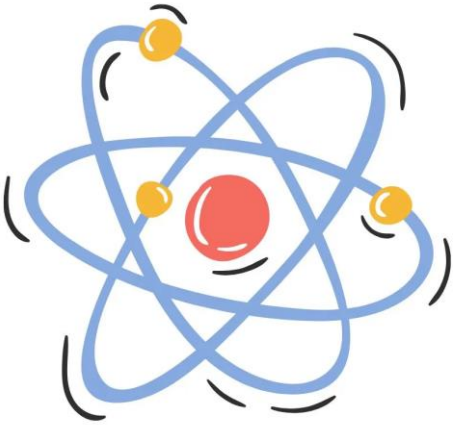

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A BRIEF REVIEW ON IMPACT OF PHYSICO-CHEMICAL PARAMETERS ON FISH DIVERSITY

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ABSTRACT: Examining the diversity of fish as well as their physical and chemical characteristics is the main goal of this research. Many Physico-chemical parameters including temperature, pH, dissolved oxygen, carbon dioxide, alkalinity, calcium content, water hardness, nitrate concentration and productivity, they were also analyzed as part of the experiment. Many species of fish have become extremely endangered as a result of the severe human involvement that has damaged and destroyed freshwater ecosystems over the past few decenniums, particularly in areas there are fresh water resources heavily relied upon. Because human activities like pollution and overfishing are endangering the fish in these places, the author strongly advises developing a workable conservation action plan to stop the loss of fish diversity. Appropriate data indicates that fish diversity and productivity are influenced by a range of physicochemical variables including water quality. The result showed that there were notable differences in fish variety and Physico-chemical characteristics between the various sampling sites.

KEYWORDS: Fish Diversity, Physico-Chemical Parameter, Productivity, Freshwater, Endangering, Overfishing, Appropriate.

Introduction

India is the world's second-largest aquaculture fish producer and the third-largest fish producing nation. About 7% of the world's fish is produced in India. The nation is among the 17 mega-biologically rich nations. Approximately 14 million people work in fishing and related industries. The nation's top fish producer is Andhra Pradesh, which is followed by Gujarat and West Bengal. An estimated 175.45 million metric tons of fish will be produced overall in 2023–2024; around 70% of this amount will come from the in land sector and approximately 50% Culture will come from fisheries**. (Graham, C., 2023) (Lynette Alvarado-Ramirez, 2023) (S., Muthukumarvel, 2022).** By supplying vital nutrients that sustain the ecosystem as a whole, fish play a significant role in it **(Priscilla, Le, Mezo., 2022**). Fishes are cold-blooded aquatic chordates that live in seas, rivers, lakes, canals, reservoirs, estuaries, etc. and have pharyngeal

gills for respiration. Fish contribute more than half of the total vertebrate fauna with 34,300 species. India contributes about 7.7% to the global fish diversity, of which 1,673 are marine and 994 are freshwater **(Froese and Pauly, 2020)** and also contributes to the diversity of aquatic ecosystems in various ways. (**Codd and Murray (2006).**

Diverse and abundant fish populations are vital to sustainable aquaculture, Which is becoming more important to meet the world's food needs.. The most varied industry in food production is aquaculture, where species diversity promotes genetic resources and ecosystem services both of which are essential for sustainable practices, the relationship between fish productivity and biodiversity is critical. **(Gyalog et. al. 2022)** Even while aquaculture has grown, research shows that it frequently depends on a small number of species, especially freshwater fish like carp and marine species like Western white leg prawns. On the other hand, increasing species diversity in polyculture systems can boost resilience, profitability, and environmental sustainability **(Anderson., 2002).** This strategy not only lessens the dangers connected to monoculture but also this strategy promotes local food security and conservation initiatives while also reducing the dangers connected with monoculture. Therefore, it is critical for sustainable development and tackling the issues brought on by rising food needs and environmental pressures to incorporate a variety of species into aquaculture **(Klinger and Naylor 2012).** Fish are good recyclers of the nutrients required for the survival of algae and other bottom-level organisms, which in turn sustain the ecosystem as a whole. Additionally, Fish can help prevent the spread of yellow fever, malaria and other terrible diseases spread by mosquitoes. **(JA, Nilsson. 2019).** As an illustration, larval fish such as Gambusia,Panchax, Haplochitus, and Trichogaster consume mosquito larvae. **(Oriol, Cano-Rocabayera., 2020) (S., V., Surendranath. (2018).**

Anthropogenic activities such as habitat change, the introduction of exotic species, pollution and a sedimentation, have a special impact on continental aquatic ecosystem .The effects of these activities could endangered the biological integrity of aquatic ecosystems and ichthyofaunal diversity. **(Oriol, Cano-Rocabayera., 2020) (Craig, Lawrence., 2016).** Overfishing can have a negative impact on the ability of the ecosystem to function as a whole. Physical and chemical changes occurring in the environment are affecting many types of plants and animals present in the aquatic ecosystem. When determining productivity, the physicochemical characteristics of a water body are of great importance**. (Muhammad, Ikbal.,2020).**

One of the most important physical and chemical factors influencing the life of aquatic fauna is **Biological Oxygen Demand** requirement. Fish diversity and productivity are significantly impacted by biological oxygen demand. Te quantity of water needed are requested by aerobic bacteria to decompose organic matter present in certain sample of water at particular temperature and over a specific amount of time is known as biological oxygen demand **(Tanmay, Datta et. al. (2022).** In freshwater bodies BOD can be a sign of both organic pollution and microbial infection. Microorganism that breakdown organic waste drastically reduces the amount of oxygen. That aquatic organism need for respiration and metabolism. Fish and aquatic plant suffers as a result, and the aquatic ecology is total upended. High BOD levels are frequently a symptoms of organic pollution which has a negative effect of aquatic ecosystem.

Lower dissolve oxygen which is essential to fish survival, is a result of elevated BOD levels. Fish mortality, slowed growth rates and changed behavior can change all result from do which eventually reduces the verities of species present in the impacted water **(Priyanka, Sharma 2014**). High BOD can result in the death of fish and aquatic plant as a result of disturbed aquatic environment. It can also reduce the natural attractiveness of water body. For example – freshwater fish such as trout and salmon will die when dissolved oxygen level drop below 5 P.P.M. (part per million), and even fish that can withstand low oxygen level such as catfish and carp may also be at risk **(Tanmay, Datta 2022)**. As BOD causes organic waste to be broken down by bacteria, less oxygen is available for aquatic species to breath and metabolize. This can causes oxygen level in the stream to drop rapidly, causing stress, suffocation and even destruction of aquatic life. Despite the well established negative effect of high BOD on fish variety. Recent research in decades that some robust species may be able to adopt new environments and possibilities preserve some degree of diversity in spite of pollution pressures **(Tanmay, Datta 2022).**

Iron has a complex effect on fish diversity, especially in freshwater environments where industrial and mining operations contribute iron and other heavy metals. According to research, high iron levels can cause major ecological disruptions that have an impact on fish populations and biodiversity as a whole. Fish diversity is lost directly and indirectly as a result of mining operations, particularly those that involve the extraction of iron from freshwater environments. The main causes are habitat degradation, erosion, and pollution introduction **(Walter, M et al. 2021).** In neotropical water bodies where mining is common, the presence of iron from mining

has been shown to cause poorer fish communities **(Walter, M et al. 2022).** Research suggests that certain amounts of iron can be harmful to aquatic life. For example, mortality in tilapia fish was found to vary with iron levels, suggesting that there is a threshold above which iron becomes harmful **(J, I, R, Udotong2003**). On the other hand, iron sulfate supplements have been used to manage eutrophication, nevertheless, this can also result in a reduction in the diversity of benthic invertebrates, which are essential to fish diets **(Neil, Philp, Radford. (1997).** In conclusion, iron has a generally detrimental effect on fish diversity, even though it can sometimes increase biological productivity in certain situations. This is especially true when iron mining and pollution are involved. However, iron still has a complex interaction with the aquatic environment, so more research is needed on its dual roles as a potential nutrient and contaminant.

Review of literature

Debjit, Kumar, et.al. (2010). Review on Water Quality Parameters and Fish Biodiversity Indices as Measures of Ecological Degradation, A case study in two flood-prone lakes of India. Conclusion is Fish diversity indices are significantly impacted by physico-chemical parameters like water depth, conductivity, and salinity, emphasizing the importance of considering environmental changes for sustainable fishing.

C., M, Nagabhushan et al. (2010). Research on Diversity of ichthyo-fauna in relation to physico-chemical characters of tungabhadra reservoir, hotspot. The ichthyofaunal diversity showed maximum of 41% during post-monsoon, 36% during pre-monsoon and minimum of 23% during monsoon season in all the study stations .Similar observations were created by Huliyal et al, (2005) in Almatti reservoir.

Quality of Bhadra River of Western Ghats (INDIA). Environmental Monitoring and Assessment. 56 fish species, 31 genera, 15 families recorded in Bhadra River. Cyprinids dominant; Puntius chola, Puntius sophore, Hypselobarbus kolus common.

Shailesh mishra, et. al. (2011). Review on "fish diversity, threats and issue of fisheries management in an unexplored tributary of the Ganga's basin, northern India" found 62 species, 24 families of 8 order and 48 genera collected from the 5 sites of river

Shailesh, et.al. (2011). observed that Pattern of Freshwater Fish Diversity, , Threats and issues of fisheries management in an unidentified tributary of the Ganga Basin, Northern

India. Journal of Ecophysiology and Occupational Health. 62 fish species from 5 sites in river Ghaghara described.Cyprinidae most abundant family, contributing 30.6% of fish fauna.

Siddiqui Tasneem (2011). Study on Freshwater Limnology and Fisheries Status in Barul Reservoir, District Nanded, Maharashtra State. Total fish production from the larger reservoir is 50-100Kg/ha/yr and1200-1400Kg/ha/yr recorded under the Fish Farmer Developing Agencies (FFDA) scheme. On an average for 2years record the fish yield of Barul reservoir.

S. Tirumala et. al (2011). Work on Fish diversity in relation to physico-chemical characteristics of Bhadra reservoir of Karnataka, India. The reservoir hosts 33 fish species, with peak diversity post-monsoon, indicating a moderately oligotrophic water body supporting varied aquatic life.

Amal, Kumar et.al. (2011). Study on Physico-chemical Characteristics and ichthyofauna diversity in the Karala River, a tributary of the Teesta River in Jalpaiguri district, West Bengal, India. The study on Karala River revealed 55 fish species from 8 orders, with Cypriniformes dominating. Physico-chemical factors such as water quality affect fish diversity in an ecosystem.**V, Jayalekshmy. (2012).** A Comparative Study on The Diversity of Ornamental and Foodfishes of River Achenkovil In Relation to Various Physico- Chemical Characteristics. Physico-chemical parameters influence fish diversity in River Achenkovil. 76 fish species were identified, with Cyprinidae dominant, and downstream showing higher diversity. Endangered species present, aiding conservation decisions.

A., Senthil . et.al.(2012). Study on Fish Diversity In Relation To Physico-Chemical Characteristics of Kamala Basin of Darbhanga District, Bihar, India. Fish diversity in Kamala basin reservoir is influenced by physico-chemical parameters like dissolved oxygen and nutrient levels, impacting species richness and population dynamics, emphasizing the need for conservation efforts.

V, Jayalekshmy. (2012). Study on A co-relative study on The Diversity of Ornamental and Foodfishes of River Achenkovil In Relation to Various Physico Chemical Characteristics. Physico-chemical parameters affecting fish diversity in Achenkovil River. 76 fish species were identified, with Cyprinidae dominant, and downstream showing higher diversity. Endangered species present, aiding conservation decisions. The Composition, , Distribution and abundance of fish species according to the influence of physico-chemical parameters of water in Lake

Livoq Kosovo. Studies in Lake Livoq, Kosovo reveal 10 fish species from 5 families, with Cyprinidae being the most diverse. Physicochemical parameters such as temperature and oxygen levels influence fish diversity.

C, Prabhahar. (2012). Study on fish diversity in relation to physico-chemical characteristics of Kamala basin of Darbhanga district of Bihar Fish diversity in Kamala basin reservoir is affected by physico-chemical parameters like dissolved oxygen and nutrient levels. Seasonal variations impact species richness, with post-monsoon showing peak diversity.

Ruchira Chaudhary et. al. (2013). Study on Diversity and density of zooplanktons of Kolar reservoir of Bhopal, M.P., India. According to Shannon-Weaver Index of Diversity the value of the index in Kolar reservoir was 2.355 which was greater than 1 indicating greater diversity. The co-relation table indicates the physico-chemical parameters that are inter-related and these parameters are influenced in variations of phytoplankton and zooplankton. The presence of the zooplanktons indicates eutrophication in the Kolar Reservoir.

Selvam, et.al.(2013). , Survey on the influence of physico-chemical parameters on finfish egg diversity in Muthupettai, south east coast of India found that physico-chemical parameters such as water temperature and salinity significantly influence the distribution of finfish eggs, which is the most common fish in India. This indicates a relationship between environmental factors and fish diversity in Muthupettai.

Gene, S., Helfman. (2013). Survey on Fishes, Biodiversity of Fish diversity encompasses 32,000 known species, categorized into jawless, cartilaginous, and bony fishes. Marine species constitute 58%, freshwater 41%, with tropical regions hosting the highest diversity.

Koushik, Roy. (2013). Study on Qualitative Plankton Diversity of a Fish Culture Pond and a Wild Village Pond of Chhattisgarh, South Central India. Qualitative plankton diversity studied in managed and unmanaged ponds. Managed pond richer in zooplankton, unmanaged pond richer in phytoplankton. P1 had 15 phytoplankton and 16 zooplankton species.P2 had 17 phytoplankton and 13 zooplankton species.

Sanjay Thiske et. al.(2014). Work on ichthyofaunal diversity of pankhajore dam district kanker Chhattisgarh, A total 25 species of primary freshwater fishes belonging to 11 families and 19 genera were recorded from the study sites during the study.

K., Silambarasan .et.al.(2014). , Studies on ichthyofaunal biodiversity in relation to physicochemical variables of Kolavoi Lake, Chengalpet, Tamil Nadu. The study on Kolavoi Lake found 18 fish species from 10 families, with Cyprinidae being dominant. Physico-chemical parameters such as temperature, oxygen, pH and alkalinity supported diverse fish populations.

Preeti saxena et.al. (2014) study on Fish-diversity in relation to physico-chemical characteristics of river Devaha, District Pilibhit (U.P.), India found Fish diversity in river Devaha, Pilibhit, India, is influenced by physico-chemical parameters like temperature, turbidity, pH, and oxygen levels, supporting different fish species including vulnerable and endangered ones.

A. N. Soomro (2014). Observed in Fish, Plankton Biodiversity and Physico-Chemical Parameters of Five Lakes of Deh-Akro II He found that Oreochromis mossambicus was the only fish species occurred at all five lakes. The length and weight of the largest specimen were measured was 29 cm and 356 gm. Zooplankton were represented by fourteen (14) species of rotifera in four (4) genera.

Mane A.M. (2014). Research on Limnology and Biodiversity of Fish Fauna in Karadkhed Reservoir, M.H., India found that the fish biodiversity of Karadkhed Reservoir consisted of maximum 15 species of Cypriniformes (65.21%) followed by four species of Ophiocephaliformes (17.39%).), four species contribute. Two species of Perciformes (8.96) and a number of Mastacembelliformes (4.34%) species and a number of Clupeiformes species (4.34%) A relatively higher number of Cypriniformes are present the greater reproductive capacity of the major carp and suitable environmental conditions.

Studies by **Sunil Mular et al. (2014)** on phytoplankton diversity and seasonal fluctuations in a freshwater reservoir in Khairkatta district, Kanker, Chhattisgarh, were discovered There are 29 species in the phytoplanktonic community, which include: 4 group Twelve species of Chlorophyceae (48.00%) and nine species of Myxophyceae (36.00%) During the study periods, three species of Bacillariophycveae (12.00%) and one species of Euglenophyceae (4.00%) were observed in Khairkatta Dam.

Divya, Kumudini, Minj. et.al.(2015). Study of Icthyofaunal Diversity of Pakhanjoor Reservoir. The paper focuses on the ichthyofaunal diversity of Pakhanjoor Reservoir in India,

highlighting 42 fish species from 11 families, emphasizing conservation and sustainable fishery practices.

The physicochemical characteristics of two distinct big pond reservoirs and the bank of the Sheonath River water sources in Rajnandgon, were examined by **Pramod Kumar Mahish et al. (2015)** in order to define the polluted level of the water sources and develop practical methods for controlling the pollution of the water.

Fabio, Di, Dario. (2015). Examine a Survey on Fishes: A Guide to Their Diversity Approximately 33,000 known fish species exhibit diverse lineages, including hagfishes and lampreys, within the non-monophyletic group of fishes, as outlined in the paper.

Prem, et. al. (2015). Estimate on Ichthyofaunal Diversity of Sarda Sagar Reservoir in Tarai Region. fish species found in Sarda Sagar reservoir. Declining fish production due to overexploitation and habitat destruction.

Hari, Om et.al. (2015) study on Fish Diversity of Lucknow District (Uttar Pradesh), India. Lucknow District in Uttar Pradesh, India, exhibits rich diversity of fish with 83 species identified, dominated by Cypriniformes, The need for conservation measures to maintain species richness was highlighted.

K.C., Gopi .et.al.(2015). Estimate the Diversity of Marine Fish of India. India showcases a high diversity of marine fishes with 2443 species, constituting 7.4% of global fish species. The Andaman and Nicobar Islands lead with 1431 species, reflecting India's biodiversity richness.

D., Samal. Et. al. (2016). Survey on Ichthyofauna diversity in relation to physico-chemical characteristics of Budhabalanga River, Baripada, Mayurbhanj, Odisha. 8288 fish from 45 species, 15 families were recorded. Peak fish diversity in october coinciding with favorable conditions.

Anita, et. al. (2016) Research on Study on Fish diversity of Haryana and its conservation status. Journal of Applied and Natural Science. 59 fish species in Haryana, Cypriniformes dominant.2 endangered, 11 vulnerable, 28 lower risk species.

SS, Mishra et. al. (2017) .observed that Biodiversity assessment of Kodar reservoir of Chhattisgarh. 44 freshwater fish species, 29 dominant phytoplankton, 11 zooplankton species identified. Fish species include Rohu, Catla, Mrigal,Silver carp and Grass carp.

Jay, Narayan . et.al.(2017). Study on Fish diversity of Triyuga River, Udayapur District, Nepal. The Triyuga River in Nepal boasts 48 fish species from 17 families and 6 orders, showcasing rich fish diversity that needs further analysis for conservation efforts.

Mohammad, Abdul et.al. (2017). Study on fish species diversity, fishing gears and crafts from Buriganga River, Dhaka. 56 fish species belonging to 20 families and 9 orders recorded highest diversity in monsoon, lowest in winter.

Bharath, Kumari. Et.al. (2017). Study on An Analysis Fish Diversity of fish in a Freshwater Temple Pond of District Tiruchirappalli, Tamil Nadu, India. 154 fishes from 12 families identified in Aathivayal lake.Cyprinidae had highest species richness (56% of total population).

Banothu, Raveendar et al. (2018). , Assess the current status of fish diversity in relation to the physicochemical characteristics of Nanaksagar reservoir of Uttarakhand. 30 fish species recorded, diverse fish community in reservoir. Fish production positively correlated with water quality parameters.

A. Suganthi et al. (2018). work on Influence of Physio-Chemical Parameters on Fish Diversity in Muthupet Estuary, Southeast Coast of India. Monthly variation of fish in Muthupet estuarine identified 22 different species . Percent of average fish abundance in Muthupet showed high percentage in L. parsia, M. cephalus and A. commersoni (11%) followed by M. gulio (9%) and S. java (9%). Least percentage was observed in A. sona (1%) during 2014 respectively.

Muslim, Ahmad et.al.(2018). Fish Biodiversity and Its Periodic Reduction: A Case Study of River Narmada in Central India. Fish biodiversity in River Narmada faces periodic reduction due to threats like habitat loss, dams, pollution, and invasive species, making aquatic ecosystems highly endangered globally.

Amena, Banoo, Khanani. (2019). Consideration on Diversity of fishes in Sadhoo Pond Reservoir of Raipur District, Chhattisgarh, India., Sadhoo Pond Reservoir in Chhattisgarh has diverse fish species. Fish families include Cyprinidae, Channidae, Cichlidae, Siluridae,

Percidae, Gobiidae. Fish diversity includes assorted Indian carp and other native fish.Families represented: Cyprinidae, Channidae, Cichlidae, Siluridae, Percidae, Gobii.

Pravej Kumar and colleagues (2019). A study on fish variety in the river Seonath in the Indian state of Chhattisgarh found out that river's abundance in fish fauna is a conclusion of its wide range of microhabitats and niches. The Sheonath River yielded 59 species, organized into 36 genera, 20 families, and 7 orders.

Romain, Frelat. (2019). Estimate The multiple dimensions of fish diversity dynamics and community stability. Fish diversity crucial for ecosystem stability, productivity, and resilience.Threatened by high fishing pressure and changing habitat conditions.

Katerina, et.al.(2019). Examine Smoke and Smoked Fish Production. Smoking methods affect flavor, aroma, and preservation of fish. Harmful substances like PAHs can precipitate on smoked fish.

Ridhi, et. al. (2019). overview on Fish Diversity and Limnological Parameters affecting Fish Assemblage Pattern in Chambal River Basin of Madhya Pradesh, Catfishes most dominant in Chambal river basin, Madhya Pradesh. Glossogobius giuris is most abundant species.

Shin-ichiro, et.al. (2019). Studies on catch diversification provide many benefits in inland fisheries. Diversification in inland fisheries increases revenues, stability, and multiple benefits. Higher fish diversity leads to enhanced revenue, nutrient removal, and seasonal species diversity, benefiting ecosystems and markets.

Mir, et. al. (2020). survey on Fish Diversity in the Andharmanik River Sanctuary in Bangladesh. A total of 93 fish species belonging to 66 genera, 45 families, and 14 orders were found. The dominant orders were Perciformes, Cypriniformes, Siluriformes, Clupeiformes, Mastacembeliformes, and Channiformes.

Manab, Kumar, Saha. (2020). Studies on fish diversity concerning Hydro-ecology of Kangsabasti river in Purulia district, West Bengal, India. A total of 1655 fish specimens were recorded. The fish specimens were distributed in 19 genera, 10 families, and 5 orders.

Neelmani et.al (2020). Ichthyofaunal Diversity of Hiran-II Reservoir, Gujarat with special reference to physico-chemical parameters. The study on Hiran-II reservoir found 28

fish species including 6 orders. Physico-chemical parameters ranged from temperature 21.77°C – 28.43°C to phosphate 0.59 – 0.90mg/l, impacting fish diversity.

Ashraf,et.al.(2020). Survey An economic study of the fish production system in Egypt. Fish production in Egypt increased from 1.45 million tons in 2013 to 1.82 million tons in 2017.The price of fish in Egypt increased from L.E. 13.5/kg in 2013 to L.E. 24/kg in 2017.

Yury,V.et.al.(2020). Estimate on freshwater fish diversity in brackish water ecosystems of Russia and adjacent waters. Russia and adjacent water 719 native fish species,103 endemic species with 14.3% endemism rate.

Sachin Sahu and Subhendu Datta (2020) overview on Study on Fish Diversity of Kawardha Town, Chhattisgarh, India. International Journal of Current Microbiology and Applied Sciences. Kawardha town has 54 fish species from 20 families. Major fish types include, catfish, Indian major Carp and Exptic carp.

JK, Jakhar et. al. (2020). Survey on Traditional and indigenous fish products of Chhattisgarh, India. Small size, low value fish species used for traditional products. Popular fish species include Puntius ticto , Mystus tengara , Anabas testudineus.

Fernando, Mayer et.al.(2021). Look at the Human impacts and the loss of Neotropical freshwater fish diversity. The paper discusses the loss of Neotropical freshwater fish diversity due to human impacts, highlighting issues such as fish kill events, contamination, and ecosystem degradation.

P, Hembrom et.al.(2021) Study of fish diversity in Dumka block of Jharkhand. The study conducted in Dumka, Jharkhand identified 31 fish species from 17 families. Cyprinidae and Chanidae were dominant. Conservation efforts are needed due to declining small indigenous fish populations.

H., S., Mogalekar et.al.(2021). Research on Fish diversity of rivers of Karnataka. The rivers of Karnataka exhibit a diverse fish fauna with 240 species categorized into 102 genera, 38 families, and 14 orders, highlighting the rich biodiversity of riverine fish species in the region.

AK, Verma.et.al. (2021). Review on Ichthyo-faunal Diversity of Alwara Lake, 45 fish species from 9 orders, 18 families, and 29 genera. Dominated by Cyprinidae (13 species) followed by Bagridae (6 species).

Rekha, Sharma et. al. (2021) Survey on status of fish population from Chandrakeshar Dam, Dewas (M.P.). Major groups: Cyprinidae family with 17 fish species

W., Subchan et. al. (2021) Research on freshwater fish diversity in Sanenrejo and Wonosri river resorts from Meru Bettiri National Park. They concluded with the identification of a total of 15 fish species.

Richard, Law., et. al. (2021). overview on Fishing for biodiversity. Moderate fishing intensity can maintain biodiversity. Balanced harvesting scales fishing mortality with species production rates. Balanced harvesting can protect rarer species while allowing some exploitation. Fishing mortality rates scaled by production are density-dependent.

Carolina, et.al. (2022). Examine A Global Overview of Aquaculture Food Production with a Focus on the development of activity in transitional systems. The Case Study of a South European Country (Portugal) Aquaculture food production reached a record of 82.1 million tonnes globally in 2018.Portugal is the 16th main producer of aquaculture in the European Union.

R., Chandran et. al. (2022) Explain the differences in fish diversity and habitat ecology of Tel River, a tributary of Mahanadi**.** A total 71 fish species belonging to 48 genera, 22 families, and 8 orders were recorded in the study area. Cypriniformes was the most dominant order, followed by Siluriformes and Perciformes.

Shyamal et. al. (2022) overview on Fish diversity, community structure, and environmental variables of River Tamas, a tributary of River Ganga, India. Aquatic Ecosystem Health & Management the paper provides information on fish diversity in the Tamas River, A total 75 fish species belonging to 54 genera,23 families, and 10 orders recorded. Family Cyprinidae was the most dominant, contributing 41% of species.

Venkatesh, R, Thakur., et. al. (2022) look at Ichthyo faunal diversity and conservation status of the fishes in the tropical wetland of Bundelkhand region, India. 32 fish species recorded in Bundelkhand region, India Maximum fish diversity observed in monsoon season.

S. Varsha. Et. al, (2022). Study on Ichthyofaunal Diversity of Bhagda or Bhagta Taal, a Wetland of Balrampur, Uttar Pradesh, India: Threats and Conservation. International journal of zoological investigations 41 fish species identified in Bhagda Taal,Cypriniformes dominant order with 16 species.

Shymal das et. al.(2022). Research on Fish diversity, community structure, and environmental variables of River Tamas, a tributary of River Ganga, India. The paper provides information on fish diversity in the Tamas River, with a total of 75 fish species belonging to 54 genera, 23 families, and 10 orders recorded.

Carolina, Rocha et.al. (2022) review on Fish diversity and fish community analysis in ponds of Saran district in Bihar. The fish diversity in the ponds of Saran district has been decreasing in recent years.

Mekuleyi, Gabriel et. al.(2023) Analyse the Numerical Simulations and diversity of fish in reference to Physico-chemical Parameters of Four Aquatic Stations in Badagry Division, Lagos, Nigeria the study reveals Fish diversity in the studied aquatic stations is influenced by physico-chemical parameters like dissolved oxygen, total dissolved solids, and conductivity, impacting demersal species distribution.

Da, Khanom et. al . (2023) survey on Fish Diversity of Chalan Beel in Tarash upazila, Sirajganj district and It mentions 42 species from 8 orders and 18 families, with the most common species being Puntius puntio.

Anubha et.al. (2023) estimate the Fish diversity and fish community analysis in ponds of Saran district in Bihar. Research Journal of Science and Technology, The fish diversity in the ponds of Saran district has been decreasing in recent years. The most dominant fish family is Cyprinidae with 12 major group species.

Eknath et. al. (2023). Review on Conservation strategies for fish biodiversity to maintain healthy ecosystem. International journal of fisheries and aquatic studies. Fish diversity declining due to human activities impacting aquatic habitats. Conservation strategies essential to maintain healthy ecosystem and fish biodiversity. Focus on conservation strategies for fish biodiversity.

A.S. Kumar Naik et.al.(2023). Assessment of fish biodiversity in the Upper Mullamari Reservoir, Basavakalyan, Karnataka (India) revealed the presence of thirty-two freshwater fish species belonging to six orders in the present study. Analysis of the data indicated that the order Cypriniformes was dominant with 16 fish species, followed by the orders Siluriformes 9 and Perciformes 3.

Shahid, Mehmood et, al.(2023) survey on Physiochemical Parameters And Freshwater Fish Diversity Of Sip River Madhya Pradesh,India. The study reveals 19 fish species from 9 families in Sip River, with varying physico-chemical parameters affecting fish diversity, emphasizing the need for conservation and management strategies.

Sangeeta, Roy et.al.(2023) Estimate the Characterization of Some Physico-Chemical Parameters of Water Bodies Inhabited by Small Indigenous Fish Species (SIFs): A Case Study, Physico-chemical parameters like temperature and pH correlate with ecomorphological indices influencing the behavior and distribution of Small Indigenous Fish Species (SIFs) in water bodies, impacting fish diversity.

C., Judith, et.al. (2023). Study on Transgenic Fish Production in over 35 species.First instances in rainbow trout and goldfish.

Vikas kumar, et.al, (2023). An overview of modern biotechnological tools in aquatic food production. The paper highlights the recent advances in biotechnological tools in aquatic food production.It discusses the potential of these tools as a sustainable platform for the future.

Mohommad, Norhaffis et.al.(2023). Research on Diversity and Structural Assemblage of Ichthyofauna in Relation to Ecological Variables of a Tropical Deltaic Estuary of Borneo Malaysia. Fish diversity in the Batang Lassa Estuary correlates positively with salinity and conductivity, negatively with water temperature and pH, and is influenced significantly by pH, salinity, water temperature, DO, chlorophyll a, turbidity, and NH4.

Fish diversity from dissimilar habitats in Savitri River (2023). Fish diversity in Savitri River varied between upstream and downstream zones due to industrial effluents. Physico-chemical parameters influenced the presence of 34 species at spot S1 and 17 at spot S2.

Dr. Arvind kumar et. al.(2024). Survey on Phytoplankton studies in relation to physico-chemical environment of Bihar River district Rewa (M.P.) India the conclusion of the monsoon season, a major impact of phytoplankton diversity was recorded in the study's findings. forty-three genera were identified.

Rimwaodo Pierre Silga et.al.(2024) work on Diversity, Length-weight structure and Condition Factor of fish species and physicochemical changes in four reservoirs in Volta basin, Burkina Faso. During this study, 30 fish species were identified belonging to 27 genera and 14 families. Maximum number (19) of species was counted in Bazega and Loumbila and

minimum of 17 species for Koubri_AB and six species composed by Brycinus nurse, Clarias anguillaris, Coptodon zillii, Oreochromis niloticus, Mormyrus rume and Sarotherodon galilaeus were present in all sites.

In their study, "Study of Diversity and Status of Endemic Ornamental Fish of Shivnath River at Mohla Manpur," **Chiranjeev Panday et al. (2024)** discovered 46 species from 15 families across 9 orders, underscoring the importance of conservation efforts.

Conclusion - Aquatic ecosystems depend on fish variety, which is impacted by anthropogenic influences, environmental variables, and different reproduction techniques. A review of recent studies emphasizes how diverse fish are and how urgently conservation actions must be undertaken.

Fish variety is at risk due to anthropogenic activities like overfishing and urbanization. Studies identifying falling species due to habitat degradation demonstrate the need of conservation methods in mitigating these consequences and ensuring sustainable fish populations. Fish diversity is a useful water quality indicator that shows how well aquatic habitats are ecologically. Studies show that fluctuations in water quality measures are frequently correlated with shifts in fish communities, which makes fish an excellent source of bioindicators.

Reference

A Shahnawaz , M Venkateshwarlu , D S Somashekar, K Santosh (2010) “Fish diversity with relation to water quality of Bhadra River of Western Ghats (INDIA)”. ‘Environmental Monitoring and Assessment’161 (1-4) (83-91) (10.1007) (s10661-00)

A. N. Soomro, S. A. Balouch, T. M. Jahangir, W. A. Baloch , K. H. Lashari W. M. Achakzai, T. J. Ursani “Fish, Plankton Biodiversity and Physico-Chemical Parameters of Five Lakes of Deh-Akro II Jamshoro”. ‘Research Journal (Sci.Ser)’ (46) (2) (111-116) (2014).

A. Suganthi, C. Venkatraman1, B. Bharath2, K. Perinbam “Influence of Physio-Chemical Parameters on Fish Diversity in Muthupet Estuary, Southeast Coast of India”.

‘International Journal of Scientific Biological Sciences’ (5) (4) (66-75) August (2018) (E-ISSN2347-7520.)

A., Senthil, Murugan., C., Prabaharan. (2012). “Fish Diversity In Relation To Physio-Chemical Characteristics Of Kamala Basin Darbhanga District, Bihar, India.” International Journal Of Pharmaceutical & Biological Archives 2012; 3(1):211-217.

A.S. Kumar Naik, S.R. Somashekara., Jitendra Kumar., V. Mahesh., S. Benakappa., H.N. Anjaneyappa., and P. Nayana Karnataka Veterinary, “ Assesment Of Fish Biodiversity In Upper Mulamari Reservoir, Basavakalyan, Karnataka (India)” Animal And Fisheries Science University, Department Of Fisheries University ‘ International Journal Of Fisheries And Aquaculture Sciences.’ ISSN 2248-9975 Volume 3, Number 1 (2013),

AK, Verma, Ashok (2021). “Ichthyo-faunal Diversity of Alwara Lake: Threats and Conservation Status”. ‘Social Science Research Network Bioherald (Int. J. Biodiversity & Environment)’ ISSN: 2248-9061 Volume 5(1-2): 2015 pp. 60-62.

Amal, Kumar, Patra., Suman, Sengupta., Tanmay, Datta. (2011). “Physico-Chemical Properties And Icthyofaunal Diversity In Karala River, A Tributary Of Teesta River At Jalpaiguri District Of West Bengal, India”.

Amena Banoo Khanani, 2018 “The Study on Ichthyofaunal Diversity in Chhattisgarh”. ‘International Journal of Emerging Technologies and Innovative Research’ Volume 5’.

Anita Bhatnagar,Abhay Singh Yadav and Neeru. Department of Zoology, Kurukshetra University, Kurukshetra, Haryana-136119, “Study on Fish diversity of Haryana and its

conservation status". Corresponding author. 'Journal of Applied and Natural Science' 8 (2): 1022 - 1027 (2016) E-mail: anitabhatnagar@gmail.com

Anubha, Kumari. and Nalin, Bhardwaj. (2023). "Fish diversity and fish community analysis in ponds of Saran district in Bihar". 'Research Journal of Science and Technology', doi: 10.52711/2349-2988.2023.00007

Ashraf, M.M., Ali., Mohamed, A., ElSayed., Reyad, Radwan., Ragab, Hefny. (2020). "An Economic Analysis Of The Fish Production System In Egypt". doi: 10.21608/SINJAS.2020.86430.

Banothu, Raveendar. (2018) "Fish Diversity In Relation To Physicochemical Characteristics Of Nanaksagar Reservoir Of Uttrakhand". 'Journal Of Entomology And Zoology Studies', E-ISSN: 2320-7078 P-ISSN: 2349-6800; 6(2): 477-484

Bharath, Kumari. (2017). "An Analysis of Fish Diversity in a Freshwater Temple Pond of Tiruchirappalli District, Tamil Nadu, India". 'International Journal of Pure & Applied Bioscience,' doi: 10.18782/2320-7051.2716

C, Prabhahar. (2012). Fish Diversity In Relation To Physic Cemical Characterstic Of Kamala Basin District Darbhanga Bihar, India. 'International Journal Of Pharmaceutical & Biological Archive',

C., Judith, Betsy., C., Siva. (2023). "Transgenic Fish Production". doi: 10.1007/978-981-99-6991-3_10. In book: 'Fisheries Biotechnology and Bioinformatics' (pp.77-83)

C.M Nagabhushan1 and B.B Hosetti Department of Applied Zoology,Kuvempu University, Shankarghatta – 577 451, "Research on Diversity of ichthyo-fauna in relation to physico-chemical characters of tungabhadra reservoir, hotspot" 'Agricultural Science Digest' volume 40 issue 2 (june 2020) : 189-193

Carolina, Rocha., Henrique, N., Cabral., João, Carlos, Marques., Ana, M., M., Gonçalves. (2022). "A Global Overview Of Aquaculture Food Production With A Focus On The Activity's Development In Transitional Systems—The Case Study Of A South European Country (Portugal)". 'Journal Of Marine Science And Engineering', Doi: 10.3390/Jmse10030417

Caroline, M., Tucker., Henrique, C., Giacomini., Nicholas, E., Mandrak., Lifei, Wang., Derrick, K., de, Kerckhove. (2024). "Estimating fish production in wetlands. Canadian" 'Journal of Fisheries and Aquatic Sciences', doi: 10.1139/cjfas-2023-0220

Chiranjeev pandey , Gagan singh guru, Sanjay thiske, Majid ali, Gurupreet singh Bhatia , Akhilesh kumar yadav (2024) "Study Of Diversity And Status Of Endemic Ornamental Fish Of Shivnath River Mohla- Manpur-Ambagarh Chowki District Of Chhattisgarh (India)" 'Journal Of Advanced Zoology' 45(6):141-153 DOI:10.53555/jaz.v45i6.4957

Craig, Lawrence, Neil, Rutherford, Rod, Hamilton, Dean, Meredith. (2016). "Experimental Evidence Indicates That Native Freshwater Fish Outperform Introduced Gambusia In Mosquito Suppression When Water Temperature Is Below 25°C". Hydrobiologia, doi: 10.1007/S10750-015-24700.

D. Samal, J. Sethy, and H.K. Sahu's (2016). "Ichthyofaunal Diversity In Relation To Physic Chemical Characterstics Of Budhabalanga River Baripada, Mayurbhanj, Odisha". 'International Journal Of Fisheries And Aquatic Studies', ISSN: 2347-5129 (ICV-Poland) Impact Value: 5.62 (GIF) Impact Factor: 0.352 IJFAS 2016; 4(1): 405-413 © 2016 IJFAS www.fisheriesjournal.com

Da Khanom, S. Shikha, M. Hossain, AR Joadder (2023). "Fish Diversity of Chalan Beel in Relation to Fish Sanctuary". 'Journal of bio-science', doi: 10.3329/jbs.v30i1.63101

Debjit, Kumar, Mondal, Anilava, Kaviraj., Subrata, Saha. (2010). "Water Quality Parameters and Fish Biodiversity Indices as Measures of Ecological Degradation: A Case Study in Two Floodplain Lakes of India". 'Journal of Water Resource and Protection', doi: 10.4236/JWARP.2010.21010

Divya, Kumudini, Minj., R.K., Agrawal. (2015). "Study of Icthyofaunal Diversity of Pakhanjoor Reservoir". 'International Journal of Pure and Applied Zoology',

Dr. Arvind Kumar Pathak and Deepak Pathak Assistant Professor and Head, Department of Zoology, Shriyut P.G. College, Gangeo, Rewa, Madhya Pradesh, India E-ISSN: 2709-9369 P-ISSN: 2709-9350 www.multisubjectjournal.com IJMT 2024; 6(6): 01-04 Received: 02-03-2024 Accepted: 06-04-2024 E-ISSN: 2709-9369 P-ISSN: 2709-9350.

Dr. Rajesh kumar rai (2021). "Studies on fish diversity on bikhma pond of ratanpur area, district bilaspur, chhattisgarh", India Vol-7 Issue-5. 'International Journal of Advance Research and Innovative Ideas in Education'-ISSN(O)-2395-4396

Eknath Dhuraji Pawde, Vivek Hanmantrao Thaware and Kiran Paul (2023). "Fish biodiversity to maintain healthy ecosystem". 'International journal of fisheries and aquatic studies'. E-ISSN: 2347-5129 P-ISSN: 2394-0506 (ICV-Poland) Impact Value: 76.37 11(1): 147-149 DOI: https://doi.org/10.22271/fish.2023.v11.i1b.2778

Fabio, Di, Dario. (2015). Fishes: "A Guide to Their Diversity. Marine Biology Research", doi: 10.1080/17451000.2015.1071851

Fernando, Mayer, Pelicice., Andréa, Bialetzki., Priscila, Camelier., Fernando, R., Carvalho., Emili, García-Berthou., Paulo, Santos, Pompeu., Franco, Teixeira, de, Mello., Carla, Simone, Pavanelli. (2021). "Human impacts and the loss of Neotropical freshwater fish diversity". 'Neotropical Ichthyology', doi: 10.1590/1982-0224-2021-013 Gene, S, Helfman (2013). "Fishes, Biodiversity of fishes" doi: 10.1016/B978-0-12-384719-5.00054-X

Graham, C., Mair, M, Halwart, Yuan, Derun., Barry, A., Costa-Pierce. (2023). "A decadal outlook for global aquaculture". 'Journal of The World Aquaculture Society', doi: 10.1111/jwas.12977

H., S., Mogalekar, P., Jawahar., J., Canciyal. (2021). "Fish diversity of rivers of Karnataka". doi: 10.47780/ 'Journal of the Inland Fisheries Society of India'.48.1.2016.116290

Hari, Om, Verma., Anju, Agarwal., Krishna, Gopal. (2015). "Fish Diversity of Lucknow District (Uttar Pradesh), India". 'Journal of Ecophysiology and Occupational Health', doi: 10.18311/JEOH/2015/1652

J, I, R, Udotong., O, U, Eka., E, U, Essien., O, U, M, John. (2015). "Biodiversity - 2015: Toxicity of heavy metals and effect of their concentrations on biological productivity and diversity in freshwater ecosystem" 'Journal of Biodiversity & Endangered Species' volume 3:3

Jay, Narayan, Shrestha. (2017). "Fish diversity of Triyuga River, Udayapur District, Nepal". Our Nature, doi: 10.3126/ON.V14I1.16452

JK, Jakhar et. al. (2020). "Traditional and indigenous fish products of Chhattisgarh, India". 'Journal of entomology and zoology studies' E-ISSN: 2320-7078 P-ISSN: 2349-6800 www.entomoljournal.com JEZS 2020; SP-8(4): 01-04

K., Silambarasan., K., Sujatha., A., Anitha, Joice., P., Senthilkumaar. (2014). "Studies On Ichthyofaunal Biodiversity In Relation With Physico Chemical Variables Of Kolavoi Lake, Chengalpet, Tamil Nadu". ' The International Journal Of Plant, Animal And Environmental Sciences',

K.C., Gopi., S.S., Mishra. (2015). "Diversity of Marine Fish of India". doi: 10.1016/B978-0-12-801948-1.00012-4

Katerina, Belichovska., Daniela, Belichovska., Zlatko, Pejkovski. (2019). "Smoke and Smoked Fish Production". doi: 10.18485/MEATTECH.2019.60.1.6

Khan, Ma, Khan, S., Miyan, K. (2011). "Aquaculture as a food production system: A review. Biology and medicine"

Koushik Roy (2013). "Qualitative Plankton Diversity of a Fish Culture Pond and a Wild Village Pond of Chhattisgarh, South Central India". ' journal of environmental science' Volume : 2 | Issue : 10 | Oct 2013 • ISSN No 2277 – 8160

Lalit Kumar Tyagi R., Chandran. (2022). "Fish Diversity And Habitat Ecology Of Tel Rivwer, A Tributary Of Mahanadi River". 'Journal Of The Inland Fisheries Society Of India', doi: 10.47780/jifsi.54.1.2022.132366

Lynette, Alvarado-Ramírez., Berenice, Santiesteban-Romero., Guillaume, Poss., Juan, Eduardo, Sosa-Hernández., Hafiz, M.N., Iqbal., Roberto, Parra-Saldívar., Alfredo, Damiano, Bonaccorso., Elda, M., Melchor-Martínez. (2023). "Sustainable production of biofuels and bioderivatives from aquaculture and marine waste". 'Frontiers in chemical engineering', doi: 10.3389/fceng.2022.1072761

Manab, Kumar, Saha. M Bhattacharya, BC Patra (2020). "Fish diversity concerning Hydro-ecology of Kangsabasti river in Purulia district, West Bengal, India". doi: 10.33451/FLORAFAUNA.V26I2PP320-328

Mane A.M. Department of Zoology, Arts, Science & Commerce College,Nanded, India 'South Asian Academic Research Journals' ISSN:2249-7137 Vol. 4, Issue 12, Dec. 2014.

Mekuleyi, Gabriel, Olarinde., J, O, Olabode., Wusu, Ashiribo, Senapon., Anetekhai, Martins, Agenuma. (2023). "Numerical Simulations And Fish Diversity In Relation To Physic

Chemical Parameter Of Four Aquatic Ststions In Badagry Division, Lagos, Nigeria". 'Asian Journal Of Fisheries And Aquatic Research', doi: 10.9734/ajfar/2023/v22i4578

Melchor-Martínez. (2023). "Sustainable production of biofuels and bioderivatives from aquaculture and marine waste". 'Frontiers in chemical engineering', doi: 10.3389/fceng.2022.1072761

Mir Mohommad Ali, ML Ali, R Proshad, S Islam, Z Rahman.Mir, (2020). "Fish Diversity in the Andharmanik River Sanctuary in Bangladesh". 'Croatian Journal of Fisheries', doi: 10.2478/CJF-2020-0003

Mohammad, Abdul, Baki., Md., Muzammel, Hossain., Naser, Ahmed, Bhouiyan., Asaduzzaman. (2017). Study on "Fish species diversity, fishing gears and crafts from the Buriganga river, Dhaka. Bangladesh" 'Journal of Zoology', doi: 10.3329/BJZ.V45I1.34190

Muhammad, Ikbal., Badriah, Sappewali., Wahyuni, Ismail. (2020). "Overview of the Externalities Between Optimization and Overfishing of Fisheries". doi: 10.2991/ 'Advances in Social Science, Education and Humanities Research'.201027.030

Muhammad, Norhaffis, Mustafa., Amy, Halimah, Rajaee., Hadi, Hamli., Khairul, Adha, A., Rahim., Razat, Suvra, Das., Fahmida, Akter. (2023). "Diversity and Structural Assemblage of Ichthyofauna in Relation to Ecological Variables of a Tropical Deltaic Estuary of Borneo Malaysia". doi: 10.2139/ 'Social Science Research Network'.4660441

Muslim, Ahmad, Shah., Vipin, Vyas., Shalini, Yadav. (2018). "Fish Biodiversity and Its Periodic Reduction: A Case Study of River Narmada in Central India". doi: 10.1007/978-981-10-5792-2_16

Neelmani., Ritesh, Chandravanshi., Varun, Narayan, Mishra., Narendra, Pargi., D., T., Vaghela. (2020). "Ichthyo Faunal Diversity Of Hiran-Ii Reservoir, Gujarat With Special Reference To Physico-Chemical Parameters". 'Journal Of Pharmacognosy And Phytochemistry',

Neil, Philip, Radford. (1997). "Ecotoxicological impact of iron III sulphate on chironomid cultures and profundal reservoir communities"

Oriol', Cano-Rocabayera., Sergi, Vargas-Amengual., Carles, Aranda., Adolfo, de, Sostoa., Alberto, Maceda-Veiga., Alberto, Maceda-Veiga. (2020). "Mosquito larvae consumption in turbid waters: the role of the type of turbidity and the larval stage in native and invasive fish". Hydrobiologia, doi: 10.1007/S10750-020-04195-0

P, Hembrom., P, Bodra. (2021). "Study of fish diversity in dumka block, dumka, Jharkhand." 'Journal of entomology and zoology studies', doi: 10.22271/J.ENTO.2021.V9.I2O.8618

Pramod Kumar Mahish and Sanjay Thiske (2015) "Physico-chemical Properties of Different Water Sources of Rajnandgaon (Chhattisgarh), India: A Pollution Monitoring Study" 'A Peer Reviewed Journal of Multiple Science, Arts and Commerce' Research Fronts, VOl. V 2015 ISSN 2250-2653

Pravej Kumar (2019). "Fish variety in the river Seonath in the Indian state of Chhattisgarh" 'international Archive of Applied Sciences and Technology Int. Arch. App. Sci. Technol'; Vol 11 [4]: Society of Education, India [ISO9001: 2008 Certified Organization] www.soeagra.com/iaast.html ISSN 2277- 1565 ISSN 0976 – 4828

Preeti Saxena., Kamal, Kumar, Saxena. (2014). "Fish-diversity in relation to physico-chemical characteristics of river Devaha, District Pilibhit (U.P.), India". 'G-Journal of Environmental Science and Technology' ISSN 2322-0228 Vol. 1, no. 6

Prem Kumar, K. K. Saxena1, B. C. Tyagi, K. D. Joshi2, N. N. Pandey Prem, (2015). "Ichthyo faunal Diversity of Sarda Sagar Reservoir in Tarai Region". 'J, Ecophysiol. occup. Hlth'. 15(1 & 2), 2015, 9–17 © 2015 The Academy of Environmental Biology, India DOI : 10.15512/joeoh/2015/v15i1&2/91182

Priscilla, Le, Mézo., J., Guiet., Kim, J., N., Scherrer., Daniele, Bianchi., Eric, Galbraith. (2022)."Global nutrient cycling by commercially targeted marine fish. Biogeosciences", doi: 10.5194/bg-19-2537-2022

Priyanka, Sharma., Sujata, Gupta. (2014). "Study of amount of Oxygen (BOD, OD, COD) in water and their effect on fishes."

Rejani Chandran .Sangeeta Mandal . Trivesh Suresh Mayekar.Amit SinghBisht .SanjayKumarSingh. "Fish Diversity And Habitat Ecology Of Tel River A Tributary Of Mahanadi River". 'Journal Of The Inland Fisheries Society Of India,'

Rekha, Sharma et al. . (2021). "Fish population from Chandrakeshar dam Dewas (M.P.)". 'International Journal of Fisheries and Aquatic Studies', doi: 10.22271/FISH.2021.V9.I3C.2479

Richard Law and Michael J Plank 2021 fishing for biodiversity DOI:10.1101/2021.06.27.450047 LicenseCC BY-NC-ND 4.0

Ridhi, bose et. al. (2019). " Fish Diversity And Limnological Parameter Influencing Fish Assemblage Pattern In Chambal River Basin Of Madhya Pradesh", 'Proceedings The

National Academy Of Sciences', India - Section B: Biological Sciences 89(10) DOI:10.1007/s40011-017-0958-5

Rimwaodo Pierre SILGA1 , Adama OUEDA1 , Komandan MANO2 , Victor BANCE1 and Gustave Boureima. "Diversity, Length-weight structure and Condition Factor of fish species and physicochemical changes in four reservoirs in basin, Burkina Faso". KABRE1 (2024) ISSN 1997-342X (Online), ISSN 1991-8631.

Romain, Frelat. (2019). "The multiple dimensions of fish diversity dynamics and community stability".

Ruchira Chaudhary, Rachana S. Pillai Department of Zoology, Govt. Motilal Vigyan Mahavidyalaya, Bhopal, (M.P.), 462003, "Seasonal variation in the Physico-Chemical Parameters of Mandavi Water Reservoir in Dist. Chhindwara (MadhyaPradesh).India" 'International Journal of Development and Sustainability' Online ISSN: 2168 -8662 .

S. Varsha. Et. al, (2022). "Ichthyofaunal Diversity of Bhagda or Bhagta Taal, a Wetland of Balrampur, Uttar Pradesh, India: Threats and Conservation". 'International journal of zoological investigations international Journal of Zoological Investigations' Vol. 9, No. 1, 213-218 (2023) https://doi.org/10.33745/ijzi.2023.v09i01.025

S., Muthukumarvel., Anand, Kishor., V., Gowthaman., G, Dinesh., Tata, Sudhakar. (2022). "An Assessment of technologies requirements in Open sea cage farming for Indian sustainable Aquaculture". 'open access journal of oceanography' ,doi: 10.1109/ international, peer-reviewed open access advanced forum Chennai45887.2022.9775309

S., Thirumala., B., R., Kiran., G., S., Kantaraj. (2011). “Fish diversity in relation to physico-chemical characteristics of Bhadra reservoir of Karnataka, India”. ‘Advances in Applied Science Research’, ,

S., V., Surendranath. (2018). “Evaluation of Efficacy of Platy (Xiphophorus maculates) as Larvivorous Fish to Control Mosquito Larvae”. ‘International Journal of Pure & Applied Bioscience’, doi: 10.18782/2320-7051.6173

Sachin, Sahu., and Subhendu, Datta. (2020). “Fish Diversity Of Kawardha Town, Chhattisgarh, India”. ‘International Journal Of Current Microbiology And Applied Sciences’, doi: 10.20546/IJCMAS.2020.909.363

Sangeeta, Roy., Surjya, Kumar, Saikia. (2023). “Characterization of Some Physico-Chemical Parameters of Water Bodies Inhabited by Small Indigenous Fish Species (SIFs): A Case Study”. doi: 10.24018/ ‘European Journal of Aquatic Science’.2023.2.3.16

Sanjay Thiske Sunil Mondal1, Agarwal, R.K.(2014). “Ichthyofaunal diversity of pankhajore dam district kanker Chhattisgarh”, ‘An International Quarterly Journal Of Biology & Life Sciences’ 2(2):644-648 ISSN (online): 2320-4257 www.biolifejournal.com

Selvam, J., Varadharajan, D., Babu, D., Balasubramanian, T. (2013). “Impact of Physico-Chemical Parameters on Finfish Eggs Diversity from Muthupettai, South East Coast of India”. ‘Journal of Environmental and Analytical Toxicology’, doi: 10.4172/2161-0525.1000185

Shahid, Mehmood., Imtiaz, Ahmed., Raheela, Mushtaq. (2023). “Physico-chemical Parameters and Freshwater Fish Diversity of Sip River Madhya Pradesh, India”. ‘Uttar Pradesh Journal of Zoology’, doi: 10.56557/upjoz/2023/v44i173586.

Shailesh, et.al .(2011). "Pattern of Freshwater Fish Diversity, Threats and Issues of Fisheries Management in an Unexplored Tributary of the Ganges Basin, Northern India". 'Journal of Occupational Health J. Ecophysiol. Occup. Hlth'. 11 (2011) 149-159 ©2011 The Academy of Environmental Biology, India

Shin-ichiro, S., Matsuzaki., Shin-ichiro, S., Matsuzaki., Ryuichiro, Shinohara., Kei, Uchida., Takehiro, Sasaki. (2019) review on "Catch diversification provides multiple benefits in inland fisheries". 'Journal of Applied Ecology', doi: 10.1111/1365-2664.13316

Shyamal, et al. (2022). "Fish Diversity, Community Structure, And Environmental Variables Of River Tamas, A Tributary Of River Ganga, India". 'Aquatic Ecosystem Health & Management', doi: 10.14321/aehm.025.02.62

Shyamal, Chandra, Sukla, Das. D., N., Jha. Vijay, Kumar., Absar, Alam., Kalpana, Srivastava., P., K., Sahoo., Basanta, Kumar, Das. (2022). "Fish diversity, community structure, and environmental variables of River Tamas, a tributary of River Ganga, India". 'Aquatic Ecosystem Health & Management', doi: 10.14321/aehm.025.02.62

Siddiqui Tasneem (2011) Dept. of Zoology, "Biodiversity of Ichthyo fauna of Barul Reservoir, Nanded District, Maharashtra" 'Bulletin of Pure and Applied Sciences'.Vol.30A (Zoology) No.1 : 2011: P .43-48.

SS, Mishra et. al. (2017). "Biodiversity assessment of Kodar reservoir of Chhattisgarh." 'International Journal of Fisheries and Aquatic Studies' 2017; 5(2): 425-429 E-ISSN: 2347-5129 P-ISSN: 2394-0506 (ICV-Poland) Impact Value: 5.62 (GIF)

Impact Factor: 0.549 IJFAS 2017; 5(2): 425-429 © 2017 IJFAS www.fisheriesjournal.com

Sunil mondal, agarwal, r.k and sanjay thiske (2014) "Diversity and seasonal fluctuation of phytoplankton in freshwater reservoir khairkatta dist, kanker, chhattisgarh" 'An international quarterly journal of biology & life sciences' 2(2):630-633 issn (online): 2320-4257 www.biolifejournals.com

Tanmay, Datta., Debashish, Das. (2022). "Impact of human interference on fish diversity in five wetlands of north bengal, india. Uttar Pradesh" 'Journal of Zoology,' doi: 10.56557/upjoz/2022/v43i183171

V, Jayalekshmy. (2012). "A Comparative Study on The Diversity of Ornamental and Foodfishes of River Achenkovil In Relation to Various Physico- Chemical Characteristics". 'International journal of scientific research', doi: 10.15373/22778179/FEB2013/140

V, Jayalekshmy. (2012). "A Comparative Study on The Diversity of Ornamental and Foodfishes of River Achenkovil In Relation to Various Physico- Chemical Characteristics". 'International journal of scientific research', doi: 10.15373/22778179/FEB2013/140

Valter, M., Azevedo-Santos., Marlene, Sofia, Arcifa., Marcelo, F., G., Brito., Angelo, Antonio, Agostinho., Robert, M., Hughes., Jean, Ricardo, Simões, Vitule., Daniel, Simberloff., Julian, D., Olden., Fernando, Mayer, Pelicice. (2021). "Negative impacts of mining on Neotropical freshwater fishes. Neotropical Ichthyology," doi: 10.1590/1982-0224-2021-0001

Valter, M., Azevedo-Santos., Marlene, Sofía, Arcifa., Marcelo, Fulgêncio, Guedes, de, Brito., Ângelo, Antônio, Agostinho., Robert, M., Hughes., Jean, R., S., Vitule., Daniel, Simberloff., Julian, D., Olden., Fernando, Mayer, Pelicice. (2022). "Negative impacts of mining on Neotropical freshwater fishes." doi: 10.6084/m9.figshare.19920562

Venkatesh, R, Thakur., et. al. (2022) "Icthyofaunal Diversity And Conservation Status Of The Fishes In Tropical Wetland Of Bundelkhand Region, India", 'Ecology Environment And Conservation' 28:386-390 January 202228:386-390 DOI:10.53550/EEC.2022.v28i07s.063

Vikas, Kumar., S., Parida., S., P., Roy., Shiban, Lal, Dhar., Kampan, Bisai., B.K., Behera., B., K., Das. (2023). "An overview of modern biotechnological tools in aquatic food production. Annals of Animal Science", doi: 10.2478/ 'Annals of Applied Statistics'2023-0034

W., Subchan., et al. (2021). "The diversity of freshwater fish sanenrejo and wonoasri rever resort from meru beteri national park. 'Journal of Physics: Conference Series,' Volume 1832, doi: 10.1088/1742-6596/1832/1/012009

Yury, V., Dyldin., Lubomír, Hanel., Ronald, Fricke., A., M., Orlov., V., I., Romanov., Jan, Plesnik., E., A., Interesova., Danil, S., Vorobiev., Maria, O., Kochetkova. (2020). "Fish diversity in freshwater and brackish water ecosystems of Russia and adjacent waters". 'Publications of the Seto Marine Biological Laboratory', doi: 10.5134/251251