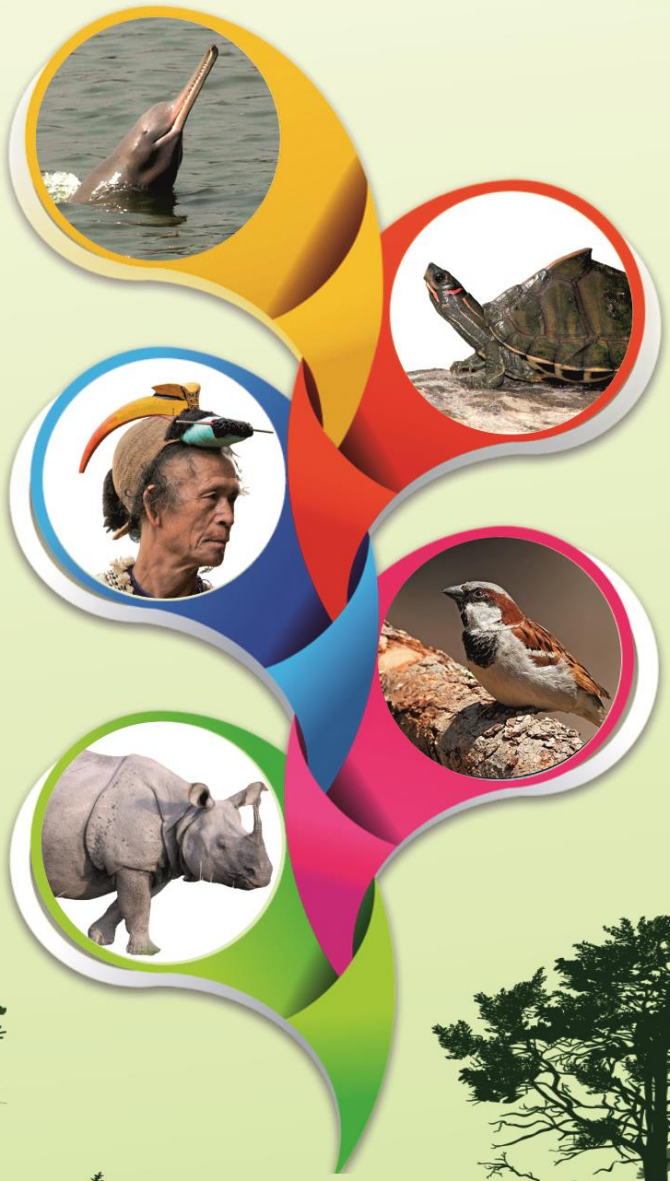
भारतीय वन्यजीव संस्थान
Wildlife Institute of India

PM's Mann Ki Baat
Reference to Wildlife Conservation



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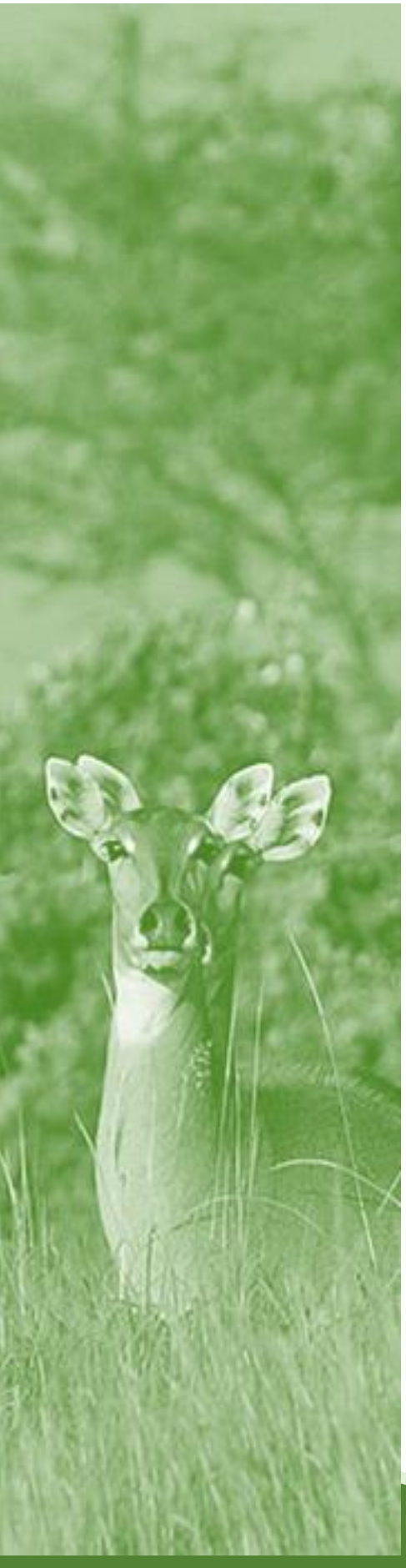

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Turtles and tortoises in Assam and their conservation

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Abstract

The Hon'ble Prime Minister of India through series of Mann Ki Baat (MKB) episodes has consistently stressed upon generating awareness about wildlife conservation in our country. However, in one such MKB episode, he talked about the conservation of turtles in the northeast Indian state of Assam. This particular reference flagged a crucial aspect of conservation of lesser known biodiversity like turtles and tortoises.

Assam is a treasure trove of freshwater chelonian diversity. Currently 21 species are recorded from the state which is nearly three fourth of the total diversity in India. This remarkable species assemblage may be attributed to the regions diverse habitat types including riverine, alluvial grasslands, swampy habitats, and lowland evergreen forests. The Kaziranga National park (KNP) which is a representative of unperturbed "swampy grassland" habitat of Assam valley holds the richest turtle diversity within a protected area. It has 17 species of turtles and tortoises of which 14 species are globally threatened. The "protected riverine stretches" of KNP support four sympatric large growing softshell turtle species. The "*beels*' and marshes of the park are known for at least eight species of hard-shell turtles. The evergreen forests of the state hold key population of two highly threatened tortoise species.

While protected areas are cornerstones in safeguarding the turtle diversity of the state, some of the endangered species are also being worshipped in the temple ponds dotted across Assam. Protecting turtles in their natural habitats, enforcing the legal framework, mass awareness and generating scientific information on species ecology and population will be the conservation tools for turtles in Assam.

Keywords: *awareness, reptiles, testudines, wetland, wildlife conservation*

Mann Ki Baat Reference: 74th episode dated 28 February 2021

असम में कछुए और उनका संरक्षण

अभिजीत दास, जेसन डी जेरार्ड एवं बिटुपन बरूआ
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सारांश

मन की बात (MKB) एपिसोडज़ की श्रृंखला के माध्यम से भारत के माननीय प्रधान मंत्री ने लगातार हमारे देश में वन्यजीव संरक्षण के बारे में जागरूकता पैदा करने पर जोर दिया है। ऐसे ही एक मन की बात के एपिसोड में, उन्होंने पूर्वोत्तर भारतीय राज्य असम में कछुओं के संरक्षण के बारे में बात की। इस विशेष संदर्भ ने कछुओं और कछुओं जैसी कम ज्ञात जैवविविधता के संरक्षण के एक महत्वपूर्ण पहलू को चिह्नित किया।

असम, मीठे पानी की चेलोनियन विविधता का खजाना है। वर्तमान में राज्य से कछुओं की 21 प्रजातियां दर्ज की गई हैं, जो भारत में पाई जाने वाली कुल विविधता का लगभग तीन चौथाई है। इस उल्लेखनीय प्रजातियों के संयोजन का मुख्य कारण इस क्षेत्र के विविध आवास प्रकार, जैसे कि नदी, दलदली घास के मैदान, दलदली आवास और तराई सदाबहार जंगल हैं। काजीरंगा राष्ट्रीय उद्यान (केएनपी) जो असम घाटी के ''दलदली घास के मैदान'' निवास स्थान का प्रतिनिधि है, एक संरक्षित क्षेत्र के भीतर सबसे समृद्ध कछुआ विविधता रखता है। इसमें कछुओं की 17 प्रजातियाँ हैं, जिनमें से 14 प्रजातियाँ विश्व स्तर पर ख़तरे में हैं। केएनपी के ''संरक्षित नदी तट'' सॉफ्टशेल कछुए प्रजातियों का सहयोग करते हैं। पार्क के ''बील'' और दलदल हार्ड–शेल कछुओं की कम से कम आठ प्रजातियों के लिए जाने जाते हैं। राज्य के सदाबहार जंगलों में दो अत्यधिक संकटग्रस्त कछुआ प्रजातियों की प्रमुख आबादी है।

चूंकि संरक्षित क्षेत्र, राज्य में कछुओं की विविधता को सुरक्षित रखने की आधारशिला हैं, कुछ लुप्तप्राय प्रजातियों की पूजा, असम भर में स्थित मंदिर के तालाबों में भी की जा रही है। कछुओं को उनके प्राकृतिक आवासों में संरक्षित करना, कानूनी ढांचे को लागू करना, जन जागरूकता और प्रजातियों की पारिस्थितिकी और जनसंख्या पर वैज्ञानिक जानकारी उत्पन्न करना असम में कछुओं के संरक्षण के उपकरण होंगे।

कीवर्ड : जागरूकता, सरीसृप, टेस्टुडाइन, आर्द्रभूमि, वन्यजीव संरक्षण।

मन की बात संदर्भ : 74वां एपिसोड, 28 फरवरी 2021

Turtles and tortoises in Assam and their conservation

Abhijit Das, Jason D. Gerard and Bitupan Boruah

What's so special about Assam's turtles?

Assam is one of the world's top priority areas in freshwater turtle conservation. The sheer diversity of 20 co-occurring species makes it a treasure trove of turtle diversity within Asia. The sympatric association of four large softshell turtles and at least six hardshell species is an ecological extravaganza. Assam's Rhino habitats are also the best-preserved turtle habitats of the state. While Protected areas such as Nameri Tiger Reserve, Orang Tiger Reserve, Pobitora Wildlife Sanctuary, Laokhowa & Burachapori Wildlife Sanctuary are worthy turtle habitats, Kaziranga National Park (KNP) is perhaps the best among them. The riverine stretches of KNP sustain large soft-shell turtles, and the alluvial mashes and "*beels*" supports many hardshell turtles. Large growing hardshell species such as Crowned River Turtle (*Hardella thurjii*) and Spotted Pond Turtle (*Geoclemys hamiltonii*) find their safest home inside KNP. The Evergreen forests of Barail Hill and Karbi Anglong are holding key surviving populations of Asian Giant Tortoise (*Manouria emys*). The undisturbed forest streams are home to Keeled Box Turtles (*Cuora mouhotii*) and Assam leaf turtles (*Cyclemys gemeli*). Semi-evergreen and moist Sal forests along the Himalayan foothills are habitats for Yellow Tortoises (*Indotestudo elongata*). Deepor Beel Ramsar Site is a crucial habitat for rare Indian-eyed turtles (*Morenia petersi*) and grasslands are home to Tricarinate turtle (*Melanochelys tricarinata*).

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Typical marshy habitat in Kaziranga National Park are storehouse of turtle diversity.

So, what are turtles and tortoises?

Turtles and Tortoises belong to the Reptilian order "Testudines". The evolutionary gift of a "Shell" is a biological masterpiece. The turtle shell is composed of two parts: the carapace (upper shell) and plastron (lower shell) fused to protect the animal from predators and environmental hazards. Freshwater turtles can be further classified based on their shell structure as hard-shelled or Soft-shelled turtles. Softshell turtles are flat-bodied, their forelimbs are flippers-like, and they have a pointed nose and lathery covering on the shell. While arrangements of large scutes can be distinctly seen on hardshell turtles. Some hardshell species have sharp tent-like projections earning their common name "roofed turtle". Tortoises have 'elephantine" hindlimbs and heavily scales forelimbs. Their shell is more dome-shaped and they lead a life mostly on land foraging among the forest floor.

What are their unique characteristics?

Turtles are primarily amphibious. They spend a significant portion of their daily activity "basking" among logs and river banks. Basking is crucial for them to digest their food and get rid of parasites. All turtles lay their eggs on land by digging a nest near the water body or on sand banks in the rivers. Some species, such as the Asian giant tortoise (*Manouria emys*), are known to create mound nests with leaf litter. It is key to identify species to know more about their unique characteristics. For species identification, we may need to look into the size, colour, and some characteristics of their shell. Softshell turtles lay eggs that are 'circular' in shape, while eggs are almost 'oval' in most hardshell turtles of Assam. Most female turtles grow bigger than their male counterpart and have a shorter tails. Males of a few largely terrestrial species have distinct plastral concavity.

Are they ecologically significant?

In Assam, turtles are the apex predators in most freshwater ecosystems. Turtles being amphibious in nature require tranquil nesting banks on the land and healthy foraging aquatic habitats for their survival. The presence or absence of a turtle in an ecosystem indicates the quality of the habitat.

Seed dispersers: Tortoises play an important role in seed dispersal by eating fruit and then excreting the seeds elsewhere. This helps to maintain plant diversity and allows for the dispersal to new areas promoting biodiversity.

Active scavenging: They clean up dead and decaying materials in the water body preventing the spread of diseases through water.

Predators and prey: Turtles are an important part of the food chain, serving as both predator and prey. Juveniles are important prey items for many birds, mammals, and fish. At the same time, they also help to control populations of invertebrates, small fish, and amphibians by eating them.

Nutrient cycle: Turtles are also important for nutrient cycling in aquatic ecosystems. They help to recycle nutrients by eating dead organisms and releasing nutrients back into the ecosystem through their waste.

What is their current conservation status?

Turtles are highly threatened globally and Assam is not an exception. 72% of all the turtle and tortoise species are categorized as a threatened category by the IUCN (International Union for Conservation of Nature). There is a total of nine endangered and six critically endangered turtle species distributed in Assam. Under the newly amended Wildlife (Protection) Act 1972, eighteen species of turtle are placed under Schedule I & three species in Schedule II. To prevent and control the illegal trade of turtles and tortoises for various purposes globally, seven species are categorized in Appendix I & rest fourteen species in Appendix II by CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) (Table 1). Despite all these conservation measures turtles outside protected areas of Assam remains vulnerable and need a close watch.

What are their threats in Assam?

Turtles and tortoises of Assam face a myriad of threats that need immediate conservation attention. Habitat loss appears to be the single largest threat. Degradation of wetland habitats, loss of nesting habitat, and disruptions of habitat connectivity are large looming threats. Turtles and tortoises are poached for consumption and juveniles are sold in illegal wildlife markets. Freshwater turtles are caught in huge numbers as "fishery bycatch". An increasing "dog" population is detrimental to their nesting success. Water pollution contaminates their habitats and reduces their prey. Rising temperatures and changes in precipitation patterns can affect reproductive success and skew the sex ratio. Warmer temperatures can also lead to the spread of disease. To make matter worse, now a noxious invasive species called *Red Eared Slider turtle* have made its way into the wetlands of Assam via the unregulated aquarium trade. Indirect threats such as Climate Change and many cumulative and interacting effects, make conservation efforts more challenging. It is important to address these threats through a combination of habitat protection, law enforcement, education, and research to ensure the survival of these important species.

How can we save them?

Protection of wild turtles demands coordination between multiple stakeholders such as the Forest Department, Police Department, Border Security Forces, Fisheries Department, Non-Govt Organisations, and local citizens. To effectively curb turtle trade strict law enforcement and implementation of existing laws are necessary. "Turtle Bycatch" especially at fish lending sites along the Brahmaputra River need to be monitored for the safe release of turtles back into the wild. Mass awareness is a must to convey the urgency of turtle conservation in Assam. The turtle populations in temple ponds and turtle exhibits in Assam State Zoo can act as great tools in educating the young generations. Turtle sighting records should be a part of regular wildlife monitoring inside the protected areas by forest departments and outside through citizen science. As responsible Assamese, it is our duty to support turtle conservation by considering them as a part of Assam's rich natural heritage.

How science can help?

So far, scientific attention on the turtles of Assam has been largely restricted to inventory, taxonomy, and captive management aspects. There is an urgent need to delineate current distribution, species occupancy and Climate change vulnerability studies. While the eDNA technique may help in determining species occupancy, satellite telemetry studies will help in movement ecological studies crucial for long-term population viability. Diseases surveillance, detecting & controlling invasive species, and designing turtle-friendly fishing gears and linear infrastructures are upcoming challenges for turtle conservation in Assam. Young students can design their dissertation works on behavioural and little-known ecological aspects of turtles.

Table-1: Checklist of Turtles of Assam

Sl. No.	Scientific Name	Common English Name	Assamese Name	Wildlife (Protection) act 1972 #	IUCN Status	CITES Appendix
Family: Testudinidae (Tortoises)						
1	*Manouria emys*	Asian Giant Tortoise	Pahari Kasso	I	EN	II
2	*Indotestudo elongata*	Yellow Tortoise	Halodia Kasso	I	CR	II
Family: Trionychidae (Softshell turtle)						
3	*Lissemys punctata*	Flapshell Turtle	Benga kasso	I	VU	II
4	*Nilssonia gangeticus*	Ganges Softshell Turtle	Gonga kasso	I	CR	I
5	*Nilssonia hurum*	Peacock Softshell Turtle	Bor kasso	I	EN	I
6	*Nilssonia nigricans*	Black Softshell Turtle	Laomura	I	CR	I
7	*Amyda cartilaginea*	Malayan Softshell Turtle	Burma Kasim	I	VU	II
8	*Chitra indica*	Narrow headed Softshell Turtle	Bhagia kasso	I	EN	II
Family: Geoemydidae (Hard Shell turtle)						
9	*Cuora amboiensis*	Malayan Box Turtle	Jap dura	I	EN	II
10	*Cuora mouhotii*	Keeled Box Turtle	Siria jap dura	I	EN	II
11	*Cyclemys gemeli*	Assam Leaf Turtle	Sheel khatua	II	NT	II
12	*Geochelys hamiltonii*	Spotted Pond Turtle	Nal dura	I	EN	I
13	*Hardella thrujii*	Crowned River Turtle	Bor dura	I	EN	II
14	*Melanochelys tricarinata*	Tricarinate Turtle	Tinisiria sil dura	I	EN	I
15	*Melanochelys trijuga*	Indian Black Turtle	Kola sil dura	II	LC	II
16	*Morenia petersi*	Indian eyed Turtle	Bangla dura	I	EN	II
17	*Pangshura sylhetensis*	Assam Roofed Turtle	Phulen dura	I	CR	II
18	*Pangshura tecta*	Indian Roofed Turtle	Futuki salika dura	I	VU	I
19	*Pangshura tentoria*	Indian Tent Turtle	Tambu dura	I	LC	II
20	*Pangshura smithii*	Brown Roofed Turtle	Muga dura	II	CR	II
21	*Batagur dhongoka**	Three Striped Roofed Turtle	Tinipatia dura	I	CR	I

*Doubtful record from Assam, # as per new amendments 2022

मूल संदेश

माननीय प्रधानमंत्री ने अपने मन की बात के एक एपिसोड में कम जाने जानी वाली कछुओं की विविधता जैसे कि कछुओं के संरक्षण को उजागर किया। असम में भारत की कुल जलीय चेलोनियन विविधता के लगभग तीन–चौथाई शामिल होते हैं, जिसमें 21 प्रजातियां होती हैं। काजीरंगा राष्ट्रीय उद्यान में 17 कछुए और टॉर्टोइज की प्रजातियां होती हैं, जिसमें से 14 वैश्विक रूप से ख़तरे में हैं। असम के प्राकृतिक आवासों की रक्षा, वैधानिक ढांचे को लागू करना, जनजागृति और प्रजाति की पारिस्थितिकी और जनसंख्या पर वैज्ञानिक जानकारी उत्पन्न करना कछुओं के संरक्षण के लिए उपयोगी उपकरण हैं।

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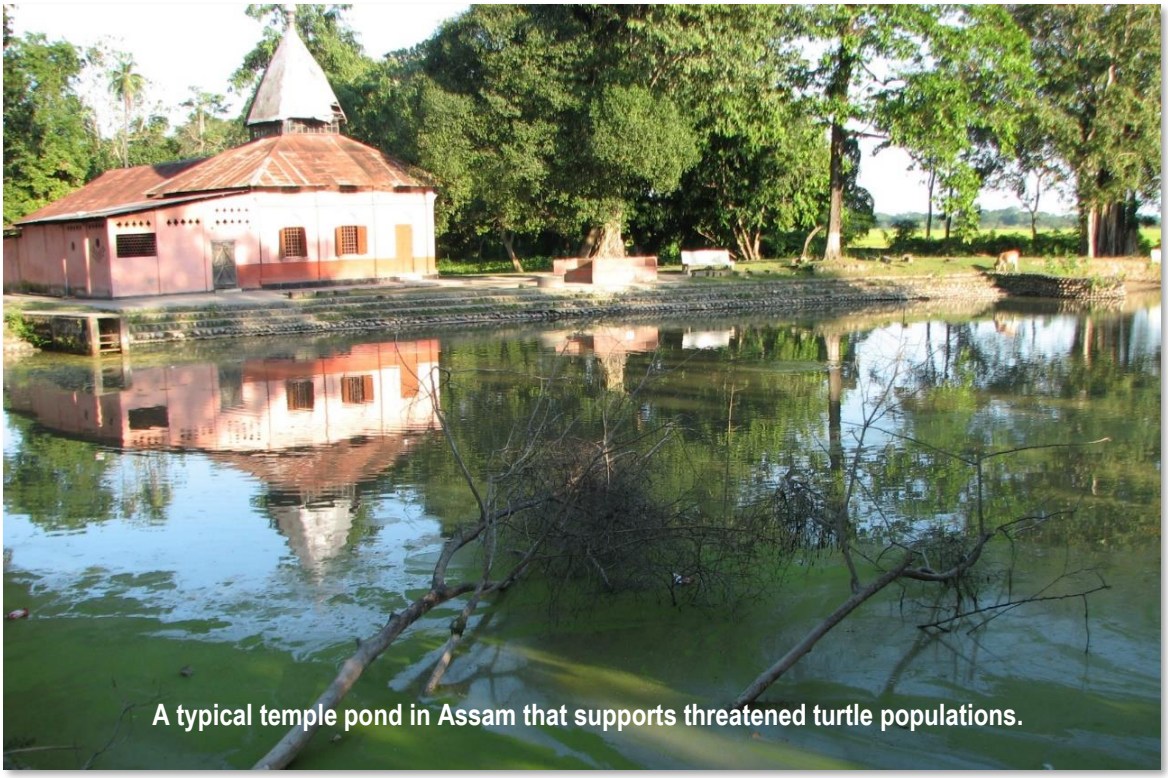
"Turtles are intricately associated with Assamese culture. There are many references to turtles in popular Assamese "Bihu" songs. Turtles are considered "kurma avatars" and releasing a turtle back into the water is often marked as an auspicious occasion for a newborn's longevity. In several temple ponds of Assam such as Kamakhya Temple in Guwahati and Hayagriva-Madhab temple in Hajo, several species of threatened turtles are revered and religiously protected."



A typical temple pond in Assam that supports threatened turtle populations.

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Photo Credit: Abhijit Das

Jalaj - Rivers and people connect to realise the goals of Arth Ganga

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Abstract

The Hon'ble Prime Minister of India, during his address acknowledged; that the greatest driving force behind the success of "Namami Gange" campaign is people's participation, highlighting, how Ganga Prahari and other volunteer groups are playing proactive role. He further added that various efforts under the campaign have aided in improvising the biodiversity value of the Ganga River system with significant increase in number of National Aquatic mammal the Gangetic dolphins and other aquatic species such as Hilsa fish. With Ganga's ecosystem being clean, alternate livelihood opportunities have also increased, with the creation of Jalaj Ajeevika Model. This model has been prepared keeping biodiversity conservation in the forefront. Jalaj is a concept to establish symbiotic linkages between river and people and is visualized as models for livelihood diversification, through promotion of local produce, and are aimed as models for strengthening women participation in ecological and economic spheres. The Ministry of Jal Shakti, Government of India through the National Mission for Clean Ganga (NMCG) has entrusted the Wildlife Institute of India, (WII) a project entitled "Biodiversity Conservation and Ganga Rejuvenation" for developing a science-based aquatic species restoration plan for Ganga River by involving multiple stakeholders. As a part of this project the WII has developed a trained cadre of volunteers known as Ganga Praharis from the local communities residing in the Ganga basin. "Prahari" is a Sanskrit work that means guardians who safeguard the biodiversity along the Ganga River and practice sustainable livelihoods contributing to the success of Ganga rejuvenation at the grassroots level. Jalaj established at different locations in the Ganga basin represent the culture and communities indigenous to that area. They are holistic centres of overall community wellbeing, conservation education and livelihood trainings where people can visit from all over the world and can have an immersive experience of life along the Ganga with Ganga Praharis.

With the Hon'ble Prime Minister talking about the Jalaj concept, has sensitized more than 1.4 billion Indians across the nation on linking conservation, economy and local livelihoods. Jalaj, today, is being visualized, as a potential bottoms up approach, balancing conservation and development with its establishment at 26 sites across the Ganga River. Considering this acknowledgement; women folks from riverside communities; today, are coming forward to be trained as torch bearers of conservation initiatives while enhancing their skills in alternate livelihoods to ensure additional source of household income at the upcoming 49 Jalaj sites in the Ganga River basin. Further, WII through NMCG will be linking the 75 Jalaj with "**Dilli Haat**", INA, New Delhi, the heritage center and international tourism hub showcasing traditional Indian crafts, cuisine and cultural practices. This center will be catering to the international and national customers promoting conservation initiative on each purchase besides taking visitors on a visual tour of the rich aquatic biodiversity thriving in the densely populated Ganga River Basin; through display panels and 3D models of freshwater species such as; Gangatic dolphin, turtles, waterbirds etc.

Keywords: Ganga River, aquatic conservation, community participation, sustainable livelihoods

Mann Ki Baat Reference: 96th episode dated 25th December 2022

जलज – नदियाँ और लोग अर्थ गंगा के लक्ष्यों को महसूस करने के लिए जुड़ते हैं

रुचि बडोला, दीपिका डोगरा, सौरव गवान एवं सैयद आइनुल हुसैन
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सारांश

भारत के माननीय प्रधानमंत्री ने अपने संबोधन के दौरान बताया कि ''नमामि गंगे'' अभियान की सफलता के पीछे सबसे बड़ी प्रेरक शक्ति लोगों की भागीदारी है, जो इस बात पर प्रकाश डालती है कि कैसे गंगा प्रहरी और अन्य स्वयंसेवी समूह सक्रिय भूमिका निभा रहे हैं। उन्होंने आगे कहा कि अभियान के तहत विभिन्न प्रयासों से गंगा नदी प्रणाली के जैवविविधता मूल्य में सुधार करने में मदद मिली है, जिससे राष्ट्रीय जलीय स्तनधारी गंगा डॉल्फिन और अन्य जलीय प्रजातियों जैसे हिल्सा मछली की संख्या में उल्लेखनीय वृद्धि हुई है। जलज आजीविका मॉडल के निर्माण के साथ गंगा का पारिस्थितिकी तंत्र स्वच्छ होने के साथ वैकल्पिक आजीविका के अवसर भी बढ़े हैं। यह मॉडल जैवविविधता के संरक्षण को सबसे आगे रखते हुए तैयार किया गया है। जलज नदी और लोगों के बीच सहजीवी संबंध स्थापित करने की एक अवधारणा है और इसे स्थानीय उपज को बढ़ावा देने के माध्यम से आजीविका विविधीकरण के मॉडल के रूप में देखा गया है, और इसका उद्देश्य पारिस्थितिकीय और आर्थिक क्षेत्रों में महिलाओं की भागीदारी को मजबूत करने के मॉडल के रूप में है। जल शक्ति मंत्रालय, भारत सरकार ने नेशनल मिशन फॉर क्लीन गंगा (NMCG) के माध्यम से भारतीय वन्यजीव संस्थान, (WII) को इस जलीय प्रजाति की बहाली योजना विकसित करने के लिए वैज्ञानिक अध्ययन पर आधारित ''जैव विविधता संरक्षण और गंगा कायाकल्प'' नामक एक परियोजना सौंपी है। गंगा नदी के लिए इस परियोजना के एक भाग के रूप में डब्ल्यूआईआई ने कई हितधारकों को शामिल करके गंगा बेसिन में रहने वाले स्थानीय समुदायों में से स्वयंसेवकों का एक प्रशिक्षित कैडर विकसित किया है, जिन्हें गंगा प्रहरी के रूप में जाना जाता है। ''प्रहरी'' एक संस्कृत शब्द है, जिसका अर्थ है – अभिभावक, जो गंगा नदी के किनारे जैव विविधता की रक्षा करते हैं और जमीनी स्तर पर गंगा के कायाकल्प की सफलता में योगदान देने वाली सतत् आजीविका का साधन जुटाते हैं। गंगा बेसिन में विभिन्न स्थानों पर स्थापित जलज उस क्षेत्र के स्वदेशी संस्कृति और समुदायों का प्रतिनिधित्व करते हैं। वे समग्र सामुदायिक कल्याण, संरक्षण शिक्षा और आजीविका प्रशिक्षण के समग्र केंद्र हैं जहां दुनिया भर से लोग आ सकते हैं और गंगा प्रहरियों के साथ गंगा के किनारे जीवन का एक गहन अनुभव प्राप्त कर सकते हैं।

माननीय प्रधानमंत्री द्वारा जलज अवधारणा के बारे में बात करने के साथ, संरक्षण, अर्थव्यवस्था और स्थानीय आजीविका को जोड़ने पर देश भर में 1.4 बिलियन से अधिक भारतीयों को संवेदनशील बनाया गया है। जलज को आज गंगा नदी के 26 स्थलों पर इसकी स्थापना के साथ संरक्षण और विकास को संतुलित करते हुए एक संभावित नीचे से ऊपर के दृष्टिकोण के रूप में देखा जा रहा है। इस पावती को ध्यान में रखते हुए, नदी के किनारे के समुदायों की महिलाएँ, आज, गंगा नदी बेसिन में आगामी 49 जलज स्थलों पर घरेलू आय का अतिरिक्त स्रोत सुनिश्चित करने के लिए वैकल्पिक आजीविका में अपने कौशल को बढ़ाते हुए संरक्षण पहल के मशाल वाहक के रूप में प्रशिक्षित होने के लिए आगे आ रहे हैं। इसके अलावा, WII NMCG के माध्यम से 75 जलज को ''दिल्ली हाट'', INA, नई दिल्ली, विरासत केंद्र और पारंपरिक भारतीय शिल्प, व्यंजन और सांस्कृतिक प्रथाओं को प्रदर्शित करने वाले अंतर्राष्ट्रीय पर्यटन केंद्र से जोड़ेगा। यह केंद्र घनी आबादी वाले गंगा नदी बेसिन में समृद्ध जलीय जैव विविधता के दृश्य दौरे पर आगंतुकों को ले जाने के अलावा प्रत्येक खरीद पर संरक्षण पहल को बढ़ावा देने वाले अंतरराष्ट्रीय और राष्ट्रीय ग्राहकों की जरूरतों को पूरा करेगा, ताजे पानी की प्रजातियों के डिस्प्ले पैनल और 3डी मॉडल के माध्यम से, गंगा की डॉल्फिन, कछुए, जलपक्षी आदि के बारे में पर्यटकों को अवगत कराया जायेगा।

कीवर्डज़ : गंगा नदी, जलीय संरक्षण, सामुदायिक भागीदारी, स्थायी आजीविका।

मन की बात संदर्भ : 96वां एपिसोड दिनांक 25 दिसंबर 2022

Jalaj - Rivers and people connect to realise the goals of Arth Ganga

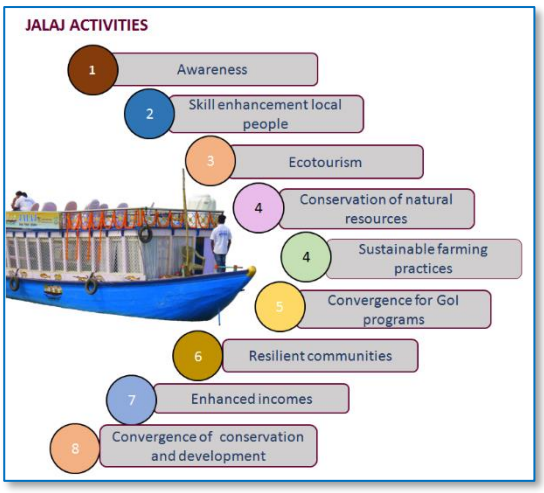
Ruchi Badola, Deepika Dogra, Saurav Gawan and Syed Ainul Hussain

The Hon'ble Prime Minister of India, during his address in the 96th episode of "Maan Ki Baat" acknowledged; that the greatest driving force behind the success of "Namami Gange" campaign is people's participation, highlighting, how Ganga Prahari and other volunteer groups are playing proactive role. He further added that various efforts under the campaign have aided in improvising the biodiversity value of the Ganga River system with significant increase in number of National Aquatic mammal the Gangetic dolphins and other aquatic species such as Hilsa fish. With Ganga's ecosystem being clean, alternate livelihood opportunities have also increased, with the creation of Jalaj Ajeevika Model. This model has been prepared keeping biodiversity conservation in the forefront. Jalaj is a concept to establish symbiotic linkages between river and people. Jalaj is also visualized as models for livelihood diversification, through promotion of local produce, and are aimed as models for strengthening women participation in ecological and economic spheres.

The Ministry of Jal Shakti, Government of India, through the National Mission for Clean Ganga (NMCG) has entrusted the Wildlife Institute of India (WII) with a project entitled "Biodiversity Conservation and Ganga Rejuvenation" for developing a science-based aquatic species restoration plan for Ganga River by involving multiple stakeholders. As a part of this project the WII has developed a trained cadre of volunteers known as Ganga Praharis from the local communities residing in the Ganga basin. "Prahari" is a Sanskrit work that means guardians. The Ganga Praharis safeguard the biodiversity along the Ganga River and practice sustainable livelihoods contributing to the success of Ganga rejuvenation at the grassroots level. Till date, more than 3,600 Ganga Praharis in 99 districts of 10 Ganga River states have been registered as Ganga Praharis; which includes more than 2,000 women.

Jalaj - an initiative depicting symbiotic linkages between the river and its people are established on the banks of Ganga River and its tributaries in the entire Ganga basin through financial support from NMCG. These models enhance the linkages of livelihood with sustainable resource use where the Ganga Praharis learn the sustainable skills, produce goods and services and eventually sell these goods and services to earn livelihoods. Ganga Praharis are trained in livelihood options, inclusive of value addition of local produce. Ganga Praharis are also being trained in finance, accountancy and management of individual Jalaj.

Jalaj established at different locations in the Ganga basin represent the diverse culture and communities indigenous to that area. They are holistic centres of overall community wellbeing, conservation education and livelihood trainings where people can visit from all over the world and can have an immersive experience of life along the Ganga with Ganga Praharis. As the Jalaj are managed by Ganga Praharis, visitors can also take this opportunity to interact with them to learn more about their experiences regarding community-based conservation and practicing sustainable livelihood.



The project is replicating and upscaling the conservation efforts in the entire Ganga basin. Linking local livelihoods with the conservation initiative, through trainings and establishment of livelihood centres, was one of the primary goals of the project, it was realized that these initiatives can be taken up as model for Arth Ganga programme. Jalaj is developed in accordance with local skill sets, raw material, market and demands, hence has site specific models such as knowledge corners, livelihood training and sale points, ecotourism-based safari boats, nurseries, health and wellness centres, sewing and stitching centres, local produce-based food processing units and sale points etc. Thus, Jalaj model primarily disseminates information on themes namely: conservation of aquatic biodiversity, skill enhancement in alternate livelihoods, production centers for items made from local resource material and sale centres.

The Jalaj will be further linked with the National Livelihood Mission of the Ministry of Rural Development, Pradhan Mantri Kaushal VikasYojna of the Ministry of Skill Development and Entrepreneurship and other schemes of the Government of India, such as Sawachh Bharat Abhiyaan, Jawahar Lal Nehru Solar Mission (JNNSM), Deen Dayal AntyodayaYojana, Heritage City Development & Augmentation Yojana (HRIDAY). The aim will be achieved through two objectives (1) Establishment of 75 Jalaj for realizing Arth Ganga in Ganga River Basin by linking conservation and livelihoods, and (2) Creation of societal awareness towards aquatic biodiversity conservation in Ganga River Basin. The project proposes to establish 75 Jalaj in Ganga River basin to commemorate 75 years of India's independence and celebrate Government of India's Azadi Ka Amrit Mahotsav (Figure 2).

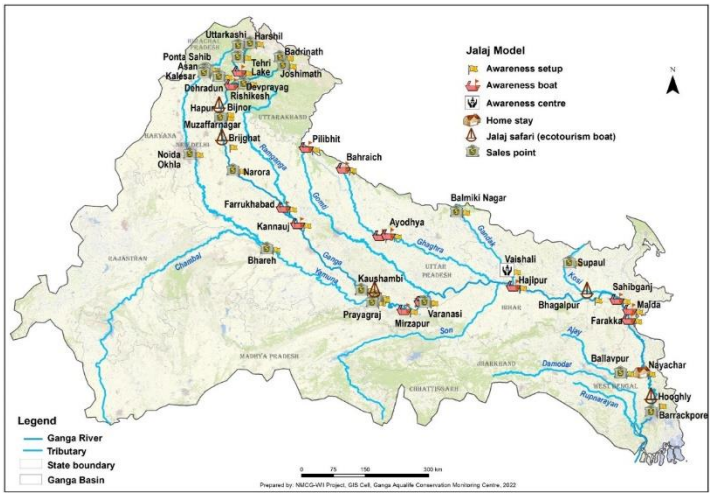


Figure 2: Location of proposed Jalaj sites

With the Hon'ble Prime Minister talking about the Jalaj concept, has sensitized more than 1.4 billion Indians across the nation on linking conservation, economy and local livelihoods. Jalaj, today, is being visualized, as a potential bottom up approach, balancing conservation and development with its establishment at 26 sites across the Ganga River. Considering this acknowledgement; women folks from riverside communities; today, are coming forward to be trained as torch bearers of conservation initiatives while enhancing their skills in alternate livelihoods to ensure additional source of household income at the upcoming 49 Jalaj sites in the Ganga River basin. Further, WII through NMCG will be linking the 75 Jalaj with "Dilli Haat", INA, New Delhi, the heritage center and international tourism hub showcasing traditional Indian crafts, cuisine and cultural practices. This center will be catering to the international and national customers promoting conservation initiative on each purchase besides taking visitors on a visual tour of the rich aquatic biodiversity thriving in the densely populated Ganga River Basin; through display panels and 3D models of freshwater species such as; Gangatic dolphin, turtles, waterbirds etc.

Pictures: 3D Models and information panels on aquatic species and Jalaj Sale center for products prepared by Ganga Praharis from riverside communities along Ganga River basin

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मूल संदेश

भारत के माननीय प्रधानमंत्री ने नमामि गंगे अभियान की सफलता की सराहना की तथा ये बताया कि इस अभियान ने जैवविविधता को बढ़ाया है और वैकल्पिक जीविका के अवसर पैदा किये हैं। जलज आजीविका मॉडल जैवविविधता संरक्षण को बढ़ावा देता है और महिलाओं की भागीदारी को मजबूत करने का लक्ष्य रखता है। भारतीय वन्यजीव संस्थान] गंगा नदी के लिए एक वैज्ञानिक अध्ययन पर आधारित जलीय प्रजाति उद्धार योजना विकसित कर रहा है, जिसमें गंगा प्रहरियों की भागीदारी होगी। अब तक कुल 26 जलज केंद्र स्थापित किये गए हैं] 75 जलज केंद्र अभी और बनेंगे। जलज केंद्रों को दिल्ली हाट से जोड़ा जाएगा, जो एक ऐतिहासिक केंद्र है और अंतर्राष्ट्रीय पर्यटन हब है जहां पारंपरिक भारतीय कला] खाने-पीने और संस्कृति का प्रदर्शन होता है। आगंतुक, गंगा नदी की जैवविविधता के बारे में गंगा सुधार की जानकारी, मॉडल और डिस्प्ले पैनल के माध्यम से हासिल करेंगे] जिसमें गागेय डॉल्फिन, कछुआ और जलपक्षियों की तस्वीरें शामिल होंगी।

Goraiya of the sacred mountains – A comprehensive study of house sparrow in the Uttarakhand Himalayas

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Abstract

The decline in House sparrow populations across the country has been a matter of concern for over two decades. Taking note of this, our Hon'ble Prime Minister Shri. Narendra Modi, in his monthly address, "Mann ki Baat" praised ongoing conservation efforts for the sparrow and urged more people to take up the cause. With our Prime Minister raising this issue a lot more people became aware of the declining status of sparrows and helped further the conservation efforts. In 2021, concerns about the fate of house sparrows in the Uttarakhand state were raised and this led to the Uttarakhand State Forest Department commissioning a comprehensive study on the species to the Wildlife Institute of India. This ongoing study addressed the question of how widely distributed and how high up in the Himalayas house sparrows occur, and whether populations in this mountainous State have also undergone declines. Systematic surveys in both urban and rural areas showed house sparrows to occur widely across the State, associated with human habitations, from the plains to as high as 3600 m, and also in parts of the Trans-Himalayan region. Sparrow numbers were found lowest in cities like Dehradun, Haridwar, and Rudrapur while rural areas adjoining these cities had relatively higher numbers. Within rural sites, house sparrow numbers again differed and their nesting was likely influenced by the housing architecture, be they of concrete as in developed villages or traditional thatched roof houses as in Gujjar settlements. These findings indicate that the decline of house sparrow populations, specifically in the cities may be a result of urbanization. This detailed study being taken up for the first time in the Uttarakhand Himalayas apart from providing information on the population status of house sparrows has also begun to provide deeper insights into these once commonly occurring human commensals.

Key Words: human-commensal, house sparrow, nest box occupancy, nest site selection, population decline, urban birdlife

Mann Ki Baat Reference: 31st episode dated 30th April 2017

पवित्र पर्वतों की गोरैया – उत्तराखंड हिमालय में गौरैया का व्यापक अध्ययन

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सारांश

देश भर में गौरैया की आबादी में गिरावट दो दशकों से अधिक समय से चिंता का विषय रही है। इसे ध्यान में रखते हुए, हमारे माननीय प्रधान मंत्री श्री नरेंद्र मोदी ने अपने संबोधन ''मन की बात'' में गौरैया के लिए चल रहे संरक्षण प्रयासों की प्रशंसा की और अधिक से अधिक लोगों से इस प्रयास को आगे बढ़ाने का आग्रह किया। हमारे प्रधानमंत्री द्वारा इस मुद्दे को उठाए जाने से बहुत से लोग गौरैया की घटती स्थिति के बारे में जागरूक हुए और संरक्षण के प्रयासों को आगे बढ़ाने में बहुत मदद की। वर्ष 2021 में, उत्तराखंड राज्य में गौरैया के भविष्य के बारे में चिंता जताई गई और इसके कारण उत्तराखंड राज्य वन विभाग ने भारतीय वन्यजीव संस्थान को इस प्रजाति पर एक व्यापक अध्ययन शुरू करने के लिये नियुक्त किया। इस चल रहे अध्ययन ने इस समस्या की खोजबीन कि कैसे व्यापक रूप से पाई जाने वाली घरेलू गौरैया हिमालय में कितनी ऊंचाई पर होती हैं, और क्या इस पर्वतीय राज्य में गौरैया की आबादी में भी गिरावट आई है। शहरी और ग्रामीण दोनों क्षेत्रों में व्यवस्थित सर्वेक्षणों में पूरे राज्य में व्यापक रूप से पायी गयी। जो मानव आवासों से जुड़े क्षेत्रों में मैदानी इलाकों से लेकर 3,600 मीटर तक की ऊँचाई तक और ट्रांस–हिमालयी क्षेत्र के कुछ हिस्सों में फैली हैं। गौरैया की संख्या देहरादून, हरिद्वार और रुद्रपुर जैसे शहरों में सबसे कम पाई गई, जबकि इन शहरों से सटे ग्रामीण क्षेत्रों में अपेक्षाकृत अधिक संख्या थी। ग्रामीण स्थलों के भीतर, गौरैया की संख्या अलग थी और उनके घोंसले के आवास की निर्माण वास्तुकला से प्रभावित होने की संभावना थी, चाहे वे विकसित गांवों में कंक्रीट के घर हों या गुर्जर बस्तियों में पारंपरिक फूस के छप्पर वाले घर हों। इन निष्कर्षों से संकेत मिलता है कि गौरैया की आबादी में गिरावट, विशेष रूप से शहरों में शहरीकरण का परिणाम हो सकता है। उत्तराखंड हिमालय में, गौरैया की आबादी की स्थिति के बारे में जानकारी प्रदान करने के अलावा, पहली बार किए जा रहे इस विस्तृत अध्ययन ने एक बार आम तौर पर होने वाली मानव बस्तियों में गहरी अंतर्दृष्टि प्रदान करना भी शुरू कर दिया है।

कीवर्डज़ : मानव–सहभोजी, गौरैया, नेस्ट बॉक्स ऑक्यूपेंसी, नेस्ट साइट चयन, जनसंख्या में गिरावट, शहरी पक्षी जीवन।

मन की बात संदर्भ : 31वां एपिसोड, 30 अप्रैल 2017

Goraiya of the sacred mountains - A comprehensive study of house sparrows in the Uttarakhand Himalayas

Renu Bala, Amarjeet Kaur, Dr. R. Suresh Kumar, and Dr. Dhananjai Mohan

The ubiquitous House Sparrow having evolved a commensal way of life, living in close proximity to people, has been a part of the culture of most Indians. Whether nesting in one's house or pecking at food scraps on a sidewalk or public park, this chirpy little bird is one that is familiar to most people, of all ages, young and old. It was no surprise when even common people started to notice over a two-decade period the continued decline of sparrows. And, in most towns and cities across the country, the once familiar chirps has now grown completely silent. This large-scale decline in house sparrows in India with reported causes being lack of nesting space and food, pesticide use, and disease outbreak echoes the reasons for the worldwide decline. Volunteering to bring back sparrows, local people across the country started placing food in their backyards or rooftops and putting up nest boxes. Spreading the efforts for sparrow conservation, a number of "Save the Sparrows" campaigns have been taken up over the years including "World Sparrow Day" celebrated every year on the 20th of March. Taking note of this, our Hon'ble Prime Minister Shri. Narendra Modi in his 31st episode of "Mann ki Baat" aired on 30th April 2017 appreciated the efforts of people to save sparrows, and encouraged more people to join in and specifically involve children in these efforts.

While conservation efforts to bring back house sparrows have been ongoing across India, there has been little effort to learn more about the species in-depth. As to how many sparrows are out there remains a question and whether the decline of sparrows is everywhere across India or it is only in the major cities and towns. And, it was in early 2021, one such inquiry pertaining to the current status of the Goraiya in Uttarakhand was raised. Following this, the Uttarakhand State Forest Department commissioned a comprehensive study on the house sparrow to the Wildlife Institute of India. This ongoing study addresses the question of how widely distributed and how high up in the Himalayas house sparrows occur, and whether populations in this mountainous State have also undergone declines.

Systematic surveys both in urban and rural areas across the State showed that house sparrows do occur widely associating with human habitations, from the Himalayan foothills to as high as 3600 m, and in parts of the Trans-Himalayan region. The surveys further found house sparrow numbers to be highly variable across the rural and urban gradient. Sparrow numbers were lowest in cities like Dehradun, Haridwar, and Rudrapur while rural areas adjoining these cities had relatively higher numbers. This was again noticeable in the nest box occupancy rates, with urban sites having poor occupancy (9%) compared to rural (90%). These findings suggest sparrow populations to have declined in the cities possibly as a result of urbanization. Further, within a few rural sites that were surveyed house sparrow numbers again differed and were influenced by the housing architecture, be they of concrete as in developed villages or traditional thatched roof houses as in Gujjar settlements. Additionally, the number of sparrows in the area was also influenced by the presence of livestock. The nest boxes deployed in the Gujjar settlements were not occupied by sparrows while in the relatively concretized built-up villages, the occupancy rate was 90%.

This initiative here in the Uttarakhand Himalayas having provided information on the population status of house sparrows has also begun to provide deeper insights into these once commonly occurring birds. This ongoing research is expected to understand other potential causes that have led to the decline of house sparrows in the region.

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मूल संदेश

प्रधानमंत्री श्री नरेंद्र मोदी ने अपने मन की बात के सम्बोधन में गौरैया के संरक्षण के लिए चल रहे प्रयासों की प्रशंसा की और अधिक लोगों को इस कार्य को अपनाने के लिए उत्साहित किया। उत्तराखंड राज्य में गौरैयों के भविष्य से संबंधित चिंताओं ने इस प्रजाति पर एक व्यापक अध्ययन की आवश्यकता को उत्पन्न किया, जिससे पता चला कि इस प्रजाति के स्थान विशेष रूप से मनुष्य के निवास से जुड़े हुए हैं। इस अध्ययन में सहयोगी शोधकर्ताओं ने बताया कि शहरों में घरेलू गौरैयों की संख्या कम होती जा रही है, जो शहरीकरण के कारण हो रहा है। इस अध्ययन से पता चलता है की ने एक समय में सामान्य रूप से पाई जाने वाली यह प्रजाति शहरीकरण के कारण आज संकट में है।

Tackling wildlife crime through forensic research: efforts spearheaded by Government of India at the Wildlife Institute of India

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Abstract

The Hon'ble Prime Minister of India has emphasized the problems of rhino poaching and Government's stern actions against it through the Mann ki Baat program in episode 85 dated 30th January 2022. He stated that rhinoceros has great glory in the culture of Assam and had faced difficulties. In 2013, 37 and in 2014, 32 rhinos were killed by poachers. To tackle this challenge, a huge campaign against the poaching of rhinoceros was launched in the last seven years with the special efforts of the Assam government. On 22nd of September last year (2021), on World Rhino Day, more than 2400 horns seized from smugglers were burnt. It was a stern message and as a result there was a steady decrease in the hunting of rhinos in Assam. Where 37 rhinos were killed in 2013, 2 killings in 2020 and only 1 in 2021.

The Wildlife Forensic and Conservation Genetics (WFCG) Cell of the Wildlife Institute of India (WII) is undertaking research in wildlife forensics and conservation genetics and providing scientific support to enforcement agencies. The WFCG Cell is receiving wildlife crime cases from across India and has received more than 4,800 offenses over 35 years. Most of the time, the enforcement agencies requested to know the victim species for the proper prosecution under the WPA and sometime the individual matching for the confiscated wildlife articles. The Ministry of Environment, Forests and Climate Change, Government of India in partnership with the Wildlife Institute of India (WII) Dehradun, the Forest Departments of Assam, West Bengal and Uttar Pradesh, and WWF India launched the Rhino DNA Index System India (RhoDIS-India) program. RhoDIS is a wildlife forensics tool developed for investigating rhino poaching. The DNA profiles of rhinos on the database system link a seizure to a crime incident and aid in prosecutions through scientific evidence-based forensics. Inspiring from PM's address and data generated through RhoDIS-India, a scientific research article has been published for rhino conservation, population management and forensic application in July, 2022.

Keyword: Rhino Poaching; Wildlife Forensics; RhoDIS-India; DNA Profiling; scientific evidence; prosecutions

Mann Ki Baat Reference: 85th episode dated 30th January 2022

फोरेंसिक अनुसंधान के माध्यम से वन्यजीव अपराध से निपटना: भारतीय वन्यजीव संस्थान में भारत सरकार द्वारा किए गए प्रयास

संदीप कुमार गुप्ता एवं सम्राट मंडल
वन्यजीव फोरेंसिक और संरक्षण आनुवंशिकी सेल, भारतीय वन्यजीव संस्थान, देहरादून

सारांश

भारत के माननीय प्रधानमंत्री जी ने दिनांक 30 जनवरी 2022 के एपिसोड 85 में मन की बात कार्यक्रम के माध्यम से गैंडों के अवैध शिकार की समस्याओं और इसके खिलाफ सरकार की कड़ी कार्रवाइयों पर जोर दिया था। वर्ष 2013 में 37 और 2014 में 32 गैंडों को शिकारियों ने मार डाला था। उन्होंने कहा कि गैंडे की असम की संस्कृति में बहुत महिमा है और उसने कठिनाइयों का सामना किया है। इस चुनौती से निपटने के लिए असम सरकार के विशेष प्रयासों से पिछले सात वर्षों में गैंडों के अवैध शिकार के खिलाफ एक बड़ा अभियान चलाया गया। 22 सितंबर 2021 को विश्व गैंडे दिवस पर तस्करों से जब्त 2,400 से अधिक सींगों को जलाया गया था। यह एक कड़ा संदेश था और इसके परिणामस्वरूप असम में गैंडों के शिकार में लगातार कमी आ रही है। वर्ष 2013 में 37, 2020 में 2 और 2021 में सिर्फ 1 गैंडे की मौत हुई थी।

भारतीय वन्यजीव संस्थान (WII) का वन्यजीव फोरेंसिक और संरक्षण आनुवंशिकी (WFCG) सेल वन्यजीव फोरेंसिक और संरक्षण आनुवंशिकी में अनुसंधान कर रहा है और प्रवर्तन एजेंसियों को वैज्ञानिक सहायता प्रदान कर रहा है। WFCG सेल को पूरे भारत से वन्यजीव अपराध के मामले प्राप्त हो रहे हैं और 35 वर्षों में 4,800 से अधिक अपराध के मामले प्राप्त हुए हैं। अधिकांश समय, प्रवर्तन एजेंसियों ने वन्यजीव सुरक्षा कानून के तहत उचित अभियोजन के लिए शिकार प्रजातियों के बारे में बताने का अनुरोध किया और कभी–कभी जब्त किए गए वन्यजीव लेखों के लिए अलग–अलग मिलान किया। पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय, भारत सरकार ने भारतीय वन्यजीव संस्थान, देहरादून, असम, पश्चिम बंगाल और उत्तर प्रदेश के वन विभागों और WWF इंडिया के साथ साझेदारी में राइनो डीएनए इंडेक्स सिस्टम इंडिया (RhoDIS–इंडिया) कार्यक्रम लॉन्च किया। RhoDIS एक वन्यजीव फोरेंसिक उपकरण है, जिसे गैंडों के अवैध शिकार की जांच के लिए विकसित किया गया है। डेटाबेस सिस्टम पर गैंडों के डीएनए प्रोफाइल एक जब्ती को अपराध की घटना से जोड़ते हैं और वैज्ञानिक साक्ष्य–आधारित फोरेंसिक के माध्यम से अभियोजन में सहायता करते हैं। प्रधानमंत्री के संबोधन और RhoDIS–इंडिया के माध्यम से उत्पन्न डेटा से प्रेरित होकर गैंडा संरक्षण, जनसंख्या प्रबंधन और फोरेंसिक एप्लिकेशन के लिए जुलाई, 2022 में एक वैज्ञानिक शोध लेख प्रकाशित किया गया है।

कीवर्ड : गैंडे का अवैध शिकार, वन्यजीव फोरेंसिक, RhoDIS–इंडिया, डीएनए प्रोफाइलिंग, वैज्ञानिक प्रमाण, अभियोजन।

मन की बात संदर्भ : 85वां एपिसोड, 30 जनवरी 2022

Tackling wildlife crime through forensic research: Efforts spearheaded by Government of India at the Wildlife Institute of India

Sandeep Kumar Gupta and Samrat Mondol

Introduction

The illegal wildlife trade is currently considered a transnational organized crime (TOC), valued at an estimated $20 billion US annually (Vince 2002). The high profits and low TOC convictions in wildlife trade drive poaching pressures by organized syndicates. As global demands and prices for these wildlife products continue to increase, rapid decline in animal biodiversity from illegal poaching greatly exacerbates the ecological, economic and security impacts worldwide (Chapron et al. 2008; Estes et al. 2011; Ripple et al. 2014). Therefore, urgent measures are needed to stop further poaching-related biodiversity declines. Large endangered mammals are major global poaching targets due to high demands for their body parts (Schipper et al. 2008). They are also more prone to poaching due to their large home ranges, higher resource requirements and potential conflict with humans (Schipper et al. 2008). Carnivores in particular, are severely affected by poaching pressure and the loss of these predators results in severe trophic downgrading effects in ecosystems (Estes et al. 2011). Such cascade effects are of major concern in biodiversity-rich countries, which are primary targets of organized poaching syndicates to fulfill global demands.

Wildlife Institute of India (WII), Dehradun, is an autonomous institute of the Ministry of Environment, Forest and Climate Change, Government of India. It nurtures wildlife science in the region through research, training and education. Also, it plays an important role in providing advisory and technical support to the different states and the Government of India. Wildlife forensics supports effectively enforcing the Wildlife (Protection) Act (WPA), 1972 of India. Wildlife crime has severely threatened 'biodiversity conservation' and 'social security'. Illicit exploitation of wildlife and its derivatives for illegal trade has arisen as an organized global crime that has threatened wild species. It is the fourth largest crime for unlawful revenue generation after narcotics, illegal arm supply and human trafficking. Several "wildlife trade hotspots" have been identified, including China's international borders, trade hubs in East/Southern Africa and Southeast Asia, the eastern borders of the European Union, few places in Mexico, parts of the Caribbean, Indonesia, New Guinea, and the Solomon Islands. Protection of animal species from illegal trade has been a prime challenge for conservationists and enforcement agencies.

The Wildlife Forensic and Conservation Genetics (WFCG) Cell of the WII has been undertaking research in wildlife forensics and conservation genetics. The WFCG Cell is receiving reported wildlife crime cases from across India. It has received more than 4,800 crime cases over 35 years. At present, WFCG Cell gets about 200-300 cases every year. Most of the time, the enforcement agencies requested to know the victim species for the proper prosecution under the WPA.

Articles of various species in illegal wildlife trade

As a country with the largest population of free-ranging Bengal tigers (*Panthers tigris*), India is a hot spot for wildlife poaching. Despite a very strict wildlife protection act, the poaching rate of tigers (*Panthera tigris*) and leopards (*Panthera pardus*) is still increasing in several countries for body parts for Chinese medicinal products and ornaments (Gupta et al. 2021). India's native wildlife is exploited for products derived from them, which includes mongoose hair; snake skins; rhino horn; tiger and leopard claws, bones, skins, whiskers; elephant tusks; antlers; turtle shells; musk pods; bear bile; wide variety of medicinal plants; timber and caged birds such as parakeets, mynas, munias; butterflies, moths and beetles (http://www.traffic.org). Interpol's record on the trade of tiger products and derivatives over 10 years indicated that poaching of 1069-1220 tigers has probably occurred. In 481 cases, materials were seized from various countries holding the tiger population (https://www.traffic.org/seizures/).

The shawl weaved from the wool of Tibetan antelope or chiru (*Pantholops hodgsonii*) is a highly demanded product in the global market (Gupta et al. 2022). The WPA of India is one of the strict acts which summons severe punishment upon possessing Indian wildlife's products. Therefore, identifying the species from the available remnant is a key task in Wildlife Forensics; it is not required to correlate the exact hunter or poacher with the confiscated wildlife objects.

From ancient times, many illegal imports of animal species and their body parts were practiced for various myths. These items were used for different religious purposes to perform traditional sacred rituals, black magic practices, and mysticism to fulfill superstitious beliefs. Hence, cruel harvesting is happening worldwide, causing serious conservation threats to the population of associated species. Many species have been identified and enlisted under international and national protection/prohibition laws. Despite such protection, the trafficking of their parts and products are going undercover. The illegal wildlife trade has heightened into a global predicament, resulting in several iconic species on the verge of extinction. The traders use sophisticated and technical way to remain to hide by misdeclarations of shipping, selling prohibited articles with uncommon code words and hiding the originality as well as making money by selling imitations. It increases the difficulties for law enforcement which becomes ineffective in perceiving such undercover wildlife trade. Enforcement authorities are progressively seeking forensic assistance to answer inspective questions regarding wildlife offenses. Identifying species from the parts and products is a prime mandate for implementing wildlife prevention laws.

Many parts of India still belive in superstitions as the general public may sometimes be swayed without knowledge of the scientific truth. Many of the mushrooming astrologers take advantage of the sentimental beliefs of the innocent public to make money. An article was published in a famous Hindi newspaper on April 19, 2017 (https://www.amarujala.com/astrology/vastu/vaastu-tips-of-hatha-jodi) regarding the propagation of such an agenda. It described the divine use of a *sacred plant root called* 'Hatha Jodi' (Figure 1). Several YouTube videos were also available in the media that portrayed the magical effect of 'Hatha Jodi'. Moreover, this product has been described as a holy plant root and not an animal organ, so people may have tempted to buy the same. It would be appropriate to mention that buyers are responsible for the consequences of the protection laws (WPA) and possession of Schedule I animals with a definite provision of 3-7 years imprisonment.

Figure 1: Hatha Jodi (hemi penis of monitor lizard)

Figure 2: Image of the original Indian one-horned Rhinoceros

Efforts of government agencies and NGO in rhino conservation

In 2016, the Ministry of Environment, Forests, and Climate Change (MoEFCC), Government of India, in partnership with the Wildlife Institute of India (WII), the forest departments of Assam, West Bengal, and Uttar Pradesh, and WWF India launched the Rhino DNA Index System (RhoDIS-India) India program. It was introduced through workshops organized by WWF India and the Assam Forest Department with experts from South Africa.

RhoDIS is a wildlife forensics tool specially developed for investigating wildlife crime cases. RhoDIS was initiated by the Veterinary Genetics Laboratory of the University of Pretoria by creating a database using the unique DNA profile of individual rhinos. The DNA profiles of all the rhinos on the database system link a seizure to a crime incident and aid in prosecutions through scientific evidence based on forensics. RhoDIS was first used in a rhino poaching case in South Africa in 2010 and resulted in the conviction of an offender.

Wildlife Institute of India houses the RhoDIS India laboratory that conducts all the analyses and maintains the DNA database as notified by the Government of India. In addition to creating the DNA database from horn, tissue, and blood samples, rhino dung was also used.

RhoDIS uses a DNA indexing system created to get a signature unique to each rhino. In India, the laboratory protocols have been finalized by testing different samples like tissue, blood, horn and dung. The RhoDIS India database now has the DNA profiles of more than 500 individual rhinos from across its range.

The success of RhoDIS-India

18 rhino poaching cases have been investigated and reported under RhoDIS-India till March 2023, and more than 60% of these cases were from Assam alone. The first case under the RhoDIS-India program was investigated in 2017 when a horn was seized near Guwahati in Assam, and the samples were sent to WII for analysis. Later, two carcasses were recovered in North Bengal, and samples from these two were also sent for analysis. After completing the analyses, the seized sample was successfully linked to one of the recovered rhino carcasses. RhoDIS-India has proven to be a successful tool in aiding crime investigation and strengthening legal presentations. Other than RhoDIS-India cases, six rhino poaching cases were also solved in the WFCG Cell of WII; therefore, WII has analyzed and provided forensic reports in 24 rhino poaching cases. In India, the tool's effectiveness has been understood as it not only supports the cases through forensics investigation but is also helping improve the entire crime investigation procedures. Recently, Ghosh et al. (2022) investigated genetic variation and evolutionary history in the future conservation of Indian one-horned rhinoceros that can help in forensic shorting of the poached population. Through the RhoDIS-India program, a deeper study on the genetic health of different rhino populations in the country is currently being conducted, which can help better manage these threatened species.

Conclusions and way forwards

Apart from active research in wildlife forensics, WII provides technical advice and training to neighboring countries' scientists to establish Wildlife Forensics support in their countries. Through a Gazette Notification of the Ministry of Home Affairs, Government of India, and in exercising of the powers conferred by clause (g) of sub-section (4) of Section 293 of the Code of Criminal Procedure, 1973 (2 of 1974), the Central Government has specified the 'Scientists' of the WFCG Cell of WII as 'Government's Scientific Expert' for the legal purpose. Hence, the wildlife forensic support from the WII has been effective in wildlife law enforcement in the judicial courts. Hon'ble Prime Minister's address on control of rhino poaching has boosted the ground workers and forensic experts to contribute more to the effective conservation and protection of this species and other threatened flora and fauna. The recent amendment to Wildlife (Protection) Amendment Bill, 2022 has enhanced the effectiveness of the WPA, 1072 with the inclusion of CITES-listed species; therefore, enforcement agencies can effectively act in comprehensive control of illegal wildlife trade.

Acknowledgement

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मूल संदेश

भारत के माननीय प्रधानमंत्री ने मन की बात के एक एपिसोड में गैंडे के शिकार और इससे निपटने में सरकारी कार्रवाई के मुद्दे पर बात की। उन्होंने असम में गैंडे के सांस्कृतिक महत्व और इसे शिकार करने से होने वाली मुश्किलों को भी उजागर किया। सात साल से गैंडे की शिकार से निपटने के लिए एक विस्तृत अभियान शुरू किया गया था, जिससे असम में शिकार की संख्या वर्ष 2013 में 37 से वर्ष 2021 में केवल 1 तक ही रह गई थी। भारतीय वन्यजीव संस्थान] वन्यजीव विज्ञान और संरक्षण जेनेटिक्स पर अनुसंधान कर रहा है और एनफोर्समेंट एजेंसियों को वैज्ञानिक सहयोग प्रदान करता है। संस्थान एवं अन्य संगठनों के साथ, सरकार ने राइनो की हंटिंग की जांच के लिए राइनो डीएनए इंडेक्स सिस्टम इंडिया कार्यक्रम की शुरुआत की।

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Wildlife conservation in Arunachal Pradesh and its challenges

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Abstract

Issues of Wildlife protection and conservation have been addressed several times by the Hon'ble PM of India in Mann ki Baat (Episodes 31, 56, 74, 84, 85 and 96). In episode 84, the PM highlighted the "Airgun Surrender Abhiyan," a mass green movement in Arunachal Pradesh, and the role that locals have played in the state's environmental management and wildlife protection.

Arunachal Pradesh, situated in the Eastern Himalayas, is predominantly a mountainous state that falls within one of the world's 18 biodiversity hotspots. The state is located in a unique transition zone between the Himalayan and Indo-Burmese regions and is also among the 200 globally significant ecoregions. More than 80% of its land is covered by forests, which are home to a rich diversity of rare, endemic, and threatened species. The state boasts over 6000 plant species, 55 mammal species, and over 900 bird species, with new species continually being discovered, such as the Sela Macaque, and Lisu Wren Babbler. Orchids, with more than 600 species in the state, are often referred to as the "Jewels of Arunachal Pradesh." The importance of the state is attributed to its strategic location, shared borders with Bhutan, Tibet (China), and Myanmar, and the presence of numerous ethnic communities with distinctive linguistic, cultural, and social identities. There are 26 indigenous communities and numerous subcommunities which comprise 65% of the population each with specific geographic distribution and distinct linguistic, cultural, and social identities.

Many ethnic communities in the state support conservation directly or indirectly through their cultural practices. For example, the traditional belief systems of the Idu Mishmis forbid them from hunting animals, including a complete prohibition on killing tigers which are considered their sacred brother. On the other hand, some traditional beliefs that support hunting also pose challenges to conservation efforts. Overall, the state's conservation has benefited recently from several social and cultural changes, conservation laws and their enforcement by authorities and local communities.

The achievements and challenges associated with wildlife conservation in Arunachal Pradesh are discussed in the article. One notable ongoing initiative for wildlife conservation is the "Airgun Surrender Abhiyan," which encourages communities across the state to surrender any guns that they may use for hunting. This campaign, owing to its success was also praised Hon. Prime Minister in 'Mann ki Baat'. Several species-specific conservation initiatives, including joint government and community-based programs, have been adopted in the state. Some of the Nyishi community members have led by example and transitioned from being hunters to protecting hornbill nests. One notable example where the Arunachal Pradesh government designated Pakke-Paga Hornbill Festival as the state festival to honor the contributions of the Nyishi and people of the state to promote wildlife conservation. There are other significant examples as well of the Mishmi community and their efforts in conservation of the rare Mishmi Takin in the Mishmi Hills Wildlife Sanctuary. Another example is the conservation of Hoolock Gibbon

through the protection of the Mehao Wildlife Sanctuary. One of the most notable examples is the role played by the Bugun people in the conservation of a recently discovered bird, the Bugun liocichla. The Bugun liocichla Conservation Area (BLCA) was created to protect this critically endangered bird. Additionally, various conservation measures have been implemented to ensure the survival and growth of populations of endangered species, such as the bears, red panda, black-necked crane, clouded leopards, snow leopard, dhole, and serow in Arunachal Pradesh.

Given the potential impact of anthropogenic pressures, including hunting, there is a pressing need for dedicated integrated forest research and management, greater awareness about conservation, community involvement, and incentive-based conservation practices to ensure continued coexistence between humans and wildlife. There is an urgent need to balance the developmental needs of the state with its conservation backdrop considering the fragile habitats and species it harbours.

Keywords: biodiversity, communities, conservation, Arunachal Pradesh, wildlife

Mann Ki Baat Reference: 31st Episode dated 30 April 2017; 56th Episode dated 25 August 2019; 74th Episode dated 28 February 2021; 84th Episode dated 26 December 2021; 85th Episode dated 29 January 2022; 96th Episode dated 25 December 2022

अरुणाचल प्रदेश में वन्यजीव संरक्षण और इसकी चुनौतियाँ

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सारांश

मन की बात (एपिसोड 31, 56, 74, 84, 85 और 96) में भारत के माननीय प्रधानमंत्री द्वारा वन्यजीव संरक्षण और संरक्षण के मुद्दों पर कई बार संबोधित किया गया है। एपिसोड 84 में, पीएम ने ''एयरगन सरेंडर अभियान,'' अरुणाचल प्रदेश में एक बड़े पैमाने पर हरित आंदोलन, और स्थानीय लोगों द्वारा राज्य के पर्यावरण प्रबंधन और वन्यजीव संरक्षण में निभाई गई भूमिका पर प्रकाश डाला।

अरुणाचल प्रदेश, पूर्वी हिमालय में स्थित है, मुख्य रूप से एक पहाड़ी राज्य है जो दुनिया के 18 जैव विविधता हॉटस्पॉटश में से एक है। यह राज्य हिमालयी और भारत–बर्मा क्षेत्रों के बीच एक अद्वितीय परागमन क्षेत्र में स्थित है और विश्व स्तर पर महत्वपूर्ण 200 पारिस्थितिकीय क्षेत्रों में से एक है। इसकी 80ः से अधिक भूमि वनों से आच्छादित है, जो दुर्लभ, स्थानिक और ख़तरे वाली प्रजातियों की समृद्ध विविधता का आवास है। राज्य में 6,000 से अधिक पौधों की प्रजातियाँ, 55 स्तनपायी प्रजातियाँ, और 900 से अधिक पक्षीयों की प्रजातियाँ हैं, एवं लगातार नई प्रजातियाँ खोजी जा रही हैं, जैसे कि सेला मकाक एवं लिसु ब्रेन बैबलर। राज्य में 600 से अधिक प्रजातियों के साथ ऑर्किड, अक्सर ''अरुणाचल प्रदेश के गहने'' के रूप में जाना जाता है। राज्य के महत्व को इसके रणनीतिक स्थान, भूटान, तिब्बत (चीन) और म्यांमार के साथ साझा सीमाओं और विशिष्ट भाषाई, सांस्कृतिक और सामाजिक पहचान वाले कई जातीय समुदायों की उपस्थिति के लिए जाना जाता है। राज्य में 26 स्वदेशी समुदाय और कई उप–समुदाय हैं जिनमें विशिष्ट भौगोलिक वितरण और विशिष्ट भाषाई, सांस्कृतिक और सामाजिक पहचान के साथ 65ः जनसंख्या शामिल है।

राज्य में कई जातीय समुदाय अपनी सांस्कृतिक प्रथाओं के माध्यम से प्रत्यक्ष या अप्रत्यक्ष रूप से संरक्षण में सहयोग करते हैं। उदाहरण के लिए, इदु मिश्मी समुदाय, पुरानी परम्परा में विश्वास के कारण, जानवरों का शिकार नहीं करते हैं, जिसमें बाघों को मारने पर पूर्ण प्रतिबंध भी शामिल है, जिन्हें उनका पवित्र भाई माना जाता है। दूसरी ओर, शिकार का समर्थन करने वाली कुछ पारंपरिक मान्यताएँ भी संरक्षण के प्रयासों के लिए चुनौतियाँ खड़ी करती हैं। कुल मिलाकर, राज्य के संरक्षण को हाल ही में कई सामाजिक और सांस्कृतिक परिवर्तनों, संरक्षण कानूनों और अधिकारियों और स्थानीय समुदायों द्वारा उनके प्रवर्तन से लाभ हुआ है।

लेख में अरुणाचल प्रदेश में वन्यजीव संरक्षण से जुड़ी उपलब्धियों और चुनौतियों पर चर्चा की गई है। वन्यजीव संरक्षण के लिए चल रही एक उल्लेखनीय पहल ''एयरगन सरेंडर अभियान'' है, जो राज्य भर के समुदायों को किसी भी प्रकार की बंदूक का समर्पण करने के लिए प्रोत्साहित करता है, जिसका वे शिकार के लिए उपयोग कर सकते हैं। इस अभियान की सफलता के कारण 'मन की बात' में माननीय प्रधानमंत्री द्वारा भी प्रशंसा की गई है। राज्य में संयुक्त सरकार और समुदाय आधारित कार्यक्रमों सहित कई प्रजाति–विशिष्ट संरक्षण पहलों को अपनाया गया है। न्यीशी समुदाय के कुछ सदस्यों ने उदाहरण पेश करते हुए हॉर्नबिल का शिकार न करके हॉर्नबिल के घोंसलों के रक्षक बनने का संकल्प लिया। एक अन्य उदाहरण, जहां अरुणाचल प्रदेश सरकार ने वन्यजीव संरक्षण को बढ़ावा देने के लिए न्यीशी समुदाय और राज्य के लोगों के योगदान का सम्मान करने के लिए पाके–पागा हॉर्नबिल महोत्सव को राज्य उत्सव के रूप में नामित किया। मिश्मी समुदाय से अन्य महत्वपूर्ण योगदान के रुप में मिश्मी हिल्स वन्यजीव अभयारण्य में दुर्लभ मिश्मी ताकिन के संरक्षण में उनके प्रयास, मेहाओ वन्यजीव अभयारण्य के संरक्षण के माध्यम से हूलॉक गिब्बन का संरक्षण और हाल ही में खोजे गये पक्षी, बुगुन लिओसीचला के संरक्षण में बुगुन लोगों द्वारा निभाई गई भूमिका है। इस गंभीर रूप से लुप्तप्राय पक्षी की रक्षा के लिए बुगुन लिओसीचला संरक्षण क्षेत्र (बीएलसीए) बनाया गया था। इसके अतिरिक्त, अरुणाचल प्रदेश में भालू, लाल पांडा, काली गर्दन

वाली सारस, क्लाउडेड लेपर्ड, स्नो लेपर्ड, ढोल और सीरो जैसी लुप्तप्राय प्रजातियों की आबादी के अस्तित्व और वृद्धि को सुनिश्चित करने के लिए विभिन्न संरक्षण उपायों को लागू किया गया है।

शिकार सहित मानवीय दबावों के संभावित प्रभाव को देखते हुए, समर्पित एकीकृत वन अनुसंधान और प्रबंधन, संरक्षण के बारे में अधिक जागरूकता, सामुदायिक भागीदारी और प्रोत्साहन–आधारित संरक्षण प्रथाओं के लिए मानव और वन्यजीवों के बीच निरंतर सह–अस्तित्व सुनिश्चित करने की अत्यधिक आवश्यकता है। वन्यजीव आवासों और प्रजातियों को आश्रय देने पर विचार करते हुए राज्य की विकासात्मक आवश्यकताओं को इसके संरक्षण पृष्ठभूमि के साथ संतुलित करने की तत्काल आवश्यकता है।

कीवर्डज़ : जैव विविधता, समुदाय, संरक्षण, अरुणाचल प्रदेश, वन्यजीव।

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Arunachal 'Land of the Dawn-lit-Mountains'

Arunachal Pradesh, the largest northeastern state (83,743 km²) is strategically located sharing international borders with Bhutan to the west, Tibet (China) to the North and Myanmar to the east [1]. It is uniquely situated at the confluence of the Himalayan and Indo-Burmese regions [2]. Arunachal falls within the Eastern Himalaya global biodiversity hotspot [3], and is among the 200 globally important ecoregions [4]. It is one of the world's top 'ecological hotspots' with diverse ecosystems. Its forests cover 80% of its land and are home to numerous rare and endemic species [5]. The wide altitudinal range (100 to 6000 m) is responsible for diverse forest types; tropical evergreen and semi-evergreen forests up to 1500 m, temperate forests up to 4000 m, and alpine areas above 4000m. Of the recorded forest area 12% is classified as Reserved Forest. Some 53 per cent of the Reserved Forest area in Arunachal Pradesh are community forests (DTE). Protected Forests, Anchal Reserve Forests, Village Reserve Forests and Unclassed State Forests (USF) constitute the remaining forests [1]. Over 6000 species of flowering plants are found (of both vascular and non-vascular origin) in the state [6], out of which more than 200 are endemic [7]. The state has more than 55 mammal species with four big cats namely tiger, leopard, clouded leopard, and snow leopard. The state is also home to some rare lesser feline species like the Golden Cat and Marbled Cat [8]. It covers an amazingly rich variety of avifauna with over 900 bird species [9]. The state has one of the highest bird diversities in India. Out of nine hornbill species reported from India, five species are found in Arunachal [10]. The state of Arunachal Pradesh is often referred to as the "Orchid Paradise" due to its high concentration of orchid species, which account for about 40% of the country's total orchid species [11]. The Dihang-Dibang Biosphere Reserve (DDBR) that spreads in West Siang, Upper Siang and Dibang Valley is the largest and most biodiverse spot in the state. The state is also rich in agro-biodiversity and has been a centre of origin for several crop plant species [7].

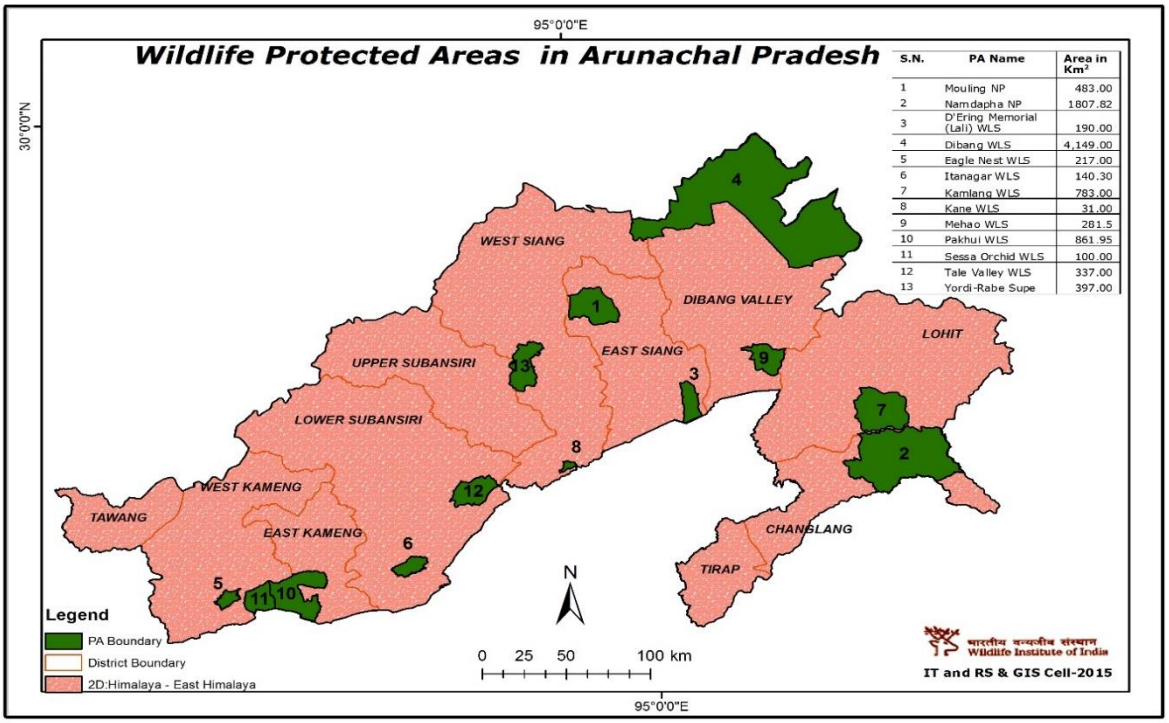
Conservation threats

The biodiversity of Arunachal Pradesh is facing various threats, including habitat fragmentation, deforestation, Jhum cultivation, forest fires, illegal hunting, resource extraction, encroachment, and rapid urbanization [12]. The development of linear infrastructure and hydroelectric power plants poses a serious threat to wildlife and diverse ecosystems. Over time, these infrastructure projects have negatively impacted a number of biodiversity-rich zones for numerous taxa in the region [38, 39, 40, 41].

Initiatives by the state and centre

To safeguard the state's diverse ecosystems, the government has taken a number of in situ and ex-situ measures, such as creating arboretums, sanctuaries, parks and reserve forests, etc. [7] The state has two national parks namely Mouling and Namdapha and 13 wildlife sanctuaries [13]. For species-specific conservation, the state has taken up activities under Project Tiger and Project Elephant with central assistance from the Government of India [14]. There are three Tiger project areas namely Namdapha, Pakka and Kamlang Tiger Reserve [15] and two elephant reserves namely Kameng and South Arunachal Reserve Forest [16]. The state has also declared nine community reserves which involve conservation with the involvement of the local communities. A large area has been designated as the Dihang Dibang Biosphere Reserve [17]. Inhospitable terrain and inaccessibility of most of the protected areas in Arunachal add more protection to these areas. Most of the areas are away from any villages and the

people of the state surrounding many of these protected areas play a key role in the conservation of wildlife and its habitat [18].



Cultural diversity and linkages to conservation

In addition to rich biodiversity, the predominantly mountainous state of Arunachal is rich in cultural heritage [19]. The state of Arunachal Pradesh is home to 26 indigenous communities, along with several sub-communities, which together make up 65% of the state's population. These communities have distinct geographic distributions, and each community has its own unique linguistic, cultural, and social identity [20,21]. Many indigenous communities are dependent on natural resources for grazing, extraction of timber and medicinal plants [19]. Despite locals' reliance on the forest, the state still has sizable forested areas, in part because of its low human population density (13 people/km^2), and because these communities coexist in perfect harmony with nature [20]. Each community exercises control over the natural resources within their inhabited area and uses the resources for shelter, cultivation, food, daily multifarious uses and other human activities. Most of the tribes have co-opted modern ways of living with traditional philosophies and belief systems which treasure biocultural diversity [22].

In Arunachal Pradesh, both the indigenous laws of traditional institutions and the formal legal system govern various aspects of the local tribal communities' lives. The 15-year-old Community Conserved Area (CCA) model implemented in Western Arunachal Pradesh has facilitated the participation of villagers in conservation initiatives for forests located outside protected areas. This model ensures the security of their traditional custodianship and user rights over natural resources. Over 15 years, the communities in Arunachal Pradesh have voluntarily declared nine community conserved areas, covering approximately 1500 sq km of forests [31]. These areas harbour significant forest habitats that provide a home to the red panda, Himalayan goral, serow, takin, small cats, and high-altitude lakes. The model is being implemented in the Western Arunachal Landscape (WAL), primarily occupied by the Monpa tribe, who are highly reliant on forests and natural resources for their livelihoods. The communities share strong religious ties and cultural values with their natural surroundings [31]. The community conserved area comprises panchayat members, village elders, and youth working together towards conserving and managing their forests, securing the habitats of red pandas, musk deer, serow, goral, Himalayan black bear, Siberian weasel, leopard, and wild dogs [31]. Another approach through Joint Forest Management seeks to provide benefits to the local communities residing in and around the forest areas in return for their assistance in the conservation, protection, and regeneration of the forests. The government of India has introduced various schemes, programs, and policies like the Apanavan Scheme and the formation of Village Forest Management Committees (VFMCs) to mobilize conservation efforts at the village level [32].

Community initiatives in conservation

A notable ongoing initiative by the Department of Forest and Environment under the Government of Arunachal Pradesh is a mass green movement called the "**Airgun Surrender Abhiyan**". It encourages communities across the state to surrender any guns that they may use for hunting [24]. Since the launch of the campaign on 17th March 2021, citizens from all communities across Arunachal Pradesh have embraced the movement and are participating in it to counteract the loss of wildlife species by surrendering their guns, otherwise used for hunting [25]. The campaign was also lauded by the Indian Prime Minister in the 84th episode of 'Mann ki Baat' aired on 26 Dec 2021 [26]. The campaign is an ongoing, successful, and brilliant effort to engage locals in environmental management and wildlife protection. In less than a month after the campaign's launch, more than 680 people had handed their air guns to district administration across the state. Several other community-based conservation efforts are being implemented in the state for conserving wildlife on different levels.

There are several ongoing species-specific conservation initiatives in the state, including joint government and community-based programs. One notable example is the Nyishi Community, an indigenous community of the forests bordering the Pakke Tiger Reserve [10]. The Nyishi people who have traditionally hunted hornbills for their feathers and beaks, have turned to hornbill nest protectors as part of the **Hornbill Nest Adoption Program** [27]. Launched in 2012, this program is a partnership between the Forest Department, the Ghora-Aabhe Society, and Nature Conservation Foundation [28]. The program encourages locals to replace the hornbill beaks in their headgear with plastic and fibreglass alternatives. In addition, Nyishi community members are employed to monitor and protect hornbill nests and educate others about the importance of conservation [29]. The Pakke-Paga Hornbill Festival was initiated to honour the Nyishi tribe's contribution and promote wildlife conservation. This festival is now a state festival [30]. Nest protectors are chosen from village headmen's nominations and observe and monitor human activity around the nests every five to six days. They take pride in being the local guardians of hornbills and strive to ensure their future generations can coexist and live in harmony with these magnificent birds [28]. The Hornbill Nest Adoption Program supports livelihoods while protecting hornbills and their habitat in this landscape, creating a conservation network [29].

Another one is the Thembang Bapu Community Conserved Area (TBCCA) has witnessed the initiation of a process by the local community to notify one-third of the TBCCA as a Community Reserve (CR) under the provisions of the Indian Wildlife (Protection) Act, 1972. This notification will legitimize the protection mechanism of community forests and has increased revenue four-fold since its inception as of 2019 [31]. The village head of the Chug community-conserved area in the West Kameng district emphasizes the cultural importance of certain animals such as red pandas, takin, musk deer, Asiatic black bears, and snow leopards. The community believes that the conservation of these species is crucial to ensure the existence of the villagers. He suggests that "the forest with rich forest and animals would keep their deity happy so it would bring good luck to the villagers and they could

stay healthy and happy" [31]. Several species-specific conservation initiatives are being implemented in coordination with local communities.

One more such effort includes the **Bugun Liocichla** (*Liocichla bugunorum*) a critically endangered bird species found only in a small area of Arunachal Pradesh, India. The conservation of the Bugun Liocichla is a priority in the region due to its restricted range and small population size. To ensure the protection of the species, the state government and conservation organizations have implemented various initiatives [33,34]. One of the key conservation efforts is the establishment of community-led conservation efforts in the area. The Bugun Welfare Society, a local conservation organization, has worked alongside local communities to establish a community reserve named the Bugun Liocichla Conservation Area (BLCA), which covers an area of around 17 square kilometres. This initiative has received recognition in the form of the 2018 India Biodiversity Awards, presented to the Singchung Bugun Village Community Reserve Management Committee in Arunachal Pradesh, for their efforts towards the conservation of wild species [34].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The Sessa Orchid Sanctuary, spanning 100 square kilometres in the West Kameng district of Arunachal Pradesh, boasts over 200 species of orchids, including numerous rare and endemic species. As an essential part of the Kameng protected-area complex, the undulating orchid habitats of Sessa have been declared an orchid sanctuary, the first of its kind in India, in 1989 [35]. Earlier this year, members of the local community, who belong to indigenous communities, worked alongside officials from the Khellong forest division to renovate the sanctuary's entrance and construct a new boardwalk leading up to it, as well as a one-kilometre-long trail for orchid enthusiasts. With the sanctuary spreading across lands belonging to indigenous communities and the local Bugun, Miji, and Hrusso tribes possessing rich ethnobotanical traditions, these efforts were part of a collaborative endeavour to improve the status of the protected area. The ***Epipogium sessanum***, a species endemic to Sessa and named after the sanctuary, blooms once a year which also has its own importance to the flora of the state [35].

Also, one of the most important efforts is in the eastern part of Arunachal Pradesh, the **Mishimi Hills of Lower Dibang** lies the Dibang Wildlife Sanctuary, a biodiversity hotspot home to rare Mishmi takin, musk deer, goral as well as clouded leopards, snow leopards and tigers. Here also lies, the Mehao Wildlife Sanctuary, which was established to protect the eastern hoolock gibbon (*Hoolock leuconedys*), the only protected area in India for this primate species [36]. The hoolock gibbon is a small, arboreal primate found in the forests of Arunachal Pradesh, India. Conservation of the hoolock gibbon in Arunachal Pradesh is crucial as it is the only ape species found in India and is classified as endangered on the IUCN Red List. Local communities, with the support of various organizations, have adopted a three-pronged strategy to conserve hoolock gibbons, which includes creating mass awareness about hoolock gibbon conservation, planting trees in gibbon-occurring areas, and convincing landowners not to cut down trees that provide shelter to gibbons. Moreover, the Idu-Mishimi community's cultural beliefs and strong ties with the region's rich flora and fauna are advantageous in conservation efforts [22]. Animals such as the hoolock gibbons and tigers have deep cultural relations with the Idu Mishmi. According to Idu mythology, they were born to the same mother, and thus, tigers are their "brothers" [23]. So, they have a strict belief system of myths 'iyu-ena' that restrict them from hunting many animals, including a complete prohibition on killing tigers. They also consider killing hoolock gibbons (known as "aame epaan" in the Idu-Mishimi language) as a sacrilege of the highest order [35]. This belief system has led to a unique model of wildlife conservation.

There is also a number of conservation projects from the Wildlife Institute of India that helped in the conservation of wildlife in Arunachal Pradesh. Some of these are An integrated approach for the conservation of Takin (*Budorcas taxicolor*), Conserving the Endangered Asiatic Wild Dog in Western Arunachal Pradesh, Developing a collaborative management strategy for the conservation of tigers in North East India and Assessment and Monitoring of Climate Change Effects on Wildlife Species and Ecosystems for Developing Adaptation and Mitigation Strategies in the Indian Himalayan Region (NMSHE) [37].

The way forward

Though, the state's conservation has benefited from several social and cultural changes, conservation laws and their enforcement by authorities and local communities, closer collaboration with indigenous communities is crucial for the conservation of wildlife in the rich biodiversity hotspots of Arunachal Pradesh. Various communities have a deep connection with their natural surroundings and traditional knowledge that can contribute significantly to conservation efforts. Engaging these communities in conservation activities through participatory approaches can increase their ownership and support for conservation initiatives. Further, empowering these communities with sustainable livelihood options that are linked to conservation objectives can provide incentives for them to protect wildlife and their habitats. Thus, working more closely with indigenous communities, state machinery for conservation and development stakeholders can play a crucial role in ensuring the long-term conservation of wildlife in Arunachal Pradesh.

मूल संदेश

भारत के माननीय प्रधानमंत्री ने मन की बात के कई एपिसोड में वन्यजीव संरक्षण के मुद्दे पर प्रकाश डाला है। एपिसोड 84 में उन्होंने अरुणाचल प्रदेश में एक सफल मास ग्रीन आँदोलन एयरगन सरेंडर अभियान को उजागर किया था, जिसमे उस क्षेत्र के समुदायों को शिकार के लिए उपयोग की जाने वाली बंदूकों को सरेंडर करने के लिए प्रोत्साहित किया गया था। अरुणाचल प्रदेश एक प्रमुखतः पर्वतीय राज्य है] जो दुनिया के 18 जैवविविधता हॉटस्पॉट्स में से है और रेयर] एंडेमिक और संकटग्रस्त जानवरों की विविधता से घिरा हुआ है। राज्य के संरक्षण में सामाजिक और सांस्कृतिक परिवर्तनों] संरक्षण कानूनों और राज्य के अधिकारियों एवं स्थानीय समुदायों द्वारा उनके संरक्षण को बल मिलता है।

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