

# A bibliometric analysis of research on fish and floristic diversity: Trends and themes

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## Supplementary Information

**TABLE S1** References of 47 found from the Scopus Database searched on 18 August 2024 with the keywords "fish" and "floristic diversity" found in the article titles, abstracts, and keywords of the indexed documents.

No.	Paper details
1	Abdelaal, M., Fois, M., & Fenu, G. (2018). The influence of natural and anthropogenic factors on the floristic features of the northern coast Nile Delta in Egypt. <i>Plant Biosystems</i> , 152(3), 407-415.
2	Alimjanova, K. A., & Shayimkulova, M. A. (2024). Inventory of biological diversity of algae flora of reservoirs of Southern Kyrgyzstan and its sustainable development. <i>E3S Web of Conferences</i> , 5 37.
3	Bravo, S. P. (2022). The role of howler monkeys ( <i>Alouatta caraya</i> ) in the primary succession of the Paraná flooded forest (Argentina). <i>Biotropica</i> , 54(1), 71-77.
4	Briceño-Vanegas, G., & Gallego-Herrera, C. (2023). Ecological functionality of forest and stream corridors in an area of the plains piedmont in Casanare. <i>Acta Biologica Colombiana</i> , 28(3), 472-483.
5	Bronaugh, W. M., Swartz, E. R., & Sidlauskas, B. L. (2020). Between an ocean and a high place: Coastal drainage isolation generates endemic cryptic species in the Cape kurper <i>Sandelia capensis</i> (Anabantiformes: Anabantidae), Cape Region, South Africa. <i>Journal of Fish Biology</i> , 96(5), 1087-1099.
6	Cabral, A. C., De Miguel, J. M., Rescia, A. J., Schmitz, M. F., & Pineda, F. D. (2003). Shrub encroachment in Argentinean savannas. <i>Journal of Vegetation Science</i> , 14(2), 145-152.
7	Chakona, A., Swartz, E. R., & Gouws, G. (2013). Evolutionary drivers of diversification and distribution of a southern temperate stream fish assemblage: Testing the role of historical isolation and spatial range expansion. <i>PLoS ONE</i> , 8(8), e71141.
8	Chakona, A., Swartz, E. R., Gouws, G., & Bloomer, P. (2013). A freshwater fish defies ancient mountain ranges and drainage divides: Extrinsic and intrinsic influences on the evolutionary history of a recently identified galaxiid. <i>Journal of Biogeography</i> , 40(7), 1399-1412.
9	Coleman, C., DeKeyser, E., Kobiela, B., Dixon, C., Escudero, E., & Aldrich-Wolfe, L. (2023). Influence of livestock grazing history on plant community composition on native prairies of the southern prairie pothole region. <i>Rangeland Ecology and Management</i> , 90, 314-321.
10	De Albuquerque, U. P., De Lima Araújo, E., El-Deir, A. C. A., De Lima, A. L. A., Souto, A., Bezerra, B. M., Maria Xavier Freire, E., Sampaio, E. V. D. S. B., Las-Casas, F. M. G., De Moura, G. J. B., Pereira, G. A., De Melo, J. G., Alves Ramos, M., Rodal, M. J. N., Schiel, N., De Lyra-Neves, R. M., Alves, R. R. N., De Azevedo, S. M., Jr., Telino, W. R., Jr., & Severi, W. (2012). Caatinga revisited: Ecology and conservation of an important seasonal dry forest. <i>The Scientific World Journal</i> , 2012, 1-18.
11	De Sousa, A. M. B., Santos, R. R. S., Moraes, F. H. R., & Gehring, C. (2012). Exploring the potential for sustainable weed control with integrated rice-fish culture for smallholder irrigated rice agriculture in the Maranhão lowlands of Amazonia. <i>Renewable Agriculture and Food Systems</i> , 27(2), 107-114.
12	Diyachenko, T. N. (2011). Dynamics of the higher aquatic vegetation of water bodies of the Danube Kiliya Delta under anthropogenic impact. <i>Hydrobiological Journal</i> , 47(1), 29-40.
13	Espinosa Prieto, A., Beisel, J.-N., Verschuren, P., & Hardion, L. (2023). Toward freshwater plant diversity surveys with eDNA barcoding and metabarcoding. <i>Environmental DNA</i> , 5(4), 648-670.
14	Finlayson, C. M., Cowie, I. D., & Bailey, B. J. (1990). Characteristics of a seasonally flooded freshwater system in monsoonal Australia. <i>Wetland Ecology and Management</i> , 2(1), 141-162.
15	Flower, R. J. (2001). Change, stress, sustainability, and aquatic ecosystem resilience in North African wetland lakes during the 20th century: An introduction to integrated biodiversity studies within the CASarina project. <i>Aquatic Ecology</i> , 35(3), 261-280.

No.	Paper details
16	Frank, G. S., Saunders, M. R., & Jenkins, M. A. (2018). Short-term vegetation responses to invasive shrub control techniques for Amur honeysuckle ( <i>Lonicera maackii</i> [Rupr.] Herder). <i>Forests</i> , 9(10), 1-15.
17	Grabas, G. P., Blukacz-Richards, E. A., & Pernanen, S. (2012). Development of a submerged aquatic vegetation community index of biotic integrity for use in Lake Ontario coastal wetlands. <i>Journal of Great Lakes Research</i> , 38(2), 243-250.
18	Grant, T. A., Shaffer, T. L., & Flanders, B. (2020). Patterns of smooth brome, Kentucky bluegrass, and shrub invasion in the northern Great Plains vary with temperature and precipitation. <i>Natural Areas Journal</i> , 40(1), 11-22.
19	Grant, T. A., Shaffer, T. L., & Flanders, B. (2020). Resiliency of native prairies to invasion by Kentucky bluegrass, smooth brome, and woody vegetation. <i>Rangeland Ecology and Management</i> , 73(2), 321-328.
20	Hanene, Z., Lyamine, M., Gérard, D. B., & Ali, T. (2008). Phyto-ecologic survey of a complex of temporary pools Gauthier pools (Northeastern Algeria). <i>Research Journal of Botany</i> , 3(2), 65-75.
21	Hargrove, J. S., Weyl, O. L. F., Zhao, H., Peatman, E., & Austin, J. D. (2019). Using species-diagnostic SNPs to detail the distribution and dynamics of hybridized black bass populations in Southern Africa. <i>Biological Invasions</i> , 21(5), 1499-1509.
22	Heino, J. (2011). A macroecological perspective of diversity patterns in the freshwater realm. <i>Freshwater Biology</i> , 56(9), 1703-1722.
23	Jafari, A., Yavari, A. R., Yarali, N. I., & Gh, V. (2010). Representativeness assessment of protected areas network emphasizing plant diversity in Charmahal & Bakhtiari, Iran. <i>Journal of Environmental Studies</i> , 36(54), 77-88.
24	Joshi, B. D. (2021). Ambient ecological conditions of the Gangetic dolphin- <i>Platanista gangetica gangetica</i> of River Ganga, between Varanasi to Farakka. <i>Advances in Animal Experimentation and Modeling: Understanding Life Phenomena</i> , 253-266.
25	Kasihiw, P., Bawole, R., Marwa, J., Murdjoko, A., Wihyawari, A., Heipon, Y., Cabuy, R. L., Benu, N. M. H., & Hematang, F. (2023). Floristic richness and diversity of Bintuni mangrove, Bird's Head Peninsula, West Papua, Indonesia. <i>Biodiversitas</i> , 24(5), 2887-2897.
26	Kubitzki, K. (1989). The ecogeographical differentiation of Amazonian inundation forests. <i>Plant Systematics and Evolution</i> , 162(1), 285-304.
27	Labat, F., Thiébaut, G., & Piscart, C. (2022). A new method for monitoring macrophyte communities in small shallow lakes and ponds. <i>Biodiversity and Conservation</i> , 31(5), 1627-1645.
28	Marquez, S., Funes, G., Cabido, M., & Pucheta, E. (2002). Grazing effects on the germinable seed bank and standing vegetation in mountain grasslands from central Argentina. <i>Revista Chilena de Historia Natural</i> , 75(2), 327-337.
29	Moure, J., & Brown, J. (2012). Participatory methodologies and indigenous communities – project-based learning: Sian Ka'an, Mexico. <i>World Heritage: Benefits Beyond Borders</i> , 217-229.
30	Nai-Bregaglio, M., Pucheta, E., & Cabido, M. (2002). Grazing effects on the floristic and structural diversity in mountain grasslands from central Argentina. <i>Revista Chilena de Historia Natural</i> , 75(3), 613-623.
31	Rajpar, M. N., Rajpar, A. H., & Zakaria, M. (2024). Riverine forest as a significant habitat to harbor a wide range of bird species. <i>Brazilian Journal of Biology</i> , 84.
32	Renno, J. E., Machordom, A., Blanquer, A., & Boursot, P. (1991). Polymorphism of mitochondrial genes in populations of <i>Leporinus friderici</i> (Bloch, 1794): Intraspecific structure and zoogeography of the neotropical fish. <i>Genetica</i> , 84(2), 137-142.
33	Russell, I. A. (2002). Freshwater fishes of Tsitsikamma National Park. <i>Koedoe</i> , 45(2), 13-17.
34	Sivicek, V. A., & Taft, J. B. (2011). Functional group density as an index for assessing habitat quality in tallgrass prairie. <i>Ecological Indicators</i> , 11(5), 1251-1258.
35	Szklarczyk-Gazdowa, C. (1965). Plankton of certain fish ponds in the Upper Vistula Lasin. <i>Monographiae Botanicae</i> , 19, 85-147.
36	Thiébaut, G., & Muller, S. (1998). The impact of eutrophication on aquatic macrophyte diversity in weakly mineralized streams in the northern Vosges mountains (NE France). <i>Biodiversity and Conservation</i> , 7(8), 1051-1068.
37	Timms, B. V., Coleman, P., & Cooper, J. (2014). Seagull Lake, western Eyre Peninsula, South Australia: A saline lake to benefit from climate change? <i>Transactions of the Royal Society of South Australia</i> , 138(2), 161-180.

No.	Paper details
38	Van Der Walt, J. A., Weyl, O. L. F., Woodford, D. J., & Radloff, F. G. T. (2016). Spatial extent and consequences of black bass ( <i>Micropterus</i> spp.) invasion in a Cape Floristic Region river basin. <i>Aquatic Conservation: Marine and Freshwater Ecosystems</i> , 26(4), 736-748.
39	Vasile Scăeteanu, G., Săndulescu, E. B., Alistar, C. F., Croitoru, C. M., Madjar, R. M., Alistar, A., Gîlea, G. C., & Stavrescu-Bedivan, M.-M. (2023). A short note on water quality and some biodiversity components in Gurban Valley, Giurgiu County. <i>AgroLife Scientific Journal</i> , 12(2), 167-180.
40	Waldon-Rudzinek, B. (2017). Is the flora of oxbow lakes different from that of fishponds? A comparison of two types of water reservoirs in the Noteć River Valley and Bydgoszcz Canal Valley (NW Poland). <i>Ecological Questions</i> , 25, 27-40.
41	Wang, F., Zhu, G., Liu, X., Yang, S., Zhang, M., Cui, C., Wu, A. (2020). Aquatic floristic characteristics and community structure of submerged macrophytes in the Henan section of the Qihe River. <i>Chinese Journal of Applied and Environmental Biology</i> , 26(4), 985-998.
42	Wishart, M., Hughes, J., Stewart, B., & Impson, D. (2006). Extreme levels of intra-specific divergence among Cape Peninsula populations of the Cape galaxias, <i>Galaxias zebratus</i> Castelnau 1861, reveals a possible species complex. <i>African Journal of Aquatic Science</i> , 31(1), 99-106.
43	Witt, A. B. R., & Samways, M. J. (2004). Influence of agricultural land transformation and pest management practices on the arthropod diversity of a biodiversity hotspot, the Cape Floristic Region, South Africa. <i>African Entomology</i> , 12(1), 89-95.
44	Woodford, D. J., Barber-James, H. M., Bellingan, T. A., Day, J. A., de Moor, F. C., Gouws, J., & Weyl, O. L. F. (2013). Immediate impact of piscicide operations on a Cape Floristic Region aquatic insect assemblage: A lesser of two evils? <i>Journal of Insect Conservation</i> , 17(5), 959-973.
45	Woodford, D. J., Impson, N. D., Day, J. A., & Bills, I. R. (2005). The predatory impact of invasive alien smallmouth bass, <i>Micropterus dolomieu</i> (Teleostei: Centrarchidae), on indigenous fishes in a Cape Floristic Region mountain stream. <i>African Journal of Aquatic Science</i> , 30(2), 167-173.
46	Woodrofe, C. D., Lovelock, C. E., & Rogers, K. (2015). Mangrove shorelines. <i>Coastal Environments and Global Change</i> , 251-267.
47	Wu, T., Shen, C., Zhong, J., Cai, J., Yu, W., Ma, C., Xu, C., Zhuang, Z., & Xie, S. (2024). Fish community structure and resource status in coastal waters of Fujian. <i>Journal of Shanghai Ocean University</i> , 33(3), 755-767.

**TABLE S2** Distribution of countries on the 47 papers from the Scopus Database searched on 18 August 2024 with the keywords “Fish” and “floristic diversity” found in the article titles, abstracts, and keywords of the indexed documents.

Country	Number of papers
South Africa	10
United States	8
France	4
Argentina	4
Undefined	3
Australia	3
China	2
Brazil	2
Uzbekistan	1
United Kingdom	1
Ukraine	1
Spain	1
Saudi Arabia	1
Romania	1
Poland	1
Pakistan	1
Malaysia	1
Kyrgyzstan	1
Italy	1
Iran	1
Indonesia	1
India	1
Germany	1
Finland	1
Egypt	1
Colombia	1
Canada	1
Algeria	1
	28
	56

**TABLE S3:** Distribution of a number of papers with the floristic-related keywords, based on the 47 papers from the Scopus Database searched on 18 August 2024 with the keywords “Fish” and “floristic diversity” found in the article titles, abstracts and keywords of the indexed documents.

Keywords	Number of papers
Species Diversity	10
Diversity	7
Cape Floristic Region	7
Biodiversity	7
Species Richness	5
Endemism	5
Prairie	4
Floristics	4
Water Quality	3
Species Conservation	3
Smooth Brome	3
Phylogeography	3
Native Species	3
Kentucky Bluegrass	3
Grass	3
Conservation	3
Bird	3
Animals	3
Animal	3
Wetlands	2
Wetland	2
Western Cape	2
Water Flow	2
Vegetation Dynamics	2
Vegetation	2
Shrub	2
Relative Abundance	2
Population Distribution	2
Poaceae	2
<i>Poa pratensis</i>	2
Plants (botany)	2
Plant Community	2
Phylogeny	2
Palaeorivers	2
Monitoring	2
Impacts	2
Humans	2
Human	2
Haplotype	2
France	2
Environmental Change	2
Ecosystems	2
Ecosystem	2
Conservation Status	2
Conservation Management	2
Climate Change	2
<i>Bromus inermis</i>	2
Birds	2
Brazil	2
Amphibia	2
Conservation Targets	1
Conservation Planning	1
Conservation of Natural	1

<b>Keywords</b>	<b>Number of papers</b>
Resources	
Conservation Intervention	1
Conservation Biology	1
Connectivity	1
Comparative Study	1
Community Structure	1
Community Quantitative	1
Features	
Community Dynamics	1
Collateral Impacts	1
Coastal Wetlands	1
Coastal Wetland	1
Coastal Flora	1
Classification	1
Chorology	1
Chaco Province	1
<i>Carex</i>	1
Carabidae	1
<i>Canos</i>	1
<i>Calidris ruficollis</i>	1
Breeding Site	1
Breeding Bird Biodiversity	1
<i>Bos taurus</i>	1
Biotic Integrity	1
Biotic Diversity	1
Biome	1
Biological Invasion	1
Biological Indicators	1
Biogeography	1
Biogeographical Region	1
Biodiversity Surrogate	1
Biodiversity Hotspot	1
Bio-diversity	1
Bayes Theorem	1
Barcode Reference Databases	1
<i>Austroglanis</i>	1
Australia	1
<i>Astragalus</i> (angiosperm)	1
Assessment Method	1
Arthropod Diversity	1
Anthropogenic Effect	2
Anthropogenic Changes of	1
Vegetation	1
Amazonia	1
Amazon Region	1
<i>Alliaria petiolata</i>	1
Alien	1
Algae	1
Agriculture	1
Agricultural Production	1
Age	1
Africa	1
<i>Acetabularia peniculus</i>	1
Abundance	1

**TABLE S4** Distribution of several papers with fish-related keywords, based on the 47 papers from the Scopus Database searched on 18 August 2024 with the keywords “Fish” and “floristic diversity” found in the article titles, abstracts, and keywords of the indexed documents.

Keywords	Number of papers
Fish	9
Pisces	6
Argentina (fish)	4
Freshwater Fish	3
<i>Galaxias</i>	3
<i>Micropterus salmoides</i>	3
Mitochondrial DNA	3
<i>Sandelia capensis</i>	2
<i>Sandelia</i>	2
<i>Micropterus dolomieu</i>	2
<i>Micropterus</i>	2
Macroinvertebrate	2
Invasive Fish	2
Galaxiidae	2
<i>Galaxias zebratus</i>	2
Aquatic Community	3
Aquatic Ecosystems	2
River	2
Aquatic Vegetation	1
Aquatic Plants	1
Aquatic Invertebrates	1
Aquatic Ecosystem	1
Aquatic Diversity	1
<i>Anguilla mossambica</i>	1
<i>Barbus calidus</i>	1
<i>Caffrogobius gilchristi</i>	1
<i>Caffrogobius</i>	1
Coastal Waters	1
Coastal Rivers	1