

Annual Work Report: 2022-2023

About Nature Mates

Nature Mates-Nature Club (NMNC) was birthed by the World Wildlife Fund (WWF) in 1995. In 2006, the organisation became independent, registered as a non-governmental organisation (NGO) under the West Bengal Society Registration Act. Over the years, NMNC has evolved into an organisation of like-minded individuals seeking to serve nature and wildlife. The Ngo is one of the most respected in India, committed to responsible conservatism and activism, inspiring the optimism that 'Nature Mates will deliver'.

Vision

To build a world for the human and non-human species to live harmoniously with mutual respect.

Beliefs and mission

NMNC seeks to conserve flora and fauna in the areas of its presence - Kolkata, West Bengal districts and other States through the interplay of awareness building, responsible activism and grassroots engagement.

Core areas

- Protection of endangered fauna and flora species
- Restoration and rejuvenation of waterbodies
- Study of wildlife with the objective to protect and provide
- Study of plants leading to their sustenance
- Providing nature-based livelihood opportunities to marginalized communities
- Engagement in species and community research
- Creation of wildlife conservatories
- Assessment of biodiversity (survey and census)
- Plantation of trees coupled with transplantation and restoration
- Ecological restoration: wetland restoration and creation
- Animal rescue and welfare
- Relief management at a time of natural disasters
- Commitment to natural health and hygiene
- Publishing of content
- Training to guides in the area of nature

Team NMNC

Governing Body

At NMNC, we recognise that engagement in nature and wildlife is a specialised activity with extensive downstream implications for the world. In view of this, we have invested in a range of knowledge professionals possessing domain experience. This has helped create a dependable eco-system.

Col. Shakti Ranjan Banerjee (2006): Lieutenant Colonel Banerjee (retired) is the founder and has been NMNC's President with extensive wildlife conservation experience.

Dr J.R.B. Alfred (2010): President of NMNC; ex-Director of the Zoological Survey of India and a reputed mammal scientist with 40 years of experience.

Arjan Basu Roy (2006): Co-founder and Secretary of NMNC; active butterfly community evangelist possessing 28 years of related experience.

Dr Arijit Chatterjee (2009): Assistant Secretary of NMNC; faculty of the Department of Environmental Science at Asutosh College (Kolkata); expertise comprises ecosystem service evaluation, species-habitat correlation and studying human role in wildlife conservation.

Devsena Roychaudhury (2010): Treasurer; plays a pivotal role in the co-ordination, implementation and monitoring of projects; possesses expertise in landscaping (urban and rural) and diversity (fish and floral). Co-authored related books.

Uttam Mahatha (2015): Passionate wildlife enthusiast; interests in photography.

Dr Vijay Barve (2007): Network of social data collection platform (Diversity India); force behind the citizen-science movement; post-doctoral research associate with the Florida Museum of Natural History.

Diya Banerjee Sur (2012): Ex-corporate dedicated to wildlife management and conservation in West Bengal; involved in prestigious conflict management mitigation projects where she voices concerns through Right to Information and Public Interest Litigation.

Prasenjit Dawn (2022): Youngest member and honorary expert; Assistant Professor of the Zoology Department in Shyampur Siddheswari Mahavidhyalaya with ten years of experience in Odonata taxonomy and ecology as well as avian diversity.

Heads and Coordinators

Sarika Baidya (2011): Darwin scholar who won the Conservation Leadership Award for her research on butterflies in Arunachal Pradesh; supervises NMNC butterfly gardens; research in colourful and beautiful butterfly species. She coordinates all research and workings of the Ecopark Butterfly Garden and is actively involved in knowledge sharing and awareness generation.

Anusua Pal (2019): She is having Zoology background and is currently heading our Biodiversity works, she conducts all biodiversity surveys, involved in fund raising and knowledge sharing. She actively handles the animal rescue operations for the organisation.

Lina Chatterjee: In-charge of Pakhi Bitan at Eco Park, Kolkata - an open area for birds. She is actively involved in bird research and conservation as well as bird rescue.

Shilpita Mandal: Project co-ordinator for the hornbill program at Buxa Tiger Reserve.

Research affiliates and field personnel

Swapna Biswas: The NMNC flora taxonomy expert; conducts tree transplantation, plantation and restoration projects for the organisation. Her keen interest and diverse knowledge in flora makes her an integral part of the team.

Archan Paul: Works at the butterfly garden in Eco Park; key field personnel in every NMNC butterfly survey, butterfly research publications, knowledge sharing and awareness generation.

Somik Ghosh: His interests in birds and animals makes him a critical resource in biodiversity surveys, he manages the NMNC library.

Anisha Mazumdar: Works in the butterfly garden at Eco Park; deep commitment to Geographic Information System and mapping.

Tarak Samanta: Having a background in Zoology and keen interest in birds, Tarak conducts day to day bird study at Pakhi Bitan along with Lina Chatterjee and involved in knowledge sharing and awareness generation.

Back-office

Shreya Das Nandi: Plays a major role in managing NMNC accounts.

Manjushree Ray: Participates in outreach programmes; holds a Master's degree in Zoology; trained in advanced Tally accounting system

Associates

Rishin Basu Roy: Technology and strong ecology knowledge makes him an asset; trained interns and volunteers in wildlife observation and data collection.

Prasun Majumdar: Project coordinator in Sundarbans; trains local guides on ecological projects; working in Central Indian landscapes for eight years; focused on mammals and fishes.

Subhashis Das: Store supervisor who manages operations and equipment.

Our volunteers

Dr. Prantik Banerjee: Professor at Adamas University; valued volunteer helping educate college students about nature.

Tathagata Talukder: Indispensable knowledge provider on organic water treatment projects in Sundarbans and Kolkata.

Anwasha Saha: Worked with NMNC from 2011 to 2013 as a research associate for butterfly projects and outreach programs (continues to volunteer).

Our significance

Preserving flora

At NMNC, we believe that the flora of the world is under threat on account of climate change. A number of species will decline or disappear. This could have extensive implications for the survival of terrains, fauna and humankind.

NMNC entered this space through the planting of saplings. It graduated to the curation of butterfly gardens across States. It conducted mangrove and fruit tree plantation drives in the Sunderbans. It has been engaged in tree restoration following natural disasters (restored more than 230 trees following Cyclone Amphan in Kolkata, June 2020).

Key figures

764 2000 375

Trees transplanted Mangroves planted Fruit trees planted

200

Families engaged through kitchen gardening

800

Individuals benefitted through pond restoration

Rescuing fauna

NMNC conducts structured research and projects related to wildlife and ecology protection. Besides, NMNC has created butterfly and bird conservatories. It is one of few NGOs dedicated to rescue birds, reptiles and mammals (palm civets, jungle cats, bats, squirrels, etc.)

Case study #1

NMNC explored human-elephant co-existence in Madhya Pradesh in 2022-2023. This project was supported by Madhya Pradesh Tiger Foundation Society and Madhya Pradesh Forest Department and funded by The Nature Conservancy.

Reality: Elephants residing in the Sanjay Tiger Reserve in Madhya Pradesh suffered on account of human conflicts. Elephants entered human community clusters leading to damage of property and loss of lives.

Activity: NMNC collaborated with Solitary Nature and Animal Protection (SNAP) to identify safe elephant corridors, elephant movements and fodder. A quick response team, solar fencing, early warning systems and spring poles were deployed; an analysis on their food habits was conducted.

Outcome: Elephants living in the reserve are now provided healthy natural food. The incidence of minor shocks helps navigate their movement.

CASE STUDY

COMBINING A ROBUST FENCE DESIGN WITH A DETERRENCE AND EARLY WARNING SYSTEM

Solar-powered fencing is commonly used for protection in areas experiencing high human-elephant conflict. Such fences can be effective when maintained well and integrated within a holistic framework of conflict mitigation mechanisms. However, solar-powered fencing is expensive (typically ₹2-2.5 lakh/km), and elephants sometimes break through them. If such breaks are not repaired, the overall integrity of the fencing system fails.

To improve the effectiveness of fencing, designs need to (i) reduce the likelihood of fences being broken, and (ii) minimise damage in cases where elephants manage to break through. TNC supported Nature Mates-Nature Club and Solitary Nature and Animal Protection Foundation (SNAP Foundation) to pilot an innovative fence design (called "Inno-fence") in a conflict-impacted village in MP.



The Inno-fence incorporates robust spring-mounted poles, a deterrence and early warning system, and hanging wires along with a standard solar energiser system. Fence poles are mounted on springs, allowing them to flex rather than break when pushed by elephants. The design also helps secure the fence against minor tree fall (a common cause of fence breakage).

The likelihood of elephants breaking through is itself further reduced by a sensor-based deterrence and early warning system. When an elephant pushes against the fence, it triggers a siren placed nearby (thereby deterring the elephant), and also a siren placed within the village premises (thereby alerting the local community). Community-led Quick Response Teams can then respond appropriately as per their standard protocols, thereby maintaining the safety of both people and elephants. A hanging wire design is used on sections where poles cannot be installed (such as across ravines or valleys). The cost of this fencing system (material and implementation) typically is ₹2.5 lakh/km.

The above system was implemented on a 5-km stretch adjoining Lurguhli village (based on conflict/vulnerability assessment by the park management) in Madwas buffer of Sanjay-Dhubri Tiger Reserve. Initial results suggest that the fence is working well, and the community is continuing to maintain it (although longer-term sustainability depends on ownership and financing). Further evaluation of human-elephant conflict mitigation measures (involving both high and low technology methods as locally appropriate, integrated within a holistic system) can help strengthen human-elephant co-existence in MP.

Our Partners



The Nature Conservancy
Protecting nature. Preserving life.

TNC (The Nature Conservancy, formerly TNC) is a not-for-profit organization registered in India under Section 8 of the Companies Act, 2013. We are also approved for endorsing Corporate Social Responsibility (CSR) activities under the Ministry of Corporate Affairs and have QA and ISO certification under the ISO 9001. For more information, please visit our website or contact us at info@tncindia.org.

TNC acknowledges financial support from SV Azim Premji Trust for the Public Collaboration for Applied Sustainability Research (CAPSR) initiative.

The financial support from AP Foundation to support the Nature Conservancy (TNC) is also acknowledged.



Case study #2

Study of biodiversity and elephant fodder in Bankura and Purulia districts (West Bengal) from May 2022 to May 2023.

Reality: NMNC conducted a habitat restoration project with Uttarayan NGO to understand the lifestyle of elephants.

Challenges: There was an ambiguity related to their breeding, movements and eating habits, corridor fragmentation and therefore man-elephant conflict.

Activity: Based on our study, indigenous trees were planted in a nursery consisting of 5 lakhs saplings; a study on restoring corridors and food was conducted. NMNC familiarized with the inventory of flora (deterrent plants, flowering and fruiting time of trees and food habits).

Outcome: The saplings are growing good and are regularly maintained by local people. As soon as the saplings grows to a considerable height they will be planted in strategic locations in elephant corridors in Bankura during their growth season as per our phenology study done in the landscape.

Case study #3

Provision of elephant fences in the Panjhora village, Jalpaiguri.

Reality: The elephants and human beings resides in proximity that affected livelihoods.

Challenges: Possible damage to lives and homes.

Activity: Solar fences were installed within 3 km to protect crops.

Outcome: Some fences were built in a manner they could be dismantled during the non-cropping season for the livestock.

Case study #5

Conservation of Hornbills in Buxa Tiger Reserve and other protected areas of North Bengal from 2012.

Reality: Out of the five residing species, three were vulnerable and a part of the Red List of Threatened Species created by the International Union for Conservation of Nature (IUCN).

Challenges: Survival of the threatened species.

Activity: In collaboration with Nature Conservation Foundation and West Bengal Forest Department, the species and lifestyles were studied. Awareness programmes were conducted. The breeding season spanned from February-end to early March with birthing around late August to early September coinciding with the monsoon. NMNC is engaged in root monitoring and tree phenology to gain a deeper understanding of hornbill ecology and relationship with habitats.

Outcome: In 2022-2023, Hornbill breeding success rate has been 90%, the highest since 2012. NMNC found 27 active nests belonging to all four hornbill species (Great, Oriental Pied, Rufous-necked and Wreathed hornbill) of which 20 nests were built and a remarkable 17 resulted in successful fledging.

Project	Findings
Hornbill Conservation and Research project at the Buxa Tiger Reserve	Seeds of the below species that hornbills consume was collected <ul style="list-style-type: none"> • Polyalthia simiarum, • Aphanamixis polystachya, • Chisocheton cumingianus, • Prunus ceylanica, • Cryptocarya sp., • Horsefieldia kingii, • Dysoxylum gotadhora, • Besilchmiedia assamica

Case study #6

A study of waders was conducted in the Sundarbans from 2017 onwards.

Reality: The waders are peaceful birds dependent on mudflats. Sundarbans is home to 355 birds, of which a peaceful species of waders resides.

Challenges: The survival of the threatened species.

Activity: Studies on the species helped a holistic approach; books were published to create awareness and contribute to their sustenance.

Outcome: NMNC continues to work to facilitate waders live freely and safely.

Case study #7

Study of lesser cats in the Sundarbans in 2019.

Reality: Lesser cats (fishing cat, jungle cat and leopard cat) are neighbours of the Royal Bengal Tiger and the golden jackal.

Challenges: The spatial distribution of the species.

Activity: NMNC, in affiliation with the Forest Department, used camera traps and other equipment to document the species across different ranges of the Sundarbans biosphere reserve.

Outcome: NMNC aspires to establish a conservation manual by understanding the habits, population and approach of locals towards these lesser cats.

Restoration of landscapes

Ecological restoration of Sundarbans landscape (ERSL): After the Super Cyclone Amphan in May 2020, NMNC helped restore ponds, plant mangroves and fruit trees, cultivate climate resilient paddy, engage in kitchen gardening and employ erosion mapping with funds from Hoffman Foundation. The project was executed in Sundarbans, Patharpratima, Sagar Island, Bhagabatpur, Kultali and Gosaba Island.

Urban landscaping: NMNC upholds the idea of 'A tree for a place, a place for a tree'. It actively supports biodiversity-friendly landscaping that blends with the development.

Butterfly gardening

NMNC promotes butterfly conservatories by creating a reservoir of plants, insects, reptiles, amphibians, birds and lesser mammals. NMNC established open-air butterfly conservatories in schools and colleges; it trained and recruited local economically backward communities to work in the laboratory.

Butterfly conservatories with laboratories

Butterfly conservatory	Year of establishment	About
Garpanchakot butterfly garden	2005	In association with the WBFDCO at the Panchakot Hills, a popular tourists destination in Purulia; around 100 species reside in this conservatory.
Banabitan butterfly conservatory	2010	This open-air butterfly conservatory is home to about 100 species (60 studied). This conservatory is the first butterfly garden with a lab support
Eden butterfly garden	2012	Collaborated with Forest Department; the fertile soil enhances plant growth and species profusion
Ramsai butterfly conservatory	2013	Collaborated with Forest Department inside the Gorumara National Park (350 species). Over 100 species were recorded (more than 55 butterflies completed their lifecycle).
Eco park butterfly garden	2015	3 acre garden in Rajarhat; comprised five members, volunteers and laboratory support; dome enclosure available to tourists; more than 100 species were visited (60 complete)
Rajabhatkhawa butterfly conservatory	2018	7 acres; conservatory of more than 100 species in Buxa Tiger Reserve
Kulik butterfly conservatory	2019	Situated near the entrance of Kulik Bird Sanctuary in Rajganj; tourists are accompanied by lab assistants to view over 60 butterfly species
Jhargram butterfly conservatory	2020	Situated inside Jhargram Eco Park.
JD Park butterfly conservatory, Bodhgaya	2021	Conservatory beside Mahabodhi Temple of Bodh Gaya inside JD Park.

Bird conservatory

Scientific intervention can transform areas into bird habitats. This has transpired in Pakhibitan of Eco Park (in collaboration with WBHIDCO). This represents one of the most important approaches towards conservation of avifauna within an urban landscape.

Bird species recorded at Pakhibitan

Date	Species
22 nd March 2023	Yellow bellied prinia (<i>Prinia flaviventris</i>)
11 th March 2023	Black redstart
8 th March 2023	Indian golden jackal
2 nd March 2023	Siberian rubythroat
13 th January 2023	Red munia
10 th January 2023	Peregrine falcon
10 th December 2022	Grey-headed swamphen
8 th December 2022	Common kestrel (<i>Falco tinnunculus</i>)
3 rd December 2022	Black redstart
8 th November 2022	Black-winged kite
5 th November 2022	Scaly thrush
28 th September 2022	Clamorous reed warbler
July 2022	Plum-headed parakeet
20 th July 2022	White-rumped munia

Wildlife census

Wildlife census is important to wildlife conservation. The census aim is to count different species and derive an accurate insight into their sex ratio, density, etc. NMNC participated in the wildlife census:

2019: Estimation of lesser cats at Sundarbans biosphere reserve with Wbfd.

2018: Study of elephant species at the Buxa Tiger Reserve

2016: Conduct of tree census at Rabindra Sarobar, Kolkata

2015 - 2017: Conducted an elephant census in Gorumara National Park, West Bengal.

2012: Conducted a crocodile census at Sundarbans, West Bengal.

1997 - 2020: Conducted a waterfowl census in West Bengal.

1995 - 2018: Conducted a tiger census in Sundarbans

Restoration of waterbodies

Wetlands are a vulnerable habitat the world over. NMNC has sought to restore urban wetlands by protecting resident species and encouraging their breeding. NMNC cleaned and restored the following lakes:

Santragachhi Jheel: NMNC cleaned the Santragachhi Jheel (October 2011), featured by the media and crowd-funded (restored annually since).

Bikramgarh Lake: Cleaned in April 2012, attracting media coverage.

Purbasthali Oxbow Lake: Cleaned of water hyacinth in 2012 and 2013; a navigable route was created to monitor migratory birds.

Sahid Nagar Bankplot Jheel: Cleaned and restored in 2013.

Climate impact

Climate change will impact the world in a decisive manner. The rapid growth of water hyacinth following increased temperature is an instance of how climate change impacts ecosystems, waterbodies, migratory birds and marine eco-systems. From 2022, NMNC conducted biodiversity assessments in Chattogram, Bangladesh. The organisation encountered endangered dolphin species during the study.

Kitchen gardening

A kitchen garden blends with a house and represents a healthy way of growing vegetables for personal consumption. Nature Mates also practises this clean and smart activity through:

CSR engagements: Established companies like HDFC ERGO, Tata Communications, Ernst & Young and Tesco participated in kitchen gardening workshops.

Projects: During monsoons, with ponds inundated with saltwater, vegetable seeds were distributed to Sundarbans residents to help them cultivate their kitchen garden. A few NMNC kitchen gardening projects were privately funded by Hoffman Family Foundation and crowd-funded.

Training

Schools: NMNC arranges nature walks and workshops for urban students

Bakkhali: NMNC provided hands-on training on field ecology for students.

Alternative livelihoods

Manufacturing: NMNC provided training in the manufacture of incense sticks and handloom towels/gamchha.

People engaged: NMNC provided training to six Self-Help Groups and 4 SHGs in manufacturing products.

Disaster management

Cyclones Amphan and Yaas: The cyclones uprooted trees and homes. NMNC arranged funds from donors to procure daily-use items and essentials distributed in Patharpratima, Dakhshin Shivganj, Baduria, Dulki, Bhagabatpur, Katamari, Koutala, Bipradaspur and Sagar Island (with Wbfd, Joint Forest Management Committee and the nature guides).

Covid-19 relief in Sundarbans, Buxa and Tadoba tiger reserves: NMNC, Svasara Jungle Lodge and Help Tourism raised funds to support distressed families of licensed freelance guides in Sundarbans and Buxa, gypsy drivers, forest guides and local villagers in Tadoba. Places covered included Dayapur, Bali, Patharpratima and Pakhiralay (Sundarban Biosphere Reserve) as well as Jayanti, Buxa Duar and Rajabhatkhawa (Buxa and Kolara), Alizhanza, Sirkada, Rangdi and Madnapur villages (Maharashtra).

Perspectives

Arjan Basu Roy, *Founder & Secretary, NMNC*

I grew up with wildlife in my house and was five when I had a one-and-a-half-year-old star tortoise as a pet. My family domesticated rats, snakes, lesser cats and mongooses. I shared my room with a mongoose; it would jump into bazaar bags attempting to grab fish and other edible items. Being the first child of my generation, I was pampered with a parakeet who escaped from its bamboo cage. My father was a friend of movie director Mahindra Kumar who shot wildlife in the early 1980s. In 1987, I was in the 5th standard when WWF associated with private schools to conserve nature. In 1993, I started a nature club called Paryavaran in Budge Budge. Two years later, the club was renamed Nature Mates and affiliated with WWF. Colonel SR Banerjee inspired me further. In the early 1990s, I volunteered with the forest department to support me in my printing enterprise. And in 2004, WWF associated itself with the forest department to make a brochure. I photographed a butterfly and in two years my first book on butterflies was published. The bottomline is that there needs to be acceptance, respect and humility among all living species if we need to bequeath a better world to our children.

Rishin Basu Roy, *Founder, NMNC*

I would go bird watching with my elder Arjan and his friends. Our house was a mini zoo where a star tortoise, some birds, mongooses and other species resided. Birds fascinated me and I developed my passion for the species and their behaviour. Mr. Dipankar Ghosh, the director of wildlife and habitats programme at WWF India, encouraged me to pursue Zoology. I attended excursions and visited forests to understand wildlife and birds. Starting to work at the butterfly conservatory in 2009 brought me closer to wildlife.

In May 2023, we participated in the Maath Theke Rannaghor' event at the Vijaygarh Jyotish Roy College in Jadavpur. Bhoomi Ka, a movement to let food producers directly connect with consumers had its small and marginalised farmers exhibit their products. NMNC organised the second phase where plans to increase the number of consumers was discussed with representatives of various food manufacturers, agricultural organizers and farmers of the state.

Diya Banerjee Sur, *Board member, NMNC*

NMNC is one of the oldest surviving environment NGOs. The cyclones Amphan in 2020 and Yaas in 2021 destroyed trees and homes. NMNC conducted erosion mapping, pond restoration and paddy field work to promote saline-resistant paddy. We promoted vegetable gardening and donated fruit plants to Sundarbans households.

Arijit Chatterjee, *Assistant Secretary, NMNC*

I was a part of the first census of crocodile and fishing cat species at the Sundarbans in 2014 with NMNC. My team published a book (Beauty of Nature and Evolutionary Truth). The best thing about NMNC is that it comprises professionals with a genuine interest in wildlife and nature. My

message to the world is that animals on the streets and birds that fly to our windowsills also comprise wildlife. We all need to be naturalists.

Anusua Pal, *Research Affiliate, NMNC*

I started volunteering for Nature Mates in college. After completing my Masters, I permanently joined NMNC and moved to field work. Nature Mates is like family because all my colleagues and my seniors are friendly; the environment at work is comfortable.

S.R. Banerjee, *Founder and Ex-President*

Arjan's father and I were friends and seeing saw Arjan's wildlife interest I assisted him to start Nature Mates (a club that became an NGO). Nature Mates was at the right place and the right time; in the last 20 years numerous forest departments and NGOs were started to conserve nature and wildlife. Nature Mates-Nature Club is a great team to work with - passionate and dedicated to conserve wildlife.

Sarika Baidya, *Research affiliate*

While pursuing M.Sc. in Food and Nutrition, I met Arjan Basu Roy and joined NMNC. He provided with the opportunity to set up the NGO's first butterfly garden at Banabitan (Kolkata). The initiative was validated by habitat changes and increased species population. There were forest officials who questioned my ability to work in the woods because of my gender; if I succeeded - established five butterfly conservatories in West Bengal, one in Bihar and more than twenty butterfly habitats across India - it was due to NMNC's equality commitment. The result is that I won the Conservation Leadership Programme award for my research on *Bhutanitis ludlowi*, a butterfly species found in Bhutan and India.

Books by NMNC

Butterflies and Wildflowers of Tollygunge Club by Arjan Basu Roy

This book is a guide to the flora and fauna breeding in Tollygunge Club, Kolkata. It contains rich and detailed descriptions of seventy-six butterfly species and thirty-six species of wildflowers. Over sixty percent of the entire biodiversity of butterflies in Kolkata has been covered in this book.

Birds of Indian Sundarbans by Prasanta Kumar Pandit and Arjan Basu Roy

This represents a review of 354 species of birds in India. The book introduces readers to the scientific names (Indian and English), size, description, habits, habitats, food and lifestyle of birds.

Common Mangroves of Sundarbans by Nature Mates-Nature Club

Mangroves are the most common inhabitants of the Sundarbans. NMNC found dissimilar views on the plant's height, flowering time and classification of trees, shrubs, etc. This encouraged the NGO to discuss with the veteran field staff of the South 24 Parganas division who have been raising mangroves nurseries and plantations for decades. After thorough field work and consulting several books, the club compiled information on mangroves and proceeded to publish this book.

The Wildlife Stories of An Army Man by Colonel Shakti Ranjan Banerjee

The author (director of the West Bengal wing of World Wildlife Fund) is involved in wildlife protection and rescued a sloth bear from a cage in Kolkata. He shared his experience of accompanying the famous mountaineer Sir Edmund Hillary (who climbed Mount Everest) and comprises stories of animals that needed rescue.

Bioenergetic Thermodynamics and Plant Physiology by Pratip Kumar Palit

Through twelve chapters with a modest bibliography, this book deals with the closed thermodynamic system with emphasis on redox potentials, electrochemical potentials and the usual schema primarily of photosynthesis. The underlying theme suggests that efficient photosynthesis will improve plant yield.

Instinctive Behaviour in Birds by Kaushik Deuti and Mousumi Roy

The authors feel that birds are ‘glorified reptiles’ because their basic behaviour is similarly instinctive. This book enriches birdwatchers and attract young birdwatchers to observe birds.

Butterflies of Tale Wildlife Sanctuary by Nature Mates-Nature Club

An estimated 12,000 moth species are found in India with at least a few thousand undescribed species. Moth biodiversity assessments at Tale Wildlife sanctuary in Arunachal Pradesh conducted in 2011 and 2019 resulted in a checklist of 497 moth species and included 17 newly discovered species for which no published records exist in India. Several steps are taken to protect the Tale Wildlife sanctuary with local eco-development committees and tourism events.

Moths of Tale Wildlife Sanctuary by Sanjay Sondhi, Tarun Karmakar, Yash Sondhi and Krushnamegh Kunte

A survey was conducted for more than twenty-nine days on moths at the Tale Wildlife Sanctuary in Arunachal. This survey was carried during the months of April, May, August and September in 2011 and 2019. A total of 497 moth species were discovered of which 460 species were of the species level while 37 were identified as genus level. There are about 17 species with no publishing records from India and more than a 100 species with zero published records from Arunachal Pradesh. Over 200 species still remain unidentified.

NMNC awareness building sessions

2023			
Date	Place	Session	Participants
9 th February	G20 India at Eco park, Rajarhat in collaboration with WBHIDCO Ltd.	Awareness on the biodiversity	Nature enthusiasts

NMNC awareness sessions in 2022

2022			
Date	Place	Session	Participants
6 th April	<ul style="list-style-type: none"> Eco park butterfly garden 	Interactive session on butterflies	Students of Ballygunge Science College

16 th to 19 th April	Bali, Sundarbans	First Diversity India Meet	Students from different colleges
30 th April to 4 th May	<ul style="list-style-type: none"> • Lower Suntaley Khola • Samsing range Kalimpong Forest Division	Second butterfly and moth watching camp	Researchers <ul style="list-style-type: none"> • Sri Ujjal Ghosh • IFS Sri. Judhajit Dasgupta • Dr Rudra Prasad Das Dr Angshuman Raha
25 th to 29 th April	Mandal Goan, Kalimpong	Biodiversity, ecology and sustainable livelihood practices in Neora Valley National Park	Students, researchers and professionals
11 th April	Rajarhat	Bird watching session	Shubhankar
12 th April	Butterfly garden and Pakhi Bitan at Eco park	<ul style="list-style-type: none"> • Dhritiman Mukherjee and Ashwika Kapur 	Dhritiman Mukherjee and Ashwika Kapur
22 nd April	Garchumuk Zoological Garden- Mini zoo	Interactive session on nature	Students from different schools and colleges
22 nd May	Rajarhat	<ul style="list-style-type: none"> • Urban biodiversity watching • Sapling plantation Seed packet distribution	Schools and college students, citizens and nature enthusiasts
21 st May	Vijaygarh Jyotish Ray College Auditorium	Seminar on wildlife beyond boundaries	Students and wildlife enthusiasts Guests: <ul style="list-style-type: none"> • IFS Subhankar Sen Gupta • IFS Lipika Ray Dr Punarbasu Chaudhuri
22 nd March	Latpanchar	Training on nature and its aspect	20 nature guides, two senior naturalists from NCF, Mr. Harsha Jayaramaiah and Ms. Payal Mehta
27 th May	Princep Ghat	Waste clean-up (10 bags were consumed)	DBS Bank

28 th May	Banabitan Biodiversity Park	Identification of various butterflies, plants, birds and other insects and parameters for collection of different ethological data	Vijaygarh Jyotish Ray College
1 st June	Department of Zoology, Brahmananda Keshab Chandra College	Interactive session on nature	College students
29 th November	Mahadevi Birla World Academy	Mahadevi Birla World Academy	179 kindergarten students
31 st October	Ramsai Butterfly Conservatory	Exploring the butterfly species	Smt. Birbaha Hansda, Hon'ble Minister of State Forests, Government of West Bengal
28 th September	Rajabhatkhawa Butterfly Conservatory	Exploring the butterfly species	Jitpur High School, Alipurduar
	Botanical garden	Touring to learn about butterflies and plants	Acharya Jagadish Chandra Bose College and Primarc
21 st June	Online session by Dr Gerard Talavera and Ms. Alessandra Lombardi	Monitoring butterfly migration	
June	Earthwatch Fellowship by Debarpan Datta on waders	Monitored the species habitat and collated the forms of threats	Bakkhali coastline in the Sundarbans biosphere reserve
21 st June	Online session by Dr Gerard Talavera and Ms. Alessandra Lombardi	Monitoring butterfly migration	Students from various colleges and schools

Medical camps in 2022

14th January: Central Dooars Club, Binnagurion in northern West Bengal; inauguration of Elesense, an automated sensor used as an elephant early warning system

30th May: Kishorimohonpur village of Raidighi range

19th June: Herobhanga beat, Matla range of South 24 Parganas

10th July: Patharpratima Dakshin Shibgunj under Ramganga range

Projects in Sundarbans, 2022

Ecological restoration

- Distribution of vegetable seeds to 450 families of North and South Gopalnagar areas, Dakshin Shivganj and K-plot areas
- Distribution of fruit trees to 450 families in Bhagabatpur and Banashyamnagar areas

Pond restoration

- 10 ponds were tested and treated to combat salt water ingress problem collaborators at Lexmark
- 5 local ponds were treated and made fit for aquaculture. Fish ball along with fish food was given in these ponds. The fish grew and yielded around Rs. 2 lakhs to the local people.

Plantation

- 12,000 mangrove trees were planted to strengthen the mangrove barrier
- A contest on the topic- Living sustainably in harmony with nature was held

CSR projects with our collaboration

- Tree naming activity at Primarc
- 30 saplings planted at the Green Verge 6, Action area 1- Rajarhat
- Princep Ghat cleaned by HDFC ERGO General Insurance Company Limited
- Trash on the Maidan collected and dropped at Golf Green Compactor Station by IBM
- Seed ball making and plantation session at the Banabitan Biodiversity Park by IBM
- Tree plantation at Banabitan Biodiversity park by Ernst & Young
- Princep Ghat cleaned by Tata Communications

Other NMNC events

Annual day: On 19th February 2023 NMNC celebrated its annual day at Banabitan Biodiversity Park by releasing four books - Wildlife Stories of an Army Man (Shakti Ranjan Banerjee), Bango Bihango (Lina Chatterjee and Arjan Basu Roy), Banglar Jalaja Udbhid (Dr Saurav Dwari and Dr Amal Kr. Mondal) and Beauty of Nature: An Evolutionary Truth (Dr. Arijit Chatterjee).

Kolkata International Book Fair: In February 2023 NMNC participated in the book fair at Karunamoyee, Salt Lake.

Bird watching: Primarc Kolkata at CKBS went bird watching on 13th December 2022

World Lizard Day: Monitor lizards around India were counted from 14th to 31st August 2022

Beetle Mania: An online session on the species was held from 22nd to 28th August, 2022

International Tiger day: It was celebrated at the Sundarbans Tiger Reserve on 29th July 2022, co-organized by Forest Department

National Moth Week: The species was celebrated at the Nilkuthi, Eco park and Banabitan Biodiversity park, on 26th to 28th July 2022

Rajarhat book fair: NMNC will set up a stall at City Square on 23rd December 2023

Vallanadu Blackbuck Sanctuary: inaugurated by Kanimozhi Karunanidhi on 1st and 2nd December 2022

Duleep Matthai Climate Action Fund: In October 2022, in fellowship with NMNC research affiliate, Ms. Anusua Pal, small maams of the Sundarbans were

NMNC store

- **T-shirts:** Vote for Butterfly, Moth Week and Caterpillar are popular
- **Key chains:** A pair of horn bills on a squared keychain.
- **Coasters:** Six assorted coasters of fauna and flora.
- **Field notebook:** To take notes.
- **Incense Sticks:** Available in packs of three.
- **Handloom towels:** Also called 'bonodebi gamchha' are available in North-Eastern India.

Awards

2023: Awarded the Electrosteel Jal Sevak Samman by India Electrosteel Casting Ltd. for contributions towards water conservation.

2021 to 2023: Award of appreciation by Sundarban Tiger Reserve for unconditional efforts and contributions towards the conservation of tigers and natural resources.

2017: Won the Earth Day Award by Infinity Benchmark, Kolkata for commitment towards the protection of the environment.

NMNC plans

The organisation plans to strengthen its work in southern and northern West Bengal.

The organization intends to build collaborations with different stakeholders.

The organisation seeks to spread awareness among the local people in and around forest areas.

Corporate donors

- Ernst and Young Global Limited.
- Tata Com Pvt. Ltd.
- DBS Bank
- HDFC Ergo Pvt. Ltd.
- Environmental Planning and Management Consultancy
- Ramboll India Pvt. Ltd.
- Arcadis India Pvt. Ltd
- Lexmark
- CKinetics Consulting Services Pvt. Ltd.
- ITC Limited
- Ambuja Neotia Group
- PS Group
- The KPC Group
- Lawrence and Mayo
- AFCONS Infrastructure
- Milestones & Journeys
- Ladybird Environmental Consulting LLP
- Millennia Infrastructure Pvt. Ltd.
- Hi-tech systems and solutions
- Siddha Real Estate Development Pvt. Ltd.
- Environmental Resource Management India Pvt. Ltd.
- Environmental Planning and Management Services
- Help Tourism
- P C Chanda and Company Pvt. Ltd.
- Shree Krishna Realcon Pvt. Ltd.
- Strand Life Sciences
- Tetra Tech
- Next Gen Project Management Systems Pvt. Ltd.
- ARD Inc.
- RA Associates
- Trisys Communications

Institutional donors

- Hoffman Family Foundation
- Voice for Asian Elephants Society
- Wildlife Trust of India
- Nature Conservation Foundation
- The University of Kalyani
- Vijaygarh Jyotish Ray College
- Barrackpore Rastraguru Surendranath College
- Sir Gurudas Mahavidyalaya
- St. Paul's Cathedral Mission College
- B S Foundation
- Mindstix Foundation Trust
- Manav Kalyan Trust
- Give Foundation
- Help Us Help Them (HUHT)
- Serampore College
- Tarakeswar Degree College

Government donors

- Department of Forests Government of West Bengal
- West Bengal Housing Infrastructure Development Corporation Ltd (WBHIDCO)
- Public Works Department (PWD)
- Newtown Kolkata Development Authority
- Kolkata Metropolitan Development Authority
- Kolkata Municipal Corporation
- Howrah Municipal Corporation
- West Bengal Biodiversity Board
- Buxa Tiger Conservation Foundation Trust
- Sundarbans Tiger Conservation Foundation Trust
- Kolkata Port Trust
- Police Athletic Club
- Victoria Memorial
- West Bengal Zoo Authority

Crowd funding

Supercyclone Amphan Relief Work: Asutosh College, Ballygunge Science College and Narasimha Dutt College.

Restoring Santragachhi jheel (2018 to 2019): Enthusiastic volunteers of Howrah and Kolkata.

Philanthropists

- Mudar Patherya
- Eishwar N Meanay
- Ratan Kumar Singh

Investors

- Fiona Luis
- Miranda Luis
- Archana Hari
- Peter Bygate
- Nigel David Peace
- Ravi Madan
- Patanjali Narasimha Somayaji
- Prakriti Samsad
- PUBLIC
- Centre for Environment Education
- Hiland Park Residents' Association Ltd.

Affiliations and Registrations

- NGO under Society Registration Act, 1961
- 12AA
- 80G
- NGO Darpan
- CSR 1
- P Tax
- TAN

Abbreviations

- Nature Mates-Nature Club (NMNC)
- World Wildlife Fund (WWF)
- Non-governmental organisation (NGO)
- Environmental Impact Assessment (EIA)
- Zoological Survey of India (ZSI)
- Right to Information (RTI)
- Public Interest Litigation (PIL)
- Geographic Information System (GIS)
- Solitary Nature and Animal Protection (SNAP)
- West Bengal Forest Development (WBFD)
- International Union for Conservation of Nature (IUCN)
- Nature Conservation Foundation (NCF)
- West Bengal Housing Infrastructure Development Corporation Ltd (WBHIDCO)
- Ecological Restoration of Sundarbans Landscape (ERSL)
- Conservation Leadership Programme (CLP)
- Self-Help Group (SHG)
- United Nations (UN)
- Convention on International Trade in Endangered Species (CITES)
- Wildlife Conservation Society (WCS)
- Wildlife Trust of India (WTI)
- Wildlife Crime Control Division (WCCD)
- United Nations Environment Programme (UNEP)
- Trade Records Analysis of Flora and Fauna in Commerce (TRAFFIC)
- Directorate of Revenue Intelligence (DRI)
- Wildlife Conservation Society – India (WCI-India)
- Wildlife Crime Control Bureau (WCCB)
- Global Biodiversity Framework (GBF)
- Asia Protected Areas Partnership (APAP)
- Memorandum of Understanding (MoU)
- Ashoka Trust For Research In Ecology And The Environment (ATREE)
- Maldives Marine Research Institute (MMRI)
- Indian Council for Agricultural Research (ICAR)
- National Endowment for the Humanities (NEH)
- Machine Learning (ML)
- Protection Assistant for Wildlife Security (PAWS)
- United Nations (UN)
- National Endowment for the Humanities (NEH)
- Save the Elephants (STE)
- Rainforest Connection (RFCx)
- Joint Forest Management Committee (JFMC)
- Help Us Help Them (HUHT)