



## DIVERSITY AND COMPOSITION OF FRESH WATER FISHES OF VIHAR LAKE, MUMBAI

**Talpade M. B.\***

Department of Zoology, Mithibai College, Vile Parle (W), Mumbai 400 056.

\*Corresponding Author

**Singh A. S.**

Department of Zoology, Mithibai College, Vile Parle (W), Mumbai 400 056.

**ABSTRACT** The present study has been carried out to assess the fish diversity at Vihar Lake, Mumbai. Six water bodies where fish cultivation is a regular practise by various fish farmer societies were selected as sites of collection. The results showed that populations of the majority of fish species showed drastic reduction over the past five decades. Present study reports 30 species of fishes belonging to 09 orders, 13 families and 22 genera from the study area such as *Amblypharyngodon mola*, *Catla catla*, *Cirrhinus reba*, *Labeo rohita*, *Puntius chola*, *Salmostoma bacaila*, *Mystus seenghala*, *Wallago attu*, *Ompok bimaculatus*, *Clarias batrachus*, *Notoperus notepurus*, *Channa striata*, *Glossogobius giuris*, *Mastacembelus pancalus*, *Anguilla bicolor* were found most abundant. The data obtained in the present study is also important in variety of manners such as to know the present status of fish fauna in the local region, it is helpful for the researchers as well as fishermen's, to get an idea about the tolerance and diversity of fish found in Vihar lake and choose exact variety of fish species for the culture so as to get maximum yield.

**KEYWORDS :** Fresh water fishes, Vihar Lake, Mumbai

### Introduction

Water is a basic need of all living organisms on the earth. Lakes, Rivers and Reservoirs are most important water resource and used for several purposes. Documentation of biodiversity has become very important aspect scientific studies. Fish diversity of any region has great significance in assessment of that region with reference to environmental conditions. Biodiversity of any pond ecosystem is predominantly determined by water conditions (Buckton, 2007, Kosygin and Dhamendra, 2009; Sharma and Tiwari, 2011). India is endowed with a vast expanse of open inland water. The fresh water resources are very precious for the life on our planet. The number of dams, reservoirs, tanks, etc. has significantly increased in last few years. The aquatic ecosystem is important and it has large number of economically important animals especially fish which is an important source of food (Daniels, 2001). Fish constitutes almost half of the total number of vertebrates in the world. They live in almost all conceivable aquatic habitats. They exhibit enormous diversity of size, shape and biology, and in the habitats they occupy (Heda, 2009).

Maharashtra is rich in freshwater (rivers, irrigation canals, dams, and lakes) reservoirs and its fish diversity. Therefore, Maharashtra is one of the important states for fish production and natural water resources and there is great scope for developing fisheries in this state. Vihar lake is the largest lake of Mumbai, after Powai Lake. It was constructed in 1860 on the Salsette group of islands. This lake, situated in between Tulsi Lake and Powai Lake, meets up to 3% of the city's southern region's water requirements. The water of the lake is filtered at Bhandup in a large filtration plant to meet the drinking water needs of the people. This quiet stretch of water extends up to 27 miles from the center of Mumbai. The lake gets its water from rainwater collected in the catchment area of Powai-Kanheri Hill Ranges. Vihar Lake is situated within the premises of Sanjay Gandhi National Park and is known to be one of the prime sources of water for the city (). Biodiversity is the variety and variability of plants, animals and microorganisms in its environment (Dahanukar *et al.*, 2004; Bhat, 2004). Diversity refers to variety of fish species; depending on context and scale, it could refer to alleles or genotypes within piscian population, to species of life forms within a fish community, and to species of life forms across aqaregimes (Battul *et al.*, 1992). Zooplanktons are essential components of the pond ecosystem, because they are present at the second tropic level as consumers (Wang *et al.*, 2010; Sharma and Tiwari, 2011). The fish diversity was studied by many workers to a great extent that includes Bandyopadhyay (1999), Ahmad *et al.*, (2008), Bhakta and Bandyopadhyay (2008), Devi Prasad *et al.* (2009), Goswami and Landmankodi (2010), Sarwade *et al.* (2010), Jadhav *et al.*, (2011), Thirumala *et al.*, (2011), Muruga (2012), Gohil and Mankodi (2013), Islam *et al.*, (2013), Bose *et al.*, (2013), Khanna and Fouzia (2013), Mohite and Samant (2013), Chouhan *et al.*, (2013), Sirajudheen and Khan (2014) and Londhe (2015). Fish diversity is declining rapidly each day due to unending anthropogenic stress. This diversity is not only the wealth of our world

but it also has some serious implications on fishery. Thus there is an urgent need for proper investigation and documentation of fish diversity in order to develop a fresh water fish diversity information system having both bioinformatics and geo referenced databases of fish and fish habitat. The present study is an attempt to study the diversity of fresh water fishes of Vihar lake of Mumbai, Maharashtra.

### Material and Methods

**Study area:** Vihar lake is the largest lake of the city, situated in Sanjay Gandhi National Park, in North Mumbai (19.1440° N, 72.9100° E), covering area of 7 km<sup>2</sup>. The water of the Vihar lake is supplied to city's southern region for the drinking purpose. This lake is situated in the limits i.e. Thane and partly in Mumbai Suburban district 25 kms north from heart of Mumbai city. The vertebrate fauna of park includes fishes, mammals, birds, reptiles and amphibians. The Tulsi and Vihar lakes catchment areas also adds to the beauty of Sanjay Gandhi National park which are in the lower westerly reaches of Krishnagari Upwan. Two rivers viz. Dahisar and Laxmi flow in the Park (Fig. 1)



**Fig 1: Map of Vihar lake, Mumbai**

**Collection of fish sample:** The collections were made once in a week from 4 points of the lake during Oct-2017 to Sep-2018 with the help of local fishermen using different types of nets namely gillnets, casts nets and dragnets. The collected fishes were photographed labelled and preserved in 10% Formalin solution and brought to the laboratory. Smaller fishes were directly placed in the 10% formalin solution while large fishes were given an incision on the abdomen before they were fixed. The fishes were identified with help of standard reference material. The qualitative and quantitate analysis of fish species was carried out (Jayaram, 1981; Talwar, and Jhingran, 1991).

**Identification of fish sample:** The fishes from dams were collected using various fishing methods. After sampling, photographs of fishes were taken and collected fish samples were preserved in 10% formalin for detailed examination and identification by using standard literature of Day (1878), Jayaram (2010) and Talwar and Jhingran (2001). Some of the samples were sent to Western Regional Office of Zoological Survey of India for further identification.

### Results and discussion:

Present study reports 30 species of fishes belonging to 09 orders, 13 families and 22 genera from the study area such as

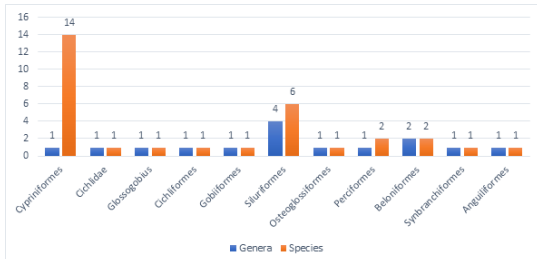
*Amblypharyngodon mola*, *Catla catla*, *Cirrhinus reba*, *Labeo rohita*, *Puntius chola*, *Salmostoma bacaila*, *Mystus seenghala*, *Wallago attu*, *Ompok bimaculatus*, *Clarias batrachus*, *Notoperus notepurus*, *Channa striata*, *Glossogobius giuris*, *Mastacembelus pancalus*, *Anguilla bicolor* were found most abundant systematic list of fishes observed from the Vihar fresh water lake has been provided in table-1. The freshwater sources are Tulsī lakes, Dahisar & Rewat rivers.

Order	Family	Species
Cypriniformes	Cyprinidae	1. <i>Amblypharyngodon mola</i> (Hamilton)
		2. <i>Catla catla</i> (Hamilton)
		3. <i>Cirrhinus mrigala</i> (Hamilton)
		4. <i>Cirrhinus reba</i> (Hamilton)
		5. <i>Cyprinus carpio carpio</i> (Linnaus)
		6. <i>Rasbora daniconius</i>
		7. <i>Garra mullya</i> (Mullya garra)
		8. <i>Labeo rohita</i> (Hamilton)
		9. <i>Labeo boggut</i>
		10. <i>Puntius chola</i> (Hamilton)
		11. <i>Puntius sarana sarana</i> (Hamilton)
		12. <i>Puntius sophore</i> (Hamilton)
		13. <i>Salmostoma bacaila</i> (Hamilton)
		14. <i>Salmostoma phulo</i> (Hamilton)
Cichliformes	Cichlidae	15. <i>Mozambique tilapia</i>
Gobiiformes	Glossogobius	16. <i>Glossogobius giuris</i>
Siluriformes	Bagridae	17. <i>Mystus seenghala</i> (Sykes)
		18. <i>Mystus bleekeri</i> (Day)
	Siluridae	19. <i>Wallago attu</i> (Schneider)
		20. <i>Ompok bimaculatus</i> (Bloch)
	Clariidae	21. <i>Clarias batrachus</i> (Linnaeus)
	Heteropneustidae	22. <i>Heteropneustes fossilis</i> (Bloch)
Osteoglossiformes	Notopteridae	23. <i>Notoperus notepurus</i> (Pallas)
Perciformes	Channidae	24. <i>Channa punctatus</i> (Hamilton)
		25. <i>Channa striata</i> (Bloch)
Beloniformes	Gobiidae	26. <i>Glossogobius giuris</i> (Hamilton)
		27. <i>Xenotodon cancila</i> (Hamilton)
Synbranchiformes	Mastacembelidae	28. <i>Mastacembelus pancalus</i> (Hamilton)
		29. <i>Mastacembelus armatus</i> (Lacepede)
Anguilliformes	Anguillidae	30. <i>Anguilla bicolor</i>

**Table-2. Number and percent composition of families, genera and species**

Sr.no.	Order	Genera	Species
1.	Cypriniformes	1	14
2.	Cichlidae	1	1
3.	Glossogobius	1	1
4.	Cichliformes	1	1
5.	Gobiiformes	1	1
6.	Siluriformes	4	6
7.	Osteoglossiformes	1	1
8.	Perciformes	1	2
9.	Beloniformes	2	2
10.	Synbranchiformes	1	1

**Fig.1: Number and percent composition of families, genera and species**

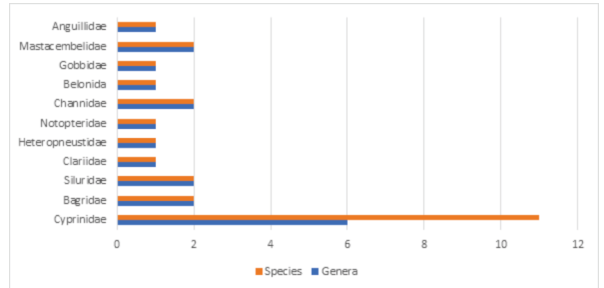


**Table-3. Number and percent composition of genera and species**

Sr.No	Families	Genera	Species
1.	Cyprinidae	6	11
2.	Bagridae	2	2
3.	Siluridae	2	2
4.	Clariidae	1	1
5.	Heteropneustidae	1	1
6.	Notopteridae	1	1

7.	Channidae	2	2
8.	Belonida	1	1
9.	Gobiidae	1	1
10.	Mastacembelidae	2	2
11.	Anguillidae	1	1

**Fig. 3: Number and percent composition of genera and species**



The diversity and abundance of the species generally showed an inverse relationship with altitude. The serious threats faced by the freshwater fishes are mostly in the form of human interventions and habitat alterations and conservation plans for the protection and preservation of the unique and rare fish biodiversity. Although lake is the part of same larger basin, significant differences in diversity values were observed. This study supports earlier studies performed by Dean et al. (1998) on the effect of human induced influences on the diversity of the fish in three small streams in southern Ontario and studies by Habit et al. (2006). Dale et al. (1999) found that an overall decrease in fish abundance occurs with increase in the length of non-forested riparian zones (a situation that can be observed in the Adan) while several studies have demonstrated that dams lower fish species diversity (Michio et al. 2007; Morita & Yamamoto 2002) (Table 3).

**Conclusion** The present study reveals seasonal variation in the diversity and distribution of fresh water fishes in Vihar Reservoir. The study indicates that temperature has important role in the distribution of fishes in a fresh water habitat. Vihar lake gave important insights into the correlation of fish biodiversity. The data obtained in the present study is also important in variety of manners such as to know the present status of fish fauna in the local region, it is helpful for the researchers as well as fishermen's, to get an idea about the tolerance and diversity of fish found in Vihar lake and choose exact variety of fish species for the culture so as to get maximum yield.

**REFERENCES**

- Buckton, S.: Managing wetlands for sustainable livelihoods at KoshiTappu. Danphe., 16, 12-13 (2007).
- Kosygin, L. and H. Dhamendra: (2009). Ecology and conservation of Loktak Lake, Manipur: An overview. In: Wetlands of North East India: Ecology, Aquatic Bioresources and Conservation (Eds.: L. Kosygin). Akansha Publishing House, New Delhi, pp. 1-20.
- Sharma, C. and R.P. Tiwari (2011). Studies on zooplanktons of fresh water reservoir at Lony Dam Theonther Rewa (M.P.). Int. J. Pharm. Life Sci., 2, 492-495.
- Battul P.N., Rao R.A., Navale K.R., Bagale M.B. and Shah N.Y. (2007): Fish Diversity from Ekrukh Lake Near Solapur Maharashtra. J. Aqua. Biol., 22 (2): 68-72.
- Wang, Chang-Fu, Xian-QiuRen, and Run-Lin Xu(2010). Composition, abundance and diversity of the Peracarida on different vegetation types in the Qi'ao-Dan'gan Island Mangrove Nature Reserve on Qi'ao Island in the Pearl River Estuary, China. Zool. Stud., 49, 608-615
- Bandopadhyay P.K. (1999): Fish Diversity in Freshwater Perennial Water Bodies in East Midnapore District of West Bengal, India. Int. J. Environ. Res., Vol 2(3): 255-260.
- Ahmad S. M., Venkateswarlu M., Honneshappa K. and Tantray A. K. (2008): Fish diversity of Sogane and Santhekadur tanks, Shimoga, Karnataka, India Current Biotica vol 5(1): 46-55.
- DeviPrasad A.G., Venkataramana.G.V. and Thomas M. (2009): Studied Fish diversity and its conservation in major wetlands of Mysore. Journal of Environmental Biology September 2009, 30(5) 713-718.
- Goswami A.P and Landmankodi P.C (2010): Diversity of fishes from freshwater reservoir Nyari II of Rajkot district, Gujarat. Electronic Journal of Environmental Sciences Vol. 3, 23-26
- Jadhav B.V., Sanjay S., Kharat., Raut R.N., Paingankar N and Dahanukar N. (2011): Studied Freshwater fish fauna of Koyna River, northern Western Ghats, India. Journal of Threatened Taxa, 3(1): 1449-145.
- Sarwade J.P. and Khillare Y. K. (2010) : Studied fish diversity of Ujani wetland, Maharashtra, India. j. fish diversity of ujani wetland special issue, Vol. 1: 173-179
- Thirumala S., Kiran B.R and Kantaraj G.S (2011): Fish diversity in relation to physico-chemical characteristics of Bhadra reservoir of Karnataka, India Advances in Applied Science Research, 2011, vol 2 (5):34-47
- Muruga S. and Prabahalal C. (2012): Fish diversity in relation to physico-chemical characteristics of Kamala Basin of Darbhanga District, Bihar, India. International Journal of Pharmaceutical and Biological Archives; vol 3(1):211-217;
- Gohil M. and Mankodi P. C (2013): Diversity of Fish Fauna from Downstream Zone of River Mahisagar, Gujarat State, India Research Journal of Animal, Veterinary and Fishery Sciences Vol. 1(3),14-15.
- Islam M.R., Das B., Baruah., Biswas and Gupta A. (2013): Studied Fish Diversity and Fishing Gears used in the Kulsī River of Assam, India. Annals of Biological Research, 4 (1):289-293.
- Bose A. K., Jha B. C., Suresh V.R., Das A., Parasar K.A and Ridhi I. (2013) : Fishes of the

- Middle Stretch of River Tawa, Madhya Pradesh, India. An International Peer Review E-3 Journal of Sciences. Vol. 3, No. 1, 706-716.
17. Khanna D. R. and Fouzia I. (2013): impact of water quality attributes and comparative study of ichthyofaunal diversity of Asian lake and river Asian Journal of Applied and Natural Science. vol.5 (1): 200-206
  18. Mohite S.A. and Samant J. S. (2013): Impact of Environmental Change on Fish and Fisheries in Warna River Basin, Western Ghats, India International Research Journal of Environment Sciences 2319-1414 Vol. 2(6), 61-70, Int. Res. J. Environment Sci
  19. Chouhan M., Siddiqui and Sharma S. A. (2013): Fish biodiversity of Narmada River in Some Selected Stations of Madhya Pradesh, India. International Journal of Advanced Research, Volume 1, Issue 3, 20-25 Londhe S.D and Sathe.T.V (2015) : Fish faunal diversity and occurrence from lakes of Kolhapur district: Biolife ;Vol 3; Issue 2:2320-4257
  20. Sirajudheen T.K and Khan J. (2014): freshwater pond ecosystems and ichthyofaunal diversity of Lakshadweep islands, Indian Journal of Aquatic Biology and Fisheries Vol. 2: 691 to 696.
  21. Day, F. (1878). The fishes of India, being A natural history of the fishes known to inhabit the seas and fresh waters of India, Burma and Ceylon. Vol. I and II. Ceylon text and atlas in 4 pts., London.
  22. Jayaram, K.C. (2010). The Freshwater Fishes of the Indian Region. Second Edition. Narendra Publishing House, Delhi, 616pp
  23. Talwar P.K. and Jhingran A.G. (2001): Inland fishes of India and adjacent countries. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi, p.18
  24. Bhat, A. (2004). Patterns in the distribution of freshwater fishes in rivers of Central Western Ghats, India and their associations with environmental gradients. Hydrobiologia 529: 83-97.
  25. Dahanukar, N., R. Raut & A. Bhat(2004). Distribution, endemism and threat status of freshwater fishes in the Western Ghats of India. Journal of Biogeography 31:123-136.
  26. Pradhan M. S., (2006). Fauna of Sanjay Gandhi National Park (Borivali, Mumbai), Zoological Survey of India, Kolkata
  27. Dale, J.E.B., G.Helfman, J.O. Harper & P.V. Bolstad(1999). Effects of Riparian Forest Removal on Fish Assemblages in Southern Appalachian Streams. Conservation Biology 13(6): 1454-1465.
  28. Daniels, R. (2001). Fresh Water Fishes of Peninsular India. University press, 282pp.
  29. Dean, G.F., E.D.Kott, P.L. Roman & D. George (1998). A quarter century of change in the fish communities of three small streams modified by anthropogenic activities. Journal of Aquatic Ecosystem Stress and Recovery 6(2): 111-127.
  30. Habit, E., M.C. Belk, R.C. Tuckfield & P. Oscar (2006). Response of the fish community to human-induced changes in the Biobío River in Chile. Freshwater Biology 51: 1-11.
  31. Heda, N.K. (2009). Freshwater Fishes of Central India: A Field Guide. (2009). Vigyan Prasar, Department of Science and Technology, Government of India, Noida, 169pp.
  32. Michio, F., S. Kameyama, M. Kaneko, K. Nakao & F.S. Ashley (2007). Modelling the effects of dams on freshwater fish distributions in Hokkaido, Japan. Freshwater Biology 52(8): 1511-1524
  33. Morita, K. & S. Yamamoto (2002). Effects of Habitat Fragmentation by Damming on the Persistence of Stream-Dwelling Charr Populations. Conservation Biology 16(5): 1318-1323
  34. Jayaram, K.C. (1981). The Freshwater Fishes of India, Pakistan, Bangladesh, Burma and Sri Lanka-A Hand Book. Director, Zoological Survey of India, Kolkata
  35. Talwar, P.K. and A.G. Jhingran (1991). Inland Fishes of India and Adjacent Countries, Vol. 1&2. Oxford & IBH Publishing Co. Pvt.Ltd., 1158pp.