

A List of the Fish fauna in Thar Desert of Rajasthan

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Rajasthan, the biggest state in India has many water bodies and a few rivers too. Based on the water and drainage system, the state can be divided into six distinct geographic regions, the western region known for the Thar Desert is devoid of any perennial riverine system, however, Indira Gandhi Nahar Pariyojna (IGNP) carrying water from the Harike Barrage in Punjab passes through Sri Ganganagar, Bikaner and Jaisalmer districts falling under this region. The semiarid region amid the Aravalli Ranges and the western desert is present from Jalore to Jhunjhunu districts. Luni River drains southern part of this region while the northern part remains dry. A larger number of small water bodies exist in the Aravalli Hill area in its uneven landscape particularly in the districts of Pali, Udaipur and Sirohi. The eastern region is mainly drained by the Banas River and its tributaries and consists of a large number of reservoirs in Sawai Madhopur, Bundi, Alwar and Bharatpur districts. The southern region consists of stony highlands where maximum numbers of man-made lakes are present. The Chambal ravine region lies in said region along the River Chambal forming boundary between Rajasthan and the adjacent Madhya Pradesh state.

The Thar Desert of Rajasthan comprising 13 districts has never been considered a good habitat site for fish faunal diversity. But, Ghaggar River and the introduction of IGNP and its escape reservoirs, and little dams in the foothills of Aravalli ranges have provided a unique landscape and diverse physiographic features. These factors have made this area having immense potential for Ichthyological studies.

Yazdani (1996) has given description of main water systems of Thar Desert of Rajasthan, which is divided into two important drainage systems, viz. Himalayan river system and Luni river system. Himalayan river system transports water and fish resources to this area through Satluj and Beas river system. Both of them are the tributaries of Great Indus River. Their water has been brought by IGNP canal to the north and north western desert districts of Thar Desert, which has its origin at Harike Barrage in Punjab and runs almost 650 km to its tail in Jaisalmer district. Ghaggar River which starts from Shivalik foothills in Himachal Pradesh flows through Hanumangarh district and before losing its distinctiveness in the desert sand near Suratgarh, it gives rise to 18 escape reservoirs. All of them are good sources of fish

diversity. This river brings mixture of sub Himalayan fishes to this area (Johal & Dhillon, 1981).

The supplementary water drainage system is Luni River system. This river originates from Anna Sagar near Ajmer district and traverses through the Thar Desert before losing its identity in the Rann of Kachchh. Besides, these two major water systems, all other districts of the Thar Desert have their individual small seasonal rivers, ponds and wetlands, except Churu district. Pali, Jalore and Sirohi districts are situated at the foothills of Aravalli ranges, have check dams which become full of water when there is good rainfall during monsoon. All of them sustain the mixture of fish fauna which ranges from exotic fish like common carp and fishes of the Peninsular India, which could have entered here due to alteration in recent geological epoch (Krishnan, 1952).

Fish fauna of Rajasthan is mainly known due to the work of Hora et al. (1952), Datta et al. (1970), Johal et al. (1993), Yazdani (1996) and Mohan et al. (2013). Yazdani (1996) has reported a total of 142 species from the entire Thar Desert, out of which 112 species belonging to 64 genera 26 families and six orders were reported from the Thar region of Rajasthan. Cyprinidae was reported as the main family with 58 species, followed by 12 species of catfishes namely, Bagridae, Schibeidae and Sisoridae. Johal et al. (2000) has revealed the occurrence of 67 fish species belonging to 7 orders, 16 families and 42 genera from the Thar Desert of Rajasthan, whereas Mohan & Singh (2006) reported 80 species of fishes belonging to 6 orders, 20 families and 37 genera from 13 districts of the Thar Desert.

In total, 124 species of fish are recorded so far from the Thar Desert of Rajasthan in the present list, which is compiled on the basis of existing literature and observations, collection and identification made by the authors.

List of the fishes found in the Thar Desert of Rajasthan :

Class : Actinoptergii

Order: Osteoglossiformes

Family : Notopteridae

1. *Notopterus notopterus* (Pallas)

2. *Chitala chitala* (Ham.-Buch.)

Order : Clupeiformes

Family : Clupeidae

3. *Gudusia chapra* (Ham.-Buch.)

Order : Cypriniformes**Family : Cyprinidae**

4. *Catla catla* (Ham.-Buch.)
5. *Carassius carassius* (Linn.)
6. *Chagunius chagunio* (Ham.-Buch.)
7. *Cirrhinus mrigala* (Ham.-Buch.)
8. *Cirrhinus reba* (Ham.-Buch.)
9. *Cyprinus carpio* (Linn.)
10. *Ctenopharyngodon idella* (Val.)
11. *Labeo angra* (Ham.-Buch.)
12. *Labeo bata* (Ham.-Buch.)
13. *Labeo boga* (Bloch)
14. *Labeo boggut* (Sykes)
15. *Labeo calbasu* (Ham.-Buch.)
16. *Bangana dero* (Ham.-Buch.)
17. *Labeo dussumieri* (Val.)
18. *Labeo dyocheilus* (McClelland)
19. *Labeo fimbriatus* (Bloch)
20. *Labeo potail* (Sykes)
21. *Labeo rajasthanicus* (Datta & Majumdar)
22. *Labeo goni* (Ham.-Buch.)
23. *Labeo rohita* (Ham.-Buch.)
24. *Bangana diplostoma* (Heckel)
25. *Labeo pangusia* (Ham.-Buch.)
26. Rohu-catla Hybrid
27. *Osteobrama cotio* (Ham.-Buch.)
28. *Puntius amphibius* (Val.)
29. *Puntius chola* (Ham.)
30. *Puntius dorsalis* (Jerdon)
31. *Systemus sarana* (Ham.-Buch.)
32. *Puntius sophore* (Ham.-Buch.)
33. *Puntius terio* (Ham.-Buch.)
34. *Pethia conchoni* (Ham.-Buch.)
35. *Pethia ticto* (Ham.-Buch.)
36. *Puntius vittatus* (Day)
37. *Tor khudree* (Sykes)
38. *Tor putitora* (Ham.-Buch.)
39. *Tor tor* (Ham.-Buch.)
40. *Hypophthalmichthys molitrix* (Val.)
41. *Chela cachi* (Ham.-Buch.)
42. *Securicula gora* (Bloch)
43. *Salmostoma bacaila* (Ham.-Buch.)
44. *Salmophasia phulo* (Ham.-Buch.)
45. *Salmophasia balookee* (Sykes)
46. *Salmophasia punjabensis* (Day)
47. *Amblypharyngodon microlepis* (Bleeker)
48. *Amblypharyngodon mola* (Ham.-Buch.)
49. *Cabdio morar* (Ham.-Buch.)
50. *Barilius barlia* (Ham.-Buch.)

51. *Barilius barna* (Ham.-Buch.)
52. *Barilius bendelisis* (Ham.-Buch.)
53. *Barilius vagra* (Ham.-Buch.)
54. *Danio rerio* (Ham.-Buch.)
55. *Esomus danrica* (Ham.-Buch.)
56. *Raiamas bola* (Ham.-Buch.)
57. *Megarasbora elanga* (Ham.-Buch.)
58. *Rasbora daniconius* (Ham.-Buch.)
59. *Devario aequipinnatus* (McClelland)
60. *Devario devario* (Ham.-Buch.)
61. *Crossocheilus diplochilus* (Heckel)
62. *Garra gotyla* (Gray)
63. *Garra lamta* (Ham.-Buch.)
64. *Garra mullya* (Skyles)

Family : Psilorhynchidae

65. *Psilorhynchus balitora* (Ham.-Buch.)

Family : Nemacheilidae

66. *Schistura baluchiorum* (Zugmayer)
67. *Acanthocobitis botia* (Ham.-Buch.)
68. *Nemacheilus corica* (Ham.-Buch.)
69. *Nemacheilus denisoni* Day

Family : Cobitidae

70. *Lepidocephalichthys guntea* (Ham.-Buch.)
71. *Botia birdi* Chaudhuri
72. *Botia lohachata* Chaudhuri

Order : Siluriformes**Family : Bagridae**

73. *Sperata aor* (Ham.-Buch.)
74. *Sperata seenghala* (Sykes)
75. *Mystus bleekeri* (Day)
76. *Mystus cavasi* (Ham.-Buch.)
77. *Mystus tengara* (Ham.-Buch.)
78. *Mystus vittatus* (Bloch)
79. *Rita rita* (Ham.-Buch.)

Family : Siluridae

80. *Ompok bimaculatus* (Bloch)
81. *Ompok pabda* (Lace.)
82. *Wallago attu* (Schn.)

Family : Schilbeidae

83. *Ailia coila* (Ham.-Buch.)
84. *Clupisoma garua* (Ham.-Buch.)
85. *Eutropiichthys vacha* (Ham.-Buch.)
86. *Silonia silondia* (Ham.-Buch.)

Family : Amblycipitidae

87. *Amblyceps mangois* (Ham.-Buch.)

Family : Sisoridae

88. *Bagarius bagarius* (Ham.-Buch.)
89. *Nangra nangra* (Ham.-Buch.)
90. *Gogangra viridescens* (Ham.-Buch.)

91. *Glyptothorax telchitta* (Ham.-Buch.)
 92. *Glyptothorax pectinopterus* (McClelland)
 93. *Erethistes pusillus* (Muller & Troschel)
Family : Clariidae
 94. *Clarias batrachus* (Linn.)
 95. *Clarias gariepinus* (Linn.)
Family : Heteropneustidae
 96. *Heteropneustes fossilis* (Bloch)
Family : Loricariidae
 97. *Pterygoplichthys disjunctivus* (Weber)
Order : Beloniformes
Family : Belonidae
 98. *Xenentodon cancila* (Ham.-Buch.)
Family : Adrianichthyidae
 99. *Oryzias melastigma* (McClelland)
Order : Cyprinodontiformes
Family : Aplocheilidae
 100. *Aplocheilus blockii* Arnold
 101. *Aplocheilus lineatus* (Val.)
Family : Poeciliidae
 102. *Gambusia affinis* (Baird & Girard)
Family : Cyprinodontidae
 103. *Aphanius dispar* (Ruppell)
Order : Synbranchiformes
Family : Mastacembelidae
 104. *Macrognathus aral* (Bloch & Schn.)
 105. *Mastacembelus armatus* (Lacepede)
 106. *Mastacembelus pancalus* (Ham.-Buch.)
Order : Perciformes
Family : Cichlidae
 107. *Oreochromis mossambicus* (Peters)
Family : Ambassidae
 108. *Chanda nama* Ham.-Buch.
 109. *Parambassis baculis* (Ham.-Buch.)
 110. *Parambassis ranga* (Ham.-Buch.)
Family : Nandidae
 111. *Nandus nandus* (Ham.-Buch.)
Family : Gobiidae
 112. *Acentrogobius viridipunctatus* (Val.)
 113. *Glossogobius giuris* (Ham.-Buch.)
Family : Osphronemidae
 114. *Trichogaster fasciata* Bloch & Schneider
 115. *Trichogaster lalius* (Ham.-Buch.)
 116. *Osphronemus goramy* Lacepede
Family : Channidae
 117. *Channa gachua* (Ham.-Buch.)
 118. *Channa marulius* (Ham.-Buch.)
 119. *Channa orientalis* Bloch & Schn.
 120. *Channa punctata* (Bloch)

121. *Channa striata* (Bloch)

Order : Mugiliformes

Family : Mugilidae

122. *Chelon parsia* (Ham.-Buch.)
 123. *Mugil cephalus* Linn.
 124. *Rhinomugil corsula* (Ham.-Buch.)

In total, 124 species of fish are reported here from the Thar Desert of Rajasthan. The most dominating order is Cypriniformes which is represented by 69 species, while order Siluriformes is represented by 25 species, followed by Perciformes with 15 species.

Maximum number of fish species and their abundance were recorded from the Jailsalmer and Bikaner districts, mainly due to the extension of IGNP and the presence of five escape reservoirs, namely, Digha, RD 1356, RD 1120, RD 750 and RD 507. These reservoirs are quite deep and full of macro vegetation which provides suitable habitat for fish growth and breeding.

The species diversity of fishes was also higher in Pali and Sirohi districts on account of the three perennial water bodies, namely, Jawai Dam, Raipur dam (Pali district) and West Banas dam (Sirohi district).

Recommendations

Some of the recommended measures to protect the threatened species are as follows: Selected perennial water bodies should be developed as fish sanctuaries; Care should be taken to protect the breeding ground of fishes; Regular monitoring of fish diversity and sample collection, and Restoration of threatened species by stocking of yearlings along with *in situ* conservation. Overexploitation of fishes particularly during breeding period should be checked and critical level should be maintained in regional water bodies.

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Interview

On Air Pollution in Delhi and NCR

An interview with SUNITA NARAIN,

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ROHIT E. DAVID

Q. What's the cause of sudden escalation of air pollution over NCR and other parts of north India?

A. Adverse weather, combined with crop burning in Punjab and Haryana, and existing and uncontrolled pollution because of emissions from vehicles, factories, garbage in our cities. According to IMD (India Meteorological Department), the weather situation of the past few days was unprecedented.

Two air circulatory systems — one bringing pollutants from crop burning in Punjab and Haryana, (including according to one theory dust from a multi-day dust storm in Iraq, Kuwait and Saudi Arabia) and the other bringing moisture from the east—collided over Delhi region. This formed a cloud of pollutants, trapped in moisture, which combined with near calm wind conditions at the ground level, and suffocated the region. Crop burning is seasonal — it will stop by November 15 — but the other two factors, adverse weather and uncontrolled pollution, will remain. Therefore, we must not indulge in blame games — political theatrics will not mitigate pollution, hard and sustained action to reduce emissions will.

Q. When this is an annual feature, why has it been impossible to find a long-term solution?

A. It is an annual feature, because weather turns adverse during winter. But sadly, governments are still not serious

enough about long-term solutions. So, we see competitive populism when pollution spikes — it seems everybody loves a good pollution — but not enough work on solutions.

Q. Do emergency measures such as odd-even and shutting down schools make a difference?

A. Emergency measures are critical, but they are only emergency measures. Last year, the Supreme Court directed government to formulate a smog alert system — the Graded Response Action Plan (GRAP). This year, during the smog emergency, within 12 hours of pollution levels rising, the Environment Pollution (Prevention and Control) Authority has directed actions, like closure of hot-mix plants and increase of parking charges. But EPCA did not direct closure of schools. Instead its advisory was to ask children, at home or schools, to remain indoor. It also did not direct government to bring the odd-even scheme even though this is part of GRAP.

On November 8, when EPCA imposed severe plus conditions (public health emergency level) in the city, it directed governments to stop entry of trucks and to stop construction across NCR. However, by November 9, the Central Pollution Control Board informed EPCA that pollution levels were coming down and by November 11-12 the situation would be much better. Therefore, it took the decision not to direct government to impose odd-even scheme.

The good news is that the analysis from Pune-based IITM (Indian Institute of Tropical Meteorology) is showing that the emergency measures taken have resulted in a reduction in pollution. Therefore, it is clear that emergency measures work. But the effort has to be that we take long-term steps so that emergency does not occur.

Q. Air quality is worsening all over India. Why isn't this public health hazard a political issue yet?

A. I believe this is changing. People are getting more aware of the health risks. Our common outrage will drive actions. It is important to stress that air pollution affects all — the rich and the poor. It is also important that we understand that even the rich cannot protect themselves by installing air purifiers. These measures are not enough to keep away the assault of these toxins from our bodies. We must work to push solutions and drive action.

Q. From a national standpoint, what are the steps we must initiate?

A. There is a clear road-map on what needs to be done. The fact is we know that vehicle numbers; polluting vehicles on the road; use of dirty fuels like pet coke, furnace oil and coal; garbage burning and mismanagement of road and construction dust are the key causes of pollution. All this can be fixed and must. But it requires sustained action and not chest-beating during high smog episodes.