


Finfish Diversity of River Narmada and Its Tributaries

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Abstract The diversity of finfish in river Narmada and its tributaries in central and western India has been reviewed. We could compile a total of 196 species from both freshwater and brackish water habitats, under 14 orders, 51 families, and 126 genera. The order Cypriniformes represented the highest diversity with 78 species (i.e., 39.8%) followed by Perciformes (47 species), Siluriformes (32 species), Clupeiformes (15 species), etc. As per the IUCN Red List category, the maximum number of species are under Least Concern (129), followed by Not Evaluated (36), Near Threatened (14), Data Deficient (11),

Vulnerable (4), and Endangered (2). The species *Tor khudree* and *Tor putitora* were found Endangered in the system. Out of 196 finfish species, 77 are food fishes, 33 having both ornamental and food fish value, 21 are truly ornamental value, and 31 as sports fishes. Habitat wise distribution of the fishes indicates that 79 species are truly freshwater and 3 species are truly marine, while 58 species range between freshwater and brackish water habitats, 21 between brackish water and marine habitats and 35 species range from freshwater to marine habitats. This review presents up-to-date information on finfish biodiversity of river Narmada. It will help in making appropriate conservation and management planning of fisheries in this river.

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Introduction

River Narmada is considered as the “Lifeline” for the millions of people of Central India. It is one of the largest (1312 km) west-flowing rivers of the country that originates from Maikala highlands near Amarkantak under Shahdol district of Madhya Pradesh and culminates into the Arabian Sea in the Bharuch district of Gujarat. This is one of the river in peninsular India that run from east to west along with river Tapi and Mahi and flows to the states of Madhya Pradesh (1077 km), Maharashtra (74 km), and Gujarat (161 km). It is also known as the lifeline of Madhya Pradesh for its huge contribution to the state. A series of dams have been constructed in the river Narmada basin under a comprehensive river valley project programme, contributing to reservoir fishery resources and an

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increase in the inland fish production of India (Bhaumik et al. 2017; Bhakta et al. 2018a).

There are several reports on the finfish diversity pattern from different stretches of river Narmada. Vyas et al. (2006) reported 47 fish species of river Narmada from Hoshangabad region. Vyas et al. (2009) studied the fish biodiversity of Narmada in the submergence area of Indira Sagar reservoir and encountered 52 species belonging to 28 genera, 13 families, and 7 orders. Vishwakarma et al. (2014) studied the assessment of fish assemblage and distribution in the Barna stream network in the Narmada basin (Central India) and recorded 33 species belonging to 5 orders, 9 families, and 21 genera. Bhakta et al. (2018b) reported finfish diversity patterns from the estuarine zone of river Narmada, Gujarat. Knowledge of the fish species composition and their respective distribution patterns is a prerequisite for the conservation and management of native fish fauna (Mogalekar et al. 2017). Besides conservation of fish diversity is an important aspect under the present scenario of habitat destruction (Vishwakarma et al. 2014). In this review, we attempted to compile the reports of the availability of finfish species from river Narmada systems with reference to their habitat, size, and human use pattern and conservation status.

Materials and Methods

Several works being carried out on fish diversity pattern in river Narmada and its tributaries by various researchers. This review is based on the documents collected from websites; published papers in journals, textbooks, bulletins, reports, and grey literature (government reports, policy statements, etc.). The species checklists reported in Tables 1 and 2 include reports from 1941 to 2018. While reporting the fish species in this review we checked the taxonomic status of the species based on Talwar and Jhingran (1991), Nelson (2006), and FishBase (Froese and Pauly 2019). Latest name of the species was prepared based on the Catalogue of Fishes of the California Academy of Sciences (Eschmeyer et al. 2019). In addition habit, maximum size recorded, utilization pattern was provided based on FishBase, while the conservation status of each species was provided as per criteria of IUCN Red List Categories (IUCN 2019).

Result and Discussion

The updated checklist of finfish species reported from different stretches of river Narmada along with their respective habitats, maximum size recorded as per FishBase, fishery information, IUCN Red List Status, and

collection sites with respective references have been provided in Table 2. We could compile a total of 196 species from both freshwater and brackish water habitats, under 14 orders, 51 families, and 126 genera (Table 3).

The order Cypriniformes is known to dominate the Indian river systems. In agreement with this, we found a total of 78 species of cyprinids out of 196 reported species (i.e., 39.8%) from river Narmada and its tributaries. As per the IUCN Red List category, the maximum number of species is under Least Concern (129), followed by Not Evaluated (36), Near Threatened (14), Data Deficient (11), Vulnerable (4) and Endangered (2). The two endangered species of this river system include *Tor khudree* and *Tor putitora* and the four vulnerable species of this river system include *Cirrhinus cirrhosus*, *Cyprinus carpio*, *Gagata ichkeea*, and *Tenualosa toli*. Special conservation measures are required to protect these six species from extinction. Out of 196 finfish species, 77 are food fishes, 33 having both ornamental and food fish value, 21 are truly ornamental value and 31 are sports fishes. A total of 79 species are reported to have freshwater habits from the Narmada river system. The freshwater fish fauna of India is diversified comprising between 1027 (Gopi et al. 2017) and 1030 species (Froese and Pauly 2020). Over the past few decades, several workers have investigated the fish diversity of river Narmada.

According to the available reports, the first study was conducted by Hora and Nair in 1941 and they reported a total of 40 species. A follow-up study by Karamchandani et al. (1967) reported 77 fish species belonging to 41 genera, 19 families, and 7 orders from Hoshangabad and Shahgang fish assembly centers. Department of Fisheries, Madhya Pradesh recorded 46 species belonging to 14 families during 1967-71 (Anon 1971). Rao et al. (1991) have documented 84 fish species belonging to 45 genera, 20 families, and 6 orders from the western zone of the river at Punasa, Omkareswar, Mandleswar, and Barwani. Tuli and Pande (1992) reported 24 species in the Indira Sagar area before the impoundment of the dam. Sharma et al. (2014) could find 50 fish species belonging to 32 genera, 14 families, and 6 orders from the Hoshangabad region of river Narmada. Recently Bhakta et al. (2018b) documented a total of 85 finfish species from the 72 km estuarine zone of Narmada river from Bharuch to Ambetha.

The finfish documentation for Narmada river systems indicated that the river is very rich in fish biodiversity. The systems also support many vulnerable and endangered species, so proper management strategies need to be formulated to save the fish populations of the systems. We believe that the present document will be immensely helpful for the stakeholders and the policymakers to design and execute future developmental strategies for the conservation of the system.

Table 1 Finfish species reported from river Narmada with the collection sites

Reference no.	Source	Collection sites	No. of species
1.	Hora and Nair (1941)	Satpura Range, Hoshangabad District, Central Province, Rec.; Madhya Pradesh	40
2.	Karamchandani et al. (1967)	Hoshangabad and Shahganj; Madhya Pradesh (M.P)	77
3.	Anon (1971)	Hoshangabad, Jabalpur, Maheshwar, Khalghat and Omkareshwar; M.P	46
4.	Doria (1990)	Narmada river, Madhya Pradesh	76
5.	Rao et al. (1991)	Punasa, Omkareshwar, Mandleswar, Maheshwar and Barwani; M.P	84
6.	Tuli and Pande (1992)	Indira Sagar area; M.P	24
7.	Singh (2009)	Amarkantak, Mandla, Jabalpur, Narsinghpur, Kareli, Gadarwada, Sandia, Shahganj, Hoshangabad, Dongarwada, Gondagaon, Handia, Mola, Maheshwar, Khalghat, Hanfeshwar, Charbara, Gadher and Surpan, Vedgam, Poicha, Sisodara, Velugam, Jhanor, Ankaleshwar, Shakkarpura, Bhadbhut and Ambetha (M.P and Gujarat)	79
8.	Vyas et al. (2009)	Chhidgoan, Mandla, Nemavar, Purni; Madhya Pradesh	52
9.	Bakawale and Kanhere (2013)	Satmatra, Eklera, Kasrawad, Bagud, Piplud, Bhilkheda, Pendra, Nangaon, Pichhodi, Kathoda, Sondul, Jangarwa, Chikhaldia and Koteswar; M.P	51
10.	Bose et al. (2013)	Below Nandiya Ghat to Tawa reservoir: Hosangabad district, M.P	57
11.	Das et al. (2013)	Amarkantak to Ambetha (M.P, Maharastra, Gujarat)	90
12.	Vyas and Vishwakarma (2013)	Jamner river, a tributary of the river Narmada; M.P	27
13.	Khedkar et al. (2014)	Dindori, Rusa, Bargi, Sultanpur, Tawa, Hoshangabad, Kolar, Harda, Indirasagar, Choral, Mortakka, Maheshwar, Pati, Sardar Sarovar, Rajpipla, Bharuch; M.P and Gujarat	83
14.	Pathak et al. (2014)	Barwani, Dhar, Khargone and Khandwa; M.P	58
15.	Sharma et al. (2014)	Sethani ghat and Dongarwada; M.P	50
16.	Vishwakarma et al. (2014)	Barna, Satdhar, Jamner, Palakmati, Charmarsil, Narheri; M.P	33
17.	Saini and Dube (2017)	Lamhetaghat and Bhedaghat, Jabalpur Region; M.P	29
18.	Shah et al. (2018)	Shahganj, Bandrabhan (Sangam), Budhni Ghat, Moukala, Holipur; M.P	37
19.	CIFRI (2018)	Kevadia, Poicha, Sisodara, Jhanor, Bharuch, Bhadbhut, Ambetha; Gujarat	63
20.	Bhakta et al. (2018b)	Bharuch, Bhadbhut, Mehgam, Ambetha; Gujarat	85
21.	Kakodiya and Mehra (2018)	Sakatpur, Bandrabhan, Sethanighat, Dongarwada and Aamlighat: Hoshangabad Dist; M.P	50
22.	Thakkar et al. (2018)	Bhabbhut; Gujarat	1

Table 2 Fish diversity of river Narmada with a note on habitat, locality, maximum size, fishery status, and conservation status

Order, Family, Scientific name	Common name/ local name	Habitat	Maximum size (TL)	Fishery information	IUCN Status	References no. as listed in Table 1
Order: Anguilliformes						
Family: Anguillidae						
<i>Anguilla bengalensis</i> (Gray, 1831)	Indian mottled eel	M, F, B	200 cm TL	F + G	NT	2, 3, 19
Order: Aulopiformes						
Family: Harpadontidae						
<i>Harpadon nehereus</i> (Hamilton, 1822)	Bombay-duck	M, B	40.0 cm TL	F	NE	7, 11, 13, 19, 20
Order: Beloniformes						
Family: Belonidae						
<i>Strongylura strongylura</i> (van Hasselt, 1823)	Spottail needlefish	F, B	40.0 cm SL	F	NE	11, 13, 20
<i>Xenentodon cancila</i> (Hamilton, 1822)	Freshwater garfish	M, F, B	40.0 cm	F + O	LC	1, 2, 4, 5, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19, 21,
Family: Hemiramphidae						
<i>Hyporhamphus limbatus</i> (Valenciennes, 1847)	Congaturi halfbeak	M, F, B	35.0 cm	F	LC	20
<i>Hyporhamphus dussumieri</i> (Valenciennes, 1847)	Dussumier's halfbeak	M	38.0 cm SL	F	NE	13
<i>Hyporhamphus quoyi</i> (Valenciennes, 1847)	Quoy's garfish	M, F, B	31.2 cm SL	F	NE	13
Order: Clupeiformes						
Family: Clupeidae						
<i>Anodontostoma chacunda</i> (Hamilton, 1822)	Chacunda gizzard shad	M, F, B	22.0 cm SL	F	LC	11
<i>Corica soborna</i> Hamilton, 1822	Ganges river sprat	M, F, B	5.3 cm TL	F	LC	11
<i>Escualosa thoracata</i> (Valenciennes, 1847)	White sardine	M, F, B	10.0 cm	F	LC	11, 20
<i>Gonialosa manmina</i> (Hamilton, 1822)	Ganges river gizzard shad	F, B	14.1 cm TL	F	LC	2, 4, 5, 8
<i>Gudusia chapra</i> (Hamilton, 1822)	Indian river shad	F, B	20.0 cm TL	F	LC	9
<i>Hilsa kelee</i> (Cuvier, 1829)	Kelee shad	M, F, B	35.0 cm	F + B	LC	20
<i>Tenualosa ilisha</i> (Hamilton, 1822)	Hilsa shad	M, F, B	60.0 cm	F	LC	2, 4, 5, 11, 19, 20
<i>Tenualosa toli</i> (Valenciennes, 1847)	Toli shad	M, F, B	60.0 cm	F	VU	13, 20
Family: Engraulidae						
<i>Coilia dussumieri</i> Valenciennes, 1848	Gold spotted grenadier anchovy	M, F, B	20.0 cm SL	F	LC	11
<i>Setipinna breviceps</i> (Cantor, 1849)	Short head hair fin anchovy	M, B	24.0 cm	F	NE	20
<i>Setipinna phasa</i> (Hamilton, 1822)	Gangetic hair fin anchovy	F, B	40.0 cm	F	LC	19, 20,
<i>Setipinna taty</i> (Valenciennes, 1848)	Scaly hair fin anchovy	M, B	15.3 cm	F	NE	11, 20
<i>Thryssa malabarica</i> (Bloch, 1795)	Malabar thryssa	M, B	17.5 cm SL	F	DD	13

Table 2 continued

Order, Family, Scientific name	Common name/ local name	Habitat	Maximum size (TL)	Fishery information	IUCN Status	References no. as listed in Table 1
Family: Pristigasteridae						
<i>Pellona ditchela</i> (Valenciennes, 1847)	Indian pellona	M, F, B	16.0 cm	F	LC	13, 20
<i>Raconda russeliana</i> (Gray, 1831)	Raconda	M, B	19.0 cm	F	LC	11, 20
Order: Cypriniformes						
Family: Botiidae						
<i>Botia dario</i> (Hamilton, 1822)	Bengal loach	F	15.1 cm TL	O	LC	14
Family: Cyprinidae						
<i>Amblypharyngodon mola</i> (Hamilton, 1822)	Mola carplet	F	20.0 cm TL	NI	LC	4, 5, 7, 8, 10, 11, 12, 13, 14, 15, 16, 18, 19, 21
<i>Amblypharyngodon microlepis</i> (Bleeker, 1853)	Indian carplet	F	10.0 cm TL	O	LC	12,
<i>Aspidoparia jaya</i> (Hamilton, 1822)	Jaya	F	15.0 cm TL	F	LC	9, 12,
<i>Bangana dero</i> (Hamilton, 1822)	Kalabans	F	75.0 cm TL	B	LC	14
<i>Barilius bendelisis</i> (Hamilton, 1807)	–	F	22.7 cm TL	F	LC	1, 2, 3, 5, 8, 10, 11, 13, 15, 18, 21
<i>Barilius barila</i> (Hamilton, 1822)	–	F	10.0 cm TL	B	LC	2, 3, 4, 5, 8, 10, 11, 15, 21,
<i>Barilius evezardi</i> (Day, 1872)	–	F	11.0 cm TL	F + O	DD	2, 4, 5
<i>Barilius radiolatus</i> (Günther, 1868)	Gunther's baril	F	10.0 cm TL	O	DD	2, 4, 5
<i>Barilius vagra</i> (Hamilton, 1822)	–	F	15.6 cm TL	O	LC	3, 5, 10
<i>Cabdio morar</i> (Hamilton, 1822)	Morari	F	20.0 cm	NI	LC	7, 11, 16
<i>Labeo catla</i> (Hamilton, 1822)	Catla	F, B	182 cm	F + G	LC	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 17, 19, 20, 21
<i>Chagunius chagunio</i> (Hamilton, 1822)	Chaguni	F	50.0 cm TL	G	LC	11
<i>Chela labuca</i> (Hamilton, 1822)	Indian glass barb	F, B	10.5 cm TL	O + B	LC	1, 2, 4, 5, 7, 8, 11, 12, 14, 15, 18, 19, 20, 21
<i>Cirrhinus cirrhosus</i> (Bloch, 1795)	Mrigal carp	F, B	100.0 cm SL	F + G	VU	9, 15, 17
<i>Cirrhinus mrigala</i> (Hamilton, 1822)	Mrigal	F	99.0 cm	F + G	LC	2, 3, 5, 6, 7, 9, 10, 11, 13, 14, 16, 17, 18, 19, 20, 21
<i>Cirrhinus reba</i> (Hamilton, 1822)	Reba carp	F	30.0 cm	F	LC	2, 3, 5, 4, 7, 9, 10, 11, 13, 14, 17, 19, 20
<i>Crossocheilus latius</i> (Hamilton, 1822)	Stone roller	F, B	17.9 cm TL	NI	LC	2, 3, 4, 5, 6, 8, 9, 10, 11, 13, 14, 16, 21,
<i>Ctenopharyngodon idella</i> (Valenciennes, 1844)	Grass carp	F	150 cm	F + G	NE	8, 9, 10, 21
<i>Cyprinus carpio</i> (Linnaeus, 1758)	Common carp	F, B	120 cm	F + O+G	VU	7, 8, 9, 10, 11, 13, 14, 15, 17, 20, 21
<i>Dawkinsia filamentosa</i> (Valenciennes, 1844)	Blackspot barb	F, B	18.0 cm TL	F + O	LC	12
<i>Devario aequipinnatus</i> (McClelland, 1839)	Giant danio	F	15.0 cm TL	F	DD	1, 2, 4

Table 2 continued

Order, Family, Scientific name	Common name/ local name	Habitat	Maximum size (TL)	Fishery information	IUCN Status	References no. as listed in Table 1
<i>Danio devario</i> (Hamilton, 1822)	Sind danio	F	10.0 cm TL	F	LC	2, 4, 5, 10, 11, 12, 14, 16, 18, 21
<i>Danio rerio</i> (Hamilton, 1822)	Zebra danio	F	3.8 cm SL	O	LC	1, 2, 4, 5
<i>Devario malabaricus</i> (Jerdon, 1849)	Malabar danio	F	12.0 cm TL	O	LC	13
<i>Esomus danrica</i> (Hamilton, 1822)	Flying barb	F, B	13.0 cm TL	O	LC	1, 2, 4, 5, 13
<i>Garra gotyla</i> (Gray, 1830)	Sucker head	F	18.0 cm	F	LC	1, 2, 4, 5, 7, 10, 12, 14, 15, 16, 19, 21
<i>Garra lamta</i> (Hamilton, 1822)	–	F	25.3 cm TL	F	LC	2, 4, 5, 8, 9, 14
<i>Garra mullya</i> (Sykes, 1839)	Sucker fish	F	17.0 cm TL	NI	LC	1, 2, 3, 4, 5, 6, 8, 10, 13
<i>Hypophthalmichthys molitrix</i> (Valenciennes, 1844)	Silver carp	F	105 cm	F	NT	9, 10, 11, 15
<i>Hypophthalmichthys nobilis</i> (Richardson, 1845)	Bighead carp	F, B	146 cm SL	F + O	DD	11, 13
<i>Labeo angra</i> (Hamilton, 1822)	Mochhna	F	22.0 cm	F	LC	21
<i>Labeo bata</i> (Hamilton, 1822)	Bata	F	61.0 cm	F	LC	2, 3, 4, 5, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21
<i>Labeo boga</i> (Hamilton, 1822)	Boga labeo	F	30.0 cm	F	LC	8, 11, 12
<i>Labeo boggut</i> (Sykes, 1839)	Boggut labeo	F	29.0 cm	F	LC	1, 2, 4, 5, 6, 7, 8, 10, 13, 16, 19, 20,
<i>Labeo calbasu</i> (Hamilton, 1822)	Orange fin labeo/ Kala benise	F, B	90.0 cm	F	LC	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20, 21
<i>Labeo dussumieri</i> (Valenciennes, 1842)	–	F	50.0 cm TL	F	LC	13
<i>Labeo dyocheilus</i> (McClelland, 1839)	Dyocheilus labeo	F	90.0 cm	F	LC	2, 4, 5, 7, 13, 20, 21,
<i>Labeo fimbriatus</i> (Bloch, 1795)	Fringed-lipped peninsula carp	F	91.0 cm	F	LC	2, 3, 5, 4, 6, 7, 8, 9, 13, 14, 15, 17, 18, 19, 20, 21
<i>Labeo gonius</i> (Hamilton, 1822)	Kuria labeo	F	150 cm	F	LC	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 14, 15, 19, 21,
<i>Labeo pangusia</i> (Hamilton, 1822)	Pangusia labeo	F	90.0 cm	F	NT	3, 7, 8, 19
<i>Labeo rohita</i> (Hamilton, 1822)	Roho labeo/Rohi, Rohu	F, B	200 cm	F + G	LC	2, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 17, 19, 20, 21
<i>Laubuka laubuca</i> (Hamilton, 1822)	Indian glass barb	F, B	10.5 cm	F + O+B	LC	1, 10, 20
<i>Oreochthys cosuatis</i> (Hamilton, 1822)	Cosuatis barb	F	8.0 cm	O	LC	1, 2, 4, 5, 9, 14
<i>Osteobrama cotio</i> (Hamilton, 1822)	Cotio	F	15.0 cm	O	LC	1, 2, 3, 4, 5, 7, 8, 10, 11, 13, 14, 16, 18, 19, 21,
<i>Osteobrama vigorsii</i> (Sykes, 1839)	Godavari osteobrama	F, B	30.0 cm TL	F	LC	7, 8, 16, 19
<i>Salmostoma balookee</i> (Sykes, 1839)	Bloch razor belly minnow	F	15.0 cm TL	F	LC	1, 2, 4, 5, 18, 21
<i>Oxygaster gora</i> (Hamilton, 1822)	–	F	24.5 cm TL	NI	LC	8, 18, 21
<i>Parapsilorhynchus tentaculatus</i> (Annandale, 1919)	Khandalla minnow	F	4.5 cm TL	NI	LC	1, 2, 4, 5, 8

Table 2 continued

Order, Family, Scientific name	Common name/local name	Habitat	Maximum size (TL)	Fishery information	IUCN Status	References no. as listed in Table 1
<i>Pethia conchonius</i> (Hamilton, 1822)	Rosy barb	F	14.0 cm TL	O	LC	1, 2, 4, 5, 8, 10, 11, 12, 16, 18, 21
<i>Pethia gelius</i> (Hamilton, 1822)	Golden barb	F	5.1 cm TL	O	LC	10
<i>Pethia guganio</i> (Hamilton, 1822)	Glass-barb	F	8.0 cm TL	NI	LC	1, 4, 5, 7
<i>Pethia ticto</i> (Hamilton, 1822)	Ticto barb	F, B	12.5 cm TL	F + O	LC	1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 21
<i>Puntius ambasis</i> (Day, 1869)	–	F	7.5 cm TL	NI	DD	2, 4, 5, 8
<i>Puntius amphibious</i> (Valenciennes, 1842)	Scarlet-banded barb	F, B	20.0 cm TL	F	DD	2, 4, 5, 8, 10, 18
<i>Puntius pinnauratus</i> (Day, 1865)	–	F	9.1 cm SL	NI	NE	1, 2, 4, 5
<i>Puntius chola</i> (Hamilton, 1822)	Swamp barb	F	15.0 cm	F + O	LC	1, 2, 4, 5, 8, 9, 10, 12, 14, 15, 16, 17, 18
<i>Puntius dorsalis</i> (Jerdon, 1849)	Long snouted barb	F	25.0 cm	F + O	LC	1, 2, 4, 5, 22
<i>Puntius sophore</i> (Hamilton, 1822)	Pool barb/Putia-kerundi	F, B	20.0 cm	O	LC	1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 13, 14, 15, 16, 18, 19, 21
<i>Rasbora daniconius</i> (Hamilton, 1822)	Slender rasbora/Jilo	F, B	15.0 cm	F + O	LC	1, 2, 3, 4, 5, 7, 8, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21
<i>Puntius neilli</i> (Day, 1865)	–	F	12.0 cm TL	NI	LC	2, 20, 22
<i>Rasbora rasbora</i> (Hamilton, 1822)	Gangetic scissortail rasbora	F, B	13.0 cm	O	LC	11, 13, 14, 15,
<i>Salmophasia bacaila</i> (Hamilton, 1822)	Large razor belly minnow	F, B	18.0 cm	O	LC	3, 5, 7, 8, 9, 10, 11, 13, 14, 16, 18, 19, 21,
<i>Salmophasia boopis</i> (Day, 1874)	Boopis razor belly minnow	F	12.0 cm TL	NI	LC	13
<i>Salmostoma orissaensis</i> Bănărescu 1968	Orissa razor belly minnow	F	10.0 cm TL	NI	NE	10
<i>Salmostoma phulo</i> (Hamilton, 1822)	Fine scale razor belly minnow	F	12.0 cm TL	NI	LC	7, 19
<i>Securicula gora</i> (Hamilton, 1822)	–	F	24.5 cm TL	NI	LC	11
<i>Systemus sarana</i> (Hamilton, 1822)	Olive barb	F, B	42.0 cm	F + O	LC	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21
<i>Systemus chrysopoma</i> (Valenciennes, 1842)	–	F	15.0 cm SL	NI	NE	1, 2, 4, 5, 8, 18
<i>Tor khudree</i> (Sykes, 1839)	Deccan mahseer	F	50.0 cm	F + G	EN	1, 2, 4, 5, 13
<i>Tor putitora</i> (Hamilton, 1822)	Putitor mahseer	F	275 cm	F + O+G	EN	2, 4, 5, 6, 7, 9, 14, 15, 17
<i>Tor tor</i> (Hamilton, 1822)	Tor barb/Kajra	F	200 cm	F + G	NT	2, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 17, 18, 19, 20, 21, 23
Family: Cobitidae						
<i>Lepidocephalichthys guntea</i> (Hamilton, 1822)	Guntea loach	F, B	15.0 cm TL	O	LC	1, 2, 4, 5, 7, 8, 10, 11, 14, 16, 21, 23,
Family: Nemacheilidae						
<i>Acanthocobitis botia</i> (Hamilton, 1822)	Mottled loach	F	11.0 cm	O	LC	1, 3, 4, 5, 9, 10, 11, 12, 13, 14, 16, 18, 21,
<i>Schistura beavani</i> (Günther, 1868)	Creek loach	F	10.2 cm TL	NI	LC	3

Table 2 continued

Order, Family, Scientific name	Common name/ local name	Habitat	Maximum size (TL)	Fishery information	IUCN Status	References no. as listed in Table 1
<i>Schistura dayi</i> (Hora, 1935)	–	F	7.3 cm SL	NI	LC	1, 2, 4, 5
<i>Indoreonectes evezardi</i> (Day, 1872)	–	F	3.8 cm SL	NI	LC	1, 2, 4, 5, 21
<i>Paraschistura montana</i> (McClelland, 1838)	–	F	12.1 cm TL	NI	NE	13
Order: Cyprinodontiformes						
Family: Aplocheilidae						
<i>Aplocheilus panchax</i> (Hamilton, 1822)	Blue panchax/ Borruguddi	F, B	9.0 cm	F + O	LC	11, 20
Family: Poeciliidae						
<i>Poecilia reticulata</i> (Peters, 1859)	Guppy	F, B	6.0 cm SL	O	NE	5
Order: Elopiformes						
Family: Megalopidae						
<i>Megalops cyprinoides</i> (Broussonet, 1782)	Indo-Pacific tarpon	M, F, B	150 cm TL	F + O	DD	13
Order: Gonorynchiformes						
Family: Chanidae						
<i>Chanos chanos</i> (Forsskål, 1775)	Milkfish	M, F, B	180 cm	F + G+B	NE	7, 19, 20
Order: Mugiliformes						
Family: Mugilidae						
<i>Planiliza macrolepis</i> (Smith, 1846)	Large scale mullet	M, F, B	60.0 cm	F + G	LC	7, 11, 19, 20
<i>Chelon parsia</i> (Hamilton, 1822)	Gold spot mullet	M, F, B	16.0 cm	F	NE	7, 11, 19, 20
<i>Chelon planiceps</i> (Valenciennes, 1836)	Tade gray mullet	M, F, B	70.0 cm	F	NE	11, 20
<i>Liza klunzingeri</i> (Day, 1888)	Klunzinger's mullet	M	20.0 cm TL	F	NE	13
<i>Mugil cephalus</i> (Linnaeus, 1758)	Flathead grey mullet	M, F, B	100.0 cm	F + G	LC	7, 11, 13, 19, 20
<i>Rhinomugil corsula</i> (Hamilton, 1822)	Corsula	F, B	45.0 cm	F	LC	5, 7, 11, 13, 19, 20
Order: Osteoglossiformes						
Family: Notopteridae						
<i>Chitala chitala</i> (Hamilton, 1822)	Clown knife fish/ Pulli	F	122 cm SL	F + O+G	NT	5, 6, 7, 9
<i>Notopterus notopterus</i> (Pallas, 1769)	Bronze feather back	F, B	60.0 cm SL	F + O	LC	1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 13, 14, 15, 19, 20, 21
Order: Perciformes						
Family: Ambassidae						
<i>Chanda nama</i> Hamilton, 1822	Elongate glass- perchlet	F, B	11.0 cm	F + O	LC	3, 4, 5, 7, 8, 9, 10, 11, 13, 14, 16, 17, 18, 19, 20, 21
<i>Parambassis baculis</i> (Hamilton, 1822)	Himalayan glassy perchlet	F	5.0 cm SL	NI	LC	8
<i>Parambassis ranga</i> (Hamilton, 1822)	Indian glassy fish/ Lal-chandee	F, B	8.0 cm	F + O	LC	2, 3, 4, 5, 7, 8, 19, 14, 10, 11, 13, 15, 16, 18, 21
Family: Anabantidae						
<i>Anabas testudineus</i> (Bloch, 1792)	Climbing perch/Kou	F, B	25.0 cm	F + O	DD	5, 9, 11, 13, 14, 18

Table 2 continued

Order, Family, Scientific name	Common name/local name	Habitat	Maximum size (TL)	Fishery information	IUCN Status	References no. as listed in Table 1
Family: Badidae						
<i>Badis badis</i> Hamilton, 1822)	Badis	F	5.0 cm	O	LC	1, 2, 4, 5, 10, 11, 14,
Family: Carangidae						
<i>Scomberoides lysan</i> (Forsskål, 1775)	Double spotted queen fish	M, B	110 cm TL	F + G	LC	13
Family: Channidae						
<i>Channa gachua</i> (Hamilton, 1822)	Dwarf snakehead	F	20.0 cm SL	O	LC	1, 2, 3, 4, 5, 6, 7, 10, 14, 15, 16, 17, 21,
<i>Channa marulius</i> (Hamilton, 1822)	Great snakehead/Saal	F	183 cm	F + O+G	LC	2, 3, 4, 5, 6, 7, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19, 21
<i>Channa orientalis</i> Bloch & Schneider, 1801	Walking snakehead/Chayung, Chenga, Dorrah	F, B	33.0 cm	F + O	NE	11, 13
<i>Channa punctata</i> (Bloch, 1793)	Spotted snakehead/Gorissa	F, B	1.0 cm	F + O	LC	1, 2, 3, 4, 5, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 20
<i>Channa striata</i> (Bloch, 1793)	Striped snakehead/Sola	F, B	100.0 cm SL	F + O	LC	3, 7, 9, 10, 11, 12, 14, 15, 17, 19, 20, 21
Family: Cichlidae						
<i>Etilopus maculatus</i> (Bloch, 1795)	Orange chromide	F, B	9.5 cm	NI	LC	7, 19, 20
<i>Etilopus suratensis</i> (Bloch, 1790)	Pearlspot/Cundahle	F, B	40.0 cm	F + O	LC	7, 19, 20
<i>Oreochromis mossambicus</i> (Peters, 1852)	Mozambique tilapia	F, B	39.0 cm SL	F + O+G	NT	13
Family: Eleotridae						
<i>Eleotris fusca</i> (Forster, 1801)	Dusky sleeper	M, F, B	26.0 cm TL	F + O	LC	11, 20
Family: Gerreidae						
<i>Gerres filamentosus</i> (Cuvier 1829)	Whipfin silver-biddy	M, F, B	39.0 cm	F	LC	11, 20
Family: Gobiidae						
<i>Awaous ocellaris</i> (Broussonet, 1782)	–	M, F, B	15.5 cm TL	F	LC	13,
<i>Boleophthalmus dussumieri</i> (Valenciennes, 1837)	–	M, F, B	18.7 cm	NI	NE	13, 20
<i>Glossogobius giuris</i> (Hamilton, 1822)	Tank goby/Gulah	M, F, B	50.0 cm SL	F + O	LC	2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 19, 20, 21,
<i>Odontamblyopus rubicundus</i> (Hamilton, 1822)	–	M, B	33.4 cm SL	F	NE	11, 20
<i>Periophthalmodon schlosseri</i> (Pallas, 1770)	Giant mudskipper	M, F, B	27.0 cm TL	F	NE	7, 19, 20
<i>Periophthalmus variabilis</i> (Eggert, 1935)	–	M, B	7.0 cm SL	NI	NE	7, 19
<i>Pseudapocrypte sangasius</i> (Cuvier, 1816)	–	F, B	20.0 cm	F	LC	20
<i>Taenioides anguillaris</i> (Linnaeus, 1758)	Eel worm goby	M, F, B	40.0 cm TL	NI	NE	20
<i>Trypauchen vagina</i> (Bloch & Schneider, 1801)	–	M, B	22.0 cm TL	F	NE	22
Family: Latidae						
<i>Lates calcarifer</i> (Bloch, 1790)	Barramundi	M, F, B	200 cm TL	F + O+G	NE	7, 11, 13, 19, 20

Table 2 continued

Order, Family, Scientific name	Common name/local name	Habitat	Maximum size (TL)	Fishery information	IUCN Status	References no. as listed in Table 1
Family: Lutjanidae						
<i>Lutjanus argentimaculatus</i> (Forsskål, 1755)	Mangrove red snapper	M, F, B	150 cm	F + G	LC	1, 12, 33
<i>Lutjanus johnii</i> (Bloch, 1792)	John's snapper	M, B	97 cm	F + G	LC	11, 20
Family: Mullidae						
<i>Upeneus vittatus</i> (Forsskål, 1775)	Yellow striped goatfish	M, B	28.0 cm TL	F + O	LC	13
Family: Nandidae						
<i>Nandus nandus</i> (Hamilton, 1822)	Gangetic leaf fish/ Bodisi, Gossiporah	F, B	20.0 cm	F + O	LC	1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 13, 14, 15, 17, 18
Family: Osphronemidae						
<i>Ctenops nobilis</i> (McClelland, 1845)	Frail gourami	F, B	10.0 cm TL	F + O	NT	15
<i>Trichogaster chuna</i> (Hamilton, 1822)	Honey gourami	F	7.0 cm TL	F + O	LC	15
<i>Trichogaster fasciata</i> (Bloch & Schneider, 1801)	Banded gourami	F	12.5 cm	O	LC	9, 11, 14, 15, 18, 20,
<i>Trichogaster lalius</i> (Hamilton, 1822)	Dwarf gourami	F	8.8 cm	O	LC	11
Family: Polynemidae						
<i>Eleutheronema tetradactylum</i> (Shaw, 1804)	Four finger threadfin	M, F, B	200 cm TL	F	NE	7, 11, 13, 19, 20
<i>Leptomelanosoma indicum</i> (Shaw, 1804)	Indian threadfin	M, B	142 cm TL	F + G	NE	7, 19, 20,
Family: Scatophagidae						
<i>Scatophagus argus</i> (Linnaeus, 1766)	Spotted scat	M, F, B	38.0 cm TL	F + O	LC	11, 13, 19, 20
Family: Sciaenidae						
<i>Daysciaena albida</i> (Cuvier, 1830)	Bengal corvina	M, B	90.0 cm	F	NE	20
<i>Johnius belangerii</i> (Cuvier, 1830)	Belanger's croaker	M, B	30.0 cm	F	NE	20
<i>Otolithoides biauritus</i> (Cantor, 1849)	Bronze croaker	M	160.0 cm	F	NE	7, 19, 20
<i>Otolithoides pama</i> (Hamilton, 1822)	Pama croaker	M, F, B	160.0 cm	F	NE	11, 20
<i>Panna microdon</i> (Bleeker, 1849)	Panna croaker	M, B	30.0 cm SL	F	NE	13
<i>Protonibea diacanthus</i> (Lacepède, 1802)	Black spotted croaker	M, B	150 cm	O	NE	13
Family: Scombridae						
<i>Scomberomorus guttatus</i> (Bloch & Schneider, 1801)	Indo-Pacific king mackerel	M, B	76.0 cm	F + G	DD	20
Family: Sparidae						
<i>Acanthopagrus latus</i> (Houttuyn, 1782)	Yellow finsea bream	M, F, B	40.0 cm FL	F	DD	13
Family: Sillaginidae						
<i>Sillago sihama</i> (Forsskål, 1775)	Silver sillago	M, B	31.0 cm	F	LC	20
Family: Teraponidae						
<i>Therapon jarbua</i> (Forsskål, 1775)	Jarbua terapon	M, F, B	36.0 cm	F	LC	11, 20

Table 2 continued

Order, Family, Scientific name	Common name/local name	Habitat	Maximum size (TL)	Fishery information	IUCN Status	References no. as listed in Table 1
Order: Siluriformes						
Family: Amblycepidae						
<i>Amblyceps mangois</i> (Hamilton, 1822)	Indian torrent catfish	F	12.5 cm SL	O	LC	1, 2, 4, 5
Family: Ariidae						
<i>Arius arius</i> (Hamilton, 1822)	Threadfin sea catfish	M, B	40.0 cm SL	F	LC	7, 13, 19, 20
<i>Arius gogora</i> (Hamilton, 1822)	Gagora catfish	M, F, B	91.4 cm SL	F	NT	11
<i>Osteogeneiosus militaris</i> (Linnaeus, 1758)	Soldier catfish	M, F, B	39.9 cm TL	F	NE	11, 20
<i>Ailia coila</i> (Hamilton, 1822)	Gangetic ailia	F, B	30.0 cm TL	F	NT	7, 19, 20
Family: Bagridae						
<i>Mystus bleekeri</i> (Day, 1877)	Day's mystus	F	15.5 cm	F + O	LC	2, 3, 4, 5, 7, 8, 16, 9, 10, 11, 14, 15, 17, 18, 19, 20, 21
<i>Mystus cavasius</i> (Hamilton, 1822)	Gangetic mystus/Kontia, Guntea	F, B	40.0 cm SL	F	LC	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 19, 20, 21,
<i>Mystus gulio</i> (Hamilton, 1822)	Long whiskers catfish/Kontia	F, B	46.0 cm	F	LC	11, 13, 20
<i>Mystus tengara</i> (Hamilton, 1822)	Tengara catfish	F	18.0 cm	F + O	LC	8, 11
<i>Mystus vittatus</i> (Bloch, 1794)	Striped dwarf catfish/Kuntia	F, B	21.0 cm SL	F + O	LC	1, 2, 3, 4, 5, 7, 10, 11, 13, 14, 15, 19, 20,
<i>Rita rita</i> (Hamilton, 1822)	Rita	F, B	150 cm	F	LC	5, 7, 8, 9, 11, 14, 15, 17, 18, 19, 20,
<i>Rita gogra</i> (Sykes, 1839)	–	F	26.0 cm TL	F	LC	1, 2, 3, 4, 5, 7, 9, 11, 14, 15, 19, 20, 22
<i>Sperata aor</i> (Hamilton, 1822)	Long-whiskered catfish	F	180 cm	F + G	LC	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 18, 19, 20, 21
<i>Sperata seenghala</i> (Sykes, 1839)	Giant river-catfish/Addi, Alli, Katrang	F, B	150 cm	F + G	LC	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19, 20, 21
Family: Clariidae						
<i>Clarias magur</i> (Linnaeus, 1758)	Philippine catfish/Magurah	F, B	47.0 cm	F + O	LC	2, 3, 4, 5, 7, 9, 11, 13, 14, 15, 18, 21
<i>Clarias gariepinus</i> (Burchell, 1822)	North African catfish	F	170 cm	F + G	LC	15
Family: Erethistidae						
<i>Pseudogubia ribeiroi</i> (Hora, 1921)	Painted catfish	F	10.0 cm TL	NI	LC	1, 2, 4, 5
Family: Heteropneustidae						
<i>Heteropneustes fossilis</i> (Bloch, 1794)	Stinging catfish/Singhi	F, B	31.0 cm	F + O	LC	2, 3, 4, 5, 7, 9, 11, 12, 13, 15, 17, 20, 21
Family: Pangasiidae						
<i>Pangasius pangasius</i> (Hamilton, 1822)	Pangas catfish/Jellum, Pangash	F, B	300 cm SL	F + G	LC	9, 17, 20
Family: Schilbeidae						
<i>Clupisoma garua</i> (Hamilton, 1822)	Garua bachcha	F, B	60.9 cm SL	F + G	LC	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 17, 19, 20, 21
<i>Eutropiichthys vacha</i> (Hamilton, 1822)	Batchwa vacha/Batchua, Nandi-butchua	F, B	34.0 cm	F + G	LC	5, 7, 10, 11, 19, 20
<i>Eutropiichthys murius</i> (Hamilton, 1822)	–	F	28.0 cm TL	F	LC	11, 13, 20

Table 2 continued

Order, Family, Scientific name	Common name/local name	Habitat	Maximum size (TL)	Fishery information	IUCN Status	References no. as listed in Table 1
<i>Silonia silondia</i> (Hamilton, 1822)	Silond catfish	F, B	183 cm	F + G	LC	7, 3
Family: Siluridae						
<i>Ompok bimaculatus</i> (Bloch, 1794)	Butter catfish/Pabtah, Pob-tah	F, B	45.0 cm SL	F + O	NT	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 20, 21,
<i>Ompok pabo</i> (Hamilton, 1822)	Pabo catfish	F	25.0 cm NG	F	NT	7, 17
<i>Ompok pabda</i> (Hamilton, 1822)	Pabdah catfish	F	30.0 cm	F	NT	7, 8, 9, 14
<i>Wallago attu</i> (Bloch & Schneider, 1801)	Wallago/Ballai, Boabe, Boallee	F, B	240 cm	F + G	NT	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19, 20, 21
Family: Sisoridae						
<i>Bagarius bagarius</i> (Hamilton, 1822)	Goonch	F, B	200 cm TL	G	NT	7, 15
<i>Gagata cenia</i> (Hamilton, 1822)	Indian gagata	F, B	15.0 cm SL	F	LC	13
<i>Gagata itchkeea</i> (Sykes, 1839)	–	F	7.6 cm TL	F	VU	2, 4, 5
<i>Glyptothorax lonah</i> (Sykes, 1839)	–	F	15.0 cm TL	NI	LC	2, 4, 5, 13,
<i>Glyptothorax telchitta</i> (Hamilton, 1822)	–	F	15.2 cm TL	F	LC	14
Order: Pleuronectiformes						
Family: Cynoglossidae						
<i>Cynoglossus cynoglossus</i> (Hamilton, 1822)	Bengal tongue sole	M, B	20.0 cm TL	F	NE	11, 13, 19, 20
<i>Cynoglossus arel</i> (Bloch & Schneider, 1801)	Large scale tonguesole	M, B	40.0 cm TL	F	NE	7
Family: Soleidae						
<i>Brachirus orientalis</i> (Bloch & Schneider, 1801)	Oriental sole	M, F, B	38.0 cm TL	F	NE	11, 20
Order: Synbranchiformes						
Family: Mastacembelidae						
<i>Macrogathus pancalus</i> Hamilton, 1822	Barred spiny eel	F, B	18.0 cm	F	LC	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 18, 20, 21,
<i>Mastacembelus armatus</i> (Lacepède, 1800)	Zig-zag eel	F, B	90.0 cm	F + O	LC	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 19, 20, 21

IUCN International Union for Conservation of Nature, *F* freshwater, *B* brackishwater, *M* marine water, *TL* total length, *SL* standard length, *cm* centimeter, *EN* endangered, *VU* vulnerable, *NT* near threatened, *LC* least concern, *DD* data deficient, *NE* not evaluated, *F* food fish, *O* ornamental value, *G* game fish, *NI* of no interest

Table 3 Finfish diversity of river Narmada systems

Sl. no.	Order	Family	Genus	Species
1.	Anguilliformes	1	1	1
2.	Aulopiformes	1	1	1
3.	Beloniformes	2	3	5
4.	Clupeiformes	3	12	15
5.	Cypriniformes	4	38	78
6.	Cyprinodontiformes	2	2	2
7.	Elopiformes	1	1	1
8.	Gonorynchiformes	1	1	1
9.	Mugiliformes	1	5	6
10.	Osteoglossiformes	1	2	2
11.	Perciformes	21	37	47
12.	Siluriformes	10	19	32
13.	Pleuronectiformes	2	2	3
14.	Synbranchiiformes	1	2	2
15.	N = 14	N = 51	N = 126	N = 196

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