

Freshwater Fishes of Pakistan: Ecology, Distribution and Threats

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SUMMARY

There are 29,447 fish species reported by the IUCN from around the world. Out of this total, 14,350 freshwater fish species are documented globally. In Pakistan, a total of 196 species of freshwater fish, belonging to 93 genera, 39 families, and 17 orders, are documented. Of the total, 123 species are from Punjab, 122 species are from Sindh, 117 species are from Khyber Pakhtunkhwa, 80 species are from Balochistan, 60 species were noted from Azad Jammu and Kashmir, and 16 species were documented from Gilgit-Baltistan. While 31 species are endemic to Pakistan, namely: *Barilius naseeri*, *Garra wanae*, *Labeo caeruleus*, *L. gedrosicus*, *Tariqilabeo macmahoni*, *Naziritor zhobensis*, *Puntius waagni*, *Schizothorax skarduensis*, *Schistura afasciata*, *S. anambarensis*, *S. arifi*, *S. fascimaculata*, *S. harnaiensis*, *S. kohatensis*, *S. lepidocaulis*, *S. machensis*, *S. macrolepis*, *S. microlabra*, *S. naseeri*, *S. prashari*, *Triplophysa hazaraensis*, *T. naziri*, *T. trewavasae*, *Ompok sindensis*, *Batasio pakistanicus*, *Mystus horai*, *Amblyceps macropterus*, *Sisor pakistanicus*, *Gagata pakistanica*, *Glyptothorax naziri*, and *G. stocki*.

Keywords: Fishes, World, Pakistan, Endemic, Threats, Distribution

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INTRODUCTION

Only around 2.5% of the world's water is freshwater, and only about 0.5% is available groundwater or surface water (Mishra, 2023). Inland waters and freshwater biodiversity are vital natural resources for economic, cultural, artistic, scientific, and educational purposes (Lynch et al., 2023). Their management and conservation are essential to the well-being of all people, nations, and governments. However, this priceless heritage is in jeopardy. Freshwaters are facing declines in ecological diversity that are far higher than those in the most impacted terrestrial environments, and if trends in human demand for water remain unchanged and the loss of species continues at the present pace, the chance for protecting much of the remaining variety of species in freshwater will vanish (Grizzetti and Poikane, 2024).

On August 14, 1947, the Islamic Republic of Pakistan was established. It is situated between latitude 24°36' North and longitude 61°75' East. The entire area is 796,096 square kilometers. Geographically, Pakistan is located in the northwest of South Asia. It shares borders with four neighboring nations. Except for the Line of Control (LOC) and working boundary, India is situated to the east and has a 1,600 km border. China shares a 595-kilometer border to the northeast, Afghanistan shares a 2,250-kilometer border to the northwest (the Durand Line), and Iran shares a 932-

kilometer border to the west. Pakistan is connected to the Arabian Sea in the south, with a coastline that is 1,048 kilometers long. It is divided into the Karachi coastal line and the Makran coastal line. Pakistan's strategic location has drawn international and regional countries to forge cordial ties. Afghanistan and the Central Asian Republics can be accessed via Pakistan. Pakistan's borders with Afghanistan, China, India, and the Arabian Sea influence global trends, particularly regarding China (Zada et al., 2023; Dikshit and Dikshit, 2025).

Pakistan has a wide variety of freshwater fishes that are found throughout the Indus River system and the rivers, lakes, reservoirs, and wetlands connected to it. Nevertheless, there is still a lack of complete and up-to-date information about the distribution patterns, biological roles, and conservation status of these fishes. Native fish populations are seriously threatened by growing anthropogenic pressures such as habitat destruction, water contamination, illegal fishing, construction of dams, exotic species, and climate change; however, there isn't a comprehensive national assessment that connects distribution, ecology, and new threats. As a result, the purpose of this review is to (a) compile and update current information on the distribution of Pakistan's freshwater fishes, (b) evaluate their environmental features and functional roles within aquatic environments, and (c) critically assess the major natural and human-induced threats to their survival, providing a scientific foundation for future studies, conservation strategies, and sustainable fisheries management.

METHODOLOGY

Data were collected via books (Mirza, 2004; Sandhu et al., 2021), research articles (Ali et al., 2010; Altaf et al., 2011; Khan, 2011; Altaf et al., 2015; Hussain et al., 2015; Muhammad et al., 2017; Bibi et al., 2018; A Abro et al., 2020; Ashraf et al., 2022; Hassan et al., 2022; Iqbal et al., 2023; Naz et al., 2023; Hahshmi et al., 2024; Hamayoon et al., 2024; Syed et al., 2026), reports, and websites such as GBIF (<https://www.gbif.org/>), IUCN (<https://www.iucnredlist.org/>) and FishBase (<https://www.fishbase.se/>).

Statistical Analysis

The data were evaluated using Microsoft Excel, which allowed for efficient arrangement, tabulation, and preliminary statistical analysis. OriginPro statistical software was used for graphical representation to generate exact and high-quality graphs, allowing for correct visualization and effective understanding of the data (OriginPro, 2026).

OVERVIEW OF FRESHWATER ECOSYSTEMS IN PAKISTAN

Distribution of Wetlands in Pakistan

Pakistan has an annual rainfall that varies between 750 mm and 1270 mm. Due to its topography and climate regimes, wetlands support a diverse and unique ecosystem. It is estimated that freshwater lakes account for 73.935 percent of wetland area, while coastal wetlands cover 26.06 percent in Pakistan. Wetlands occupy an area of 0.78 million hectares in Pakistan, including wet paddy cultivation areas. More than 225 significant wetland sites are recorded in Pakistan by the PWGIS Database. Nineteen

of these 225 sites have been internationally recognized by the Ramsar Convention Bureau as being of global importance (Altaf et al., 2014; Khan and Arshad, 2014).

The largest canal system in the world is present in Pakistan. There are 62 streams and rivers in Pakistan, which are as follows: Dasht River (Gawadar, Balochistan), Kech River (Gawadar, Balochistan), Basol River (Gawadar, Balochistan), Hingol River (Makaran, Balochistan), Nal River (Balochistan), Porali River (Balochistan), Hub River (Lasbela, Balochistan), Malir River (Karachi, Sindh), Layari River (Karachi, Sindh), Indus River (the longest river in Pakistan, originating from the northern area of Pakistan, passing through KPK, Punjab, and Sindh, and entering the Arabian Sea), Punjnad River (Punjab), Chenab River (Punjab), Ravi River (Punjab), Jhelum River (Punjab), Poonch River (at AJK, between Pakistan and India, entering Mangla Dam), Kunhar River (KPK), Neelum River (AJK), Tawi River (Doda district, Punjab), Sutlej River (Punjab), Gomal River (Waziristan, Balochistan), Kandar River (Gomal, Balochistan), Zhob River (Balochistan), Kurram River (FATA), Tochi River (Waziristan, Balochistan), Soan River (Murree, Punjab), Haro River (Abbottabad, AJK), Kabul River (Punjab and Balochistan), Swat River (Swat, KPK), Panjkora River (Dir, KPK), Bara River (Nosher, KPK), Kunar River (Chitral, KPK), Siran River (NWFP), Tangir River (Gilgit Baltistan i.e. GB), Astore River (Deosai Plateau, Gilgit Baltistan), Rupal River (Nanga Parbat, Gilgit Baltistan), Gilgit River (Gilgit Baltistan), Hunza River (Gilgit Baltistan), Hispar River (Hispar, Hoper, and Nagar, Northern Areas of Pakistan), Naltar River (Gilgit Baltistan), Shamshal River (Gojal, Gilgit Baltistan), Chapursan River (Chapursan Valley, Gilgit Baltistan), Misgar River (Gilgit Baltistan), Khunjerab River (Northern Areas of Pakistan), Ishkuman River (Gilgit Baltistan), Yasin River (Darkot, Gilgit Baltistan), Shigar River (Northern Areas, Gilgit Baltistan), Nubra River (AJK), Suru River (AJK), Dras River (Mochai Glacier near Zoji-la, between India and Pakistan, AJK), Shingo River (Ladakh, AJK), Mushkel River (Balochistan), Lora River (Quetta, Balochistan), Nari River (Balochistan), Mula River (Gandawa, Balochistan), Bolan River (Balochistan), Anamber River (AJK), Loralai River (Balochistan), Tarim River (Gilgit Baltistan), Yarkand River (Gilgit Baltistan), Shiksam River (Shaksgum Valley, K2), Braldu River (K2 mountain), and Rakshan River (Washuk, Balochistan) (Altaf et al., 2014).

The coastal mangrove area has been estimated to be between 250,000 and 283,000 hectares. Mangroves covered 44% of the Indus Delta's intertidal zone, or over 260,000 hectares, according to a research using remote sensing for mangroves. Pakistan's total inland water area is estimated to be over 7.8 million hectares, comprising 3.1 million hectares of rivers and significant tributaries, 56,000 hectares of irrigation canals, 110,000 hectares of natural lakes, 92,000 hectares of water storage reservoirs, 108,000 hectares of ponds, dhands, and farms, 300,000 acres of delta marshes (Indo), and more than 4 million hectares of flooded areas, flood plains, and seasonal saline wastes (Altaf et al., 2014; Laghari et al., 2015).

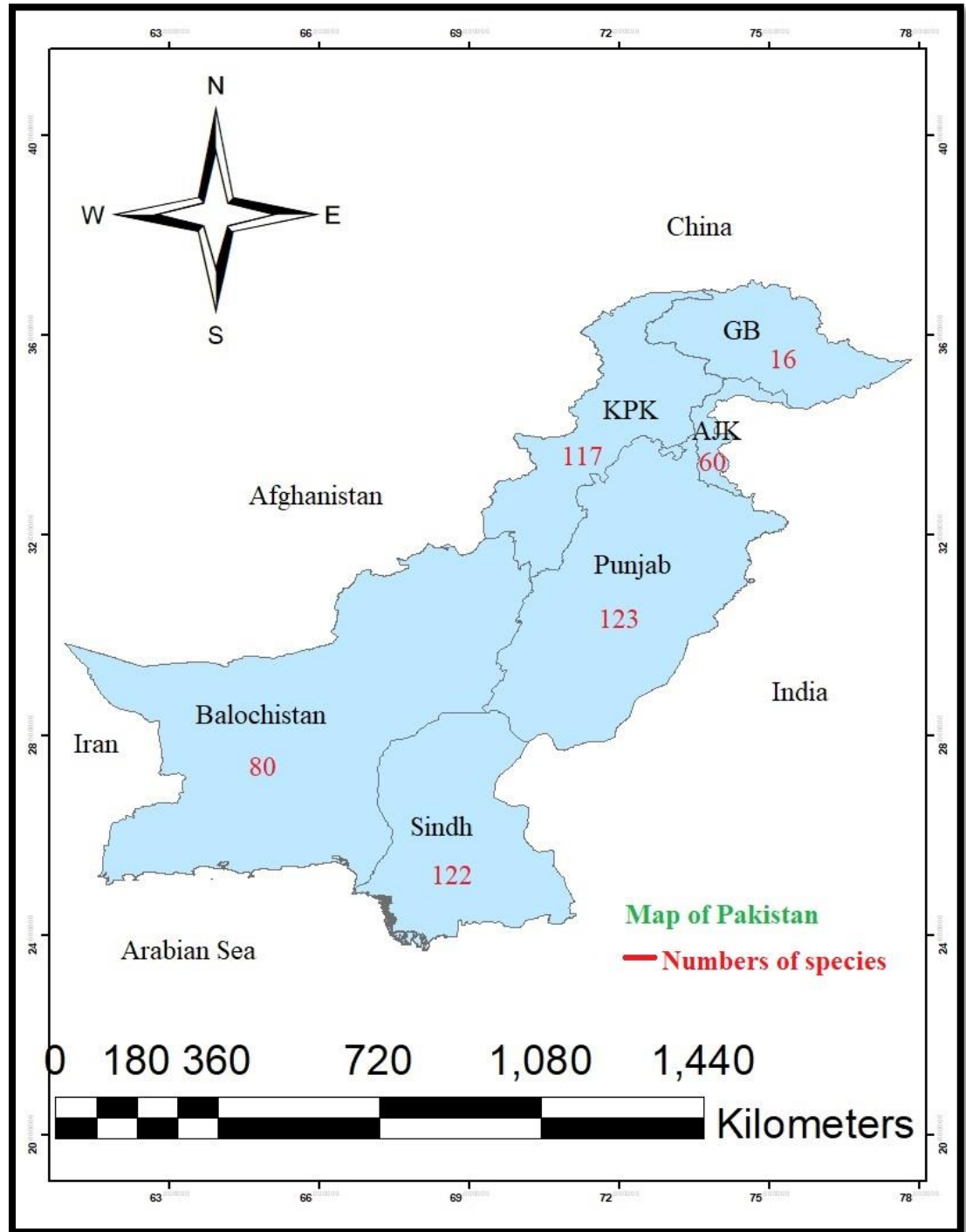


Figure 1: Map of Pakistan (Note: 16 freshwater species of fishes reopted from Gilgit-Baltistan (i.e. GB), 60 species from Azad Jammu and Kashmir, 117 species from Khyber Pakhtunkhwa (i.e. KPK), 80 species from Balochistan and 122 species from Sindh).

Pakistan's coastline is 1,050 km long (Figure 1). The eastern half of the coast of Pakistan is in southern Sindh province, featuring the Indus River delta and the

coast of the Great Rann of Kutch. The largest saltwater wetland in Pakistan is the Indus River delta. Unlike many other deltas, it is clayey and very swampy. In contrast, this part of the coast is not as muddy. The western half of the coast of Pakistan, in the southern province of Balochistan, also has protected areas known as the Makran coast, Hingol National Park, and Astola Island. The three major mangrove plantations along the coast of Balochistan are known as Miani Hor, Khor Kalimat, and Gwatar Bay. Miani Hor is a marshy lagoon along the coast in the district of Lasbela. Gwatar, the third site, is an open bay with its mouth almost as wide as its length (Altaf et al., 2014; Inam et al., 2022).

Ramsar Sites in Pakistan

Nine wetlands were present on the list of the Ramsar Convention (July 1976). In 1980, at the first Conference of Contracting Parties in Cagliari, Italy, a new criterion was approved. A revised list of Ramsar sites was prepared in Pakistan in 1987 during the Third Conference of the Contracting Parties, which established criteria for Ramsar sites. Currently, there are 19 Ramsar sites in Pakistan, namely: Balochistan Island, Chashma Barrage (Sindh), Deh Akro-II Desert Wetland Complex (Sindh), Drigh Lake (Sindh), Haleji Lake (Sindh), Hub Dam (between Balochistan and Sindh), the Indus Delta (Sindh), the Indus Dolphin Reserve (Sindh), Jiwani Coastal Wetland (Balochistan), Jubho Lagoon (Sindh), Kinjhar Lake (Sindh), Miani Hor (Balochistan), Nurri Lagoon (Sindh), Ormara Turtle Beaches (Balochistan), Runn of Kutch (Sindh), Tanda Dam (KPK), Taunsa Barrage (Sindh), Thanedar Wala (KPK), and the Complex of Khabbaki (including Uchhali and Jahlar in Punjab) (Altaf et al., 2014).

Values of Wetland in Pakistan

Wetlands provide many services and commodities for humanity. Each wetland is therefore ecologically unique. Wetlands perform many important functions, such as recycling nutrients, purifying water, attenuating floods, maintaining stream flow, recharging groundwater, and providing safe drinking water, fish, fodder, fuel, and habitat for wildlife. They also control the rate of runoff in urban areas, buffer coastlines against erosion, and support recreation for society. The interaction between people and wetlands in recent decades has been of concern largely due to rapid population growth, accompanied by the intensification of industrial, commercial, and residential development, leading to increased pollution of wetlands from domestic wastewater and industrial and agricultural waste, such as fertilizers, insecticides, and chemical waste. The fact that the values of wetlands are under threat has resulted in a loss of these benefits. Wetlands are often described as the "kidneys of the landscape". Modifications of the physical and chemical environment have a direct impact on the wetland biotic response (Khan and Arshad, 2014).

TAXONOMIC DIVERSITY OF FRESHWATER FISHES

Freshwater Fish species in world

There are 28,900 species of fishes are reported by Levêque et al. (2008), out of total, 13,000 freshwater fish species are documented in the world (Brosse et al., 2013).

Fish species in Pakistan

In Pakistan, a total of 196 species (i.e. *Elops machnata*, *Chitala chitala*, *Notopterus notopterus*, *Gudusia chapra*, *Tenuilosa ilisha*, *Gonialosa manmina*, *Dayella malabrica*, *Chela cachius*, *Laubuka laubuca*, *Salmostoma bacaila*, *S. punjabense*, *Securicula gora*, *Cabdio morar*, *Amblypharyngodon mola*, *Barilius bendelisis*, *B. modestus*, *B. naseeri*, *B. pakistanicus*, *B. vagra*, *Danio rerio*, *Devario devario*, *Esomus danrica*, *Bengala elanga*, *Rasbora daniconius*, *R. rasbora*, *Catla catla*, *Cirrhinus mrigala*, *C. reba*, *Crossocheilus diplochilus*, *Garra gotyla*, *G. rossica*, *G. wanae*, *Labeo angra*, *L. bata*, *L. boga*, *L. boggut*, *L. caeruleus*, *L. calbasu*, *L. diplostomus*, *L. dyocheilus*, *L. fimbriatus*, *L. gedrosicus*, *L. goni*, *L. nigripinnis*, *L. pangusia*, *L. rohita*, *Tariqilabeo macmahoni*, *Cyprinion microphthalmum*, *C. milsei*, *C. watsoni*, *Carassius auratus*, *Cyprinus carpio*, *Osteobrama cotio*, *Naziritor zhobensis*, *Puntius chola*, *P. conchoni*, *P. gelius*, *P. phutunio*, *P. punjabensis*, *P. sophore*, *P. terio*, *P. ticto*, *P. vittatus*, *P. waagni*, *Systomus sarana*, *Tor putitora*, *Racoma labiate*, *R. ramzani*, *Schizothorax curvifrons*, *S. dainellii*, *S. esocinus*, *S. niger*, *S. plagiostomus*, *S. skarduensis*, *S. brucei*, *Diptychus maculatus*, *Ptychobarbus conirostris*, *Schizopygopsis stolickai*, *Ctenopharyngodon idella*, *Hypophthalmichthys molitrix*, *H. nobilis*, *Botia almorhae*, *B. birdi*, *B. lohachata*, *Misgurnus anguillicaudatus*, *Lepidocephalichthys guntea*, *Paracanthocobitis botia*, *Nemacheilus corica*, *Schistura afasciata*, *S. alepidota*, *S. anambarensis*, *S. arifi*, *S. balochiorum*, *S. curtistigma*, *S. fascimaculata*, *S. harnaiensis*, *S. horai*, *S. kessleri*, *S. kohatensis*, *S. lepidocaulis*, *S. lindbergi*, *S. machensis*, *S. macrolepis*, *S. microlabra*, *S. nalbanti*, *S. naseeri*, *S. pakistanica*, *S. prashari*, *S. punjabensis*, *S. shadiwalensis*, *S. zonata*, *Triplophysa brahui*, *T. choprai*, *T. hazaraensis*, *T. kashmirensis*, *T. marmorata*, *T. microps*, *T. naziri*, *T. stolickai*, *T. tenuicauda*, *T. trewavasae*, *T. yasinensis*, *Ompok bimaculatus*, *O. pabda*, *O. sindensis*, *Wallago attu*, *Ailia Coila*, *Ailiichthys punctata*, *Clupisoma garua*, *C. naziri*, *Eutropiichthys vacha*, *Pachypterus atherinoides*, *Rita rita*, *Batasio pakistanicus*, *Mystus bleekeri*, *M. cavasius*, *M. gulio*, *M. horai*, *M. tengara*, *M. vittatus*, *Sperata sarwari*, *Amblyceps macropterus*, *Bagarius bagarius*, *Sisor rabdophorus*, *S. pakistanicus*, *Gagata cenia*, *G. pakistanica*, *Glyptosternon reticulatum*, *Glyptothorax cavia*, *G. kashmirensis*, *G. naziri*, *G. pectinopterus*, *G. punjabensis*, *G. stocki*, *G. sufii*, *Nangra nangra*, *N. robusta*, *Clarias batrachus*, *Heteropneustes fossilis*, *Oncorhynchus mykiss*, *Salmo trutta fario*, *Glossogobius giuris*, *Boleophthalmus dussumieri*, *Chanda nama*, *Parambassis baculis*, *Parambassis ranga*, *Mugil cephalus*, *Minimugil cascasia*, *Planiliza abu*, *Ellochelon vaigiensis*, *Oreochromis aureus*, *O. mossambicus*, *O. niloticus*, *Xenentodon cancila*, *Aplocheilus blockii*, *A. panchax*, *Aphanius dispar*, *Gambusia affinis*, *Monopterusuchia*, *Macrognathus aral*, *M. pancalus*, *Mastacembelus armatus*, *Trichogaster fasciata*, *T. lalius*, *Channa gachua*, *C. marulius*, *C. punctata*, *C. striata*, *Nandus nandus*, *Badis badis*, *Lates calcarifer*, *Terapon puta*, *Lutjanus johnii*, *Acanthopagrus berda*, *Silurus glanis* and *Poecilia reticulata*) of fish belong to 93 genera (i.e. *Acanthopagrus*, *Ailia*, *Ailiichthys*, *Amblyceps*, *Amblypharyngodon*, *Aphanius*, *Aplocheilus*, *Badis*, *Bagarius*, *Batasio*, *Bengala*, *Boleophthalmus*, *Botia*, *Cabdio*, *Carassius*, *Catla*, *Chanda*, *Chela*, *Chitala*, *Cirrhinus*, *Clarias*, *Clupisoma*, *Crossocheilus*, *Ctenopharyngodon*, *Cyprinion*, *Danio*, *Dayella*, *Devario*, *Diptychus*, *Ellochelon*, *Elops*, *Esomus*, *Eutropiichthys*, *Gagata*, *Gambusia*, *Garra*, *Glossogobius*,

Glyptosternon, *Glyptothorax*, *Gonialosa*, *Gudusia*, *Heteropneustes*, *Hypophthalmichthys*, *Labeo*, *Lates*, *Laubuka*, *Lepidocephalichthys*, *Lutjanus*, *Macrognathus*, *Mastacembelus*, *Minimugil*, *Misgurnus*, *Monopterus*, *Mugil*, *Mystus*, *Nandus*, *Nangra*, *Naziritor*, *Nemacheilus*, *Notopterus*, *Ompok*, *Oncorhynchus*, *Oreochromis*, *Osteobrama*, *Pachypterus*, *Paracanthocobitis*, *Parambassis*, *Planiliza*, *Poecilia*, *Ptychobarbus*, *Puntius*, *Racoma*, *Rasbora*, *Rita*, *Salmo*, *Salmostoma*, *Schistura*, *Schizocypris*, *Schizopygopsis*, *Schizothorax*, *Securicula*, *Silurus*, *Sisor*, *Sperata*, *Systemus*, *Tariqilabeo*, *Tenuialosa*, *Terapon*, *Tor*, *Trichogaster*, *Triplophysa*, *Wallago*, and *Xenentodon*) are documented from Pakistan (Figure 2).

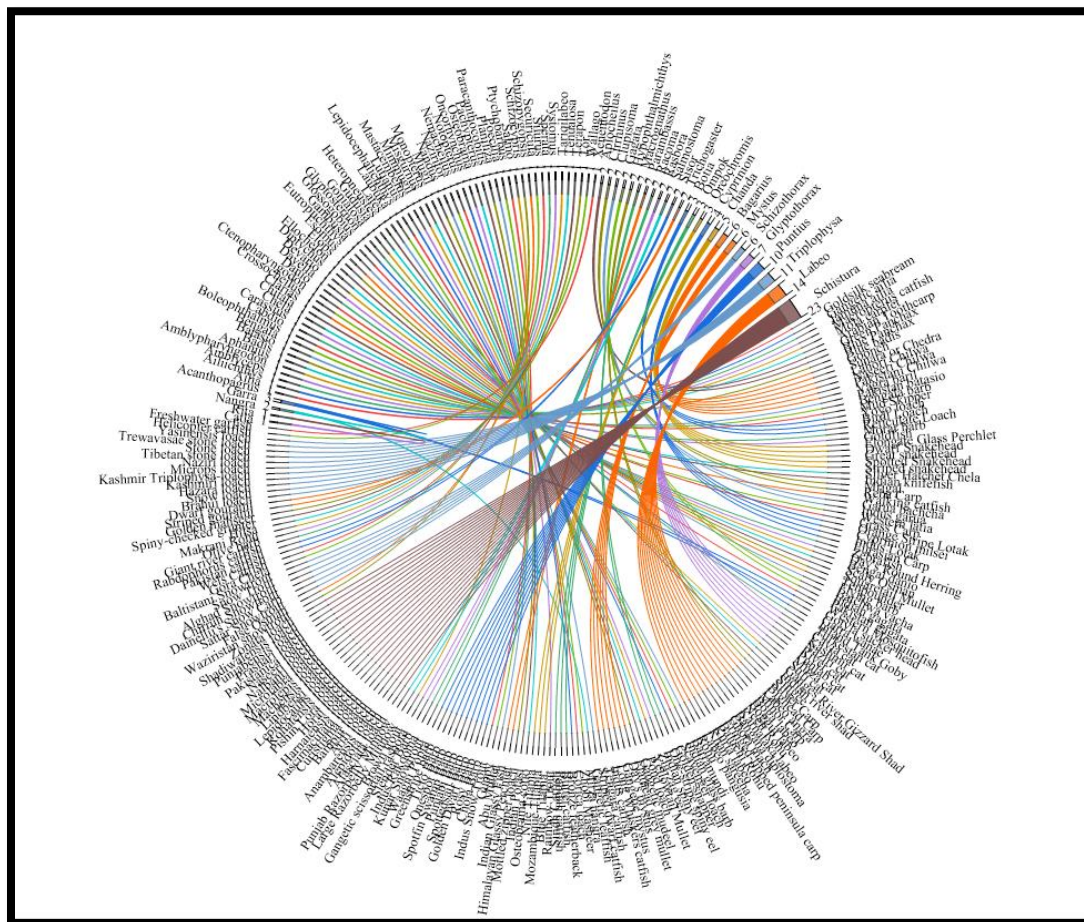


Figure 2: Genera of Freshwater fishes in Pakistan.

While 39 families (i.e. Elopidae, Notopteridae, Clupeidae, Cyprinidae, Botiidae, Cobitidae, Nemacheilidae, Siluridae, Ailiidae, Horabagridae, Ritidae, Bagridae, Amblycipitidae, Sisoridae, Erethistidae, Clariidae, Heteropneustidae, Salmonidae, Gobiidae, Oxudercidae, Ambassidae, Mugilidae, Cichlidae, Belonidae, Aplocheildidae, Cyprinodontidae, Poeciliidae, Synbranchidae, Mastacembelidae, Osphronemidae, Channidae, Nandidae, Badidae, Latidae, Terapontidae, Lutjanidae, Sparidae, Siluridae, and Poeciliidae) (Figure 3) and 17 orders (i.e. Elopiformes, Osteoglossiformes, Clupeiformes, Cypriniformes, Siluriformes, Salmoniformes, Gobiiformes, Mugiliformes, Cichliformes, Beloniformes, Cyprinodontiformes,

Synbranchiiformes, Anabantiformes, Perciiformes, Spariiformes, Siluriformes, and Cyprinodontiformes) are documented from Pakistan (Figure 4).

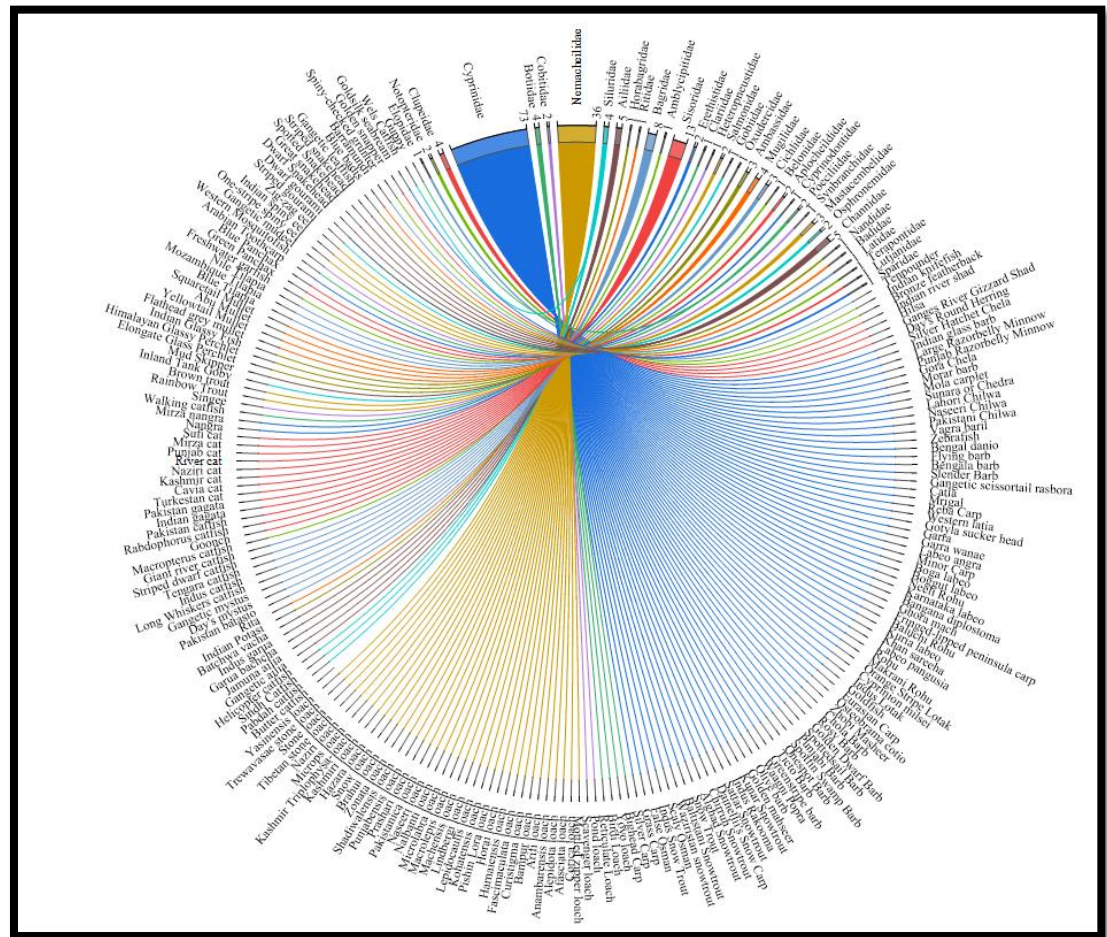


Figure 3: Families of Freshwater fishes in Pakistan.

Out of the total, 123 species are reported from Punjab (Bronze Featherback, Indian River Shad, Silver Hatchet Chela, Indian Glass Barb, Large Razorbelly Minnow, Punjab Razorbelly Minnow, Gora Chela, Morar Barb, Mola Carplet, Sunara Or Chedra, Lahori Chilwa, Naseeri Chilwa, Pakistani Chilwa, Vagra Baril, Zebrafish, Bengal Danio, Flying Barb, Slender Barb, Catla, Mrigal, Reba Carp, Western Latia, Gotyla Suckerhead, Labeo Angra, Minor Carp, Boga Labeo, Boggut Labeo, Neeli Rohu, Karnataka Labeo, Bangana Diplostoma, Ghora Mach, Kuria Labeo, Rohu, Indus Lotak, Goldfish, Eurasian Carp, Osteobrama Cotio, Chola Barb, Rosy Barb, Punjabi Barb, Spotfin Swamp Barb, Onespots Barb, Ticto Barb, Waagni Popra, Olive Barb, Golden Mahseer, Kunar Snowtrout, Indus Rakooma, Chirruh Snowtrout, Alghad Snowtrout, Snow Trout, False Osman, Grass Carp, Silver Carp, Bighead Carp, Birdi Loach, Reticulate Loach, Scavenger Loach, Mottled Zipper Loach, Corica Loach, Alepidota Loach, Curistigma Loach, Horai Loach, Lepidocaulis Loach, Macrolepis Loach, Nalbanti Loach, Punjabensis Loach, Shadiwalensis Loach, Zonata Loach, Microps Loach, Butter Catfish, Pabdah Catfish, Helicopter Catfish, Gangetic

Ailia, Jamuna Ailia, Garua Bachcha, Indus Garua, Batchwa Vacha, Indian Potasi, Rita, Pakistan Batasio, Day's Mystus, Gangetic Mystus, Indus Catfish, Tengara Catfish, Giant River Catfish, Macropterus Catfish, Goonch, Rabdophorus Catfish, Pakistan Catfish, Indian Gagata, Pakistan Gagata, Naziri Cat, Punjab Cat, Mirza Cat, Sufi Cat, Nangra, Mirza Nangra, Singee, Inland Tank Goby, Elongate Glass Perchlet, Himalayan Glassy Perchlet, Indian Glassy Fish, Yellowtail Mullet, Abu Mullet, Blue Tilapia, Mozambique Tilapia, Nile Tilapia, Freshwater Garfish, Western Mosquitofish, Gangetic Mudeel, One-Stripe Spiny Eel, Indian Spiny Eel, Zig-Zag Eel, Striped Gourami, Dwarf Gourami, Dwarf Snakehead, Great Snakehead, Spotted Snakehead, Striped Snakehead, Gangetic Leafish, Blue Badis, and Guppy).

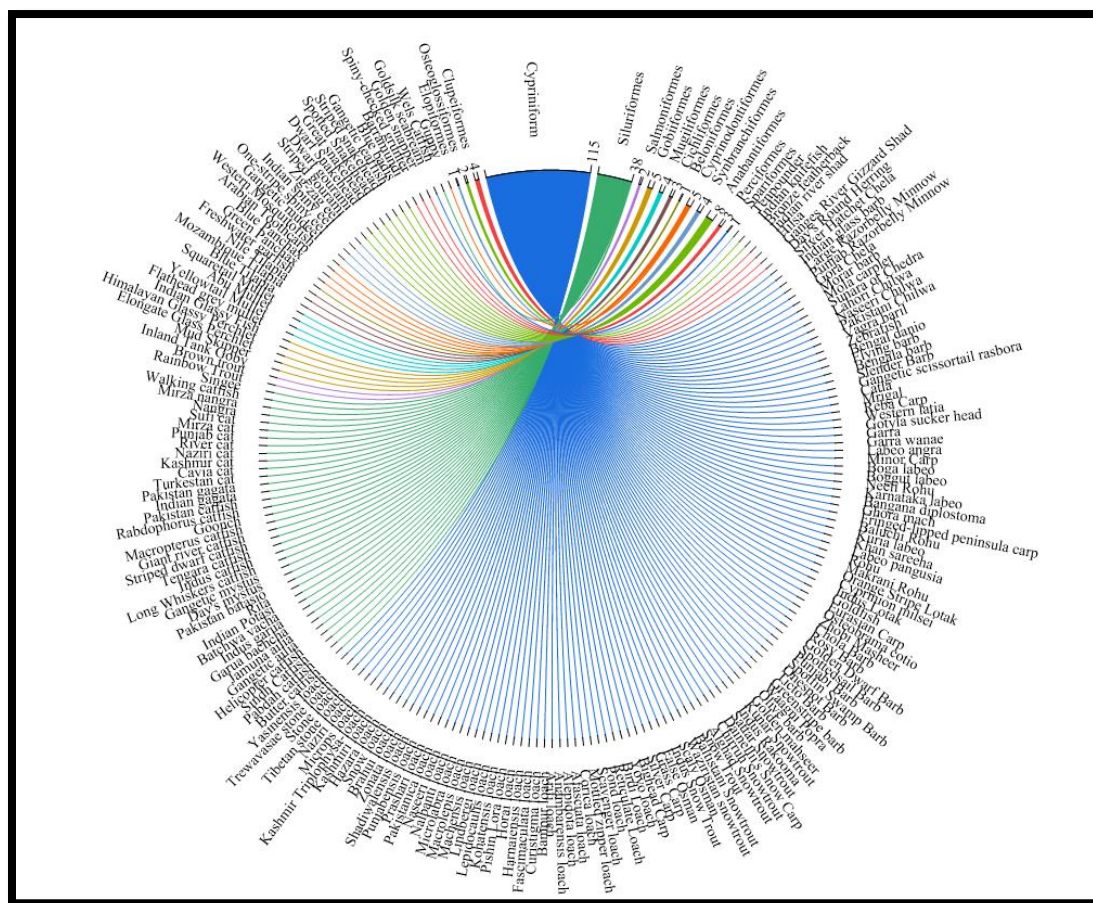


Figure 4: Orders of Freshwater fishes in Pakistan.

Out of 196 species of fishes, 122 species (Tenpounder, Indian Knifefish, Bronze Featherback, Indian River Shad, Hilsa, Ganges River Gizzard Shad, Day's Round Herring, Silver Hatchet Chela, Indian Glass Barb, Large Razorbelly Minnow, Punjab Razorbelly Minnow, Gora Chela, Morar Barb, Mola Carplet, Sunara or Chedra, Lahori Chilwa, Pakistani Chilwa, Vagra Baril, Bengal Danio, Flying Barb, Bengal Barb, Slender Barb, Gangetic Scissortail Rasbora, Catla, Mrigal, Reba Carp, Western Latia, Gotyla Sucker Head, Minor Carp, Boga Labeo, Boggut Labeo, Neeli Rohu, Karnataka Labeo, Bangana Diplostoma, Ghora Mach, Fringed-Lipped

Peninsula Carp, Kuria Labeo, Khan Sareeha, Labeo Pangusia, Rohu, Indus Lotak, Goldfish, Eurasian Carp, Osteobrama Cotio, Chola Barb, Rosy Barb, Golden Dwarf Barb, Spottedsail Barb, Punjabi Barb, Spotfin Swamp Barb, Onespots Barb, Ticto Barb, Greenstripe Barb, Olive Barb, Golden Mahseer, Indus Rakooma, Snow Trout, False Osman, Grass Carp, Silver Carp, Bighead Carp, Birdi Loach, Reticulate Loach, Mottled Zipper Loach, Corica Loach, Butter Catfish, Sindh Catfish, Helicopter Catfish, Gangetic Ailia, Jamuna Ailia, Garua Bachcha, Batchwa Vacha, Indian Potasi, Rita, Day's Mystus, Gangetic Mystus, Long Whiskers Catfish, Tengara Catfish, Striped Dwarf Catfish, Giant River Catfish, Macropterus Catfish, Goonch, Rhabdophorus Catfish, Sufi Cat, Walking Catfish, Singee, Rainbow Trout, Brown Trout, Inland Tank Goby, Mud Skipper, Elongate Glass Perchlet, Himalayan Glassy Perchlet, Indian Glassy Fish, Flathead Grey Mullet, Yellowtail Mullet, Abu Mullet, Squaretail Mullet, Blue Tilapia, Mozambique Tilapia, Nile Tilapia, Freshwater Garfish, Green Panchax, Blue Panchax, Arabian Toothcarp, Western Mosquitofish, Gangetic Mudeel, One-Stripe Spiny Eel, Indian Spiny Eel, Zig-Zag Eel, Striped Gourami, Dwarf Gourami, Dwarf Snakehead, Great Snakehead, Spotted Snakehead, Striped Snakehead, Gangetic Leaf-fish, Blue Badis, Barramundi, Spiny-Checked Grunter, Golden Snapper, Goldsilk Seabream, and Guppy) noted from Sindh.

From Khyber Pakhtunkhwa, 117 species (Figure 1) (Indian Knifefish, Bronze Featherback, Indian River Shad, Silver Hatchet Chela, Indian Glass Barb, Large Razorbelly Minnow, Punjab Razorbelly Minnow, Gora Chela, Morar Barb, Mola Carplet, Sunara Or Chedra, Lahori Chilwa, Pakistani Chilwa, Vagra Baril, Zebrafish, Bengal Danio, Flying Barb, Slender Barb, Catla, Mrigal, Reba Carp, Western Latia, Gotyla Suckerhead, Garra Wanae, Labeo Angra, Karnataka Labeo, Bangana Diplostoma, Ghora Mach, Indus Lotak, Goldfish, Eurasian Carp, Osteobrama Cotio, Zhobi Masheer, Chola Barb, Rosy Barb, Punjabi Barb, Spotfin Swamp Barb, Ticto Barb, Olive Barb, Golden Mahseer, Kunar Snowtrout, Indus Rakooma, Sattar Snowtrout, Chirruh Snowtrout, Snow Trout, Waziristan Snowtrout, Indus Snow Trout, False Osman, Grass Carp, Silver Carp, Bighead Carp, Birdi Loach, Pond Loach, Scavenger Loach, Mottled Zipper Loach, Corica Loach, Afasciata Loach, Alepidota Loach, Curistigma Loach, Fascimaculata Loach, Kohatensis Loach, Lepidocaulis Loach, Lindbergi Loach, Microlabra Loach, Nalbanti Loach, Naseeri Loach, Prashari Loach, Punjabensis Loach, Snow Loach, Hazara Loach, Kashmiri Loach, Microps Loach, Naziri Loach, Butter Catfish, Pabdah Catfish, Helicopter Catfish, Indus Garua, Batchwa Vacha, Indian Potasi, Rita, Gangetic Mystus, Indus Catfish, Tengara Catfish, Striped Dwarf Catfish, Giant River Catfish, Goonch, Indian Gagata, Pakistan Gagata, Turkestan Cat, Cavia Cat, Kashmir Cat, Naziri Cat, River Cat, Punjab Cat, Mirza Cat, Sufi Cat, Singee, Inland Tank Goby, Elongate Glass Perchlet, Himalayan Glass Perchlet, Indian Glassy Fish, Abu Mullet, Blue Tilapia, Mozambique Tilapia, Nile Tilapia, Freshwater Garfish, Indian Spiny Eel, Zig-Zag Eel, Striped Gourami, Dwarf Gourami, Dwarf Snakehead, Great Snakehead, Spotted Snakehead, Striped Snakehead, Gangetic Leaf-fish, Wels Catfish, and Guppy) were documented.

While 80 species (Tenpounder, Indian Knifefish, Bronze Featherback, Indian River Shad, Hilsa, Ganges River Gizzard Shad, Silver, Hatchet Chela, Large Razorbelly Minnow, Morar Barb, Pakistani Chilwa, Vagra Baril, Bengal Danio,

Catla, Western Latia, Gotyla Suckerhead, Garra, Neeli Rohu, Bangana Diplostoma, Ghora Mach, Baluchi Rohu, Makrani Rohu, Orange Stripe Lotak, Cyprinion Milsei, Indus Lotak, Goldfish, Eurasian Carp, Osteobrama Cotio, Rosy Barb, Punjabi Barb, Spotfin Swamp Barb, Onespots Barb, Ticto Barb, Olive Barb, Golden Mahseer, Kunar Snowtrout, Snow Trout, Waziristan Snowtrout, False Osman, Grass Carp, Silver Carp, Bighead Carp, Birdi Loach, Mottled Zipper Loach, Anambarensis Loach, Arifi Loach, Bampur Loach, Harnaiensis Loach, Pishin Lora Loach, Lindbergi Loach, Machensis Loach, Pakistanica Loach, Brahui Loach, Pabdah Catfish, Helicopter Catfish, Rita, Long Whiskers Catfish, Giant River Catfish, Macropterus Catfish, Cavia Cat, Naziri Cat, Punjab Cat, Walking Catfish, Inland Tank Goby, Mud Skipper, Elongate Glass Perchlet, Flathead Grey Mullet, Blue Tilapia, Mozambique Tilapia, Nile Tilapia, Freshwater Garfish, Blue Panchax, Arabian Toothcarp, Western Mosquitofish, Zig-Zag Eel, Dwarf Snakehead, Great Snakehead, Spotted Snakehead, Spiny-Checked Grunter, Goldsilk Seabream, and Guppy) were documented from Balochistan.

At the same-time, 60 species (Bronze Featherback, Silver Hatchet Chela, Large Razorbelly Minnow, Morar Barb, Pakistani Chilwa, Vagra Baril, Flying Barb, Catla, Reba Carp, Western Latia, Gotyla Sucker Head, Bangana Diplostoma, Ghora Mach, Rohu, Indus Lotak, Goldfish, Eurasian Carp, Zhobi Masheer, Rosy Barb, Spotfin Swamp Barb, Ticto Barb, Olive Barb, Golden Mahseer, Kunar Snowtrout, Sattar Snowtrout, Chirruh Snowtrout, Alghad Snowtrout, Snow Trout, Indus Snow Trout, False Osman, Grass Carp, Silver Carp, Bighead Carp, Yoyo Loach, Birdi Loach, Mottled Zipper Loach, Alepidota Loach, Shadiwalensis Loach, Kashmiri Loach, Kashmir Triplophysa Loach, Microps Loach, Pabdah Catfish, Helicopter Catfish, Garua Bachcha, Indus Garua, Giant River Catfish, Turkestan Cat, Cavia Cat, Kashmir Cat, Naziri Cat, River Cat, Punjab Cat, Mirza Cat, Inland Tank Goby, Elongate Glass Perchlet, Himalayan Glassy Perchlet, Indian Glassy Fish, Zig-Zag Eel, Dwarf Snakehead, and Guppy) were noted from Azad Jammu and Kashmir, and 16 species, including Sattar Snowtrout, Dainellii's Snow Carp, Chirruh Snowtrout, Snow Trout, Baltistani Snowtrout, Scaly Osman, Indus Snow Trout, False Osman, Microps Loach, Tibetan Stone Loach, Stone Loach, Trewavasae Stone Loach, Yasinensis Loach, Turkestan Cat, Rainbow Trout, and Brown Trout, were documented from Gilgit-Baltistan (Figure 1).

STATUS

It is documented that 138 species (Bronze Featherback, Indian River Shad, Hilsa, Ganges River Gizzard Shad, Day's Round Herring, Silver Hatchet Chela, Indian Glass Barb, Large Razorbelly Minnow, Punjab Razorbelly Minnow, Gora Chela, Morar Barb, Mola Carplet, Sunara or Chedra, Lahori Chilwa, Pakistani Chilwa, Vagra Baril, Zebrafish, Bengal Danio, Flying Barb, Bengal Barb, Slender Barb, Gangetic Scissortail Rasbora, Catla, Mrigal, Reba Carp, Western Latia, Gotyla Sucker Head, Labeo Angra, Minor Carp, Boga Labeo, Boggut Labeo, Neeli Rohu, Karnataka Labeo, Bangana Diplostoma, Ghora Mach, Fringed-Lipped Peninsula Carp, Baluchi Rohu, Kuria Labeo, Khan Sareeha, Rohu, Orange Stripe Lotak, Indus Lotak, Goldfish, Eurasian Carp, Osteobrama Cotio, Chola Barb, Rosy Barb, Golden Dwarf Barb, Spotted Sail Barb, Punjabi Barb, Spotfin Swamp Barb, One-spot Barb,

Ticto Barb, Greenstripe Barb, Olive Barb, Kunar Snowtrout, Sattar Snowtrout, Dainellii's Snow Carp, Alghad Snowtrout, Scaly Osman, Indus Snow Trout, False Osman, Grass Carp, Yoyo Loach, Birdi Loach, Reticulate Loach, Pond Loach, Scavenger Loach, Mottled Zipper Loach, Corica Loach, Anambarensis Loach, Arifi Loach, Bampur Loach, Horai Loach, Pishin Lora Loach, Shadiwalensis Loach, Snow Loach, Kashmir Triplophysa Loach, Microps Loach, Naziri Loach, Tibetan Stone Loach, Yasinensis Loach, Jamuna Ailia, Garua Bachcha, Batchwa Vacha, Indian Potasi, Rita, Day's Mystus, Gangetic Mystus, Long Whiskers Catfish, Tengara Catfish, Striped Dwarf Catfish, Giant River Catfish, Rabdophorus Catfish, Indian Gagata, Pakistan Gagata, Turkestan Cat, Cavia Cat, River Cat, Nangra, Walking Catfish, Singee, Rainbow Trout, Inland Tank Goby, Mud Skipper, Elongate Glass Perchlet, Himalayan Glassy Perchlet, Indian Glassy Fish, Flathead Grey Mullet, Yellowtail Mullet, Abu Mullet, Squaretail Mullet, Blue Tilapia, Nile Tilapia, Freshwater Garfish, Green Panchax, Blue Panchax, Arabian Toothcarp, Western Mosquitofish, Gangetic Mudeel, One-Stripe Spiny Eel, Indian Spiny Eel, Tenpounder, Zig-Zag Eel, Striped Gourami, Dwarf Gourami, Dwarf Snakehead, Great Snakehead, Spotted Snakehead, Striped Snakehead, Gangetic Leafaffish, Blue Badis, Barramundi, Spiny-Checked Grunter, Golden Snapper, Goldsilk Seabream, Wels Catfish, and Guppy) of fishes are Least Concern (LC) by IUCN (Figure 5).

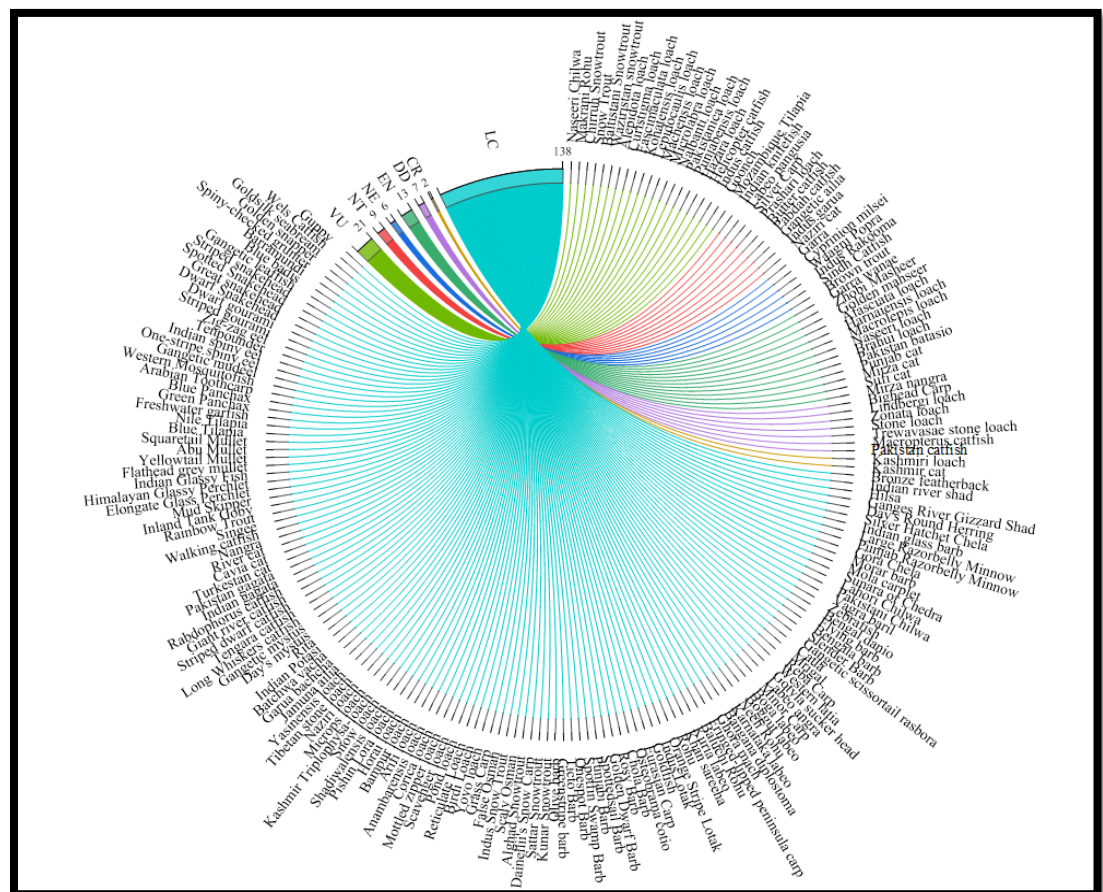


Figure 5: Status of freshwater fishes in Pakistan.

Out of the total, 7 species (Bighead Carp, Lindbergi Loach, Zonata Loach, Stone Loach, Trewavasae Stone Loach, Macropterus Catfish, and Pakistan Catfish) are classified as Data Deficient (DD) by the IUCN. In comparison, 6 species (Garra, Cyprinion Milsei, Waagni Popra, Indus Rakooma, Sindh Catfish, and Brown Trout) are Not Evaluated (NE) by the IUCN to date.

Out of the total, 9 species are documented as Near Threatened (NT), namely Indian Knifefish, Labeo pangusia, Silver Carp, Prashari Loach, Butter Catfish, Pabdah Catfish, Gangetic Ailia, Indus Garua, and Naziri Cat, according to IUCN. Meanwhile, 21 species (Naseeri Chilwa, Makrani Rohu, Chirruh Snowtrout, Snow Trout, Baltistani Snowtrout, Waziristan Snowtrout, Alepidota loach, Curistigma loach, Fascimaculata loach, Kohatensis loach, Lepidocaulis loach, Machensis loach, Microlabra loach, Nalbanti loach, Pakistanica loach, Punjabensis loach, Hazara loach, Helicopter Catfish, Indus Catfish, Goonch, and Mozambique Tilapia) are Vulnerable (VU) according to IUCN. And the same time, 13 species (Garra Wanae, Zhobi Masheer, Golden Mahseer, Afasciata Loach, Harnaiensis Loach, Macrolepis Loach, Naseeri Loach, Brahui Loach, Pakistan Batasio, Punjab Cat, Mirza Cat, Sufi Cat, and Mirza Nangra) are Endangered (EN), and only 2 species (Kashmiri Loach and Kashmir Cat) are Critically Endangered (CR) according to the IUCN.

Kashmiri Loach *Triplophysa kashmirensis*

In 2020, *Triplophysa kashmirensis* was evaluated for inclusion in the IUCN Red List of Threatened Species. According to criteria A2ace+3ce, *T. kashmirensis* is classified as Critically Endangered. Throughout its range, *T. kashmirensis* is threatened by flooding, drought, and damming, which can disrupt aquatic habitat and breeding grounds. Siltation and hazardous chemicals from industrial sources pose a threat as well (Rafique et al., 2021a; Maqbool et al., 2026).

Kashmir Cat *Glyptothorax kashmirensis*

In 2020, *Glyptothorax kashmirensis* was last evaluated for inclusion on the IUCN Red List of Threatened Species. According to criterion A2c+3c, *G. kashmirensis* is classified as Critically Endangered. Several proposed dams on the Jhelum River pose significant risks to the species and researchers did not believe that dams posed a hazard to this species and suggested that if fish ladders were available, this species could use them effectively. Nevertheless, the current scenario with river development operations is quite concerning for the species. The species will be severely impacted because it is a rapid-flowing river species, and dams will create pools. Furthermore, history has shown that reservoirs are supplied with exotics, which has the potential to destroy this species. Drought is another hazard to this species across its range. Sand, gravel, cobble, and rock mining are severe threats to the species, and this hazard is developing at a rapid pace (Rafique et al., 2022a; Gilani et al., 2026; Jahangeer et al., 2026).

DISTRIBUTION

It is noted that out of the total, 152 species of fishes are native to Pakistan, i.e. *Elops machnata*, *Chitala chitala*, *Notopterus notopterus*, *Gudusia chapra*, *Tenuulosa ilisha*, *Gonialosa manmina*, *Dayella malabarica*, *Chela cachius*, *Laubuka laubuca*,

Salmostoma bacaila, *S. punjabense*, *Securicula gora*, *Cabdio morar*, *Amblypharyngodon mola*, *Barilius bendelisis*, *B. modestus*, *B. pakistanicus*, *B. vagra*, *Danio rerio*, *Devario devario*, *Esomus danrica*, *Bengala elanga*, *Rasbora daniconius*, *Rasbora rasbora*, *Catla catla*, *Cirrhinus mrigala*, *Cirrhinus reba*, *Crossocheilus diplochilus*, *Garra gotyla*, *Garra rossica*, *Labeo angra*, *L. bata*, *L. boga*, *L. boggut*, *L. calbasu*, *L. diplostomus*, *L. dyocheilus*, *L. fimbriatus*, *L. gonius*, *L. nigripinnis*, *L. pangusia*, *L. rohita*, *Cyprinion microphthalmum*, *C. milesi*, *C. watsoni*, *Osteobrama cotio*, *Puntius chola*, *P. conchoni*, *P. gelius*, *P. phutunio*, *P. punjabensis*, *P. sophore*, *P. terio*, *P. ticto*, *P. vittatus*, *Systomus sarana*, *Tor putitora*, *Racoma labiate*, *Racoma ramzani*, *Schizothorax curvifrons*, *Schizothorax dainellii*, *Schizothorax esocinus*, *Schizothorax niger*, *Schizothorax plagiostomus*, *Schizocypris brucei*, *Diptychus maculatus*, *Ptychobarbus conirostris*, *Schizopygopsis stolickai*, *Botia almorhae*, *Botia birdi*, *Botia lohachata*, *Misgurnus anguillicaudatus*, *Lepidocephalichthys guntea*, *Paracanthocobitis botia*, *Nemacheilus corica*, *Schistura alepidota*, *S. balochiorum*, *S. curtistigma*, *S. horai*, *S. kessleri*, *S. lindbergi*, *S. nalbanti*, *S. pakistanica*, *S. punjabensis*, *S. shadiwalensis*, *S. zonata*, *Triplophysa brahui*, *T. choprai*, *T. kashmirensis*, *T. marmorata*, *T. microps*, *T. stolickai*, *T. tenuicauda*, *T. yasinensis*, *Ompok bimaculatus*, *O. pabda*, *Wallago attu*, *Ailia Coila*, *Ailiichthys punctate*, *Clupisoma garua*, *Clupisoma naziri*, *Eutropiichthys vacha*, *Pachypterus atherinoides*, *Rita rita*, *Mystus bleekeri*, *M. cavasius*, *M. gulio*, *M. tengara*, *M. vittatus*, *Sperata sarwari*, *Bagarius bagarius*, *Sisor rabdophorus*, *Gagata cenia*, *Glyptosternon reticulatum*, *Glyptothorax cavia*, *G. kashmirensis*, *G. pectinopterus*, *G. punjabensis*, *G. sufii*, *Nangra nangra*, *N. robusta*, *Clarias batrachus*, *Heteropneustes fossilis*, *Glossogobius giuris*, *Boleophthalmus dussumieri*, *Chanda nama*, *Parambassis baculis*, *Parambassis ranga*, *Mugil cephalus*, *Minimugil cascasia*, *Planiliza abu*, *Ellochelon vaigiensis*, *Xenentodon cancila*, *Aplocheilus blockii*, *A. panchax*, *Aphanius dispar*, *Monopterus cuchia*, *Macrognathus aral*, *M. pancalus*, *Mastacembelus armatus*, *Trichogaster fasciata*, *T. lalius*, *Channa gachua*, *C. marulius*, *C. punctate*, *C. striata*, *Nandus nandus*, *Badis badis*, *Lates calcarifer*, *Terapon puta*, *Lutjanus johnii*, and *Acanthopagrus berda*.

While only 13 species are introduced in Pakistan, i.e. *Carassius auratus*, *Cyprinus carpio*, *Ctenopharyngodon idella*, *Hypophthalmichthys molitrix*, *H. nobilis*, *Oncorhynchus mykiss*, *Salmo trutta fario*, *Oreochromis aureus*, *O. mossambicus*, *O. niloticus*, *Gambusia affinis*, *Silurus glanis*, and *Poecilia reticulata*.

While 31 species are endemic to Pakistan, i.e. *Barilius naseeri*, *Garra wanae*, *Labeo caeruleus*, *L. gedrosicus*, *Tariqilabeo macmahoni*, *Naziritor zhobensis*, *Puntius waagni*, *Schizothorax skarduensis*, *Schistura afasciata*, *S. anambarensis*, *S. arifi*, *S. fascimaculata*, *S. harnaiensis*, *S. kohatensis*, *S. lepidocaulis*, *S. machensis*, *S. macrolepis*, *S. microlabra*, *S. naseeri*, *S. prashari*, *Triplophysa hazaraensis*, *T. naziri*, *T. trewavasae*, *Ompok sindensis*, *Batasio pakistanicus*, *Mystus horai*, *Amblyceps macropterus*, *Sisor pakistanicus*, *Gagata pakistanica*, *Glyptothorax naziri* and *G. stocki*. (Figure 6)

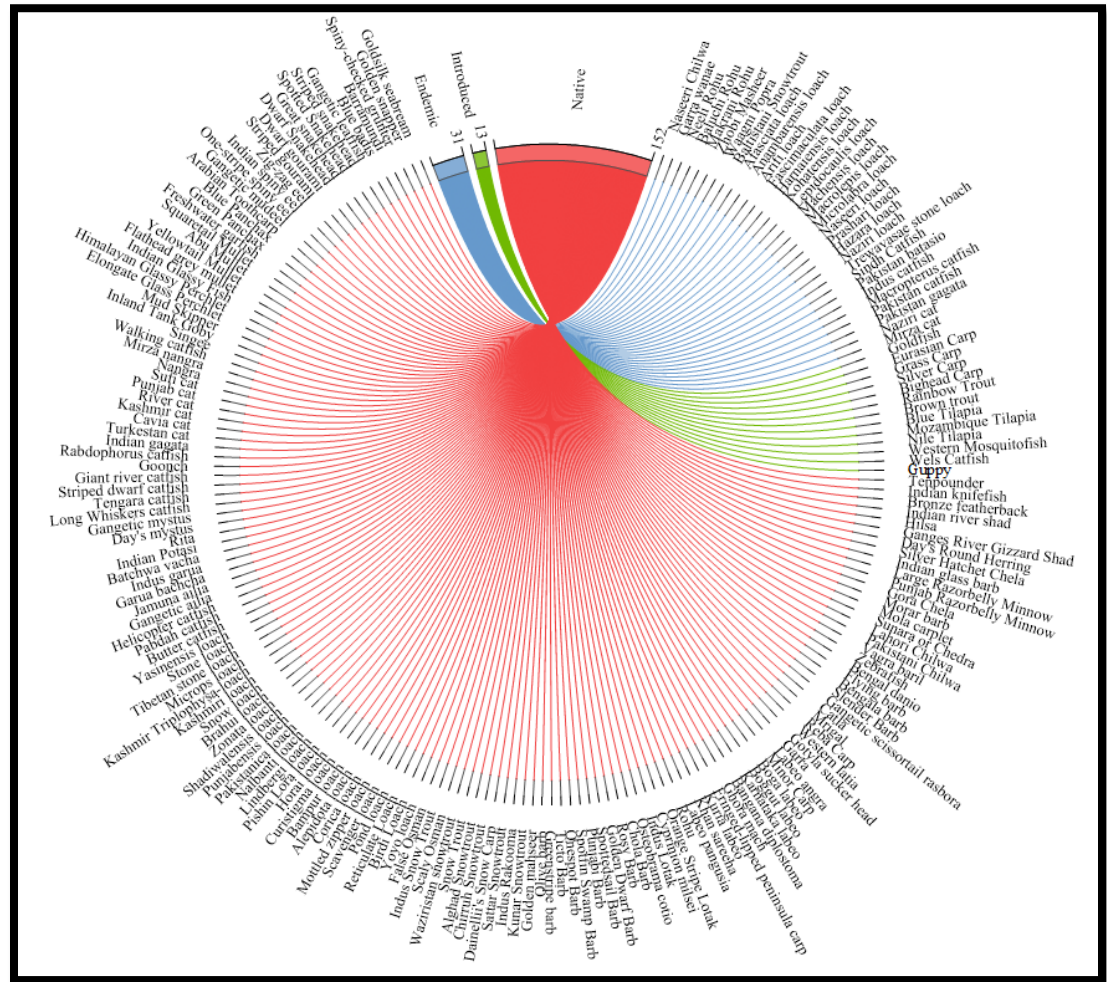


Figure 6: Distribution of freshwater fishes in Pakistan.

Barilius naseeri

The Soan and Jhelum Rivers in Pakistan's Punjab Province are home to the endemic *Barilius naseeri*, which has a restricted range. The species' area of occupancy is 1,300 km², and its extent of occurrence is 8,000 km². The species, which is thought to be rare, is threatened by a variety of human stresses that are common in the river systems in which it lives (Mirza and Mirza, 2014). Based on these risks, *B. naseeri* is classified as Vulnerable under criteria B1ab(iii)+2ab(iii) (Daniels and Raghavan, 2022).

Garra wanae

In 2019, *Garra wanae* was last evaluated for inclusion on the IUCN Red List of Threatened Species. According to criterion B1ab(iii), *G. wanae* is classified as Endangered. *G. wanae* was first identified in Wana Toi, a tributary of the Gomal River in southwest Waziristan, Pakistan. It is limited to the area between the villages of Dubkot and Wana Toi, Khyber Pakhtunkhwa (Daniels and Raghavan, 2021).

Labeo caeruleus

Labeo caeruleus was first described from the Sindh hills in Pakistan. The species is indigenous to Pakistan, with its distribution limited to rivers at the base of the Sindh hills and Baluchistan (Jayaram 2000). The species is found in the Hub and Guddu dams in Sindh, the Taunsa and Panchnadh reservoirs in Punjab, and the Loralai and Bolan rivers (Balochistan) that drain into the Hub reservoir. *L. caeruleus* is listed as Least Concern (Daniels, 2021).

Labeo gedrosicus

This species is believed to be unique to the Mashkel watercourse in Balochistan, Pakistan. It has been found in the Rakhshan River near Punjgur, where it meets the Mashkel River, as well as in spring water in Garruk, Kharan District. It is listed as Least Concern (Rafique et al., 2021c).

Tariqilabeo macmahoni

Tariqilabeo macmahoni was first described from the Dasht River, near Suntsar and Turbat in Baluchistan Province, and is now believed to be limited to this basin. *T. macmahoni* is classified as vulnerable under criteria B1ab(iii) (Daniels et al., 2021a).

Naziritor zhobensis

The Zhob, Gomal, and Kurram rivers in Pakistan are home to the endemic species *Naziritor zhobensis*. According to earlier reports, the species is now extinct in the Kabul and Swat rivers. This species' record from the Kunhar River is probably inaccurate. According to criterion A2bc, *N. zhobensis* is classified as Endangered (Ahmad et al., 2022).

Puntius waageni

Puntius waageni is documented from the Chua Saidar Shah in Pakistan's Punjab Province, where it is endemic. In 2002, the species was also collected from the Chenab River at Head Rasool. *Puntius waageni* is classified as Vulnerable under criterion B1ab(iii) (Daniels et al., 2021b).

Schizothorax skarduensis

Schizothorax skarduensis is endemic to Pakistan and can be found in northern rivers and streams, such as those in the Skardu District of Gilgit-Baltistan. This species is classified as Vulnerable under Criterion D2 (Rafique and Daniels, 2022).

Schistura afasciata

It was formerly believed that *Schistura afasciata* was confined to a small region of the Dor River, a left tributary of the upper Indus River close to Havelian, Pakistan. According to recent reports, this species is reported to be found in the Jhelum River (Muzaffarabad, AJK), the Kunhar River, the Punjkora River, the Swat River, the Dor River, the Unar stream, and the Siren River in the upper reaches of the Trabela Dam, KPK. According to criterion A3c, this species is classified as Endangered (Rafique et al., 2021i).

Schistura anambarensis

Schistura anambarensis is endemic to Pakistan and has been found in the Anambar River, the Kolachi River, and the upper reaches of the Zhob River in Balochistan (Qureshi et al., 2021).

Schistura arifi

Schistura arifi's distribution is native to Pakistan's Zhob River basin, as well as the Gomal and Tochi rivers. It is listed as Least Concern (Zafarullah et al., 2021).

Schistura fascimaculata

Schistura fascimaculata is classified as Vulnerable under Criteria B1ab(iii). This species is endemic to Pakistan and is reported from Hangu in the Kohat Toi River, the Indus River in the Kohat District, the lower Kurram River below Thal, and the Orakzai District up to Kalaya. It is listed as Least Concern (Rafique et al., 2022c).

Schistura harnaiensis

Schistura harnaiensis is classified as Endangered under the criteria B1ab(iii). This species is endemic to Pakistan, collected only from Harnai, in the basin of the Kaman-Beji River, which flows into the Nari River and ends in Lake Nari-Bolan, west of the Indus River (Rafique et al., 2022c).

Schistura kohatensis

Schistura kohatensis is classified as Vulnerable under criteria A2c and 3c. It is endemic to Pakistan, where it has been found in the Gomal, Hundo, Kohat, Kurram, and Zhob regions of Balochistan (Rafique et al., 2021h).

Schistura lepidocaulis

Schistura lepidocaulis is classified as Vulnerable under Criteria B1ab(iii). It is endemic to Pakistan and is found in Punjab, Khyber Pakhtunkhwa, and Balochistan. It has been observed in the lower Kurram River drainage and Soon Skesar Valley. An older record from the Indus River is also being contested (Rafique et al., 2021h).

Schistura machensis

Schistura machensis is endemic to Pakistan, specifically found in the Macch River and Harnai, both of which are tributaries of the Bolan River and part of the Kaman-Beji basin in the Nari region of Balochistan province. This species is classified as Vulnerable under Criteria B1ab(iii) (Rafique et al., 2021f).

Schistura macrolepis

Schistura macrolepis is classified as Endangered (EN) using the criterion A2c+3c. It is endemic to Pakistan. It has been observed in three locations on both sides of the middle Indus River, including a tiny tributary at Racki Munh (Fort Munroe), Dera Ghazi Khan District, the upper reach of the Chenab River in Shadiwal, and the Trimmu area in the Jhang District (Rafique et al., 2021g).

Schistura microlabra

Schistura microlabra is classified as Vulnerable under criteria A3c and B1ab(iii,v). It is endemic to Pakistan and has been documented in the province of Khyber Pakhtunkhwa at Ali Mazjid in the Kabul and Unar river drainages, as well as in tributaries of Siren Loghi and Manglhra (Rafique et al., 2021d).

Schistura naseeri

Schistura naseeri is classified as Endangered under criterion A3c. This species is endemic to Pakistan, where it has been identified in the Swat, Doar, and Indus rivers within the Hazara region (Battagram, Abbottabad). It is also found in the Swat and Bajaur districts of Khyber Pakhtunkhwa, including the Madyan stream (Rafique et al., 2021e).

Schistura prashari

Schistura prashari is classified as Near Threatened under Criteria A3c. It is a Pakistani endemic species identified from Kohat city on the Indus River. It is found in the northern regions on both banks of the Indus, in a narrow geographical area. It has been observed in the Swat, Haro, and Kabul rivers, as well as the Soon Skesar Valley in the Bajaur, Mohmand, and Khyber Pakhtunkhwa provinces (Rafique et al., 2021b).

Triplophysa hazaraensis

Triplophysa hazaraensis is classified as Vulnerable under criteria A3c and B1ab(iii,v). It is found in Pakistan's Hazara region, specifically along the Shiren and Dor rivers. It has recently been recorded from Malakand, Swat, and Dir in the Swat and Panjkora rivers (Rafique et al., 2021k).

Triplophysa naziri

Triplophysa naziri was documented from the streams (known as Madyan and Matta) of the Swat River in Pakistan and is endemic. It is classified as Least Concern (LC) (Rafique et al., 2021j).

Triplophysa trewavasae

This species has been reported from the Yasin Valley and Chatorkhunj Valley of the Ghizar River in Gilgit-Baltistan, Pakistan, and is endemic (CAMP 2004; M. Rafique pers. comm. 2020). It is classified as Least Concern (LC) (Rafique et al., 2022b).

Ompok sindensis

It is reported only from Sindh, Pakistan, and is endemic to this country; this species is Not Evaluated (NE) by the IUCN (Sandhu et al., 2021).

Batasio pakistanicus

The only known locations for this endemic species in Punjab, Pakistan, are Attock Khurd, Jinnah, and Chashma Barrage in the Indus basin (Ahmad et al. 2010). This species has not been collected, despite surveys conducted in other regions of the Indus system. The extent of occurrence is currently 3,780 km², while the known area

of occupancy is 332 km². To comprehend the species' micro-level distribution, research is necessary. This species is categorized as Endangered under the criteria B1ab(i,ii,iii)+2ab(i,ii,iii) (Daniels et al., 2021b).

Mystus horai

Mystus horai is endemic to Pakistan and has been observed from Taunsa Barrage. It was first reported from Kalabagh in the Indus River. The species' extent of occurrence is 12,300 km², and its area of occupancy is 1,900 km². It is classified as Vulnerable using the criteria B1ab(i,ii,iii)+2ab(i,ii,iii) (Daniels et al., 2021b).

Amblyceps macropterus

Amblyceps macropterus is classified as Data Deficient. It was first described from the Hub River in Hinidan, and Las Bela District, in Balochistan, Pakistan. Since the species' description, no information has been published; endemic in Pakistan (Rema and Bogutskaya, 2022).

Sisor pakistanicus

Sisor pakistanicus is classified as Data Deficient. *Sisor pakistanicus* was first described from the River Chenab at Trimmu headworks near Jhang. There is no further data on the species available, and it is endemic to Pakistan (Ramzan et al., 2021).

Gagata pakistanica

Gagata pakistanica is endemic to Pakistan; it is reported from the Indus River, Attock, Murree, Punjab, and Charsadda, Swat Rivers, Khyber Pakhtunkhwa. This species is classified as Least Concern (Daniels et al., 2022).

Glyptothorax naziri

Glyptothorax naziri is classified as Near Threatened under Criteria A3c. It is endemic to Pakistan and has been reported from the Neelum, Jhelum, and Siran rivers, as well as the lower Swat, Kabul, Kohar Toi, and Haro rivers, and the lower Kurram (Rafique, 2021).

Glyptothorax stocki

Glyptothorax stocki is listed as Endangered under criteria A2ac+3c. *Glyptothorax stocki* is endemic to Pakistan and has been found in the provinces of Punjab, Khyber Pakhtunkhwa, and Azad Kashmir. It has been observed in the districts of Attock and Rawalpindi in Punjab Province, as well as in the Indus River at Taunsa Barrage. Additionally, it was discovered in the River Ravi in 1970. It has been documented in Tarbela, the Kabul River at the Warask Dam, the Etai River at Shangla, and the Swat River in locations like Charsadda and Landakay in Khyber Pakhtunkhwa Province. It has been observed in the Jhelum River in the Muzaffarabad District of Azad Kashmir (Rafique, 2021).

MAJOR THREATS TO FRESHWATER FISH DIVERSITY

Pakistan has an alarming water crisis. The issues of water supply and quality, as well as the conservation and protection of freshwater habitats, are as urgent here as anywhere in the world. Pakistan, once a water surplus country, is now a water deficit one. The variability in rainfall levels and drought has devastating effects on agriculture, rangelands, and wetlands (Ishaque et al., 2022; Mohsin et al., 2025). Seawater intrusion due to low flows below Kotri has resulted in ecosystem degradation in the Indus Delta (Inam et al., 2022). The reduction in reservoir capacity due to sedimentation in Tarbela, Mangla, and Chashma is expected to cause a loss of 25% of their storage capacity by 2010. Increased domestic and industrial demands for water have put pressure on irrigation requirements, resulting in poor delivery efficiencies in the irrigation sector. Water quality is decreasing due to the disposal of untreated urban sewage, individual effluent, and agricultural drainage. The population of species dependent on freshwater ecosystems is threatened due to shrinking rivers and poor water quality, as well as depletion of groundwater due to overexploitation, and resultant waterlogging and salinity (Rasheed and Ahmad, 2023; Baocheng et al., 2024).

Wetlands are one of the world's most threatened habitats. The wetlands of Pakistan face various anthropogenic pressures. Due to the rapid increase in the human population, large-scale changes in land use have decreased wetland areas. Significant losses have resulted from conversion threats from industrial, agricultural, and various urban developments. These hydrological disturbances have led to pollution and its effects. Unsustainable levels of grazing and fishing activities have resulted in the degradation of wetlands. The main threats to water biodiversity include habitat loss, a decrease in wetland area, chemical toxins, chemical pollution, diseases, human disturbance of nesting, feeding, and roosting areas, water shortages, degraded quality of foraging habitat due to the invasion of introduced species, excessive hunting, logging, and large-scale use of insecticides and pesticides in agriculture, as well as industrial pollution. Various agricultural activities, including the use of chemical fertilizers, pesticides, and insecticides, lead to diseases in aquatic fauna. Lack of awareness, weak law enforcement, insufficient inventories and data, limited resources, and poor management of wetlands are the main threats in Ravi Siphon (Munir, 2010). Climate change, such as global warming, poses a serious threat to biodiversity. The most commonly cited human threat to biodiversity is habitat loss (Berde et al., 2022; Sharma and Naik, 2024; Batool et al., 2025a; Batool et al., 2025b).

CONCLUSION

Pakistan boasts a rich diversity of freshwater fish, primarily associated with the Indus River system and its tributaries, lakes, wetlands, and reservoirs. This review highlights that approximately 196 freshwater fish species have been recorded across 93 genera, 39 families, and 17 orders in the country. Many of these species inhabit various provinces, including Punjab, Sindh, Khyber Pakhtunkhwa, Balochistan, Azad Jammu and Kashmir, and Gilgit-Baltistan. Notably, 31 species are endemic to Pakistan, underscoring the region's unique ecological and biogeographical characteristics. Freshwater ecosystems, such as rivers, wetlands, and Ramsar sites,

play a vital role in preserving fish biodiversity, maintaining ecological balance, supporting fishery resources, and enhancing the well-being of local communities.

The variety of freshwater fish in Pakistan is in danger from many human activities and environmental challenges, such as habitat loss and degradation, water contamination, dam building, overfishing, and climate change. Many fish species, already considered Vulnerable, Endangered, or Critically Endangered by the IUCN, are threatened due to human activities such as wetland and water quality deterioration and habitat modification. Thus, increasing the freshwater fisheries resources of Pakistan will require the implementation of more aggressive conservation and sustainable fisheries management, protection of freshwater habitat, and monitoring of freshwater and fish resource biodiversity in Pakistan, as well as updating and inventorying ecological conservation studies. Therefore, research should be directed toward updating inventories, ecological studies, and conservation planning for the fish species of the freshwater ecosystem of Pakistan.

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Table 1: Freshwater fishes of Pakistan.

Sr.	Species	Species authority	English Names	Azad Jammu and Kashmir	Khyber Pakhtunkhwa	Baluchistan	Punjab	Sindh	Gilgit-Baltistan	Mirza (2004)	Sandhu et al. (2021)	www.iucnredlist.org
1	<i>Elops machnata</i>	Linnaeus, 1766	Tenpounder									
2	<i>Chitala chitala</i>	Hamilton, 1822	Indian Knifefish									
3	<i>Notopterus notopterus</i>	Pallas, 1769	Bronze Featherback									
4	<i>Gudusia chapra</i>	Hamilton, 1822	Indian River Shad									
5	<i>Tenuulosa ilisha</i>	Hamilton, 1822	Hilsa									
6	<i>Gonialosa manmina</i>	Hamilton, 1823	Ganges River Gizzard Shad									
7	<i>Dayella malabarica</i>	Day, 1873	Day's Round Herring									
8	<i>Chela cachius</i>	Hamilton, 1822	Silver Hatchet Chela									
9	<i>Laubuka laubuca</i>	Hamilton, 1822	Indian Glass Barb									
10	<i>Salmostoma bacaila</i>	Hamilton, 1822	Large Razorbelly Minnow									
11	<i>Salmostoma punjabense</i>	Day, 1872	Punjab Razorbelly Minnow									
12	<i>Securicula gora</i>	Hamilton, 1822	Gora Chela									
13	<i>Cabdio morar</i>	Hamilton, 1822	Morar Barb									
14	<i>Amblypharyngodon mola</i>	Hamilton, 1822	Mola Carplet									
15	<i>Barilius bendelisis</i>	Hamilton, 1807	Sunara Or Chedra									
16	<i>Barilius modestus</i>	Day, 1872	Lahori Chilwa									
17	<i>Barilius naseeri</i>	Rafique & Awan, 1986	Naseeri Chilwa									
18	<i>Barilius pakistanicus</i>	Mirza & Sadique, 1978	Pakistani Chilwa									
19	<i>Barilius vagra</i>	Hamilton, 1822	Vagra Baril									
20	<i>Danio rerio</i>	Hamilton, 1822	Zebrafish									
21	<i>Devario devario</i>	Hamilton, 1822	Bengal Danio									
22	<i>Esomus danrica</i>	Hamilton, 1822	Flying Barb									

[illegible]

[illegible]

85	Misgurnus anguillicaudatus	Cantor, 1842	Pond Loach
86	Lepidocephalichthys guntea	Hamilton, 1822	Scavenger Loach
87	Paracanthocobitis botia	Hamilton, 1822	Mottled Zipper Loach
88	Nemacheilus corica	Hamilton, 1822	Corica Loach
89	Schistura afasciata	Mirza and Banarescu, 1981	Afasciata Loach
90	Schistura alepidota	Mirza and Banarescu, 1970	Alepidota Loach
91	Schistura anambarensis	Mirza and Banarescu, 1970	Anambarensis Loach
92	Schistura arifi	Mirza and Banarescu, 1970	Arifi Loach
93	Schistura balochiorum	Zugmayer, 1912	Bampur Loach
94	Schistura curtistigma	Mirza and Nalbant, 1981	Curistigma Loach
95	Schistura fascimaculata	Mirza and Nalbant, 1981	Fascimaculata Loach
96	Schistura harnaiensis	Mirza and Nalbant, 1981	Harnaiensis Loach
97	Schistura horai	Menon, 1952	Horai Loach
98	Schistura kessleri	Gunther, 1889	Pishin Lora Loach
99	Schistura kohatensis	Mirza and Banarescu, 1981	Kohatensis Loach
100	Schistura lepidocaulis	Mirza and Nalbant, 1981	Lepidocaulis Loach
101	Schistura lindbergi	Banarescu and Mirza, 1965	Lindbergi Loach
102	Schistura machensis	Mirza and Nalbant, 1970	Machensis Loach
103	Schistura macrolepis	Mirza and Banarescu, 1981	Macrolepis Loach
104	Schistura microlabra	Mirza and Nalbant, 1981	Microlabra Loach
105	Schistura nalbanti	Banarescu and Mirza, 1972	Nalbanti Loach
106	Schistura naseeri	Ahmad and Mirza, 1963	Naseeri Loach
107	Schistura pakistanica	Mirza and Banarescu, 1969	Pakistanica Loach
108	Schistura prashari	Hora, 1933	Prashari Loach
109	Schistura punjabensis	Hora, 1933	Punjabensis Loach
110	Schistura shadiwalensis	Mirza and Nalbant, 1981	Shadiwalensis Loach
111	Schistura zonata	McClelland, 1839	Zonata Loach
112	Triplophysa brahui	Zugmayer, 1912	Brahui Loach
113	Triplophysa choprai	Hora, 1934	Snow Loach
114	Triplophysa hazaraensis	Omer and Mirza, 1975	Hazara Loach
115	Triplophysa kashmirensis	Hora, 1922	Kashmiri Loach

116	<i>Triplophysa marmorata</i>	Heckel, 1838	Kashmir Triplophysa-Loach									
117	<i>Triplophysa microps</i>	Steindachner, 1866	Microps Loach									
118	<i>Triplophysa naziri</i>	Ahmad and Mirza, 1963	Naziri Loach									
119	<i>Triplophysa stolickai</i>	Steindachner, 1866	Tibetan Stone Loach									
120	<i>Triplophysa tenuicauda</i>	Steindachner, 1866	Stone Loach									
121	<i>Triplophysa trewavasae</i>	Mirza and Ahmad, 1990	Trewavasae Stone Loach									
122	<i>Triplophysa yasinensis</i>	Alcock, 1898	Yasinensis Loach									
123	<i>Ompok bimaculatus</i>	Bloch, 1794	Butter Catfish									
124	<i>Ompok pabda</i>	Hamilton, 1822	Pabdah Catfish									
125	<i>Ompok sindensis</i>	Day, 1877	Sindh Catfish									
126	<i>Wallago attu</i>	Bloch and Schneider, 1801	Helicopter Catfish									
127	<i>Ailia Coila</i>	Hamilton, 1822	Gangetic Ailia									
128	<i>Ailiichthys punctata</i>	Day, 1872	Jamuna Ailia									
129	<i>Clupisoma garua</i>	Hamilton, 1822	Garua Bachcha									
130	<i>Clupisoma naziri</i>	Mirza and Awan, 1973	Indus Garua									
131	<i>Eutropiichthys vacha</i>	Hamilton, 1822	Batchwa Vacha									
132	<i>Pachypterus atherinoides</i>	Bloch, 1794	Indian Potasi									
133	<i>Rita rita</i>	Hamilton, 1822	Rita									
134	<i>Batasio pakistanicus</i>	Mirza and Jan, 1989	Pakistan Batasio									
135	<i>Mystus bleekeri</i>	Day, 1877	Day's Mystus									
136	<i>Mystus cavasius</i>	Hamilton, 1822	Gangetic Mystus									
137	<i>Mystus gulio</i>	Hamilton, 1822	Long Whiskers Catfish									
138	<i>Mystus horai</i>	Jayaram, 1954	Indus Catfish									
139	<i>Mystus tengara</i>	Hamilton, 1822	Tengara Catfish									
140	<i>Mystus vittatus</i>	Bloch, 1794	Striped Dwarf Catfish									
141	<i>Sperata sarwari</i>	Mirza, Nawaz and Javed, 1992	Giant River Catfish									
142	<i>Amblyceps macropterus</i>	Ng, 2001	Macropterus Catfish									
143	<i>Bagarius bagarius</i>	Hamilton, 1822	Goonch									
144	<i>Sisor rabdophorus</i>	Hamilton, 1822	Rabdophorus Catfish									
145	<i>Sisor pakistanicus</i>	Javed and Mirza, 2011	Pakistan Catfish									
146	<i>Gagata cenia</i>	Hamilton, 1822	Indian Gagata									

[illegible]

178	<i>Gambusia affinis</i>	Baird and Girard, 1853	Western Mosquitofish									
179	<i>Monopterusuchia</i>	Hamilton, 1822	Gangetic Mudeel									
180	<i>Macrogathus aral</i>	Bloch and Schneider, 1801	One-Stripe Spiny Eel									
181	<i>Macrogathus pancalus</i>	Hamilton, 1822	Indian Spiny Eel									
182	<i>Mastacembelus armatus</i>	Lacepede, 1800	Zig-Zag Eel									
183	<i>Trichogaster fasciata</i>	Bloch and Schneider, 1801	Striped Gourami									
184	<i>Trichogaster lalius</i>	Hamilton, 1822	Dwarf Gourami									
185	<i>Channa gachua</i>	Hamilton, 1822	Dwarf Snakehead									
186	<i>Channa marulius</i>	Hamilton, 1822	Great Snakehead									
187	<i>Channa punctata</i>	Bloch, 1793	Spotted Snakehead									
188	<i>Channa striata</i>	Bloch, 1793	Striped Snakehead									
189	<i>Nandus nandus</i>	Valenciennes, 1831	Gangetic Leaffish									
190	<i>Badis badis</i>	Hamilton, 1822	Blue Badis									
191	<i>Lates calcarifer</i>	Bloch, 1790	Barramundi									
192	<i>Terapon puta</i>	Cuvier and Valenciennes, 1829	Spiny-Checked Grunter									
193	<i>Lutjanus johnii</i>	Bloch, 1792	Golden Snapper									
194	<i>Acanthopagrus berda</i>	Forsskal, 1775	Goldsilke Seabream									
195	<i>Silurus glanis</i>	Linnaeus, 1758	Wels Catfish									
196	<i>Poecilia reticulata</i>	Peters, 1859	Guppy									

Note	
	Native
	Endemic
	Introduced
	Mirza (2004)
	Sandhu et al. (2021)
	www.iucnredlist.org