



# ANNUAL REPORT

*ATREE Siang expedition team on the 500-metre-long narrow bridge hanging over the roaring river. It takes 7-10 minutes to cross the Siang and is not for the faint-hearted*

**The Ashoka Trust for Research in Ecology and the Environment (ATREE) completes a quarter century of groundbreaking work in the field of conservation and sustainability.** The immense knowledge we have gathered and still generate across landscapes influences research in our domains. We aim to tap the amazing potential this knowledge has to change and mobilise the public imagination.

Our progress covered in this annual report was made possible by the generous support of our donors and partners. Conserving biodiversity is a collaborative effort, and human partnerships, as mirrored in the natural world, hold the key. Thank you for backing us.

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ATREE's Agasthyamalai Community Conservation Centre was awarded the Tamil Nadu Green Champion Award 2022 for its exceptional contributions to environmental protection, awareness, biodiversity conservation and research studies in Thoothukudi district. The award was presented by Smt. Geetha Jeevan, the Honourable Minister of Social Welfare and Women Empowerment of Tamil Nadu.

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## About ATREE

ATREE is a global non-profit organisation generating interdisciplinary knowledge and informing policies and practices in conservation and sustainability. At ATREE, we focus on applied science through research, education and action that influence policy and practice in the conservation of nature, management of natural resources and sustainable development. ATREE is recognised as a Scientific and Industrial Research Organisation by the Ministry of Science and Technology, Government of India.



### **An Academic Institution**

Developing the next generation of environmental leaders



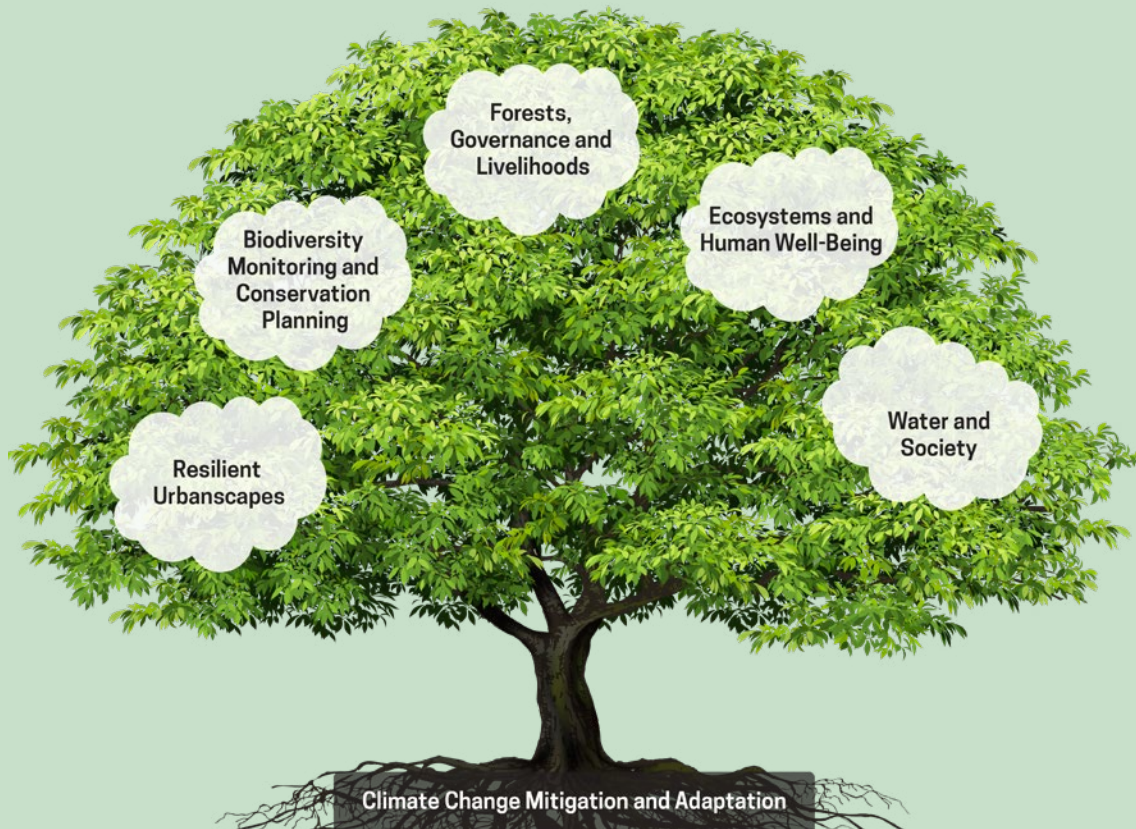
### **A Research Hub**

Interdisciplinary applied knowledge feeding into policy and practice to achieve environmental and social goals



### **A Grassroots Organization**

Enabling local communities to enhance their lives and livelihoods and manage natural assets



## Our Mission

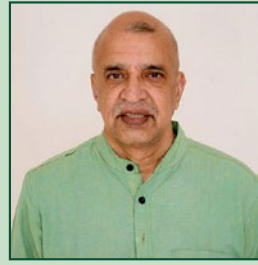
ATREE's mission is to generate rigorous interdisciplinary knowledge for achieving environmental conservation and sustainable development in a socially just manner, to enable the use of this knowledge by policymakers and society, and to train the next generation of scholars and leaders.

To deliver on our mission, we work across issues like biodiversity and conservation, climate change mitigation and development, land and water resources, forests and governance, and ecosystem services and human well-being.

## The Board of Trustees



**Balaram,**  
Co-chair, BoT  
Former Director, Indian  
Institute of Science



**Darshan Shankar**  
Vice-Chancellor, The University  
of Trans-Disciplinary Health  
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**K.N. Ganeshiah**  
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Chairperson, BoT  
Distinguished Professor,  
Department of Biology,  
University of Massachusetts



**Rahul Matthan**  
Founder Partner, Trilegal



**Ravi Venkatesan**  
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## The Advisory Council



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Executive Director & CEO,  
Kirloskar Systems Ltd.



**Manoj Kumar**

Co-founder & CEO, Social Alpha  
& Representative of Tata Trusts



**Pheroza J. Godrej**

Founder, Cymroza Art Gallery



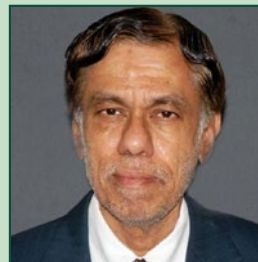
**Raj Khoshoo**

Senior Vice President,  
Siemens Product Lifecycle  
Management



**Ranjit Barthakur**

Founder & President, Balipara  
Foundation



**S.V. Ranganath**

Vice Chairman, Karnataka  
State Higher Education  
Council



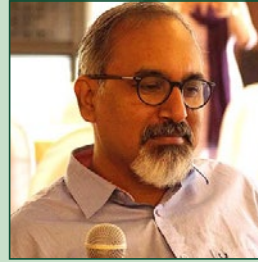
**Shruti Shibulal**

CEO & Director, The Tamara  
Leisure Experiences

# The Academic Advisory Board



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Professor Emeritus, Indian  
Institute of Management  
Bangalore



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**Robin L. Chazdon**  
Professor emerita, Ecology  
and Evolutionary Biology  
Department, University of  
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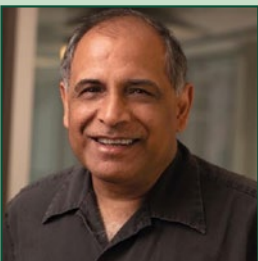
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Professor,  
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University of Hawaii



**Upmanu Lall**  
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**K. VijayRaghavan**  
Former Principal Scientific  
Adviser, Government of India

## Forging Ahead



### **Kamaljit S. Bawa**

*President, Chairperson, Board of Trustees, Distinguished Professor, Department of Biology, University of Massachusetts*

Almost a year ago, ATREE celebrated its 25th anniversary for good reasons. Over the last quarter of a century of its existence, ATREE has pioneered a number of concepts and initiatives to sustain and manage our natural assets for the benefit of society. These initiatives, to name a few, encompass new approaches to the conservation of our precious biodiversity, discovery of many new species, development of innovative approaches to assess water quality and quantity in a watershed, demonstration of how the landmark Forest Rights Act can be implemented at a large scale, and the launch of an innovative, interdisciplinary PhD programme in conservation and sustainability studies. Thus, justifiably, ATREE won many national and international awards and was consistently ranked among the top 20 global environmental think tanks.

As I step down as the Chair of the Board of Trustees, I have no doubt that ATREE will not only continue to excel but also expand the scope of its work. Our socio-environmental challenges continue to increase and grow in complexity as well as intensity. Undoubtedly, we will need to be more creative, imaginative and expansive in our thinking and the design of our programmes.

Fortuitously, ATREE is well positioned to expand the scope of its contract with society for socially just development and for healing the planet. Our efforts to acquire new human resources and develop new partnerships and collaboratives will continue. On the heels of a generous endowment from Rohini Nilekani Philanthropies, we have recently received a substantial commitment from the Rainmatter Foundation and we are extremely grateful to them. We also thank many who provide us with unrestricted support: the Shibulal Family, SM Sehgal Foundation, Umesh Maheshwari, Mala Gaonkar, Balachander Ganesan, Tshering Bawa, Ari Daman, Chitra and Vasu Rao, Ajit Issac, Raj Khoshoo, Trevor Price, Jack Liu, James Beach and Andy Kalambi among many others listed in this report.





**Balaram**

*Co-chair, Board of Trustees, Former Director, Indian Institute of Science*

The last year has been a year of transition at ATREE. We have welcomed our new Executive Director, Anita Arjundas. She brings a wealth of leadership experience in the private sector and a passion for promoting sustainability science and conservation. The year has also marked the stepping down of our Founder Prof. Kamal Bawa from his position as Chair of the Board of Trustees. Over the last twenty-five years, his contributions to the growth and development of the institution have been immeasurable. His continuance as President Emeritus and a permanent invitee to the Board will allow ATREE to benefit from his vast experience.

ATREE's great progress over the last 25 years in establishing itself as a leader in conservation and sustainability science has permitted the institution to position itself in contributing to the evolution of rational, science-based policy interventions in restoring and preserving our natural environment and contributing meaningfully to facing the emerging challenges of climate change.

As environmental challenges mount, we need to be creative and develop innovative tools and approaches for environmental research that link knowledge generation directly with policy and governance. Bridging this gap between academic research, civil society and policymakers, ATREE'S Centre for Policy Design strives to analyse, design and advocate for environmental and conservation policies that translate to scientifically sound and socially responsible action on the ground.

ATREE has paid special attention to preparing the next generation of environmental leaders through its novel, interdisciplinary Master's programme on conservation practice. We are proud that our first batch of Master's students will be passing out in 2023.

Our achievements are possibly only because of the unwavering support from our donors and friends and the commitment of our faculty, staff and students. We hope to continue generating cutting-edge research, creating meaningful partnerships and addressing key conservation issues.



**Anita Arjundas**  
*Executive Director*

It gives me great pleasure to write my first annual review of the progress of ATREE over the year. With a return to the field and active engagement with partners and other stakeholders, it was a year of renewed vigour towards knowledge generation and environmental action, which form the fulcrum of ATREE's mission.

We are at a juncture where the demands for sustainable action are growing louder. The impacts of declining biodiversity, shrinking habitats, increasing pollution, and climate change are at our doorsteps, and our responsibilities surpass our achievements. I acknowledge with immense pride that the ATREE team has worked with this awareness in every project undertaken over the year, be it through conservation and restoration efforts, partnerships with organisations and communities, building capacity through its academic programmes and citizen-science initiatives, or knowledge dissemination and policy recommendations with a focus on environmental conservation and sustainability.

Many global, national and regional awards came our way, bringing credence to these efforts. From recognising the lifetime contributions of our board members to listing our senior researchers among the top-cited scientists in the world, and celebrating the promise and creativity of our young scientists.

But none of this would have been possible without the commitment of the staff at ATREE, our partners across the landscapes we work in, and the generous support of our funders and well-wishers. Their faith in ATREE emboldens us to take on the challenges ahead and work better towards influencing policy, impacting practice, and creating the next-generation of environmental leaders.

## Our Key Donors



## Recognitions and Achievements

In 2022, The Balipara Foundation has honoured Dr Kamaljit Singh Bawa with the Global Lifetime Service Award. The award recognizes Dr Bawa's work in setting up ATREE's Eastern Himalaya Programme and his contribution to conserving the critical and biodiversity-rich landscape.

In 2022, Dr Asmita Sengupta receives INSA Medal for Young Scientists. The award is considered to be the highest recognition of promise, creativity and excellence in a young scientist.

In 2022, The Updated science-wide author databases of standardized citation indicators published by Elsevier in September 2022 lists Veena Srinivasan, Adjunct Fellows at ATREE and Sharad Lele, Distinguished Professor at ATREE amongst the top-cited scientists in the world.

In 2022, ATREE's Agasthyamalai Community Conservation Centre (ACCC), Manimuthar, was awarded the Green Champion Award 2022 by the Government of Tamil Nadu.

In 2022, The Balipara Foundation has honoured Dr Kamaljit Singh Bawa with the Global Lifetime Service Award.

In 2020, ATREE's 'Weeds to Wealth' project was awarded the iF SOCIAL IMPACT PRIZE.

In 2020, ATREE was ranked #14 for Water Security Think Tanks and #20 for Environment Policy Think Tanks in the University of Pennsylvania's Global Go To Think Tank Index Report.

In 2019, ATREE became the first Indian organisation to receive the prestigious UNESCO Sultan Qaboos Prize for environmental conservation.

In 2016, ATREE received the Distinguished Service Award from the Society for Conservation Biology (SCB) Asia Section, in recognition of its extraordinary contributions to the conservation of biodiversity and capacity building for sustainable development in India.

In 2012, Dr Kamaljit S. Bawa won the Gunnerus Sustainability Award in recognition of ATREE as an Innovative, knowledge-based conservation and research organisation for sustainability science.

In 2005, the Government of Karnataka honoured ATREE with the prestigious Dr A. P. J. Abdul Kalam award for Environment Conservation for its outstanding contributions in environmental conservation and management.

ATREE has been certified as equivalent to a US public charity by the NGO Source.

ATREE has won the prestigious GuideStar India Transparency Key award and has joined India's largest pool of credible NGOs after undergoing a rigorous due diligence process. GuideStar India's Transparency Key is the Foundation Level certification, indicating that the organisation has filed annual income tax returns as a tax-exempt entity and has shared the same in the public domain.



# Academy for Conservation Science and Sustainability Studies

# PhD Programme

The ATREE doctoral programme in Conservation Science and Sustainability Studies is designed to train research scholars to develop and use integrated approaches in sustainable development and biodiversity conservation.

The programme promotes interdisciplinary research and frameworks to integrate tools and approaches from ecology, economics, sociology and climate science.

ATREE is a recognised centre of the Manipal Academy for Higher Education (MAHE) doctoral programme; MAHE awards the PhD degree.

Typically, ATREE accepts new PhD students in odd-numbered years and provides research contingencies and stipend support. In addition, students who have qualified for the Junior Research Fellowship under the UGC or the CSIR schemes or are working on a research project at ATREE can enrol in the doctoral programme.

### Coursework:

Doctoral training begins with rigorous coursework that is expected to take a year to complete. This includes a set of mandatory courses and a choice of electives. We have designed foundation courses in the natural and social sciences to introduce students to the main concepts in

both these disciplines since students will have a background in one of these.

- Foundations in Natural Sciences – Ecology
- Foundations in Natural Sciences – Environmental Science
- Foundations in Social Sciences – Economics
- Foundations in Social Sciences – Sociology

Mandatory coursework concludes with the tools for conducting research in the natural and social sciences and the ethics and practice of disseminating science, through a series of research methods courses.

- Practising Interdisciplinary Research on the Environment
- Research Design and Methods – Social Sciences
- Research Design and Methods – Natural Sciences
- Quantitative Methods
- Scientific Writing
- Research and Publication Ethics

Sl. No	Categories	Numbers
1	PhD Students	47
2	Faculty	15
3	PhD Degree Awarded in 2022-23	3
4	Public and Internal Talks	7
5	PhD Pre-Submission/ Synopsis Presentation	15



## MSc Programme

The MSc Environmental Studies course in Conservation Practice, jointly offered by ATREE and the University of Trans-Disciplinary Health Sciences and Technology (TDU), equips natural and social science students with interdisciplinary knowledge, perspectives and skills to understand and address conservation challenges. The course is curated to create young environmental leaders whose interdisciplinary skills will add value to corporate social responsibility and sustainability offices, development and conservation NGOs and government-line departments dealing with environment and development portfolios. In academic institutions, these leaders will lend a practical edge.

Besides foundational knowledge in social and natural sciences, our graduates will accumulate domain knowledge and skills across a spectrum of conservation and sustainability themes and sectors ranging from forests to farms: biodiversity, ecosystem services, and human well-being; environmental ethics and social justice; policy, governance and impact assessment; ecological restoration and landscaping; climate change; and field and machine learning technologies. A wide range of competencies in these fields make our graduates competitive and sought-after candidates for roles in conservation and sustainability initiatives across the country.

## Internship Programme

ATREE internships are aimed at a diverse set of applicants – including undergraduates, postgraduates, and mid-level professionals in environment and development, government employees, policymakers and educators. The Academy for Conservation and Sustainability Studies helps match intern interests with requirements on current ATREE projects and

initiatives. Applicants are expected to commit to a minimum duration of 8 weeks to be considered for an ATREE internship.

Last year, ATREE hosted 54 interns for different projects.

## PhD Awardees

Rinan Shah – Disentangling the drivers of domestic water scarcity in the Eastern Himalayan Region.

Annesha Chowdhury – Biodiversity, ecosystem service and human well-being in the Darjeeling tea-forest social-ecological landscapes.

Rahul Muralidharan – Conservation, intensification, and securitization: the political ecology of marine conservation on the Tamil Nadu coast, India.

## Scholarships / Grants / Funds

- Anirban Roy got a Rufford grant for the project ‘Attaining “Appropriate Restoration” – Analysing reforestation and afforestation efforts through the lens of ecological and community-need drivers’.
- Nabasmita Malakar received a grant from the International Association of Plant Taxonomy (IAPT) for the project ‘Systematics, biogeography and character evolution of Persea (Lauraceae) group in the Indian subcontinent’ in June 2022.
- Priya Ranganathan got the Prakriti Research Fellowship 2022 (April 2022–March 2023).
- Anirban Roy received the second tranche (2022–2023) of the SayTrees research grant.
- Anirban Roy was awarded a scholarship of USD 1000 to attend the 8th Annual Meeting on Forests and Livelihoods: FLARE 2022 organised by and at the University of Notre Dame Rome Global Gateway, Rome, Italy .
- Kesang Bhutia was awarded the National Fellowship (NFST) to support her research work with effect from 14 October 2022.
- Nobin Raja was awarded a DBT Travel Grant to attend SCCS Cambridge on 03 February 2023.
- Ranjini T.S. received the Earthwatch Fellowship for Citizen Science for the project Firefly Watch 2022.
- Abhijit Dey received a Travel Grant from Central Indian Landscape Symposium on 05 February 2023.

## Awards

- Anirban Roy received Fulbright Alumni Award for Reconciling ecological restoration and livelihood sustenance: Creating awareness regarding ecologically sound and socially beneficial forest restoration practices among CFR villagers.
- Priya Ranganathan won the M. Krishnan Nature Writing Memorial Award 2023.
- Priya Ranganathan was featured in Sanctuary Asia Green Peeps 2023.





# Rohini Nilekani Philanthropies Centre for Environment and Development



## Forest, livelihood and co-management in Western Ghats, South India

The indigenous Soliga community has been living across the forests of the Western Ghats in Chamarajanagara district, Karnataka, for centuries. ATREE is working towards integrating the community members in the management of forest resources, thus

also enhancing their benefits. It includes participatory resource monitoring, value addition for forest products and co-management. This has been made possible by the implementation of the Forest Rights Act (FRA) of 2006.

The FRA empowers forest-dependent communities to access forests for their well-being. Our work has facilitated the provisioning of forest rights to 77 gram sabhas, including 83 villages and 5433 families with 21,732 members and individual rights to 2000 farmers. These accomplishments are important milestones and implemented first time in the protected area regime in India. To develop an inclusive co-management plan, we conducted seven community meetings in which 341 community members participated. The meetings focused on encouraging the community develop co-management plans on 1) governance 2) livelihood and 3) conservation.

## The indigenous community, their livelihood, and the sustainable use of forest resources

The Soligas living in the Western Ghats derive 30–40% of their income from Non-timber forest products (NTFPs). ATREE has been working on enterprise-based conservation models, and our work speaks about the experiences and challenges of implementing these models through NGOs and decentralised NTFP processing units



under the Forest Rights Act (FRA) of 2006. Enhancing incomes from the sustainable harvest of NTFPs can help maintain local livelihoods and provide economic incentives for conservation. Some of our studies indicate that tenure plays an important role in bringing community participation in conservation, the sustainable use of forest resources and establishing sustainable business models.

ATREE enabled the implantation of decentralised enterprise-based conservation models with respect to NTFPs and agricultural products, helping the community earn Rs 15 lakh during the period. The income was distributed among the community as an incentive for the sustainable use of the forests and monitoring forest resources. Later, additional community owned and managed decentralised processing units were established in 2022, funded by the government of India under the SFURTI project, and their annual turnover is around Rs. 50 lakh. We found more ownership and inclusive participation with the decentralized processing units compared to those associated with local NGOs before implementing the Forest Rights Act.



## Invasive plant management in elephant habitats

The *lantana camara* removal and native plant regeneration project, initiated by ATREE, WWF-India, National Centre for Biological Sciences and The Shola Trust, focuses on invasive plant management in elephant habitats. The project is piloting a novel and scalable system for removing lantana accompanied by an experiment to replace the plant with

native vegetation. This is a collaborative multi-stakeholder project aiming to identify the best methods for regenerating native vegetation, which can be implemented at larger scales and increase the natural forage area for elephants and other herbivores in the landscape.

*Lantana camara*, a widespread invasive plant, is rapidly taking over landscapes across India, within and outside protected areas. Unpalatable to several herbivore species including the endangered Asian elephant, the lantana reduces the available forage area and may push animals to raid crops and move greater distances in search of food. The project aims to conduct action-oriented research activities to address the problems of lantana, provide science-based insights for an effective habitat management and help alleviate human-elephant conflict.

## Technical support for piloting community forest resource (CFR) rights recognition in Telangana

The Telangana state has as yet not recognised the Community Forest Resource (CFR) rights under the Forest Rights Act (FRA) 2006. To initiate the process, the Bharat Rural Livelihoods Foundation (BRLF) started a pilot project in Adilabad and Asifabad districts with two partner organisations, the Centre for People's Forestry (CPF) and the Centre for Collective Development (CCD). ATREE was approached for technical support. We organised a two-day workshop on 'Understanding Maps, Identifying CFR Potential Areas, and Using GPS' for the frontline staff of the partner organisations. We also prepared CFR maps based on the CFR boundary demarcations done by CPF and CCD staff for 84 villages in Tiryani and Sirikonda mandals of the pilot districts. Additionally, we also provided online training for the senior staff of these organisations for displaying GPS tracks and preparing CFR maps.



## Training, capacity building and support for decision-making for CFR rights recognition & management in Bastar district

ATREE was invited by the Bastar district administration to provide support for CFR rights recognition and post-recognition management planning in the district. We recruited and trained 18 FRA coordinators, almost all Adivasi youth, who then helped more than 30 gram sabhas claim their CFR rights, and began the process of CFR management planning in five villages. We also created

a public domain webGIS, a GPS-enabled app to understand village and forest boundaries. We trained the officials at the district, block and village levels to use the webGIS to understand the claims under CFR rights and conducted research to identify policy changes to resolve inter-village conflicts and bring about the convergence of CFR-based forest governance with the existing government programmes and policies on NTFPs.



## Rapid water quality and biodiversity assessment of Hennagara Lake, Bengaluru

ATREE carried out an assessment of the baseline condition of Hennagara Lake – a constructed tank located in Anekal taluk, Bengaluru Urban District, Karnataka, from April to June 2022. The study aimed to develop a comprehensive road map for the restoration and sustainability of Hennagara Lake. The study comprised an evaluation of the lake water quality and hydrology, an

examination of human-lake interactions, and an assessment of biodiversity in and around the lake area. The performance of lake restoration projects is evaluated by attaining Class B of the Designated Best Use Water Quality Criteria, published by the Central Pollution Control Board. Our proposed approach attempts to shift the focus of evaluation to one based on current and anticipated uses of the lake water and associated water quality targets required for restoring it iteratively.

After consulting with stakeholders and engaging with the local communities, we recommend that the lake restoration be aimed towards attaining and sustaining Class D Water Quality Criteria, which specifies that the lake should be aesthetically pleasing and fit for fisheries and irrigation for present and future generations. Given the increase in population around the lake and the rise of apartment buildings in its surroundings, local communities heavily advocate tourism and recreation in the lake, adding to the goals of the restoration. Stakeholder engagement and further discussions with polluters and the concerned government authorities are imperative to remedy the current state of the lake.

## Implementing nature-based solutions for lake restoration: assessing, designing and evaluating impact

ATREE's approach to addressing water quality issues in a lake involves three crucial aspects: assessing the baseline condition, designing nature-based solutions and developing operation and maintenance guidelines for interventions.



Our comprehensive year-long study at Venkateshpura Lake in Bangalore indicates a decline in its water quality, primarily due to elevated nutrient levels and organic matter inputs from both internal and external sources. This deterioration has led to the loss of aquatic life, as frequent fish kill events reveal. Our analysis highlights a notable contribution of total phosphorus from lake sediments. We recommend dredging as one potential solution to mitigate nutrient input from sediments. However, since dredging merely provides a temporary solution, we propose designing and implementing nature-based alternatives such as constructed wetlands and floating islands in the lake.

The placement and design of these solutions are informed by inflow load estimation and contamination profiling of the lake. These systems will effectively address both dry and wet weather flows, ensuring comprehensive water treatment. Furthermore, we have established an ongoing community engagement and outreach programme involving the neighbouring apartment complexes and a police academy. The objective is to educate stakeholders on wastewater treatment and disposal techniques and their impact on lake health.



## Applied experimental ecology to investigate and promote sustainable and biodiversity-friendly livestock grazing practices in Community Forest Resource (CFR) areas of Vidarbha, Maharashtra

Livestock rearing is a vital livelihood resource for several forest-dwelling communities. And so, livestock grazing has been integral to most forest and open ecosystems. Unsustainable grazing can often lead to resource depletion and also pose a threat to biodiversity. Through field experiments, this study aims to explore the sustainable and biodiversity-friendly ways of livestock grazing management in the Community Forest Resource (CFR) areas of Vidarbha in eastern Maharashtra. Grazing enclosures were set up in grazed and ungrazed areas in July 2022 in the CFR areas of Payvihir village. The herbaceous aboveground vegetation in the experimental plots is clipped systematically and periodically to simulate grazing management practices. We hope to identify and promote sustainable livestock management practices through this project in the near future.





**S M Sehgal Foundation Centre for  
Biodiversity and Conservation**





## Exploration in the Siang and Dibang river valleys, Eastern Himalayas

The landscape encompassing the Siang and Dibang rivers, the main tributaries of the mighty Brahmaputra in Eastern Himalayas, is a complex mountainous terrain with a mosaic of farmlands and forests. With diverse weather ranging from subtropical monsoonal to temperate conditions, the forests of this landscape are least explored

for biodiversity, barring a few sporadic explorations in the period 1911–12. The snow-covered mountains along the meandering rivers, clothed by alpine vegetation, followed by coniferous forests, diverse broad-leaved temperate forests, wet evergreen forests, low-elevation evergreen forests and riparian forests and grasslands, make the Siang and Dibang river valleys exploding with diversity.

We focus on exploring and documenting plant diversity across diverse forests along the Siang and Dibang river valley region. It includes documenting the habitat quality and geographical distribution of plants to conserve the forests. Knowing the distribution and population status of plants will help support community-based biodiversity conservation efforts. This will have a greater implication for conservation planning of the global biodiversity hotspots (Himalayan, Indo-Burma and WG) in India.

## Biodiversity Alive

The 7000 sq. km Agasthyamalai landscape comprises a diverse habitat from the heavy rainfall regions at high elevations with undisturbed evergreen forests to the semi-arid human-dominated agricultural regions in the plains. The plains support countless wetlands, grasslands and scrub forests with unique species spread across four districts. The hill forests are protected by the state. The challenge has been



to conserve the ecosystems outside the protected area network. The ACCC, situated in the landscape, fosters research, education and outreach to address this challenge using a multi-stakeholder approach with a broad goal of biodiversity conservation in a human-dominated landscape.

## Project objectives and outcomes



### Restoration

Agasthyamalai Community Conservation Centre (ACCC) has partnered with the district administration to conserve and restore vanishing grasslands in the Tirunelveli region. The government has given ACCC 52 ha of land to develop a model grassland restoration project. The project stresses on participative approach, involving local pastoral communities to sustain their livelihoods and foster biodiversity conservation.

### Wetlands

Over the year, ACCC has helped the district administration to map and document wetlands and their biodiversity and issues.



### Enhancing temple garden biodiversity for local sustenance

Ancient temples in the region had gardens (Nandavanas) supporting many native plant species fostering rich biodiversity. Many of these gardens are now also occupied by commercial species like coconut trees and have paved pathways. To bring back Nandavanas, we have planted native species in selected temples of the region. The temple authorities maintain them, using their flowers and leaves in rituals. The ACCC monitors these spaces.

## Discovery and exploration



### Phenological changes

The long-term data on plant phenology in the evergreen forests, which is now over 30 years, has been analysed. The community-level fruiting phenology shows some connection with global climate processes such as El Nino events in the Pacific. High El Nino events seem to negatively affect fruiting in these forests.

### The unknown Moths of the region

We initiated a unique programme to document and monitor moths in forests and agricultural areas. A large number of moths have been documented and many of these are unidentified and possibly new to science. Recently a moth *Mimeusemia ceylonica* was rediscovered after 127 years in ACCC, which was known only from Sri Lanka.



### Wetland birds

The Tamiraparani waterbird count is a citizen science programme where participants come from the districts and beyond every January to count birds in over 60 wetlands. This is an annual event at ACCC, sustained for the last 12 years. Recently we analysed the 12 years of data, which showed the counts of birds are coming down in the landscape though the majority of the species were fairly stable. This also allowed us to identify seven critical wetlands that require conservation.

## Capacity building, education and awareness

The ROVERS is a signature education programme of ACCC that exposes school students to the perennial river Tamiraparani as it winds its way through the varied landscape of the Agasthyamalai. Over 100 students participate in the programme, which runs for four months. We built the capacity of local stakeholders to form Biodiversity Monitoring Committee (BMC) through several workshops and are currently developing the People's Biodiversity Register in many villages as required by the government.



## Designing Sustainable Urban Gardens for Bangalore - Phase-2

There is a critical knowledge gap about what is a sustainable urban landscape. It is well known that green cover in a city is critical to a) maintain healthy and aesthetically pleasing spaces, b) provide greater opportunity for harbouring biodiversity and ecological interactions and c) maintain critical ecosystem services and functions. Yet, as Indian cities are rapidly losing green to brown and grey, it is pertinent that all available spaces are innovatively used for re-greening in an ecologically sustainable way. However, we recognise that a major impediment in this regard is a lack of easy, user-friendly knowledge-driven sustainable greening tool for urban planners, private homeowners and urban gardeners, which can potentially allow the willing to make the right choices and select the most ecologically appropriate plants. To address this gap, we proposed a host of knowledge-based solutions, tools and pilots that demonstrate how to design urban green spaces sustainably.

### Objectives

- Information on nurseries to streamline supplies to demand in different parts of the city based on the information collated through this project.
- Ideal planting combination designs for different types of requirements.
- Demonstration Gardening Plots.



## Biodiversity and human well-being linkages across the agricultural socio-ecological systems of Sikkim

Culture influences the two mainstays, income and livelihood: agriculture and tourism. For both activities, biodiversity is critical. For organic agriculture, local biodiversity enables key services like pollination and is the main source

of manure and livestock feed. Sikkim has a rich diversity of wild edibles, many growing around existing farmland and agri-fallows. About 90% of tourism is centred around biodiversity – largely for aesthetics and watching birds, butterflies and plants. The remaining 10% is held by Buddhist religious sites, in all of which biodiversity is a key element. Many such sites are amid sacred forests, lakes and mountains. Unfortunately, recent developments and centrally sponsored policy trajectories are pushing agriculture towards monocropping focused on high yields while promoting organic fertilizers. Tourism pressures are increasing almost exponentially, particularly following the disastrous COVID-19, after which the state has been highly aggressive in drawing more tourists. It creates a situation of high volume but negative feedback for local biodiversity and culture, which are the mainstays of tourism. Therefore, any interventions should strengthen the positive values and overturn the negative feedback.

### Objectives

1. Biodiversity assessments of prevalent agricultural practices across agroecological zones and
2. Impact assessments of tourism spurt on biodiversity.

### Outcomes

1. The highest biodiversity was observed within the agroforestry crops. The same system also led to a greater flow of direct income and livelihood benefits from biodiversity.
2. Identified Khasmahals as important commons through which people derive direct and indirect biodiversity and environmental benefits.
3. Data collection has just started for objective 2.



## Frugivory, fruit preference and seed dispersal by Asian elephants *Elephas maximus*: recruitment patterns of elephant-dispersed plant species and their alternative seed dispersers across varying elephant densities

Although recent research has increasingly demonstrated that large-bodied animals may

have functionally unique roles within their ecosystems, studies show that it is still not clear how their extirpation or decline will affect biodiversity and ecological processes. Large-bodied animals, however, are also more vulnerable to extinction due to various anthropogenic pressures such as habitat modification and poaching. Among them, the Asian elephant *Elephas maximus* is listed as Endangered. They now occupy a very small proportion of their historic range, and their numbers have dwindled to <30,000. Given the global decline in their numbers and range, it is imperative to understand the impact of the Asian elephant population decline on forest community dynamics.

Our project examines the potential influence of reduced densities of elephants on the recruitment of tree species whose fruits are consumed/preferred by the pachyderms at BTR.

### Objectives

- Identifying fruit species consumed, preferred and dispersed by elephants.
- Assessing age class distribution (seedlings, saplings, poles and trees) of elephant-preferred fruit species across differing elephant densities.
- Examining seedling recruitment patterns of elephant-preferred fruit species across varying densities of elephants.
- Understanding if elephant-dispersed fruit species are dispersed by other frugivores and assessing if species richness and abundance of seedlings are functions of elephant densities.

The study can potentially help assess viable population sizes required to ensure that Asian elephants are not functionally extirpated as seed dispersers. Identification of plant species preferred by Asian elephants will further aid in devising management actions wherein their ranging can be restricted within Protected Areas by planting more of these species, thereby

reducing conflict with humans. Finally, this study will also enable us to identify other frugivores that may be important for the seed dispersal of certain plant species, especially in the absence of elephants. Thus, by bringing the ecological importance of Asian elephants as seed dispersers to the fore, we aim to help conserve elephants, the numerous plant species that they disperse and the frugivore guilds and forest ecosystems that they are a part of.

## Tree Outside Forests in India (TOFI)

A socio-ecologically responsible increase in the cover of Tree Outside Forests in India (TOFI) can bring multiple environmental, economic and social benefits while helping India meet its international commitments to sequester 2.5–3 billion tonnes of additional carbon dioxide equivalent (CO<sub>2</sub>e) gases and restore 26 million hectares of degraded land. The TOFI project intends to achieve this by (i) expanding the resource base and political commitment to scale up TOFI, (ii) providing economic incentives and reducing the risks for tree-based enterprises and (iii) improving access to actionable TOFI information through digital and conventional platforms.



TOFI's activities are expected to cover seven states (Andhra Pradesh, Assam, Haryana, Odisha, Rajasthan, Tamil Nadu, and Uttar Pradesh) and draw on the expertise of a consortium that includes World Agroforestry (ICRAF), ATREE, Gramin Vikas Vigyan Samiti (GRAVIS), the Central Agroforestry Research Institute (CAFRI), the National Institute of Agricultural Economics and Policy Research (NIAP), the Network for Certification and Conservation of Forests (NCCF), the Energy and Resources Institute (TERI), Tamil Nadu Agricultural University (TNAU) and the Forest College and Research Institute (FCRI). In so doing, TOFI intends to unlock environmental and socio-economic benefits that will be sustainably experienced by diverse social and economic backgrounds at scale.

### Project objectives and outcomes

ATREE's role in TOFI focuses on:

- Designing, deploying and directing problem-driven, solution-oriented research and disseminating these results in the TOFI states.
- Assessing economic incentives for increasing TOFI cover, such as payment for ecosystem service (PES) schemes and conducting demand assessments for selected TOFI products.



## IndiaZooRisk+: Using OneHealth approaches to understand and co-develop interventions for zoonotic diseases affecting forest communities in India.

Zoonotic diseases disproportionately affect poor tropical communities, leading to loss of life, impaired livelihoods, health and welfare. Social and environmental change appears to increase zoonotic diseases, but little is known about the drivers of change and how they interact. This project will (1) better understand the impacts of different drivers, such as forest degradation, land tenure, human mobility, power dynamics and knowledge systems and seasonal ecology, on health outcomes and the spread of zoonotic diseases and (2) co-develop improved interventions with affected forest communities and policymakers and practitioners from the human health, animal health and environmental sectors thereby building the capacity of local communities to be more resilient to zoonotic diseases.

### Objectives

- Determine the local contextual and biological factors that underpin the vulnerability of individuals and forest communities to zoonotic pathogens and their resilience strategies.
- Understand how knowledge sharing within forest communities and with cross-sector practitioners affects zoonotic disease management.
- Understand seasonal exposure to zoonotic diseases in relation to vector and host cycles and human activities.
- Investigate how human mobility affects knowledge sharing and public health interventions and interacts with disease ecology to influence regional spread and burdens of zoonotic infections.
- Integrate contextual and mobility risk factors for zoonotic diseases into co-developed predictive models, surveillance and decision support systems at district and state levels.
- Co-develop interventions, prioritize traditional knowledge and build OneHealth capacity.

### Outcomes

Strengthened capacity and protocols for vector, reservoir host and human surveillance and diagnostics for focal diseases. Co-developed predictive maps and decision support tools for focal diseases to guide decision-making and target interventions and transferred them to key stakeholders. Explorer tool already developed for Kyasanur Forest Disease through the MonkeyFeverRisk project. Developed blueprints and training for modelling and empirical approaches that can be utilised at different stages of endemic or epidemic transmission to understand and predict disease risk from social, ecological and environmental risk factors for stakeholders and researchers in India.





Centre for Policy Design

The Centre for Policy Design (CPD) at ATREE has focused its efforts towards knowledge building, public engagement and policy communications for sustainable land-use strategies at multiple landscapes across the semi-arid and sub-humid parts of peninsular India. This included co-designing and co-creating restoration pathways for degraded landscapes as part of our flagship initiative – Alliance for Reversing Ecosystem Service Threats (AREST).

**The CPD reconciled this effort by undertaking the following key activities:**

- Identified potential policy pathways, constitutionally mandated institutional structures and transition finance as scaling mechanisms for impact.
- Invested in supporting local institutions and service providers to catalyse financial, technological and policy enablers. For this purpose, we initiated multiple pilots across peninsular India, namely, Raichur district (Karnataka), Chikkaballapur district (Karnataka) and Pune district (Maharashtra).
- Focused on convergence, collaboration and cooperation at multiple levels, embracing socio-ecological complexities and gendered aspirations.

## Socio-ecologically responsible restoration (pilot) in Karnataka

We initiated a restoration pilot on 100 hectares of degraded agricultural land. We kick-started a process of conducting baseline assessments on three factors: (i) Soil, (ii) Biodiversity and (iii) Socio-economic analysis.

Project outcomes: After consultations with the local communities of Devadurga and Lingasur taluks in Raichur district



and recommendations from NGO Prarambha, the first 100 hectares of land was selected for identifying potential interventions (27 hectares of private property resources and 91 hectares of common property resources). To initiate a pilot project of restoring degraded landscapes in Raichur district, we have chosen three villages in Devadurga taluk – Mukkanal, Parapur and Gejaldinne – all part of Amarapur Gram Panchayat and geographically contiguous with one another. The socio-economic baseline study for restoration efforts was conducted through focus group discussions and key informant interviews. The secondary data was collected from national-level data archives such as the Census, state-level data archives compiled by the

Government of Karnataka, and village-level data archives compiled by gram panchayats, village schools and anganwadis. We are now taking this work forward by co-designing restoration interventions with partners and local communities.



## Engagement with forest department in Pune

We are closely engaging with the Forest Department as well as other line departments in Maharashtra to highlight the need for grassland conservation and restoration in the state. As part of the engagement, we organised a workshop to highlight the need for conserving Open Natural Ecosystems such as grasslands in Maharashtra.

Project outcomes: We held a sensitisation workshop at the Forest Department (Vanbhavan), Pune, which was well-attended with over 60 officers of the Forest Department, including the Chief Conservator of Forests of Pune and Regional Forest Officers. The workshop concluded with a productive discussion with the FD officers on implementing the policy recommendation, paving the way forward.

## Grassland restoration pilot in Maharashtra

India's environmental history and post-Independence policy suggests a forest-centric view, which has had enormous implications for Open Natural Ecosystems (ONEs) such as grasslands, their biota and the people and livestock that depend on them. Given this background, the CPD recognises the need for a comprehensive policy that



considers these habitats as functional and important ecosystems, which can lead to better outcomes for biodiversity conservation and local livelihoods.

### **Project outcomes**

The project site, Kendur, is a village in Shirur taluk in Pune district, Maharashtra, India. The identified site (80 hectares) is village common land, locally known as 'Gaayraan', which has been subject to inefficient water percolation projects and unscientific afforestation activities. Following two years of engagement with a local NGO, the Grasslands Trust, and the village governance body (Gram Panchayat), we initiated the pilot project in the village. A baseline study and engagement with the community members reveal that the unavailability of fodder is the key issue in the landscape. We are now co-designing interventions with the communities that will be socially and ecologically suitable for the restoration pilot.



### **Policy Communications @ COP27**

We organised 3 events at the COP27 in Sharm El Sheikh, Egypt, highlighting our approach in socio-ecologically responsible restoration and protecting Open Natural Ecosystems.

### **Project outcomes**

1. Event 1: Creating win-wins on soil? Rewarding smallholder farmers for building soil organic carbon (11 November 2022 at the Food Systems Pavilion).
2. Event 2 (participation): Tree-based food system transformation for improving lives and the environment, at the Indian Pavilion.
3. Event 3: Title: Open natural ecosystems for people, carbon and biodiversity, at the Indian Pavilion.
4. Event 4: A restoration handbook: 'What does socially and ecologically responsible ecosystem restoration look like?' at the Food Systems Pavilion.



## Policy analysis for natural climate solutions (TNC)

We were invited by The Nature Conservancy (TNC) to conduct ‘A political economy study of Natural Climate Solutions (NCS) in India’, as a part of their consortium working towards creating an action plan for NCS in India. CPD conducted a national-level policy analysis of policies, legislations and

schemes influencing and framing four NCS pathways in India – the restoration of degraded land, reforestation, avoided deforestation and trees in cropland. Additionally, we conducted field-based case studies in five states under four biogeographic zones: India-Sikkim and Himachal Pradesh (Eastern and Western Himalayas, respectively), Assam (Northeast), Maharashtra (Deccan Plateau) and Karnataka (Western Ghats). Based on these case studies, we identified key enablers and constraints for NCS pathways in India, along with steps for capacity building for the legal and policy environment.

### Project outcomes

The study came out with a set of guiding principles and recommendations to frame NCS in India based on a political economy approach taking into consideration land, communities and institutions. With this, CPD will contribute to the consortium’s larger agenda for NCS in India along with the Central Government’s commitments to improving the carbon sequestration capacities of India.



**Centre For Social & Environmental  
Innovation**

The Centre for Social and Environmental Innovation (CSEI), incubated at ATREE, brings together institutions and change makers to find science-backed solutions and create impact at scale. CSEI's focus is on cities and towns and farms and forests.

## Cities and towns

This initiative aims to create greener climate-resilient towns and cities using wastewater. In Bengaluru, the focus is on using treated water for greening, in the water-intensive construction industry and for recharging aquifers; in small towns, we aim to make the urban growth trajectory less freshwater-intensive.



### Project outcomes:

Participated in the International Water Association's 13th international conference held in Chennai on the theme 'Water Reuse: Overcoming the Challenges of Growth and Climate Change'.

- Participated in a panel discussion organised by the Bangalore Apartment Federation on how to make the city's rapidly-growing residential sector more sustainable.
- Researched the need to better understand how water moves through cities and to illustrate effective ways to create and visualise the urban water balance through the case of Bengaluru.
- Organised a workshop along with the Bangalore Apartment Federation (BAF) to explore ways to improve wastewater treatment and reuse. Among the attendees were researchers from EAWAG, the Swiss federal water research institute and officials from the Bruhat Bengaluru Mahanagara Palike and Karnataka State Pollution Control Board.



## Farms and forests

This initiative focuses on the restoration of degraded agricultural land to achieve ecological security and enhance rural livelihood.

- To address the issue of degraded lands at scale, CSEI-ATREE initiated a pilot in the Raichur district of Karnataka, based on the AREST

approach of adopting a people-centric, demand-based assessment for restoration.

- Oracle renewed the grant to fund CSEI's restoration efforts. Oracle's financial support was critical in setting up baselines and monitoring and evaluation systems at our field sites.
- Helped organise soil workshops with Soil Vasu in Raichur, an 'aspirational' district where our research on socially and ecologically responsible restoration is focused.

To check the invasive *Lantana camara*, we are working with multiple stakeholders towards potential long-term solutions involving forest restoration, primer explaining how a lantana 'Living Lab' could function and deep-dive on bioenergy clusters.

Organised a two-day consensus building workshop on how to tackle the spread of the invasive lantana weed and restore ecosystems degraded by it.

## Research and development

The Research and Development team acts as an internal service provider for our initiatives by answering specific questions. For example: How much water flows through cities? What restoration methods work in a given site? The team collaborates with universities, NGOs and think tanks to understand problems on the ground. They put together digital tools and capacity-building programmes to address these gaps and disseminate knowledge through freely available guides and reports.



- To understand the usability of Jaltol, an app we developed to improve rural water management, we visited field sites with our partners, the Foundation for Ecological Security (FES) and the Watershed Support Services and Activities Network (WASSAN):
- Participated in the United Nations World Geospatial Information Congress in Hyderabad in October with the Jaltol tool. While we routinely speak to practitioners and researchers in the rural water management sector, this event exposed us to researchers from premier institutes, corporates and UN agency members.
- Our engagement with FES in Anand, Gujarat, highlighted that there is a need to track the impact of watershed interventions on a finer scale.



- Our visit to a village in Jharkhand, where WASSAN worked with the villagers to estimate water availability for the Rabi cropping season, showed that we need to supplement remote sensing data with on-ground data collection on features such as surface water bodies.
- In a first-of-its-kind attempt, we applied the agent-based modelling method to assess the impact of solar irrigation on farmer behaviour in six districts. We addressed the question ‘can farmers earn more money while using less water?’
- Completed a landscape review of the agritech startup ecosystem in India. Funded by the Patrick J. McGovern Foundation, we studied a sample of startups and assessed whether they were working towards climate-resilient agriculture.



# Northeast Initiative

## Pangolin conservation in the tea landscape of Darjeeling, Eastern Himalayas, India

Our engagement with Pangolin conservation started in 2014. Ecological studies confirmed that tea plantations, a prominent land use in Darjeeling district, provide significant refuge for the Chinese Pangolin and Indian Pangolin. However, one of the most alarming revelations has been a total absence of Pangolin and Pangolin evidence from tea plantations from where the species was earlier reported, thereby requiring targeted conservation efforts.



### Objectives

- To monitor the current pangolin distribution, abundance, threats and trade in the tea landscape of Darjeeling.
- To enhance public awareness and sensitisation on the Pangolin trade through targeted public awareness campaigns for different strata of stakeholders.
- To strengthen local transboundary coordination with relevant stakeholders between India and Nepal to garner support actions against the Pangolin trade.
- To explore nature-based solutions and build the capacity and skills of local communities for adopting diverse livelihood options.

### Project Outcomes

- Chinese Pangolin is reported in 50% of the sites surveyed (n=78) and Indian Pangolin in 17% with their numbers significantly decreased, suggesting a strong probability of local extirpation in 14% of the sites. Pangolin trade is suspected to be active in approximately 54% of the sites.
- Hunting emerges as a major driver behind the decreasing population of the species in the landscape. Hunting is for local consumption of meat, trade and entertainment.
- A report on 'Key Action Points for combating transboundary pangolin trade across the Indo-Nepal border' is an important output of the project, with an expected outcome of garnering networks and support actions against pangolin trade in the landscape.



## Rural Evidence and Learning (REAL) for water: State of planning in the rural drinking water sector in India

The main objective of this project was to find out the status of the rural drinking water supply in Sikkim through a journey mapping research tool and using Jal Jeevan Mission as a research lens. Given the water security issues in Sikkim, this study focused on understanding the water sector in the state from the

inception, planning and implementation to the operation of the water supply system.

### Project Outcomes

This project in Sikkim commenced with the assessment of the situation of the water supply system, the institutional mechanism and the water resource sustainability initiatives. Some achievements:

- A holistic and detailed report was prepared based on the journey maps of cross-scale multiple stakeholders from the field study sites and nodal agencies, institutional mapping and secondary research.
- One of the key findings was the presence of 'Informal water user groups' across the study sites. These adaptive capacities of rural communities emerged as the invisible infrastructure actualising the water supply.
- At the outset, we discovered that access to water is heavily governed by the non-climatic factors amid the hydrological and climatic variables present in the state.

## Conserving the Critically Endangered White-bellied Heron *Ardea insignis* (Humes 1878) in Arunachal Pradesh, India.

White-bellied Heron (WBH) is a Critically Endangered bird species whose population is considered insufficient for future survival. There has been a limited WBH-specific systematic survey in Arunachal Pradesh. The threats pertaining to WBH are information gaps on its distribution even in its known range, leading to habitat destruction and poaching .



### We aim to

1. extensively search and survey the potential habitats of the WBH, namely Changlang, Lohit and Anjaw districts, 2) systematically monitor WBH in known sites and 3) engage with the public for sensitising and creating stewardship through tourism.

### Project Outcomes

- Covering a distance of 574.45 km in 8 monitoring transects and 11 search and survey transects.
- Two new distribution areas were recorded.

### Threats

- Destruction of roosting and nesting sites (agriculture, timber collection, cane collection).
- Habitat destruction (mining: sand, boulder and stones; dams).
- Prey availability (unsustainable extraction of aquatic resources like fish and insects) and poaching.

### Outreach Programme

- Key institutions mapped.
- Outreach events to be carried out.



## Wild edible plants of Dzongu Valley, North Sikkim, India: Conserving diversity, traditional knowledge and practice for sustainable use

Wild edible plants are widely perceived as vital contributors to the food security of the indigenous Lepcha community in Dzongu Valley. They are also used as medicines and for various traditional and cultural rituals/practices. This project comprehensively documents the diversity of wild edible plants, traditional

knowledge and practices, assesses threats and develops strategies to conserve them through sustainable use. The focus is on the trends of wild edibles and their usage, particularly among the younger generation, and the reasons for the loss of traditional knowledge.

### Objectives

- To conserve wild edible plants that are biodiversity resources as well as a vital component of indigenous people's food.
- To strengthen the existing database on wild edible plants with more detailed and in-depth information.
- To engage with the local communities for a comprehensive understanding of the use of wild edibles and traditional knowledge.

### Project outcomes / Findings

- 30 key informant Interviews and 110 household survey completed in Open Data Kit (ODK)
- One outreach event was held on the occasion of International Day of Forest 2023 at Gnon-Sangdong JHS , which included an inter-school quiz competition and painting competition.
- Wild Edible Plants are still being used by the Lepcha community in their day-to-day lives. Easy accessibility and the homogeneity of agricultural landscapes have resulted in limited availability and utilisation of wild edibles, though considered by the Lepcha community as essential nutritional sources.

A photograph of a mountain range with dense green forests. The foreground is filled with lush green trees and foliage. In the middle ground, a thick layer of white mist or low clouds hangs between the forested hills, partially obscuring the lower slopes. The background shows more distant, hazy mountain peaks under a sky filled with large, grey, overcast clouds. The overall atmosphere is serene and natural.

# Our Community Conservation Centres

Agasthyamalai  
Biligiri Rangaswamy Temple Tiger Reserve  
Darjeeling  
Male Mahadeshwara Hills  
Vembanad



## Agasthyamalai Community Conservation Centre

### Restoration of Social-Ecological Systems of Tamiraparani Riverscape (TamiraSES)

Tamiraparani – the only perennial river in Tamil Nadu – originates in the Pothigai Hills of Western Ghats in Tirunelveli district. Used for irrigation purposes and generating hydroelectric power, the river, to this day, evokes an emotion that binds the people of the region, their culture and history. But in recent years Tamiraparani has been facing severe threats from human activities. The Tirunelveli district administration invited ATREE's



Agasthyamalai Community Conservation Centre (ACCC) to develop a Detailed Project Report (DPR) to address the following concerns.

- Reduced ecological flows downstream due to agriculture, domestic water consumption and industry.
- Water quality degradation due to untreated domestic, agricultural and commercial waste and inadequate waste treatment facilities.



- Reduced quality of life, human well-being and livelihoods of the dependent communities.

### **Project Overview**

A river's ecological processes are closely intertwined with social systems, and any intervention needs to consider these systems holistically. The coupled-complex social-ecological systems (SES) of the Tamiraparani riverscape have been divided into meaningful sub-systems to develop a roadmap for restoration. The Phase-I of the restoration plan has identified the hotspots of concern based on a detailed ground survey, engagement with the local communities and support from village and town panchayats and the Tirunelveli district administration. It involves stakeholders ranging from policymakers, practitioners, scientists and non-government organisations to citizens who have been impacted. Five pilot sites (1 town municipality, 3 town panchayats and 1 village panchayat) were designated for establishing a network of Social-Ecological Observatories (SEOs) in the riverscape. The first SEO has come up at the Gopalamudram site. The effort leverages social capital and sound scientific principles to monitor and assess the

- hydrology and water chemistry of the river water.
- riparian vegetation, including native and invasive species.
- associated aquatic and terrestrial biodiversity.
- well-being of stakeholders linked to its ecosystem services.

We have submitted the DPR to the Tirunelveli district administration, and the implementation process is in the pipeline.



## **A journey along the Tamiraparani River**

ATREE started Wetland Rovers of Tamiraparani – a year-long ecological, field-based wetland education programme for grades 6 to 9 – in 2019. In the two batches covered so far, 180 students from Sri Paramakalyani Higher Secondary School in Alwarkurichi, Tenkasi district, Rosalind Chelliah Government Higher Secondary School in Maruthakulam, Muthamil Public School in Muneerpallam, Tirunelveli, and Pushpalata

Vidya Mandir in Tirunelveli district participated, along with 30 teachers and more than 15 resource persons.

The module helps the 'Roversians' explore various types of wetlands, including hill streams, wet evergreen forest swamps, riparian forests, rivers, irrigation tanks, paddy fields, temple ponds, natural springs in red dunes, mangrove forests, estuaries and seashores. The programme focuses on the landscapes surrounding the Tamiraparani River, particularly Ainthinai, which represents five landscapes: Kurinji (mountains), Mullai (forest), Marutham (farmland), Paalai (arid land) and Neithal (seashore). Activities include field trips, classroom lectures and hands-on field experiences (soil coring, dip netting, kick netting, measuring physical/chemical parameters, maintaining mini-wetlands in schools, and games and art and craft), all fostering scientific inquiry.

The students get to witness the life of the Tamiraparani from its origin to its confluence with the ocean and appreciate its rich biodiversity, prompting them to conserve it. Their journey through the different zones of the river, packed with hands-on activities like identifying macroinvertebrates or experiencing leech bites, concludes with the Rovers Students conference, where they present their learnings through documentaries, stories and poems.



## Biligiri Rangaswamy Temple Tiger Reserve



### Incentives for conservation

Soligas, the indigenous tribal people residing in BR Hills, Karnataka, depend on the Non-Timber Forest Products (NTFPs) for their subsistence livelihood. To ensure better profits from NTFPs and sustainable harvesting, ATREE has been conducting participatory resource monitoring with enterprise-based conservation models with funding from the Ministry of Micro, Small and Medium Enterprise (MSME), Government of India,

through the Scheme of Funds for Regeneration of Traditional Industries (SFURTI). The models have been initiated through the community institution, Shree Biligiri Rangaswamy Soligara Samskarana Sangha, in BR Hills, with the help of the technical agency Keystone Foundation and the Nodal agency IMEDF.

The enterprise functions from a 5000 sq. ft common facility centre (CFC) having the required machinery and overseen by an inclusive management committee. It processes four types of honey, Amla fruit-based products, soapnut, soapberry, turmeric, coffee, black pepper and bee wax, all sold under the brand ADAVI. ADAVI made a profit of Rs 8 lakh in the year 2022–2023. Of this, the committee distributed Rs 2 lakh as incentives to conserve NTFPs, and 220 honey harvesters received this benefit.

## Conservation awareness on sustainable honey harvest

The Soliga tribal community in BRT Tiger Reserve harvest four different types of honey from *Apis dorsata* (Hejjenu), *Apis cerana indica* (Tuduve Jenu), *Apis florea* (Kaddi Jenu), and Stingless bee (Nesare Jenu). With government funding and assistance from Keystone Foundation and IMEDF, ATREE has been conducting conservation awareness programmes for honey harvesters. Under this project, 600 honey harvesters were trained in sustainable honey harvesting techniques to reduce the impact on wild honey.

To promote apiculture, the harvesters were provided with an incentive of 600 bee colonies. The programmes focused on the conservation of honey bees and maintaining the quality of honey. As many as 100 honey harvesting kits were distributed to the Soliga honey harvesters.



## Darjeeling

### Transforming lives through Efficient Energy Technologies and restoration of degraded lands in the Tea landscape of Darjeeling

Most households in the tea garden villages of Rangbang Valley in Darjeeling district are dependent on fuelwood for their cooking needs, sourced from the surrounding forests. The local supply of LPG cylinders is expensive to procure. Considering these energy-use



issues, we are trying to popularise clean wood-burning stoves, which require less fuelwood and improve indoor air quality, reducing the drudgery of fuelwood collection and disturbance to the environment.

The objective is to build resilience in the communities' livelihoods targeting women by promoting ICS through training and demonstration and enhance the capacity of local institutions to adopt nature-based enterprises and linking with markets; and to restore degraded and marginal land so that these contribute to biodiversity conservation and ecosystem services.

## Project outcomes

The project has encouraged the involvement of women beneficiaries at all levels. Eighty-three participants were trained in Improved Cook Stove (ICS) brick-making, of which 47 were women and 62 participants were trained in ICS Installation, of which 35 were women. One hundred and seven Self-help group (SHG) members were trained to make Biomass based Briquettes. A total of 4600 saplings were planted in an area of 3.56 hectares.



## Strengthening resilience and reducing vulnerabilities of rural communities

Farming is the main livelihood of the people residing in the project area at Sittong-III in Kurseong under Darjeeling district, West Bengal. Communities frequently experience numerous threats, such as food insecurity, climate change, human-wildlife conflicts, soil erosion and decreasing agricultural yields, hampering

their ability to support themselves. It has resulted in an increasing trend among the youth to migrate in search of better pastures. The project aimed to develop sustainable livelihoods and strengthen capacity towards climate adaptation and mitigation.

It focused on key strategies and focus areas like climate-smart agriculture, community-based tourism, efficient energy technology and community-based enterprise.

## Project Outcomes

Significant changes were initiated in the decision-making and self-development of the participating community. The project helped them become more capable and technically proficient and it strengthened groups like the Self-Help Groups led by women and the progressive farmers' group.

The project's main accomplishments include the establishment of 30 food and nutrition gardens and 42 vermicomposting units, the adoption of efficient energy technology and the formation of a community-based biomass briquette firm.



## Male Mahadeshwara Hills

### Collaborative projects

- ATREE, together with The Shola Trust, facilitated the production of over 100 life-size elephant sculptures using lantana sticks and sent them to the UK. Currently, about 25 households are involved in making elephant sculptures, lampshades, furniture and utility products and they earned Rs 19 lakh in one year.
- In collaboration with the Khadi and Village Industries Commission, forest department and Chamarajanagara zilla panchayat , ATREE organised a lantana crafts training for 300 women from 10 self-help groups (SHGs) at Mangla village in Bandipur National Park in September 2022. MoEFCC Minister Mr Bhupendra Yadav, zilla panchayat CEO, chief wildlife wardens, environmental secretaries and DCFs of different forest divisions of Karnataka and Tamil Nadu were present.
- Dr Ramesh, Conservator of Forests, invited ATREE to showcase and demonstrate the lantana craft making at the golden jubilee celebrations of Bandipur Tiger Reserve. He assured to support the training of local people in lantana craft and provide an outlet at the Bandipur safari camp.
- The LCC has been working with Oorjaa, Bengaluru, for the last seven years on new product designs through internship activities, the production of lampshades, etc.
- In collaboration with Madeinearth, LCC artisans worked on new products for two months worth Rs. 177000.

- Together with United Way, Bengaluru and funding from Mercedes-Benz- CSIR fund, LCC conducted a training camp at Nandi Hills in October 2022 for 60 local people.
- The LCC at Palar in the Karnataka–Tamil Nadu border received a CSR grant of Rs 3.5 lakhs to construct a work shed at the village. Built with the help of Youth for Seva, the shed provides work space for artisans of the village.
- ATREE’s community conservation centre at MM Hills (MCCC) along with NP3F organised a farmers’ meeting at Kumbudukki village to discuss organic farming, certification and marketing. Farmers have evinced interest to grow crops 100% organic if NP3F assured financial support for maintaining the standards, the assured price for the crops and marketing.

**LCC annual meet**

The LCC annual meeting held at Keeranahola village in MM Hills witnessed a brainstorming session with the artisans and technical people of the Chennapatna toys unit (Mr Shivakumar and Ms Varsha Kulkarni). The challenges, lessons learned from the past 18 years, and the way forward were discussed.



**Ongoing research**

Apart from the regular long-term monitoring of the population dynamics of NTFP species, phenology and rock bee colonies in MM Hills Wildlife Sanctuary, the MCCC team continued to facilitate work on Bamboo mass flowering and aftermath.





## Vembanad



### **Sustainable clam cultivation to enhance the livelihood of the clam collectors**

The clam fishery plays a vital role in supporting the livelihoods of the people residing in the Vembanad Lake area in Kerala. However, the degradation and alteration of the ecosystem have had a detrimental impact on the availability of this crucial resource, affecting the local communities who depend on it.

In response to this issue, ATREE has undertaken a project aimed at restoring the clam beds by transplanting baby clams from zones where they are abundant. This collaborative project involves grassroots organisations such as the Vembanad Lake Protection Forums (LPF), Black Clam Co-operative Societies and the scientific communities with financial support from the Kerala State Wetland Authority of Kerala (SWAK).

#### **Project outcomes**

As part of this project, several additional activities have been organised to enhance the clam sector and address related challenges. These include the construction of weed barriers to allow clam collectors easier access to the lake, removing plastic waste from the lake bed, initiatives for value addition within the clam sector, and raising awareness about the unethical practice of baby clam mining.

## Rainwater harvesting to resolve the drinking water crisis in Kuttanad

‘Water, water everywhere, not a drop to drink.’ The saying aptly captures the dire drinking water crisis at Kuttanad in Kerala. For years, this region has been grappling with a severe shortage of potable water. Kuttanad is primarily an agricultural area that relies on farming and fishing for livelihood. A network of canals and backwaters intersect it. Unfortunately,



the groundwater in the region has become highly saline due to intrusion from the sea, rendering it unsuitable for drinking and irrigation purposes. Shockingly, less than 20% of the households in Kuttanad have access to Functional Household Tap Connections.

### **Project outcomes:**

In response to the issue, ATREE CERC launched a pioneering project supported by CSR funds from LIC Housing Finance and implemented in collaboration with the local panchayats. The initiative focused on rainwater harvesting and utilising 10,000-litre ferrocement tanks to store clean drinking water. We formed user groups consisting of three families, with 280 tanks installed across nine panchayats. Alongside infrastructure implementation, the project also prioritised water literacy and conservation initiatives.

# Our Alliances

## Alliance for Reversing Ecosystem Service Threats (AREST)



A scientifically validated and socio-ecologically responsible roadmap aims to complement and support the Government of India's international climate pledges. AREST has identified 12 Mha of degraded lands in peninsular India consisting of three ecosystem types across semi-arid and sub-humid zones outside protected areas – open natural ecosystems (ONEs), riparian and agricultural lands. The roadmap encompasses 90 million households across 13 states and 204 districts, of which 33 are aspirational districts. Pilot projects are being implemented in Chikkaballapur (Karnataka), Raichur (Karnataka) and Pune (Maharashtra).

The 'AREST approach' brings together scientific rigour and grassroots engagements for achieving dynamic goals of climate action and human well-being through ecological restoration. The stressors of degradation are landscape driven and a one-size-fits-all approach may not be conducive for addressing the problem at scale. For long-term and sustainable land-use management, it is important to identify types and drivers of land degradation and the most suitable restoration interventions. AREST aims to adopt people-centric principles and scale-up restoration by leveraging constitutionally mandated governance structures and public-private financing mechanisms. The Alliance is developing a blueprint detailing seven steps for restoration while advocating for and enabling restoration cognisant of socio-economic and ecological realities at scale.

AREST partners:



# Our Alliances

## Biodiversity Collaborative for the National Mission on Biodiversity and Human Well-Being



India is blessed with an extraordinary richness of life. Our nation has sections of 4 of the world's 36 biodiversity hotspots — areas that have a high concentration of species that do not occur anywhere else on Earth. This rich fabric of biodiversity has, over the centuries, sustained a stunningly vibrant and colourful tapestry of peoples, cultures, and traditions.

The Biodiversity Collaborative's vision is to embed biodiversity and its links to human wellbeing as a key consideration in the public imagination and policy discourse, particularly in sectors of agriculture, health, ecosystem services, bioeconomy, and climate change mitigation.

Over the last year, the Collaborative has taken several initiatives towards this goal. Our outreach programme has cumulatively touched the lives of more than 2000 people directly, across 3 aspirational districts in India. These pilot initiatives are informing us as to how biodiversity augmentation and human development can happen in congruence, and not at the cost of each other. Our public engagement programmes have touched more than 100,000 people through online and offline events, and our various publications have demonstrated interdisciplinary knowledge and thinking. We have also been continuously engaging with the government towards launching large scale programmes on these issues, and with different policy making stakeholders on multiple laws, amendments and scientific data-driven inputs, thus filling a critical gap in our collective understanding of the role of biodiversity in our lives.

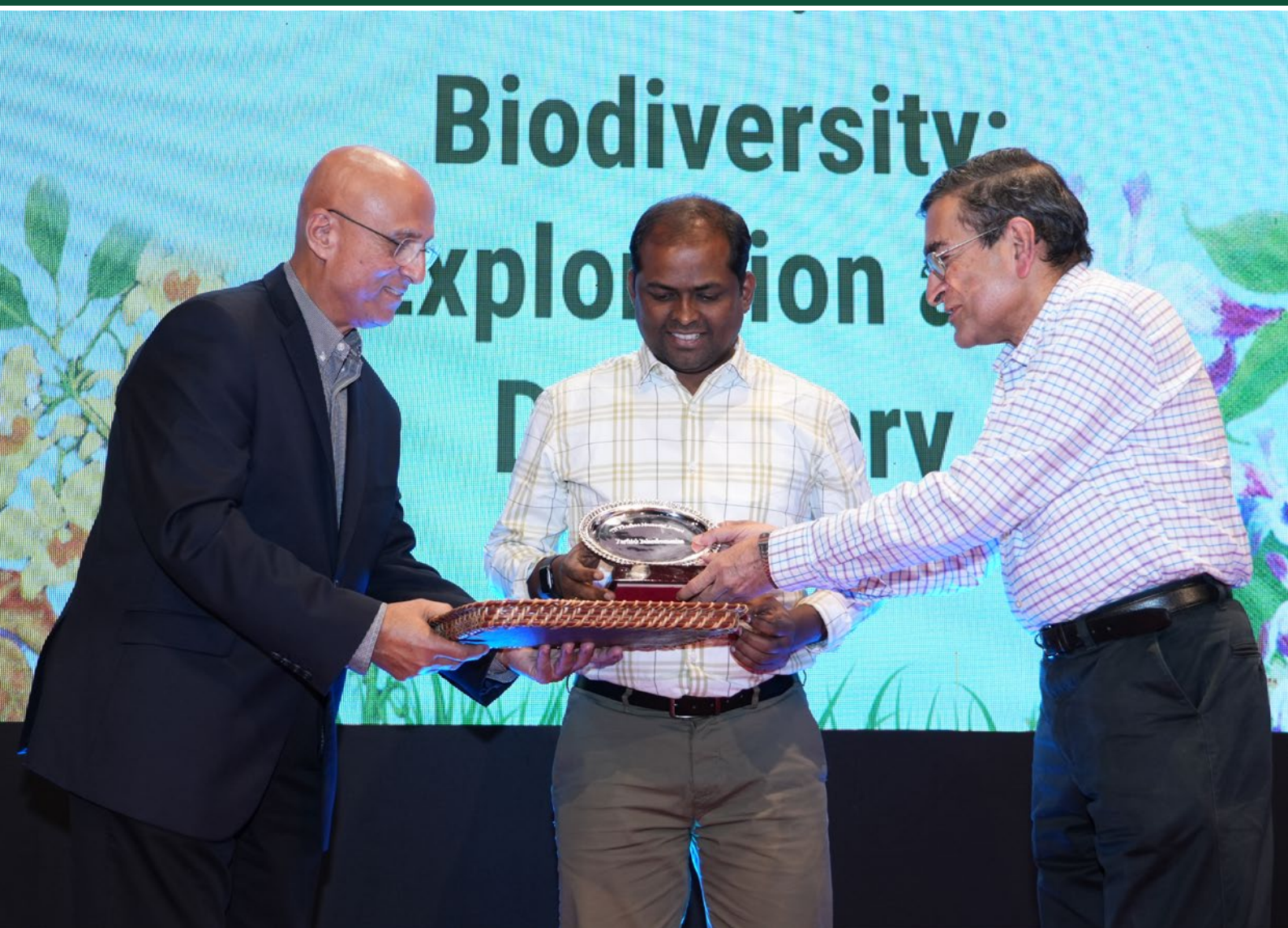
### Biodiversity Collaborative partners:



SRISHTI MANIPAL  
INSTITUTE OF ART, DESIGN & TECHNOLOGY, BENGALURU  
A Constituent Unit of MAHE, Manipal



# TN Khoshoo Memorial Award and Lecture Celebrating Exploration and Discoveries



The 19th TN Khoshoo awardee, Dr Karthick Balasubramanian, has done pioneering work on the taxonomy and systematics of freshwater diatom flora of Peninsular India and NE India. He has described 106 new species or new combinations of diatoms from India and has erected 2 new genera. For his contribution towards diatom systematics, one genus of freshwater diatom called *Karthickia* is named after him. In 2013, he released a book titled *An Illustrated Guide to Diatoms of Peninsular India* at ATREE. Apart from his classical taxonomic work, he also uses fossil diatoms to understand climate change and changes in the habitat.

The event featured various eminent speakers who delivered the Memorial Lectures: Dr Vinita Gowda, an evolutionary biologist, spoke about 'Species and Nature'. Dr Praveen J. Scientist, Education and Public Engagement, talked about 'Species and Citizen Science'. Sandesh Kadur, Wildlife Filmmaker, discussed the importance of 'Species and Exploration'.

Highlighting the traditional practice of naming flora and fauna in our surroundings, Devu Khan Manganiyar and troupe sang traditional folk tunes from the dunes of Rajasthan.

# Financial Statement

Balance Sheet as at 31st March 2023			(INR in Lacs)	
Particulars	31st March 2023		31st March 2022	
<b><u>Source of Funds</u></b>				
Corpus Fund		10,016		7,406
General Fund		215		128
<b>Utilised Reserves</b>				
Project Assets		1,524		1,497
Other Assets		40		31
Land and Building		872		882
Project Fund		1,710		2,112
<b>Total</b>		<b>14,378</b>		<b>12,055</b>
<b><u>Application of Funds</u></b>				
Fixed Assets				
Project Assets		1,497		1,497
Other Assets		40		31
Land and Buildings		872		882
<b>Investments</b>				
Corpus Investments		10,016		7,323
Other Investments		638		69
<b>Current Assets and liabilities</b>				
Advances	73		46	
Other Current Assets	52		64	
Cash and Bank	1,183		2,145	
<b>Gross Current Assets</b>	<b>1,308</b>		<b>2255</b>	
Less: Other current Liabilites	21		3	
<b>Net Current Assets</b>		<b>1,287</b>		<b>2,252</b>
<b>Total</b>		<b>14,378</b>		<b>12,055</b>

Income & Expenditure Account for the year ended 31st March 2023		(INR in Lacs)
Particulars	31st March 2023	31st March 2022
<b><u>Income</u></b>		
Grants	2,477	2,020
Interest	767	308
Donation & other income	135	2
<b>Total</b>	<b>3,379</b>	<b>2,331</b>
<b><u>Expenditure</u></b>		
<b>Centre for Environment and Development</b>		
Forests & Governance	87	71
Water, Land & Society	799	277
Climate Change Mitigation & Development	152	120
<b>Centre for Biodiversity and Conservation</b>		
Ecosystem Services and Human Wellbeing	397	302
Biodiversity Monitoring & Conservation Planning	743	358
Landscapes, Livelihoods & Conservation	304	304
<b>Centre for Social and Environmental Innovation</b>	18	97
<b>Centre for Policy Design</b>	20	34
<b>Academy for Conservation Science and Sustainability Studies</b>	63	91
Salaries-Programme Support	79	101
<b>Administration and Support Expenses</b>		
Salaries/Consultancy-Institutional Support	470	399
Staff Welfare	5	60
Administrative Expenses	195	115
Depreciation	23	22
<b>Total</b>	<b>3,355</b>	<b>2,351</b>
<b>Surplus/(Deficit) during the year</b>	<b>24</b>	<b>(20)</b>



Receipts & Payments Account for the year ended 31st March 2023		(INR in Lacs)
Particulars	31st March 2023	31st March 2022
<b><u>RECEIPTS</u></b>		
<b><u>Opening Balances</u></b>		
(Cash & Cash equivalents)	9,538	7,293
<b><u>Receipts during the year</u></b>		
Project Grants	2,415	2,478
Corpus/Endowments	2,580	1,747
Interest	652	541
Donation and other income	154	10
<b>Total</b>	<b>15,339</b>	<b>12,070</b>
<b><u>PAYMENTS</u></b>		
Fixed Assets	213	65
<b>Centre for Environment and Development</b>		
Forests & Governance	82	82
Water, Land & Society	791	307
Climate Change Mitigation & Development	142	121
<b>Centre for Biodiversity and Conservation</b>		
Ecosystem Services and Human Wellbeing	405	295
Biodiversity Monitoring & Conservation Planning	721	422
Landscapes, Livelihoods & Conservation	328	312
<b>Centre for Social and Environmental Innovation</b>		
	18	97
<b>Centre for Policy Design</b>		
	20	34
<b>Academy for Conservation Science and Sustainability Studies</b>		
Salaries-Programme Support	79	101
Salaries/Consultancy-Institutional Support	470	400
Staff Welfare	5	60
Administrative Expenses	195	115
<b><u>Closing Balances</u></b>		
(Cash & Cash equivalents)	11,809	9,568
<b>Total</b>	<b>15,339</b>	<b>12,070</b>



# Publications



**124**

Journal/Popular  
Articles



**490**

Press/News



**15**

Conferences/  
Talks



**122**

Events



**2**

Book/Book  
Chapters



**58**

Articles/Blog

## Thank you for your support

The year 2022–23 has been remarkable for us all. ATREE completes a quarter-century of groundbreaking work in the field of conservation and sustainability. It has been a year of celebrations, rewards and recognition, locally and internationally, for the contribution to conservation science by ATREE's fellows, researchers, scholars and students. This was a transformational year for ATREE with new leadership and a renewed strategic programmatic outlook leveraging our interdisciplinary work and placed-based research across our centres and landscapes.

ATREE Academy continues to nurture and produce future environmental leaders, with 3 PhD students passing out this year. We have our first cohort of 22 Master's students in Conservation Practice passing out in September 2023. We are happy to see a good fitment of our students for placements across sectors and a growing interest from fresh students to take up our unique conservation practice programme.

I sincerely thank all our principal donors and other organisations for their generous support. Their support significantly enriched our endeavours, fostering innovative research and enabling us to progress and create impactful work in our thematic areas. We thank our Board of Trustees for guiding ATREE towards the next dynamic phase of development and growth. Thanks to the entire team at ATREE for their dedicated commitment towards building a world-class institution in environmental conservation and sustainability.

**Vamsidhar Pothula**

*Chief Operating Officer & Registrar*



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