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**Research Article**

# ICHTHYOFAUNAL DIVERSITY AND CONSERVATION STATUS OF SIDDHESHWAR RESERVOIR DISTRICT HINGOLI, MAHARASHTRA, INDIA

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## ABSTRACT

The study of ichthyofaunal diversity of Siddheshwar reservoir, district Hingoli, Maharashtra, was conducted over a two-year period from January 2015 to December 2016, and the reservoir shows occurrence of rich ichthyofaunal diversity, with a total of 40 fish species belonging to 29 genera, 15 families, and 9 orders in Siddheshwar reservoir. The order Cypriniformes dominated with 18 species, followed by the orders Siluriformes with 8, Channiformes with 4, Preciformes with 3, Clupeiformes and Mastcembeliformes with 2, and the rest of the orders Angulliformes, Beloniformes, and Mugiliformes with a single species. Because of the abundance of food materials, most of the significant fishes may be found in this reservoir. Primary productivity occurs in the form of primary producers (Phytoplanktons and Zooplanktons). According to the IUCN red list categories, 52.5 percent of the species are least concern, 20 percent are not evaluated, 10 percent are near threatened, 5.00 percent are data deficient, 5.00 percent are lower risk near threatened and vulnerable, and 2.5 percent are lower risk least concern. The study reveals that this freshwater body could be beneficial to regional fish variety conservation, particularly for indigenous and endangered fish species.

**Keywords:** Ichthyofauna, Conservation Status, IUCN categorization, Threats, fish diversity.

## INTRODUCTION

Reservoirs are used for drinking water, agriculture, and power generation, and they also reflect the diversity and richness of fish. Fresh water reservoirs built for this purpose are underutilised and do not have adequate water utility management. According to (Battul *et al*., 2007), understanding fish faunal variety is critical for the utilisation of fresh water reservoirs and the sustainable and cost-effective management of lakes in India. According to (Krishna & Piska, 2006), a diverse range of fish species is supported, which in turn supports the commercial exploitation of 102 fisheries. Knowledge of fishing resources, their availability, and distribution, particularly in aquatic water resources, is necessary for proper fishery resource exploitation, according to (Hiware & Pawar, 2006). Misra, (1959) investigated the freshwater fishes of the Indian subcontinent's inland waters. The current reservoirs, according to (Sharma *et al*., 2019) and (Oliveira *et al*., 2004), offer a wonderful opportunity for investigating fish diversity and the relative importance of factors that impact fish variety and abundance. It's also a valuable resource for introducing species from the previous revering fish fauna into a newly formed water body, such as a reservoir. Fish diversity has declined in recent years as a result of irrational fishing practises and environmental issues such as reduced water levels, dumping of solid wastes in water bodies, increased sedimentation, and water pollution. Few species of fish have been lost from India's freshwater ecosystem, and some are endemic, endangered, or threatened. Kottore Chidambaran (1981) reported 742 freshwater species of fish under 233 genera, 64 families, and 16 orders from India; (Talwar & Jhingran, 1991) reported 2546 species of fish belonging to 969 genera, 254 families, and 40 orders; and (Devi & Indra, 2012) reported

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667 freshwater fish species from India. As a result of its diverse biological resources, it is considered one of the world's mega diversity countries. Fishes have a wide range of morphologies, habitats, and biology. There are 2500 species of fish in India, 930 of which are freshwater and 1,570 of which are marine (Kar *et al*., 2003). Over the last 30 years, freshwater biodiversity has plummeted faster than terrestrial or marine biodiversity (Jenkins, 2003). The stabilisation of ecosystems such as wetlands is critical for the long-term use of resources. Because of their extreme vulnerability to changes in aquatic habits and habitats, freshwater fish are one of the most vulnerable taxonomic groups (Darwall & Vié, 2005). The diversity and abundance of fish fauna are represented by the ecosystem's ichthyofaunal diversity. Many fish species have become critically endangered in freshwater settings where freshwater is in great demand. The reservoir not only provides water for drinking, agricultural operations, recreation, and sewage disposal, but it also sustains a significant fishery. It not only provides a nutritious food, but it also provides a source of income for the local or impoverished fishing population. As a result, knowledge of the fish species found in wetlands and other aquatic habitats is required for the development of both culture and capture fisheries. As a result of the combined and overlapping pressures of overexploitation, water pollution, flow modification, habitat destruction or degradation, and invasion by exotic species, freshwater fish diversity is altering and depleting at an alarming rate (Revenga *et al*., 2005). To investigate the reservoir's valuable fishing potential, a research was undertaken at Siddheshwar reservoir, District Hingoli of Marathwada area, Maharashtra, India.

## MATERIALS AND METHODS

### Study area

In 1968, the Siddheshwar reservoir was built on the Purna River, a tributary of the Godavari, near Rupur camp Tq, Aundha Nagnath, Dist, Hingoli, and close hamlet Siddheshwar Tq, Aundha Nagnath, Dist, Hingoli. The site is around 15 kilometres north-west of Hingoli. The reservoir is located between 19° 0' 20" north latitude and 76.57'30" east longitude. On both sides, the reservoir is naturally positioned in a steep location. For two years, a periodic survey of the ichthyofaunal variety of Siddheshwar reservoir was carried out (from January 2015 to December 2016). Local fishermen used gill nets, cast nets, drag nets, hooks, and line to gather fish at various locations across the reservoir. Local fish markets on the banks of the reservoir and the Purna River were also used to harvest fish. The captured fish were preserved in 10% formalin and tagged according to their size. Standard keys created by Kottore (1981), (Hiware & Pawar, 2006; Jayaram, 1999; Jayaram, 2010; Talwar & Jhingran, 1991) were used to identify fish up to the species level (2015). Experts in the field of fish taxonomy validated the identification of the creatures. Day (1989), (Jayaram, 1961; Nadel & Nelson, 1976) were used to classify the items (1976). The report of the Conservation, Assessment, and Management Plan (CAMP) workshop on freshwater fishes of India (Molur & Walker, 1998) and the IUCN Red List Category of Threatened Species provided data on current conservation status of fish (IUCN, 2017). Direct observation and engagement with local stakeholders, as well as internet search techniques, were used to acquire data on the quantity of various fish species, risks to the fish fauna, and economic relevance.

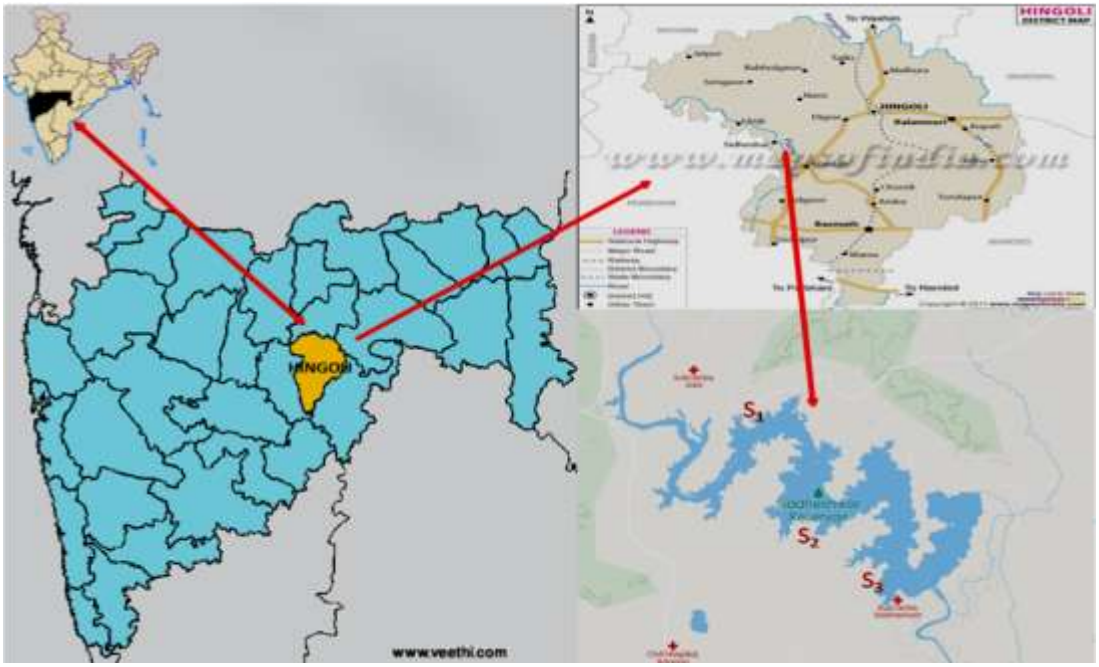


**Figure 1.** Map Showing study area of Siddheshwar reservoir.

## RESULTS AND DISCUSSION

The current study's findings suggest that there are 40 fish species in total, divided into 29 genera, 15 families, and 9 orders. In, a list of fish was provided, along with their conservation status (Table 1). Order Cypriniformes dominated with 18 (45.00%) species, followed by Siluriformes with 8 (20.00%) species, *Channi formes* with 4 (10.00%) species, and Preciformes with 3 (7.5%) species, while the orders *Osteoglossi formes* and *Mastcembeli formes* each had 2 (5.00%) species, and the rest of the orders, *Angulli formes*, *Cyprnidonti formes* (Table 2). According to CAMP, 1998, the majority of these 40 fish species belong to the cyprinidae family (45.00 percent) and are low risk near threatened, however the remainder 20.00 percent are vulnerable and not evaluated, and 7.5 percent are endangered and low risk least concern. According to the IUCN red list, 52.5 percent of species are of least concern, 20.00 percent have not been reviewed, 10.00 percent are near threatened, and 5.00 percent have insufficient data. Lower risk near endangered and vulnerable, as well as 2.5 percent, are the least concerning risks (Table 3). In the Siddheshwar reservoir, three species are abundant, ten species are moderately numerous, 18 species are common, and nine species are uncommon. There are 35 food fish species, 32 ornamental fish species, 11 cultivable fish species, and 6 sport fish species among the fish listed. *Cyprinus carpio*, *Hypothalamichthyes molitrix*, *Ctenopharyngodon idella*, and *Oreochromius mossambica* are among the exotic species found in the reservoir.

**Table 1**. Checklist of ichthyofauna and Conservation status of Siddheshwar reservoir during January 2015 to December 2016.

| Order/Family/Species | | CAMP Status | IUCN Status | Frequency | Commercial Importance | Threats |
|---|---|---|---|---|---|---|
| Order | Osteogossiformes | | | | | |
| Family | Notopteridae | | | | | |
| | *Notopterusnotopterus* | LRnt | LC | C | C,F,O | HL,OE,T |
| | *Notopteruschitala* | EN | NT | R | F,O | AL, OE |
| Order | Angulliformes | | | | | |
| Family | Angullidae | | | | | |
| | *Anguilla bengalensis* | EN | LC | R | F,O | HL,OE, P |
| Order | Cypriniformes | | | | | |
| Family | Cyprinidae | | | | | |
| | *Chela phulo* | NE | NE | R | F | SP |
| | *Chela sladoni* | LRlc | LC | R | F,O | P,T |
| | *Cyprinuscorpio* | NE | NE | A | C,F,O,S | SP |
| | *Catlacatla* | VU | NE | A | C,F,S | HL,P |
| | *Cirrhinus mrigala* | LRnt | LC | C | C,F | HL,OE,SL |
| | *Ambylpharyngodonmicrolepis* | LRlc | LC | M | O | O,F |
| | *Labeo rohita* | LRnt | LC | C | C,F,S | HL,OE,SL,T |
| | *Labeo calbasu* | LRnt | LRnt | R | C,F | OE,P |
| | *Osteo bramacotio* | LRnt | NE | C | O | HL,P |
| | *Discohnathus lamta* | LRlc | LC | M | F,O | HL,OF |
| | *Puntiussarana sarana* | VU | LC | C | F,O,S | HL,T |
| | *Puntius sophere* | LRnt | LC | C | O | OF,P |
| | *Hypothalamichthysmolitrex* | NE | NT | C | F,O,S | OF,HL,P |
| | *Thynnichthyssandkhol* | NE | DD | R | F,S | HL,P |
| | *Ctenopharyngodonidella* | NE | NE | C | C,F | SP |
| | *Rasboradaniconius* | LRnt | LC | M | F.O | OF,P |
| Family | Cobitidae | | | | | |
| | *Lepidocephalichthysguntea* | LRnt | LC | C | F,O | HL,P |
| | *Nemacheilusbotia* | LRnt | LC | C | F,O | HL,T |
| Order | Siluriformes | | | | | |
| Family | Bagridae | | | | | |
| | *Mystusaor* | NE | LC | C | F,O | HL,P |
| | *Mystusbleekeri* | VU | LC | M | F,O | OF,P,T |
| | *Mystuscavasius* | LRnt | LC | C | F,O | OF,HL,T |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Mystusseenghala* | LRnt | LC | C | F,O | OF,P,T |
| Family | Clariidae | | | | | |
| | *Clariasbatrachus* | VU | VU | C | C,F,O | T |
| Family | Heteropneustidae | | | | | |
| | *Heteropneustes fossils* | VU | VU | M | C,F,O | OF,HL,T |
| Family | Siluridae | | | | | |
| | *Wallagoattu* | LRnt | NT | R | F,S | P,T |
| | *Ompakbimaculatus* | EN | NT | R | C,F,O | OF,HL,P,T,SL |
| Order | Cyprinodontiformes | | | | | |
| Family | Belonidae | | | | | |
| | *Xenentodoncancila* | LRnt | LC | M | O | OF |
| Order | Mugiliformes | | | | | |
| Family | Mugilidae | | | | | |
| | *Mugilcephalus* | NE | LC | M | F,O | SP |
| Order | Channiformes | | | | | |
| Family | Channidae | | | | | |
| | *Channagaucha* | VU | LC | M | F,O | HL,OE |
| | *Channamarulius* | LRnt | LC | M | F,O | HL,OF |
| | *Channastriatus* | LRnt | LRlc | C | C,F,O | OF,T |
| | *Channapunctatus* | LRnt | LRnt | C | F,O | HL,OF,T |
| Order | Mastacembaliformes | | | | | |
| Family | Mastacembelidae | | | | | |
| | *Mastacembelusarmatus* | VU | NE | C | F,O | P |
| | *Mastacembeluspancalus* | LRnt | NE | M | F,O | OF,HL,P,T |
| Order | Preciformes | | | | | |
| Family | Anabantidae | | | | | |
| | *Anabas testudineus* | VU | DD | R | F,O | OF,OE |
| Family | Gibiidae | | | | | |
| | *Glassogobiusgiuris* | LRnt | LC | C | F,O | SP |
| Family | Cichlidae | | | | | |
| | *Oreochromismossambica* | NE | NE | A | F,O | SP |

Threat Status :- LC- Least Concern, VU- Vulnerable, DD-Data deficient, NE- Not Evaluated, LRnt- Lower Risk near threatened, NT- Near threatened, LRlc- Lower Risk least concern, EN- Endangered. Abundance:- C- Common, R- Rare, M- Moderate, A- Abundant. Commercial value:- C- Cultivable, F- Food Fish, O- ornamental, S- Sport fish Threats:- HL- Habitat Loss, OE- Over Exploitation, P- Pollution, T- Trade, SP- Stable Population, SL- Siltation, OF- Over Fishing.

**Table 2.** Number and percent composition of families, genera and species under various orders.

| S.No. | Order | Families | Genus | Species | % of families in an order | % of Genera in an order | % of Species in an order |
|---|---|---|---|---|---|---|---|
| 1 | *Osteogossiformes* | 1 | 1 | 2 | 6.66 | 3.44 | 5.00 |
| 2 | *Angulliformes* | 1 | 1 | 1 | 6.66 | 3.44 | 2.5 |
| 3 | *Cypriniformes* | 2 | 15 | 18 | 13.33 | 51.72 | 45.00 |
| 4 | *Siluriformes* | 4 | 5 | 8 | 26.66 | 17.24 | 20.00 |
| 5 | *Cyprinodontiformes* | 1 | 1 | 1 | 6.66 | 3.44 | 2.5 |
| 6 | *Mugiliformes* | 1 | 1 | 1 | 6.66 | 3.44 | 2.5 |
| 7 | *Channiformes* | 1 | 1 | 4 | 6.66 | 3.44 | 10.00 |
| 8 | *Mastacembaliformes* | 1 | 1 | 2 | 6.66 | 3.44 | 5.00 |
| 9 | *Preciformes* | 3 | 3 | 3 | 20.00 | 10.34 | 7.5 |
| Total | | 15 | 29 | 40 | | | |

**Table 3.** Number and percentage occurrence of fish fauna of Siddheshwar reservoir under the conservation status CAMP, 1998 and IUCN 2017.

| S. No. | Threat Category | CAMP | | IUCN | |
|---|---|---|---|---|---|
| | | Number | Percentage | Number | Percentage |
| 1 | Lower risk Near Threatened | 18 | 45.00 | 2 | 5.00 |
| 2 | Not Evaluated | 8 | 20.00 | 8 | 20.00 |
| 3 | Endangered | 3 | 7.5 | -- | -- |
| 4 | Vulnerable | 8 | 20.00 | 2 | 5.00 |
| 5 | Lower Risk least Concern | 3 | 7.5 | 1 | 2.5 |
| 6 | Data Deficient | -- | -- | 2 | 5.00 |
| 7 | Critically endangered | -- | -- | -- | -- |
| 8 | Least Concern | -- | -- | 21 | 52.5 |
| 9 | Near Threatened | -- | -- | 4 | 10.00 |

Habitat loss is the most serious threat to the fish fauna of the Siddheshwar reservoir, causing severe damage to 50.00 percent of total species, followed by pollution (40.00 percent), overfishing and trade (37.5 percent), overexploitation (17.5 percent), stable population (15.00 percent), and siltation (7.5 percent). (Pawar, 2014) found the diversity and richness of fishes in the selected sites of the river Narmada in Madhya Pradesh, with a total of 52 species of fishes identified.. Because the water is suited for faunal diversity, especially fish, Siddheshwar reservoir has the richest fish fauna. There is a need for the conservation of fish diversity. Disseminating conservation information, education, and practises to fishermen and other stakeholders about the Species' danger of extinction and the necessity for its conservation is the best way to its conservation. This will go a long way toward ensuring the species' survival. Preventing the extinction of a species today is not only better, but also less expensive than trying to find a means to bring it back. Extinction cannot be readily reserved or returned once it has occurred. Fish biologists, limnologists, aquatic ecologists, and conservationists all play important roles in raising public knowledge and support for the species' protection methods.

Fishermen will be regulated, and overfishing will be avoided, allowing the species to be protected in the reservoir. Fish species are usually captured in the dry season and located in the sparsely planted food plain parts of reservoirs; it would be better if the vegetation of these areas were expanded and protected from fishing operations (Crivelli, 2002). Stocking juveniles of the species and cultivating the species in the reservoir could help to conserve the species. This will help to ensure the species' abundance, protect its genetic variability, increase yield, rehabilitate the destroyed stock, and maintain a balanced population. India's reservoir fisheries are particularly important from a social and economic standpoint, since they have the potential to employ approximately 2 million people. Polluting inputs, such as industrial effluents, pesticides, and fertilisers from aquaculture, agriculture, and home sewage, increased as the reservoir's population and land usage intensified (Venot *et al*., 2008). During the dry season, intensive fishing of the species should be discouraged, if not outright outlawed (Mustapha & Ewulum, 2015). The threat to the fish fauna is posed by large-scale industrialization and the resulting wastewater discharge. Introduced species have been identified as potential dangers to the native fish fauna for a variety of reasons. Many major native food fishes appear to have suffered substantial habitat destruction as a result of these practises. The fish fauna of this reservoir is also over-exploited for consumption, and because the fish fauna of this lake supports the livelihoods of several economic classes, conservation action plans are urgently needed. Most essential fishes can be found in abundance in reservoirs due to strong primary production in the form of primary producers (Phytoplanktons and Zooplanktons).

To develop a comprehensive action plan, fish conservation measures must take into account a wide range of factors. A comprehensive approach that incorporates the concept of sustainable development as well as conservation measures could help to improve the situation. The conservation of fish biodiversity should be a top priority. The following strategies should be implemented in order to preserve the valuable biodiversity of Siddheshwar reservoir's fish fauna: restocking of economically important fish species, restocking of economically important fish species, restocking of economically important fish species, restocking of economically important fish species, restocking of economically important fish species, re Proper exotic species introduction and control, implementation of restricted seasons, regular reservoir supervision and monitoring, enforcement of rigorous overfishing rules and regulations, alternative livelihood for local people, sustainable fish harvest, captive breeding Public awareness, Fishermen cooperative societies' education and activation, as well as research and development.

## CONCLUSION

One of the most pressing environmental issues is the preservation of icthyofaunal variety. The current work

offers reservoir authorities and fisheries departments with the most up-to-date database to aid in conservation efforts. Only legal and scientific fishing methods should be used. Fishing tactics that aren't scientifically sound should be disallowed. The Siddheshwar reservoir's fish fauna is being harmed by excessive aquatic plant development. Aquatic weeds, silt, predatory birds, and fishes should all be controlled and eradicated. Fishermen should be prohibited from fishing endangered species. During the breeding season, fishing should be prohibited. During the summer, the water level drops dramatically. Anthropogenic stress has a deleterious impact on fish production as well as the overall ecology of reservoirs. Reservoir authorities should maintain water levels, especially during the summer, and take the necessary steps to reduce human activities in and around the reservoir. They should also check physico-chemical and biological parameters on a regular basis to prevent reservoir ecology from being depleted.

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