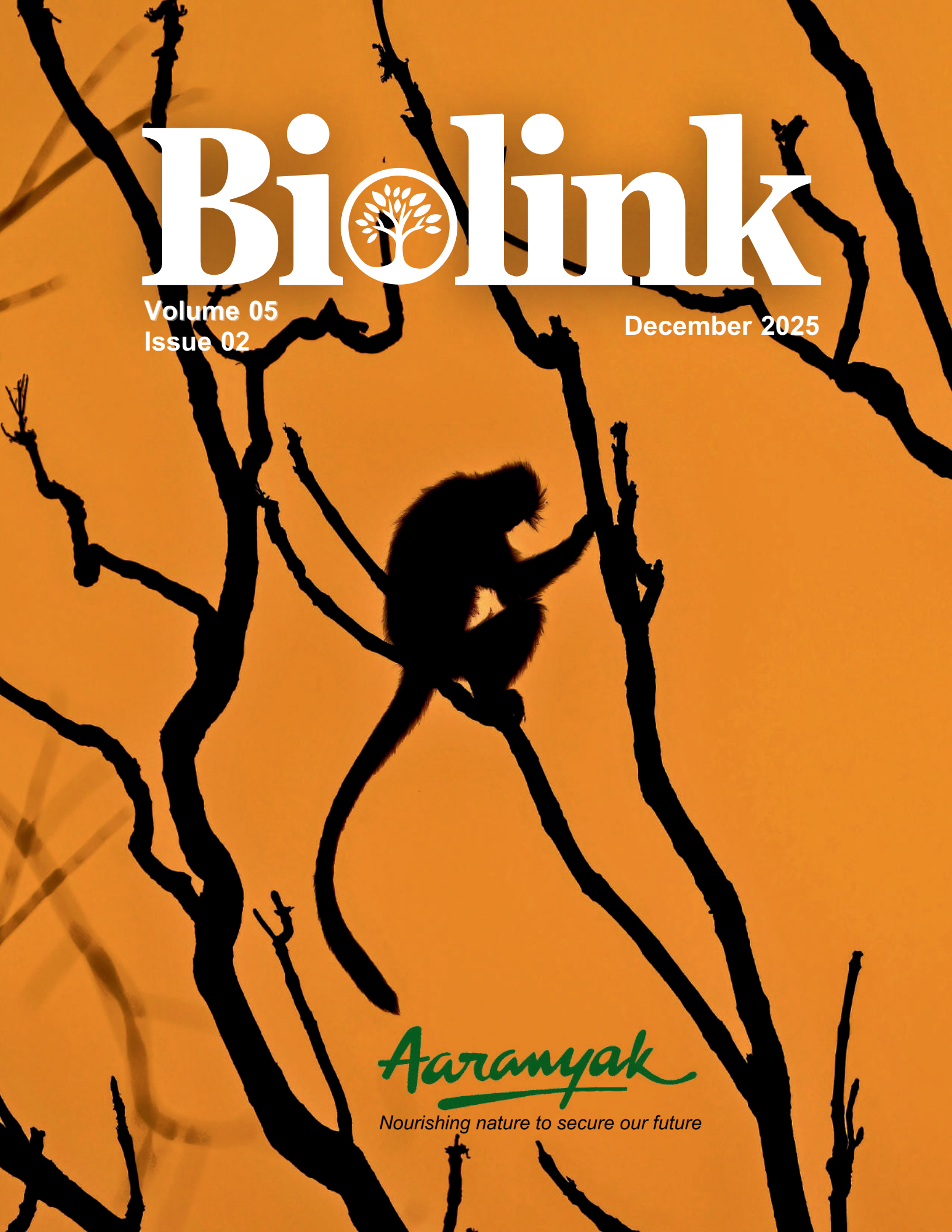

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Aaranyak

Nourishing nature to secure our future

Biolink

35 YEARS Aaranyak

ABOUT AARANYAK

Aaranyak is a registered society working towards nature conservation in Northeast India, since 1989. Our strength lies in applied research in biological and social fields and our thrust area of work is the Northeastern India and Eastern Himalayas.

MISSION

Our mission is to foster conservation of biodiversity in Northeast India through research, environment education, capacity building and advocacy for legal and policy reform to usher a new era of ecological security.

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Editorial

Landmark feat for Aaranyak's Wildlife Genetics Laboratory

The Government of Assam has recognized the pioneering Wildlife Genetics Laboratory (WGL) of Aaranyak and its Director Udayan Borthakur, for the purpose of utilizing the expertise in wildlife genetics and wildlife forensic analysis, pursuant to Section 329 (4) of the Bharatiya Nagarik Suraksha Sanhita (BNSS), 2023.

Following an order from the Governor of Assam on August 4, 2025, the Special Chief Secretary of the Govt. of Assam, Environment, Forest and Climate Change Department has issued a notification recognising the laboratory and Mr. Borthakur under the relevant provision of the Act.

This marks the stamp of appreciation from the Government of Assam on the consistently outstanding efforts put in by this laboratory and its expert in the fields of wildlife genetics and wildlife forensic analysis that is so crucial to investigation of wildlife crimes as well as conservation of wildlife.

In Assam, this marks the first recognition of a laboratory and an expert in the wildlife sector under the BNSS, 2023 for the purpose of assisting wildlife crime investigations and control through forensic evidence gathering using DNA sampling methods.

The Assam Government's notification is construed as a significant acknowledgement of the laboratory's nearly two decades of work in this field. At the same time the notification has bestowed a significant and critical responsibility on the laboratory and its expert falls.

The notification under Section 329 (4) of BNSS, 2023 will allow the lab and its biologist as scientific expert to support law enforcement agencies to gather evidences for forensic analysis in wildlife offences that will facilitate increased conviction rates in coming days.

WGL Aaranyak, founded in 2008, is northeast India's only conservation genetics and wildlife DNA forensics facility till date. Over the past decade, the lab has provided genetic analysis and on-ground DNA sampling support to about 150 wildlife crime investigations by government authorities. In addition to forensic work, the lab has conducted over two dozen conservation genetic research projects on threatened wildlife species in India and overseas.

Forensic science, when applied effectively, becomes instrumental in investigating and combating wildlife crimes. This speaks volume of the important role the WGL of Aaranyak plays in fighting wildlife crimes thereby facilitating conservation of wildlife especially in the biodiversity-rich Northeast region of the country.

The Wildlife Genetics Laboratory of Aaranyak has been complimenting the efforts of the government to achieve conservation goals and shall continue to do so in years to come.

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Medicinal plant conservation: Balancing ecosystem health and community wellbeing

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Introduction

Medicinal plants link nature's healing power with human survival. In Assam, they play a key role in local diets, healing practices, and cultural traditions. Their importance extends beyond disease treatment to shaping community wellbeing through nutrition, livelihoods, and cultural identity. At the same time, sustainable harvesting and cultivation help preserve ecosystem health by conserving biodiversity and ecological functions. This article highlights six important species - *Aegle marmelos, Alternanthera sessilis, Clerodendrum infortunatum, Tradescantia spathacea, Phlogacanthus thyrsiformis,* and *Garcinia morella* - illustrating how their conservation supports both ecosystem health and community wellbeing.

1. ***Aegle marmelos*** **(L.) Corrêa —**
Assamese: Bel
Family: Rutaceae
Medicinal values:

- Fruit pulp: Unripe fruits rich in tannins help treat diarrhoea and dysentery, while ripe fruits have cooling and laxative effects.
- Leaves: Contain alkaloids (aegeline, skimmianine) with antidiabetic and anti-inflammatory properties.
- Bark and roots: Source of coumarins with antimicrobial activity. (Dutta et al., 2014)

Community wellbeing

Bel trees contribute to wellbeing by providing food security, home remedies, and cultural identity. Seasonal drinks from ripe fruits keep families healthy in summer, while bark decoctions support rural healthcare. Sacred associations also strengthen social bonds, as temple rituals preserve the tree.

Ecosystem health

Because of its sacred value, Bel trees are rarely cut. They are planted in homesteads and temple grounds, creating green patches that improve the microclimate and provide habitat for birds. Thus, protecting Bel ensures ecological stability while serving community needs.

2. ***Alternanthera sessilis*** **(L.) R. Br. —**
Assamese: Matikanduri
Family: Amaranthaceae
Medicinal values:

- Leaves and shoots: Used as a cooling vegetable, a wound healer, and a remedy for skin and eye diseases.
- Juice: Treats bronchitis, asthma, and intestinal inflammation. Rich in flavonoids and antioxidants. (Singh et al., 2022)

Community wellbeing

By doubling as a vegetable and a medicinal herb, Matikanduri supports nutritional security and everyday health. Consumed during Bohag Bihu, it links the seasonal diet with cultural wellbeing. For poor households, it provides free, accessible healthcare.

Ecosystem health

It thrives in wetlands and paddy margins, ecosystems that are vital for maintaining soil fertility and water balance. Communities harvest selectively and leave patches intact, ensuring the species can regenerate. Therefore, the plant's availability depends on conserving wetland ecosystems, which also benefit from sustainable community practices.

3. ***Clerodendrum infortunatum*** **L. —**
Assamese: Dhopat Tita
Family: Lamiaceae
Medicinal values:

- Leaves: Used as anthelmintic, antipyretic, and diuretic.
- Roots: Applied after childbirth, for malarial fever, and ulcers.
- Phytochemicals include saponins and flavonoids with antimicrobial activity.
- Debnathet et al., 2024

Community wellbeing

Tribal healers use Dhopat Tita to treat worms, fever, and hypertension. This reduces dependence on costly healthcare and reinforces traditional knowledge systems. Sharing remedies within families and communities also promotes well-being and resilience.

Ecosystem health

The plant grows naturally in hedges and forest margins. Communities harvest leaves without uprooting roots, which allows regrowth. Protecting this species supports the maintenance of semi-wild green spaces that benefit pollinators and small wildlife, contributing to ecological health.

4. *Tradescantia spathacea* Sw. - Common Name: Rhoeo plant, Moses in a boat, Moses in the cradle, or Boat Lily
Family: Commelinaceae
Medicinal values:

- Leaves and roots: Used for cough, fever, and wound healing.
- Contains phenolic compounds with antioxidant and antimicrobial action.
- Wu et al., 2024

Community wellbeing

As a common garden plant, it supports household health by providing quick remedies for cuts and fevers. Its presence in gardens also improves aesthetic and psychological well-being, especially for elders who value greenery in homes.

Ecosystem health

Its cultivation in gardens reduces pressure on wild habitats. The plant also acts as ground cover, reducing soil erosion and maintaining small garden ecosystems. By planting it ornamentally, communities indirectly conserve biodiversity while meeting health needs.

5. ***Phlogacanthus thyrsiformis* Nees - Assamese: Titaphul / Titabahak**
Family: Acanthaceae
Medicinal values:

- Leaves: Effective anthelmintic, confirmed in laboratory studies.
- Flowers: Used as an antiseptic and for smallpox and skin diseases.
- Roots: Treat abdominal pain and ulcers. (Phurailatpam et al., 2014)

Community wellbeing

Used in rural households as both food (flowers as a vegetable) and medicine (leaf decoctions for worms). It reduces the burden of parasitic infections, improving nutrition and health, particularly in children.

Ecosystem health

Communities pluck leaves and flowers without uprooting, allowing regrowth. Some families cultivate the plant in gardens, reducing wild harvesting. These practices ensure ecosystem health by balancing human needs with the regeneration of plants.

6. *Garcinia morella* (Gaertn.) Desr. — Assamese: Kujee Thekera
Family: Clusiaceae
Medicinal values:

- Fruits: Treat gastric disorders, dysentery, and gastritis. Consumed fresh, dried, or cooked.

·Bark latex: Applied for wounds and appetite stimulation.
Rich in xanthones and benzophenones with antimicrobial activity. (Murthy, 2020)

Community wellbeing

Thekera fruits are a valued part of Assamese cuisine, enhancing both digestion and the culinary experience. Their role as both food and medicine strengthens wellbeing by combining health benefits with culinary identity.

Ecosystem health

The species grows in semi-evergreen forests. Protecting these trees conserves forest ecosystems, which also offer water regulation and wildlife habitat. Community practices of drying fruits for year-round use help reduce excessive harvesting, maintaining stable populations.

Medicinal plants:

1. *Aegle marmelos* (L.) Corrêa
2. *Alternanthera sessilis* (L.) R. Br.
3. *Clerodendrum infortunatum* L.
4. *Tradescantia spathacea* Sw.
5. *Phlogacanthus thyrsiformis* Nees
6. *Garcinia morella* (Gaertn.) Desr.

Table: Medicinal Plants Linking Ecosystem Health and Community Wellbeing

Scientific Name	Assamese / Local Name	Family	Main Parts Used	Community Wellbeing	Ecosystem Health	Key References
Aegle marmelos (L.) Corrêa	Bel	Rutaceae	Fruit, leaves, bark	Home remedies, cultural rituals	Sacred planting conserves biodiversity	Dutta et al., 2014
Alternanthera sessilis (L.) R. Br.	Matikanduri	Amaranthaceae	Leaves, shoots	Nutritious vegetable, folk medicine	Grows in wetlands, supports soil health	Singh et al., 2022
Clerodendrum infortunatum L.	Dhopat Tita	Lamiaceae	Leaves, roots	Low-cost healthcare, traditional healing	Semi-wild hedges preserved	Debnathet et al., 2024
Tradescantia spathacea Sw.	Ornamental herb	Commelinaceae	Leaves, roots	Quick garden remedies, psychological well-being	Garden cultivation reduces wild use	Wu et al., 2024
Phlogacanthus thyrsiformis Nees	Titaphul, Titabahak	Acanthaceae	Leaves, flowers, roots	Prevents parasitic infections, food and medicine	Sustainable leaf plucking, home gardens	Phurailatpam et al., 2014
Garcinia morella (Gaertn.) Desr.	Kujee Thekera	Clusiaceae	Fruits, bark latex	Gastric relief, culinary souring agent	Forest conservation, controlled use	Murthy, 2020

Photo by Mitali Baruah

Conclusion

The case of these six species shows that human and ecological health are connected. Community wellbeing improves when households access safe, natural remedies and culturally valued plants. At the same time, ecosystem health benefits from sustainable practices like selective harvesting, sacred planting, and home gardening. Communities act as guardians, making sure forests, wetlands, and gardens stay healthy while providing nourishment and medicine.

This balance demonstrates that conservation is not only about protecting nature from people but also about helping people coexist harmoniously with nature. Medicinal plants exemplify how ecosystems support society and how society, in turn, safeguards ecosystems. By conserving both, Assam can foster a cycle of resilience where biodiversity and human well-being mutually reinforce each other.

References

1.Debnath, S., Sarkar, S., Shil, D., & Bhowmik, D. A Comprehensive Review of the Phytochemical Constituents and Pharmacological Properties of Clerodendrum infortunatum Linn.
2.Dutta, A., Lal, N., Naaz, M., Ghosh, A., & Verma, R. (2014). Ethnological and Ethno-medicinal importance of Aegle marmelos (L.) Corr (Bael) among indigenous people of India. American journal of ethnomedicine, 1(5), 290-312.
3.Murthy, H. N., Dalawai, D., Dewir, Y. H., & Ibrahim, A. (2020). Phytochemicals and biological activities of Garcinia morella (Gaertn.) Desr.: A review. Molecules, 25(23), 5690.
4.Phurailatpam, A. K., Singh, S. R., Chanu, T. M., & Ngangbam, P. (2014). Phlogacanthus-An important medicinal plant of North East India: A review. Afr J Agric Res, 9(26), 2068-2072.
5.Singla, R. K., Dhir, V., Madaan, R., Kumar, D., Singh Bola, S., Bansal, M., ... & Shen, B. (2022). The genus alternanthera: phytochemical and ethnopharmacological perspectives. Frontiers in Pharmacology, 13, 769111.
6.Wu, J., Sun, J., Liu, M., Zhang, X., Kong, L., Ma, L., ... & Ma, W. (2024). Botany, traditional use, phytochemistry, pharmacology and quality control of taraxaci herba: comprehensive review. Pharmaceuticals, 17(9), 1113.

FEATURE ARTICLE

বন্যপ্ৰাণী পৰ্যটন; বহনক্ষম হোৱাৰ প্ৰয়োজন

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(জেষ্ঠ বিজ্ঞানী, উত্তৰ-পূব মহাকাশ প্ৰয়োগ কেন্দ্ৰ, মেঘালয় ।)

বন্যপ্ৰাণী পৰ্যটন হৈছে বিশ্বৰ পৰ্যটন উদ্যোগৰ গুৰুত্বপূৰ্ণ অংগ। এই পৰ্যটনৰ বিষয়সূচীত কোনো ঠাইৰ স্থানীয় প্ৰাণী, উদ্ভিদ আদিৰ সৈতে সিহঁতৰ প্ৰাকৃতিক বাসস্থানত পৰ্যবেক্ষণ, পাৰস্পৰিক ক্ৰিয়াৰ ওপৰত পৰ্যবেক্ষণ, অধ্যয়ন, গৱেষণা আদি কেন্দ্ৰীভূত হৈ আছে। ইয়াৰ দ্বাৰা পৰিৱেশ, বন্য জন্তু , চৰাই-চিৰিকতি, উদ্ভিদ, পখিলা আদিৰ লগত বন্ধুত্বপূৰ্ণ সাৱলিল সম্পৰ্ক গঢ়ি তোলাৰ মহান উদ্দেশ্য জড়িত আছে , যাক পৰিৱেশ পৰ্যটন (ecotourism) বুলি কোৱা হয়। এই পৰ্যটনৰ সফল আৰু নিয়ন্ত্ৰিত প্ৰয়োগে বন্যপ্ৰাণীৰ সংৰক্ষণৰ ওপৰত ইতিবাচক প্ৰভাৱ পেলাব পাৰে। আনহাতে পৰ্যটনৰ পৰা আহৰণ কৰা বিপুল আয়ৰ বাবে কৰ্তৃপক্ষ তথা স্থানীয় লোকসকলে ভৱিষ্যতেও নিৰন্তৰ লাভ বা আয়ৰ বাবে জীৱ-জন্তুৰ প্ৰাকৃতিক বাসস্থান সংৰক্ষণৰ লক্ষ্য ৰাখে।

পৰ্যটনৰ পৰা উপাৰ্জন কৰা ধনৰ এটা অংশ বিলুপ্তপ্ৰায় প্ৰজাতিৰ বন্যপ্ৰাণী সংৰক্ষণ আৰু বাসস্থান সুৰক্ষিত কৰাৰ বাবে ব্যৱহাৰ কৰা হয়। এছিয়াৰ ভাৰত, ইণ্ডোনেছিয়া, বাংলাদেশ, মালয়েছিয়া, শ্ৰীলংকা আৰু মালদ্বীপ; আফ্ৰিকা আৰু দক্ষিণ আমেৰিকাৰ বহু দেশ তথা অষ্ট্ৰেলিয়াৰ বহু দেশৰ পৰ্যটন উদ্যোগৰ এক গুৰুত্বপূৰ্ণ অংশ হৈছে বন্যপ্ৰাণী পৰ্যটন। ৰাষ্ট্ৰসংঘৰ "বিশ্ব পৰ্যটন সংস্থা"ৰ মতে বিশ্বৰ পৰ্যটন উদ্যোগৰ ৭% বন্যপ্ৰাণী পৰ্যটনৰ সৈতে জড়িত। উল্লেখযোগ্য যে বন্যপ্ৰাণী পৰ্যটনে বৰ্তমান বিশ্বজুৰি প্ৰায় আঠৈ কোটি লোকক প্ৰত্যক্ষ বা পৰোক্ষভাৱে নিয়োজিত কৰি ৰাখিছে। বহুক্ষেত্ৰত বন্যপ্ৰাণী পৰ্যটনক বিনোদনৰ অংশ হিচাপে মানুহে ব্যৱহাৰ কৰি আহিছে। বহু দেশত এতিয়াও বন্যপ্ৰাণী চিকাৰ মানুহৰ বাবে বিনোদনৰ বিষয় হৈ আছে, যিটো অতি পৰিতাপৰ কথা। অব্যৱস্থাপক বহল পৰিসৰৰ বন্যপ্ৰাণী পৰ্যটনে বন্যপ্ৰাণী, বন পৰিৱেশ আদিত প্ৰভাৱ পেলায়।

পৰ্যটকৰ অনিয়ন্ত্ৰিত কাৰ্যকলাপে প্ৰকৃতিৰ কোলাত উমলি থকা পোক-পতংগ, জলচৰ-স্থলচৰ জন্তু, চৰাই-চিৰিকতি, উদ্ভিদকূল আদিৰ মাজৰ নিৰবিচ্ছিন্ন জোৰ- প্ৰক্ৰিয়া (coupling process)ত দীৰ্ঘম্যাদী প্ৰভাৱ পেলায়। একেদৰে বন্যপ্ৰাণীৰ জীৱনচক্ৰৰ কিছু স্পৰ্শকাতৰ সময় যেনে -- চৰায়ে বাহ সজাৰ সময় , চৰাই বা জন্তুৰ সম্ভোগৰ সময়, প্ৰজননৰ সময়, চিকাৰৰ সময়, খাদ্য গ্ৰহণৰ সময় আদিত যেতিয়া পৰ্যটকৰ কাৰ্যকলাপ বাঢ়ি যায়, তেতিয়া সিহঁতৰ জীৱন চক্ৰত বিৰূপ প্ৰভাৱ পৰে। বহু সময়ত দেখা যায় অপ্ৰশিক্ষিত আৰু অদক্ষ ফটোগ্ৰাফাৰৰ বাবেও এইবোৰত বিৰূপ প্ৰভাৱ পৰে। উল্লেখযোগ্য যে বন্যপ্ৰাণী বিচাৰি ফটো উঠাবলৈ কৰা পৰ্যটকৰ হেঁচাই বন্যপ্ৰাণী তথা চৰাই-চিৰিকতিৰ চিকাৰ, খাদ্য খোৱাৰ ধৰণ আৰু কিছুমান প্ৰজাতিৰ প্ৰজননৰ সফলতাত বিৰূপ প্ৰভাৱ পেলায় ।

Photo by Imon Abedin

পৰ্যটকসকলে জীৱ-জন্তুৰ অত্যধিক ওচৰলৈ গৈ নিৰিক্ষণ কৰিলে তথা ফটো তোলাৰ উদ্দেশ্যে কিছুমান কাৰ্যকলাপ কৰিলে জীৱ-জন্তুবোৰে মানুহৰ উপস্থিতিৰ প্ৰতি সচেতন হৈ পৰে আৰু সিহঁতৰ নিয়মীয়া প্ৰাকৃতিক কাম-কাজ আগবঢ়াই নিব নোৱাৰে। আমাৰ সকলোৱে জ্ঞাত যে বন্যপ্ৰণী, কীট-পতংগ, সৰীসৃপ আদিৰ শ্ৰৱণ, ঘ্ৰাণ আৰু দৃষ্টিৰ পৰিসীমা আমাৰ মানৱ জাতিৰ কান, নাক, চকুৰ পৰিসীমাতকৈ পৃথক আৰু বহল। এতেকে আমি যিমানেই নিৰৱতা অৱলম্বন নকৰোঁ কিয়, সিহঁতৰ বাবে আমাৰ উপস্থিতি সদায়ে বিৰক্তিদায়ক। আনকি এই ক্ষেত্ৰত কিছুমান প্ৰাণীৰ আচৰণ আৰু পৰিৱেশগত সম্পৰ্কৰ ওপৰতো দীৰ্ঘম্যাদী প্ৰভাৱ পৰিব পাৰে। পৰ্যটকৰ সঘন কোলাহল ভ্ৰমণৰ ফলত সৃষ্টি হোৱা শংকিত পৰিৱেশে বন্যপ্ৰাণীৰ পৰিয়ালকেন্দ্ৰিক বান্ধোন বা বন্যপ্ৰাণীৰ পিতৃ-মাতৃ আৰু সন্তানৰ মাজৰ বান্ধোন বিঘ্নিত কৰে। জীৱ-জন্তুৰ সৈতে হোৱা পৰ্যটকসকলৰ আদান-প্ৰদানৰ জৰিয়তে বন্যপ্ৰাণীসমূহ ক্ষতিগ্ৰস্ত হয়। সিহঁতৰ প্ৰৱেশ তথা যাতায়তৰ পথ আৰু প্ৰাকৃতিক বাসস্থানো ধ্বংস হয়। লগতে সিহঁতৰ আচৰণ আৰু পৰিৱেশৰ মাজৰ সম্পৰ্কত দীৰ্ঘম্যাদী প্ৰভাৱ পৰে।

বন্যপ্ৰাণী পৰ্যটনৰ ফলত জীৱ-জন্তুৰ প্ৰাকৃতিক বাসস্থানত যথেষ্ট অশান্তিৰ সৃষ্টি হৈ আহিছে। আজিকালি বন্যপ্ৰাণীৰ বাসস্থানৰ প্ৰায় আশে-পাশে পৰ্যটনৰ নামত গঢ়ি উঠা ৰিজৰ্ট, হোটেল আদিৰ দ্বাৰা হোৱা বায়ু, পানী, মাটি, শব্দ আৰু পোহৰ প্ৰদূষণে বন্য পৰিৱেশ তথা বন্যপ্ৰাণীৰ বাসস্থানত দীৰ্ঘম্যাদী নেতিবাচক প্ৰভাৱ পেলাইছে। এই পৰ্যটনে আন যিকোনো উদ্যোগৰ দৰেই একে ধৰণৰ প্ৰদূষণৰ সৃষ্টি কৰিব পাৰে । যেনে - বায়ু নিৰ্গমন, শব্দ প্ৰদূষণ, কঠিন আৱৰ্জনা আৰু আৱৰ্জনা, নলা-নৰ্দমা, তেল আৰু ৰাসায়নিক পদাৰ্থৰ নিৰ্গমন, লগতে পোহৰ প্ৰদূষণ। পৰ্যটকসকলে বন্যপ্ৰাণীৰ বাসস্থান বা বনাঞ্চলৰ মাজত ব্যৱহাৰ কৰা গাড়ী বা চাফাৰী তথা খোজ কঢ়াৰ ফলত সৰু সৰু তৃণ, গছ-গছনি ধ্বংস হয় লগতে সৰু কীট-পতংগ আৰু জীৱ-জন্তুৰ মৃত্যু হয়।

আনহাতে পৰ্যটনৰ ফলত বন্যপ্ৰাণীৰ স্বাভাৱিক কাৰ্যকলাপত ব্যাঘাত জন্মে, খাদ্য আৰু প্ৰজননৰ ধৰণত ব্যাঘাত জন্মে। পৰ্যটকৰ উপস্থিতি তথা কোলাহলপূৰ্ণ পৰিৱেশৰ ফলত বন্যপ্ৰাণীসমূহে সিহঁতৰ সক্ৰিয় প্ৰতিৰক্ষা প্ৰতিক্ৰিয়া দেখুৱাই, ফলত সিহঁতৰ হঠাৎ হৃদস্পন্দন আৰু শ্বাস-প্ৰশ্বাস বৃদ্ধি, শৰীৰৰ উষ্ণতা বৃদ্ধি আদি শাৰীৰিক পৰিৱৰ্তন আহে আৰু কিছুমান নিষ্ক্ৰিয় প্ৰতিৰক্ষা দেখুওৱা জন্তুৰ বাবে ওলোটা হয়। এইটো প্ৰাণীবোৰৰ বাবে অতি ক্ষতিকাৰক।

উল্লেখযোগ্য যে অসমত ২৯৩টা প্ৰজাতিৰ আপুৰুগীয়া অৰ্কিড আছে। অসমৰ প্ৰত্যেক অভয়াৰণ্যৰে সুকীয়া বৈশিষ্ট্য আছে। উদাহৰণস্বৰূপে ব্ৰহ্মপুত্ৰ উপত্যকাৰ বৃহত্তম সমতল ঘাঁহনি, ঘাঁহনিৰ জটিল পৰিৱেশ ব্যৱস্থাৰ লগতে প্ৰায় ১০০টাকৈ বৃহত্তম জলাশয়, ক্ৰান্তীয় গছ, পাহাৰৰ সংগমেৰে কাজিৰঙা অৱস্থিত। কাজিৰঙাই বন্যপ্ৰাণী অনুৰাগীৰ বাবে অন্যান্য শীৰ্ষ পছন্দৰ গন্তব্যস্থান হিচাপে পৰিচিত লাভ কৰিছে । বিশ্বৰ ৭০%তকৈ অধিক এক খৰ্গৰ গঁড়ৰ বাসস্থান এই উদ্যান। দেশৰ ভিতৰতে বাঘৰ ঘনত্বও সৰ্বাধিক। অন্যান্য জীৱ-জন্তু, সৰীসৃপৰ লগতে প্ৰায় ৪৮০টা প্ৰজাতিৰ চৰাইৰ বাসস্থান এই কাজিৰঙা ৰাষ্ট্ৰীয় উদ্যান। আনহাতে মানস ৰাষ্ট্ৰীয় উদ্যান বাঘৰ উপৰিও ২০০ৰো অধিক প্ৰজাতিৰ পখিলা আৰু ৪৭৬ বিধ বিভিন্ন প্ৰজাতিৰ চৰাইৰ বাসস্থান। ডিব্ৰু-ছৈখোৱা ৰাষ্ট্ৰীয় উদ্যান আৰু পানীদিহিং অভয়াৰণ্য পৰিভ্ৰমী চৰাইবোৰৰ বাবে প্ৰধান আকৰ্ষণ। এই আকৰ্ষণীয় জৈৱ বৈচিত্ৰ্যই অসমত বন্যপ্ৰাণী পৰ্যটনৰ এক মঞ্চ তৈয়াৰ কৰিছে। ইয়াৰ দ্বাৰা আকৰ্ষিত হৈ বহুতো দেশী-বিদেশী বা স্থানীয় পৰ্যটকে অসম ভ্ৰমন কৰিছে। ফলত আমাৰ ৰাজ্যৰ আৰ্থিক লাভালাভ হৈছে। তথ্য অনুসৰি ২০২৩–২০২৪ বৰ্ষত উদ্যানখনে মুঠ ৩,২৭,৪৯৩ জন পৰ্যটকৰ ৰেকৰ্ড গঢ়িছিল, যাৰ ফলত প্ৰায় ₹ ৮.৮ কোটি টকাৰ ৰাজহ সংগ্ৰহ হৈছিল। আনহাতে ২০২৪–২০২৫ চনত ১৭,৬৯৩ জন বিদেশী পৰ্যটকক ধৰি ৪,০৫,৫৬৪ জনলৈ বৃদ্ধি পায়, যাৰ ফলত মুঠ ৰাজহ প্ৰায় ১০.৯০ কোটি হয়। ২০২৫-২০২৬ চনৰ বাবে ইতিমধ্যে কাজিৰঙা পয্যটকৰ বাবে মুকলি কৰি দিছে। অন্যান্য অভয়াৰণ্যবোৰলৈ অহা পৰ্যটকৰ সংখ্যা সুকীয়া। এই বাঢ়ি অহা সংখ্যাৰ লগত আমাৰ জনসাধাৰণৰ কিছু কৰণীয় আছে।

এই পযাটন উদ্যোগৰ লগত গঢ়ি উঠা হোটেল তথা অন্যান্য উদ্যোগৰ দ্বাৰা সৃষ্টি হোৱা পোহৰৰ প্ৰদূষণ মন কৰিবলগীয়া। এই পোহৰৰ প্ৰদূষনে উদ্ভিদ তথা জীৱকূলৰ ওপৰত নেতিবাচক প্ৰভাৱ পেলায় যাক আমি ঘপকৈ লক্ষ নকৰো। দিন-ৰাতিৰ ছন্দ গছ-গছনিৰ বাবে অতিকৈ দৰকাৰী। গছৰ বিপাকীয় (metabolism) ক্ৰিয়া, বিকাশ আৰু জীৱনৰ কাৰ্যসূচীৰ ব্যৱস্থাপনা দিন-ৰাতি ছন্দৰ দ্বাৰা প্ৰভাৱিত হয়। উদ্ভিদে ৰাতিৰ দৈৰ্ঘ্যৰ অনুপাতে ক্ৰিয়া কৰে। এই কাৰণে চুটি দিনীয়া গছবোৰত দীঘলীয়া ৰাতিৰ প্ৰয়োজন হয়। যদি এনে উদ্ভিদক দীঘলীয়া ৰাতি কৃত্ৰিম পোহৰৰ দ্বাৰা আলোকিত কৰা হয়, তেন্তে ই এটা দীঘলীয়া ৰাতিৰ বিঘিনি হয়। ফলস্বৰূপে ইয়াৰ ফুল ফুলা আৰু বিকাশৰ ধৰণ সকলো সম্পূৰ্ণৰূপে বিঘ্নিত হয়। এনেধৰণৰ প্ৰভাৱে গছৰ ওপৰত দীৰ্ঘম্যাদী প্ৰভাৱ পেলায় ইয়াৰ ক্ৰমবিকাশ সলনি কৰিব পাৰে। অধ্যয়নত দেখা গৈছে যে হ্ৰদৰ চাৰিওফালে থকা পোহৰ প্ৰদূষণে ডাফনিয়াৰ দৰে জুপ্লাংকটনক (zooplankton) পৃষ্ঠৰ শেলাই খাবলৈ বাধা দিয়ে, যাৰ ফলত শেলাই ফুলি উঠাত সহায় হয়, যিয়ে হ্ৰদৰ আন গছ-গছনিবোৰক হত্যা কৰি পানীৰ গুণাগুণ হ্ৰাস কৰে।

পোহৰ প্ৰদূষণে পৰিৱেশতন্ত্ৰক অন্য ধৰণেও প্ৰভাৱিত কৰিব পাৰে। উদাহৰণস্বৰূপে, পতংগবিজ্ঞানীসকলে অধ্যয়নত কৈছে যে ৰাতিৰ পোহৰে মহ, পতংগ আৰু নিশাৰ অন্যান্য পোক-পৰুৱাৰ যাত্ৰাৰ ক্ষমতাত বাধাৰ সৃষ্টি কৰিব পাৰে। পৰাগ ৰেণুৰ বাবে মহ-পতংগ আদিৰ ওপৰত নিৰ্ভৰশীল ৰাতি ফুলি উঠা ফুলবোৰ ৰাতিৰ কৃত্ৰিম পোহৰৰ দ্বাৰা প্ৰভাৱিত হ'ব পাৰে ।


Photo by Imon Abedin

ইয়াৰ ফলত বংশবৃদ্ধিত বাধাপ্ৰাপ্ত হৈ উদ্ভিদৰ প্ৰজাতি হ্ৰাস পাব পাৰে আৰু কোনো অঞ্চলৰ দীৰ্ঘম্যাদী পৰিৱেশবিজ্ঞান সলনি হ'ব পাৰে। গছে অসংখ্য প্ৰাণী প্ৰজাতিক সমগ্ৰ পৰিৱেশতন্ত্ৰ প্ৰদান কৰে। পোহৰ প্ৰদূষণ তথা কৃত্ৰিম পোহৰৰ ফলত গছবোৰে ঋতুৰ পৰিৱৰ্তনৰ লগত খাপ খাব পৰা প্ৰাকৃতিক পৰিৱেশৰ পৰা বঞ্চিত হয়। ইয়াৰ প্ৰভাৰ বাসস্থান হিচাপে গছৰ ওপৰত নিৰ্ভৰশীল হোৱা জীৱ-জন্তুৰ ওপৰত পৰে।

আনহাতে পোহৰ আৰু আন্ধাৰৰ প্ৰাকৃতিক আৰ্হিৰে ইতৰ প্ৰাণীবোৰৰ জীৱনৰ ছন্দ প্ৰকৃতিয়ে গঢ়ি তুলিছে। গতিকে সেই আৰ্হিৰ বিঘিনিয়ে প্ৰাণীৰ আচৰণৰ অসংখ্য দিশক প্ৰভাৱিত কৰে। পোহৰ প্ৰদূষণে প্ৰাণীৰ প্ৰব্ৰজনকাৰী যাতায়তত বিভ্ৰান্তিৰ সৃষ্টি কৰে তথা পাৰস্পৰিক ক্ৰিয়া-কলাপ সলনি কৰে; চিকাৰী আৰু চিকাৰৰ মাজৰ সম্পৰ্ক সলনি কৰে আৰু প্ৰাণীৰ শৰীৰ বিজ্ঞানত প্ৰভাৱ পেলায়। সহজে পৰিচিত কিছুমান জীৱ যেনে মহ, বেং, সাগৰীয় কাছ আদিক কৃত্ৰিম পোহৰে সহজতে আকৰ্ষণ কৰে। ইহঁত অন্য জন্তুৰ সহজ চিকাৰ হয়, লগতে ইহঁতৰ প্ৰকৃতিক জীৱন প্ৰণালী বিঘ্নিত হয়।।

আনহাতে কৃত্ৰিম পোহৰে চৰাইৰ ওপৰতো বিশেষ ধৰণেৰে প্ৰভাৱ পেলায়। বিশেষজ্ঞসকলে কৈছে যে দিগন্তক অভিমুখ হিচাপে ব্যৱহাৰ কৰা চৰাইবোৰৰ পৰিবহণ পোহৰ আৰু আকাশৰ জিলিকনিৰ ফলত বিঘ্নিত হয়। প্ৰব্ৰজনকাৰী চৰাইবোৰে চন্দ্ৰ, তৰা আৰু উদীয়মান সূৰ্য্যক আলম কৰি যাত্ৰা কৰে। গতিকে ৰাতিৰ অস্বাভাৰিক উজ্জ্বল কৃত্ৰিম পোহৰে বিভ্ৰান্তিকৰ পৰিৱেশৰ সৃষ্টি কৰি চৰাইবোৰক দিশহাৰা কৰে আৰু ইহঁত লক্ষ্যভ্ৰষ্ট হয়।

চৰকাৰৰ বিভাগবোৰে তেওঁলোকৰ বিষেশজ্ঞৰ দ্বাৰা অধ্যয়ন তথা গৱেষণা কৰি এক নিৰ্দিষ্ট "প্ৰমাণিত মানদণ্ড সূচক কাৰ্যকৰী প্ৰক্ৰিয়া" বা “Standard Operating Procedure” (SOP)ৰ মাজেৰে এই সকলোবোৰ পৰিচালনা কৰে। আমি জনসাধাৰণে পৰ্যটক হিচাপে যেতিয়া এই অভয়াৰণ্যবোৰত ভ্ৰমণ কৰোঁ, বিভাগীয় নীতি-নিয়ম আখৰে আখৰে পালন কৰিব লাগে। মোৰ নিজৰ অভিজ্ঞতাৰ পৰা কওঁ যে আমি যেতিয়া কাজিৰঙা, মানস ৰাষ্ট্ৰীয় উদ্যান আদিত জীপ চাফাৰী কৰোঁ, আমি যেন ধূলি উৰুৱাই, হৰ্ষ-উল্লাসেৰে এক বিজয় সমাৰেশৰ আয়োজন কৰোঁ।

এনে পৰিৱেশ অতি চিন্তনীয়। সৌ সিদিনা "Facebook" অৰ এক "Upload" অত দেখিলোঁ অসমৰ এখন অভয়াৰণ্যত এজন ফটোগ্ৰাফাৰে লাজুকী বান্দৰৰ ফটো তুলিবলৈ গৈ বাঁহ জোকাৰি বান্দৰটোক ব্যতিব্যস্ত কৰিছে। কাজিৰঙাতো দেখিলোঁ কাছৰ ফটো তুলিবলৈ কাছক ব্যতিব্যস্ত কৰা।

বন্যপ্ৰাণীৰ প্ৰতি কৰা এনে আচৰণে প্ৰাণীৰ সহাৱস্থানত বিৰূপ প্ৰভাৱ পেলায়। পখিলাৰ ফটো তুলিবলৈ গৈ পখিলা খেদা। আচলতে এই ক্ষেত্ৰত ইতিবাচক সঁহাৰি জনাই বিভাগীয় কৰ্তৃপক্ষক আমি সহায় কৰাৱহে প্ৰয়োজন। সৃষ্টিকৰ্তাই প্ৰদান কৰা অসমৰ এই জৈৱ-বৈচিত্ৰ্য আমাৰ পৰিচয়। ইয়াক সংৰক্ষণ কৰা , উচিত পৰিচালনা ব্যৱস্থাপনা কৰা আমাৰ সকলোৰে দায়িত্ব।

সঠিক সমন্বয় অবিহনে বন্যপ্ৰাণী আৰু ইহঁতৰ বাসস্থান তথা জৈৱ-বৈচিত্ৰ্যক সংৰক্ষণ কৰাটো সম্ভৱ নহয়। বন্যপ্ৰাণী সংৰক্ষণৰ বিষয়ে আৰু পৰ্যটকৰ কৰণীয় সম্পৰ্কে পৰ্যটকক ব্যপক জ্ঞান দিব লাগে আৰু প্ৰচাৰ কৰিব লাগে। বিভাগীয় কৰ্তৃপক্ষইও প্ৰাকৃতিক পৰিৱেশত প্ৰভাৱ নপৰাকৈ সীমিত সংখ্যক পৰ্যটকৰ ভ্ৰমণত অনুমতি দিব লাগে (হয়তো এনে নিৰ্দেশ আছে)। আগতীয়াকৈ আৰক্ষণ (Booking) আদিৰ ব্যৱস্থা কৰিব লাগে। এনে ব্যৱস্থা কৰিব লাগে যে, ভ্ৰমণৰ আগত এক প্ৰশিক্ষণ ব্যৱস্থা থাকিব লাগে আৰু ইয়াত উত্তীৰ্ণ হ'লেহে আৰক্ষণ দিব লাগে। প্ৰমাণপত্ৰ যুক্ত (Certified) আৰু প্ৰশিক্ষিত ফটোগ্ৰাফাৰকহে কেমেৰা নিবলৈ অনুমতি দিব লাগে। ওপৰে ওপৰে চালে এই কথাবোৰ পাতল যেন লাগিলেও বন পৰিৱেশৰ দীৰ্ঘম্যাদী সংৰক্ষণৰ বাবে যে ই অতি প্ৰয়োজনীয় সেই কথা উপলব্ধি কৰিব লাগিব। এই চিন্তা ধৰণী মাতৃৰ মহামূল্যবান অলংকাৰ জৈৱ-বৈচিত্ৰ্যক কেন্দ্ৰ কৰি বিশ্বব্যাপী হোৱা উচিত।

FEATURE ARTICLE

White-winged wood duck: The vanishing jewel of forest wetlands

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Once abundant in the wetlands of Northeast, the white-winged wood duck now survives as a rare emblem of vanishing forest pools. Its silent presence reflects the delicate balance between water, forest, and life itself.

During one of my visits to Dibrugarh, my hometown, I had the opportunity to explore Dehing Patkai National Park on 20th November, 2024, a place rich in natural and cultural heritage. Accompanied by some of my friends, we ventured into the dense forest and tranquil pools that define its wilderness. It was during this visit that we were fortunate enough to catch a glimpse of this elusive and endangered species, the white-winged wood duck (WWWD) *(Asarcornis scutulata),* a fleeting yet unforgettable moment that deepened my admiration for the hidden treasures of Assam's forest wetlands.

The White-Winged Wood duck (WWWD) *(Asarcornis scutulata)* is one of the world's rarest and most endangered birds. This species has been categorized as endangered by the International Union for the Conservation Nature (IUCN) since 1994. Once widely found across Northeast India and Southeast Asia, its numbers have now dwindled to just around 800 individuals in the wild, with about 450 residing in India, Bangladesh and Myanmar.

In India, this elusive bird is mostly confined to Assam and Arunachal Pradesh.

With its haunting ghost like call, it is fondly known in Assamese as "Deo Haans" or the "Spirit Duck", a fitting name for this mysterious inhabitant of forest wetlands.

The WWWD has a predominantly black body with a white head densely spotted with black, and striking white patches on its wings. Its eyes are a vivid red or orange, adding to its distinctive appearance. The species measures about 81 cm in length on average. Males and females are generally similar in appearance, though the male is larger, heavier, and displays a glossier plumage.

Photo by Binanda Hatiboruah

Habitats of White-winged wood duck

The WWWD primarily inhabits remote, swampy regions within dense tropical evergreen forests, typically at elevations between 200 and 1500 meters above mean sea level. In India, the species is now mainly restricted to the tropical evergreen and semi-evergreen forests of Assam and Arunachal Pradesh, where a few fragmented populations still persist. The species has been declared the State Bird of Assam, highlighting its ecological and cultural importance. However, despite this recognition, the White-winged Wood Duck continues to face multiple threats that endanger its survival.

Rising threats to the WWWD

a. Habitat loss and degradation
Habitat destruction remains the most severe threat to the species. The dense swamp forests and wetlands that serve as its primary habitat are being cleared for agriculture, tea plantations, human settlements, and infrastructure development.

b. Wetland drainage and alterations
The conversion of natural wetlands into paddy fields, fish ponds, or for other land uses has drastically reduced suitable habitats.

c. Hunting and poaching
Despite being legally protected under ***Schedule I of the Wildlife (Protection) Act, 1972***, illegal hunting continues in some remote areas. The bird is occasionally hunted for meat by local communities, particularly in forest-fringe villages, due to lack of awareness and alternative protein sources.

d. Habitat fragmentation and small population size
The current population in India is estimated at only 50–150 individuals, mostly confined to Dibru-Saikhowa National Park, Dehing-Patkai Wildlife Sanctuary, and Nameri National Park, along with a few scattered forest fragments. Such small, isolated populations face genetic bottlenecks, reduced breeding success, and a high risk of extinction from stochastic events like floods, disease, or forest fires.

e. Anthropogenic disturbance
Increasing human interference through logging, cattle grazing, collection of fuelwood, and eco-tourism has disturbed the natural breeding and feeding grounds of the species.

f. Climate change
The changing climate has begun to alter rainfall patterns and flood dynamics in the Brahmaputra valley. Irregular monsoons and prolonged dry spells can affect wetland hydrology, leading to reduced food availability and unsuitable nesting conditions.

Reviving population of WWWD

Insufficient knowledge regarding the species' population dynamics and habitat-specific conservation requirements poses a significant challenge to its effective management and recovery. Protecting the remaining forested wetlands in Assam and Arunachal Pradesh is the most urgent need. Protecting the remaining forested wetlands in Assam and Arunachal Pradesh is the most urgent need.

Local communities play a crucial role in the species' survival. Creating awareness among villagers, tea garden workers, and forest-dependent people can reduce hunting and habitat disturbance. Promoting eco-friendly livelihoods such as community-based eco-tourism and organic farming can help minimize forest dependence and provide economic incentives for conservation.

Photo by Binanda Hatiboruah

There is a pressing need for updated and region-specific research on the population size, distribution, breeding ecology, and habitat requirements of the species. The use of GIS and remote sensing techniques for habitat suitability mapping, coupled with field-based monitoring, can guide effective management. Long-term ecological studies will help track population trends and identify critical nesting or foraging sites.

Although the species enjoys legal protection, law enforcement must be intensified. Regular patrolling in protected and buffer zones, coupled with community vigilance, can prevent illegal hunting and encroachment. Effective implementation of the Wildlife (Protection) Act, 1972 is essential to ensure the safety of remaining individuals.

Since the species is highly sensitive to hydrological changes, its conservation should be integrated into climate resilience strategies. Restoring floodplain wetlands and maintaining natural water flow regimes can buffer against climate-induced changes in habitat conditions.

Public outreach through schools, NGOs, and media can highlight the importance of conserving the White-winged wood duck as the State Bird of Assam and a flagship species of Northeast Indian wetlands. Awareness programmes can foster a sense of pride and responsibility among local communities toward conserving this rare species.

Conclusion

The White-winged wood duck stands as a symbol of the rich biodiversity of Northeast India's forests and wetlands. However, its dwindling population is a stark reminder of the rapid ecological degradation occurring across the region. Protecting this species requires a multi-dimensional approach one that combines scientific research, strong legal frameworks, community participation, and sustainable land-use planning.

Over the years, its numbers have drastically fallen, mainly due to habitat destruction, hunting, and fragmentation. These threats have resulted in small, isolated populations restricted to a few protected areas and forest patches, putting the species at serious risk of local extinction. Current estimates suggest that only about 50–150 individuals remain in India. Highly sensitive to human disturbances, the White-winged wood ducks continued existence in Northeast India now depends on urgent, well-directed conservation action. The species' natural range has diminished considerably, with habitat degradation posing the most significant danger to its survival.

Studies from the early 1990s reported that 21 protected areas worldwide supported populations of the White-winged Duck. In India, Dibru-Saikhowa National Park and Dehing-Patkai Wildlife Sanctuary were designated primarily for its protection, as it is also recognized as the State Bird of Assam. Nevertheless, the species continues to decline, and conservation efforts across its range especially in India remain fragmented and inadequate, largely due to outdated information and the absence of a unified, coordinated approach.

By conserving the White-winged Wood Duck, India can also safeguard the broader ecosystem services provided by its wetlands and forests ensuring the survival of countless other species that depend on these fragile habitats.

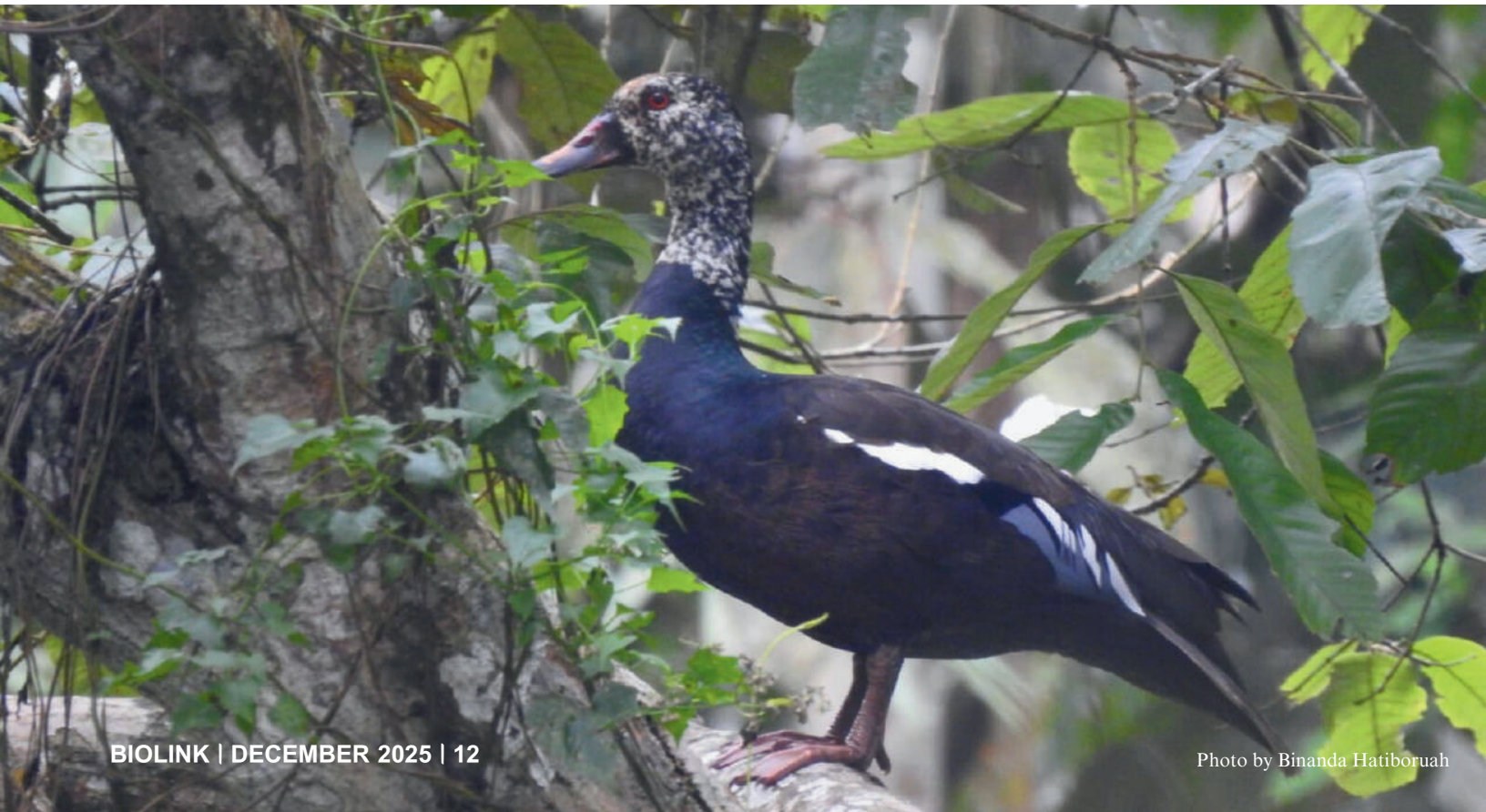

Photo by Binanda Hatiboruah

FACE-TO-FACE

In conversation with Er. Ranjan Bhuyan- The inception and growth of Aaranyak

Interviewed by Jayanta Kumar Pathak,
Assistant Director & In-charge Head,
Environment Education and Capacity Building Division, Aaranyak.

Q **Could you tell us about your initial association with *Aaranyak* ?**

We are talking about the year 1989. Back then, our neighbourhood felt like one big family - everyone knew each other well and readily came forward to help whenever needed. It truly had the warmth of a traditional joint family.

It was during Magh Bihu celebrations at Bibhab's residence that the seeds of Aaranyak were sown. We had all gathered in their front lawn when Bibhab's elder brother, Dullu, was in deep conversation with Bhaskar Das, who was also from our locality. At that moment, Bibhab came up to us and proposed the idea of forming a nature club to improve our neighbourhood and promote greenery. The idea instantly resonated with all of us. We decided that Bibhab would serve as the General Secretary and I would take on the role of President so that we could get to work immediately.

Every Sunday, we met at a convenient spot, pooled our limited resources, and held serious discussions over cups of tea, goja, and samosas. When we could find free accommodation - such as Gopal Boro H.S. School or J.B. Law College - we held our meetings there. Though we frequently changed venues, our membership gradually grew.

Memories from Aaranyak's early days.

We began with small projects focused on increasing the greenery in Guwahati, but funds were extremely limited. Our head office functioned from Bibhab's residence, where a small team maintained all records and documents. Later, when an RCC building was constructed and Bibhab's family shifted, we began using the Assam-type house as our office - a huge relief that allowed us to accommodate our growing materials and hold meetings comfortably.

Over time, Aaranyak achieved significant milestones, including a historic court victory that helped strengthen wildlife protection in the state. With the dedication of our members, we were able to bring in several foreign-funded projects that furthered our mission.

Eventually, under the leadership of Ashok Dey and his team, we identified a plot of land at Beltola within the Guwahati Metropolitan area for our permanent office. That land has now been prepared for construction, and in the near future, we hope to see an architecturally remarkable green building rise there - a symbol of Aaranyak's journey and ideals.

Q What aspirations have connected you with this organisation since its inception?

✔ The North East Region of India is a global biodiversity hotspot, but it constantly faces threats from modernization - such as infrastructure expansion, industrialization, and oil exploration. To counter these challenges, Aaranyak has always aimed to bring together scientists, researchers, educators, and community workers committed to conserving and restoring our natural ecosystems.

My aspiration has always been that Aaranyak continues to protect the region's pristine environment for future generations while promoting a balance between progress and conservation.

Q Could you share a memorable experience from your journey with Aaranyak?

✔ One incident that remains vivid in my memory took place in December 1992. I had just bought my first Maruti car and was excited to drive to Borjhar Airport with Bibhab to receive Mr. Adam Adamou - a foreign visitor making his first trip to Northeast India.

As we drove along the Jalukbari–Lokhra highway, Mr. Adam was visibly disturbed by what he saw - rampant earth-cutting on green hillocks. *"Isn't there any law against such blatant destruction?"* he asked, clearly disappointed. We felt deeply ashamed to witness our country's natural beauty being so carelessly degraded.

Later, he was even more shocked to see coal tar and other banned chemicals being used in a local workshop to treat the inner shell of oil tankers - substances that were prohibited in Western countries. Experiences like this reminded us of the urgent need to protect our environment before it was irreversibly damaged.

Q You have dedicated 35 years of voluntary service to Aaranyak. How do you view the organisation's current growth and development?

✔ We began from scratch, with only passion and commitment as our foundation. Today, thanks to the hard work of Aaranyak's talented scientists and researchers, the organisation has earned recognition on international platforms. It's an achievement we all take pride in.

However, we cannot afford to be complacent. The challenges before us are many and evolving. Aaranyak must continue to strive harder, ensuring that its progress is sustained through the proactive efforts of the younger generation under the mentorship of our experienced seniors.

Q In your opinion, which areas should Aaranyak focus more in the future?

✔ Given Aaranyak's expertise in wildlife conservation, I believe we should broaden our scope to include the protection of lesser-known endangered species and their habitats. Addressing human–wildlife conflict should also be a priority.

Collaborations with other organisations, academic institutions, and government bodies can strengthen our research in conservation biology, ecology, and sustainable development. Moreover, as Northeast India is highly vulnerable to climate change, Aaranyak should intensify its work on adaptation and resilience-building measures to support vulnerable communities.

Q What suggestions would you like to offer to the younger generation, particularly in the field of biodiversity conservation in the Northeast India?

✔ Northeast India is home to over a hundred tribes, each of which has traditionally preserved nature in its own way - through cultural practices, beliefs, and sustainable lifestyles. The younger generation must partner with these rural and tribal communities to blend traditional wisdom with modern sustainable practices.

Today's youth, being tech-savvy, can play a key role in developing projects that promote renewable energy, sustainable agriculture, and waste management. They should also harness the power of social media to raise awareness, educate communities, and inspire collective action for biodiversity conservation.

Q Finally, is there any message you would like to share with our readers?

✔ I have great confidence in Aaranyak's teamwork and its tireless efforts toward conservation and sustainable development. Over the past three and a half decades, Aaranyak has demonstrated how community-led conservation can make a real difference.

I encourage our readers to contribute their knowledge, skills, and time to conservation initiatives. By sharing our success stories and participating in ongoing projects, you can help amplify our collective impact and inspire more people to join hands in safeguarding nature for future generations.

Honouring Er. Ranjan Bhuyan for his visionary leadership since Aaranyak's inception - from serving as the organisation's President to now guiding us as President Emeritus.

From vision to legacy: Two decades of Indian Rhino Conservation (2005–2025)

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The Greater One-Horned Rhinoceros, or Indian Rhino *(Rhinoceros unicornis)*, is among the most iconic and threatened megaherbivores on Earth. Despite its gentle nature, this species symbolizes resilience and self-sufficiency. Biologists often consider it a "biological success story" because of its evolutionary persistence, wide ecological tolerance, and ability to adapt to diverse habitats. Its distinct horn, broad three-toed feet, specialized teeth for grazing on coarse grasses, and exceptional mobility have helped it survive through centuries of natural and human-induced challenges. Historically, Indian rhinos roamed freely across the entire Indo-Gangetic plains and the Brahmaputra valley of Assam.

Today, however, their range is restricted to a few protected areas in India and Nepal. Together, these countries host around 4000 free-ranging individuals. This drastic contraction of range is largely a result of relentless poaching driven by the illegal wildlife trade, coupled with massive habitat loss over the past two centuries.

Poaching, often linked to episodes of social unrest, wiped out many local rhino populations in the subcontinent. By the 1980s, Assam had breeding rhino populations in six protected areas, with a few scattered individuals surviving on remote river Brahmaputra and its tributary islands. It was clear that a visionary and coordinated program was needed to secure the future of this species in Assam.

In 2005, during the centenary celebrations of Kaziranga National Park, this vision began to take shape. Conservationists often compared Kaziranga with Umfolozi in KwaZulu-Natal, South Africa. Both areas had fewer than 100 rhinos a century ago, but while proactive translocation efforts at Umfolozi had created new populations totaling more than 18,000 southern white rhinos by 2005, Kaziranga's population stood at about 2,400 during the same year. The difference lay not in protection standards-Kaziranga had strict patrolling and enforcement-but in the absence of systematic range expansion efforts.

Photo by Avijan Saha

This realization led to the launch of the Indian Rhino Vision 2020 (popularly known as IRV 2020), a bold, forward-looking initiative supported by the Government of Assam, national and international institutions, local communities, and global conservation partners. The program set an ambitious target: to increase Assam's rhino population to 3,000 individuals by 2020, spread across at least seven protected areas. The idea was simple yet powerful-avoid putting "all rhinos in one basket" and reduce the risk of catastrophic loss from disease, natural disasters, or poaching by creating multiple secure populations.

The most remarkable success of IRV 2020 was the reintroduction of rhinos to Manas National Park. On 12th April 2008, two wild rhinos were translocated to Manas from Pobitora wildlife sanctuary under this program, marking the beginning of a historic recovery effort. The initiative not only restored a key species but also revitalized the park itself. Anti-poaching camps were rebuilt, patrolling was strengthened, roads and infrastructure were improved, and community engagement programs were launched.

This collective effort boosted the morale of forest staff and local stakeholders, transforming Manas after more than a decade of insurgency-related turmoil. In 2011, this renewed conservation momentum helped Manas regain its prestigious UNESCO World Heritage Site status. The recovery of other flagship species such as tigers, elephants, swamp deers further strengthened the park's ecological health. Tourism, too, began to flourish, bringing economic opportunities to local communities.

IRV 2020 also aimed to re-establish rhino populations in Laokhowa and Burhachapori Wildlife Sanctuaries through a series of soft- and hard-release translocations between 2012 and 2016. Unfortunately, the death of the first batch of translocated rhinos halted further efforts. Even so, these sanctuaries are now witnessing temporary rhino immigration from Orang and Kaziranga, proving their potential as rhino habitats. Current assessments suggest that these parks could eventually support more than 100 rhinos if proactive management is resumed.

While IRV 2020 created momentum, the enthusiasm of earlier years appears to have slowed. There has been little recent progress on translocation or range expansion, despite a significant decline in poaching pressure in Assam. Without renewed leadership from the state government and active engagement of stakeholders, the progress made over the past two decades' risks stagnation. Rhino conservation in Assam is entering a critical new phase marked by complex and interlinked challenges

Climate change is disrupting water regimes, leaving rhino ranging areas alternately inundated by extreme floods and stressed by insufficient water during dry spells. Poorly managed spillover populations from Kaziranga, Orang, Pobitora, and Manas are increasingly straying into unprotected areas, while the shrinking habitat of Pobitora Wildlife Sanctuary adds to the pressure. Human–rhino conflict is gradually intensifying across Majuli, Dergaon, Golaghat, Nagaon, Sonitpur, Biswanath, Gohpur, Morigaon, and other fringe landscapes, straining coexistence with local communities. Compounding the crisis are rising grazing pressures, an unchecked increase in feral cattle, buffalos and horses inside protected areas, the spread of invasive plant species, shrinking wetlands, rapid road and infrastructure expansion, and declining corridor connectivity-all of which heighten the risk of genetic isolation and inbreeding among rhino populations.

Successful rhino release in Manas National Park under the IRV 2020 programme. Photo by Dr. Deba Kumar Dutta

The Road ahead – Beyond 2020

The success of IRV 2020 has reaffirmed that research-driven, collaborative conservation delivers results. The challenge now is to build on this momentum and craft a "Beyond 2020" Rhino Conservation Plan that responds to today's realities and anticipates tomorrow's challenges. This must include habitat management and range expansion, secure new grasslands, waterbodies and restoring degraded areas to establish multiple, genetically viable rhino populations across Assam and beyond. Community mobilization will be critical-empowering fringe villagers through alternative economic opportunities that reduce forest dependence while fostering stewardship. Equally important is stronger governance and coordination, ensuring political will, inter-agency collaboration, and sustained funding.

Scientific monitoring and adaptive management must guide interventions, incorporating climate resilience and disease surveillance into decision-making. At the regional level, cross-border cooperation with Bhutan through the Transboundary Manas Conservation Area, and partnerships with states such as Arunachal Pradesh, Bihar, Uttar Pradesh, Uttarakhand and West Bengal each exploring rhino reintroduction offer fresh opportunities for range recovery.

A thriving, well-managed rhino population can become a powerful engine for Assam's economy. Rhino tourism already draws lakhs of visitors annually, benefiting local communities. Expanding rhino range would spread these benefits more widely, creating jobs and spurring rural development. Beyond tourism, protecting rhino habitats safeguards crucial ecosystem services-carbon sequestration, water regulation, and climate resilience-yielding dividends for both people and nature far into the future.

A call to action

Assam is home to almost 70% of the world's remaining Indian rhinos a responsibility that carries global significance. The time is ripe for the Assam Government, conservation partners, and local communities to come together once again to chart a bold, forward-looking plan beyond IRV 2020. This will require sustained investment, political will, and grassroots participation, but the rewards ecological security, economic opportunity, and global leadership in conservation are well worth the effort.

As we look to the future, let us reimagine Assam not just as the stronghold of the Indian rhino but as a model landscape where people and wildlife thrive together. The success of IRV 2020 proves what is possible when vision, science, and collaboration meet. The next two decades can be even more transformative if we act now.

Sledging of a darted rhino under the IRV 2020 programme.
Photo by Dr. Deba Kumar Dutta

বিহংগৰ প্ৰব্ৰজন

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বাৰিষাৰ বোকা-পানী বিহীন শীতকালৰ সময়ছোৱা সকলোৰে প্ৰিয়। শীতকালৰ পুৱাবেলা লেপৰ উম লৈ দেৰিলৈকে বিছনাত থকা নাইবা জুই সেক লৈ গল্প-গুজব কৰাৰ আমেজেই সুকীয়া। এই আমেজ ভৰা দিনবোৰত আমাৰ ঠাইলৈ আহে কিছু সংখ্যক আলহী। যাৰ আগমনে আমাৰ অঞ্চলৰ প্ৰকৃতিক দৃশ্যৰ সোণত সুৱগা চৰায়।

আলহী বা অতিথি এটা চিনাকী শব্দ। নিমন্ত্ৰিত আৰু অনিমন্ত্ৰিত অতিথি দুটা প্ৰধান ভাগ। অসমীয়া মানুহ অতিথি পৰায়ন বুলি এটা সুনাম আছে। অসমলৈ দুটা ঋতুত কিছু সংখ্যক অনিমন্ত্ৰিত অতিথি আহে।

বসন্ত আৰু শীতকালৰ সময়ছোৱাত এই আলহীবিলাকৰ হুলস্থুল কৰি আগমন ঘটে আৰু ঋতুৰ শেষভাগত সিহঁত উলটি যায়।

বসন্ত কালত কৈ শীতকালৰ সময়ছোৱাত আগমন ঘটা আলহীৰ সংখ্যা তুলনা মূলক ভাবে বেছি। আলহী খাবলৈ অহা এইসকল আন কোনো নহ'য় প্ৰব্ৰজন কৰা চৰাইবিলাক।বসন্ত কালত প্ৰায় ২০ বিধ আৰু শীত কালত প্ৰজাতি হিচাপে প্ৰায় ১৬০ বিধ মান চৰাই বিভিন্ন ঠাইৰ পৰা অসমলৈ আগমন ঘটে। গোত্ৰ হিচাপে শীতৰ আলহীৰ একাংশ হৈছে - বিভিন্ন প্ৰকাৰৰ হাঁহ, শিৱহাঁহ, ঢেৰা, শেন, চিলনী, আজান, বালিমাহী, কৰ্চন, ৰাম পাৰ, বালিঘোৰা, চাতক, লৰিয়লি আদি। বসন্ত কালত অসমলৈ অহা চৰাই হ'ল কেতেকী, বতাহী, জিঞাখাটি, ফেঁচুলুকা, ঢাপলিকা আদি। চিনাকী অচিনাকী বহু চৰাই আহে অসমলৈ। শীতৰ আলহীৰ ভিতৰত হাঁহ জাতীয় চৰাইৰ সংখ্যাটো ডাঙৰ।

শীতৰ অতিথি হিচাপে অসমলৈ বহু চৰাইৰ আগমন ঘটে।এইবোৰ আহে সুদুৰ ছাইবেৰীয়া, ইউৰোপ, আফ্ৰিকা, নিউজিলেণ্ড, চীন আদি দেশৰ পৰা। সিহঁতৰ কলৰৱত মুখৰিত হৈ পৰে জয়াল ঠাইবোৰ। কিছুমান চৰাই আকৌ বসন্ত কালতহে আগমন ঘটে। বসন্ত কালত অহা চৰাইবিলাকে তুলনামূলকভাৱে কম দুৰত্ব অতিক্ৰম কৰি আমাৰ ঠাইলৈ প্ৰবজন কৰা দেখা যায়।কেতিয়াবা পাহাৰৰ পৰা ভৈয়ামলৈ নাইবা গভীৰ অৰণ্যৰ পৰা পাতল অৰণ্যলৈ বসন্ত কালত চৰায়ে প্ৰবজন কৰা দেখা যায়।

বিভিন্ন সময়ত বিভিন্ন ঠাইলৈ পক্ষীকুলৰ আগমন নিৰ্গমন বছৰ বছৰ ধৰি চলি আহিছে। পৰিভ্ৰমী চৰাইবোৰে শীত আৰু বসন্ত কালত বিশেষ ভাৱে পৰিভ্ৰমণ কৰা দেখা যায়। দিন দীঘল হোৱা বাবে সিহঁতে এই সময়খিনি বাছি লোৱা যেন লাগে। বসন্ত কালৰ তুলনাত শীতকালৰ আলহী চৰাইৰ সংখ্যাটো বেছি হোৱা দেখা যায়।

Photo by Imon Abedin

চৰায়ে বিভিন্ন সময়ত বিশেষ পদ্ধতিৰে বিভিন্ন ঠাইলৈ নিয়াৰিকৈ কৰা ভ্ৰমণক এক কথাত প্ৰবজন বুলি কোৱা হয়। সকলো চৰায়ে প্ৰবজন কৰা দেখা নাযায়।মূঠ প্ৰজাতিৰ প্ৰায় পাঁচ ভাগৰ এভাগ মান চৰায়েহে সাধাৰণতে প্ৰবজন কৰা দেখা যায়।

চৰায়ে বিভিন্ন ঠাইলৈ মূলতঃ তিনিটা কাৰণত প্ৰবজন কৰা দেখা যায়। প্ৰজনন, উষ্ণতাৰ পৰিবৰ্তন আৰু খাদ্যৰ সন্ধানত চৰায়ে শীত আৰু বসন্ত কালত বিভিন্ন ঠাইলৈ প্ৰবজন কৰে।

পুব, পশ্চিম, উত্তৰ, দক্ষিণ যিকোনো দিশতে চৰায়ে প্ৰবজন কৰিব পাৰে। বিষুৱ অঞ্চলত বাস কৰা চৰাই বোৰে এপ্ৰিল মে' মাহত উত্তৰলৈ প্ৰজননৰ বাবে প্ৰবজন কৰা দেখা যায়। কাৰণ সেই সময়ত উত্তৰ মণ্ডলৰ অঞ্চল সমূহত বাৰিষাৰ আৰম্ভণি হয় আৰু উষ্ণতা কিছু বৃদ্ধি পায়। দিন দীঘল হয় আৰু পৰিৱেশ চৰাই প্ৰজনন ৰ বাবে অনুকূল হয়। অৰ্থাৎ গছে-বনে, পোক-পতংগই আৰু মাছে-পুঠিয়ে উভয়নদী হয়।সেই সময়ত বাহ সাজি, পোৱালি জগায়, পোৱালিক পেট ভৰাই খুৱাবলৈ উত্তম পৰৱেশ হোৱা দেখা যায়।

পুৰ্বৰ বাস কৰা ঠাইৰ লগত পৰিৱেশৰ বিশেষ পাৰ্থক্য নথকা স্বত্তেও কিছুমান চৰায়ে প্ৰজননৰ বাবে পুব বা পশ্চিমলৈ গতি কৰে।আনহাতে কিছুমানে আকৌ প্ৰজননৰ বাবে নিয়মীয়াকৈ ১০/১৫ কিল'মিটাৰ হে প্ৰবজন কৰা দেখা যায়।

উষ্ণতাৰ তাৰতম্যৰ বাবে ও চৰায়ে প্ৰবজন কৰে। শীতকালত বৰফ পৰা, হাড় কপোৱা জাৰ আৰু তাৰ ফলত হোৱা খাদ্য সংকটৰ পৰা বাচিবৰ বাবে চৰায়ে প্ৰবজন কৰা দেখা যায়।

খাদ্যৰ প্ৰাচুৰ্য থকা ঠাইলৈ কিছুমান চৰায়ে প্ৰবজন কৰা দেখা যায়। সৰু চৰাই বেছি থকা ঠাইলৈ চিকাৰী চৰায়ে প্ৰবজন কৰে ঠিক সেইদৰে পোক-পতংগ বেছি থকা ঠাইলৈ পতংগভোজী চৰাই আগমন ঘটে।তাৰোপৰি ফল-মূল ভৰপূৰ হোৱা ঋতুত ফল-মূল খাদ্য হিচাপে গ্ৰহণ কৰা চৰাই সেই ঠাইলৈ প্ৰবজন ঘটা দেখা যায়।

বিভিন্ন চৰাইৰ এখন ঠাইৰ পৰা আন এখন ঠাইলৈ প্ৰবজনৰ সময় ভিন্ন হোৱা দেখা যায়। সাধাৰণতে বেছিভাগ সৰু চৰায়ে ৰাতি আৰু ডাঙৰ চৰায়ে দিনত প্ৰবজনৰ কৰে।হয়তো নিৰাপত্তা ৰ বাবে সৰু চৰায়ে এই সময় বাচি লয়।

প্ৰবজন কৰা চৰাই বিলাকে বছৰ বছৰ ধৰি নিদিষ্ট পথৰে আহি লক্ষ্য স্থানত উপস্থিত হয়হি।এই পথ প্ৰজাতি ভেদে বেলেগ বেলেগ হয়।ইণ্ডো-এছীয় উৰণ পথ আৰু পুব-এছীয় উৰণ পথ ভাৰতলৈ প্ৰবজন কৰা চৰাই বিলাকে বছৰ বছৰ ধৰি ব্যৱহাৰ কৰি আহিছে। খোৱা-বোৱা, জিৰণি লোৱা আদিক গৌণ কৰি দীঘলীয়া পথ যিমান পাৰি সোনকালে অতিক্ৰম কৰি কেৱল লক্ষ্য স্থান লৈ উৰাই প্ৰবজন কৰা চৰাইৰ মূল লক্ষ্য হৈ পৰা দেখা যায়। সেইবাবে সাধাৰণতে বেছি গতিবেগত প্ৰবজন কৰা চৰায়ে উৰিব লগা হয়।প্ৰবজন কৰা হাঁহে ঘণ্টা ত ৫০-৬০ মাইল বেগত উৰে বুলি পক্ষীবিদ সকলে গণনা কৰিছে।

শীতৰ পৰিভ্ৰমী চৰাইৰ ভিতৰত আটাইতকৈ প্ৰথমে অহা আটাইতকৈ শেষত ঘুৰি যোৱা ধুনীয়া চৰাইজনীয়েই হল সকলো সময়তে নেজ নচুৱাই থকা ৰচকী "বালিমাহী "। বালিমাহীৰ বৈজ্ঞানিক নাম Motacilla alba। শৰতৰ আগমনৰ বতৰা লৈ ছেপ্টেম্বৰ মাহৰ প্ৰথম সপ্তাহ যোৱাৰ পাছত অসমত আগমন ঘটে আৰু মে-জুন মাহত চৰাইজাক নিজ ঠাইলৈ ঘুৰি যায়। আমাৰ সমাজ জীৱনত বালিমাহী চৰাই আহিলেই বাৰিষাই বিদায় মাগি খৰালিৰ আগমনৰ বতৰা দিয়ে।বালিমাহী চৰাইৰ আগমনৰ লগে লগে খেতিয়কসকলে ৰবি শস্যৰ খেতি আৰম্ভ কৰা দেখা যায়। তাৰোপৰি শীতকালৰ সময়ছোৱাত অসমলৈ বিভিন্ন প্ৰজাতিৰ হাঁহকে ধৰি বহু চৰাইৰ প্ৰবজন ঘটে।

চৰাই প্ৰবজন এক ৰহস্যৰ বিষয় পক্ষীবিদসকলৰ মতে এই ৰহস্যৰ ভেদ ভঙা কঠিন।যেই কি নহওঁক এই শীতৰ আগমনৰ লগে লগে আমাৰ ঠাইলৈ ধুনীয়া চৰাই বিলাকৰ আগমন ঘটা দেখা পোৱা গৈছে। চৰাই বিলাক আমাৰ অতিথি।গতিকে অতিথি শুশ্ৰূষাৰ লগতে নিৰাপত্তা নিশ্চিত কৰাটো আমাৰ দায়িত্ব আৰু কৰ্তব্য হিচাপে গণ্য কৰা উচিত।

Photo by Partha Pratim Das

Unying Aran: the spring hunt

By: Ivy Farheen Hussain (Senior Project Officer, LAD, Aaranyak), Himadri Bhuyan (Educator and Astrophotographer, Freelance), Jimmy Borah (Deputy Director, LAD, Aaranyak)

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Cultural pride in motion - an Adi woman dancing with grace

Lying in the easternmost landscape of Arunachal Pradesh, the mighty river Siang flows in its glory. Called Yarlung Tsangpo in Tibet, this river crosses deep gorges and mountaineous passes before reaching the main town of Pasighat. The river flows in a braided pattern towards the southwest before entering Assam.

There, it merges with the Lohit and Dibang rivers before nestling into the mighty Brahmaputra. Among the braids of Siang and the mountains of East Arunachal, inhabits the indigenous group of the Adi. Although well-established in other parts of the state as well- the Adis are the maiden tribe in this landscape. They are one of the tribes of the Tani group- speaking derivatives of Tibetan-Burmese and belong to the mongoloid bloodline.

For them, main religion guiding their salvation is Donyi-Polo. Literally translating to 'Sun-Moon', this animistic religion considers the celestial bodies possessing the "eyes of conscience" which guides their truth, wisdom and harmony in the natural order. But this religion isn't as old as others- having been born only in 1968.

Adi intellects gathered in Along under the guidance of Talom Rukbo to discuss countermeasures against the gradual erosion of indigenous identity and traditions attributes to India's policy of integration of Arunachal Pradesh- particularly against the spread of Christianity since the 1950s. In the 1971 census, around 37000 inhabitants identified as adherents of Donyi Polo and henceforth, this religion was born. Since then, the population under this religion has been steady.

Under Donyi-Polo, there emerged several religious festivals. Deeply rooted in nature and surrounding their main guarding spirit of agriculture- Kine Nane. According to the Miris (the ceremonial leaders of Adi rituals), there are nine Gidis (festivals). Pimeng Yageng celebrates the ripening of paddy fields while Solung celebrates the thanksgiving before harvest. Ampi Dorung or Eso Dorung is celebrated after the harvest while Tapu is a communal celebration marking collection of wood for house construction. Siki Mopun is celebrated to appreciate the Kine Nane for a good harvest followed by Kombi to mark the end of harvesting season. In the winters, Taku is celebrated to appease Doying Bote- the guarding spirit of mankind. Etor marks the communal fencing of the paddy fields and then comes Unying Aaran- the major hunting festival of the Adis.

Contrary to belief, this 'hunting festival' is not really what is sounds like. It involves hunting rats and mice which are a threat to the existing paddy fields of the Adis. Celebrated from 7 March heralding spring and the Adi New Year, trapping and hunting the rodents is the main activity of the centenary. The main activity starts the day before- when all the men in the families leave their homes together to go to the nearby forests fringing their paddy fields and lay down traps for the rodents. After a night of bounty killing, they come back the next day.

Among the many areas of operations for me in Northeast India, one of them is Pasighat. I've been involved in that landscape for more than two years now and have been fortunate to be among the people of the Adi community. This year, I was invited by them to witness Unying Aran and boy! It was an unforgettable experience!

I reached on March 7th Morning while the men were returning form their first night of hunting. Accompanied by Mr. Oki Modi, my very own companion in that landscape, our car was first stopped by a group of women and children in their bright traditional Gales (wrap skirts) and Adigalo (jackets). We were each handed a leaf-wrapped rice balls and a glass of ice-cold Apong (rice beer, traditionally prepared). Talk about beer in the morning! And from the opposite direction came the men, in bikes, scooters, cars and on foot. Each holding a big bag of traps and kills. All day, we went around the villages of Mebo, Borghuli, Seram and Kongkul. I noticed how subdued this festival really was. If you drove through any village during this- you'll hardly see anything. We visited the homes of a few of our acquaintances and they very proudly showed off their kills.

We also came know how innately the emotion of woven into the minds of the people who celebrate it- often in a negative way. Many men- who do not get a sizable bounty (which can be due to a multitude of reasons)- have unalived themselves. This comes from a long belief that if they cannot hunt well-, they cannot protect and provide well for their families. This really shocked us because up until then, we assumed this was a recreational hunting practice. The truth was truly humbling. This festival taught me a lot of things. From how scrappy and resourceful these indigenous communities really are to how with their Traditional EcologicaL knowledge (TEK) had already played a part in how to effectively control the pest population in and around their fields. It also showed me the negatives to perceived notion of what a true 'man' is – and the immense emotional distraught it has brought to many- who we ended up losing forever. With deep thoughts and lot of write about, I attended the last event at a house of the village head i.e. Gamburahof Sika-Tode village. . There, we witnessed the beautiful dance of Yakjong, performed by different groups of young and old alike- to the melodious Baryi songs sung by the male elders.

An Adi man proudly showcasing his bounty

At home with heritage - an Adi man in his dwelling

The evening started with bonfires, local rice beers and soft beats of the bamboo instruments like Tapu, the flutes called Peng keling and a mouth organ called damru- played mostly by women. As night grew, traditional food and wines flowed freely as the people spoke of their memories of the past to laughing about their failed romantic pursuits, the laughter and harmony was symbolic. It told me- that hardships are always temporary- but if you have the right people around you, we will always find a reason to be happy. Joy does come at a cost- but for the people here, the sunsets are a sign to start living again.

Adi women showcasing traditional sword-like tool

নামদফা ৰাষ্ট্ৰীয় উদ্যানঃ প্ৰকৃতি আৰু সংস্কৃতিৰ সমন্বয়ৰ এক বিৰল দৃষ্টান্ত

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Photo by Simanta Medhi

ভাৰত-ম্যানমাৰ সীমান্তৰ অৰুণাচল প্ৰদেশৰ আটাইতকৈ পূব প্ৰান্তত অৱস্থিত নামদফা ৰাষ্ট্ৰীয় উদ্যান কুঁৱলীৰে আবৰি থকা এখন বৰ্ষাৰণ্য। ১৯৮৫ বৰ্গ কিলোমিটাৰত বিস্তৃত নামদফা কেৱল ভাৰতৰ চতুৰ্থ বৃহত্তম ৰাষ্ট্ৰীয় উদ্যানেই নহয়, ইপ্ৰাকৃতিক দৃশ্যৰ এক জীৱন্ত প্ৰতিফলন য'ত অৰণ্য, বন্যপ্ৰাণী আৰু থলুৱা সংস্কৃতিৰ সুক্ষ্ম সমন্বয়ৰ অস্তিত্ব বিলীন হৈ আছে।

ইয়াৰ প্ৰতিটো নদী, পৰ্বত, আৰু প্ৰতিটো প্ৰাণীৰ একবিশেষ অৰ্থ বহন কৰে। ইয়াত পোৱা প্ৰাণী সমূহৰ ভিতৰত অন্যতম হ'ল হলৌ বান্দৰ, ভাৰতৰ একমাত্ৰ বন মানুহৰ (Ape) প্ৰজাতিৰ সংৰক্ষণৰ বাবে স্থানীয় জনজাতিৰ অহৰহ প্ৰচেষ্টাই এক বিশেষ স্থান দখল কৰিছে। ইয়াৰ ৰাতিপুৱা ঘনসেউজ অৰণ্য আৰু পৰ্বতৰ মাজেৰে প্ৰতিধ্বনিত হয়ইয়াৰ সুৰবোৰ। নামদফাৰ নিচেই কাষত থকা লিসু, টাঙ্ছা, আৰু চিংফৌ জনজাতিৰ বাবে এক আধ্যাত্মিক আৰু সাংস্কৃতিক প্ৰতীক হিচাপে বিবেচিত।

এক ঐতিহাসিক পৰ্যালোচনা

উদ্যানখনৰ নাম "নামদফা" হৈছে নোৱা-ডিহিং নদীৰ পৰা, যাক স্থানীয়ভাৰে "নামদফা" বুলি কয়, অৰ্থাৎ "নদীৰ কাষৰ হাবি"। ১৯৭০ দশকত ড° এম. এছ. প্ৰসাদ আৰু ভাৰতীয় বটেনিকেল চাৰ্ভেৰ দলৰ দ্বাৰা প্ৰথমবাৰৰ বাবে বৈজ্ঞানিকভাৱে নামদফাৰ অধ্যয়ন কৰা হৈছিল আৰু ইয়াৰ অদ্বিতীয় সম্পদৰ দস্তাবেজকৰণ (Documentation) কৰিছিল। ইয়াৰ গুৰুত্ব স্বীকাৰ কৰি ১৯৭২ চনত ইয়াক বন্যপ্ৰাণী অভয়াৰণ্য হিচাপে ঘোষণা কৰা হৈছিল আৰু ১৯৮৩ চনত প্ৰজেক্ট টাইগাৰৰ অধীনত ৰাষ্ট্ৰীয় উদ্যানলৈ উন্নীত কৰা হৈছিল। এই প্ৰচেষ্টাই বাঘৰ লগতে হাতী, আৰু অন্যান্য গুৰুত্বপূৰ্ণ প্ৰজাতিৰ সংৰক্ষণৰ ওপৰত জোৰ দিয়ে।

কিন্তু সংৰক্ষিত এলেকা হোৱাৰ বহু আগতে নামদফা স্থানীয় জনজাতি আৰু লোককথাৰ স্মৃতিত সজীৱ আছিল। “দাফাবুম” কাহিনীয়ে এটি শক্তিশালী আধ্যাত্মিক পৰ্বতৰ কথা কয়, যিজংঘল, নদী, আৰু প্ৰাণীক পাহৰি জীৱনৰ সুষমা সুৰক্ষিত ৰাখে।

দাফাবুম: হাবিৰ ৰক্ষক

স্থানীয় টাঙ্ছা, আৰু চিংফৌ জনজাতিৰ বাবে দাফাবুম (উচ্চতা প্ৰায় ৪,৫৭০ মিটাৰ) কেৱল পৰ্বত নহয়—এটি জীৱন্ত দেৱতা। কাহিনী অনুসৰি, দাফাবুম স্বৰ্গৰ পৰা অবতীৰ্ণ হৈ মানুহ আৰু জংঘলক ৰক্ষা কৰে। মানুহ ৰোৰ লুভীয়া হৈ পৰা সময়ত দাফাবুম পৰ্বত হৈ পৰে আৰু ইয়াৰ আত্মাই চিৰকাল ভূমিৰ ওপৰত দৃষ্টি ৰাখে। স্থানীয় লোকসকলে জংঘলৰ ভিতৰত যাওঁতে সৰু প্ৰাৰ্থনা আৰু উপহাৰ আগবঢ়ায়, বিশ্বাস কৰে যেএই পৰ্বতেই তেওঁলোকৰ আৰু বন্যপ্ৰাণীৰ সুৰক্ষাৰ ওপৰত চকু ৰাখে।

হলৌ বান্দৰ: পৰ্বতৰ মাজৰ পৰা ভাহি অহা এতি মাত

হলৌ বান্দৰ নামদফাৰ পৰিচয়ৰ কেন্দ্ৰ হিচাপে বিবেচিত। সূর্য উদয়ৰ পিছত, উপত্যকা জুৰি তেওঁলোকৰ মাতৰ প্ৰতিধ্বনি বনজুৰি জংঘলৰ হৃদস্পন্দন হিচাপে অনুভূত হয়। স্থানীয় জনজাতিৰ দৃষ্টিভংগী অনুসৰি, হলৌ কেৱল এটা প্ৰাণী নহয়; ই বাৰ্তাবাহক, অশুভ-শুভৰ সূচক, আৰু নৈতিক পথপ্ৰদৰ্শক হিচাপেও বিবেচিত।

লিসু পৰম্পৰা

খোছি পাই হৈছে ভাৰতৰ অৰুণাচল প্ৰদেশৰ লিসু (যোবিন) সম্প্ৰদায়ৰ নৱবৰ্ষৰ উৎসৱ, যি গান্ধীগ্ৰাম (শিদী)ত পৰম্পৰাগত ৰীতি-নীতি, সংগীত, নৃত্য আৰু "বন্ধুত্বৰ পানীয়" (শ্বাফে-তা)ৰ ভাগ-বতৰাৰে উদযাপন কৰা হয়। এই উৎসৱ সাংস্কৃতিক গৌৰৱৰ প্ৰতীকহৈ থকাৰ লগতে বাৰিষাৰ পূৰ্বৰ নতুন আৰম্ভণিৰ প্ৰতীক স্বৰূপ।

খোছি পাইৰ সময়ত লিসু জনজাতিৰ শিশুৱে হলৌৰ দোলনীয় বা জপিয়াই ফুৰা গতি অনুকৰণ কৰি নৃত্য প্ৰদৰ্শন কৰে। এই নৃত্য পৰিয়ালৰ ঐক্য, নিষ্ঠা আৰু সম্প্ৰীতিৰ প্ৰতীক। বিশেষকৈ, ইয়াত দেখা গোৱা আচৰণেই হলৌ হলৌৰ এটা লক্ষণীয় গুণ — যি একে সংগে দলগত সংহতি আৰু প্ৰকৃতিৰ সৈতে সহঅস্তিত্বৰ পাঠ প্ৰদৰ্শন কৰে। এই উৎসৱে কেবল সাংস্কৃতিক পৰম্পৰা সংৰক্ষণ নকৰে, বৰঞ্চ স্থানীয় সম্প্ৰদায় আৰু প্ৰাকৃতিক পৰিৱেশৰ মাজত এক গভীৰ সম্পৰ্ক স্থাপন কৰি জীৱনৰ এক বিশেষ অধ্যায়ৰ প্ৰতিফলন ঘটায়।

টাঙ্ছা বিশ্বাস

টাঙ্ছা মানুহে বিশ্বাস কৰে যেহলৌক হানি কৰিলে, শস্য নষ্ট হোৱা বা মানুহ ৰোগাক্ৰান্ত হোৱাৰ দৰে অশুভ সংকেত আহিব পাৰে। শিশুক হলৌৰ মাত মনদি শুনিবলৈ শিকায়, কিয়নো হলৌৰ মাতৰ পৰা বৰষুণ বা বিপদৰ সংকেত পোৱা যায়।

চিংফৌ কাহিনীত হলৌ

চিংফৌ জনজাতিৰ মাজত হলৌৰ চিকাৰ কৰাৰ কোনো পৰম্পৰা নাই। তেওঁলোকে বিশ্বাস কৰে যে হলৌৰ মাত শুনিলে খেতিৰ বাবে বতৰ ভাল হয়। এই বিশ্বাসই প্ৰকাশ কৰে যে চিংফৌ জনগোষ্ঠীয়ে হ'লৌ বান্দৰক গভীৰ সন্মান কৰে।

নামদফাৰ জীৱবৈচিত্ৰ্য

নামদফাৰ বিস্ময়কৰ বৈচিত্ৰ্যই ইয়াৰ ভূমিৰূপত প্ৰতিফলিত হৈছে — সমুদ্ৰপৃষ্ঠৰ পৰা মাত্ৰ ২০০ মিটাৰ উচ্চতাৰ পৰা আৰম্ভ কৰি ৪,৫০০ মিটাৰৰ ওপৰৰ বৰফেৰে আবৃত পৰ্বত পৰ্যন্ত বিস্তৃত। ইয়াত বাঘ, চিতাবাঘ, গোধাফুটুকী আৰু স্নো লিওপার্ড একে হাবিত বাস কৰি থাকিলেও, প্ৰতিটো প্ৰজাতিয়ে নিজৰ পৃথক পৰিৱেশগত স্থান দখল কৰিছে।

নামদফা ৰাষ্ট্ৰীয় উদ্যানৰ জীৱবৈচিত্ৰ্য অত্যন্ত সমৃদ্ধ আৰু বিস্ময়কৰ। ইয়াত বাঘ, এছিয়াটিক ব্লেক বেয়াৰ, ৰেড পাণ্ডা, হিমালয়ান ছেৰু, মিথুন, আৰু মিচিমি টাকিনৰ দৰে বহুবিধ স্তন্যপায়ী প্ৰজাতি দেখা যায়। কপিকূলৰ মাজত হলৌ বান্দৰ, সেন্দুৰী বান্দৰ, গাহৰী নেজীয়া বান্দৰ, মলুৱা, অসমীয়া মলুৱা আৰু লাজুকী বান্দৰ বিশেষভাৰে উল্লেখযোগ্য। নামদফা চৰাই প্ৰেমীৰ স্বৰ্গ স্বৰূপ, কাৰণ ইয়াত ৫০০তকৈ অধিক চৰাইৰ প্ৰজাতি পোৱা যায় — যাৰ ভিতৰত হোৱাইট-বেলিড হেৰন, বিউটিফুল নাটচ, ৰার্ড'ছ ট্ৰ'গন আৰু ছ্নো'ই-থ্ৰ'টেড (Snowy-Throated Babbler) বাবলাৰৰ দৰে বিৰল চৰাইও অন্তৰ্ভুক্ত। তদুপৰি, উদ্যান খনত ৪০০তকৈ অধিক কীট-পতঙ্গৰ প্ৰজাতি নথিভুক্ত কৰা হৈছে, যাৰ ভিতৰত কাইজাৰ-ই-হিন্দ আৰু ভুটান গ্লে'ৰি দৰে মনোমোহা প্ৰজাপতিও পোৱা যায়। এই সকলো প্ৰজাতিৰ উপস্থিতিয়ে নামদাফাক উত্তৰ-পূৰ্ব ভাৰতৰ জীৱবৈচিত্ৰ্যৰ এক অনন্য ভঁৰালৰূপে প্ৰতিষ্ঠিত কৰিছে।

উদ্যানৰ জংঘলত ৰ'ড'ডেণড্ৰন, মেগন'লিয়া, অৰ্কিড, আৰু গছ ঢেঁকীয়া (Tree ferns) পোৱা যায়। বনভূমি আৰু নদীৰ পাৰৰ এলেকাই জীৱবৈচিত্ৰ্যৰ সংৰক্ষণ কৰে।

The gentle grace of a Hoolock gibbon. Photo by Dr. Dilip Chetry

সংৰক্ষণকাৰী হিচাপে জনজাতি

লিসু, টাঙ্ছা আৰু চিংফৌ জনজাতি নামদফাৰ ৰক্ষক। তেওঁলোকৰ জ্ঞান আৰু সাংস্কৃতিক পৰম্পৰাই চিকাৰী নিয়ন্ত্ৰণ, জংঘলৰ ব্যৱহাৰ আৰু পানীৰ সুৰক্ষা নিয়মিত ভাৱে কৰি আহিছে। পবিত্ৰ বনভূমি আৰু নদী সম্পৰ্কীয় নিৰ্দেশে বন্যপ্ৰাণী আৰু উদ্ভিদ সুৰক্ষা কৰে। ৰীতি, উৎসৱ, আৰু লোককাহিনীয়ে বাঘ, হাতী, হলৌ আৰু সাপৰ প্ৰতি সন্মান শিকায়, দৈনন্দিন জীৱনত সংৰক্ষণক অন্তৰ্ভুক্ত কৰে।

স্থানীয় যুৱ গোটে বনবিভাগৰ সৈতে মিলি অবৈধ চিকাৰী দমন আৰু জীৱবৈচিত্ৰ্য সমীক্ষাত সহায় কৰে। গাইডেড ট্ৰেক আৰু আতিথ্য গৃহ (হোমষ্টে) ৰ সহ সেউজ পৰ্যটন (ইক'-টুৰিজম) উদ্যোগে বিকল্প জীৱিকা প্ৰদান কৰে আৰু নামদফাৰ প্ৰাকৃতিক আৰু সাংস্কৃতিক সম্পদ সম্বন্ধে সচেতনতা বৃদ্ধি কৰে।

নামদফাৰ বন শিৰিৰ আৰু কিছু কাহিনী

নামদফাৰ ভিতৰত তিনিটা ধুনীয়া ঝীল (হ্ৰদ) আছে — ম'তী ঝীল, ৰাণী ঝীল, আৰু ৰাজা ঝীল। তাৰ ভিতৰত দুখন ঝীল মোহনীয় স্থানীয় লোককথাৰ বাবে জনাজাত। কোৱা হয় যে এই হ্ৰদবোৰত দুটা পিশাচ, এটা মতা আৰু এটা মাইকী বাস কৰে। প্ৰতিদিনে সন্ধিয়া হাৰিৰ সিপাৰৰ পৰা ইজনে সিজনক মাতে। মাইকী আত্মা বাস কৰা হ্ৰদটোক ৰাণী ঝীল বুলি জনা যায়, আৰু মতা আত্মা বাস কৰা হ্ৰদটোক ৰাজা ঝীল বুলি কোৱা হয়। তৃতীয়টো হ্ৰদ ম'তি ঝীলৰ নাম এনেদৰে ৰখা হৈছে কাৰণ, বহু আগতেই মানুহে দাবী কৰিছিল যে ইয়াৰ পানীত এসময়ত প্ৰাকৃতিক স্ফটিক বা মুকুতা ("ম'টি") পোৱা গৈছিল।

নামদফা ৰাষ্ট্ৰীয় উদ্যানখনৰ গভীৰ অঞ্চলসমূহ অন্বেষণ কৰা ট্ৰেকাৰসকলৰ বাবে জনপ্ৰিয় ষ্টপেজ বুলবুলিয়া নামৰ ঠাইত চালফাৰযুক্ত প্ৰাকৃতিক গৰম পানীৰ উৎস পোৱা যায়। নামদাফা বৰ্ষাৰণ্যৰ গভীৰত অৱস্থিত বুলবুলিয়া, ফাৰ্ম বেছৰ (Firm base) দৰে অভ্যন্তৰীণ শিবিৰলৈ যোৱা ট্ৰেকিং পথৰ কাষত অৱস্থিত। চালফাৰ সমৃদ্ধ পানীত শান্ত কৰা আৰু চিকিৎসামূলক গুণ আছে বুলি বিশ্বাস কৰা হয়, যিয়ে ছালৰ বাবে প্ৰাকৃতিক সকাহ প্ৰদান কৰে। আমোদজনকভাৱে এইঅনন্য স্থানলৈ কেৱল মানুহেই নহয়, বন্যপ্ৰাণীয়েও আহে, যিবোৰে কেতিয়াবা ভৰি দুখন উষ্ণ পানীত ডুবাই থকা দেখা যায়, হয়তো ইয়াৰ নিৰাময়কাৰী স্পৰ্শৰ পৰা আৰাম বিচাৰে।

নামদফাৰ এটা সৰু বনশিবিৰ হেপি ভেলীৰ পৰা সুন্দৰ বগা পাহাৰৰ আচৰিত দৃশ্য দেখা যায়। শিবিৰৰ চাৰিওফালে এতিয়াও ইতিহাসৰ চিন আছে — ওচৰৰ বহু গছ জ্বলি যোৱা যেন লাগে। স্থানীয় বন প্ৰহৰীৰ মতে, দ্বিতীয় বিশ্বযুদ্ধৰ সময়ত এই ঠাইতে এটা বোমা বিস্ফোৰণ ঘটিছিল, যাৰ ফলত নিস্তব্ধ অৰণ্যৰ মাজত সেই দূৰৈৰ অতীতৰ নিৰৱ সোঁৱৰণী ৰৈ গৈছিল।

প্ৰত্যাহ্বান

জনবহুল নগৰীৰ পৰা বহুত দূৰত থকা সত্বেও, নামদফা ৰাষ্ট্ৰীয় উদ্যান কিছু সমস্যাৰ সন্মুখীন হৈছে— নিৰ্বনিকৰণ, ঝুম খেতি,চিকাৰী, আৰু মানুহৰ বাসস্থানৰ নিৰ্মান। বিশেষকৈ হাতী আৰু বাঘৰ সৈতে সময়ে সময়ে মানৱ–বন্যপ্ৰাণী সংঘাত দেখা যায়। তথাপি, স্থানীয় জনজাতিৰ জ্ঞান আৰু আধুনিক সংৰক্ষণ উদ্যোগে এই চাপসমূহ হ্ৰাস কৰি আহিছে।

মিয়াও–বিজয়নগৰ পথতো অৱস্থা অত্যন্ত বেয়া। প্ৰতি বছৰে ভূমিস্খলনৰ বাবে এইপথতো বন্ধ হৈ পৰে। বাৰিষা সময়ত যেতিয়া গৱেষক বা পৰ্যটকে এই অঞ্চল ভ্ৰমণ কৰে, তেতিয়া তেওঁলোকে বহু সময়ত বনভূমিৰ ভিতৰত আটক খাই পৰে। তথাপিও বনভূমিৰ ভিতৰত অৱস্থিত অসম ৰাইফেলছৰ শিবিৰে অত্যন্ত সহায়ক ভূমিকা গ্ৰহণ কৰে — তেওঁলোকে আটক পৰ্যটক আৰু বনকৰ্মীৰ সহায়তাত আগবাঢ়ি আহে।

সেউজ পৰ্যটন, পৰিৱেশ শিক্ষা আৰু গাঁৱৰ মুখিয়ালৰ নেতৃত্বাধীন বনৰক্ষা কৰ্মসূচীয়ে গাঁওবাসীক জীৱিকা আৰু বন সংৰক্ষণ একেলগে বজাই ৰাখিবলৈ সহায় কৰে। সচেতনতা অভিযানে বুজায় যে হলৌ বান্দৰ আৰু বাঘ সংৰক্ষণ কৰাটো সাংস্কৃতিক পৰিচয় সংৰক্ষণৰ লগত জড়িত।

নামদফাৰ জীৱন্ত আত্মা

নামদফা উদ্যানৰ পুৱা সময়ত হলৌ বান্দৰৰ মাত, বিভিন্ন চৰাইৰ চিৰিকনি আৰু জংঘলৰ সুৰ একেলগে মিলি প্ৰকৃতিৰ একঅনন্য সংগীত সৃষ্টি কৰে। দাফাবুমৰ ওপৰত ধোঁৱাৰ দৰে ওলমি থকা কুঁৱলীৰ চাদৰে যেন সমগ্ৰ উদ্যানখনক আৱৰি ৰাখে। এই দৃশ্য যেন মানুহ আৰু প্ৰকৃতিৰ শতাব্দীয় সম্পৰ্কৰ এক জীৱন্ত সাক্ষ্য — য'ত সকলো জীৱ একেলগে এই মহান হাবি খনৰ পৰিচাৰক হিচাপে একত্ৰিত হৈ কাম কৰি আছে।

নামদফা ৰাষ্ট্ৰীয় উদ্যান কেৱল এটা সংৰক্ষিত এলাকা নহয়; সেয়া জীৱবৈচিত্ৰ্য, সংস্কৃতি আৰু আধ্যাত্মিক ঐতিহ্যৰ এটা জীৱন্ত সংগ্ৰহালয়। দাফাবুমৰ কিংবদন্তী কাহিনী আৰু হলৌ বান্দৰৰ মাতে উদ্যানখনক জীৱন্ত সত্তা প্ৰদান কৰে, য'ৰ পৰা মানুহে প্ৰকৃতিৰ সৈতে সহঅস্তিত্বৰ পাঠ শিকে। নামদফাৰ জীৱনধাৰা বন্যপ্ৰাণী, স্থানীয় জনগোষ্ঠীৰ জ্ঞান আৰু পৰম্পৰাগত বিশ্বাসৰ ওপৰত ভিত্তি কৰি গঢ় লৈ উঠিছে, যি প্ৰমাণ কৰে যে সংৰক্ষণ কেৱল বৈজ্ঞানিক প্ৰচেষ্টা নহয়, বৰঞ্চ এটা সাংস্কৃতিক আৰু আধ্যাত্মিক যাত্ৰা।

কৃতজ্ঞতা

ড° দিলীপ চেত্ৰীৰ পৰ্যবেক্ষণত কৰা হলৌ বান্দৰৰ জনসংখ্যা মূল্যায়ন অধ্যয়নৰ সময়ত, মই নিজৰ আগ্ৰহ অনুসাৰে স্থানীয় লোকসকলৰ সৈতে যোগাযোগ স্থাপন কৰি নামদফা ৰাষ্ট্ৰীয় উদ্যান আৰু ইয়াৰ পৰিসৰৰ সংস্কৃতি, জীৱনশৈলী আৰু পৰিৱেশ সম্পৰ্কে জানিবলৈ চেষ্টা কৰিছিলোঁ। এই আলোচনাৰ ভিত্তিত মই তেওঁলোকৰ পৰা শিকি লোৱা কিছু বিষয় সংক্ষেপে লিখি ৰাখিছোঁ।

আমাৰ সমীক্ষাৰ সময়ত সহায় কৰা সকলো ব্যক্তিক মই আন্তৰিক কৃতজ্ঞতা জনাইছোঁ— জামুক জোহাম, ৪০ মাইল কেম্পৰ ইন-চার্জ; ডব্লিউ. আৰণ, ডেবান কেম্পৰ ইন-চার্জ; অনুৰুধ মাহাতো, বন ৰক্ষক; ইলিছা যোবিন, স্থানীয় পথপ্ৰদৰ্শক; ৰঞ্জিত মুণ্ডা, স্থানীয় টেক্সি চালক; লাটগুম ছিংফো, স্থানীয় সমাজকৰ্মী; টাগে মালি, ডেবান ৰেঞ্জৰ ৰেঞ্জ অধিকাৰী। তেওঁলোকৰ সহযোগিতা আৰু তথ্যসমূহে আমাৰ ক্ষেত্ৰসমীক্ষা সফল কৰিবলৈ বিশেষ ভূমিকা পালন কৰিছে।

লগতে মোৰ ছাৰ্ভে দলকো ধন্যবাদ জনাইছো: পিতম জ্যোতি গৱে, ললিত শইকীয়া, ৰঞ্জিত শইকীয়া আৰু ধন বাহাদুৰ লিম্বুৰ, যিয়ে ছাৰ্ভেৰ সময়ত মূল্যবান সহায় আৰু অৱদান আগবঢ়াইছিল।"

Quiet invaders: Ecology of alien invasive plants across India's Protected Areas

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Protected areas (PA) are often pictured as islands of untouched nature. But many of these islands are quietly changing from the inside. A new cast of characters in the form of alien invasive plants are moving in, changing habitats, and creating problems that are as ecological as they are social. An invasive alien plant is a non-native species that arrives, becomes established, spreads rapidly, and causes harm to native biodiversity, ecosystem processes, livelihoods, or human health.

In protected areas, where the goal is to conserve native biodiversity, invasions are particularly unwelcome as invaders can outcompete native plants, alter fire regimes and nutrient cycling, reduce habitat quality for wildlife, and even change how water moves through a landscape. A single aggressive invader can transform a thorn scrub or native grassland into something very different within a few decades. These changes erode the very values protected areas exist to preserve.

Invasions are widespread and often concentrated along edges and disturbed zones like trails, roadsides, buffer lands, and areas affected by grazing or fire. Many species that were originally introduced for purposes such as ornamentals, fuelwood, or erosion control have escaped and colonized nearby reserves. For a country like India with policy gaps that make consistent management difficult, the problems arising from invasive plants rarely take a center stage.

The megaherbivore face to face with the "Terror of Bengal" Eupatorium odoratum (Water hyacinth). Photo by Avishek Sarkar

Some of the major invaders across the country's protected area landscapes are *Lantana camara*, *Chromolaena odorata* (commonly called Siam weed), *Mikania micrantha* (mile-a-minute weed), *Parthenium hysterophorus*. But these species rarely act in isolation, as they form mixed stands that are harder to remove than single-species invasions, and they can interact with other threats like grazing, fire, and habitat fragmentation to accelerate change.

However, quantifying invasion impacts is difficult because invasions vary by site, ecosystem, and history. Hundreds of alien plant species have been reported to have established in India, many with invasive tendencies, and documented invasions inside protected areas across the country. Species distribution modelling for invaders too shows large tracts of the Western Ghats and northeastern India being climatically suitable for expansion by these aliens under current and future climates. Such studies help explain invasions at higher elevations and in new parks, with previously unreported presence. Surveys show loss of native understory species and decreased regeneration in areas dominated by *L. camara* or *C. odorata* demonstrating measurable local declines in native plant richness and cover where invasives become dense.

The PAs are not immune because invasions are driven by disturbances, introduction pathways, and species traits. Roads, tourism trails, livestock grazing, and fire create open niches. Many invasives are disturbance specialists that establish and spread from these openings. Planting alien invasives for ornamentals, fuelwood, or erosion control near reserves, and unregulated movement of soil and fodder too introduces propagules that then find their way into sanctuaries. Once established, some species reproduce prolifically and disperse via wind, animals, or water. For instance, research into *M. micrantha* and other climbers shows both rapid growth and chemical defenses that reduce natural enemies, boosting their invasiveness.

Impacts that matter beyond plants

When plant communities change, animals and ecosystem services follow:

·*Wildlife habitat loss:* Many wildlife species depend on specific native plants for food, nesting, or shelter. Replacement by an invasive thicket can reduce food availability and nesting sites for birds, reduce quality of grasslands for large herbivores, and fragment habitat for smaller mammals and reptiles.

·*Altered fire and nutrient cycles:* Some invaders change fuel loads (making fires hotter or more frequent) or alter soil nutrients (e.g., nitrogen-fixing invasives changing nutrient balance). These shifts can make recovery to native states harder, and sometimes favor other invasive species - a vicious cycle.

·*Human and economic costs:* Invasives like *P. hysterophorus* cause health problems and reduce grazing value; *P. juliflora* has been reported to lower groundwater and displace native tree groves affecting livelihoods. Managing invasives requires labour, herbicides, or biological control - all of which have costs.

There is growing targeted eradication drives, research into biological control agents, and mapping efforts to prioritize hotspots of invasion risk. But several persistent gaps like Weak policy and lack of inter-organizational coordination, Capacity and funding, Over-reliance on cure than prevention has seen negligible improvement across the invaded areas.

In order to manage the impact of such species, field surveys and modelling to identify current infestations and future risk zones is important. High-value habitats need to be prioritized where invasives would do the most damage.

Early detection and rapid response are much easier to remove than a landscape-scale infestation, making it necessary to invest in surveillance and quick removal teams. Integrated control is another way by combining manual removal, targeted herbicide uses where acceptable, and tested biological-control agents with post-removal native restoration. Local people are both part of the problem and the solution. Their participation in eradication, restoration, and providing alternative livelihoods reduces pressure on reserves and creates local stewardship.

Chromolaena odorata. Photo by Avishek Sarkar

National and state wildlife and forestry bodies need clear guidelines, dedicated funds, and cross-sector coordination for invasive plant management in protected areas.

Not every non-native plant becomes a disaster, and context matters. But across India, scientific studies and on-ground reports paint a consistent picture: invasive plant species are an expanding threat to protected-area ecology. They change vegetation structure, reduce native diversity, alter ecosystem processes, and carry social and economic costs. The good news is that many tools work, if applied early, persistently, and in partnership with local people. The choice for managers and citizens is straightforward: treat invasions as a long-term management priority, not a one-off cleanup, and protect the living values that our protected areas were created to save.

Tipi Orchid Research Centre of Arunachal Pradesh – A harmony of research, conservation, and ecotourism

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Nestled amidst the verdant foothills of the Eastern Himalayas, the Tipi Orchid Research Centre in West Kameng District, Arunachal Pradesh, stands as both a paradise for nature lovers and a hub of scientific exploration. Located about 6 km from Bhalukpong along the Bomdila–Bhalukpong Highway (NH-13) and approximately 65 km from Tezpur, Assam, the centre lies at an altitude of about 190 meters above sea level on the scenic banks of the Kameng River.

Spread over nearly 10 hectares, Tipi forms an integral part of the Sessa–Tipi Orchid Sanctuary Zone, a region celebrated for harbouring more than 500 orchid species. The area's humid subtropical climate, with abundant rainfall and moderate temperatures, provides an ideal environment for the propagation, study, and conservation of orchids.

As I entered the beautifully landscaped campus, the air felt cool and fragrant of different flowers. The centre immediately revealed its dual nature-it was not merely a research institution but a living museum of natural beauty and scientific curiosity. The major attractions of the center which observed are-

The Species Houses

The first section I explored was the Species Houses, of which there are four within the Tipi campus. These structures, shaded with nylon and evergreen climbers, provide a semi-natural environment for orchids to flourish. Around 10,000 orchid plants belonging to diverse genera and species are cultivated here, ensuring ex-situ conservation of both common and rare orchids. Among them were several endangered and spectacular species such as *Vanda coerulea* (Blue Vanda), *Renanthera imschootiana*, Dendrobium densiflorum, *Vanda bicolor*, *Paphiopedilum venustum*, *Paphiopedilum fairrieanum*, and *Acanthephippium sylhetens*e. The sight of these orchids, glowing in hues of blue, gold, pink, and white, was nothing short of breathtaking-a living testament to nature's diversity and the scientific commitment to preserve it.

The Natural Orchidaria

Moving on, I entered the Natural Orchidaria, two beautiful open enclosures created under the shade of Erythrina and Teak plantations. These orchidaria serve as sanctuaries for rescued orchid species collected from timber coupes, landslide-affected zones, and degraded habitats. Here, hundreds of native orchids have been rehabilitated as part of the centre's ex-situ conservation efforts. The orchids clung gracefully to the bark of trees, mimicking their natural forest habitat. Walking through these lush sections felt like entering a tropical rainforest alive with colors, textures, and the soft hum of biodiversity being reborn.

The Orchid Herbarium

The Orchid Herbarium at Tipi is a treasure trove of botanical knowledge. Specializing exclusively in orchids, it houses about 2,770 specimens representing 380 species from 100 genera found across Arunachal Pradesh. The herbarium also preserves 30 type specimens of newly discovered species from the centre itself, making it an invaluable reference for taxonomists and researchers worldwide.

Each preserved specimen, neatly mounted and labeled, tells the story of a discovery-of field explorations in remote mountains, of meticulous identification, and of the scientific pursuit to understand the immense floral wealth of the region.

The Tissue Culture Laboratory

One of the most scientifically significant sections of the centre is the Tissue Culture Laboratory. This state-of-the-art facility is dedicated to the micropropagation of orchids through seed culture and tissue culture techniques. Every year, the lab produces between 20,000 and 40,000 orchid seedlings belonging to various rare, endangered, and ornamental species, as well as hybrids. These plantlets are distributed to farmers, orchid enthusiasts, and commercial growers, and some are reintroduced into natural habitats to strengthen wild populations. Inside, I saw flasks and culture tubes glowing under soft light, each containing a tiny green plantlet—future orchids destined to adorn forests, homes, and botanical gardens. It was inspiring to witness how biotechnology and conservation seamlessly unite in this Himalayan outpost.

The Hardening Unit

Adjacent to the laboratory is the Hardening Unit, a transitional space where laboratory-raised plantlets are acclimatized before being transferred to outdoor conditions. This unit is equipped with controlled light, temperature, humidity, and a periodic water spray system, creating the perfect environment for young orchids to adapt to natural settings. Watching the tender green plantlets gradually strengthen under these conditions offered a sense of quiet fulfillment-here, science was not confined to glass tubes but was nurturing life that would one day thrive in the wild.

The Orchid Museum

Another fascinating section of the centre is the Orchid Museum, which beautifully narrates the orchid diversity of Arunachal Pradesh and the Northeast. The exhibits include maps, color photographs, charts, black-and-white blow-ups, and preserved specimens displayed in jars and tubes. The museum also highlights the activities and achievements of the Tipi Centre over the years, showcasing how research, conservation, and awareness programs have evolved in this remote yet vibrant region. It served as both an educational space and a celebration of the state's botanical heritage.

The Cactus House

While orchids dominate the centre, a small yet captivating Cactus House added a delightful contrast to my visit. Though modest in size, it displayed a variety of striking cactus species-tall, columnar types reaching upward, and small, rounded ones adorned with colorful blossoms. The collection reflected the adaptability and resilience of desert flora, standing as a visual counterpoint to the delicate tropical orchids. The Cactus House reminded me that beauty in nature takes many forms-from the tender petals of an orchid to the thorny elegance of a cactus.

Next, I stepped into the Display-cum-Sale Centre, which offered a collection of handicrafts, souvenirs, and beautifully published books on orchids. It was a delightful blend of science, culture, and local craftsmanship, reflecting the harmonious coexistence of tradition and modernity in Arunachal Pradesh.

River Kameng View Point

A short walk from there led me to a viewpoint, which offered a breathtaking panorama of the Kameng River flowing serenely beside the research complex. Beyond the river stretched the dense green expanse of the Pakke Tiger Reserve, forming a majestic backdrop of wilderness and tranquillity. Standing there, listening to the soothing rush of the river and the chirping of birds, I felt deeply connected to nature's rhythm.

Orchid stars I encountered

The centre, known for its remarkable ex-situ conservation efforts, cultivates many rare and ornamental species, preserving them for future generations while offering visitors an unforgettable botanical experience. Each orchid seemed to embody a story of adaptation, survival, and the delicate balance of nature that thrives in this part of the Eastern Himalayas.

Among the exquisite varieties that caught my attention was Vanda coerulea, famously known as the Blue Vanda. Its mesmerizing bluish-purple petals glowed under filtered sunlight, symbolizing serenity and grace. This rare orchid, native to the region, is one of the most sought-after species for its striking beauty and horticultural value. Close by, I found *Vanda bicolor*, another remarkable species with contrasting hues of violet and white that instantly stood out against the lush green backdrop of the orchidarium. Together, they represented the rich palette of nature's artistry that flourishes under the careful care of the researchers at Tipi.

Equally captivating was Dendrobium densiflorum, known for its dense clusters of golden-yellow blossoms that hung like miniature lanterns. Its bright color and compact form made it one of the most cheerful orchids on display. The Paphiopedilum venustum, commonly known as the Lady's Slipper Orchid, was another fascinating specimen-its pouch-like labellum and delicate patterns reflecting nature's intricate craftsmanship. Alongside it was Paphiopedilum fairrieanum, another rare and prized slipper orchid that drew the admiration of collectors and visitors alike for its elegant curvature and vibrant hues. The collection also included Acanthephippium sylhetense, a terrestrial orchid that may not boast the flamboyance of its epiphytic counterparts but holds immense botanical significance.

Its understated beauty and sturdy form reminded me of how every species, whether spectacular or subtle, contributes to the incredible diversity of the orchid family. The researchers at Tipi have ensured that such less-celebrated orchids receive equal attention in conservation efforts, reflecting a balanced and inclusive approach to biodiversity preservation.

Beyond these renowned species, the centre is deeply engaged in the study and protection of locally endemic orchids, some of which are extremely rare and found only in the forests of Arunachal Pradesh. Among them is Biermannia jainiana, a critically endangered epiphytic orchid discovered in this region. Its rarity and delicate structure highlight the ecological sensitivity of these mountain forests, where each plant's survival is linked to a complex web of environmental factors. Another fascinating orchid associated with Tipi is Cheirostylis tippica, a unique species named after the very locality-Tippi-where it was first identified. Known only from this area, it stands as a living testament to the centre's role in scientific discovery and documentation of regional flora.

Extending the significance of Tipi's conservation network, the nearby Sessa Orchid Sanctuary shelters another notable species, Spathoglottis arunachalensis, which is of considerable conservation concern. Its vibrant blooms and restricted distribution underscore the urgent need to protect the fragile ecosystems of Arunachal Pradesh that harbor these botanical treasures. Together, these species-ranging from the dazzling Vandas and Dendrobiums to the understated Cheirostylis and Spathoglottis—paint a vivid picture of the state's floral wealth.

Exploring these orchids at Tipi was not just an aesthetic delight but a profound educational experience. Each name I encountered-each petal, color, and form-revealed the intricate relationship between nature, science, and conservation.

The Tipi Orchid Research Centre, through its tireless efforts, has not only created a sanctuary for these living jewels but has also built a bridge between human curiosity and the timeless beauty of the natural world.

My visit to the Tipi Orchid Research Centre was not just a botanical excursion but a soulful experience that celebrated the beauty, diversity, and ecological importance of orchids. It reminded me how nature, when nurtured with care and scientific understanding, can truly bloom in its fullest splendour.

If one ever seeks to witness the harmony of science and nature, the Tipi Orchid Research Centre is undoubtedly the place to be—a living testament to Arunachal Pradesh's rich floral heritage and the timeless allure of orchids.

While the Tipi Orchid Research Centre stands as a remarkable hub for orchid conservation and research, certain sections of the campus appear to require better maintenance and management. A few areas, particularly around the older species houses and visitor sections, show signs of neglect in terms of cleanliness, infrastructure upkeep, and proper labeling of plant specimens. These issues, though minor, can diminish the overall appeal and scientific value of the centre. It is therefore advisable that the concerned authorities undertake regular maintenance drives, improve signage and plant documentation, and ensure that every section of the facility reflects the high standards expected of such a prestigious institution dedicated to biodiversity conservation.

Advice to visitors: Before entering Arunachal Pradesh, visitors are required to obtain an Inner Line Permit (ILP), a travel document issued by the state government to regulate entry of non-residents into the state. The ILP can be easily obtained online through the official portal of the Government of Arunachal Pradesh or from designated offices located in cities such as Guwahati, Tezpur, and Naharlagun.

Photos by Dr. Ashoke Kumar Das

From organic waste to agricultural affluence- the role of Vermicompost and its nanoparticles

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India's major source of livelihood, especially in the nation's vast rural areas, is without any question agriculture and its associated sectors. Agriculture offers a substantial contribution to the GDP.

Holistic rural development depends on sustainable agriculture in terms of food security, rural employment, and environmentally friendly technologies including soil conservation, sustainable natural resource management, and biodiversity protection. It's our duty to use wisely and behave with royalty with this sector.

In agricultural sector, the crops are treated with lots of chemicals and pesticides to prevent them from various diseases and pathogenic attacks. Here vermicompost jumps into action and plays a pivotal role in plant disease management and plant pathogen control as they are the abundant sources of microbial diversity and action and shelters a wide range of antagonistic bacteria, thereby acting as an effective biocontrol agent helping in inhibition of different soilborne and plant diseases. Vermicompost and its applications are one-of-a-kind and spectacular when utilized properly.

Vermiwash and vermicompost liquid extract (known as teas) are also highly beneficial in a lot of agricultural and industrial scenarios.

Let us understand what vermicomposting is and what does it contain?

Vermicomposting technology plays a significant role in the plant growth and development, initiation of rooting and root growth, thereby improving crop production and crop yield. Vermicomposting aids in the conversion of organic materials into vermicompost.

A vermicompost pit.

Vermicompost is a peat like material, showing high porosity, drainage, aeration and even water holding capacity. Vermicompost improves soil biodiversity by nurturing the useful microbes which further enhances plant growth straightaway by the production of plant growth regulating hormones and enzymes and also by controlling plant pathogens and other pests, thereby improving plant health and reducing crop yield loss.

Vermicomposting is one of the sustainable approaches of composting where different species of earthworms such as *Eisenia fetida, Eisenia andrei* etc. are used. Vermicomposting is a mesophilic process that involves the interaction between microorganisms and earthworms, which acts at a temperature of 10°C to 32°C. Different composition of nutrients such as nitrates, phosphates, calcium and soluble potassium along with certain plant growth influencing materials produced by microorganisms are present in vermicompost.

Vermiwash is the liquid/aqueous extract formed by the process of vermicomposting of organic matter from an abundant population of earthworms.

Its quality and composition vary depending upon the raw organic matter used during the process of vermicomposting. Vermiwash is a rich source of different nutrients, vitamins and can act as pest control agents, thereby showing fungicidal, insecticidal and pesticidal properties, which are sustainable and eco- friendly. The presence of microbiota especially fungi, bacteria and actinomycetes makes it suitable for plant growth. The intestine of earthworm contains a broad range of microorganisms, hormones and enzymes which helps in fast decomposition of half-digested materials thereby converting them into vermicompost. Within a short period of time, in comparison to traditional composting methods, which takes a much longer period of time for compost production.

A study and experiment was done by me and my associate under the guidance of Dr. Indira M.N, on the *"Synthesis and characterization of vermicompost mediated copper oxide nanoparticles and assessing its antifungal activity"*. Various assays and analysis were done to find answers as to how nanoparticles found in the vermicompost could be used as healers and protectors of the plants.

We found that the earthworms used in the vermicomposting process contained a huge diversity of bacteria. Earthworms have the ability to increase plant nutrient availability that depends upon the earthworm's gut microflora. Earthworm activity also improves the population of Plant growth-promoting rhizobacteria (PGPR). The gut of certain earthworms such as *Allolobophora caliginosa, Lumbricus terrestris* and *Allolobophora terrestris* contains higher number of aerobes compared to soil. The composition of earthworms has increased the number of microbes in soil and also the number of bacteria and actinomycetes in the ingested material also increased while passage through the gut. The gut of E. fetida was also found to contain a wide range of anaerobic N2-fixing bacteria such as *Clostridium butyricum*, *C. paraputrificum* and *C. beijerinckii.*

Vermicompost plays a major role in maintaining soil fertility as they are comprised of a range of micro elements, macro elements, hormones, enzymes, nutrients such as calcium, phosphorus, soluble potassium and magnesium which are present in plant available forms and are capable of providing a large surface area that provides a number of microsites for microbial activity and for the withholding of nutrients. The bacterial population present in vermicompost plays an important role in biomedical waste management.

Vermiwash contains a huge number of decomposer bacteria, mucus, vitamins, various digestible minerals, hormones, enzymes, antimicrobial peptides, as well as other components. The more liquid the vermiwash is, the more bioavailable it is for plants to absorb and inhibit infections. The impact of vermiwash and mucus derived from *Eisenia fetida* on Fusarium graminearum dramatically suppressed the pathogenic fungus's proliferation, affecting both wheat (*Triticum aestivum* L.) quality and yield. When partnered with other plant-based pest management approaches, vermiwash seemed to have a synergetic impact, reducing insect infestations like thrips and mites while also producing a significant number of sound seeds to maximize yield.

Earthworms thriving in nutrient-rich vermicompost.

When compared with control leaves, the bean leaf (*Phaseolus vulgaris* L.) treated with vermiwash had a considerable repellent activity against Acarina (*Tetranychus urticae*). Vermiwash substantially barred the maturation of eggs of the plant-eating spider mite (*Tetranychus urticae*), implying that it might be used as an insecticide to manage red spider mite outbreaks in the agricultural sector Vermiwash contains a huge number of decomposer bacteria, mucus, vitamins, various digestible minerals, hormones, enzymes, antimicrobial peptides, as well as other components.

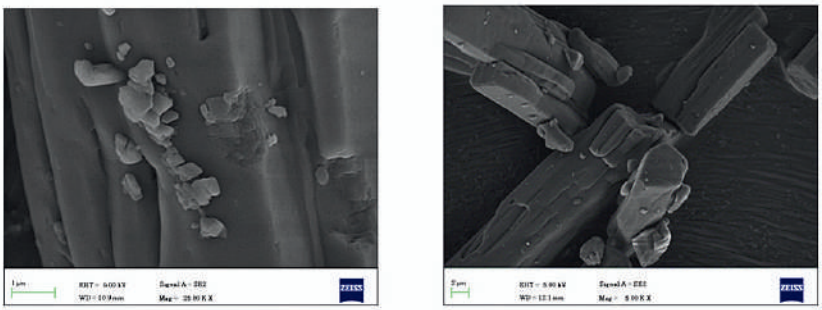
To understand the role of the nanoparticles present in the vermicompost, we extracted many nanoparticles like silver, copper, zinc etc. We found that CuO NPs were shown to have powerful antimicrobial efficacy against eight different bacterial species.

CuO NPs might thus be used as antibacterial in surface coatings on a variety of substrates to inhibit microbes from colonizing, spreading, and creating microflora in implantable medical devices. Copper oxide NPs were synthesized from leaf extract of Cassia fistula and its antifungal properties were being evaluated against *Fusarium oxysporum* f. sp. Lycopersici (causative organism for wilt of tomato). The results showed effective inhibition of the growth of fungal hyphae along with termination of the spore germination by the copper oxide nanoparticles.

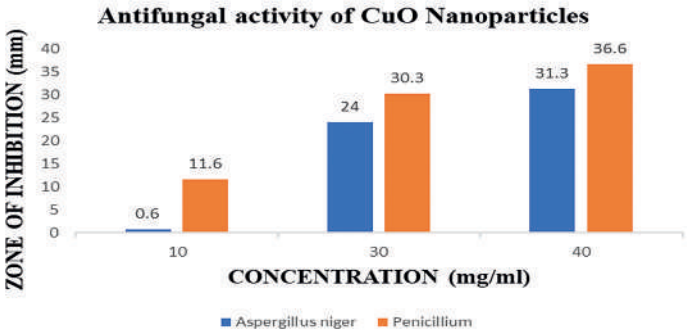
To analyse the nanoparticles, we used different methods like Scanning electron microscopy (SEM), transmission electron microscopy (TEM), X-Ray Diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), ultraviolet diffraction spectroscopy (UVSpectroscopy)SEM and the reports were directly out from the labs of IISC Bangalore.

Zinc oxide nanoparticles have been shown to effectively suppress post-harvest fungal species such as Botrytis cinerea and Penicillium expansum in the agricultural industry. Many metal oxides were shown to have antimicrobial inhibitory effects against bacteria such as Streptococcus sp. The commercially available vermicompost was subjected to extraction and characterization of copper oxide nanoparticles. The copper oxide nanoparticles showed a great deal of antifungal properties against Aspergillus niger and Penicillium sp.

The extraction of the nanoparticles from the organic waste generated from our households which lack too much impurities and using in the crop health benefits is such a wonder and bliss. In today's world we should learn and also pass on these techniques to the youth for a sustainable agricultural practice along with organic waste management ideologies. Many people are now converting the flowers used in wedding or other decorative purposes into composts in their own backyard composting pits. These practices direct the world to a greener approach to maintain the agriculture as an asset.



SEM images of the synthesized CuO nanoparticles



Commercially available vermicompost

Antifungal activity of synthesized CuO nanoplastics

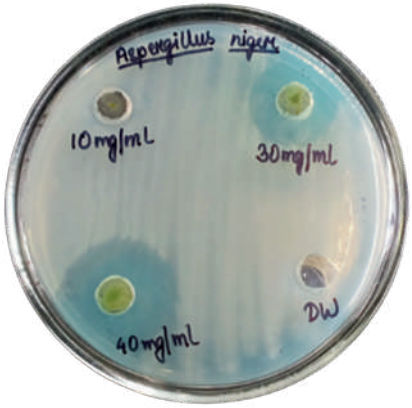


Fig 1: Aspergillus niger

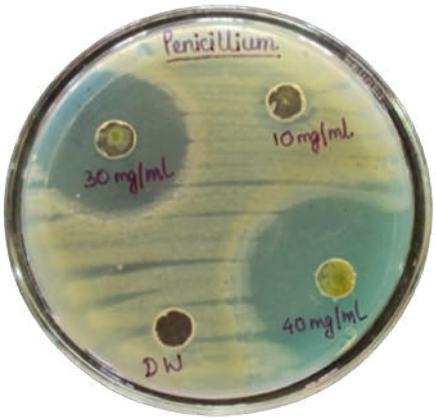
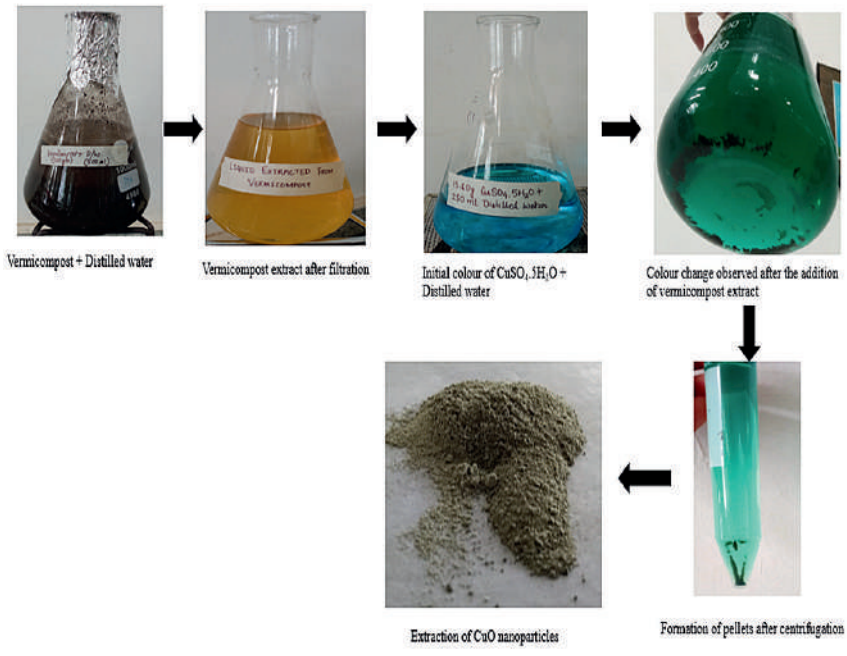


Fig 2: Penicillium sp.



The process and the findings of the experiment are in the above images. It shows how the copper nanoparticles were extracted and dried into powdered form, followed by the antimicrobial assay.

Photos by Jahnabi Bora

ধৃতিৰাজ’ৰ আঁত ধৰি

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প্রাণীজগতৰ সর্বাধিক আকর্ষণীয় প্রাকৃতিক কার্যবোৰৰ ভিতৰৰ অন্যতম এটা হ’ল চৰাই কিছুমানৰ নৈমিত্তিক ঋতুভিত্তিক প্রব্রজন। পৃথিৱীৰ সকলো প্রকাৰৰ জীৱ বা প্রাণীৰ ভিতৰত চৰায়েই হ'ল পৰিভ্রমণৰ ক্ষেত্রত বিশেষবাবে উল্লেখযোগ্য–বিশেষ ভাবে বিখ্যাত।

যিবোৰ চৰাই বা পক্ষীয়ে বছৰৰ কোনোবা এটা নির্দিষ্ট ঋতু বা সময়ত নিয়মীয়াকৈ কোনোবা এটা অঞ্চলৰ পৰা অন্য এটা অঞ্চললৈ দীঘলীয়াকৈ যাত্রা কৰে সেইবোৰ চৰাইকে পৰিভ্রমী চৰাই বুলি অভিহিত কৰা হয়। বহু প্রজাতিৰ পৰিভ্রমী চৰায়ে সহস্রাধিক কিলোমিটাৰ পর্যন্ত অতিক্রমি এনেদৰে বিশাল আকাশৰ বুকুৰেদি উৰি যাব পাৰে। এনেকুৱা ধৰণৰ প্রজাতিৰ চৰাইসমূহক সেইবাবে ‘ভ্রমণকাৰী’ চৰাই বা ‘বিশ্বভ্রমণকাৰী পক্ষী’ বুলি কোৱাও শুনিবলৈ পোৱা যায়।

চৰাইবোৰৰ এই পৰিভ্রমণ কিন্তু লক্ষবিহীন ভ্রমণ নহয়। পৰিভ্রমণৰ কাৰণবোৰ ভিতৰত মূল কাৰণটো হ’ল জীৱবৈজ্ঞানিক প্রবৃত্তি আৰু পৰিৱেশগত প্রয়োজনীয়তা। ইয়াৰ অন্তৰালৰ উদ্দেশ্য হ’ল জলবায়ু আৰু পৰিবেশৰ লগত নিজকে খাপ খোৱাকৈ এটা পৰিবেশিক অঞ্চলৰ পৰা আন এটা পৰিবেশৰ অঞ্চললৈ ভ্রমণ কৰাটো।

Photo by Imon Abedin

চৰাইসমূহে পৰিভ্ৰমণৰ কৰাৰ প্ৰধান কাৰণ হ'ল খাদ্যৰ সন্ধান কৰা, অনুকূল জলবায়ু আৰু নিৰাপদ প্ৰজননক্ষেত্ৰৰ সন্ধান ইত্যাদি। উত্তৰ গোলার্ধত শীতকালত চৰাইৰ বাবে প্ৰয়োজনীয় খাদ্যৰ যথেষ্ট অভাৱ হয়, ফলস্বৰূপে সেই অঞ্চলত চৰাই সমূহে শীতৰ ঋতুত জীৱন যাপন কৰাটো কঠিন। এনে অৱস্থাৰ পৰা পৰিত্ৰাণ পাবলৈ বহু পৰিভ্ৰমী চৰায়ে খাদ্য যথেষ্ঠ পৰিমানত মজুত থকা উষ্ণ অঞ্চল সমূহলৈ উৰি গুচি যায়। কিছুমানে আকৌ প্ৰজননৰ সুবিধাৰ নিমিত্তেও নিৰ্দিষ্ট স্থানলৈ পৰিভ্ৰমণ কৰে,য'ত পোৱালিৰ প্ৰতিপালনৰ বাবে উপযুক্ত পৰিৱেশ উপলব্ধ হ'ব পাৰে। সেয়ে চৰাইৰ পৰিভ্ৰমণ মূলতঃ জীৱননিৰ্বাহ তথা বংশৰক্ষাৰ এক কৌশল। ইচ্ছাকৃত ভাবে পৰিবেশ-পৰিস্থিতিৰ পৰিবৰ্তন কৰি, জীৱনচক্ৰ চিৰস্থায়ী কৰাৰ এক স্বাভাৱিক প্ৰক্ৰিয়া।

চৰাই বা পক্ষীসমূহৰ এই পৰিভ্ৰমণৰ ধৰণ বিভিন্ন প্ৰকাৰৰ। কিছুমান পৰিভ্ৰমণকাৰী চৰায়ে অক্ষাংশ-দ্ৰাঘিমাংশ ভিত্তিক পৰিভ্ৰমণ কৰে, উত্তৰ গোলার্ধৰ শীতল অঞ্চলৰ পৰা উষ্ণমণ্ডলীয় অঞ্চললৈ উৰি যায়। আন কিছুমানে উচ্চভূমিৰ পৰা উপত্যকা আৰু সমতলত অৱতৰণ কৰে – যাক উচ্চতাগত পৰিভ্ৰমণ বুলি কোৱা হয়। কিছুমান চৰায়ে কম দূৰত্ব পৰিভ্ৰমণ কৰিলেও, কিছুমান চৰায়ে কিন্তু আশ্চৰ্যকজনক ভাৱে এটা দীঘলীয়া যাত্ৰা অতিক্ৰম কৰে। এবিধ চৰাই আছে যি বিধে নৱৈহাজাৰ কিলোমিটাৰৰো অধিক আকাশৰ ওপৰেদি উৰি উত্তৰ আৰু দক্ষিণ মেৰুৰ মাজত নিয়মীয়াকৈ বাৰ্ষিকভিত্তিত অহা-যোৱা কৰে। এইবিধ চৰাইৰ একোটাই বোলে তেওঁৰ সমুদায় জীৱন কালত এইদৰে পৰিভ্ৰমণ কৰোতে পৃথিৱী আৰু চন্দ্ৰৰ মাজৰ দূৰত্বৰ সমান দূৰত্ব অতিক্ৰম কৰে।

আন এক অদ্ভুত উদাহৰণ হ'ল আমাৰ ধৃতিৰাজ চৰাই; ইংৰাজীত যাক কোৱা হয় Bar-Headed Goose বুলি। আকাৰত যথেষ্ট ডাঙৰ,হাঁহ প্ৰজাতিৰ এই পৰিভ্ৰমী চৰাইবিধ মধ্য এছিয়াৰ পৰ্বতীয়া অঞ্চলৰ পৰা কেইবা হাজাৰ কিলোমিটাৰ অতিক্ৰম কৰি,সুউচ্চ হিমালয় পৰ্বতমালাৰ ওপৰেদি উৰি আহি দক্ষিণ এছিয়া পাইহি। আমাৰ অসমৰ কাজিৰঙা,পবিতৰা, ডিব্ৰুছৈখোৱা ইত্যাদি অভয়াৰণ্যত শীতকালত ধৃতিৰাজ নামৰ চৰাইবিধ প্ৰচুৰ পৰিমাণত দেখিবলৈ পোৱাৰ সৌভাগ্য ঘটে।

এই ধৰণৰ কষ্টসাধ্য ভ্ৰমণ সফল কৰিবলৈ পৰিভ্ৰমী চৰাইবোৰে উৰণৰ আগে আগে স্বাস্থ্য সংক্ৰান্তীয় বিশেষ কৌশল অৱলম্বন কৰিবলগীয়া হয়। তেওঁলোকে দীঘলীয়া যাত্ৰাৰ পূৰ্বে শৰীৰটো মেদবহুল কৰি তোলে। পাখিৰ পেশী শক্তিশালী কৰে আৰু শ্বাস-প্ৰশ্বাসৰ ক্ষমতা উন্নত কৰে। পৰিভ্ৰমী চৰাইবোৰৰ দিশ-জ্ঞানৰ ক্ষমতাও অসাধাৰণ। পৃথিবীৰ চৌম্বক ক্ষেত্ৰ, সূৰ্য, নক্ষত্ৰ বা পৰিচিত পৰ্বত-নদীৰ জড়িয়তে তেওঁলোকে দিশ নিৰ্ণয় কৰে। আশ্চৰ্য্যজনকভাৱে, বহু প্ৰজাতিৰ চৰায়ে বছৰ বছৰ ধৰি এনেদৰে একেটা পথেৰে পৰিভ্ৰমণ কৰি পূৰ্বনিৰ্ধাৰিত প্ৰজননক্ষেত্ৰলৈ উৰা মাৰে।

আশ্চৰ্যজনকভাবে পৰিভ্ৰমী চৰাইবোৰে সাধাৰণতে পৃথিৱীৰ স্থলভাগৰ ওপৰেদিহে অহা-যোৱা কৰে বা পৰিভ্ৰমণ কৰে। জলভাগ বা সাগৰ-মহাসাগৰৰ ওপৰেদি পৰিভ্ৰমী চৰাইবোৰে ভ্ৰমণ কৰা দেখিবলৈ পোৱা নাযায়। পৰিভ্ৰমণ কালত তৃষ্ণা অনুভৱ কৰিলে তললৈ নামি সাগৰৰ লুণীয়া পানী খাব নোৱাৰাটোৰেই পৰিভ্ৰমী চৰায়ে পৃথিৱীৰ স্থলভাগৰ ওপৰেদি দীঘলীয়া যাত্ৰা কৰাটো এটা প্ৰধান উদ্দেশ্য।

পৃথিৱীৰ বিভিন্ন স্থানত পৰিভ্ৰমী চৰায়ে প্ৰাকৃতিক বিস্ময় সৃষ্টি কৰাৰ লগতে সাংস্কৃতিক সমন্বয় গঢ়ি তুলিছে। ভাৰতৰ ভৰতপুৰ অভয়াৰণ্যত ছাইবেৰিয়ান ক্ৰেইনৰ আগমন, নাগালেণ্ডত আমুৰ ফেলকনৰ চমক, অথবা উৰিষ্যাৰ চিলিকা হ্ৰদত ফ্লেমিংগো চৰাই দেখিবলৈ পোৱাটো ইয়াৰ সুন্দৰ উদাহৰণ। এই সকলোবোৰেই প্ৰকৃতিৰ বিশেষ উপহাৰ। ইয়াৰ ফলত জীৱবৈচিত্ৰ সমৃদ্ধ হয় আৰু লগে লগে পৰ্যটকৰো আকৰ্ষণ ঘটে। বহু স্থানীয় লোকে বা সমাজে ইয়াক উৎসৱৰ দ'ৰে পালন কৰে। এই উৎসৱ উদযাপনে প্ৰকৃতিৰ ওপৰত মানুহৰ ভালপোৱা বৃদ্ধি কৰাৰ লগতে পক্ষী সংৰক্ষণৰ সজাগতাও বৃদ্ধি কৰে।

কিন্তু বৰ্তমান সময়ত পৰিভ্ৰমী চৰাইবোৰে বহুত বিপদৰ সন্মুখীন হ'বলগীয়া হৈছে। নগৰাঞ্চল বৃদ্ধি, কৃষি, আৰু জলাহভূমি শুকাই যোৱাৰ ফলত চৰাইৰ বাসস্থান সমূহ টুটি অহা বা ধ্বংস হোৱা পৰিলক্ষিত হৈছে। জলবায়ু পৰিৱৰ্তনৰ ফলত চৰাইৰ পৰম্পৰাগত পৰিভ্ৰমণৰ সময়সূচীতো ব্যাঘাত হৈছে।

A pair of Bar-headed goose. Photo by Mrinal Kaushik

কীটনাশক ঔষধ প্রয়োগ, দূষিত জলবায়ু আৰু খনিজ তেল আদিৰ প্ৰভাৱত চৰাইৰ বাসস্থান সমূহ নষ্ট হৈ পৰিছে। অবৈধ চিকাৰৰ ফলতো বহুটো চৰাই প্ৰজাতি বিলুপ্তিৰ দিশে আগবাঢ়িছে। লগতে বিদ্যুতৰ তাঁৰ, উচ্চ অট্টালিকা আৰু বায়ুবিদ্যুত চক্ৰৰ সৈতে সংঘৰ্ষত বহু পৰিভ্ৰমী চৰাই মৃত্যুমুখত পৰাও দেখিবলৈ পোৱা গৈছে।

এইবোৰ সঙ্কটৰ সমাধানৰ বাবে বিশ্বব্যাপী সংৰক্ষণৰ প্ৰয়োজন আহি পৰিছে। এই উদ্দেশ্যেৰে আন্তঃৰাষ্ট্ৰীয় পৰ্যায়ত বহুতো সংগঠনৰো ইতিমধ্যে প্ৰতিষ্ঠা হৈছে। আমাৰ দেশত, বিশেষকৈ উত্তৰ-পূৰ ভাৰতত জৈৱ বৈচিত্ৰ্য আৰু বন্যপ্ৰাণী সুৰক্ষাৰ নিমিত্তে সমৰ্পিত অগ্ৰণী অনুষ্ঠান আৰণ্যক ৰ নাম এই ক্ষেত্ৰত বিশেষভাৱে উল্লেখযোগ্য।

নিশ্চিতভাৱে এইবোৰ একো একোটা উল্লেখযোগ্য শুভ লক্ষণ। ইয়াৰ লগে লগে স্থানীয় পৰ্যায়ত জন সচেতনতা বৃদ্ধি, ইকো-টুৰিজমৰ সম্প্ৰসাৰণ, আৰু চোৰাং চিকাৰৰ বিৰুদ্ধে কঠোৰ আইন বলবত কৰিব পাৰিলে পৰিভ্ৰমী চৰাই সংৰক্ষণৰ ক্ষেত্ৰত যথেষ্ট সহায়ক হ'ব।

পৰিভ্ৰমী চৰাইবোৰ কেৱল মাত্ৰ আকাশত উৰা ভ্ৰমণকাৰী চৰায়েই নহয়,তেওঁলোকে বিশ্বজুৰি জীৱবৈচিত্ৰ আৰু পৰিৱেশৰ সংযোগৰ শৃংখল। তেওঁলোকে প্ৰাকৃতিত সুষমা সৃষ্টি কৰে, পৰিবেশক সুস্থ কৰি ৰাখে, আৰু মানৱ সভ্যতাক প্ৰকৃতিৰ সৈতে জড়িত কৰি ৰাখে। সেইবাবে পৰিভ্ৰমী চৰাই সংৰক্ষণ মানে হ'ল বিশ্ব পৰিবেশ সংৰক্ষণ কৰা।

উত্তৰ পুৰুষে যাতে এই আকাশ-ভ্ৰমণকাৰী বিস্ময়কৰ চৰাই সমূহৰ দৰ্শন লাভৰ পৰা বঞ্চিত নহয় সেই দিশৰ প্ৰতি সতৰ্কতা অৱলম্বন কৰাটো আমাৰ প্ৰত্যেকৰে এক সমূহীয়া গধূৰ দায়িত্ব।

Faces of conservation: The people who keep wildlife alive

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Wildlife conservation narratives often highlight the efforts of forest departments and government initiatives as exemplar of success. However, the remarkable cooperation, struggles, and sacrifices local community makes rarely receive the recognition they deserve. These communities play a pivotal role in preserving wildlife, yet their efforts sometimes go unnoticed.

Every dawn sees farmers preparing for the day ahead, knowing they may have to restore their fields. Parents teach their children to respect the wildlife wandering freely near their homes, instilling an understanding that these wild animals are not intruders but the rightful inhabitants of the land. Their coexistence with wildlife is largely overlooked, and their hard work is persistently tested by the challenges of living on the edge of protected land.

In Pobitora Wildlife Sanctuary, located in Mayang within Assam's Morigaon district, approximately 28 villages sit on the periphery of the sanctuary. Although relatively small at 38.85 square kilometres, Pobitora is renowned for hosting India's highest density of rhinos, along with significant populations of feral water buffaloes and wild boars.

Photo by Ujjal Bayan

Historically, the sanctuary's landscape was marked by farmlands and rice paddies intertwined with vast wetlands. Initially designated as a grazing reserve forest in 1971, Pobitora was later transformed into a wildlife sanctuary in 1987. Today, the sanctuary is encircled by villages and agricultural fields, creating a fragile yet interdependent relationship between people and wildlife.

When it comes to conservation, communities play an essential role in protecting wildlife and the environment. They act as a bridge between conservation efforts and the local ecosystems, providing valuable insights and practical support. Living close to wildlife, they are more aware of changes in the environment and are often the first to respond when challenges arise, such as human-wildlife conflicts or habitat disturbances.

Their local knowledge and daily interactions with nature enable them to contribute effectively to conservation strategies, making them vital partners in preserving biodiversity and maintaining ecological balance. Communities not only take immediate actions but also help sustain long-term efforts by promoting understanding and cooperation within their regions. Their involvement ensures that conservation is rooted in local realities and becomes a shared responsibility for everyone.

Community and agriculture practices

Approximately 28 villages are situated along the edge of the Pobitora Wildlife Sanctuary, forming a vibrant yet intricate relationship between the sanctuary and its surrounding communities. While the majority of the population engage themselves in agriculture, when it comes to sources of income, farming is not the only livelihood for the people of Mayang. Many individuals are engaged in livestock rearing, which serves as a primary income source for a significant portion of the population.

Additionally, numerous landless individuals earn their living by working as labourers. Villages such as Burha Mayang, Chengmari, Kamarpur, Nalani, Sanaka, Nekera Habi, Bardia, Hatigarh, Bura-Buri, and Hatimuria primarily focus on cultivating paddy and mustard, which are staples in the region. In other villages like Kukuwari, Diprang, and Boha Dalani, paddy cultivation remains the primary occupation, anchoring their agricultural practices.

Meanwhile, villages such as Sildubi, Muroibari, and Murkata (No. 1 and No. 2) showcase a more diversified approach, growing paddy alongside seasonal crops like watermelons and pumpkins. Khalkhila Par (Loonmati) stands out as the only village in Pobitora that specializes in cultivating sugarcane, adding a unique and different agricultural element to the region. Similarly, the villages of Jhargaon and Hiloikunda have diversified their practices by complementing paddy farming with the cultivation of black lentils and maize.

Community and wildlife

The lives of people residing near the sanctuary are deeply intertwined with wildlife in ways that are often beyond imagination. For these communities, the threat of having to rebuild their lives from scratch is an ever-present reality.

As previously mentioned, "Every dawn sees farmers preparing for the day ahead, knowing they may have to rebuild their fields." This reflects the fortitude of these individuals, who navigate the balance of coexistence with the sanctuary's wildlife.

Chengmari village, which lies closest to the sanctuary's boundary, the presence of straying buffaloes and rhinos is a common occurrence. The lush cultivation of crops such as paddy and mustard acts as an irresistible lure, drawing wildlife beyond the sanctuary's boundaries.

The author during a field assignment. Photo by Ujjal Bayan

In particular, feral buffaloes frequently venture out, not only in search of food but also for mating purposes. This regular interaction has led to several reports of feral buffaloes raiding crops and, in some cases, creating situations of conflict with humans. Certain villages, such as Kamarpur, Nalani and Kuronibori, have emerged as hotspots for such incidents. Here, farmers face repeated challenges as they strive to protect their livelihoods while also coexisting with the wildlife that roams freely. One notable incident, dating back three to four years ago, involved a rhino wandering into a school campus in Hatigarh Village, Mayang.

Such occurrences are not uncommon in the region; these reflect the challenges faced by communities living in close proximity to wildlife. Tragically, a few years ago, a 10-year-old child lost his life in Nalani Village due to an attack by a feral buffalo. On 23rd December 2024, in the early hours, a buffalo attacked a local resident of Kamarpur Gaon, who succumbed to injuries sustained during the incident.

Similarly, on 22nd January 2025, a rhino entered the agricultural land rented annually by Mr. Padmeshwar Nath. The rhino caused significant damage to approximately 1 - 1.5 bighas of land (1 bigha = 14,400 square foot), impacting a variety of crops.

Agriculture being Mr. Nath's primary source of income, even damage to 1-2 katha's (1 katha = 2,880 square foot) of land is considerable. During this incident, Mr. Nath incurred financial losses exceeding ₹50,000. Despite the magnitude of his loss, Mr. Nath displayed an extraordinary level of understanding regarding the behaviour of wildlife.

In an interaction, he expressed no resentment or negativity toward the animal, stating, "*Just as this is our place, it is theirs too. Yes, I am at loss, but that does not mean I should punish the animal. I choose to think of it as dedicating a portion of my land to wildlife. This is not the first-time rhinos or buffaloes have entered my crop field. I believe the rhino only takes its share, and I have to let it go for them.*"

Incidents like these have left a lasting impact on the lives of local residents. As a result, many villagers have chosen to move away from traditional agriculture, seeking alternative sources of income. Some have ventured into new businesses, while others have experimented with alternate cropping methods to reduce the risk of human-wildlife conflicts.

Numerous incidents have been recorded over the years, each providing the local communities ample reason to harbour resentment or ill intentions towards wildlife. They have endured relentless challenges-fields raided season after season, acres of crops lost to foraging animals, and livelihoods jeopardized by the unpredictable behaviour of nature. By all rights, they could have retaliated or resorted to violence, yet their response has been one of remarkable restraint and unwavering commitment to conservation.

Despite their hardships, these resilient individuals display a profound willingness to learn and adapt. The villagers understand a profound truth-wildlife knows no boundaries. For instance, the father who lost his son in a tragic human-wildlife incident at Nalani Village continues to devote himself to conserving the wildlife that claimed his child.

He stated *"Even after losing my son, I am still working towards better conservation efforts because I don't want such a tragedy to happen to anyone else.*" They strive to understand wildlife behaviour, dedicating themselves to protecting the very animals that, at times, threaten their survival.

Their dedication is evident in their active participation in community meetings, awareness camps, and consultative workshops. They eagerly seek knowledge, equipping themselves with the tools to foster coexistence and safeguard biodiversity.

Why do they endure this relentless struggle? Is it because they see no other choice, or is it something deeper, a sense of responsibility, a belief in a shared existence? Well, the answer lies in their commitment to the land and its wildlife. Despite the challenges, they persevere because they view conservation not as a burden, but as a duty tied to their identity and heritage.

Footprints that tell a wild story. Photo by Ujjal Bayan

Positive and negative perspective of communities in conservation efforts

Conservation is inherently challenging, particularly when it encounters negative attitudes and resistance from communities. These barriers often stem from economic concerns, where the cost of coexistence with wildlife weighs heavily on livelihoods.

Human emotions like anger and frustration naturally arise when personal property is damaged-whether it is crops, livestock, or homes. For instance, while a significant portion of the community may support wildlife conservation, there will invariably be others who oppose it due to the perceived threats posed by certain species.

In Mayang, Pobitora, incidents of human-wildlife conflict are deeply rooted in interactions between local residents and buffaloes. Unfortunately, this conflict has also extended to rhinos, further straining relationships between the community and wildlife. As tensions escalate, some individuals have resorted to harmful measures to mitigate the presence of rhinos, including the use of firecrackers and other destructive tools.

The persistence of such incidents-resulting in death, injuries, and crop damage-has severely disrupted the lives of residents. In October last year, a tragic incident occurred when a rhino crushed a man traveling to Morigaon via Tamulidova, leading to his death and widespread unrest within the sanctuary.

Similar attacks have been recorded, including buffaloes injuring villagers during early morning farming activities. These recurring conflicts have created a climate of fear and frustration among the community.

During interactions with villagers, one individual expressed their concerns, stating, "*We have lost enough lives because of these animals. Either we can live, or they live-we are afraid something might happen to our children.*" Another villager shared their experience, saying, "*I lost my husband in a buffalo attack. I have no source of income now, and the little land I use for farming is constantly raided by buffaloes and rhinos.*"

The negative consequences of human-wildlife conflict, compounded by loss of lives, injuries, and economic hardships, have led many residents to question the value of conserving these animals.

On a brighter note, the majority of the community holds positive views and has adopted non harmful measures to protect themselves from these interactions, showcasing their commitment to peaceful coexistence. A belief persists among many that rhinos grazing on crops often result in better yields-a perception that strengthens the case for conservation. Furthermore, sustainable and non-invasive deterrents are frequently employed. For example, the use of bamboo clappers to create noise has effectively replaced firecrackers, and many families have constructed machans (elevated platforms) for crop monitoring. Additionally, the use of lighting systems serves a dual purpose-alerting both humans and animals to each other's presence while minimizing potential conflict.

Photo by Ujjal Bayan

Community as a first line of defence

Communities and the Forest Department both play vital and complementary roles in conservation. However, communities often prove to be more effective as the first line of defence against poaching due to their proximity to wildlife habitats, their cultural ties to the land, and their strength in numbers.

Pobitora Wildlife Sancturay has become a beacon of anti-poaching success, with more than eight years having passed since the last recorded incident of rhino poaching. When it comes to security, the villagers play an instrumental role in safeguarding Pobitora Wildlife Sanctuary.

While much of the credit rightly goes to the forest department for their unwavering vigilance, meticulous monitoring, and robust security measures, the invaluable contributions of the local communities cannot be overlooked.

The villagers provide steadfast support, often acting as the sanctuary's eyes and ears, staying closely attuned to the forest department's efforts. Their involvement, such as sharing vital information and keeping the authorities updated on field scenarios, has been pivotal in maintaining the sanctuary's anti-poaching record.

When it comes to identifying intruders such as poachers, local communities possess invaluable knowledge and information that are critical for wildlife protection. Their intimate familiarity with the area and constant presence enable them to be the first to detect suspicious activities.

This makes them a crucial barrier against illegal activities, as their vigilance often prevents poaching from escalating. These communities not only act as the eyes and ears of the sanctuary but also have the ability to mobilize swiftly, ensuring that potential threats are addressed without delay.

Additionally, when wildlife strays beyond the boundaries of the sanctuary, it is the community that first notices and reports these occurrences to the forest department. Their observations-such as identifying the direction in which an animal is moving-are vital for effective monitoring and management. This collaborative effort enhances the ability to track animals' movements, enabling timely interventions that help prevent human-wildlife conflicts.

One of the most remarkable roles communities play is in ensuring safety-both for themselves and for the wildlife. Their lives are intricately connected with conservation efforts, and they often face challenges such as crop damage or personal risks while living alongside wildlife. Despite these difficulties, they contribute to creating safe spaces for wild animals, whether consciously or unconsciously. Their efforts result in an environment where wildlife can thrive, reflecting an admirable commitment to coexistence and stewardship.

The role of local communities in wildlife conservation goes beyond mere support-it is foundational. In Pobitora Wildlife Sanctuary, the active participation of local communities has led to the establishment of vigilance committees and patrol groups that work closely with the forest department. A noteworthy initiative is the recent formation of a crop protection group, or Anti-Depredation Squad, consisting of 12 sub-groups drawn from 28 villages. This organized network spans the entire sanctuary, addressing both human-wildlife conflict and poaching threats.

Previously, while communities had formed independent vigilance groups, the official establishment of the crop protection or Anti-Depredation Squad has brought structure and clear direction to their efforts. With this organized approach, their collaboration with the forest department has proven to be significantly effective within just a few months, showcasing the strength of community-driven initiatives in conservation.

As the world grapples with increasing challenges in wildlife conservation, the role of local communities emerges as a central force in safeguarding wildlife. Their efforts, grounded in familiarity with their surroundings and a sense of responsibility, highlight the immense value of collaboration in conservation. In places like Pobitora, these communities have demonstrated how vigilance and proactive measures can create an environment where both humans and wildlife can coexist.

Their willingness to adapt and organize-from forming vigilance committees to agreeing to creating networks like the Anti-Depredation Squad-shows that conservation is not merely about policies or enforcement. It is about the commitment and actions of everyday individuals. These initiatives not only prevent threats like poaching but also foster a sustainable model of living in harmony with nature. The partnership between local communities and the forest department is a powerful reminder that protecting wildlife is a shared responsibility.

In their daily lives, community members make sacrifices to ensure the safety of wild animals, often facing challenges like crop damage and personal risks. Yet, their contributions go beyond mere coexistence-they create safe spaces for wildlife to thrive and build a legacy of stewardship that inspires others. The example set by the people of Pobitora offers hope for conservation efforts everywhere, urging us to recognize and support the role of communities in preserving the natural world for future generations.

From poaching to pride: The inspiring story of Natundanga Village

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During a recent work near Kaziranga National Park, I visited a small Karbi village called Natundanga. At first, it looked like any other quiet village near the forest. But soon, I discovered an incredible story of change centered around a lovely ethnic food centre called "*Choran Ahem.*"

What pulled me in was the amazing aroma of food and the warmth of the people. But I quickly realized that Choran Ahem is more than just a place to eat, it's a symbol of how a village turned its life around.

Years ago, Natundanga had a bad name. Few people here once involved in rhino poaching as learnt from local administration. With little money, no jobs, and being so close to the forest, some villagers ended up lending assistance to poachers. The Forest Department often raided the village, and there was tension between the authorities and locals.

But things have changed completely for betterment for this fringe villagers and wildlife authorities.

Continued efforts from Forest Department, NGOs, and the Eco-Development Committee, the village began to move forward with head high exploring earning livelihood without hurting wildlife. One big step was the idea of starting a local food centre that would celebrate Karbi culture and offer jobs to the people, especially women and youth.

That's how Choran Ahem was born. It's now run by villagers who serve healthy, tasty dishes made in traditional Karbi style cooked in bamboo, without oil or heavy spices, using local herbs and natural ingredients.

Photo by Choran Ahem

The food includes bamboo rice, steamed fish, sesame chutney and more, each dish full of local flavor. Currently, tourists from far and wide visit Choran Ahem. The place has brought pride and respect back to the village. In fact, it was recently given the 'Assam Gaurav' award for its role in promoting rural tourism and conservation.

Sitting in the peaceful, green surroundings of Choran Ahem, I felt truly inspired. It was hard to believe that this beautiful village was once branded for wildlife crime.

Natundanga's journey shows how change is possible, when people are given support, guidance, and a chance to do better. Change for a good cause is worth highlighting and needs to be appreciated in our society to encourage everyone follow a path of living in harmony with nature.

Photo by Choran Ahem

Community efforts to protect vultures in Eastern Assam

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In the verdant landscapes of Eastern Assam, a quiet revolution is taking place. Vultures, once abundant across the Indian subcontinent, have faced catastrophic declines over the past decades. Through Aaranyak's dedicated conservation efforts, these magnificent birds, nature's most efficient cleanup crew, are finding new hope through comprehensive community based programmes.

The Landscape of Eastern Assam

Eastern Assam, stretching across districts like Sivasagar, Dibrugarh, Tinsukia, and parts of Jorhat, is a region of remarkable biodiversity and cultural richness. The area lies within the Eastern Himalayan biodiversity hotspot, supporting diverse ecosystems ranging from wetlands and forests to agricultural landscapes. This ecological diversity makes the region a critical refuge for several threatened species, including vultures. However, rapid urbanization, expansion of agricultural land, and unregulated use of veterinary drugs have posed serious challenges to wildlife conservation, demanding urgent community-driven interventions.

The critical role of vultures in our ecosystem

Vultures serve as nature's sanitation workers, playing an irreplaceable role in maintaining ecological balance. Research highlights their importance as keystone species, with their decline leading to cascading environmental and public health consequences [1]. Across India, vulture populations face multiple threats including toxic veterinary drugs, habitat loss, and accidental poisoning challenges especially acute in the biodiverse regions of Northeast India [2][3]. The region's location within a global biodiversity hotspot makes vulture conservation not only an ecological necessity but also crucial for preserving overall ecosystem integrity [4].

Photo by Hiren Dutta

Educational outreach: Nurturing tomorrow's conservation champions

Aaranyak's school level awareness initiatives form a cornerstone of long-term conservation strategy. The programs engage multiple stakeholders and target three key audiences:

·*Students:* The next generation of environmental stewards learn vultures' ecological significance through interactive sessions highlighting their role in disease prevention and ecosystem balance. Research confirms that education programs targeting local communities are vital for reducing threats and building long-term conservation support [5].

·*Teachers:* Educators are trained to incorporate vulture conservation themes into their teaching, multiplying the impact of awareness efforts.

·*Local Communities:* Villagers learn vulture-safe practices and the health benefits of sustaining vulture populations.

These sessions emphasize that vulture conservation directly supports community health and environmental stability.

Collaborative Conservation: The cow vaccination initiative

One of Aaranyak's most innovative actions is the cow vaccination drive, organized with the Forest Department and local stakeholders. This initiative proactively addresses accidental poisoning one of the leading causes of vulture deaths. Research shows that veterinary drugs like diclofenac have caused catastrophic vulture mortality across India [6]. Although banned for veterinary use, other toxic substances remain in circulation. The vaccination programme ensures healthier livestock, reduces harmful drug use, strengthens community collaboration, and prevents contaminated carcasses from entering the food chain.

Honuoring conservation heroes

Aaranyak's recognition program honors individuals such as Rajen Mili , Phuleswari Dutta and other dedicated guardians whose grassroots work has significantly advanced vulture conservation. These recognitions promote community leadership, preserve local ecological knowledge, and inspire others to act. Studies affirm that community participation and local leadership are fundamental to sustainable vulture conservation [7].

Looking Forward

This initiative is Led by reputed and passionate conservation scientist and Executive Director of Aaranyak Bibhab Kumar Talukdar, PhD and Dr. Dipankar Lahkar, an Assistant Director in Aaranyak and assisted by Aaranyak official Wasima Begum and Aaranyak's senior member Hiren Dutta.

Aaranyak's integrated model combining education, preventive health measures, and community recognition illustrates how scientific research and public engagement can drive long-term conservation success.

Through continued awareness, vaccination initiatives, and celebration of local champions, Eastern Assam stands as a beacon of hope where people and nature unite to ensure that vultures nature's silent sentinels continue to soar high in the skies.

References

[1] Frank, E. G., & Sudarshan, A. (2023). The Social Costs of Keystone Species Collapse: Evidence from the Decline of Vultures in India. Social Science Research Network. DOI: 10.2139/ssrn.4318579

[2] Saikia, P. K., & Devi, O. S. (2011). A checklist of avian fauna at Jeypore Reserve Forest, eastern Assam, India with special reference to globally threatened and endemic species in the Eastern Himalayan biodiversity hotspot. Journal of Threatened Taxa, 3(4), 1711-1722. DOI: 10.11609/JOTT.O2340.1711-8

[3] Jha, R., & Jha, K. K. (2021). Habitat prediction modelling for vulture conservation in Gangetic-Thar-Deccan region of India. Environmental Monitoring and Assessment, 193(8). DOI: 10.1007/S10661-021-09323-4

[4] Manigandan, S., Byju, H., & Kannan, P. (2024). Harmonizing ecology and society: an integrated analysis of vulture conservation in the Nilgiri Biosphere Reserve, India. Journal of Threatened Taxa, 16(6), 25330-25344. DOI: 10.11609/jott.8915.16.6.25330-25344

[5] Jha, K. K., Jha, R., & Campbell, M. O. (2021). The Distribution, Nesting Habits and Status of Threatened Vulture Species in Protected Areas of Central India. Ecological Questions, 30(2), 35-49. DOI: 10.12775/EQ.2021.020

[6] Prakash, V., Pain, D. J., Shultz, S., et al. (2004). Saving Asia's Gyps vultures: the "vulture rescue" team's conservation programme. Raptors Worldwide, 633-641.

[7] Ghosh-Harihar, M., Yadav, N., Gurung, N., et al. (2023). Spatial patterns in the diet of Gyps vultures in India and their implications for conservation. bioRxiv. DOI: 10.1101/2023.08.21.554114

Assam Gaurav awardee Phuleswari Dutta receiving an appreciation certificate from Aaranyak.

The Whisper of wild serenity: Nature's enduring symphony as life's quiet mentor

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I grew up on the river island of Majuli, and for as long as I can remember, nature has been a constant part of my life. My childhood was spent by the river, surrounded by birdsong, the rustle of bamboo leaves, and the wind carrying stories from the paddy fields. Rain, sunlight, and mud weren't just things I noticed; they were part of how I understood the world. Nature wasn't something outside of me; it shaped the person I was becoming.

Even now, as a wildlife professional, that connection hasn't changed. Every time I step into a forest, I feel the same calm I did as a child. The soft sound of the soil under my feet, the sunlight slipping through the canopy, these little things still ground me. They remind me that everything in nature has its own pace. Watching ants work or elephants move through the forest always feels like a quiet reminder that life has purpose, but there's no need to rush it.

The smell of wet paddy fields after rain still takes me straight back to my childhood, walking barefoot through muddy paths, laughing with friends, and watching the sky clear after a storm. Those memories remind me that life doesn't have to move fast to be meaningful. Like nature, we all need time to grow, to rest, to find our way. It's easy to forget that when we're caught up in the rush of work and deadlines, but nature always finds a way to bring me back to that truth.

The mystical charm of Majuli. Photo by Abhilasha Boruah

There's something incredibly humbling about being deep in a forest. The cool shade, the sound of water flowing somewhere nearby, the calls of birds hidden in the trees, they make me realise that silence can teach you more than words ever can. In a forest, everything, the trees, soil, water, and air, work together effortlessly. It's balance in its purest form, something we humans seem to lose touch with all too often.

Working in wildlife conservation has taught me that protecting nature isn't just about saving species or forests, it's about saving a part of ourselves. The peace you feel when surrounded by nature can't be replaced by anything man-made. It teaches you patience, compassion, and gratitude, qualities we need now more than ever.

Whenever I'm standing in the middle of a forest, listening to the birds and the wind moving through the leaves, I feel a deep sense of belonging. The forest doesn't speak in words, but it teaches what really matters to live, to stay grounded, and to find balance even when things feel chaotic. And when you find that kind of peace, honestly, what more do you need?

Everyday moment in Majuli. Photo by Abhilasha Boruah

PEOPLE SPEAK

DNA to the rescue: Building India's National Wildlife Genetic Database to combat poaching and preserve biodiversity

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India has an incredible biodiversity, stretching from the Northern foothills to the Western Ghats. Driving deep into the forest of India, every fallen feather, shed hair, even drop of blood holds an unrevealed truth and the reason is often invisible to our eyes. This traces evidence can tell us the stories of survival, migration or even the type of crime that might have occurred. With increase cases of poaching and illegal wildlife trade growing into a billion-dollar global enterprise, scientists have begun turning to the one witness that never lies: DNA.

Today India ranks fourth in wildlife crimes. As human greed extends its reach, tigers, rhinos, pangolins, hornbills and many more are being pushed towards to endangered species list. In this grim landscape, science has become a powerful ally. Yet, the backbone of this science remains fragile. India still lacks a centralized, verified genetic database for its wildlife.

Without one, each new investigation starts from scratch, and the reliability of DNA evidence can be questioned in court. Many native species, especially reptiles, amphibians, and lesser-known birds don't have reference sequences in global repositories, making identification slow and uncertain. Even closely related animals like lions and leopards share such similar DNA regions, which can only be detected by advance sequencing databases.

Aaranyak researchers conducting an elephant distribution survey in Meghalaya.

Despite these hurdles, the Rhino DNA Indexing System (RhODIS India) has been developed by the Ministry of Environment, Forest and Climate Change (MoEFCC) in collaboration with WWF-India. This system has already held link confiscated the rhino horns to specific animals, which is vital for addressing the poaching cases. In the Northeast, a major milestone was marked in 2025 when Aaranyak's Wildlife Genetics Laboratory became the region's first accredited facility authorized to issue legal DNA-based forensic reports. Meanwhile, over 3,500 cases have been analyzed by the Wildlife Institute of India (WII) in Dehradun, with nearly two-thirds of these being successfully resolved through DNA profiling.

The next step is clear India needs a National Willdlife Genetic Database (NWGD). This centralized digital system would compile DNA barcodes, STR markers, and mitochondrial profiles from accredited labs across the country. Which have given conservationists and enforcement agencies the ability to trace seized items to specific protected species listed under India's Wildlife (Protection) Act, 1972.

With such a database, investigators could confirm species identity quickly and accurately, while courts could rely on standardized, verifiable data. Beyond law enforcement, it would also preserve India's genetic heritage and strengthen long-term conservation planning.

To make this vision a reality, a few key actions are essential for standardizing genetic markers, which must be validated for major species groups, and a secure digital network should connect authorized laboratories. Forest officials and biologists need training in forensic sampling, collecting and preserving evidence properly.

It is crucial to have a strong ethical and legal guideline for handling genetic data. The benefits would extend far beyond fighting crime. A national genetic database could help track migration routes, detect inbreeding in isolated populations, and guide breeding or reintroduction programmes. When combined with ecological monitoring, it could even provide early warnings of population decline before visible damage occurs.

Every poached animal represents a broken thread in India's ecological fabric. By building a unified wildlife genetic database, India has the opportunity to repair that fabric and set a global example of how technology and empathy can work together to protect the living world.

Chinese pangolin
(Manis pentadactyla)

Photo by Bidyut Bishaya

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Nourishing nature to secure our future

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