

The Tamiraparani Fish Count:

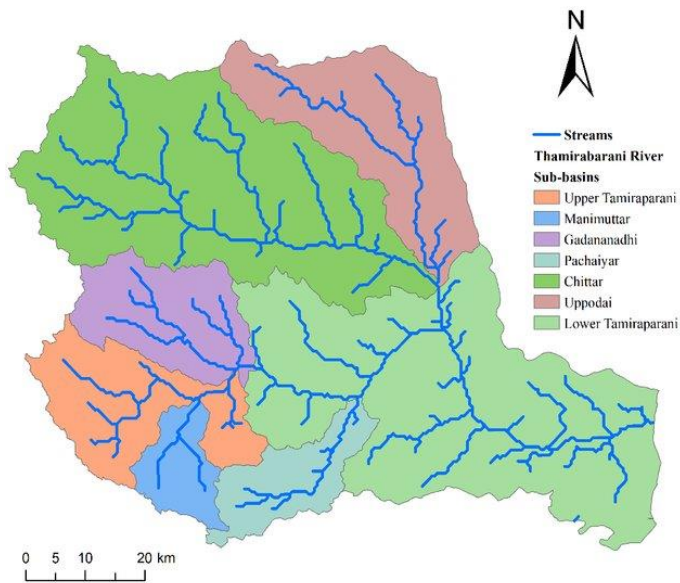
Ichthyofaunal exploration of the Tamiraparani River



The Tamiraparani River



The Tamiraparani is the southern-most major east-flowing river in Peninsular India. It originates at an altitude of 2000m ASL in the Agasthyamalai hills on the eastern slope of the Western Ghats in Tirunelveli district of Tamil Nadu. It is the only perennial river entirely in Tamil Nadu, and traverses the districts of Thirunelveli and Thoothukoodi for a distance of nearly 130KM before draining into the Gulf of Mannar.



The Chittar, Gadana, Servalar, Pachaiyar, Uppodai and Manimuttar are its major tributaries. The upper reaches of the river basin flow through the Kalakkad-Mundathurai Tiger Reserve and therefore are reasonably safe from human disturbance, however the middle and lower reaches are affected by water abstraction for agriculture and pollution due to sewage and run-off from the ever expanding human settlements along the course of the river.

Fishes of the Tamiraparani River



The endemic Tamiraparani Barb (*Dawkinsia tambraparniei*)

The ichthyofaunal diversity in the Tamiraparani has been largely understudied. Silas (1953) was the first work on the fishes of this basin, although it was restricted to the headwaters of the river. This was followed by Johnsingh & Viikram (1987), and Rema Devi (1992) also on the upper reaches of the river.

Rema Devi et al. (1997) was the first comprehensive survey of the entire river system and reported 70 species of fish, of which included 4 exotic species (*O. mossambicus*, *Poecilia reticulata*, *G. affinis*, *C. carpio*). More recently, Mogalekar (2018) reported 125 species on the basis of a survey of 4 locations on the river, Kannan & Johnsingh (2020) reported 50 species from the upper reaches within KMTR, and Durairaja et al (2022) reported 57 species from the lower stretches of the river. Most studies have not taken the entire course of the river into account, and several contain evident misidentifications.

The river basin is home to 7 endemic species of fish; *Horallabiosa joshuai*, *Garra kalakkadensis*, *Neolissocheilus tamiraparaniensis*, *Hypselobarbus tamiraparaniei*, *Mesonoemacheilus tambraparniensis*, *Haludaria kannikattiensis* and *Dawkinsia tambraparniei*, the first 6 of which are apparently restricted to the upper catchment.



Endemic *Hypselobarbus* recorded during the fish count



Possible new species of *Aplocheilus* recorded during the fish count.



Salmostoma sp recorded by volunteers during the training workshop.

The Tamiraparani Fish Count: Fish diversity exploration

Given that the last comprehensive survey of the entire river basin was over 25 years ago, we believed that it was necessary to conduct a wide-ranging survey of this basin to establish a baseline for aquatic biodiversity and assess the impact of exotic species, climate change and anthropogenic activities on the native fish fauna. The preparation of a DNA barcode library for the river basin will also aid in future conservation efforts.

We began conducting surveys in April 2023 between Manimutthar and Cheranmahadevi, where the river transitions from the hills to the plains; yielded 22 species of fish, of which 3 are exotic species and 2 others may be new to science.



A second phase of the survey conducted in June 2023 across multiple locations between Naranammalpuram and Punnakayal, near the mouth of the river, resulted in 43 species, of which 5 are exotic.



Continuing the surveys in 2024, we explored the fish assemblages in the SEO sites of Manimuthar, Papanasam, Cheranmahadevi, Gopalsamudram and Naranammalpuram during January and February, documenting a total of 34 species of fish.

During this phase of the survey, the team from ATREE-ACCC reached out to the fisher communities at every location to interact, work with and engage in the survey and conservation efforts.

Our interactions revealed that most traditional fishermen no longer fish in the river outside of the monsoons season, due to declining catch diversity. Most commercial fishing takes place in reservoirs and impoundments and focuses on translocated carp and tilapia. We were informed that several native species that used to be fished earlier are no longer caught because they are not commercially viable. As a consequence, casual fishermen who make up a significant number of the fishing community, and the public in general, are unaware of the fish diversity in the river.



It is therefore necessary to educate people of the native aquatic diversity that exists in the Tamiraparani, and co-opt them in conservation efforts in order to ensure the long term success of such programmes.

The role of citizen-driven initiatives in conservation cannot be overlooked. The Tamiraparani Waterbird Count (TWC), initiated by ATREE in 2011 with the involvement of just 13 citizens and 14 bird experts has now become a flagship conservation event, with about 700 volunteers participating in 2016.

ATREE's Agasthyamalai Community Conservation Centre (ACCC) diligently conducts various Citizen Science programs in the Tamiraparani landscape, including the Tamiraparani Waterbird Count, Harrier Watch, and Moth Watch. These initiatives greatly contribute to biodiversity documentation and conservation, engaging local citizens in the process.

In this spirit of inclusive research, ATREE's Agasthyamalai Community Conservation Centre, Manimutharu, in collaboration with the Department of Zoology, Sadakathullah Appa College, Tirunelveli, and MS University, Alwarkurichi, conducted the Tamiraparani Fish Count, on 23rd and 24th March.

For the first time in peninsular India, a synchronised fish count was conducted in Tamiraparani River.



Methodology

Fish Count Protocol

The Fish Count was performed at 6 pre-determined locations along the Tamiraparani River in both Tirunelveli and Thoodukudi districts. The sites were Papanasam, Thirupudaimaruthur, Gopalamudram, Seevalaperi, Karungulam, and Srivaikundam. The Fish Count was led by M. Mathivanan, Coordinator, ATREE's Agasthyamalai Community Conservation Centre, Manimutharu, Dr. M. Muralidharan, Associate Professor, Sri Paramakalyani Centre for Environmental Sciences, Alwarkurichi, Nilanjan Mukherjee, Researcher, ATREE, Bengaluru, Surya Narayanan, Researcher, ATREE, Bengaluru, and local fishermen Murugan, Paulraj, Suresh, Durai, Esakki and Sudalai.

Volunteers were divided into 6 teams, with each team led by an ATREE-ACCC member and one fisherman who would sample different habitats in the survey site with a cast net.

A detailed Fish Count protocol was developed and followed by each team member. The details of the protocol are in the appendix below.



Workshops

Workshop at Sadakathullah Appa College, Tirunelveli



The team from ATREE-ACCC conducted an interactive workshop titled 'Dive into Diversity: Workshop on Fish Conservation in the Tamiraparani Basin' at the Department of Zoology, Sadakathullah Appa College, Tirunelveli, on February 23, 2024, to bring awareness about the fishes of the Tamiraparani River, the threats posed to aquatic biodiversity and to begin conversations between students, NGO personnel, fisher folk and Government officials.

M. Suganya, District Revenue Officer, Tirunelveli, inaugurated the workshop in the presence of Dr. Shakul Hameed, Principal In-charge, Dr. S.M.A. Syed Mohamed Khaja, Vice Principal, Sadakathullah Appa College, K. Selvan, Thasildhar, Disaster Management Unit, Tirunelveli, and Arockiasamy, Inspector, Department of Fisheries and Fishermen Welfare, Tirunelveli.

Dr. M. Sithi Jameela, HoD, Department of Zoology, Sadakathullah Appa College, M. Mathivanan, Coordinator, ATREE's Agasthyamalai Community Conservation Centre, Manimutharu, Dr. M. Muralidharan, Associate Professor, Sri Paramakalyani Centre for Environmental Sciences, Alwarkurichi, Nilanjan Mukherjee, Researcher, ATREE, Bengaluru, Surya Narayanan, Researcher, ATREE, Bengaluru, and local fishermen Kumarasamy and Murugan took sessions on various topics related to Tamiraparani and its aquatic biodiversity.

Dr. M. Sithi Jameela, HoD, Department of Zoology, announced that due to the considerable interest generated from the workshop, she would be proposing that their College, being an autonomous institution, develop a course on the aquatic fauna of the Tamiraparani River.

Training workshop at Kallidaikuruchi

The survey started with a training workshop on the Tamiraparani River at Kallidaikuruchi on 23rd March, in which students from the two different colleges, local volunteers and members from the fisher community came together to learn the protocol that was to be followed for sampling and counting the fishes of the Tamiraparani. In total, 26 volunteers were trained and then assigned to 6 teams for the fish count on the following day. Kallidaikuruchi was also considered a sampling site for the fish survey as 13 species were counted and documented by the volunteers during the course of the training.

We also developed a poster on the common fishes of the Tamiraparani that can be printed in any size and distributed to educational institutions, NGO's and any interested organizations.

A datasheet that was to be filled in by each sampling team was printed and distributed to the volunteers.

TAMIRAPARANI FISH COUNT 2024				
FISH SURVEY DATASHEET				
				
Date				
Location name				
Location GPS coordinates				
No of team members				
Time of start of survey				
Time of end of survey				
Approx length of the area surveyed				
+	Common name of fish	No of individuals	Method of capture (Cast net/Hand net)	Remarks

Outcomes

The first ever synchronized fish count in peninsular India was a success. Each team was able to deploy the protocol on the morning of 23rd March 2024, at each of the 6 sampling locations.

Considerable local interest was generated at each site, with numerous local residents asking the teams questions about the fish count and fish diversity in the river.

In total, 36 species of fishes were recorded from the river with a total of about 1120 individual fishes (See Table 1). The locations with the highest number of species recorded were Kallidaikuruchi and Srivaikundam, with 16 and 17 species respectively.

Srivaikundam also recorded the highest number of individual fish, with 432 fish counted and released safely. The other locations recorded between 13-15 species each.

Highlights from the fish count included many individuals of the endemic Tamiraparani Barb (*Dawkinsia tambraparniei*), Mahseer (*Hypselobarbus* sp.), Half Beak fish (*Eleotris* sp.), and Torrent Catfish (*Glyptothorax* sp.).

At Papanasam, the survey team also sighted a group of rare Smooth-coated Otters, an indication of the good health of the river. The majority of the fishes documented were native species, however invasive species like Tilapia, Tank cleaner and African catfish were recorded from most of the sampling locations.

Table 1. Results of the Tamiraparani fish count.

S. no	Species	Common name	Native / introduced	Count
1	<i>Dawkinsia filamentosa</i>	Filament barb	Native	210
2	<i>Xenentodon cancila</i>	Needlefish	Native	7
3	<i>Rasbora dandia</i>	Broad-stripe Rasbora	Native	33
4	<i>Dawkinsia tambraparniei</i>	Tamiraparani barb	Native	96
5	<i>Hypselobarbus</i> sp 1	Koothal	Native	1
6	<i>Devario aequipinatus</i>	Giant Devario	Native	22
7	<i>Glyptothorax</i> sp	Torrent catfish	Native	12
8	<i>Pseudoetropius maculatus</i>	Orange chromide	Native	10
9	<i>Glossogobius giriuus</i>	Tank goby	Native	4
10	<i>Oreochromis niloticus</i>	Nile tilapia	Invasive	61
11	<i>Aplocheilus lineatus</i>	Striped killifish	Native	20
12	<i>Salmostoma</i> sp.	Razorbelly	Native	254
13	<i>Hyporhamphus quoyi</i>	Half beak	Native	18
14	<i>Chanda nama</i>	Glassfish	Native	46
15	<i>Aplocheilus parvus</i>	Dwarf killifish	Native	12
16	<i>Bangana</i> sp.	Calabans carp	Native	11
17	<i>Pethia</i> sp (<i>ticto</i>)	Spot barb	Native	3
18	<i>Puntius dorsalis</i>	Long snouted barb	Native	59
19	<i>Labeo</i> sp (<i>fisheri</i>)	Seval Kendai	Native	2
20	<i>Systemus sarana</i>	Olive barb	Native	25
21	<i>Etropius suratensis</i>	Green chromide	Native	2
22	<i>Hypselobarbus</i> sp 2	Koothal	Native	1
23	<i>Labeo calbasu</i>	Orangefin labeo	Introduced from N India	3
24	<i>Plecopterygoplichthys</i>	Pleco/Tank cleaner/Suckermouth	Invasive	16
25	<i>Clarius gariepinus</i>	African catfish	Invasive	3
26	<i>Pseudosphromenus cupanus</i>	Paradise fish	Native	16
27	<i>Mystus gulio</i>	Long whiskers catfish	Native	8
28	<i>Pethia</i> sp.	Barb	Native	8
29	<i>Labeo rohita</i>	Rohu	Introduced from N India	7
30	<i>Bhava vittatus</i>	Greenstripe barb	Native	4
31	<i>Lepidocephalichthys thermalis</i>	Common spiny loach	Native	10
32	<i>Mesonoemachilus</i> sp.	Hillstream loach	Native	1
33	<i>Puntius sophore</i>	Pool barb	Native	9
34	<i>Labeo dyocheilus</i>		Native	1
35	<i>Amblypharyngodon</i>	Carplet	Native	200
36	<i>Mastecembelus armatus</i>	Tyre track eel	Native	2
	Total fish count			1197

தாமிரவருணியில் 36 சிற்றின மீன் வகைகள் கணக்கெடுப்பு

அல்பாழத்தில் மார்ச் 27, தாமிரவருணி ஆற்றில் நடைபெற்ற மீன் கணக்கெடுப்பில் 36 சிற்றின மீன்கள் கண்டெடுக்கப்பட்டன. இவற்றில் 6 சிற்றின மீன்கள் ஆழி வகுப்பு உட்பட 4 சிற்றின மீன்கள் ஆழி வகுப்பு அடங்காத தாமிரவருணி மீன்கள் கண்டெடுக்கப்பட்டன.



ஸ்ரீவைகுண்டத்தில் அதிகபட்ச பதிவு

கொடும்பேட்டையில் இடைக்கேளியில் ஆழி மீன்களைப் பிடிக்கப்பட்டது. இவற்றில் 36 சிற்றின மீன்கள் கண்டெடுக்கப்பட்டன. இவற்றில் 6 சிற்றின மீன்கள் ஆழி வகுப்பு உட்பட 4 சிற்றின மீன்கள் ஆழி வகுப்பு அடங்காத தாமிரவருணி மீன்கள் கண்டெடுக்கப்பட்டன.

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தாமிரபரணி ஆற்றில் மீன்கள் கணக்கெடுப்பு

கல்லிடைக்குறிச்சி
 மார்ச் 22



கல்லிடைக்குறிச்சி தாமிரபரணி ஆற்றில் மீன்கள் கணக்கெடுப்பு குறித்த பயிற்சியில் கலந்து கொண்டவர்கள்.

தாமிரபரணி ஆற்றில் மீன்கள் கணக்கெடுப்பு குறித்த பயிற்சியில் கலந்து கொண்டவர்கள். இவ்வகைகள் கண்டெடுக்கப்பட்ட 36 சிற்றின மீன்களில் 22 வகைகள் ஆழி வகுப்பில் கண்டெடுக்கப்பட்டன. இவற்றில் 6 சிற்றின மீன்கள் ஆழி வகுப்பு உட்பட 4 சிற்றின மீன்கள் ஆழி வகுப்பு அடங்காத தாமிரவருணி மீன்கள் கண்டெடுக்கப்பட்டன.

திரைபெயர்ச்சியில் தாமிரவருணி மீன்கள் கணக்கெடுப்பு தொடக்கம்

அல்பாழத்தில் மார்ச் 22 மணி முதல் 2 மணி வரையில் தாமிரவருணி ஆற்றில் மீன்கள் கணக்கெடுப்பு தொடக்கம்.



தாமிரவருணி மீன்கள் கணக்கெடுப்பு பற்றியும் பார்வையாளர்கள்.

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Urgent Call for Research to Protect the Thamirabarani River's Fish Diversity

▲ Suresh Teja | Published: 2024-03-06 Last Updated on 2024-03-07

Researchers have sounded the alarm for urgent conservation efforts to safeguard the diverse fish species inhabiting the Thamirabarani river in Tamil Nadu. This ancient water body, home to six endangered species, faces a grave threat from invasive species and habitat disruption. A recent study published in the Indian Journal of Animal Sciences underscores the need for extensive research programs to mitigate these threats.

Originating from the Podhigai hills and traversing Tirunelveli and Thoothukudi districts, the Thamirabarani river boasts a rich variety of fish, comprising 125 species. Among them, 72 are freshwater species and 53 are estuarine species, with 80 species serving as food sources and 32 considered ornamental. However, the proliferation of invasive species like the African sharp tooth catfish, Ploce tank cleaner catfish, and Tilapia has caused a decline in native species, leading to

05 TIRUNELVELI WEDNESDAY 06.03.2024

'Thamirabarani river needs more research to explore its fish diversity'

Detailed study on endemic species essential for conservation strategies, says researcher

S EGDSON WISELY DASS
 @Thoothukudi

IN a bid to evolve a conservation plan for threatened species, researchers have urged the need to carry out more research programmes to explore the fish diversity in Thamirabarani river, an ancient water body of the state. At present, the river is home to six endangered species, even as invasive species pose threat for the fish diversity.

The Thamirabarani river, which originates from Podhigai hills, traverses 120 km through Tirunelveli and Thoothukudi districts, before emptying into the Gulf of Mannar along the Bay of Bengal at Punnakayal. It slides down the eastern slopes of Western Ghats for 24 km, along with 66 species in the mid-stream, 58 species at Srivaikuntam and 64 species at Punnakayal estuary. Due to its location in catchment areas, which receive rains during both southwest and north-east monsoons, Thamirabarani river flows throughout the year. Interestingly, it is the only river in Tamil Nadu to originate and flow through the state, and also holds a perennial status.

In the Thamirabarani river system, the top three orders with diverse species composition are Cypriniformes (43 species), Perciformes (36 species) and Siluriformes (19 species). While six species are endangered, four are vulnerable, besides nine are near threatened, 64 are in the least concern category. Three are data deficient and 39 species have not been evaluated against the IUCN criteria. The six endangered species include three ornamental fishes - Dawkinsia arulius, Dawkinsia tambraparniei and Garra kalakandensis and three food species of Hypsobarbus curmuca, Hypsobarbus dubius, and Pterocryptus wynadensis, sources said.

HS Mogalekar, author of 'Fishes from Thamirabarani river system', says the number of fishes observed in the Thamirabarani river system is greater than that given in the earlier reports from Tamil Nadu. However, the researcher attributes this to lack of research on fish diversity.

Speaking to TNIE, Nilanjan Mukherjee, a research consultant at ATRIE, said that Thamirabarani is home to numerous endemic fish species. However, due to non-availability of literature on the fish diversity in the river, an effective comparison is not possible, he added.

In the 1970s, Common carp, Tilapia and Cuppes or Gambusia were the invasive species recorded in Thamirabarani. Now, the situation has changed with the invasion of African sharp tooth catfish (Clarias gariepinus), Ploce tank cleaner catfish (Pterygoplichthys species) and Tilapia (Oreochromis species), which pose threats in causing loss of biodiversity, health hazards and economic damage. The dams prevent migration of fishes, and it could affect the population of certain fish species like Mahaseer and Labeo, which swim upstream to breed during its reproduction," he said.

Mukherjee also called for a detailed study on the diversity of fishes in rivers turning essential for any conservation strategies.

Appendix

Standardized methodology for fish count

General guidelines

Sampling time

Early morning and late afternoon-evening are the best time periods to sample in the river. Morning sampling should be conducted between 6am and 9am, and the evening sampling between 3pm and 6pm to obtain best results. However, this time can be altered to early sampling before 8am and after 4pm during the summer when water temperature is expected to be high. This is mainly because that the fishes are less active and less susceptible when the water temperature is lower. No sampling shall be done during higher water flow or during the rains that result in higher flow. Fishes may displace or burrow further into cover during these events. This may reduce the catch probability and may underestimate species diversity and abundance.

Site selection

Site selection is an important step for the fish count and has to be carefully decided based on multiple criteria. It is advised to select sites with least anthropogenic disturbance, if a site with no disturbance could be identified. These disturbances may include high anthropogenic activity, a closer industrial presence that releases effluents, presence of check dams. If sites were selected with one or many of such factors, it should be noted in the datasheet. Input from the local fishers on the best locations for different species is critical.

Select a 100m stretch along the river covering all possible microhabitat availability and feasibility to use gill nets and cast nets. Identify different microhabitats for different fish assemblages (e.g. - rocky/gravelly areas for loaches and *Garra*; Sandy open bottom for barb and other cyprinids; Vegetation along shoreline for catfish, eels and killifish).

Sampling method

Fill in the datasheet with site details like site name, location, coordinates and other relevant information. Cast nets with a mesh size smaller than 1.5cm should be used by skilled fisherfolk, casted repeatedly at different points and different depths. This can be done at different points covering different depth along the 100m meter stretch identified for constrained time of not more than one hour per site in all the sites to keep sampling effort consistent. However, this time can be extended to another 30 minutes if the fishes are seen but evades capture. This can happen

depending on the skill of the fisher or site variability. This decision can be made by both team leader and the fisher based on the site dynamic. After each cast, all the fishes captured should be carefully transferred to a holding bucket with fresh water (from the catch site) and a secure lid.

Simultaneously, dip nets of varying sizes should be employed in the shallow areas of the river to capture small species, for the same time as above. These fish should be transferred to a different holding bucket.

Specimen processing

All the collected fish in the holding buckets to be moved into a shaded area for the next step.

Have a fresh holding bucket ready to receive fish. All fish above 3cm to be placed on the measuring sheet in the tray and photographed. Smaller fish can be placed in a photography tank (small aquarium) for documentation, if personnel are available at the site.

If multiple individuals of an identified species are present, count the total number of specimens in each net cast, and photograph and measure the largest individual.

If a fish could not be positively identified, place the individual into the photography tray and take a clear picture. Enter all the data into datasheet immediately. Prepare a photography tray, a clear plastic tray with 1-2cm of water and the laminated graph sheet. After counting/photography, fish should be transferred to fresh buckets to eliminate double counting.

Take photos of the habitats and catch sites at each sampling location.

Data processing

For each team, photo documentation should be done by one assigned team member.

Google drive folders for each site will be created. All images of the fish should be uploaded to the given google drive. A data sheet will be given to each sampling team, with details that must be filled in. One team member should be in charge of this sheet, which can also be photographed/scanned and uploaded to the drive.

Do's & Don't's

Do not apply any anti-mosquito cream or sunscreen on your hands prior to sampling.