

Ichthyo Faunal Bio Diversity in the Meghadrigedda Reservoir at Visakhapatnam, Andhra Pradesh: India

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ABSTRACT: Fish faunal bio diversity in the Meghadrigedda reservoir was studied from September-2014 to August-2015. Fish samples were collected once in every fortnight with the help of local fishermen by using local fishing Craft and Gear. A total of 55 species of fishes were identified belonging to 9 orders such as Osteoglossiformes (01 species), Cypriniformes (24 species), Ciprinodontiformes (01 species), Siluriformes (13species), Angulliformes (01 species), Beloniformes (01 species), Channiformes (03 species), Mastacembaliformes (03 species) and Perciformes (08 species). The number and percentage composition of population status were calculated to 36.36% common, 29.09% abundant, 20.0% moderate, and 14.55% rare species were identified in the Meghadrigedda reservoir. During this study, 42 species of fishes are least concerned (LC), 05 species are near threatened (NT), 04 are not evaluated (NE), 02 species of fish are vulnerable (VU), and 01 each as endangered (ED) and data deficient (DD) were reported. IUCN (2004.2), CAMP (1998) status and Shannon-Weiner diversity (H-), Evenness (E), $H_{max} = \ln(S)$ Maximum diversity possible and species richness (S) for different months were calculated.

KEYWORDS: Fish diversity, Shannon-Weiner diversity, species richness (S), $H_{max} = \ln(S)$ Maximum diversity possible, IUCN and CAMP.

I. INTRODUCTION

Meghadrigedda is an east flowing non-perennial river taking its rise in the Eastern Ghats at Nandikonda hills. It flows towards Rajaourajapeta village in S.Kota mandal of Visakhapatnam district then it turns south upto Karuvapuvanipalem village and there after it runs in the south eastern direction and joins the Bay of Bengal near Ramapuvanipalem, Visakhapatnam. Meghadrigedda reservoir is situated in Gajuwaka municipality in Visakhapatnam district in Andhra Pradesh. The reservoir area lies in between the geographic co-ordinates of 17⁰ 42' to 17⁰ 57' northern latitudes and 83⁰ 00' to 83⁰ 17' of eastern longitudes and is bound by three administrative mandals (sub-districts) of Visakhapatnam district i.e, Sabbavaram, Pendurthi, K.Kotapadu and Kothavalasa mandal of Vizianagaram district. Naravagedda (which flows via Anantapuram and chintapatla villages), Meghadrigedda (flows vis Pinagadi, Rampuram and Pedagadi villages) and Borramgedda (flows via Kothavalasa, Pendurthi) are the three major ephemeral rivers which flow into the reservoir. The reservoir area experiences sub-tropical climate conditions and temperature ranges min. 14-20°C during the month of December and max.33-42 °C during May. The area receives rainfall mostly during June-December from both the south west and northmonsoon, and the annual average rainfall is 11.10 cm. It is manifested mostly with deciduous dry and deciduous scrub types of vegetation.

The dam is built across the Meghadrigedda River. The reservoir was commissioned in the year 1979 and the gross storage of the reservoir is 1169 M.C.P.T. The maximum height of the dam is 46.5 Ft and the maximum depth of the reservoir is 13.77m. Water spread area of the river is 124.62 sq.km and the reservoir full level is 23.33m. The total area of the reservoir is about 368km² The basin perimeter of the reservoir is 192 km. Land acquired for the purpose of the reservoir is 2716 Acres. Meghadrigedda reservoir is a large new impoundment with medium productive potential and

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reservoir is used to provide employment to over 100 fishermen every year. The water of this reservoir is mainly used for industrial, domestic and irrigation purposes.

Reservoirs contribute to the single largest inland fishery resources both in terms of size and production potential. Fish fauna of a reservoir basically represents the fish diversity and their abundance. Indian reservoirs preserve a rich variety of fish species, which supports to the commercial fisheries. The objectives of the present study report the fish species in relation to species richness, Evenness and species diversity in the reservoir. Biodiversity is the degree of variation of life forms within a given ecosystem, it is essential for stabilization of ecosystem protection of overall environmental quality for understanding intrinsic worth of all species on the earth represented by Ehrlich *et al*[1]. India consists of six riverine systems such as Indus river system, upland cold water bodies, Gangetic river system, Brahmaputra river system, east flowing river system, and west flowing system studied by Pandey *et al* [2]. In this river ecosystem, fishes play a very important role in the maintenance of the ecosystem. Fish biodiversity of a river essentially represents the fish faunal diversity and their abundance. River conserves a rich variety of fish species which support the commercial fisheries. Kumar Varun [3] described Ichthyofaunal Diversity of Dhaura Reservoir, Kichha. Menon [4] documented the Check list - freshwater fishes of India, Records of the Zoological Survey of India. Fish constitutes half of the total number of vertebrates in the world. About 21,730 species of fishes have been recorded in the world of which about 11.7% are found in the Indian waters (Murugan, A.S.2012). In India, out of 2500 species of fishes, 930 live in freshwater and remaining 1570 are marine reported by K.C Jayaram [5]. Fresh water fish are used as bio indicators for the assessment of water quality, river network connectivity or flow regime (Chovane et.al 2003).

The two most common measures of species diversity index are Simpson index and Shannon-Weiner index. The Simpson index is the measure of diversity which takes into account both the number of species and the evenness of occurrence of individuals in the various species. It is an expression of the number of times one would have to take pairs of individuals at random from the entire aggregation to find a pair from the species. Shannon- Weiner Index is a widely employed index. The Shannon index is also an expression of how many equally abundant species would have diversity equal to that in the observed collection. It measures the degree of uncertainty in a sampling event. That is if diversity is low, then the certainty of picking a particular species is high. If diversity is high, then it is difficult to predict the identity of a randomly picked individual.



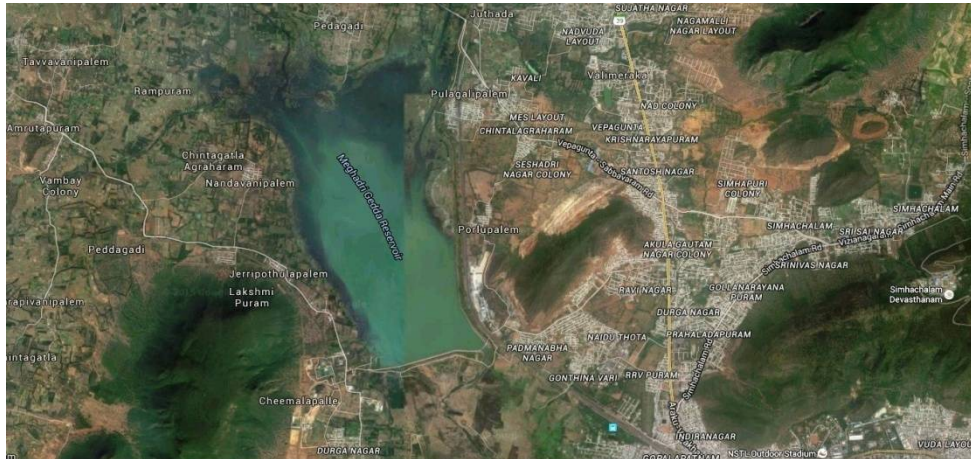


Fig: 1. Meghadrigedda Reservoir Map (Google courtesy)

II. RELATED WORK

Nunoo et al [42] studied the species diversity of 1.67 indicates a highly complex community, for a greater variety of species allows for a larger array of species interactions. Among ecologists, high species diversity is correlated with community stability; the ability of community structure to be unaffected by disturbance of its components. However, a few maintain that there is no simple relationship between diversity and stability. Mookappa Naik and Hina Kousar [43] reported that the occurrence of 23 species of fishes belonging to 6 orders, 18 genera of 10 families. The order Cypriniformes was dominant with 13 species followed by order Siluriformes with 4 species while, the order Channiformes was represented with 3 species and the remaining orders viz., Perciformes, Osteoglossiformes and Mastacembeliformes were represented with one species respectively. Among the fish families, Cyprinidae was dominant with 12 species followed by Channidae with 3 species and rest of the families consists of single species.

Rama Rao [21] reported 64 species of fishes belonging to 8 orders such as Cypriniformes (27 species) Siluriformes (13species), Perciformes (14 species), Channiformes (4 species) Beloniformes(2 species), Anguiliformes (2 species) Osteoglossiformes (one species) and Mogiliformes(one species) in the Lower Manair Dam. The number and percentage composition of population status were calculated to 32.81% common, 29.69% abundant, 21.86% moderate, and 15.63% rare species were identified .Of these, 52 species of fish are least concerned (LC), 4 are data deficient (DD), 2 are not evaluate (NE), 2 species of fish were endangered (ED) and 1 species of fish is vulnerable (VU).

Anuradha Bhata [44] studied the Western Ghats (India) is a region of high biological diversity and endemism of terrestrial fauna, but very little is known about its freshwater species distributions. Four rivers, Sharavati, Aghanashini, Bedti and Kali, of the central Western Ghats were studied for their fish diversity and composition. A total species richness of 92 species (and an endemism of 25%) was reported. A comparison of expected species richness (SR) estimates using different statistical estimators was made – these showed the expected SR to be in the range of 92–120 species. Many of the species were found to be shared with those belonging to the southern Western Ghats, but the study also unearthed new findings in terms of description of a new species and extension of the known distribution range of some of the species.

III. MATERIALS AND METHODS

The study was carried out for 12 months from September-2014 to August-2015. Fish samples were collected from Chintagatla Agraharam, Jerripothulapalem and Peddagadi of Meghadrigedda reservoir surrounding areas with the help of fishermen. Fishes were also collected from local fish markets and fish sellers. Different types of locally available nets (Drag nets, Push nets, Cast nets and Stationary gill nets) and Bamboo baskets (Traps) were used for fish collection.

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Photographs of fishes were taken immediately in fresh condition and preserved in 10% formalin. A data sheet was prepared to record the local name and vernacular name Hamilton-Buchanan, F [6], Mishrs, K.S, [7] Munro, ISR [8]. Fishes were brought to the laboratory; smaller fishes were directly placed in 10% formalin, whereas larger fishes were given an incision on the abdomen and removed the gut contents before they were preserved. The fishes collected and fixed were labelled giving serial numbers, date of collection, and exact locality from where they were collected. Identification was done based on keys for fishes of the Indian subcontinent by Day, F, [9, 10] Jairam, K.C, [11,12,13], Talwar, PK and Jhingran,A. [14] Nath & Dey [15], and classification was carried out on lines of Day, F [9, 16], Jairam, K.C [12], Nelson [17]. Identification of the species was done mainly on the morphometric and meristic characters.

Statistical analysis

The mathematical expression of Shannon - Wiener Diversity Index is

Shannon-Wiener Index denoted by $H = -\sum [(p_i) \times \ln(p_i)]$

SUM = summation

p_i = proportion of total sample represented by species i

Divide no. of individuals of species i by total number of samples

S = number of species, = species richness

$H_{max} = \ln(S)$ Maximum diversity possible

E = Evenness = H/H_{max}

IV. EXPERIMENTAL RESULTS AND DISCUSSIONS

The present study revealed the occurrence of fifty five fish species belonging to 9 orders, 19 families and 34 genera. List of fishes collected from Meghadrigedda reservoir including their order, family, genus, species, common name, vernacular name, IUCN (2015.4) and CAMP (1989) status is provided in Table 1. The listed species are *Notopterus notopterus*, *Catla catla*, *Labeo ariza*, *Labeo calbasu*, *Labeo rohita*, *Cirrhinus mrigala*, *Cirrhinus reba*, **Ctenopharyngodon idella*, **Cyprinus carpio*, *Hypophthalmichthys molitrix*, *Osteobrama cotio cotio*, *Puntius chola*, *Puntius ticto*, *Puntius sarana*, *Puntius sophore*, *Puntius terio*, *Puntius dorsali*, *Puntius pethia gelius*, *Rasbora daniconius*, *Salmostoma bacaila*, *Salmostoma phulo*, *Amblypharyngodon microlepis*, *Amblypharyngodon mola*, *Danio devario*, *Schistura corica*, *Aplocheilus panchax*, *Mystus bleeker*, *Mystus cavasius*, *Mystus gulio*, *Mystus tengra*, *Mystus vittatus*, *Ompok bimaculatus*, *Ompok pabda*, *Wallago attu*, *Pangacius pangacius*, *Eutropneustes vacha*, *Clarias batrachus*, **Clarias gariepinus*, *Heteropneustes fossilis*, *Anguilla bengalensis bengalensis*, *Xenentodon cancila*, *Channa orientalis*, *Channa panctatus*, *Channa striatus*, *Glosogobius giuris*, *Gobiopsis macrostoma*, *Mastacembelus aral*, *Mastacembelus armatus*, *Mastacembelus pancalus*, *Trichogaster faciatius*, *Anabas testudineus*, **Oreochromis mossambicus*, *Etroplus maculatus*, *Chanda nama*, *Ambassis ranga*.

Table: 1. List of fishes and their order, family, genus, species, common name, vernacular name, population status, IUCN and CAMP status in Meghadrigedda Reservoir.

Order / Family	No.	Scientific Name	Common Name	Vernacular Name	Popula tion Status	IUCN Status (2015. 4)	CAM P Status
Osteoglossiformes/	I						
Notopteridae (1)	1	<i>Notopterus notopterus</i>	Grey feather back	Ollenki	C	LC	LRnt
Cypriniformies/	II						
2. Cyprinidae (23)	2	<i>Catla catla</i>	Catla	Botchea	A	VU	LRnt
	3	<i>Labeo ariza</i>	Reba carp	Arju	C	LC	NE
	4	<i>Labeo rohita</i>	Rohu	Seelavati, Ragandi	A	LC	LRnt
	5	<i>Labeo calbasu</i>	Black rohu	Nalla botche	M	LC	LRnt

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	6	<i>Cirrhinus mrigala</i>	Mrigal	Yerra mylu	C	LC	LRnt
	7	<i>Cirrhinus reba</i>	Reba carp	Moyya	C	LC	VU
	8*	<i>Ctenopharyngodon idella</i>	grass carp	Jadduva	M	LC	NE
	9*	<i>Cyprinus carpio</i>	Common carp	Bangarupapa	M	VU	NE
	10*	<i>Hypophthalmichthys molitrix</i>	Silver carp	Silver chepa	M	NT	DD
	11	<i>Osteobrama cotio cotio</i>	Cotio	Tellaparigi	A	LC	LRnt
	12	<i>Puntius chola</i>	Swamp barb	Chedupariga	A	LC	VU
	13	<i>Puntius ticto</i>	Ticto barb	Yerra sedu pariga	C	LC	LRnt
	14	<i>Puntius sarana</i>	Olive barb	Kanumu pariga	C	LC	VU
	15	<i>Puntius sophore</i>	Spot-fin swamp barb	Pittaparega	A	LC	LRnt
	16	<i>Puntius terio</i>	Onespot barb	Tella sedupariga	C	LC	LRnt
	17	<i>Puntius dorsalis</i>	Long snouted barb	Pittapariga	C	LC	EN
	18	<i>Puntius pethia gelius</i>	Golden barb	Rangu chepa	C	LC	NE
	19	<i>Rasbora daniconius</i>	Slender rasbora	Nallamatcha vulusu	M	LC	LRnt
	20	<i>Salmostoma bacaila</i>	Large razorbelly minnow	Bedusu	A	LC	LRlc
	21	<i>Salmostoma phulo</i>	Fine scale razor belly minnow	Bedusu	C	NE	NE
	22	<i>Amblypharyngodon microlepis</i>	Indian carplet	Vulisa	A	LC	NE
	23	<i>Amblypharyngodon mola</i>	Mola carplet	Vulisa	A	LC	LRlc
	24	<i>Danio devario</i>	Devario danio, Dind Danio	Rangu chepa	C	EN	NE
3. Cobitidae (1)	25	<i>Schistura corica</i>	Polka Dotted Loach	Vullikicchuka	R	LC	NE
Cyprinodontiformes/	III						
4. Aplocheiidae (1)	26	<i>Aplocheilus panchax</i>	Blue panchax	Yerramaccha vulusu	C	LC	DD
Siluriformes/	IV						
5. Bagridae (5)	27	<i>Mystus bleeker</i>	Day's mystus	Nara Jella	A	LC	VU
	28	<i>Mystus cavasius</i>	Gangetic mystus	Pedda jella	A	LC	LRnt
	29	<i>Mystus gulio</i>	Long Whiskers Catfish	Yeti Jella	C	LC	NE
	30	<i>Mystus tengara</i>	Tengara mystus	Tepa Jella	A	LC	NE
	31	<i>Mystus vittatus</i>	Striped dwarf catfish	Sinki Jella	A	LC	VU
6. Siluridae (3)	32	<i>Ompok bimaculatus</i>	Butter Catfish	Paluka Jella	M	NT	EN
	33	<i>Ompok pabda</i>	Pabdah catfish	Paluka Jalla	R	NT	EN
	34	<i>Wallago attu</i>	Boal	Valuva Jella	M	NT	LRnt
7. Pangasiidae (1)	35	<i>Pangasius pangasius</i>	Pangas catfish	Pangasu	R	LC	NE
8. Schibeidae (1)	36	<i>Eutropiichthys vacha</i>	Air breathing catfishes/ Magur	Seerva jella	R	LC	VU
9. Claridae (2)	37	<i>Clarias batrachus</i>	Batchwa vacha	Natu Marpoo	C	LC	VU

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	38*	<i>Clarias gariepinus</i>	African catfish	Yeti marpoo	R	NE	NE
10. Heteropneustidae (2)	39	<i>Heteropneustes fossilis</i>	Stinging catfish	Inglilam	R	LC	VU
Anguilliformes/	V						
11. Anguillidae (1)	40	<i>Anguilla bengalensis bengalensis</i>	Indian Long fin eel	Malugu pamu	M	LC	EN
Beloniformes/	VI						
12. Belonidae (1)	41	<i>Xenentodon cancila</i>	Freshwater garfish	Saimanu	A	LC	LRnt
Channiformes/	VII						
13. Channidae (3)	42	<i>Channa orientalis</i>	Walking snakehead	Tatidimmidi	C	NE	VU
	43	<i>Channa punctatus</i>	Giant snakehead	Mattagidise	C	LC	LRnt
	44	<i>Channa striatus</i>	Banded snakehead	Korramenu	C	LC	LR-Ic
Mastacembeliformes/	VIII						
14. Mastacembelidae (3)	45	<i>Mastacembelus aral</i>		Natu bommidam	R	LC	LRnt
	46	<i>Mastacembelus armatus</i>	Zig zag spiny eel	Yeleswaram Bommidam	M	LC	VU
	47	<i>Mastacembelus pancalus</i>	Barred spiny eel	Aku Bommidam	A	LC	LRnt
Perciformes/	IX						
15. Gobiidae (2)	48	<i>Glossogobius giuris</i>	Tank/Bar-eyed goby	Isukadondhi	A	LC	LRnt
	49	<i>Gobiopsis macrostoma</i>	Long Jawed goby	Isukadondhi	R	NE	NE
16. Osphronemidae (1)	50	<i>Trichogaster fasciatus</i>	Banded gaurami	Ranguchepa	M	LC	LRnt
17. Cichlidae (1)	51*	<i>Oreochromis mossambicus</i>	Mozambique Tilapia	Mutchu gorasa	C	NT	NE
18. Anabantidae (2)	52	<i>Anabas testudineus</i>	Climbing perch	Rati Gorasa	M	DD	VU
	53	<i>Etroplus maculatus</i>	Ornate chromid	Rangu chepa	A	LC	NE
19. Ambassidae (2)	54	<i>Chanda nama</i>	Elongate glass perchlet	Kampa pariga	C	LC	NE
	55	<i>Ambassis ranga</i>	Indian glassy fish	Kampa Pariga	C	LC	NE

A= Abundant (76-100%); C = Common (51-75%); M = Moderate (26-50%); R = Rare (1-25%) of the total catch.

EN- Endangered; VU- Vulnerable; LRnt- Lower risk near threatened; LRlc- Lower risk least concern; LC- Least concern; DD- Data Deficient; NE- Not evaluated, NT: Near threaten.

*Exotic fishes Nos: 8, 9, 10, 38, 51

Out of the 55 species recorded from Meghadrigeedda reservoir five are exotic species available in Meghadrigeedda reservoir. (* indicates exotic fish species). Earlier reports indicated by Biju Kumar [18] studied exotic fishes of Freshwater fish diversity in 2000. Rama Rao. K. [19, 20, 21] reported 64 fishes, out of these 53 are ornamental and 58 larvivorous fish species belonging to 8 orders, 19 families and 34 genera in Lower manair Dam. Chatoan Tesia & Sabitry Bordoloi [22] studied on ichthyofauna of Charju river results indicating that, 37 species of fishes belonging to 3 orders, 12 families and 22 genera. Cyprinids were most dominant group represented by 16 species belonging to 8 genera followed by Balitoridae with 5 species, Amblycipitidae and Sisoridae with 3 species each and Cobitidae and Psilorhynchidae with 2 species each and 1 species each in Bagridae, Siluridae, Nandidae, Chandidae, Ambassidae and Channidae. Mahapatra [23] recorded the abundance of catfishes in Hirakund reservoir. A total of 43 species were present in which 18 were commercially important. Sakhare and Joshi [24] reported 34 species of fishes in reservoirs of Parbhani Dist. of Maharashtra. Pisca *et al.*, [25] reported a genera fish belonging to four orders and 28 species from

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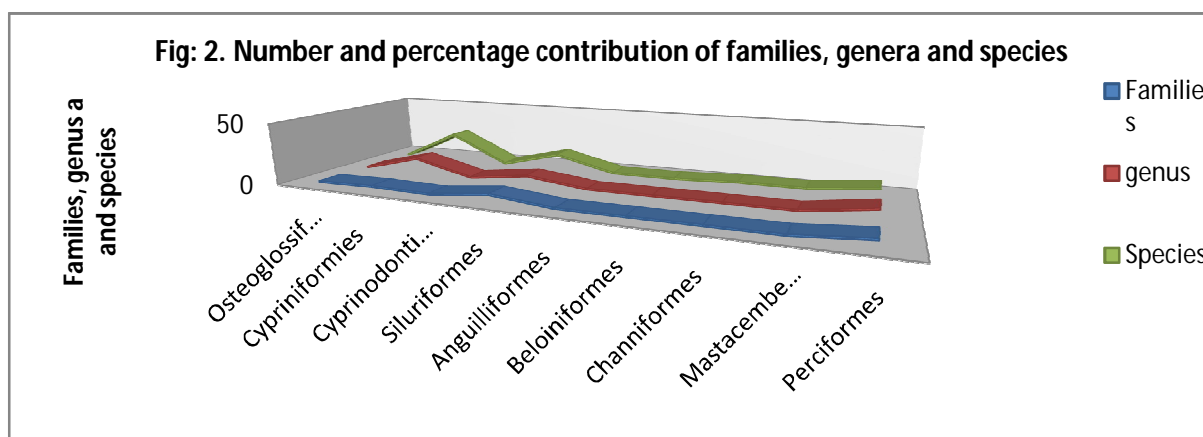
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Ibrahimbagh reservoir of Hyderabad. Sugunan and Yadava, [26] mentioned 40 fish species from Hirakhud reservoir of Orissa forming the commercial fishery.

In the present investigation, the number and percent composition of families, genera and species under different orders are shown in Table 2 and Fig 2. Order cypriniformes was dominant with 24 species which contributed to 43.64% of the total species followed by Siluriformes 13 (23.64%), Perciformes 08 (14.55%), Channiformes and Mastacembeliformes each with 03 (5.46%), Osteoglossiformes, Cyprinodontiformes, Anguilliformes, and Beloiniformes each 01 (1.82%). Recorded families out of 19, Siluriformes contributed 06 (31.58%) families followed by Perciformes 05 (26.32), Cypiniformies 02 (10.53%) Osteoglossiformes, Cyprinodontiformes, Anguilliformes, Beloiniformes, Channiformes and Mastacembeliformes are each with one respectively (05.26%). Recorded genera out of 34, Cypiniformies contributed 13 (38.24%) species followed by Perciformes 08 (23.53%), Siluriformes 07 (20.59%), Osteoglossiformes, Cyprinodontiformes, Anguilliformes, Beloiniformes Channiformes and Mastacembeliformes each with 01 (2.94%).

Table: 2. The Number and percent composition of families, genera and species of fishes under various orders

S.No	Orders	Families	genus	Species	% of families in an order	% of genera in an order	% of species in an order
1	Osteoglossiformes	01	01	01	5.26	2.94	1.82
2	Cypriniformies	02	13	24	10.53	38.24	43.64
3	Cyprinodontiformes	01	01	01	5.26	2.94	1.82
4	Siluriformes	06	07	13	31.58	20.59	23.64
5	Anguilliformes	01	01	01	5.26	2.94	1.82
6	Beloiniformes	01	01	01	5.26	2.94	1.82
7	Channiformes	01	01	03	5.26	2.94	5.46
8	Mastacembeliformes	01	01	03	5.26	2.94	5.46
9	Perciformes	05	08	08	26.32	23.53	14.55
Total		19	34	55			



Chandra Sekhara Rao et al [27] studied the occurrence of 63 species from 9 orders, 22 families and 41 genera. Cypriniformes was the most dominant order with 23 species followed by Siluriformes and Mugiliformes each with 11, Perciformes with 7, Anguilliformes, Cyprinodontiformes and Mastacembeliformes each with 3 and Osteoglossiformes and Elopiformes each with 1 species. Sandeep et al [28] reported during the study period different fish varieties in the Godavari River, India. Fishes belonging to nine orders and twenty one families were

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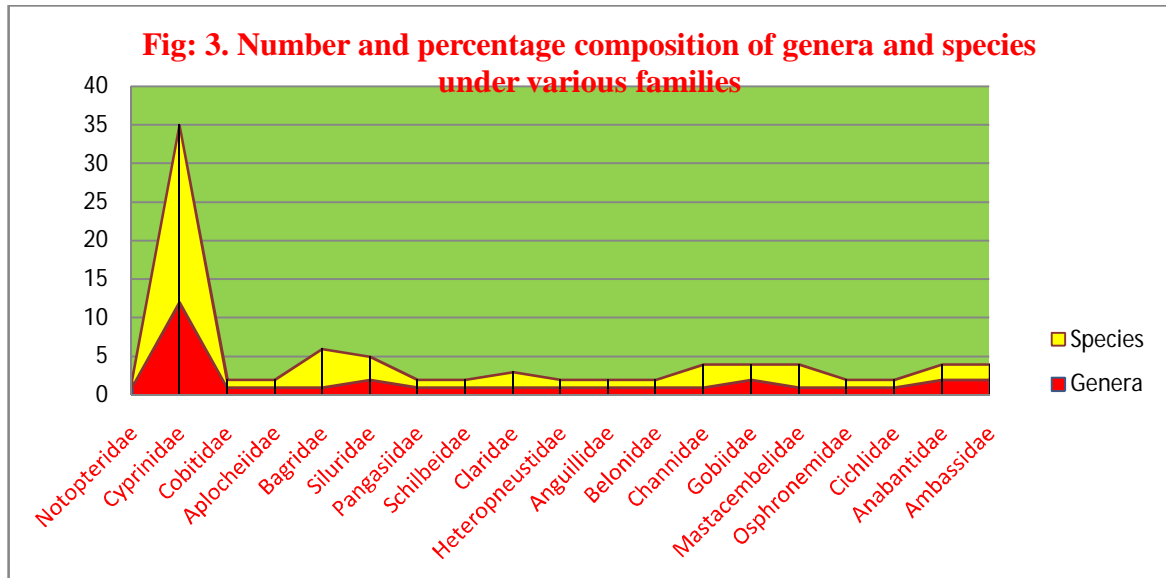
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collected during the study period. During the fish biodiversity study, 53 species of 37 different genera, 21 families and 9 orders were recorded from the Godavari River. The members of Order Cypriniformes were dominated with 40 species followed by Perciformes with 7 species, Siluriformes with 6 species, Beloniformes with five species each, Osteoglossiformes with 2 species and Synbranchiformes with 1 species. Ahirrao[29] recorded 32 fish species belonging to 25 genera and 8 families from Parbhani district of Maharashtra. Joshi [30] reported the ichthyofauna of Bori reservoir in Maharashtra. Krishna & Ravi Shankar [31] reported 31 ichthyofauna in secrete lake, Durgamcheru, Ranga Reddy District. Hiware and Pawar [32] recorded 43 fish species from Nath Sagar Dam Paithan in Aurangabad district. Battul *et al* [33] recorded 18 fish species in Ekruk Lake near Solapur, Maharashtra. Jayabhaye *et al* [34] recorded 25 fish species belonging to 7 orders in Jawalgaon reservoir in Solapur district of Maharashtra.

In the present investigation the number and percent composition of genera and species under various families were represented in Table-3 and Fig.3. The generic composition of fishes belonging to different families shows that 12 genera under Cyprinidae contributed to 35.29%, two genera under Siluridae, Gobiidae, Anabantidae and Ambassidae contributed to 5.88% and one genus under Notopteridae, Cobitidae, Aplocheiidae, Bagridae, Pangasiidae, Schilbeidae, Clariidae, Heteropneustidae, Anguillidae, Belonidae, Channidae, Mastacembelidae, Osphronemidae and Cichlidae contributed to 02.94% each. The species composition of fishes belonging to different families has revealed that 23 species belong to family Cyprinidae that made up to 41.82%, 05 species to family Bagridae that contributed to 9.09%, three species each to families Siluridae, Channidae and Mastacembelidae contributed to 05.46%, two species to family Clariidae, Gobiidae, Anabantidae and Ambassidae constituted to 03.64%, one species to families Notopteridae, Cobitidae, Aplocheiidae, Pangasiidae, Schilbeidae, Heteropneustidae, Anguillidae, Belonidae, Osphronemidae and Cichilidae contributed 01.81% each of total fish species.

Table: 3. Number and percentage composition of genera and species under various families at Meghadrigedda reservoir

S.No	Families	Genera	% of genera in a family	Species	% of species in a family
1	Notopteridae	01	2.94	01	01.81
2	Cyprinidae	12	35.29	23	41.82
3	Cobitidae	01	2.94	01	01.81
4	Aplocheiidae	01	2.94	01	01.81
5	Bagridae	01	2.94	05	09.09
6	Siluridae	02	5.88	03	05.46
7	Pangasiidae	01	2.94	01	01.81
8	Schilbeidae	01	2.94	01	01.81
9	Claridae	01	2.94	02	03.64
10	Heteropneustidae	01	2.94	01	01.81
11	Anguillidae	01	2.94	01	01.81
12	Belonidae	01	2.94	01	01.81
13	Channidae	01	2.94	03	04.6
14	Gobiidae	02	5.88	02	03.64
15	Mastacembelidae	01	2.94	03	05.46
16	Osphronemidae	01	2.94	01	01.81
17	Cichlidae	01	2.94	01	01.81
18	Anabantidae	02	5.88	02	03.64
19	Ambassidae	02	5.88	02	03.64
Total		34		55	



Thirumala et al [35] studied hydro-biological features of the collection centres and indicated that an effective role in fisheries output to a greater extent. Among 33 species of fishes, the family Cyprinidae was the most dominant in the assemblage composition with 54.55% followed by Bagridae and Siluridae with 9.09%, Channidae with 6.06 %, Mastacembalidae, Ambassidae, Cichlidae, Claridae, Notopteridae, Cobitidae and Heteropneustidae each with 3.03 % respectively.

The number and percent composition of population status is as follows; 16 species were abundant which contributed to 29.09% whereas 20 species were common contributing to 36.36%, 11 species were moderate contributing to 20.00% and the least percent of species i.e., 08 were represented as rare which contributed to only 14.55% in the total catch (Table. 4 and Fig. 4). According to IUCN (2015.4) [36] 42 species contributed to 76.36% are least concern (LC), five species contributed to 9.09% are near threatened (NT), four species contributed to 7.27% are not evaluated (NE), two species contributed to 03.64% are vulnerable (VU), one species each of 01.82% are data deficient (DD) and endangered (EN) respectively (Table. 5. Fig. 5). According to CAMP status (1998) [37] 18 species of fish are at low risk near threatened (LR nt) contributing to 32.73%, 11 species contributing 20.0% are regarded as vulnerable (VU), 17 species being not evaluated (NE) contributed to 30.91%, four (07.27%) species of fish are considered as endangered (EN), three species of fish (5.46%) are at low risk least concern (LRlc) and two species are (3.64%) data deficient (DD) (Table. 5 and Fig. 6). Thirupathaiiah et al [38] reported in Lower Manair reservoir a total of 44 species of fishes belonging to 8 orders such as Cypriniformes (18 species) Siluriformes (11species), Perciformes (6 species), Channiformes (4 species) Beloniformes (2 species), Anguilliformes (one species) Osteoglossiformes (one species) and Mogiliformes(one species). Of these, 24 species of fish are least concerned, 8 are data deficient (DD), 10 are not evaluate (NE), one species of fish is vulnerable and one species of fish is near threatened.

Table: 4. Number and Percentage composition of Population Status in the total catch at Meghadrigedda reservoir.

Population Status	Abundant (76-100%)	C = Common (51-75%)	M = Moderate (26-50%)	R = Rare (1-25%)
Number of species	16	20	11	08
% Composition	29.09	36.36	20.0	14.55

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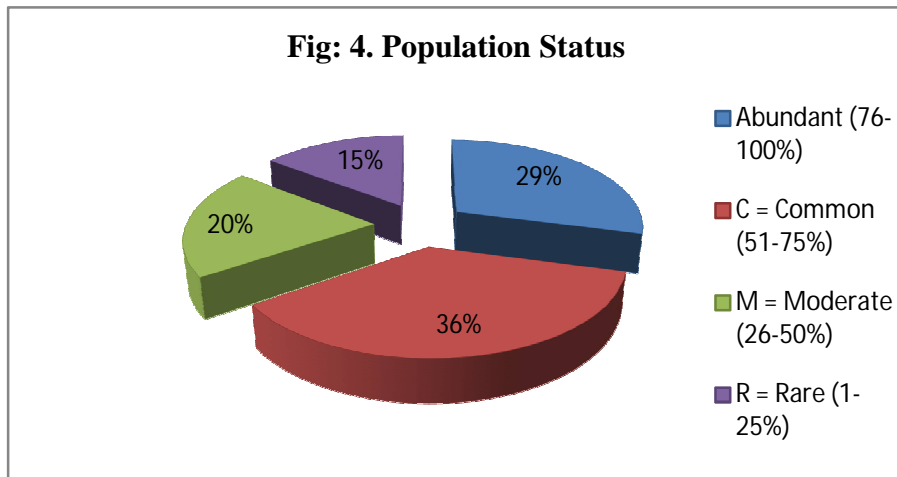
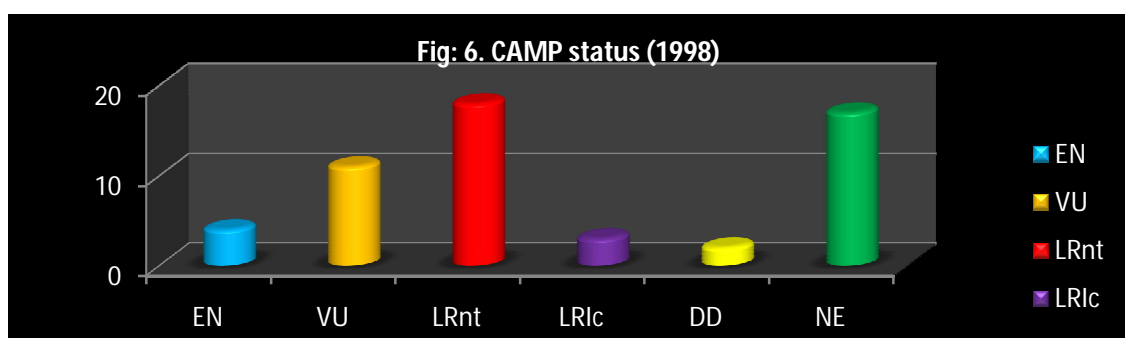
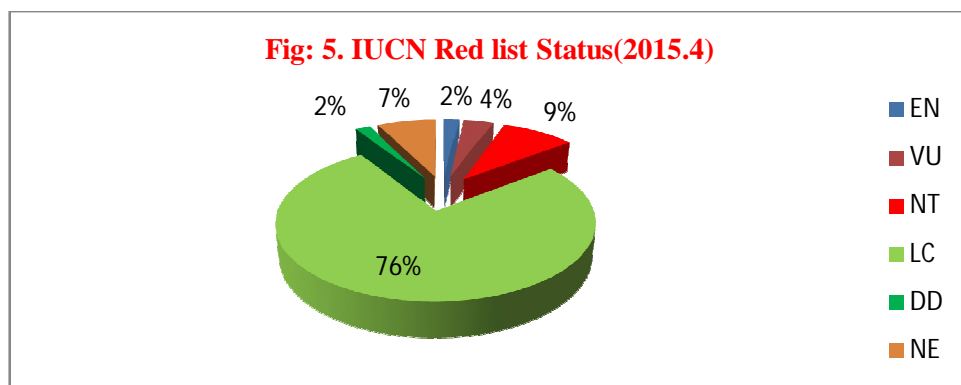


Table: 5. Percentage occurrence of fish species in Meghadrigedda reservoir under the conservation status IUCN (2015.4) and CAMP (1998)

Category		EN	VU	NT	LRnt	LRlc	LC	DD	NE
IUCN (2015.4)	No. of species	01	02	05	—	—	42	01	04
	% contribution	1.82	3.64	9.09	—	—	76.36	1.82	7.27
CAMP (1998)	No. of species	04	11	—	18	03	—	02	17
	% contribution	7.27	20.0	—	32.73	5.46	—	3.64	30.91



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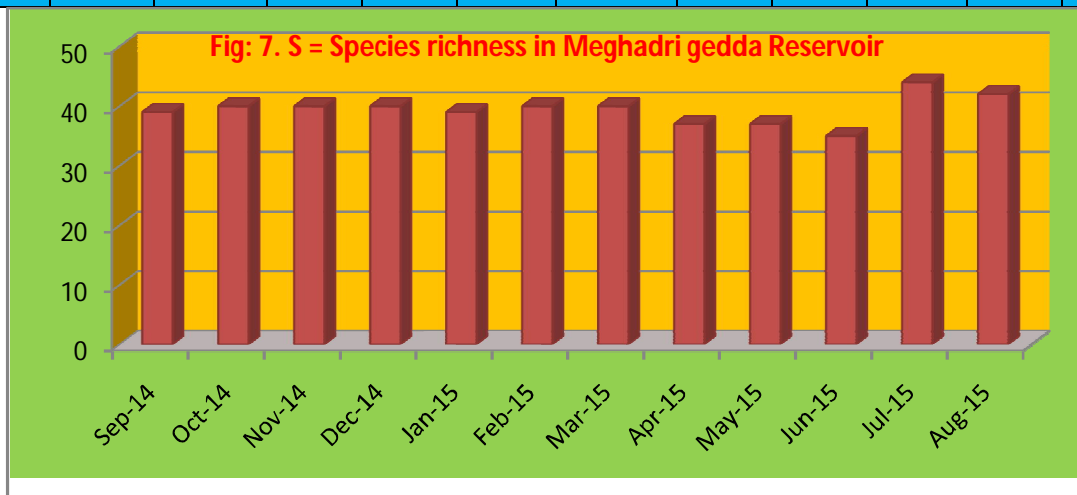
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Shannon-Wiener Index diversity indices of fish species is represented in Table-6. The richness of fish species was highest in July 2015 and lowest in June 2015 (Fig: 7), the fish species diversity (H) ranged from 2.157 (Aug-2015) to 2.684 (Nov. 2014). These results indicated that good diversity index having in the Meghadrigedda reservoir (Fig. 8). Tirupathaiiah et al [38] found variation that highest diversity was recorded in June 2011 and the lowest in January 2011. Barthem [39] found variation in the Shannon-Weiner index from 2.2 to 3.2. According to Wilhm and Dorris [40] Shinde et al [41] Shannon index (H-) values ranged from >3 indicates clean water, 1.00 to 3.00 indicates moderate water and <1.00 indicates heavily polluted water. Related to this, Rama Rao [21] reported that the Shannon-Wiener Index diversity of fish species at Lower Manair dam represented to richness of fish species was highest in December 2013 and lowest in January 2014, the fish species diversity (H) ranged from 2.24 to 3.31. The highest diversity was recorded in September 2013 and the lowest in February 2014. The results indicated that the maximum diversity possible $\ln(S)$ ranged from 2.37 to 4.03. The fish species diversity evenness (E) is 0.58 to 0.88. But the present results indicated that the maximum diversity possible $\ln(S)$ ranged from 3.555 (Jun. 2015) to 3.784 (Jul. 2015) (Fig: 9). The fish species diversity evenness (E) is 0.577 (Aug. 2015) to 0.728 (Nov. 2014) (Fig: 10). It is clearly indicated that there is an even distribution of the fish fauna in Meghadrigedda reservoir.

Table: 6. Fish Population Diversity Index.

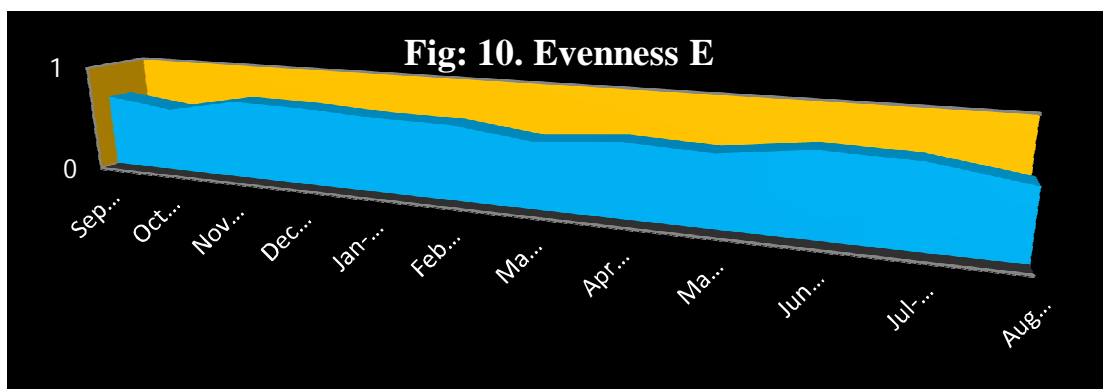
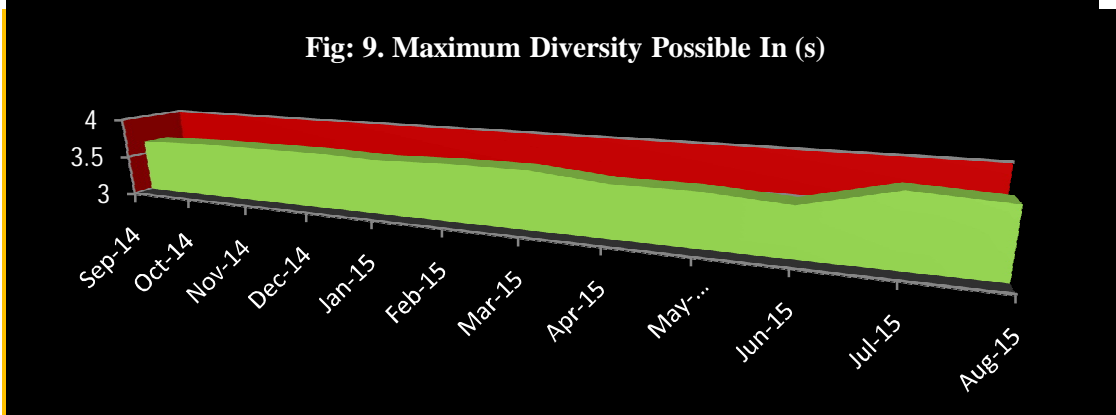
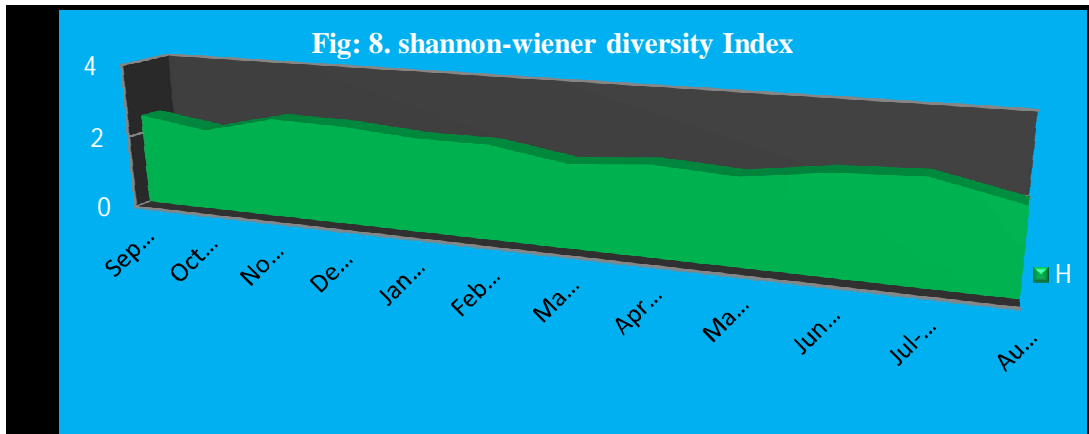
Fish Population / Monthly	Sep 2014	Oct 2014	Nov 2014	Dec 2014	Jan-2015	Feb 2015	Mar 2015	April 2015	May 2015	Jun 2015	Jul 2015	Aug 2015
Species richness	39	40	40	40	39	40	40	37	37	35	44	42
H	2.497	2.226	2.684	2.648	2.499	2.488	2.173	2.341	2.230	2.523	2.609	2.157
Maximum diversity possible $\ln(S)$	3.664	3.689	3.689	3.689	3.664	3.689	3.689	3.611	3.611	3.555	3.784	3.738
Evenness E	0.682	0.603	0.728	0.717	0.682	0.674	0.589	0.648	0.618	0.709	0.689	0.577



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V. CONCLUSION

Present study revealed that fifty five fish species including five exotic species in the Meghadrigedda reservoir, of these 20 species are common, 16 are abundant, 11 are moderate and 08 are rare species in the reservoir. As per IUCN one species is endangered, five species are near threatened whereas CAMP status follows that four species are endangered and eighteen fish species are Lower risk near threatened. The biotic indices of Shannon-Weiner, Evenness and richness were fairly significant in during study period and the diversity of fish fauna is more in Meghadrigedda reservoir. The present work will provide a latest database for reservoir authorities of Meghadrigedda reservoir. The

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control and eradication of unnecessary aquatic weeds, predatory birds and fishes (*Pangasius pangasius* is rarely observed in this reservoir) is must. Fishing should be strictly banned during the breeding season and using of large eye size gears. Reservoir authorities should take necessary steps to minimize the human activities in and around the reservoir and they have to regularly check the physicochemical and biological parameters to prevent any duplication on reservoir ecology. The biotic indices of Shannon-Weiner, Evenness and richness were fairly significant in during study period. The diversity of fish fauna is more in Meghadrigedda reservoir. It is recommended that further the reservoir can be consider being in good condition for fish production.

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