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Ichthyofaunal diversity of Nizamsagar Reservoir, Kamareddy District, Telangana, India

Reddy, S.G.[1*], Dathrika, B.K.[2] and Reddy, R.T.[3]

[1.] *Department of Zoology, Girraj Government College (A), Nizamabad, Telangana, India*
[2.] *Department of Zoology, University Arts and Science College, Warangal, Telangana, India*
[3.] *Department of Zoology, Kakatiya University, Warangal, Telangana, India*
**E.mail: gaddamsreddy@gmail.com*

ABSTRACT

The ichthyofaunal diversity of the Nizamsagar reservoir was studied from January 2019 to December 2019. Samples were collected with the help of local fishermen by using various crafts and gear. A total of 41 fish species belonging to 6 orders, 16 families, and 26 genera were recorded. Cypriniformes were the dominant group, represented by 18 species which contributed 44% of the total species, followed by Siluriformes with 9 species (22%), Perciformes with 7 species (17%), Channiformes with 4 species (10%), Beloniformes 2 species (5%) and Osteoglossiformes 1 species (2%).

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1. Introduction

Ichthyofaunal diversity refers to the variety of fish species in a particular ecosystem or geographic area. High levels of Ichthyofaunal diversity represent a healthy and well-functioning ecosystem, while low levels may indicate environmental degradation or overfishing. Ichthyofaunal diversity is usually studied by scientists as a way to understand and monitor the health of aquatic ecosystems. It can be measured using different indexes, such as the Shannon-Wiener index, Margalef's index, and Pielou's index. These indices can help to determine the richness, evenness, and diversity of fish species in an ecosystem. (Limbu and Prasad, 2020; Raut, 2023)

Freshwater reservoirs are vital aquatic ecosystems that provide many ecological, economic, and social benefits. One critical component of these ecosystems is the diversity of fish species present. Several studies have investigated the ichthyofaunal diversity of freshwater reservoirs, examining factors such as the effect of human activities, the impact of climate change, and the role of environmental variables. A study by Mustafa G et al. (2017) investigated the ichthyofaunal diversity of Halali Reservoir, Vidisha, Madhya Pradesh. The study found that the reservoir had a relatively low diversity of fish species, with only 23 species recorded. The low diversity was due to human activities such as overfishing and pollution.

Similarly, a study by Laxmappa et al. (2015) examined the ichthyofaunal diversity of the Koilsagar Reservoir in Mahaboobnagar district, Telangana. The study found that the reservoir had a moderate diversity of fish species, with 30 species recorded. Another study by Naik et al. (2014) investigated the diversity of Chulkinala reservoir of Karnataka. They reported 45 species. The study found that the reservoir had a relatively high diversity of fish species. However, climate change could threaten this diversity by altering the reservoir's water temperature and nutrient levels.

2. Materials and Methods

2.1. Study Area:

The Nizamsagar reservoir is one of the oldest irrigation projects in India. The reservoir is located in the Kamareddy district of Telangana state and is built across the Manjeera River, which is a tributary of the Godavari River. It is situated at 18º 19′ (N) Latitude and 76º 56′ (E) longitude. The construction of the reservoir began in 1923 and was completed in 1931 during the reign of the last Nizam of Hyderabad, Mir Osman Ali Khan. The project was constructed with the primary goal of providing irrigation to the drought-prone areas of this region and also improving the drinking water supply to the nearby villages.

2.2. Sample Collection:

Fish samples were collected with the help of local fisherman from the different locations of the reservoir. Gill nets (mesh size 40-90 mm), cast nets (mesh size 6-12 mm) and other traditional square shaped bamboo baskets were used to collect the fishes. Fishes were collected for a period of one year from January 2019 to December 2019.

2.3. Identification and Analysis:

Immediately after the collection of the fishes, they were photographed, labelled and preserved in 4-10% of formalin solution according to their size. Fishes were identified up to the species level followed by (Nelson, 1976; Jayaram 1991, 2010; Talwar and Jhingran1991; Jayaram and Dhas2000; Jayaram and Sanyal 2003). Nomenclature of fishes was done by the following (Fricke et al., 2019).

3. Results and Discussion

In the present study, a total of 41 fish species categorized 16 different families, 26 genera and 6 orders were recorded from the different locations of the Nizamsagar reservoir (Table 1). The majority of fish species found within the Nizamsagar reservoir are native, with a mere 7.31 % of the piscine diversity being comprised of exotic species, such as Ctenopharyngodon idella, Cyprinus carpio and Oreochromis mossambicus.

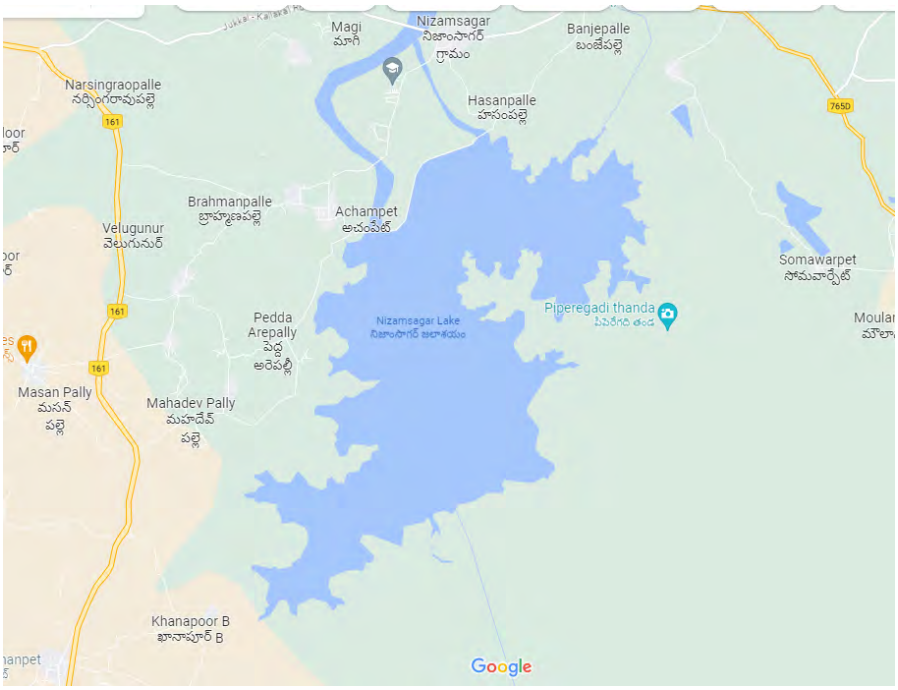

Fig. 1. Sketch map of Nizamsagar Reservoir

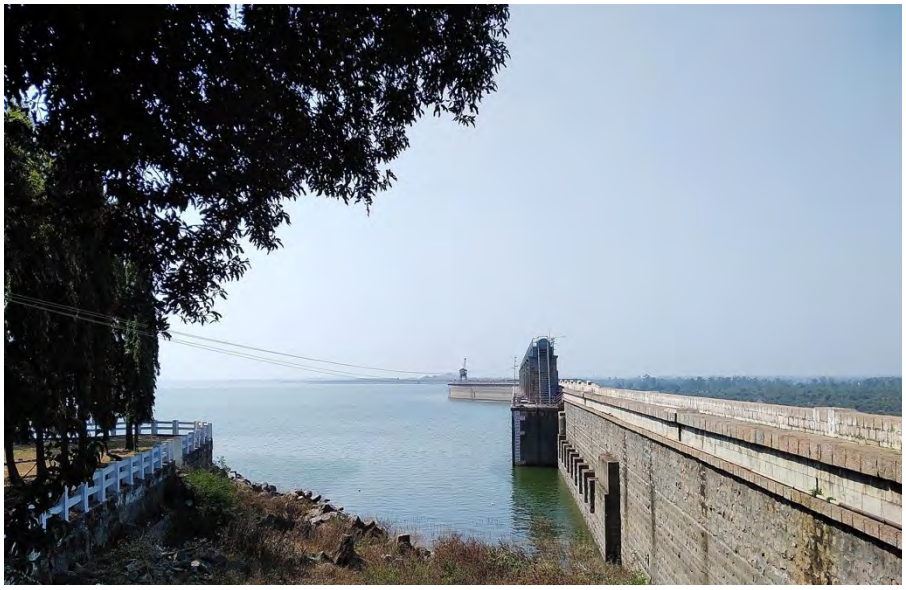

Fig. 2. Nizamsagar Reservoir side view

Cypriniformes consists of 2 families (13 % of all families), 9 genera (34 % of all genera) and 18 species (44% of all species). Cypriniformes species exhibit a wide range of sizes, shapes, and colors. Cypriniformes is a diverse order of freshwater fish that includes a wide array of species with different adaptations, habitats, and ecological roles. Their ecological and economic significance, as well as their popularity in the aquarium trade and recreational fishing, make them an important group within the world of fish fauna.

Osteoglossiformes contains 1 family (6% of all families), 1 genus (4% of all genera) and 1 species (2% of all species). Siluriformes comprises 5 families (31% of all families), 7 genera (27% of all genera) and 9 species (22% of all species). Siluriformes are primarily freshwater fish, although some species can also be found in brackish and marine environments. They are characterized by their elongated bodies, smooth skin or armored plates, and prominent barbels around their mouths. These barbels, often resembling cat whiskers, give them their common name.

Beloniformes order includes 2 families (13% of all families), 2 genera (8% of all genera) and 2 species (5% of all species). Channiformes consists 1 family (6% of all families), 1 genus (4% of all genera) and 4 species (10 % of all species). Perciformes comprises of 5 families (31% of all families), 6 genera (23% of all genera) and 7 species (17% of all species). Perciformes is a diverse order of fish that encompasses a vast array of species, known for their remarkable adaptability, wide distribution, and ecological

Table 1. List of the fishes of Nizamsagar Reservoir

Order	Family	Scientific Name	Vernacular Name
Cypriniformes	Cyprinidae	1. *Catlacatla*	Botcha
		2. *Labeocalbasu*	Kaki Botcha
		3. *Labeorohita*	Rohu
		4. *Labeogonius*	Kursi
		5. *Labeopotail*	Bochhe
		6. *Cirrhinusmrigala*	Merige
		7. *Cirrhinusreba*	Argu
		8. *Ctenopharyngodon idella*	Gaddichepa
		9. *Cyprinus carpio*	Bangaruteega
		10. *Puntius chola*	Parka
		11. *Puntius titus*	Budda Parka
		12. *Puntius saranasarana*	Gundu Parka
		13. *Puntius sophore*	Parka
		14. *Rasbora elanga*	KatteKodipe
		15. *Salmostomabacila*	Chandamama
		16. *Amblypharyngodon mola*	Kodipe
		17. *Amblypharyngodonmicrolepis*	Kodipe
	Cobitidae	18. *Lepidocephalusguntea*	Ulshe
Osteoglossiformes	Notopteridae	19. *Notopterusnotopterus*	Vollenka
	Bagridae	20. *Mystusbleekeri*	JellaGuddiJellaErraJella
		21. *Mystuscavasius*	
		22. *Mystusvittatus*	
	Siluridae	23. *Ompokbimaculatus*	BuggadummaWalugachepa
		24. *Wallago attu*	
	Schibeidae	25. *Eutropiichthysvacha*	SeervajellaBarusa
		26. *Pseudeutropiusatherinoides*	
	Claridae	27. *Clarias magur*	Marpoochepa
Siluriformes	.Heteropneustidae	28. *Heteropneustesfossilis*	Ingleekam
Beloniformes	Belonidae	29. *Xenentodoncancila*	Kongamoothichepa
Channiformes	Exocoetidae	30. *Hyporhamphusgaimardi*	Kongamukku
	Channidae	31. *Channa marulius*	Poomotta
		32. *Channa orientalis*	Malapankidi
		33. *Channa punctatus*	Mottapilla
		34. *Channa striatus*	Korramotta
Perciformes	Gobiidae	35. *Glossogobiusgiuris*	Ushkedanthi
	Mastacembelidae	36. *Mastacembelusarmatus*	Papera
		37. *Mastacembeluspancalus*	Chinni Papera
	Anabantidae	38. *Anabas testudineus*	Burkalu
	Cichlidae	39. *Oreochromis mossambica*	Chinnaguraka
	Ambassidae	40. *Chanda nama*	Addamchepa /
		41. *Ambassisranga*	SirabaraPodugusirabara

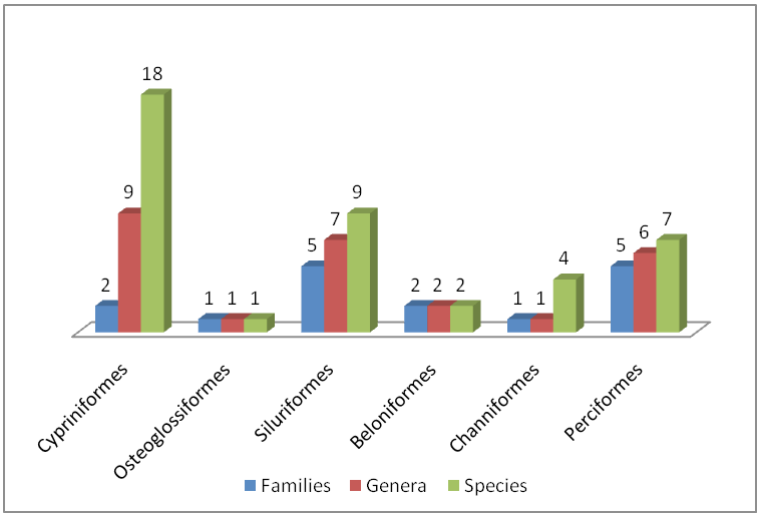

Fig. 3. Number wise contribution of families, genus and species

Table 2. Order wise representation of families, genera and species

Order	Families	Percentage	Genera	Percentage	Species	Percentage
Cypriniformes	2	13	9	34	18	44
Osteoglossiformes	1	6	1	4	1	2
Siluriformes	5	31	7	27	9	22
Beloniformes	2	13	2	8	2	5
Channiformes	1	6	1	4	4	10
Perciformes	5	31	6	23	7	17

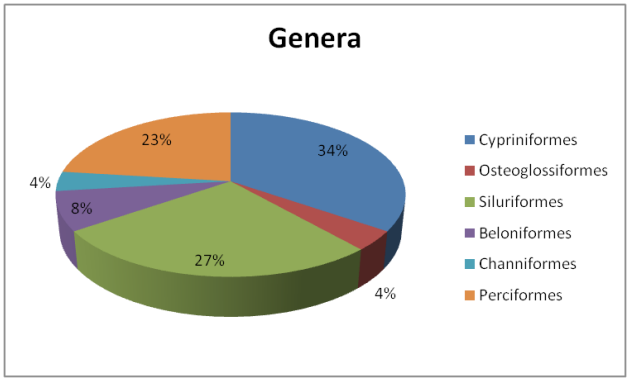

Fig. 5. Genera wise representation of fish fauna of Nizamsagar Reservoir

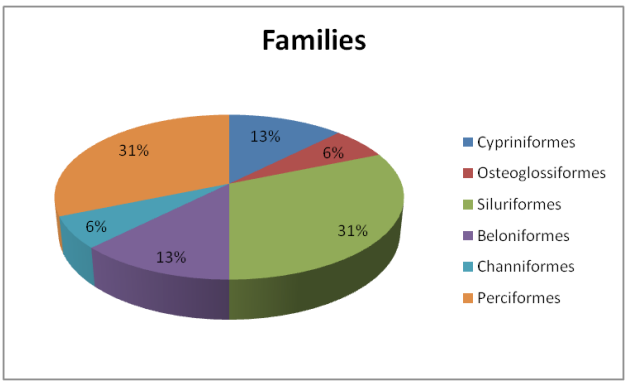

Fig. 4. Family-wise representation of fish fauna of Nizamsagar Reservoir

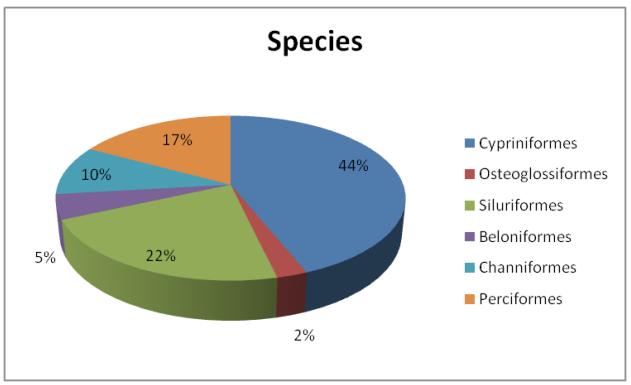

Fig. 6. Species wise representation of fish fauna of Nizamsagar Reservoir

importance. These fishes are found in both marine and freshwater environments around the world. They exhibit a wide range of sizes, shapes, and behaviors, making them a fascinating group for study and observation.

Cypriniformes was dominant with 18 species followed by Siluriformes (9 species), Perciformes (7 species), Channiformes (4 species), Beloniformes (2 species) and Osteoglossiformes 1 species. Order-wise percentage composition is Cypriniformes (44%), Siluriformes (22%), Perciformes (17%), Channiformes (10%), Beloniformes (5%) and Osteoglossiformes (1%).

Freshwater fish species diversity has been studied in various regions, including Asia, Africa, Europe, North America, and Russia. In Asia, the family-wise diversity of inland waters is higher compared to Africa and Latin America (Thuy et al., 2006). The region has a diverse fish fauna, with an estimated cumulative total of 7447 species, dominated by cyprinids, loaches, gobids, catfishes, and Osphronemidae (Khade et al., 2017). Threatened freshwater finfish species in Asia account for 17.5% of all finfish species in the world, with 66 species classified as critically endangered and or endangered (Mark et al., 2017).

Several studies have been conducted in different regions of India to assess the fish diversity. In Sagar Lake, Madhya Pradesh, a total of 21 species belonging to 6 orders, 11 families, and 17 genera were recorded, with the family Cyprinidae being the most abundant (Owais et al., 2015). At the confluence of Pravara and Godavari rivers in Maharashtra, 21 fish species belonging to 6 orders were found, with carps, barbs, eels, snake-heads, and other fish forming the bulk of the collection (Balraj et al., 2016). In Harsool-Savangi Dam, Aurangabad district, 15 fish species belonging to 3 orders were recorded, with the order Cypriniformes being dominant (Babasaheb Ambedkar, 2009). In the upper catchment of the Kabini River in the Wayanad part of the Western Ghats, a total of 136 fish species belonging to 13 orders were recorded, with the order Cypriniformes dominating (Dencin et al., 2021). In the Sasihithlu estuary in Karnataka, 63 species of freshwater, estuary, and marine fish belonging to 13 orders were recorded, with the order Perciformes being predominant (Abhishek et al., 2021). In Wan River, India, a study identified 21 species of freshwater fishes belonging to 8 families and 5 orders (Khade et al., 2017).

The ichthyofaunal diversity in Andhra Pradesh and Telangana has been studied in several locations. In Jammikunta mandal, four larger freshwater tanks were studied, and a total of 56 fish species belonging to 9 orders were identified (Rama Rao et al., 2017).The Nizamsagar Reservoir of Kamareddy District was also studied, and 19 fish species belonging to 5 orders were recorded (Reddy G.S. et al., 2015). Kolleru Lake and Upputeru Creek in Andhra Pradesh were found to have 78 fish species belonging to 14 orders (Bharatha et al., 2015). The Somasila Reservoir in Nellore district was surveyed and 19 fish species belonging to 6 orders were recorded (Jesintha et al., 2020).These studies provide valuable information on the diversity of freshwater fishes in Andhra Pradesh and Telangana.

4. Conclusion

The present study shall furnish a contemporary database to the reservoir authorities and fisheries department, thereby enabling them to preserve the ichthyofaunal diversity of Nizamsagar reservoir. In forthcoming research, this study can be beneficial in quantifying the pace of the reduction in fish diversity and demonstrating the magnitude of the emergent impacts.

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