International Journal of Advanced Research in Biological Sciences
ISSN: 2348-8069
www.ijarbs.com
(A Peer Reviewed, Referred, Indexed and Open Access Journal)
DOI: 10.22192/ijarbs Coden: IJARQG (USA) Volume 9, Issue 7 -2022

Research Article

DOI: http://dx.doi.org/10.22192/ijarbs.2022.09.07.027

Diversity, Distributional status of the Endemic stream - Fishes in Palani hills

S.Kalaimani[1]*, Y.Thangam[2], S.Kowsalya[3]

[1] Assistant Professor of Zoology, PG and Research Department of Zoology, J.K.K.Nataraja college of Arts and Science, Kumarapalayam-638183, Namakkal (D.t), Tamil Nadu, India.
E-mail: *kalaimanipadma@gmail.com*

[2] Assistant Professor of Zoology, PG and Research Department of Zoology, J.K.K.Nataraja college of Arts and Science, kumarapalayam-638183, Namakkal (D.t), Tamil Nadu, India.
E-mail: *thangambaskars@gmail.com*

[3] Assistant Professor of Zoology, PG and Research Department of Zoology, J.K.K.Nataraja college of Arts and Science, kumarapalayam-638183, Namakkal (D.t), Tamil Nadu, India.
E-mail: *kowsalya.s@jkkn.ac.in*

* Corresponding author

Abstract

The present research has been carried out in different broad aspects viz. bio-ecological parameter analysis of freshwater streams and diversity, seasonality and distributional status of the endemic stream-fishes in palani hills. However, conservatory measures to mitigate the impact of the pressures have not only been slow but also inadequate and as a result many of the aquatic fish species decline rapidly. The main causes behind the loss of biodiversity in freshwater streams were found with habitat degradation and water depth decline, exotic species introduction, water diversions, pollution, and seasonal change impacts. The diversity and system of the genus Cyprinidae form genus currently and the genus includes at least eleven species, all endemic to fresh water system of Palani Hills of South India. While these species found commonly in south India and were frequently used as a food sources, little was known about the morphological diversity within between species and nothing was known regarding intraspecific genetic diversity (or) species relationship. This study provided information of the conservation and distributional variation that have been reported in *Punitius* species, suggesting significant diversity among the selected species. The clearly the genus warrant more through bio-geographic sampling and examination of morphological data or analysis to reveal the natural lineage exist in this research work. This study would be useful in future to understand the phylogenetic position of stream fishes in palani hills.

Keywords: Bio-ecological studies, Endemic fishes, diversity conservation, distribution status, Palani hills.

1. Introduction

The diversity and distribution of the fresh water stream fish fauna is essential for designing and implementing conservation strategies. In the present study, palani hill streams physiochemical parameters during and after pandemic situation that affect the distributional pattern of freshwater stream fishes in palani hills. Further, investigations on the freshwater fish fauna were initiated by Mr. Hora and Law. Silas listed 25 fish species from the Anamalai Hills and 10 species from the Nelliampathi Hills. Arunachalam and Manimekalan reported economically important and cultivable fishes of the Nilgiris biosphere reserve later he described the assemblage structure of stream fishes. Nilgiris Biosphere. Manimekalan and Singh recorded *Schismatorhynchus* (Nukta (nukta (Sykes) (Pisces: Cyprinidae) from Moyar River. Later, Arunachalam et al. reported the occurrence of *Neolissochilus wynaadensis*, from Karnataka. Earlier, Biju et al., recorded *Puntius filamentosus* and *Puntius melanampyx* (Day) in Orukomban and thelikal respectively. Manimekalan and Arunachalam (2002) rediscovered the critically endangered air – breathing catfish Clarias dayi Hora (Pisces: Claridae) in Mudumalai Wildlife Sanctuary. *Puntius denisonii* (Day, 1865) and *Danio malabaricus* (Jerdon,1849) *P. melanostigma* (day), *P. filamentosus* (Valenciennes), *P.arulius* (jerdon), *Punitus dorsalis (Jerdon,1849) Horalabiosa joshuai* (Silas,1954), *Nemacheilus keralensis* (Rita, Banarescu & Nalbant,1978) and Nemacheilus as over-exploitation of wild stock of these highly-priced fishes can lead to their extinction. It has been now well established that fish diversity is determined by the geographical location, ecological condition and physiochemical nature of the aquatic habitat. The Indian species represent about 8.9% of the known fish species of the world. Jayaram (2010) listed 852 freshwater species of fishes under 272 genera, 71 families and 16 orders, including both primary and secondary freshwater fishes from India, Bangladesh, Myanmar, Nepal, Pakistan and Sri Lanka. Freshwater fishes are a poorly studied group since information regarding distribution, population dynamics and threats is incomplete, and most of the information available from few well-studied locations only (Sabuj Kumar chaudhuri 2010).

2. Materials and Methods

2.1. Sampling area

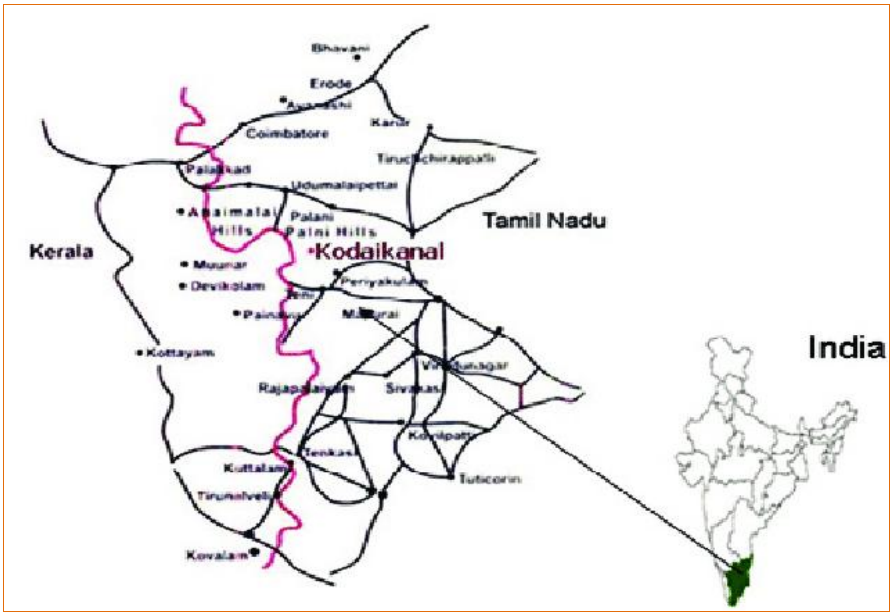
The Palani hills of western Ghates are currently subject to increasing development pressure as it is under developed for a long time. Tamil Nadu state government that much of the range be granted protected status as a wildlife sanctuary or palani hills wildlife sanctuary and national park. The Palani hills are a mountain range in the southern Indian states of Kerala and Tamil nadu. The Palani hills are an eastward extension of the Western Ghats ranges, which run parallel to the west coast of India. Palani hills, range of hills, an eastward extension of the Western Ghats, in southwestern Tamil state, southern India. The ecological study selected of fifteen sites (5 low, 5 high elevations) will be selected from Palani hills. 10 sites have been selected from Palani hills. In each site, three replicas were made between 1 m intervals. Month-wise sampling was carried out for a year. The sampling site was measured by following: Latitude, longitude and elevation of sampling sites have been taken from GPS (Global Positioning System); temperature, pH, dissolved oxygen, velocity depth, substrates, etc will be measured. The collected fishes have been preserved separately in the field using 99% ethanol. Isolation of Fish from this study 14 fish species collected from 15Streams of Palani hills. Fish samples collected were *Devario malabaricus* (Devario), *Punitus denisonii* (Day, 1865) *Punitus dorsalis* (Jerdon, 1849) *Horalabiosa joshuai* (Silas,1954) Each fish sample was placed in aseptic small plastic box, labeled and sealed separately to avoid contamination. These fishes were brought to the laboratory and kept at 40^{o}C.

2.2. Preservation method

Collection of sample 3 replica area between 1 meter distances. Sample collected month wise up to one year Collected Specimen preserved by 70% Ethanol or 95% Ethanol separately. In each site, three replicas were made between 1 m intervals. Month-wise sampling was carried out for a year. The physic-chemical parameters analysis of sampling site were measured the following latitude, longitude, and elevation of sampling sites were taken from GPS (global positioning system); temperature, ph, dissolved oxygen, velocity depth, substrates were measured. The field surveys and identifications have been carried out through non-destructive sampling by using sampling methods suited to the nature of river course, stream order, and flow, presence of aquatic flora and fauna, and local human disturbance of collection area. Collected information on threats to and ecology of species were also collected based on direct observation, bio-ecological measurements of streams and ecological survey with local key informants.

Palani hills of South India

Location map of Palani hills, Western Ghates



Elevation: 2,533 m
Location: Tamil Nadu, India
Mountain range: Western Ghats
Country: India
Easiest route: Laws Ghats Road
Parent range: Western Ghats

Table 1: Collection streams with elevation in Palani hills of South India.

S.NO	Low elevation(m)	S.NO	Mid elevation(m)	S.NO	High elevation (m)
1.	Poolathur (900)	6	Adukkam (1406)	11.	Fairy falls (2050)
2.	Kumbakarai (400)	7	Silver cascade (1256)	12.	Guntar (1990)
3.	Pachalur (296)	8.	Kurusedi (1213)	13.	Bear Shola falls (1980)
4.	Rat tail falls (290)	9.	Moolayar (1186)	14.	Samakadu (1538)
5.	Thallakuttu (250)	10.	Kozikottu (1182)	15.	Pillar rock stream (1534)

3. Results and Discussion

One year period of seasonality wise analysis physio- chemical parameters were collected there are, odor, temperature, and to statistical findings every collection area chemical and physical factors mean values the maximum in TDS values are 86.6 -57.88 and minimum mean value are 0.03-0.02 were studied this results indicate that large scale variables were responsible for determining the diversity of fresh water stream fish communities. Multivariate analysis suggests that physical and chemical variables significantly influence the distribution and abundance of fresh water stream fishes in streams of palani hills of Southern Western Ghats. Apart from these variables, elevation was an important factor. Identified some fish species in that collection area of palani hills and collect fish identification and fish morphological studies, feeding habit, biology studies, distribution, IUCN status, threat to human and its uses was tabulated (Table: 3). Finally studied fish scientific name, common name, vernacular name, and fish classification was noted. My study were continue to analysis fish distributional status, biological study, feeding habit was studies my identified endemic fishes. Finally to analysis based on phylogenetic nature to collect their IUCN red list status information was collected and tabulated (Table: 4).

Table: 2. physical parameters of the sampling sites

Area of collection	**Latitude (n)**	**Longitude (e)**	**Elevation (m)**	**Temperature**		Width (m)	**Depth (cm)**	**Current velocity**	**Canopy**	**Local human distribu-tion**
				At	Water					
1.Poolathur	10.16152	77.331	900	17.2	12.4	2	12	0.09	90	YES
2.Kumba-karai	10.17739	77.545	400	17.2	15.8	9	7	11.7	80	YES
3.Pachalur	10.39085	77.677	296	17.3	15.2	4	7	2.1	80	YES
4.Rat tail falls	10.13133	77.383	290	22.7	17.5	9	5	0.08	60	YES
5.Thalla-kuttu falls	10.44181	77.696	250	19.7	18.7	5	39	0.07	50	YES
6.Adukkam	10.23677	77.543	1406	23.5	18.4	14	3.5	3.9	10	NO
7.Silver cascade	10.24537	77.516	1256	23.1	20.7	3	11	0.04	80	NO
8.Kurusedi	10.27633	77.559	1213	22.3	20.1	2	5	50.9	80	YES
9.Moolayar	10.26903	77.611	1186	23.4	20.2	5	6	10.06	50	YES
10.Kozikott u	10.23731	77.546	1182	28.3	20.5	2	12	3.3	50	YES
11.Fairy falls	10.13524	77.281	2050	24.4	25.5	2	17	0.09	40	YES
12.Guntar	10.10927	77.318	1990	28.1	22.7	5	12	0.11	60	YES
13.Bear shoal falls	10.13182	77.239	1980	24.6	23.1	2	24	0.05	60	YES
14.Sama-kadu	10.24044	77.564	1538	27.7	23.3	2	3	3.3	20	YES
15.Pillar rock	10.21018	77.466	1534	26.2	24.5	2	6	2.6	50	NO

Table: 3. Chemical parameters of the sampling sites

Area of Collection of Sample	pH	Temp (OC)	DO2	Co2	TDS	Alkalinity	Hardness	Calcium	Chloride	Ammonia	Nitrite	Nitrate
1.Poolathur	7.77	27.33	4.30	3.61	138.01	120.01	110.02	32.01	61.02	0.05	0.01	0.46
2.Kumbakarai	7.74	29.01	3.72	5.95	53.92	50.01	40.02	12.02	29.01	0.01	0.01	0.23
3.Pachalur	7.38	29.01	3.52	6.01	112.01	80.01	70.01	20.02	53.31	0.03	0.01	0.36
4.Rat tail falls	7.35	28.91	4.41	4.81	45.01	64.01	35.02	10.02	23.05	0.01	0.01	0.32
5.Thallakuttu falls	7.44	29.01	4.82	6.15	47.22	82.02	30.02	8.02	25.01	0.01	0.01	0.45
6.Adukkam	7.38	29.10	4.35	6.01	54.65	80.01	45.02	14.02	28.12	0.01	0.01	0.36
7.Silver cascade	7.38	29.41	5.33	4.64	72.01	60.02	55.01	18.03	39.96	0.00	0.01	0.25
8.Kurusedi	7.44	29.61	5.42	6.03	75.84	80.01	60.02	18.03	46.93	0.01	0.01	0.16
9.Moolayar	7.33	29.12	4.16	5.62	260.01	80.01	190.03	56.02	99.02	0.05	0.01	0.43
10.Kozikottu	7.95	29.42	5.62	2.73	89.02	90.02	60.03	20.03	49.81	0.01	0.01	0.24
11.Fairy falls	7.76	29.13	4.13	2.42	101.02	80.03	60.02	16.02	51.03	0.04	0.01	0.12
12.Guntar	7.35	29.23	3.62	5.27	44.83	70.02	30.03	8.02	24.23	0.02	0.01	0.16
13.Bear shoal falls	7.55	29.23	4.15	3.27	38.03	70.02	30.03	2.41	22.03	0.01	0.04	0.16
14.Samakadu	7.96	29.13	4.42	1.83	73.23	95.03	50.03	16.02	48.04	0.04	0.01	0.11
15.Pillar rock	7.82	22.14	4.52	1.75	70.22	91.04	51.04	17.05	50.08	0.08	0.04	0.14
Mean	**7.56**	**29.05**	**4.43**	**4.60**	**86.06**	**78.66**	**61.81**	**17.91**	**42.90**	**0.03**	**0.01**	**0.27**
SD	**0.23**	**0.53**	**0.66**	**1.53**	**57.88**	**16.78**	**42.55**	**13.05**	**20.87**	**0.02**	**0.00**	**0.12**

Table no. 4: collected fishes distributional status.

Pethia ticto	Non-endemic	Common	Abundance	LC	India, Nepal, Pakistan, Srilanka, Bangladesh, Burma
Puntius denisoni	Non-endemic	ENWG	Very rare	EN	Mundakayam, Travancore, Aralam, Kannur, Nilgris
Puntius dorsalis	Non-endemic	ENWG	Very rare	EN	Tamilnadu, Kerala, Karnataka, Andhra, Orissa, Srilanka
Devarimalabaricus	Non-endemic	ENWG	Very rare	LC	Western Ghats, Tamilnadu, Kerala, Karnataka
Nemaceilus guentheri	Non-endemic	ENWG	Very rare	VU	Western Ghats, Tamilnadu, Kerala, Karnataka
Nemacheilus keralensis	Non-endemic	ENWG	Very rare	VU	Western Ghats, Tamilnadu, Kerala, Karnataka

4. Conclusion

This study depicted the status of the distributions of climatic changes during monsoon seasons in sampling area of south India region. The changes of physic-chemical factors during monsoon or seasonal variations were represented all the factors changed in inhabited fishes in this study area. The clear the understanding of bio ecological condition in particular inhabited area of palani hills based on seasonality, distributional status, diversity of fresh water stream fishes has been made through this research encompassing the different fishes endangered and the responsibility of parameter analysis in that area was based on the frequent climatic changes in the palani hills. The findings were made based on the analysis of water quality and the local human population activity on the freshwater of streams and rivers that affect the living of endemic freshwater fishes and its bio-ecological condition. The attentions during different Seasonality, Distributional analysis given in this research would be useful to understand the conservation status of freshwater streams fishes of Palani hills, and its endemic freshwater fishes. This biology study clearly proven the evidence of their fish fauna diversities collected through fish base. The fish identification was tabulated and presented. It is concluded through this study about the fish diversity and distributional pattern of fish species based on their habitat seasonality and water parameters of living habitat and thus this study 4. would be an input for further researches relating to phylogeny.

References

1. S. Kalaimani C.Kandeepan (2018) “Studies on physic chemical parameters analysis during seasonality, diversity and distribution status of fresh water stream fishes in palani hills of south India” GIS science journal UGC-CARE listed journal Volume 8, Issues 7, 2021. ISSN: 1869-9391. UGC Care listed journal.
2. S.Kalaimani, S.Kowsalya, Dr.C. Kandeepan (2018)“The Effect of Heavy Metals From Tannery Effluents on the Fresh water Fish *Catla catla* and Health Status of the Consumer in Erode District “International Journal of Research and Analytical Reviews (IJRAR).Volume – 5 / Issues / July – September 2018. E-ISSN-2348 – 1269C
3. S.Kalaimani & K.Parvathi (2017)“The Effect Of Commercial Probiotic on Histological Changes in the Muscle of Ornamental Fish *Puntius Conchonius*.”International Journal of Advanced Research in Biological Sciences, Volume – 4, Issue 8 – 2017ISSN:2348 – 8069. UGC listed Journal csosmos impact Factor : 4.236,

S.Kalaimani & K.Parvathi (2017)"A study on the effect of commercial probiotics on Physico – Chemical parameters of ornamental fish (*Puntius Conchonius*) Culture water "International Journal of Current Science Research. Volume-3, issue 7,july 2017. ISSN: 2454-5422. UGC listed journals.

5. S.Kalaimani & C.Kandeepan (2017)"Effect Of Organophosphate – Pesticide On the Freshwater Fish *Labeo rohita* (Hamilton)"Indian Journal Of Natural Sciences. (IJONS) On Issue 44/October-2017.ISSN:0976 – 0997.UGC listed journals.
6. S. Kalaimani, Dr.C. Kandeepan (2018)"Effect of Rhizobacterial Inoculation On Alkaloid Aloin content of *Aloe vera*" International Journals of Research and Analytical Reviews (IJRAR)Volume 5/issues 3/July 24/2018.ISSN 23495138.Cosmos Impact Factor 4.236,
7. Bruton, M.N. (1995). Threatened fishes of the world: *Latimeria chalumnae* Smith, 1939. (Latimeriidae). Environ. Biol. Fish. 43: 104pp.
8. Gibbs, J.P. (2000) Wetland loss and biodiversity conservation. Conserv. Biol 14(1):314–317
9. Hebert, P.D.N., Cywinska, A., Ball, S.L. & deWaard, J.R. (2003) Biological identifications through DNA barcodes. *Proceedings of the Royal Society of London Series B, Biological Sciences*, 270(1512), 313–321.
10. Jayaram, K.C. (1991). Revision of the Genus Puntius Hamilton. Records of the Zoological Survey of India – Occasional Paper No. 135, Zoological Survey of India, Kolkata, India.
11. Jayaram, K.c. (2010). The Freshwater Fishes of the Indian Region. Narendra Publishing House, Delhi, 616pp.
12. Arunachalam, M. & Johnson, J.A. 2002. A new species of Puntius Hamilton (Pisces: Cyprinidae) from Kalakad, Mudanthurai Tiger Reserve, Tamil Nadu, India. Journal of Bombay Natural History Society 99(3): 474-480.
13. Arunachalam M.; Chinnaraja S. & Mayden, R.L. 2016. On the identity of *B arbus* (= Hypselobarbus) gracilis Jerdon (1849) and description of a new species of Hypselobarbus (Cypriniformes: Cyprinidae) from Western Ghats, peninsular India. Fish Taxa 1(2): 75-83.
14. Bijukumar, A.; Siby Philip Anvar Ali, Sushama, S. & Raghavan R. 2013. Fishes of River Bharathapuzha, Kerala, India: diversity, distribution, threats and conservation. Journal of Threatened Taxa 5(15): 4979-4993.
15. Dinakaran, S., and Anbalagan, S. 2010. Spatio – temporal dynamics of Caddis flies in streams of Southern Western Ghats. J Insect Sci 10:46
16. Eschmeyer WN, Fricke R (2012) Catalog of fishes electronic version (20 December, 2013). Electronic database accessible at http:// research.calacademy.org /research/ichthyology/ catalog/ fishcatmain.asp/.
17. Menon AGK (1999) Check list-Fresh water fishes of India. Records of the Zoological Survey of India. Misc Publ 175: 1-366.
18. Froese R, Pauly (2012) Fish Base. World Wide Web Electronic Publication Available: www.fishbase.org Accessed: 2012 Dec 28.
19. Leveque C, Oberdorff T, Paugy D, Stiassny MLJ, Tedesco PA (2008) Global diversity of fish (Pisces) in freshwater. Hydrobiologia 198: 545-567.
20. Hoagland KE (1996) the Taxonomic Impediment and the Convention on Biodiversity. ASC News 24: 66-67.
21. Pethyagoda R, Kottelat M (1994) Three new species of fishes of the genera Osteochilichthys (Cyprinidae), Travancoria (Balitoridae) and Horabagrus (Bagridae) from the Chalakudy River Kerela India. J South Asian Nat Hist 1: 97-116.

22. Lakra WS, Singh M, Goswami M, Gopalakrishnan A, Lal KK (2015) DNA barcoding Indian freshwater fishes. Mitochondrial DNA 1-8.
23. Mendonca A, Cunha A, Chakrabarti R (2012) Natural Resources, Sustainability and Humanity: A Comprehensive View, Springer.
24. Waugh J (2007) DNA barcoding in animal species: progress, potential and pitfalls. Bioessays 29: 188-197.
25. Becker S, Hanner R, Steinke D (2011) Five years of FISH-BOL: brief status report. Mitochondrial DNA 22: 3-9.
26. Liu H, Chen Y (2003) Phylogeny of the East Asian cyprinids inferred from sequences of the mitochondrial DNA control region. Can J Zool 81: 1938-1946.
27. Day, F. 1871. Monograph of Indian Cyprinidae, Parts 13. Journal of Asiatic Society, Bengal 40: 95-142, 277-367.
28. Day, F. 1873. Report of freshwater fish and fisheries of India and Burma. Government Press, Calcutta. Day, F. 1878. The Fishes of India; being a natural history of the fishes known to inhabit the seas and freshwaters of India, Burma and Ceylon, part 4. William Dawson & Sons Ltd. London.
29. Hora, S.L. & Law, N.C. 1941. The freshwater fishes of Travancore. Records of the Indian Museum 43(1): 9-27. Hubbs, C.L. & Lagler, K.F. 1964. Fishes of the Great lakes region. University of Michigan Press. USA.
30. ICZN (International commission on Zoological Nomenclature) (1999). International Code of Zoological Nomenclature. International Trust for Zoological Nomenclature, The Natural History Museum, London.

Access this Article in Online

Website: www.ijarbs.com

Subject: Fish Biology

Quick Response Code

DOI:10.22192/ijarbs.2022.09.07.027

How to cite this article:
S.Kalaimani, Y.Thangam, S.Kowsalya. (2022). Diversity, distributional status of the endemic stream-fishes in Palani hills. Int. J. Adv. Res. Biol. Sci. 9(7): 273-280.
DOI: http://dx.doi.org/10.22192/ijarbs.2022.09.07.027