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Ichthyofaunal Diversity of Chandrasagar and Ramanpad Reservoirs in Mahabubnagar District, Telangana, India

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Abstract

Present study is an attempt to make a comparison of ichthyofaunal diversity and abundance of a river fed reservoir, the Ramanpad and a rain fed reservoir, the Chandrasagar situated in Mahabubnagar district, Telangana state in India. The study was undertaken between March-2013 and February-2015 covering two hot and two wet seasons. The fish fauna of two reservoirs were collected for the present study. A total of 19 fish species belongs to 3 orders, 16 genera of 8 families were recorded in Chandrasagar and 32 species belong to 6 orders, 21 genera of 11 families in Ramanpad reservoir. In Chandrasagar, the order Cypriniformes was most dominant group represented by 10 species followed by orders Perciformes with 5 species and Siluriformes with 4 species. Cypriniformes was also the dominating order in Ramanpad and is represented by 11 species followed by orders Siluriformes with 9 species, Perciformes 9 species, Osteoglossiformes 1 species, Belontiiformes 1 species and Synbranchiiformes 1 species. Thus the two reservoirs have good potential for fish fauna. Cyprinidae was the most dominant family and fish diversity was high in Ramanpad and least in Chandrasagar.

Keywords: Telangana, Mahabubnagar, Chandrasagar, Ramanpad reservoir, Ichthyofaunal diversity.

1. Introduction

Studies have been made on ichthyofaunal diversity of various freshwater bodies in India during the last few decades [3, 8, 9, 12, 14, and 18]. There were some studies in Telangana state also [13, 15, and 16]. Recently some studies have been made on the ichthyofaunal diversity of the Mahabubnagar District [1, 10, and 11]. 41 fish species were recorded from Jammulamma reservoir, located in Gadwal revenue division of this district during 2008-2010, 109 species from Krishna River in the district in 2015 and 30 species from Koilsagar in 2015. As far as the ichthyofaunal diversity and abundance of fish species in Ramanpad and Chandrasagar reservoirs is concerned poor attention has been paid towards the systematic investigation on diversity of fish fauna. So, to fill this gap, an attempt has been made to present piscine inventory from the well-known but remotely located Chandrasagar and Ramanpad reservoirs of this district and suggest mitigating measures. This is the first effort in this direction.

2. Materials and Methods

2.1. Study Area

Present work has been conducted in Ramanpad and Chandrasagar reservoirs situated in Mahabubnagar district, Telangana, India. Telangana, the 12th largest state in India is situated in the eastern edge of Deccan plateau. The climate and physiography of the region make the state one of the most important in the country with regard to water resources. Telangana state has wide range of water spread area under various rivers and different man-made impoundments. Thus this state has great habitat heterogeneity. A large number of studies covering a wide variety of ecosystems and organisms suggest that species richness tends to vary strongly with ecosystem production and habitat heterogeneity. As the Telangana is rich in productive and heterogeneous fresh water habitats, it supports a great ichthyofaunal diversity.

Mahabubnagar is the largest district in Telangana. It has varied habitats like rivers, streams, backwaters, major, medium and minor irrigation tanks. Thus it supports a wide range of fish species. The main objective of the study is to generate information on diversity of fishes and compare the biodiversity of a rain fed and rain fed cum river fed reservoirs in the district namely Chandrasagar and Ramanpad respectively.

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Ramanpad Reservoir: It is a perennial Lake and was constructed in 1972 across the Peddavagu (Ookachettivagu), the tributary of the Krishna River. It is located near Ramanpad village, Atmakur mandal (tehsil) of Mahabubnagar district in Telangana state and lies on 77°50'38"E and 16°20'21"N coordinates. It is the medium size irrigation project with water spread area (WSA) of 305 ha. It was rain fed up to 1995. Thereafter in 1996, it was made as a balancing reservoir after construction of a feeder channel from Priyadarshini Jurala Project (PJP) which is a major project in the district constructed across Krishna River. Ramanpad is meant for both irrigation and drinking water purposes. This reservoir irrigates not only about 4500 acres of agriculture land but also supports about 310 local fishermen families. Hence it plays a key role in the prosperity of rural economy. It receives moderately good (68.09 cm) rain fall in its catchment areas. Now its water is being supplied to half of the district for drinking purpose.

Chandrasagar Reservoir: Chandrasagar is also a perennial Lake known as Brahmanpalli Lake and was constructed in 1948 across Chandravagu, the tributary of Krishna River near the foot hill ranges of Nallamala in Eastern Ghats. It is located near Chandapur village of Achampet mandal (Tehsil) of Mahabubnagar district in Telangana state and lies on 78°43'99.40"E and 16°25'55.10"N coordinates. It is the minor size irrigation tank with a water spread area about 100 hectares. It receives scanty rain fall (29cm) in its catchment area. Its catchment area is spread over 300.00 square miles which lies completely in the Nallamala hill region in Eastern Ghats. An area of 949 acres is cultivated under this reservoir. The morphometric features of the two reservoirs are furnished in table1.

2.2. Methodology

Lot of interactions were made with local fishermen of Chandrasagar and Ramanpad reservoirs to draw information about the locally available fishes and their vernacular names. Sampling of fishes has been conducted on minimum 2 sampling sites at each reservoir for the estimation of their fish diversity. Fish were collected twice in a month for a period of two years from March 2013 to February 2015 covering two dry and two wet seasons. Fishes were collected from fishermen immediately after their catching and photographed prior to preservation for their identification. Collected fish sample were preserved in 9-10% formalin. Big sized fishes (of length 10-30 cm) were stored only after making an incision on their abdominal wall to one side (preferably left side) of the mid-ventral line in order to allow the entry of formalin in to their bodies. For fishes longer than 30cm crude formalin was injected in several places along the abdomen and also made two or three incisions along the belly. Fish samples were brought to the laboratory for their identification and preservation. Samples were sorted, labelled and stored in acrylic jars of suitable size. The fish were collected by operating various nets like gill nets, cast nets, hook nets, line nets, drag nets (pandi vala) and locally used indigenous box traps. The fishes were identified with the help of standard keys mentioned in the taxonomic literature [2, 4-7, and 17]. The fishes were identified mainly on basis of colour pattern, specific markings on the surface of the body, structure and shape of fins, barbs, barbells, teeth and mouth shapes etc. The identified fishes were registered with the natural history museum of Sarojini Naidu Vanitha Maha Vidyalaya Hyderabad, Telangana, India. Assuming that fishing efforts were common for given type of fishing net, the relative abundance of the fish was classified in to four categories, namely: abundant (76-100% of the total catch), common (51-75% of the total catch), moderate (26-50% of the total catch) and rare (1-25% of the total catch).

Table 1: Morphometric features of Ramanpad and Chandrasagar reservoirs

Sl. No	Attribute	Value	
		Ranmanpad reservoir	Chandrasagar reservoir
1	Location	77°50'38"E & 16°20'21"N	78°43'49.40"E & 16°25'55.10"N
2	Name of the Dam	Ookachettivagu Dam	Brahmanpalli Lake.
3	Nearest city	Atmakur	Achampet
4	District	Mahabubnagar	Mahabubnagar
5	State	Telangana	Telangana
6	Basin name	Krishna	Krishna
7	River	Ookachettivagu (Tributary of Krishna)	Chandravagu (Tributary of Krishna)
8	Size	Medium	Minor
9	Purpose	Irrigation/Drinking	Irrigation
10	Year of completion	1972	1948
11	Length of Dam(m)	254.95	950
12	Dam Type	Gravity/Masonry	Earth fill gravity dam
13	Catchment area (Sq. Km)	4071.43	777
14	Water spread area(ha)	305	100
15	Water source	Monsoon run-off/By lift	Man soon run-off
16	Rain fall (Cm)	68.09	29
17	Irrigated land (acres)	4500	949

Source: 1.India-WRIS (Water resource Information System) 2.Irrigation & CAD Department, Mahabubnagar.

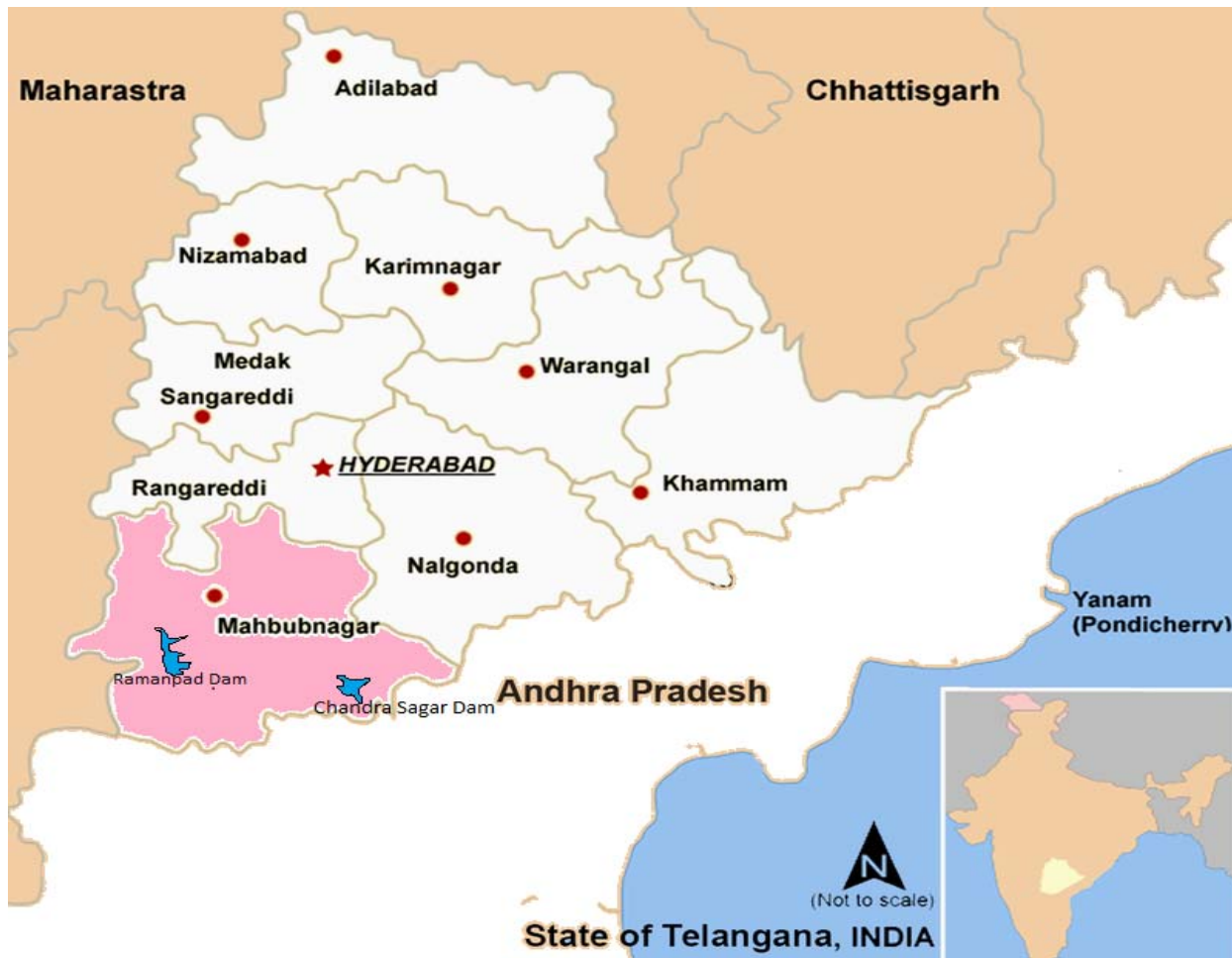


Fig 1: Location of Ramanpad and Chandrasagar Reservoirs in Mahabubnagar District. Telangana, India.

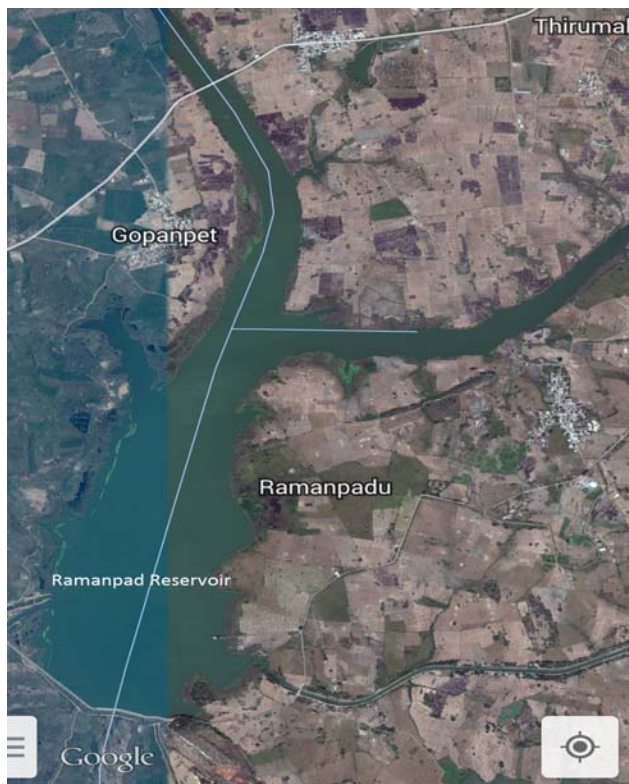


Fig 2: Satellite image of Ramanpad reservoir



Fig 3: Satellite image of Chandrasagar reservoir



Fig. 4: Inner view of Ramanpad reservoir



Fig. 5: Inner view of Chandrasagar reservoir



Fig 6: Interaction with fisher folk at Ramanpad



Fig 7: Fish harvesting at Chandrasagar

3. Results and discussion

During the present study a total of 32 species of primary freshwater fishes belonging to 11 families and 21 genera were recorded from the study sites of Ramanpad reservoir and 19 species belonging to 8 families and 16 genera from Chandrasagar. Number of species and their relative abundance is given in Tables 2, 3 and Charts 1, 2. On the basis of percentage composition and species richness, order Cypriniformes was dominant (11 species) followed by Siluriformes and Perciformes (9 species each) Osteoglossiformes, Beloniformes and Synbranchiformes (1 species each) in Ramanpad reservoir. Order Cypriniformes was also dominant (10 species) in Chandrasagar followed by Perciformes (5 species) and Siluriformes (4 species).

In Chandrasagar, a total of 8 families were evident of which Cyprinidae was the largest with 10 species followed by Bagridae and Channidae (each 2 species) followed by Siluridae, Claridae, Ambassidae, Gobiidae and Cichlidae (each 1 species). The sequence of encountered families in Chandrasagar is Cyprinidae (52.63%) > Bagridae (6.25%) = Channidae (6.25%) > Siluridae (3.12%) = Claridae (3.12%) = Ambassidae (3.12%) = Cichlidae (3.12%) = Gobiidae (3.12%). In Ramanpad 11 families were evident and the Cyprinidae was the most dominating family (11 species) followed by Bagridae (5 species), Channidae (4 species), Cichlidae (3 species), Siluridae (2 species), Claridae (2 species), Ambassidae, Gobiidae, Notopteridae, Hemiramphidae and Mastacembelidae (each 1 species). The sequence of dominance of encountered families in Ramanpad reservoir is Cyprinidae (34.38%) > Bagridae (15.62%) > Channidae

(12.5%) Cichlidae (9.38%) > Siluridae (6.25%) = Claridae (6.25%) > Ambassidae (3.12%) = Gobiidae (3.12%) = Notopteridae (3.12%) = Hemiramphidae (3.12%) = Mastacembelidae (3.12%).

In Chandrasagar, *Catla catla*, *Labeo rohita*, *Garra mullya*, *Salmophasia balookee* and *Mystus cavasius* were abundant. *Cirrhinus mrigala*, *Puntius chola*, *Puntius ticto*, *Amblypharyngodon microlepis*, *Channa striatus* and *Channa gachua* were common. *Cyprinus carpio*, *Ctenopharyngodon idellus*, *Mystus aor* and *Oreochromis nilotica* were moderate. *Ompok bimaculatus*, *Clarius batrachus*, *Chanda nama* and *Glossogobius giuris* occur rare. In Ramanpad, *Mystus cavasius*, *Etroplus suratensis* and *Oreochromis nilotica* were abundant. *Puntius chola*, *P. ticto*, *Amblypharyngodon mola*, *Mystus seenghala*, *Channa striatus* and *Channa gachua* were common. *Catla catla*, *Labeo rohita*, *L. calbasu*, *Cirrhinus mrigala*, *Ctenopharyngodon idellus*, *Mystus aor*, *Rita gogra* and *Chanda nama* were moderate. *Cirrhinus reba*, *Cyprinus carpio*, *Osteobrama peninsularis*, *Rita chrysea*, *Ompok bimaculatus*, *Wallago attu*, *Clarius batrachus*, *C. gariepinus*, *Oreochromis mossambica*, *Glossogobius giuris*, *Channa punctatus*, *C. marulius*, *Notopterus notopterus*, *Hyporhamphus limbatus* and *Mastacembelus armatus* were rare.

Among the fish species found in these reservoirs, 14 species belong to the carp group. The carps, *Catla catla*, *Labeo rohita*, *Cirrhinus mrigala*, *C. reba*, *Cyprinus carpio* and *Ctenopharyngodon idellus* are highly commercial and economically important. Whereas the other carps *Labeo calbasu*, *Puntius chola*, *P. ticto*, *Amblypharyngodon mola*, *A. microlepis*, *Salmophasia balookee*, *Garra mullya* and

osteobrama peninsularis are commercially less important. Among the cat fishes, *Mystus cavasius*, *Mystus seenghala* and *Myastus aor* belonging to Bagridae, *Wallago attu* belonging to Siluridae are of high economic importance while *Rita gogra* and *R.Chrysea* belonging to Bagridae, *Ompok bimaculatus* belonging to family Siluridae, *Clarius batrachus* and *C.gariepinus* Belonging to Claridae are also economically important. Among the murrels, *Channa striatus* and *C.Marulius* bears high economic importance while *C. gachua* and *C. Punctatus* have moderate economic importance. *Mastacembelus armatus* belonging to Mastacembelidae is also economically important. *Notopterus notopterus* belonging to Notopteridae, *Etroplus suratensis*, *Oreochromis mossambica* and *O. nilotica* have little economic importance.

Indian Major Carps (IMC) and exotic carps like grass carp and common carp are less frequent in Rammanpad reservoir as there is no regular stocking because of great fluctuations in its water. Riverine fauna like *Wallago attu*, *Mystus seenghala*, *Notopterus notopterus*, *Mastacembelus armatus*, *Labeo calbasu* often occur in Ramanpad as it majorly fed with Krishna Water from Priyadarshini Jurala Project. The fish fauna of Chandrasagar remarkably varies from that of Ramanpad. However the fishermen of Chandrasagar regularly stock the Indian major carps and exotic carps like grass carp and common carp so they are abundant in this lake. Some species were evident in both the reservoirs. They are *Catla catla*, *Cirrhinus mrigala*, *Labeo rohita*, *Ctenopharyngodon idellus*, *Cyprinus carpio*, *Puntius* Sp, *Mystus cavasius*, *M. aor*, *Ompok bimaculatus*, *Clarius batrachus*, *Chanda nama*, *Oreochromis nilotica*, *Glossogobius giuris*, *Channa striatus* and *C. gachua*. Certain fish species like *Cirrhinus reba*, *Labeo calbasu*, *Amblypharyngodon mola*, *Osteobrama peninsularis*, *Mystus seenghala*, *Wallago attu*, *Rita sp*, *Clarius gariepinus*, *Etroplus suratensis*, *Notopterus notopterus*, *Hyporhamphus limbatus*, *Mastacembelus armatus* were evident only in Ramanpad reservoir and species like *Amblypharyngodon*

microlepis, *Garra mullya*, *Salmophasia balookee* were exclusive in Chandrasagar.

Almost all the species present in these two reservoirs are included in the IUCN Red List of Threatened species and most of them were given the least concern status, a few are near threatened, very few are vulnerable, one is data deficient and one is not evaluated. The alien species *Oreochromis nilotica* was the most predominating species and heavy competitor for Indian major carps in Ramanpad, in every 100 catches it constitutes about 30-40% This may be due to the over exploitation of Indian major carps and its prolific feeding and breeding nature. *Oreochromis mossambica*, which was given the Near Threatened (NT) status by the IUCN was also evident in Ramanpad reservoir. Certain species like *Rita chrysea* which is common in Mahanadi River system has also been recorded by us in Ramanpad reservoir. In Chandrasagar *Garra mullya* is the most predominating species. Thus, the two reservoirs have good potential for fish fauna and significant in respect of their fish diversity. However fish diversity was high in Ramanpad and least in Chandrasagar.

Many researchers have reported the strong dominance of Cyprinidae family in their investigation on ichthyofaunal diversity. Reported 23 species belonging to seven orders where Cyprinidae was dominant with 11 species from Jawalgaon reservoir of Solapur district in Maharashtra [14]. Reported 37 species from Issapur dam in district Yavatmal where cyprinidae family was dominant with 20 species [8]. Reported 18 species from Errukh Lake in Solapur district where Cyprinidae was dominant with 8 species [3]. Reported 22 species from Ramappa Lake in Warangal district in Andhrapradesh Cyprinidae was dominant with 9 species [16]. Reported 30 species from Koilsagar reservoir of Mahabubnagar district in Telangana Cyprinidae was dominant with 13 species [10]. Reported 109 species from Krishna River in Telangana Cyprinidae was dominant with 65 species [11].

Table 2: Ichthyofauna of Chandrasagar reservoir in Mahabubnagar district.

Sl. No.	Species	Local name (Telugu)	Family	Abundance	IUCN status
Order: Cypriniformes					
1	<i>Catla catla</i> (Hamilton,1822)	Botcha	Cyprinidae	A	LC
2	<i>Labeo rohita</i> (Hamilton,1822)	Rohu	Cyprinidae	A	LC
3	<i>Cirrhinus mrigala</i> (Hamilton,1822)	Merige	Cyprinidae	C	VU
4	<i>Cyprinus carpio communis</i> (Linnaeus,1758)	Bangaruteega	Cyprinidae	M	VU
5	<i>Ctenopharyngodon idellus</i> (Valenciennes,1844)	Gaddiparaka/ Gaddi chepa	Cyprinidae	M	NE
6	<i>Puntius chola</i> (Hamilton,1822)	Budda paraka	Cyprinidae	C	LC
7	<i>Puntius ticto</i> (Hamilton,1822)	Budda paraka	Cyprinidae	C	LC
8	<i>Amblypharyngodon microlepis</i> (Bleeker,1853)	Kodime	Cyprinidae	C	LC
9	<i>Garra mullya</i> (Sykes,1839)	Meyya	Cyprinidae	A	LC
10	<i>Salmophasia balookee</i> (Sykes,1839)	Chandamama	Cyprinidae	A	LC
Order: Siluriformes					
11	<i>Mystus cavasius</i> (Hamilton,1822)	Thella jella	Bagridae	A	LC
12	<i>Mystus aor</i> (Hamilton,1822)	Multi-jellla	Bagridae	M	LC
13	<i>Ompok bimaculatus</i> (Bloch,1794)	Teduva	Siluridae	R	NT
14	<i>Clarius batrachus</i> (Linnaeus,1758)	Marpu	Claridae	R	LC
Order: Perciformes					
15	<i>Chanda nama</i> (Hamilton,1822)	Gaju chepa	Ambassidae	R	LC
16	<i>Oreochromis nilotica</i> (Linnaeus,1758)	Duboche	Cichlidae	M	LC
17	<i>Glossogobius giuris</i> (Hamilton,1822)	Isuka dondu	Gobiidae	R	LC
18	<i>Channa striatus</i> (Bloch,1793)	Korra-matta	Channidae	C	LC
19	<i>Channa gachua</i> (Hamilton,1822)	Kamse	Channidae	C	LC

Note: A: Abundant; C: Common; M: Moderate; R: Rare; LC: Least Concern; NE: Not Evaluated; VU: Vulnerable; NT: Near Threatened; DD: Data Deficient.

Table 3: Ichthyofauna of Ramanpad reservoir in Mahabubnagar district.

Sl. No.	Species	Local name (Telugu)	Family	Abundance	IUCN status
Order: Cypriniformes					
1	<i>Catla catla</i> (Hamilton,1822)	Botcha	Cyprinidae	M	LC
2	<i>Labeo rohita</i> (Hamilton,1822)	Rohu	Cyprinidae	M	LC
3	<i>Labeo calbasu</i> (Hamilton,1822)	Kaki paraka	Cyprinidae	M	LC
4	<i>Cirrhinus mrigala</i> (Hamilton,1822)	Merige	Cyprinidae	M	VU
5	<i>Cirrhinus reba</i> (Hamilton,1822)	Arju	Cyprinidae	R	LC
6	<i>Cyprinus carpio communis</i> (Linnaeus,1758)	Bangaruteega	Cyprinidae	R	VU
7	<i>Ctenopharyngodon idellus</i> (Valenciennes,1844)	Gaddiparaka	Cyprinidae	M	NE
8	<i>Puntius chola</i> (Hamilton,1822)	Budda paraka	Cyprinidae	C	LC
9	<i>Puntius ticto</i> (Hamilton,1822)	Budda paraka	Cyprinidae	C	LC
10	<i>Amblypharyngodon mola</i> (Hamilton,1822)	Bedisha	Cyprinidae	C	LC
11	<i>Osteobrama peninsularis</i> (Silas,1952)	-	Cyprinidae	R	DD
Order: Siluriformes					
12	<i>Mystus cavasius</i> (Hamilton,1822)	Thella- jella	Bagridae	A	LC
13	<i>Mystus seenghala</i> (Sykes,1839)	Nare-jella	Bagridae	C	LC
14	<i>Mystus aor</i> (Hamilton,1822)	Muulti-jella	Bagridae	M	LC
15	<i>Rita gogra</i> (Sykes,1841)	Banki yeddu	Bagridae	M	LC
16	<i>Rita chrysea</i> (F.Day,1877)	-	Bagridae	R	LC
17	<i>Ompok bimaculatus</i> (Bloch,1794)	Teduva	Siluridae	R	NT
18	<i>Wallago attu</i> (Bloch&Schneider,1801)	Waaluga	Siluridae	R	NT
19	<i>Clarius batrachus</i> (Linnaeu,1758)	Marpu	Claridae	R	LC
20	<i>Clarius gariepinus</i> (Burchell,1822)	Marpu	Claridae	R	LC
Order: Perciformes					
21	<i>Chanda nama</i> (Hamilton,1822)	Gaju chepa	Ambassidae	M	LC
22	<i>Etroplus suratensis</i> (Bloch,1794)	Gangammapuste	Cichlidae	A	LC
23	<i>Oreochromis mossambica</i> (Peters,1852)	Duboche	Cichlidae	R	NT
24	<i>Oreochromis nilotica</i> (Linnaeus,1758)	Duboche	Cichlidae	A	LC
25	<i>Glossogobius giuris</i> (Hamilton,1822)	Isuka dondu	Gobbiidae	R	LC
26	<i>Channa striatus</i> (Bloch,1793)	Korra-matta	Channidae	C	LC
27	<i>Channa punctatus</i> (Bloch,1793)	Burada-matta	Channidae	R	LC
28	<i>Channa marulius</i> (Hamilton,1822)	Poo-matta	Channidae	R	LC
29	<i>Channa gachua</i> (Hamilton,1822)	Kamse	Channidae	C	LC
Order: Osteoglossiformes					
30	<i>Notopterus notopterus</i> (Pallas,1769)	Chappatta	Notopteridae	M	LC
Order: Beloniformes					
31	<i>Hyporhamphus limbatus</i> (Valenciennes,1847)	-	Hemiramphidae	R	LC
Order: Synbranchiformes					
32	<i>Mastacembelus armatus</i> (Lacepede,1800)	Pamu chepa	Mastacembelidae	R	LC

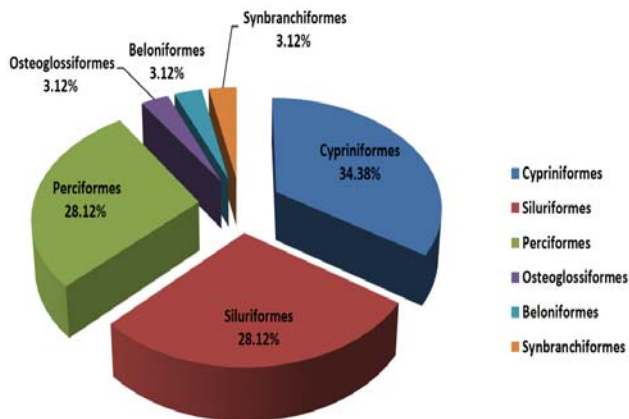


Chart.1: Order-wise fish species percentage composition of Ramanpad reservoir

(Cypriniformes > Siluriformes = Perciformes > Osteoglossiformes = Beloniformes = Synbranchiformes)

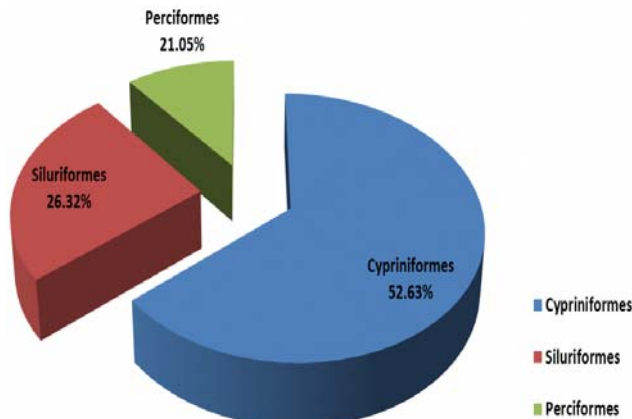


Chart.2: Order-wise fish species percentage composition of Chandrasagar reservoir

(Cypriniformes > Siluriformes > Perciformes)



Fig 8: *Catla catla*



Fig 9: *Labeo rohita*



Fig 10: *Cyprinus carpio*

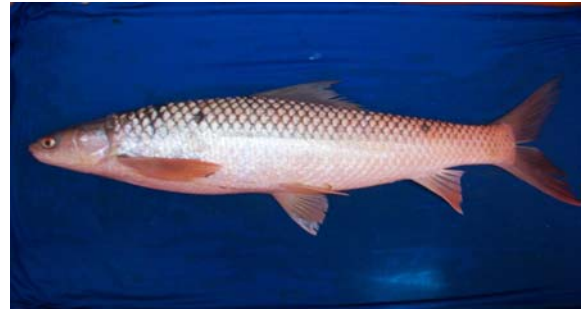


Fig 11: *Cirrhinus mrigala*



Fig 12: *Cirrhinus reba*



Fig 13: *Ctenopharyngodon idellus*



Fig 14: *Labeo calbasu*



Fig 15: *Garra mullya*



Fig 16: *Puntius chola*



Fig 17: *Amblypharyngodon microlepis*



Fig 18: *Osteobrama peninsularis*



Fig 19: *Salmophasia balookee*



Fig 20: *Glossogobius giuris*



Fig 21: *Etroplus suratensis*



Fig 22: *Hyporhamphus limbatus*



Fig 23: *Chanda nama*



Fig 24: *Mystus cavasius*



Fig 25: *Mystus seenghala*



Fig 26: *Notopterus notopterus*



Fig 27: *Ompok bimaculatus*



Fig 28: *Wallago attu*



Fig 29: *Rita gogra*



Fig 30: *Clarius batrachus*



Fig 31: *Rita chrysea*



Fig 32: *Oreochromis mossambicus*



Fig.33: *Oreochromis nilotica*



Fig 34: *Channa striatus*



Fig.35: *Channa marulius*

4. Conclusion

The fish community in Reservoirs includes the native and alien species, introduced for the purpose of fish production. The present study is the first ever documentation of ichthyofauna in the Ramanpad and Chandrasagar reservoirs of Mahabubnagar district in Telangana state. Invasive species like Tilapia are becoming a threat to the native Indian major carps here, this

must be checked out. Over exploitation must be prevented by following a fishing holiday of about three months during the breeding season from July to September in order to allow the proper growth of fishes and mesh regulation in fishing is also an important factor. Sustainable fish production by taking appropriate steps for sustaining diversity is necessary to conserve these resources.

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