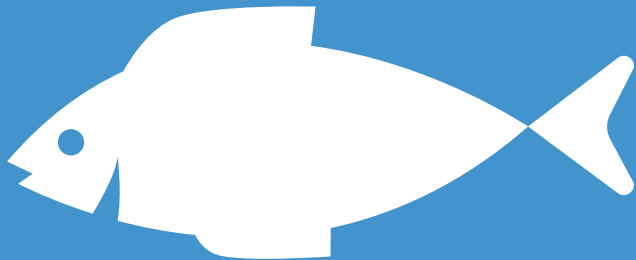


**SHIV NADAR**

INSTITUTION OF EMINENCE DEEMED TO BE

— UNIVERSITY —

DELHI NCR



## SUSTAINABLE DEVELOPMENT GOAL 14

### Life Below Water

Conserve and sustainably use the oceans, seas, and marine resources for sustainable development.

## Overview

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According to the UN Sustainable Development Goals Report 2023, **“The ocean is in a state of emergency as increasing eutrophication, acidification, ocean warming, and plastic pollution worsen its health. Additionally, the alarming trend of overfishing persists, leading to the depletion of over one-third of global fish stocks.”**

With ten targets and indicators, Sustainable Development Goal 14, Life Below Water, aims to prevent and significantly reduce marine pollution from land-based activities, including marine debris and nutrient pollution. At Shiv Nadar University, we contribute to SDG 14 by teaching and research on marine bodies, life below water, and aquatic ecosystems at large. Through research partnerships, faculty and students are undertaking exciting projects.

## Teaching and Learning

Every undergraduate student at Shiv Nadar takes a core group of common subjects designated Core Common Curriculum (CCC). The CCC has an Ecology and Environmental Sciences component, including courses such as Global Environmental Issues (CCC 715) and Environmental Studies (CCC 704). The Department of Life Sciences offers a core course to undergraduate students on Ecology and Environmental Science (BIO 104). The course explores the importance of biological conservation, current anthropogenic stressors affecting ecosystems, and how these problems can be mitigated using a multidisciplinary approach, including biotechnology.



## Student projects

### Molecular Ecology and Evolution Laboratory in the Department of Life Sciences, the School of Natural Sciences

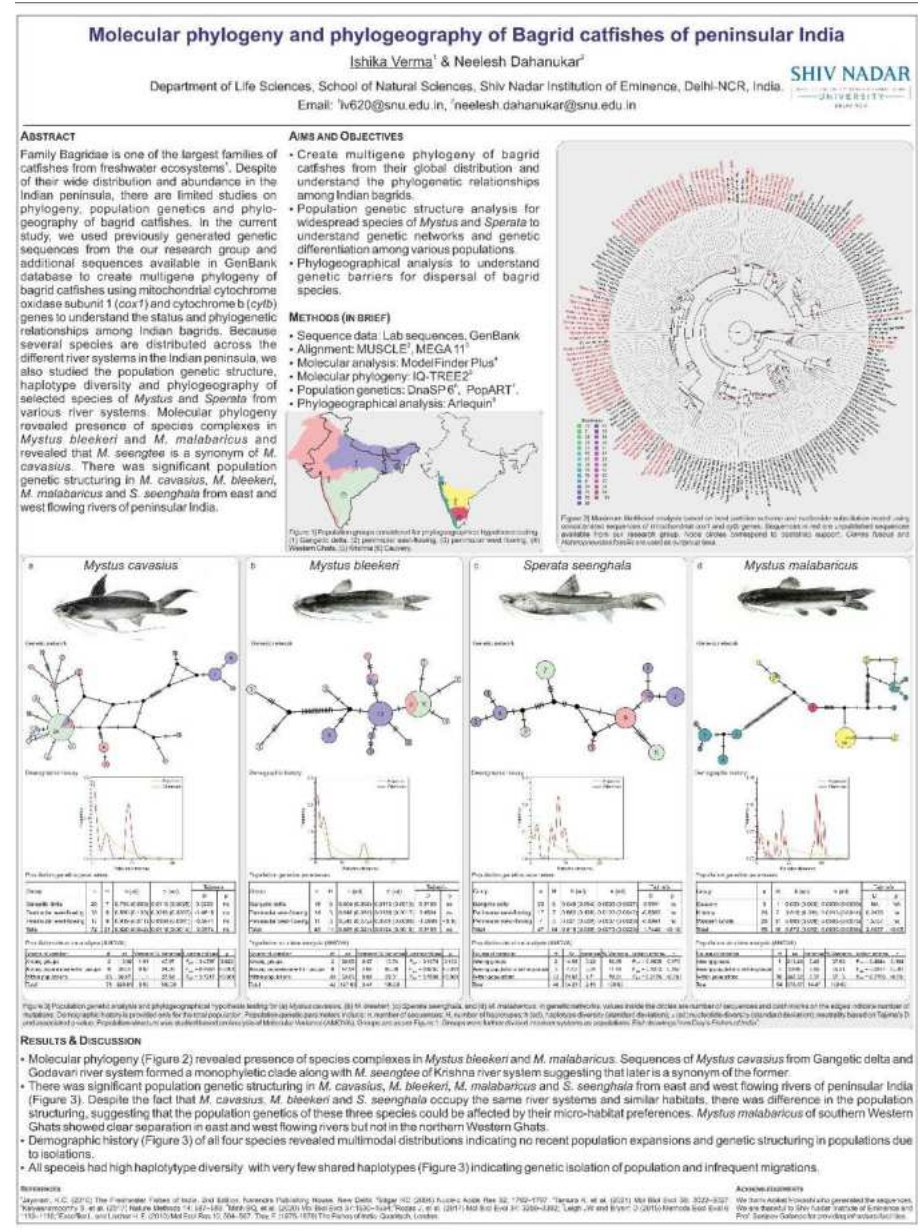
Research in the laboratory focuses on various aspects of aquatic ecology, such as conservation, molecular phylogeny, phylogeography, and evolution; subterranean aquifer ecology; and molecular systematics, molecular taxonomy, and diversity.

Four students from B.Sc. Biotechnology (Research), first-year are working on the molecular ecology and evolution of freshwater fish of Channoidea (snakehead fishes), Mastacembelidae (spiny eels), Sisoridae (torrent catfishes), and Danioninae (minnows).

These projects are in collaboration with [The Habitats Trust \(THT\)](#), a wildlife conservation organization in India.

Ishika Verma, 4th year B.Sc. (Research) in Biotechnology student, is pursuing her project on population genetics and phylogeography of catfishes of the family Bagridae from the Indian subcontinent. She presented her work in a departmental poster presentation in May 2023.

A manuscript with a part of her work is currently in preparation.



## Molecular phylogenetic position of the enigmatic subterranean blind catfish genus *Horaglanis*.

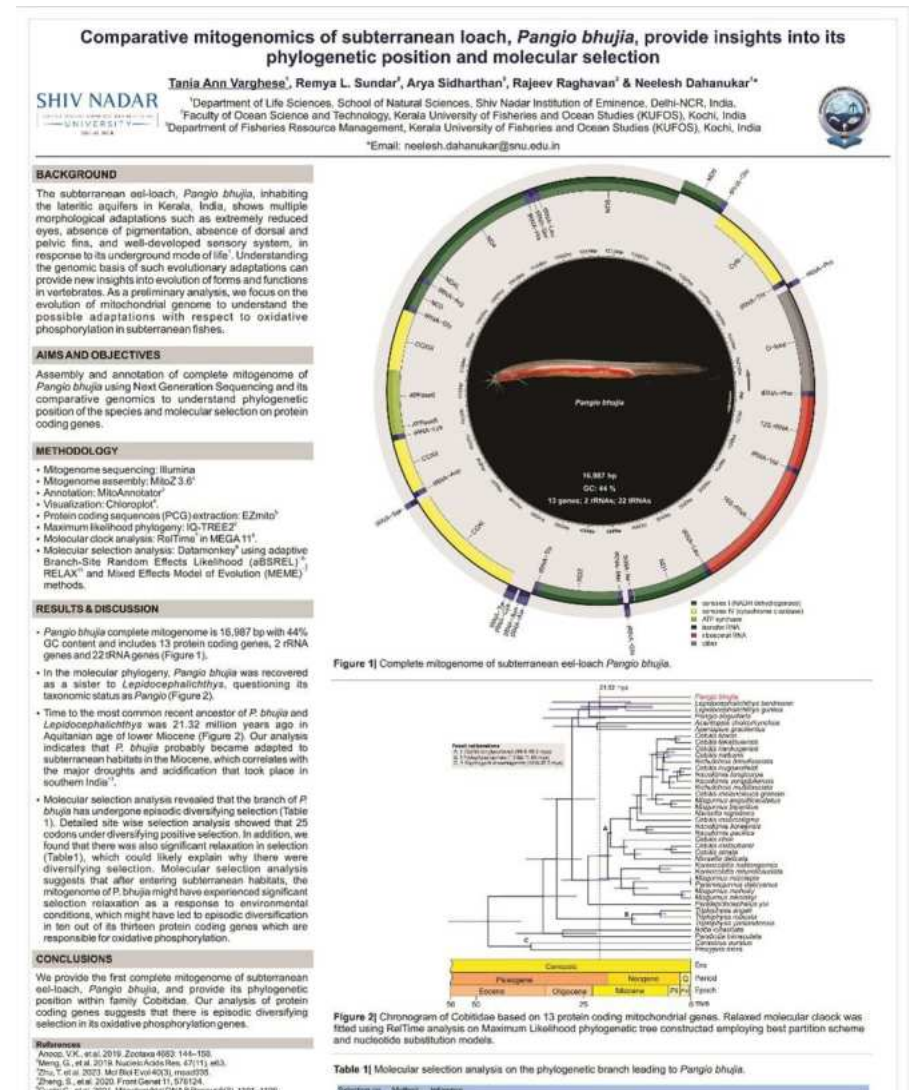
Tarani Jindal, 4th year B.Sc. Biotechnology (Research) student is working on the molecular phylogenetic position and evolution of subterranean freshwater catfish *Horaglanis krishnai* endemic to lateritic aquifers of Kerala. The study established that the species is an evolutionarily distinct lineage sister taxa to two families, Clariidae, and Heteropneustidae. It also established that the species shared a common ancestor with its sister taxa 120 million years ago, suggesting that the lineage evolved when India was still a part of Gondwana.



MicroCT scan of *Horaglanis populii* (Photo credit - Ralf Britz)

## Comparative mitogenomics of subterranean loach, *Pangio bhujia*, provides insights into its phylogenetic position and molecular selection

Tania Varghese, the doctoral research scholar currently working with the group presented a poster in the Genomics India Conference, hosted by Shiv Nadar Institution of Eminence, Delhi-NCR and powered by Genotypic India. The poster presented the complete mitochondrial genome of subterranean eel loach *Pangio bhujia* and its implications in understanding molecular evolution of the species and effects of selection



Varghese, T.A., Sundar, R.L., Sidharthan, A., Raghavan, R. & Dahanukar, N. (2024) Comparative mitogenomics of subterranean loach, *Pangio bhujia*, provide insights into its phylogenetic position and molecular selection. In: Abstract Book, Genomics India Conference, hosted by Shiv Nadar Institution of Eminence, Delhi-NCR and powered by Genotypic India, 1-3 Feb 2024. pp. 87–88.

## Characterizing novel members of two *Hydra* secretory protein families: Neuropeptides and Antistatins

Pranav Prabhu, 4th year B.Sc., is researching two *Hydra*. Aquatic organisms contain diverse novel bioactive molecules that have not been explored. Cnidaria is one of the largest marine phyla, and it is comprised of diverse members. The cnidarian model *Hydra* is an ideal system to study secretory molecules, where many well-studied signaling molecules and protein families are expanded, diversified, and functionally specialized from developing an in-silico pipeline to identify and annotate an organism's secretome from its genome and implementing it for the latest chromosome-scale assembly of *Hydra vulgaris* AEP. The study focuses on two specific secretory protein families for further characterization: neuropeptides and antistatin-like proteins.

This project demonstrates the importance of studying aquatic species, especially cnidarians, for identifying novel bioactive molecules with broad applications.

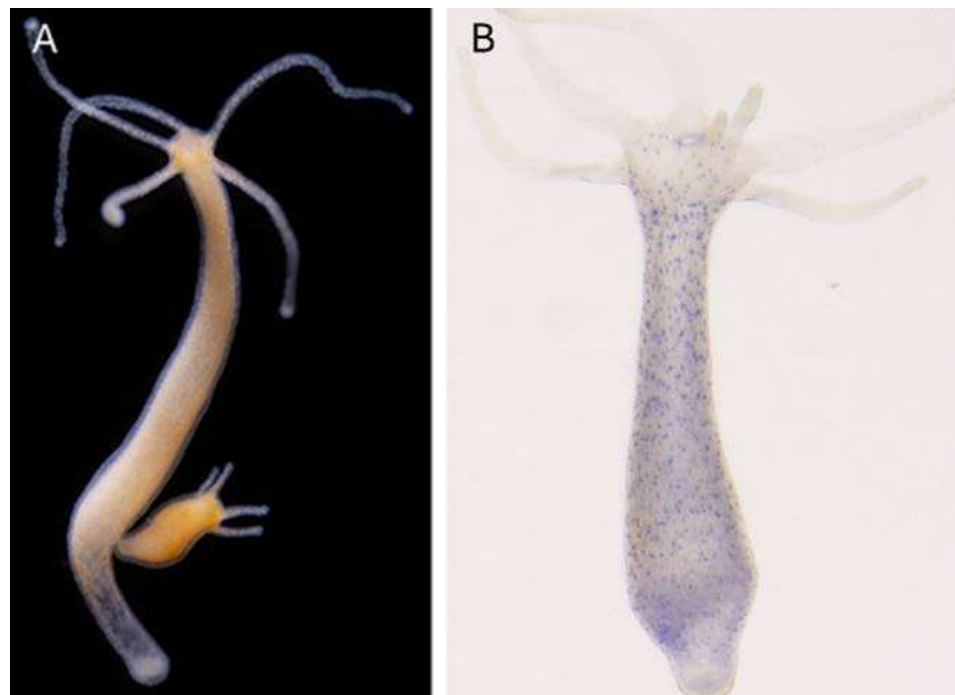


Figure: (A) *Hydra vulgaris* AEP polyp. (B) A novel neuropeptide expression in neurons of *Hydra* (unpublished data).

### Undergraduate Student Project

**Prarthana Nanda**, a second-year B.Sc. (Research) in Biotechnology student, started her work on the molecular phylogeny and biogeography of freshwater fishes of the genus *Channa* from the Indian subcontinent. She is currently pursuing it as an **Opportunity for Undergraduate Research (OUR)** project and is preparing a manuscript on the molecular phylogeny of Indian snakehead fishes.

Three undergraduate students, **Sreedhar Prabhu**, **Pranavesh Mourouganad** and **Arnav Ghugal**, are working on genetic barcoding of cartilaginous fishes collected from various fish landing sites in Kerala. The study is in collaboration with **Dr. Rajeev Raghavan** of **Kerala University of Fisheries and Ocean Studies, Kochi**. The students have sequenced more than 200 Elasmobranch tissue samples to understand the diversity of fishes in trade, which includes several threatened fishes. The study has important implications for conservation.

## Research

This section highlights a selection of research projects.

### Evolution in the dark: Unexpected genetic diversity and morphological stasis in the blind, aquifer-dwelling catfish.

The research provides the first molecular phylogeny of the enigmatic subterranean catfish genus *Horaglanis*, discusses its population genetics and cryptic species diversity, and describes a new species, *Horaglanis populi*. The species name *populi* (Latin for people) honours the invaluable contribution of citizen scientists from Kerala who helped document the biodiversity of subterranean and groundwater ecosystems, which led to the discovery of new species.

Raghavan, R., Sundar, R.L., Arjun, C.P., Britz, R. & Dahanukar, N. (2023) Evolution in the dark: Unexpected genetic diversity and morphological stasis in the blind, aquifer-dwelling catfish *Horaglanis*. *Vertebrate Zoology* 73: 57-74.



*Horaglanis populi*. Photo credit: CP Arjun



MicroCT scan of *Horaglanis populi*. Photo credit: Ralf Britz.

## Published in local media



FORESTS ANIMALS OCEANS PEOPLE RIVERS SOLUTIONS OPPORTUNITIES MONGABAY GLOBAL ABOUT

To search, type and hit enter.

Mongabay Series: Almost Famous Species

### Citizen scientists help discover a blind catfish species hidden inside Kerala's aquifers

by Neha Jain on 2 May 2023

[f](#) [in](#) [@](#) [📧](#) [🔖](#)



- A new-to-science catfish species has been described by a team of scientists from India and Germany from the subterranean aquifers of the southern Indian state of Kerala.
- The catfish, which is named after the public who helped in the discovery, is tiny, possesses a blood red-coloured body and lacks eyes. It is genetically diverse from other species of its genus but looks similar to the other species.

#### Our mission

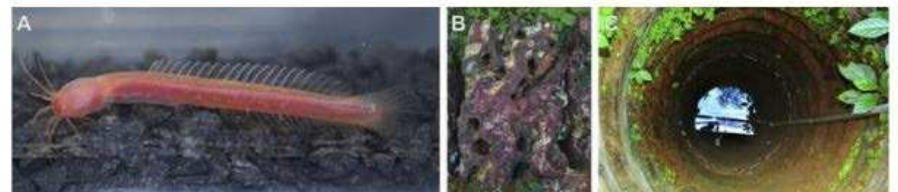
Mongabay improves understanding of the concurrent global scale forces undermining the health of Earth's systems. Mongabay makes science accessible and

FEBRUARY 15, 2023

Editors' notes

### Evolution in absolute darkness: New fish species discovered in India

by Senckenberg Research Institute and Natural History Museum



<https://india.mongabay.com/2023/05/citizen-scientists-help-discover-a-blind-catfish-species-hidden-inside-keralas-aquifers/>

<https://phys.org/news/2023-02-evolution-absolute-darkness-fish-species.html>

## Wetlands contribution and linkage to support SDGs - A critical review

This study was conducted as one of the pioneering efforts to compile comprehensive information on Ramsar sites. Globally. It delves into the significance of wetlands and the designation of Ramsar sites<sup>1</sup> across various countries, incorporating a concise exploration of utilizing Unmanned Aerial Vehicles (UAVs) for wetland monitoring and assessment. The study conducted a comparative evaluation of Ramsar sites, analyzing their percentage area and overall coverage worldwide. Incorporating a Scientometric analysis utilizing the Scopus database, the study features a co-occurrence and thematic map, thematic evolution trend, and country collaboration map. It emphasizes the interconnection between wetlands and Sustainable Development Goals (SDGs), particularly SDGs 6, 12, 13, 14, 15, and 17, aligning with wetland management and conservation and providing insights to researchers and policymakers.

1 Ramsar Sites in India are the wetland sites listed under the Ramsar Convention on Wetlands of International Importance.

Mohanty, Smrutisikha, Prem Chandra Pandey, Manish Pandey, Prashant K. Srivastava, and Chandra Shekhar Dwivedi. "Wetlands contribution and linkage to support SDGs, its indicators and targets-A critical review." Sustainable Development (2024).

## The world's largest cave fish from Meghalaya, Northeast India, is a new species, *Neolissochilus pnar* (Cyprinidae, Torinae)

The world's largest subterranean fish, discovered in 2019, was tentatively identified as a troglomorphic form of the golden mahseer, *Tor putitora*. Detailed analyses of its morphometric and meristic data, as well as results from molecular analyses, now reveal that it is a new species of the genus *Neolissochilus*, the sister taxon of *Tor*. The paper describes the new species as *Neolissochilus pnar*, honouring the tribal communities of East Jaintia hills in Meghalaya, Northeast India, where it was discovered. *Neolissochilus pnar* possesses many characteristics unique among species of *Neolissochilus*, including highly reduced eye size to complete absence of externally visible eyes, complete lack of pigmentation, long maxillary barbels, long pectoral-fin rays, and scalation pattern. *Neolissochilus pnar* is distinguished from the hypogean *N. subterraneus*, the type locality of which is a limestone cave ~2000 km away in Central Thailand, by a lesser pre-pelvic length (47.8–49.4 vs. 50.5–55.3 %SL), a shorter caudal peduncle (16.1–16.8 vs. 17.8–23.7 %SL), and shorter dorsal fin (17.4–20.8 vs. 21.5–26.3 %SL). In addition, *Neolissochilus pnar* is also genetically and morphologically distinct from its close congeners with a raw genetic divergence of 1.1–2.7% in the COI gene with putative topotype of *N. hexastichus* and 2.1–2.6% with putative topotype of *N. hexagonolepis*.



Dahanukar, N., Sundar, R.L., Rangad, D., Proudlove, G. & Raghavan, R. (2023) The world's largest cave fish from Meghalaya, Northeast India, is a new species, *Neolissochilus pnar* (Cyprinidae, Torinae). *Vertebrate Zoology* 73: 141-152.

This paper describes the world's largest cave-dwelling subterranean fish from Meghalaya, Northeast India. It is a follow-up work on our earlier discovery of the world's largest cavefish, which Prime Minister Narendra Modi covered in his February 2020 episode of 'Mann ki Baat'. We provide the formal name for the new species, *Neolissochilus pnar*, in honour of Meghalaya's "Pnar" people.



*Neolissochilus pnar*. Photo credit: Uros Aksamovic

## Complete mitogenome of *Lepidopygopsis typus*, an evolutionarily-distinct, endangered cyprinid fish from the Western Ghats Biodiversity Hotspot: Phylogenetic relationships and implications for conservation

Dr. Dahanukar, Associate Professor, Department of Life Sciences, along with his team, provided the first complete mitogenome of the endangered species *Lepidopygopsis typus* or the Peninsular trout endemic to the Periyar Tiger Reserve of Kerala, India, and its implications in conservation genetics. The study provides molecular phylogenetic position, species evolution, and selection analysis of protein-coding genes. The small population size and relaxed selection of protein-coding genes suggest that the species' population is vulnerable to deleterious mutations that can wipe out the entire species, making the conservation of the species an immediate concern.

Chandra, S., Abhilash, R., Sidharthan, A., Raghavan, R. & Dahanukar, N.\* (2024) Complete mitogenome of *Lepidopygopsis typus*, an evolutionarily-distinct, endangered cyprinid fish from the Western Ghats Biodiversity Hotspot: phylogenetic relationships and implications for conservation. *Gene* 898: 148098. <https://doi.org/10.1016/j.gene.2023.148098>

## The loach genus *Lepidocephalichthys* (Teleostei: Cobitidae) in Sri Lanka and peninsular India: multiple colonizations and unexpected species diversity

The study provides the first extensive phylogeny of the South Asian loach genus *Lepidocephalichthys* distributed in India and Sri Lanka. The study shows for the first time that the species *L. thermalis* is widely distributed in both peninsular India and Sri Lanka. The study suggests that ancestral members of the genus *Lepidocephalichthys* colonized Sri Lanka from Peninsular India in the late Miocene and multiple back-migrations to India, as well as colonization from the mainland, took place in the Plio-Pleistocene.

Sudasinghe, H., Dahanukar, N., Raghavan, R., Ranasinghe, T., Wijesooriya, K., Pethiyagoda, R., Rüber, L. & Meegaskumbura, M. (2024) The loach genus *Lepidocephalichthys* (Teleostei: Cobitidae) in Sri Lanka and peninsular India: Multiple colonizations and unexpected species diversity. *Hydrobiologia* 851:1113-1133. <https://doi.org/10.1007/s10750-023-05321-4>

## Biogeography and evolutionary history of *Puntius sensu lato* (Teleostei: Cyprinidae) in Sri Lanka

Sri Lanka's biota is derived mainly from Southeast Asian lineages, which immigrated via India following its early-Eocene contact with Laurasia. Because of their dependence on perennial aquatic habitats, freshwater fish are useful models for biogeographic studies. The paper investigates the timing and dynamics of the colonization of—and diversification of—Sri Lanka by a group of four closely related genera of cyprinid fishes (*Puntius sensu lato*). Constructing a molecular phylogeny based on two mitochondrial and two nuclear gene markers, the study conducts divergence timing analyses and ancestral-range estimations to infer historical biogeography and use haplotype networks to discern phylogeographic patterns. Results support the historical extinction of Sri Lanka's montane aquatic fauna, followed by a recent partial recolonization of the highlands, showing that headwater stream capture facilitated dispersal across basin boundaries.

Sudasinghe, H., Ranasinghe, T., Dahanukar, N., Raghavan, R., Rüber, L., Pethiyagoda, R., Meegaskumbura, M. (2023) Biogeography and evolutionary history of *Puntius sensu lato* (Teleostei: Cyprinidae) in Sri Lanka. *Scientific Reports* 13: 18724.

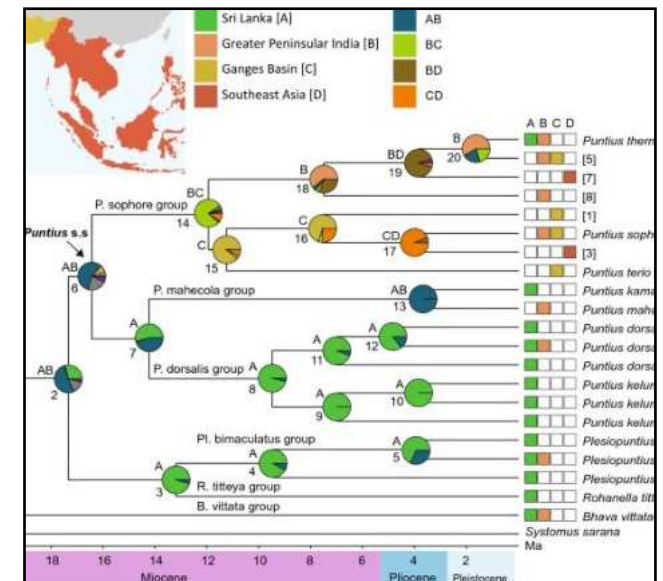


Photo credit: <https://doi.org/10.1038/s41598-023-45377-9>

## University Operations

### Campus Lake

The lake on campus is part of the Dadri wetlands, also called the Bil Akbarpur wildlife habitat. From a dried state when the university was founded, the lake was immediately revived and preserved in its natural ecosystem. This has allowed many fish and aquatic plants to thrive, such as *Nitella*, *Chara*, and other phytoplankton. These phytoplankton, in turn, provide food for winged visitors. *Alternanthera philoxeroides* grows gregariously throughout the year on the lakes' fringes, encroaching on the water body and offering a good insect population to feed the birds.

During summers, the lake is supported by external water to preserve life underwater, and the water is conserved and rejuvenated through rainwater harvesting.



## Partnerships

### Research contributing to the International Union for Conservation of Nature (IUCN)

Dr. Neelesh Dahanukar, Assistant Professor at the Department of Life Sciences, is working in collaboration with the IUCN to understand the conservation status of freshwater fishes of the Indian subcontinent. He has assessed 170 species of freshwater fishes. The IUCN red list of threatened species helps understand the likelihood of a species going extinct in the near future unless conservation actions are designed to protect them.

In 2023, Dr. Dahanukar authored 68 [IUCN Red List assessments](#) for Indian freshwater fish.

Of these, two species are Critically Endangered, 22 are Endangered, 11 are Vulnerable, 15 are Least Concern and 18 are Data Deficient. The list includes four subterranean fishes from the Western Ghats of India, which have been assessed as Endangered (*Kryptoglanis shajii*, *Horaglanis abdukalami* and *Pangio bhujia*) and Vulnerable (*Aenigmachanna gollum*), based on extensive data on these species.

The research group is currently working on molecular ecology, population genetics and conservation genomics of several Endangered (*Kryptoglanis shajii*, *Horaglanis abdukalami* and *Pangio bhujia*), Vulnerable (*Mesonoemacheilus tambaraparniensis*) and Data Deficient (*Parapsilorhynchus odishaensis*, *Parapsilorhynchus swaini* and *Parapsilorhynchus alluriensis*) to help in conservation management and action.

The list was released on the IUCN Red List of Threatened taxa. The details of this assessment can be accessed from Dr. Dahanukar's website - <https://sites.google.com/view/neeleshdahanukar/publications/iucn-assessments>



*Kryptoglanis shajii* is a subterranean fish from the lateritic aquifers of Kerala that is assessed as Endangered in the IUCN Red List of Threatened Species. Photo credit: Anoop VK.



*Pangio bhujia* is assessed as Endangered. Photo credit: Anoop VK.



*Aenigmachanna gollum* is assessed as Vulnerable. Photo credit: Ralf Britz.

Dahanukar, N. 2023. *Kryptoglanis shajii*. The IUCN Red List of Threatened Species 2023: e.T201980A2731657.

<https://www.iucnredlist.org/species/201980/2731657>

Dahanukar, N. & Sidharthan, A. 2023. *Pangio bhujia*. The IUCN Red List of Threatened Species 2023: e.T173252358A173252372.

<https://www.iucnredlist.org/species/173252358/173252372>

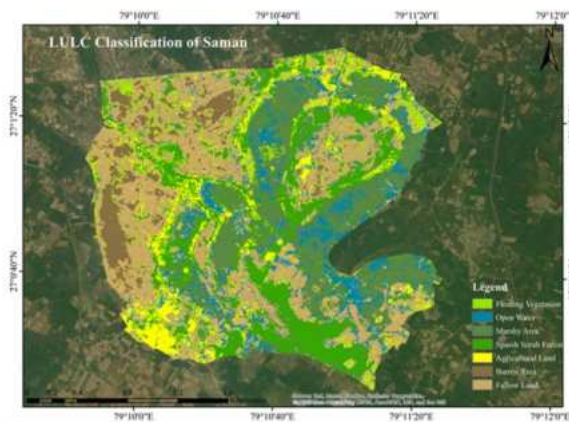
Ali, A., Dahanukar, N. & Sidharthan, A. 2023. *Aenigmachanna gollum*. The IUCN Red List of Threatened Species 2023:

e.T164304141A164304165.

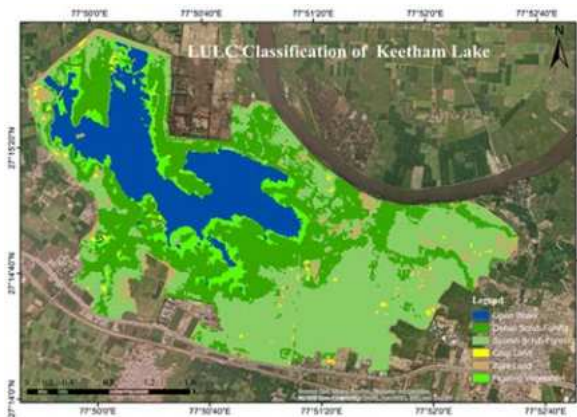
<https://www.iucnredlist.org/species/164304141/164304165>

## Assessment of aquatic weeds in Northern India using Remote Sensing Technology - National Geospatial Program - NGP (erstwhile NRDMS division)

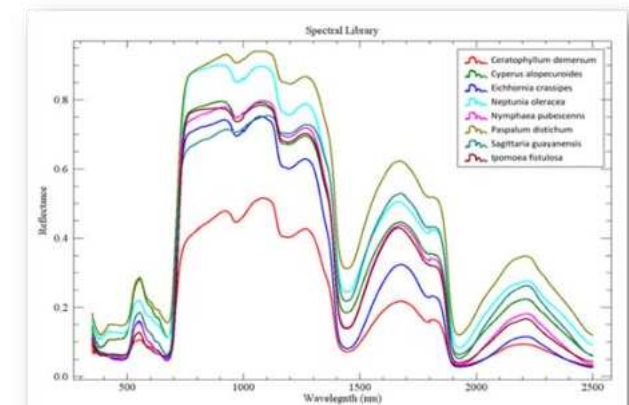
Dr. Prem Pandey, Assistant Professor, Department of Life Sciences, in partnership with Dr. PK Srivastava at the Banaras Hindu University, is working on a project funded by the Department of Science and Technology, Government of India to quantify the spatial distribution of aquatic weeds at two Ramsar sites in Uttar Pradesh. The project delves into monitoring water quality, pre-monsoon, monsoon, and post-monsoon, and identifying wetland plant species and their spatial distribution using advanced technologies (Remote sensing, imaging spectroscopy & drones, cloud computing, machine algorithms).



Site A. Saman Bird Sanctuary at Mainpuri, Uttar Pradesh (Location 27°01'28"N 79°10'58"E). This site is designated as Ramsar site no 2413, dated 02 December 2019



Site B. Sur Sarovar (also known as Keetham Lake) is a human made reservoir in Agra, Uttar Pradesh (Location 27°15'N 77°50'E). This site is designated as Ramsar site no 2440 on 21 August 2020.



Spectral library of a few wetland plants and aquatic weed species.

The project's significance is to generate spectral libraries of wetland plant species, water occurrence data, and spatial distribution of wetland plant species at the study sites.

### Significant findings:

Recorded the presence of a rare insectivorous (carnivorous) plant species, *Utricularia stellaris* (also known as Star Bladderwort). This was also covered in the local news media.

- Both sites provide different habitats for migratory birds and threatened species, such as the greater spotted eagle (*Clanga clanga*), sarus crane (*Grus antigone*), and catfish *Wallago attu*.
- Identified several threats to the wetlands, such as overgrazing, foraging activities, sewage discharge, agricultural runoff, and gregarious growth of weeds.



## News in local media

# हिन्दुस्तान

## पक्षी विहार में बढ़ने लगी मेहमान पक्षियों की चहचहाहट



किसानी | हिन्दुस्तान टाइम्स

समान पक्षी विहार में स्थानीय पक्षियों के साथ-साथ मेहमान पक्षियों की भी आवक बढ़ने लगी है। यह हम नहीं कह रहे, यह मुंबई से आई चार सदस्यीय टीम ने अपने अंकड़ों में कहा है। रिपोर्ट सामने आने के बाद पक्षी विहार में तैनात अधिकारियों में खुशी जाहिर की है। टीम ने झील में पानी कम होने पर चिंता जताई।

अक्टूबर में समान पक्षी विहार पहुंचे शिवनाथर बुनिवर्सिटी के वनस्पति विशेषज्ञ को एक जलवीय मांसाहारी पौधे की प्रजाति भी यहाँ मिली थी। किसानी के समान पक्षी विहार में



समान पक्षी विहार में मिला मांसाहारी पौधा यूट्रिकुलरिया स्टेलारिस।

तीन दिन पहले मुंबई से बॉम्बे नेचुरल हिस्ट्री सोसाइटी से चार सदस्यीय टीम आई थी। टीम में वैज्ञानिक डा. निशा सिंह के साथ जेआर रिसर्च फ्यूबो ओमकार डी. जोशी, टीआरएफ



रविहार को समान पक्षी विहार में विद्यमान करने स्थानीय और मेहमान पक्षी। • हिन्दुस्तान

आर्मीफोर्सेजी राहोम आर शेख, सुधीश मैक्सिमा शामिल थे। टीम ने वाघ टावर व झील के बीच जाकर पक्षी विहार में पक्षियों की गणना की। रिपोर्ट के अनुसार माहाश्वरी पक्षी

1824, स्थानीय पक्षी 9939 पाए गए। वैज्ञानिक डा. निशा सिंह ने बताया कि इस वर्ष मेहमान और स्थानीय पक्षियों की आवक बढ़ी है। टीम ने झील में पानी कम होने पर चिंता

जताई तो रेजर सर्वेस कुमार भटौरिया ने बताया कि सर्दियों में बरसात से झील के पानी में बढ़ोतरी हो जाती है। यदि बरसात न हुई तो रजवहा से पानी झील में पूरा कर दिया जाएगा।

### रिसर्च में मिला था मांसाहारी पौधा यूट्रिकुलरिया

किसानी। माह अक्टूबर में नोरहा की शिवनाथर बुनिवर्सिटी के वनस्पति विशेषज्ञ ऑनररिट प्रोफेसर डा. प्रेम फुबेय ने समान पक्षी विहार आकर रिसर्च की थी। उन्हें यहां एक जलवीय मांसाहारी पौधा यूट्रिकुलरिया स्टेलारिस की प्रजाति मिली, जिसे संरक्षित कर लिया। उन्होंने बताया कि इस पौधे को ब्लैकवॉटर भी कहा जाता है। यह ज्यादातर राक पानी में पाया जाता है। बरसात के दौरान इसी ग्रोथ अधिक होती है। इसकी पत्तियां गैल गुब्बारेनुमा होती हैं। जैसे ही कोई कीट-पतंग इसके नजदीक आता है इतना ही गुब्बारेनुमा उसी जगह लेते हैं। पतंगों में निकलने वाला एजाइन कीटाणु को खत्म करने में मदद करता है।



Image Credit: Amber Habib

अमर उजाला

मैनपुरी

2019

## परिंदों को भाया समान पक्षी विहार, दो गुने पहुंचे

मुंबई से आई टीम ने की गणना, मांसाहारी पौधे की प्रजाति भी मिली

संवाद न्युज एजेंसी

किशनवी। समान पक्षी विहार में मेहमान पक्षियों व स्थानीय पक्षियों की संख्या में इस वर्ष बढ़ोतरी हुई है। ये जानकारी विभागीय स्तरों द्वारा की गई गणना के बाद सामने आई है। गत वर्ष तक पक्षियों की संख्या लगभग छह हजार थी। इस बार गणना में संख्या 12 हजार 220 मिली है।

रेमरखर खड्ड समान पक्षी विहार में दो दिन पूर्व पक्षियों की गणना के लिए मुंबई से बॉम्बे नेचुरल हिस्ट्री सोसाइटी से चार सदस्यीय टीम आई थी। टीम में वैज्ञानिक डॉक्टर निशा सिंह के साथ जेआर रिसर्च फ्यूबो ओमकार डी जोशी, टीआरएफ आर्मीफोर्सेजी राहोम आर शेख, सुधीश मैक्सिमा के साथ वाघ टावर व झील के बीच में जाकर पक्षी विहार में पक्षियों की गणना की। रिपोर्ट के अनुसार मेहमान पक्षी

1824 तथा स्थानीय 9939 (नौहत्तर) पाई गई।

गणना के बाद डॉक्टर निशा सिंह ने बताया कि पिछले वर्ष के अलोक इस वर्ष मेहमान और स्थानीय पक्षियों में बढ़ोतरी हुई है। सारथ गणना में उनकी संख्या भी पिछले वर्ष के



गणना करते बॉम्बे नेचुरल हिस्ट्री सोसाइटी टीम के लोग। संवाद

अपेक्षा संख्या बढ़ी हुई पाई गई। इसके बाद टीम ने झील में पानी कम होने पर चिंता जताई।

रेजर सर्वेस कुमार भटौरिया ने बताया कि सर्दियों में बरसात से झील के पानी बढ़ जाता है। अगर बरसात न हो तो रजवहा से पानी झील में आकर पानी भर लेते। फिर

नाथर बुनिवर्सिटी के ऑनररिट प्रोफेसर व वनस्पति विशेषज्ञ डॉ. प्रेम पौधे ने बताया कि उन्होंने

अक्टूबर में समान पक्षी विहार का निरीक्षण किया था। इसमें एक जलवीय मांसाहारी पौधे यूट्रिकुलरिया स्टेलारिस की प्रजाति भी पाई गई थी, जिसने

## Algal discrimination and characterization using hyperspectral datasets of Chilika Lake, Odisha, India” by SERB under SRG grant, Government of India

This project aims to monitor the water quality of Chilika Lake, Odisha, the largest brackish lake in Asia. Funded by the Science and Engineering Research Board under an SRG grant, the project uses Hyperspectral images, imaging spectroscopy, and field-measured data to understand the lake’s productivity in terms of eutrophication. 25 water physio-chemical parameters are assessed to deliver the stages of eutrophication of the lake, which assess its biological productivity and support level for aquatic organisms. The reasons are seawater exchanges, deposition of sediments, sewage discharge, etc. Chilika Lake is declared a Ramsar site (no 229), an essential area for breeding, wintering, and staging for 33 species of water birds (the largest wintering ground for migratory waterfowl found anywhere on the Indian sub-continent). A rare breed of Irrawaddy dolphins is exclusively found here.

## Shiv Nadar University collaborates with The Habitat Trust (THT)

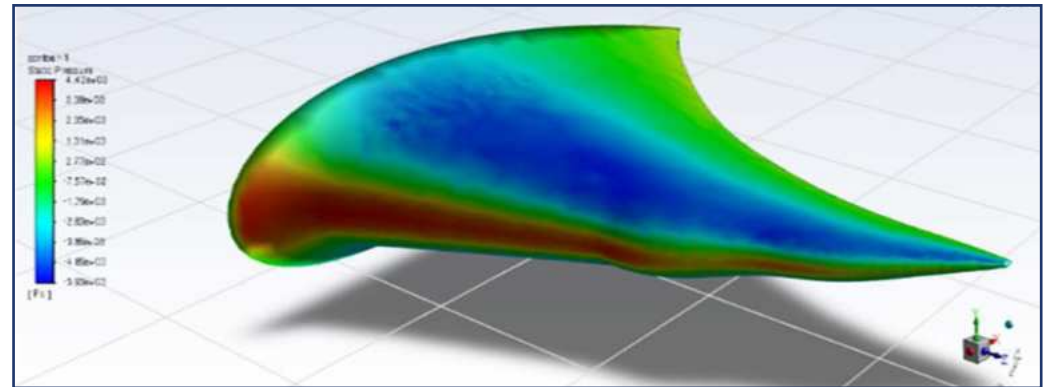
The Department of Life Sciences is working in partnership with [The Habitats Trust](#) to achieve synergistic gains by bringing together diverse areas of expertise and launching multidisciplinary conservation programs. One of the programs is to work on eDNA studies of elasmobranchs across India’s coastline. Elasmobranchs, including sharks, rays, and skates, are under enormous anthropogenic pressure worldwide, with many species classified as threatened with extinction. The sawfish, closely related to rays, are an intriguing and understudied group of elasmobranchs. The population of five known species of sawfish worldwide has declined by more than 90% due to overfishing (directed and bycatch) and habitat loss (IUCN). Three of the species are endangered, while the other two are threatened. Understanding the distribution of these critically endangered elasmobranchs is critical because they live in coastal waters and estuaries subjected to intense anthropogenic pressure. These can serve as flagship species for habitat conservation, and using eDNA methodology allows for large-scale sampling, making it ideal for studying such elusive species while paving the way to study organisms that are difficult to observe or extremely rare (Beng and Corlett, 2020).



## Design and Development of Bio-inspired Unmanned Underwater Vehicles (UUV) in collaboration with the Naval Research Board (NRB)

The Department of Mechanical Engineering has designed a bio-inspired unmanned underwater vehicle, which is a physical intelligent system that looks like natural species, propels efficiently underwater, and achieves multiple tasks, including underwater pollution monitoring, oil cleaning, migration of species, and underwater threat detection, to name a few.

The design and manufacturing of flexible propulsion are essential to batoid-inspired UUV. The current study focuses on Manta Ray species that have a unique advantage over other underwater species and can carry a larger payload. The efficient locomotion of the vehicle leads to higher speed and energy efficiency. The higher payloads facilitate various sensors, cameras, and other sophisticated components to make it intelligent and adopt strategic locomotion. In collaboration with the Naval Research Board (NRB) of the Defense Research and Development Organization (DRDO), the department is working on two projects with a funding of 35 lakhs.





Shiv Nadar Institution of Eminence is fully committed to the UN Sustainable Development Goals (SDGs). We have embraced a four-pronged strategy for SDGs through teaching, research, our core institutional practices, and partnerships.

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