	66	16.50	6.6

Table 2: Total Number and Percentage of FISH Species of Pardeswadi lake.

Stations	year	2014-2015		2015-2016	
	Order	Total fish	Percentage%	Total fish	Percentage%
A	Channidae	302	25.6	306	25.8
	Claridae		4.6		4.8
B	Channidae	303	26.2	459	39.3
	Claridae		4.1		6.6
C	Channidae	275	22.0	414	35.9
	Claridae		5.5		5.5
D	Channidae	604	52.7	270	20.4
	Claridae		7.7		6.6

Table 3: Diversity Indises of Pardeswadi Lake.

Year	2014-15				2015-16			
Index/ site	**A**	**B**	**C**	**D**	**A**	**B**	**C**	**D**
Texa-sp.	2	2	2	2	2	2	2	2
Individuals	302	303	275	604	306	459	414	270
Dominance-d	0.7418	0.766	0.68	0.7775	0.7355	0.7538	0.7696	0.6306
Simpson-1-d	0.2582	0.234	0.32	0.225	0.2645	0.2462	0.2304	0.3694
Shannon-h	0.4267	0.3964	0.5004	0.3816	0.4344	0.4118	0.3918	0.5561
Evenness-e^h	0.7661	0.7432	0.8247	0.7322	0.772	0.7548	0.7398	0.872
Brillouin	0.4676	0.3874	0.4902	0.7366	0.4254	0.4054	0.3849	0.5455
Menhinick	0.1151	0.1149	0.1206	0.8138	0.1143	0.09335	0.09829	0.1217
Margalef	0.1751	0.175	0.178	0.1562	0.1747	0.1632	0.166	0.1786
Fisher_alpha	0.2874	0.2872	0.292	0.2577	0.2868	0.2686	0.273	0.2929
Berger-parker	0.8477	0.8647	0.8	0.8725	0.8431	0.8562	0.8671	0.7556

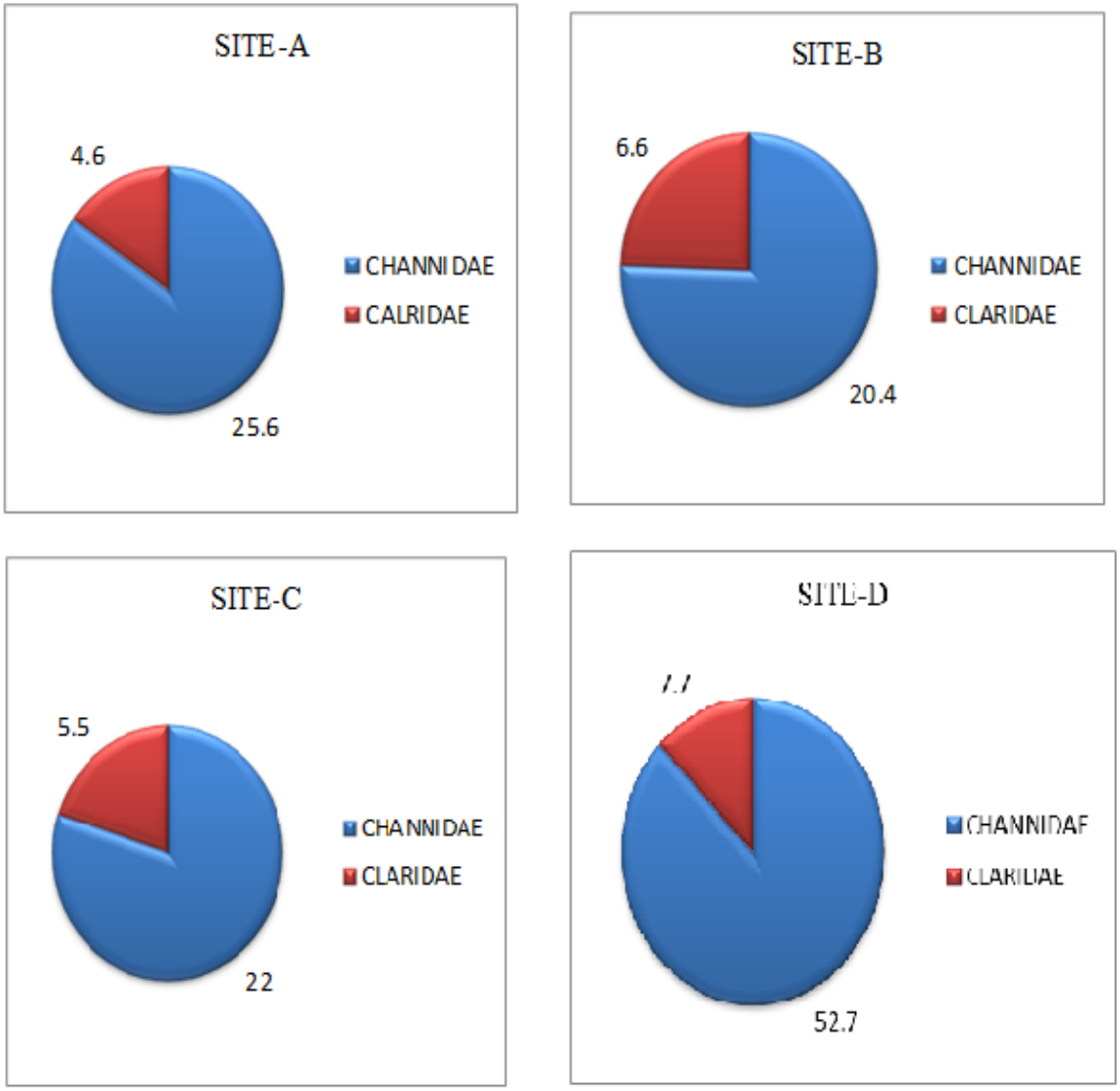

FIG. 1: PI chart shows percentage of Fish Speceis at Pardeswadi lake during Feb 14 – Jan 15.

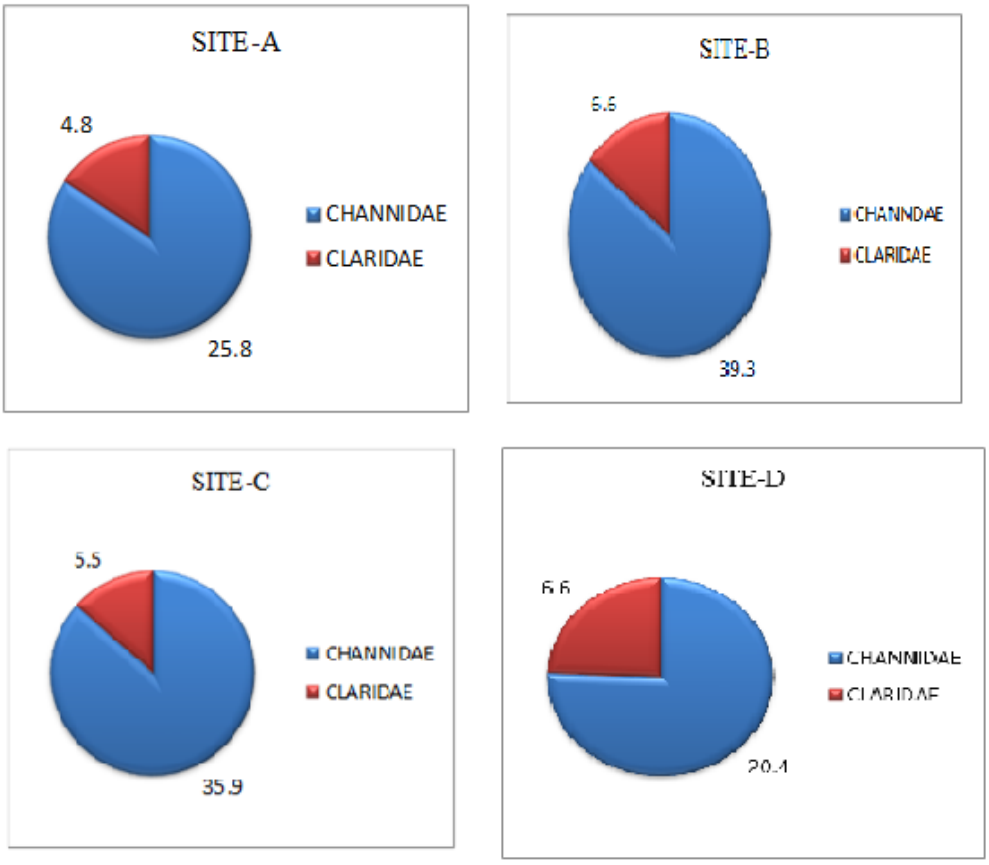

FIG. 2: PI chart shows percentage of Fish Species at Pardeswadi lake during Feb 15 – Jan 16.

CONCLUSION

The study concluded that Pardeswadi lake provides a poor diversity of fish. The proper utilization and care of this dam is necessary. The biotic indices of Shannon-Weiner and Evenness were significant during study period. The result of present study are indicating that Pardeshwadi lake poor for fish species diversity. It indicates that this lake does not provide suitable environment for breeding. Factors like human activities and lake parameters might greatly influence the lake quality and affect the function of the lake as a habitat. Therefore study has been conducted to evaluate the fish diversity, conservation status and anthropogenic stress of the lake.

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