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Fish Diversity of Sai River flowing through Raebareli District of Uttar Pradesh (India)

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Abstract

A systematic survey of Sai River was conducted throughout the year 2019 from three collection sites of Raebareli districts of U.P. Its main aim was to find out fish diversity and their conservation status. The results of the present study revealed the occurrence of 22 species belonging to 17 genera, 12 families and 6 orders. The family Cyprinidae were dominated by 8 species followed by Bagridae, Siluridae and Ophiocephalidae (2 species of each family). The fishes in these areas are under threat due to anthropogenic activities such as overfishing and pollution hence authors strongly recommend practical conservation action plan to prevent the species from extinction.

Keywords: Conservation Status, Diversity, Family, Fishes, Sai River.

Introduction

Fishes are exclusively aquatic and cold blooded animals with streamlined body and lateral line sense organs (Verma and Prakash, 2020). Fish constitutes almost half of the total number of vertebrates in the world and live in almost all conceivable aquatic habitats. Out of 30,900 species of vertebrates, about 22,000 living fish species have been recorded (Jayaram, 2010) [8]. Out of these 22,000 fish species recorded, 2500 (11%) species are found in India (Nagma and Khan, 2013) [15]. India is endowed with vast freshwater consisting 45,000 km of rivers, 26,334 km of canals, 2.36 million hectares of ponds and tanks, 2.05 million hectares of reservoirs and 5,82,86,000 hectares of wetlands (Bhakta and Bandyopadhyay, 2008; Kumar *et al.*, 2015) [2, 12]. The river water is useful both for sustainable and unsustainable agriculture. The unsustainable agriculture has multiple effects (Verma, 2017a) [33, 46] and disturbs the ecological balance (Verma, 2018a) [38]. These water bodies have rich and diversified fish fauna characterized by many rare and endemic fish species. The fresh water of India is utilized for irrigation or urban-industrial water supply or hydro power generation or discharging of sewage and industrial waste or the capture of edible fishes.

In India, there are 2500 fish species, of which, 930 live in freshwater and 1570 are marine (Kar, 2003) [9]. The ichthyofauna of the northeastern region of India has elements of the Indo-Gangetic region; and to some extent of the Myanmar and south-Chinese regions (Yadava and Chandra, 1994) [50]. This bewildering ichthyo-diversity of this region has been attracting many ichthyologists both from India and abroad. Concomitantly, the northeastern region of India was identified as a biodiversity hotspot by the World Conservation Monitoring Centre (WCMC, 1998) [49]. Due to irrational fishing practices, environmental aberrations like reduction in water volume, increased sedimentation, water abstraction and pollution over the years this diversity is decline and even few species have been lost from the freshwater ecosystem of India and some are belonging under endemic, endangered and threatened category (Bhakta and Bandyopadhyay, 2008) [2].

River ecosystems (rivers capes) encompass ecological, social and economic processes (ecosystem functions) that interconnect organisms (ecosystem structure) including humans and helpful in maintaining the biodiversity. The genetic diversity acts as a buffer for biodiversity which helps in maintaining the ecological balance. The biodiversity has different levels and values. There is a necessity of ecological balance for widespread biodiversity and the biodiversity loss has ecological impact (Verma 2016a, 2017b, 2017c; Kumar and Verma, 2017) [30, 34, 47, 35, 11]. The ecological balance is an indispensable need for human survival (Verma 2018b) [39].

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The climate change has a huge impact on biodiversity (Prakash and Srivastava, 2019) [24] and farmers' practices (Mandal and Singh, 2020) [13].

A review of literature revealed that many researchers have studied the taxonomy, biodiversity and distribution of freshwater fishes from various rivers of India. Some notable examples include David (1963) [4] from Godavari and Krishna river, Menon (1992) [14] from Himalayan rivers, Jayaram (2010) [8] from Cauvery river, Jadhav *et al.* (2011) [7] from Koyana river, Kharat *et al.* (2012) [10] from Krishna river, Venugopalan (2012) [29] from Mahe river, Sheikh (2014) [26] from Pranhita river, Prakash *et al.* (2020) [25] from Rapti river and so on.

Moreover, other prominent researchers associated with limnological and ichthyological studies of fresh water bodies include Prakash *et al.* (2015a, 2015b) [19, 20], Prakash and Verma (2015, 2016) [18, 21], Verma and Prakash (2016) [21], Verma and Prakash (2017a, 2017b) [33, 46, 34, 47], Prakash and Verma (2017, 2019) [22, 32] and Prakash (2020a, 2020b) [16, 17]. Verma (2016b, 2016c, 2017d, 2017e, 2018c, 2018d, 2019a, 2019b, 2019c) [31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44] Sugumaran *et al.* (2020) [28] and Bhagde *et al.* (2020) [1] studied the limnological parameters, planktons as well as biodiversity and conservation status of different vertebrates including fishes in the various lentic fresh water bodies. However, no systematic attempt has been taken so as far to explore the fish diversity of Sai River. The present survey was conducted once in a month for a period of one year during 2019 from three collection sites of Raebareli district to find out fish diversity and their conservation status.

Materials and methods

The study area, Raebareli (80° 41' to 81°34' N, altitude and 25°43' 48 to 26°20'18 E longitude) district is situated in south region of U.P. Sai river is the main river traversing in this area and plays a vital role in the topography.

The river Sai originates at the sprawling pond on the hilltop at Parsoi, a village in the Hardoi district. It separates the region of Lucknow from Unnao. The river flows south by Raebareli, comes into the region of Pratapgarh and Jaunpur through the west, then turns east and touches the Ghuisarnath Dham. From there it touches another Chandika Dham. Most of the districts of Uttar Pradesh are situated on the banks of the Sai River. Shani Dev Dham is located on banks of the Sai River at Parsadepur.

The fishes were collected from three fishing sites and fish specimens were preserved 10% formaldehyde solution at the sampling site. Identification of fish specimens was done up to species level while identifying its natural colour, pattern of scales, fins, mouth pattern, identification marks like black or red spots, bloch on operculum, paired and unpaired fins and body parts with the help of standard literature by Datta Munshi and Srivastava (1988) [3], Day (1989) [5], Menon (1992) [14], Srivastava (1998) [27] and Jayaram (2010) [8]. The fresh fishes were mainly used for colour and identifying marks while preserved specimen for studying morphometric and meristic characteristics.

Results and discussion

The fish diversity of collected and identified fish species from different sites of Sai River along with conservation status are shown in table 1.

Table 1: Ichthyofauna of Sai River flows through Raebareli district of U.P.

| S.N. | Fish Species | Common Name/Local Name | Availability In River | Conservation status |
|--|--|------------------------|-----------------------|---------------------|
| Order- Cypriniformes; Family- Cyprinidae (Minnows and Carps) | | | | |
| 1. | <i>Labeo rohita</i> (Hamilton) | Rohita | Rare | LC |
| 2. | <i>Labeo calbasu</i> (Hamilton) | Karaunchh | Rare | LC |
| 3. | <i>Labeo bata</i> (Hamilton) | Bata | Common | LC |
| 4. | <i>Cirrhinus mrigala</i> (Hamilton) | Naini | Rare | LC |
| 5. | <i>Cirrhinus reba</i> (Hamilton) | Reba | Common | LC |
| 6. | <i>Cyprinus carpio</i> (Linnaeus) | Common carp | Rare | VU |
| 7. | <i>Puntius ticto</i> (Hamilton) | Two spot barb | Moderate | LC |
| 8. | <i>Danio devario</i> (Hamilton) | Pataki | Very Rare | LC |
| Order- Siluriformes; Family- Bagridae | | | | |
| 9. | <i>Mystus vittatus</i> (Bloch) | Tengara | Common | LC |
| 10. | <i>Mystus tengara</i> (Hamilton) | Tengara | Common | LC |
| Order- Siluriformes; Family- Siluridae | | | | |
| 11. | <i>Wallago attu</i> (Schneider) | Pardni | Common | LC |
| 12. | <i>Ompak pabda</i> (Hamilton) | Pabdah catfish | Common | NT |
| Order- Siluriformes; Family- Schilbeidae | | | | |
| 13. | <i>Ailia coila</i> (Hamilton) | Gangetic ailia | Rare | NT |
| Order- Siluriformes; Family- Clariidae | | | | |
| 14. | <i>Clarias batrachus</i> (Linnaeus) | Mangur | Moderate | LC |
| Order- Siluriformes; Family- Saccobranchidae | | | | |
| 15. | <i>Heteropneustes fossilis</i> (Bloch) | Singhi | Moderate | LC |
| Order- Ophiocephaliformes; Family- Ophiocephalidae (Snake headed fish) | | | | |
| 16. | <i>Channa punctatus</i> (Bloch) | Saura | Common | NE |
| 17. | <i>Channa striatus</i> (Bloch) | Saura | Common | LC |
| Order-Perciformes; Family- Anabantidae (Climbing Perch) | | | | |
| 18. | <i>Anabas testudeni</i> (Bloch) | Kawai | Moderate | LC |
| Order-Perciformes; Family- Nandidae (Leaffish) | | | | |
| 19. | <i>Nandus nandus</i> (Hamilton) | Gangetic leaffish | Rare | LC |
| Order-Perciformes; Family- Osphronemidae (Gourami fish) | | | | |
| 20. | <i>Colisa fasciatus</i> (Bloch) | Rainbow gourami | Moderate | NE |
| Order-Perciformes; Family- Ambassidae (Glassfishes) | | | | |
| 21. | <i>Chanda nama</i> (Hamilton) | Chanda | Moderate | NE |
| Order -Clupeiformes; Family-Clupeidae (Herrings) | | | | |
| 22. | <i>Gudusia chapra</i> (Hamilton) | Suhia / Suiya | Rare | LC |

In the present study total 22 fish species were collected from three collection sites belonging to 17 genera, 12 families and 6 orders. The Sai river ecosystem supports diverse stock of carps, catfishes, perches, feather backs, eels, puffers and so on. Status of fish species of the Sai River is given in table 1. Out of 22 species, very rare (1), rare (7) moderate (6) and common (8) were observed (IUCN Red List, 2020). Among these, *Cirrhinus reba*, *Labeo bata*, *Puntius sarana*, *Mystus* spp., and *Channa* spp. were frequently observed. During survey, a total of 22 species of fishes belonging to 17 genera, 12 families and 6 orders were identified. As per latest version of IUCN Red List, out of 22 species of fishes identified, 1 species under UV (vulnerable), 2 under NT (near threatened), 16 under LC (least concern) and 3 species are NE (not evaluated) so far. Considerable attention should be paid to conserve fish species comes under NT categories.

Fish species composition when grouped into families reveal that Cyprinidae captures the major share (28.26%) followed by Bagridae, Siluridae and Ophiocephalidae (2 species of each family). *Labeo rohita* and *Cyprinus carpio*, are rare and have been recorded during rainy season. *Puntius tictio* has been recorded during spring season. There may be a possibility that these fishes might have entered in river from fish pond of these areas during rainfall.

The fishes in these areas are under threat due to anthropogenic activities such as overfishing and pollution hence authors strongly recommend practical conservation action plan to prevent the species from extinction. The authors also recommend for regular cleaning of the river and protection of the fish seeds such as eggs, spawn, fry and fingerlings as well as small sized fishes.

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