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On the record of Ichthyofaunal diversity from Narayan Sarovar Wildlife Sanctuary, Kachchh, Gujarat

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Abstract

The ichthyofaunal diversity of Narayan Sarovar Wildlife Sanctuary was studied during the present investigation. The study reported four new ichthyofauna records from the sanctuary. Cyprinodontiformes was represented with 2 species under 2 genera and 2 families followed by Cichliformes and Siluriformes represented by 1 species each among the fishes explored.

Keywords: *Aphanius dispar,* Kachchh district, Fishes, Invasion, Wetlands

Introduction

Gujarat, India's western most state, located closer to Thar Desert, has varied terrain having most of the land dry and arid in nature. Gujarat state can be divided into the following three distinct geomorphological regions: Gujarat Mainland, Saurashtra Peninsula and Kachchh Peninsula. The Kachchh peninsula falls under the category of Desert Ecosystem which can further be divided into three regions, *viz.*, Kachchh, Great Rann of Kachchh and Little Rann.

The Narayan Sarovar Wildlife Sanctuary (444.23 km^2), lies between latitudes 23°27' N to 23°42' N and longitudes 68°30' E to 68°57' E is in the western most part of India in the Kachchh district of Gujarat and supports most remarkable floral and faunal diversity. It has an ecological matrix of mixed forest system comprising of dry savannah, desert thorn, tropical euphorbia, scrub etc. The biodiversity consists of a few rare animals and birds and rare flowering plants. The sanctuary is bordered by the Kori creek on the northwest and mangrove forest on the west, while conspicuous land features with undulating topography of minor hill ranges; form its northern and southern borders. In the hill section, it is 157 meters (515 ft) (AMSL) at Manijal hill in Kaniyaro Rakhal. The sanctuary has arid climate and rainfall is very light and unpredictable. Surface water is being stored at 15 reservoirs that surround the sanctuary; water is mainly saline in the sanctuary area. The water bodies present in the sanctuary are small and ephemeral in nature.

Notified as a Sanctuary in 1981, Narayan Sarovar is a home to a wide array of wildlife including many species of mammals, reptiles and birds. The Sanctuary is especially known as Chinkara Wildlife Sanctuary. The sanctuary represents a distinct gene pool and harbors several rare and endangered faunal elements. According to GEER & GUIDE (Annon., 2001), the faunal diversity of the Narayan Sarovar Wildlife Sanctuary consist of 27 species of mammals, 183 species of birds, 15 species of reptiles, 3 species of amphibians, 29 species of spiders and 34 species of butterflies. Vegetation cover in the Sanctuary as per satellite data (1997) indicates that 2.8 % dense forest, 25% sparse tree cover, 62.2% herbaceous cover, 3.8% cultivation, 0.5% water bodies and 5.2% other categories (Singh, 1998).

Fish diversity is a primary constituent of any aquatic ecosystem. Fish diversity is a bioindicator of the health of a water body and predicts its ability to endure life in it. Management of biodiversity is especially vital in emerging countries where people's living is directly dependent

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on natural resources such as forests and fisheries. The freshwater fish fauna of Gujarat is represented by 119 species (Sen & Banerjee, 2000). Dholakia (2004) has reported 96 freshwater fish from the state of Gujarat. Goswami & Mankodi (2010) and Gohil & Mankodi (2013) stated that 15 and 26 species of fishes were found in Nyari-II reservoir and Mahi River respectively. Barman et al. (2000) has described 486 marine and estuarine fish species from Gujarat. Patel & Chhaya (1979) gave a field key to the fishes of Gujarat.

Singh *et al.* (1999), Banyal & Kumar (2013, 2014a, b), and Kumar & Banyal (2018) have done noticeable work on fish faunal diversity including vertebrate faunal diversity in seasonal wetlands of Kachchh Biosphere Reserve (KBR), but fish diversity is not known from the Narayan Sarovar Wildlife Sanctuary in Gujarat state until present work was carried out during 2018-2019. This paper reviews progress in research on the distribution of ichthyofauna.

Material and Methods

The present investigation on ichthyofauna was carried out on the Narayan Sarovar Wildlife Sanctuary during September, 2018 and February, 2019 (Figures 1 & 2). Fish samples were collected with the help of local fishermen in the sampling sites by using different types of cast nets, hand, scoop and drag net. The collected fishes were brought to the laboratory, fixed and preserved in 5-10% Formalin solution for identification to genus and species level using taxonomic keys and standard literature such as Talwar & Jhingran (1991), Jayaram (1999), and Froese & Pauly (2019).

Results and Discussion

The study area is characterized by open scrub vegetation with high percentage of scrub savanna along with Rann saline scrub, desert dune and sparsely vegetated grasslands. Mainly thorny bushes and few trees

Source: Google Earth
Figure 1. Satellite image depicting area of study.

A wetland near Gugariyana Rakhal

Godhatad reservoir

Figure 2. A view of area of study.

are resent in the area of study. Most parts of the Sanctuary are of dry conditions. Black drongo, Grey francolin, Eurasian collared dove, laughing dove, Indian robin, red-vented bulbul, common babbler, house sparrow etc. are the main bird species abundantly seen in the sanctuary. Some of the important animals supported by the sanctuary include chameleon, spiny tailed lizard, monitor lizard, chinkara, caracal, desert cat, pangolin, porcupine, blue bull, Indian boar, jackal, mongoose, hare and striped hyena.

Though much work has been carried out on faunal diversity especially on fish faunal diversity in the Rann of Kachchh (Singh *et al.,* 1999; Banyal & Kumar, 2013, 2014a, b; Kumar & Banyal, 2018), this protected area still needs detailed investigations to explore the fish faunal component of this unique and mosaic of many ecosystems to fill the existing gap. In this context survey of fish faunal iversity of the sanctuary was conducted during September, 2018 and February, 2019. During the survey, low fish diversity was observed due to the presence of few conducive ephemeral water bodies in the sanctuary.

Godhatad dam is one of the most favourable water bodies surveyed in the sanctuary. It is built across Mitiyativali River which originates near Mitiyati village and meets in Arabian Sea near Kori creek. Its length is 20 km and the catchment area is 165.75 km^2. Water of Godhatad reservoir is used for drinking and irrigation purpose in the nearby four villages of Lakhpat Taluka. The reservoir was filled with substantial water during the study period. Besides, few waterholes/small wetlands were found at few places in the sanctuary. A wetland was too having substantial water at Gugariyana Rakhal. These waterholes support populations of organisms especially fish which are not able to live elsewhere in the arid landscape during adverse conditions (Nekola, 1999).

The major factors which regulate the fishery in the region are rainfall, salinity, temperature and proximity to mangrove vegetation. The periodical survey of the ichthyofauna revealed the occurrence of following four fish species.

Systematic Account

Order SILURIFORMES

Family BAGRIDAE

Genus *Mystus* Scopoli, 1777

1. *Mystus gulio* (Hamilton, 1822)

Long-whiskered Catfish

1822. *Pimelodus gulio* Hamilton, *Fishes of Ganges*: 201, 379, pl. 23, Fig. 66.

2018. *Mystus gulio*: Sulaiman et al., Zootaxa, **4379**(1): 44

Material examined: V/3821, 05 ex., Ghodatad dam, Narayan Sarovar WLS, coll. S. Kumar & H. S. Banyal; 07.ix. 2018.

Distinguishing characters: D I 7; A iii-iv 9-11; P I 8-9; V i 5. Body prolonged and somewhat compressed, barbels four pairs; maxillary barbels range posteriorly to end of pelvic fins. Dorsal spine hard, saw-toothed on its inner

edge, adipose fin small, implanted significantly behind rayed dorsal fin.

Distribution: Dwells in estuaries and tidal rivers and lakes, ascending to freshwater, often enters the sea. Extensively distributed in India.

Remarks: It offers food to many migratory birds in this area.

Order CYPRINODONTIFORMES

Family CYPRINODONTIDAE

Genus *Aphanius* Nardo, 1827

2. *Aphanius dispar* (Rüppell, 1829)
Dispar Top minnow

1829. *Lebias dispar* Rüppell, *Zoologie Fische des Rothen Meeres*: 66, pl. 18, Fig. 1-2.

2017. *Aphanius dispar*: Freyhof *et al., Zootaxa,* **4338**(3): 565

Material examined: V/3822, 03 ex., Ghodatad dam, Narayan Sarovar WLS, coll. S. Kumar & H. S. Banyal; 07.ix.2018; V/3824, 03 ex., Gugariyana Rakhal, Narayan Sarovar WLS, coll. S. Kumar & H. S. Banyal; 04.ix.2018.

Distinguishing characters: D I 9; A ii 8; P 16; V 7. Body discreetly elongate and rather flattened. Mouth small; scales large, 25 to 27 in longitudinal series. Caudal fin yellowish, with a widespread crescentic black band.

Distribution: Inhabits fresh and brackish waters. Distributed in Kachchh and some parts of south west Rajasthan.

Remarks: This gorgeously colored species was equitably common in brackish water of the sanctuary. It is consumed as food by many migratory birds observed in the sanctuary.

Family: POECILIIDAE

3. *Gambusia affinis* (Baird & Girard, 1853)
Mosquito fish

1853. *Heterandria affinis* Baird & Girard, *Proc. Acad. nat. Sci. Philad.*, **6** : 390.

2016. *Gambusia affinis:* Miesen *et al., Bonn zool. Bull.,* **64**(2): 87

Material examined: V/3823, 02 ex., Ghodatad dam, Narayan Sarovar WLS, coll. S. Kumar & H. S. Banyal; 07.ix.2018.

Distinguishing characters: D I 7-9; A 8-10; P 13-14; V 6. Dorsal fin placed in central part of body in male, but in female equidistant amongst front edge of eye and tip of caudal fin. Scales large, 30 to 32 in lateral series. Strewn black spots generally present on body including a dark transverse bar across eye.

Distribution: South-eastern United States of America; introduced into Indian waters in 1928 from Italy for antimalarial work.

Remarks: Currently this species is extensively distributed in India.

Order CICHLIFORMES

Family CICHLIDAE

Genus *Oreochromis* Günther, 1889

4. *Oreochromis mossambicus* (Peters, 1852)
Tilapia

1851. *Chromis (Tilapia) mossambicus* Peters, *Ontab. Akad. Wiss., Berlin:* 681.

2018. *Oreochromis mossambicus:* Fricke *et al., Fish Taxa*, **3**(1): 251.

Material examined: V/3820, 05 ex., Ghodatad dam, Narayan Sarovar WLS, coll. S. Kumar & H. S. Banyal; 07.ix.2018.

Distinguishing characters: D XV-XVI 10-12; A III 10-11; P 14-15; V I 5. Snout extended; temple with reasonably big scales, beginning with 2 scales amongst the eyes straggled by 9 scales up to the dorsal fin. Grown up males develop a blunted duckbill-like snout due to expanded jaws, regularly activating the upper profile tobecome bowl-shaped.

Distribution: Exotic fish introduced in India for aquaculture including biological control of nuisance plants and animals.

Remarks: Flourishes in reservoirs, rivers, creeks, drains and tidal creeks etc.; usually over mud bases, commonly in well-vegetated areas. Carnivorous in nature and prey on small fishes and sometimes cannibalize their own young.

During present investigation ichthyofaunal study was carried out and reported the occurrence of only 4 species of fishes belonging to 3 orders, 4 families from the wetlands of Narayan Sarovar Wildlife Sanctuary of Gujarat state. The order Cyprinodontiformes represented by 2 species under 2 genera and 2 families followed by Cichliformes and Siluriformes with 1 species each. This

is the first attempt to document fish diversity of Narayan Sarovar Wildlife Sanctuary in Gujarat state.

Dispar Top minnow [*Aphanius dispar* (Ruppell, 1829)], Mosquito fish [*Gambusia affinis* (Baird & Girard, 1853)], Tilapia [*Oreochromis mossambicus* (Peters, 1852)] and Long-whiskered Catfish [*Mystus gulio* (Hamilton, 1822)] were the only species recorded from the study area. These fishes can tolerate salinity and were probably introduced in the wetlands of the sanctuary from the creeks of Mitiyativali, Kapurasi and Kali riverine systems, which are ephemeral in nature ultimately drain into Arabian Sea near Kori creek. These Fishes are integral constituents of these wetlands, as they provide food to many winter migratory birds detected.

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Gambusia affinis (Baird & Girard, 1853)