

JUNGLE RHYTHMS

CONFLICTS

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Tiger Human
Conflict-A Review

54 BLUE PLANNET
Andaman Sea

76 EVENT
Jungle Rhythms
Wildlife Awards 2024



Jungle Rhythms celebrating 50years of Project Tiger

Environmental protection is a fundamental duty of every citizen of this country under Article 51-A(g) of our Constitution and it reads as - "It shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures."

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Exploring the Hidden Depths
of the Andaman Sea

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The Indian subcontinent is a unique land of rich biodiversity and culturally beautiful people. We have diverse ecosystems and life forms, vivid colours, songs and languages in the natural world. We have been living in harmony with our wild neighbours since ages and continue to have a deep cultural influence from wildlife and nature. Respect for nature's processes is a way of life.

This fine line of tolerance is being tested every time our increasing population have experienced the 'modern day hardships and challenges.' The aspirations of becoming a global economic power have also pushed countless infrastructure projects, some of which leading to natural disasters, ecological imbalances and direct climate impacts. With shrinking forests and ever-eroding legal protections, the space for wildlife is now challenged by an ever-tightening ring of human habitation, roads, mines, agricultural farm lands, industries and defense demands. Due to less space, animals have started dispersing out from their congested 'little forests' in search of new habitats. Many jungle corridors and forest patches through which they travel are now overgrazed, over-utilized or fragmented by roads, dams, rails, powerlines or human homes. Many non-protected habitats and migratory routes are now fragmented and lost. The incidents of elephant deaths on railway lines, high-tension power lines have increased. Territorial fights among wildlife have also intensified leading to tiger deaths. There is now a stiff rise in tension and human-animal conflicts leading to livestock predation and loss of life.

There is a need for strong commitment, collaboration and action. Let us plan to balance commerce, environment and biodiversity conservation in a sustainable way. It will ensure our better quality of life, ecological balance and our rich wildlife will continue to thrive in our forests.

Let us be greener and live an eco-sensitive life. 

Dr. Nirmalya Chakraborty

Tiger-Human Conflict - A Review

V. V. Subrahmanyam



Anything of beauty is a joy forever! Well, this famous line by the renowned English poet John Keats is, perhaps, best suited for the magnificent Royal Bengal Tiger. For its sheer majesty, the regal walk and the striking stripes. Rather unfortunately, even as this beauty presents a spectacular sight for the wildlife and nature enthusiasts, the Royal Bengal Tiger is also the cynosure for a rather unfortunate debate in recent times - the quandary of human-wildlife conflict.

The recent sight of villagers parading a 'man-eater' through the streets was spine-chilling indeed, for the gruesome response to apparent human casualty. This is more so in Central India, with specific emphasis on Madhya Pradesh, also known as the 'Tiger State' and Uttar Pradesh. Maybe because of the prime tiger habitats and the forests!

Not surprisingly, this tiger-human conflict, to be more precise, is not new but has been there for ages. Decades back, it is the humans who transgressed the borders and hunted down the tigers for different reasons. Apparently, since then there was no media, or the hyper active social media of modern times, they were not as publicised as the tiger attacks on human beings.

There can be some specific instances in the recent past where humans still ended up killing tigers. In 2019, a six-year-old tigress was beaten to death in Pilibhit Tiger Reserve and worse a video was captured to showcase their 'bravery' as they even slit the throat of the tiger too!

It is always debatable to point out the specific reasons for this conflict. One report suggests that the tiger attacks on humans take place mostly during day time, which may indicate that this happens when the villagers who live on the periphery of the forest venture deep into the forest in search of livelihood.

This, in a way, should also reflect the dwindling forest cover. For instance, Madhya Pradesh has six tiger reserves- Kanha, Pench, Panna,

Bandhavgarh, Satpura and Sanjay-Dubri- and its forest area had shrunk by three per cent according to a survey in 2017 itself, though two years later, a 0.03 per cent increase in forest cover was recorded.

Many critics feel that mining and felling of trees and conversion of vast

stretches into agricultural fields are clearly responsible for diminishing tigers' natural habitat. And, compounding the misery is the gruesome poaching which still goes on despite the best of the efforts by the State and the Central Governments.

Interestingly, the territorial fights between the dominant tigers is also cited to be one of the reasons for them to stray into the human habitats like the one which entered the premises of National Institute of Technology campus in Bhopal, four km from Van Vihar National Park, in October 2022.

Importantly, the buffer zones which often see the villagers move freely along with the tigers, like the road crossings on way to Moharli Gate in Tadoba Tiger Reserve (Maharashtra) and the one in

Kanha Reserve is said to experience one of the most frequent conflicts followed by Pench Tiger Reserve, which also mean testing the patience of the villagers who often resort to the extreme steps to counter what they call a 'menace'.

The story is no different with Sundarban, one of the most picturesque wildlife habitats in the world itself. There, the rich mangrove forest is being converted into arable land posing a serious challenge for the very existence of the Royal Bengal Tiger, which is inevitably forced to attack the humans in the nearby villages. The tigers are a unique species as they live in saline mangroves with a different behavioural pattern compared to the tigers in other States and have a great survival rate in extreme conditions too.

Unfortunately, what is being ignored by all concerned is how deforestation is also leading to natural calamities like cyclones, coastal floods, soil and river bank erosion and not just diminishing the existence of wildlife .

There is no doubt that it is the tribals who suffer the most because of these conflicts because it means a struggle for livelihood and survival itself. And, naturally this poses one of the biggest challenges to address the tiger-human conflict.

Interestingly, not many States have official records for tiger-human conflicts and mostly it is the media reports which continue to be the source of information, thanks to social media.

This also brings to the fore the success story of National Tiger Conservation Authority, part of the Project Tiger aimed at increasing the tiger population and launched by former Prime Minister Mrs Indira Gandhi. And, it is indisputable that Project Tiger has been one of the

defining chapters in terms of conservation and a role model of a Government scheme can be implemented if it is backed by the desired will, determination, planning and implementation.

Significantly, the drastic increase in the number of tigers is also cited to be one of the reasons for the human-tiger conflict! For, the more the number, the smaller the forests become of these tigers as it also leads to more territorial fights.

Here it may not be out of place to mention how Ramdegi Nimdela Gate presents a striking contrast to this whole issue. For all those who have been to this Gate in Tadoba Tiger Reserve, it is a five-minute drive from the main entrance to the temple. And, there were innumerable instance,



mostly recorded, when the tigers 'visit' the temples and the villagers, vendors in the vicinity rarely ventured to

disrupt this unique phenomenon. Perhaps, some sort of awareness has been created among the villagers about the importance of being within the 'boundaries' of non-interference.

In fact, one of the important reasons attributed for this conflict is the shrinking water resources with diminishing natural resources leading to the fight for survival by both the humans and the tigers.

According to some activists, one of the major areas of concern is the villagers lacking the necessary awareness and training in how to enter the forests. And, it is pointed out that in Sunderban, even those who are trained to collect honey end up collecting fish and crabs!

It is indisputable that with increasing population, land use, land cover change, exploitation of forest resources to name a few, the conflicts will only increase unless there are serious efforts to educate the villagers about the need to change their livelihood, not just depending on forest wealth.

Minimum financial support, alternative employment opportunities like facilitating the villagers to set up petty businesses like shops, eateries, merchandising, extending easy interest loans to let them choose any business which they feel should be good enough to make a living are some of those suggested measures.

Awareness, for sure, is one of the keys to reduce the number of these conflicts, along with proper relocation of the villagers whose very existence is threatened for different reasons like rising sea levels in the case of Sunderban.

When it comes to implementing the Indian Forest Act, Prevention of Cruelty to Animals, Wildlife Protection Act, Forest Conservation Act, there is a dire need to ensure that they are not confined to paper only. The message has to spread right across that those guilty will not be spared. The fear factor has to be there to desist the humans from engaging in such unwanted activities.

It is imperative to educate the villagers that tigers don't attack human beings unless there is a survival issue for them.

The latest instance of a 33-year-old farmer Ankush Khobragade being a victim of a tiger attack in Chandrapur (May 2024) in the early hours was another glaring example of this dreaded conflict. Unfortunately, he is the ninth victim of this kind in the span of five months.

Mostly, these conflicts also lead to emotional outrage and the hefty compensations become secondary, maybe understandably too. In this case, it is informed, the Forest Department's response was prompt in setting up eight camera traps in the vicinity of tiger's movements, announcing ₹5 lakhs as ex-gratia, deploying 25 personnel for intensive patrolling.

Measures which need to be understood by the villagers or there should be efforts to educate them that sometimes better understanding of the grim realities of being so close to the forest can be helpful.

Maybe, since Tadoba Tiger Reserve, one of the most popular destinations for tiger sightings, is in Chandrapur, the fatal attacks gain more prominence. According to one report, in 2023, there were 21 tiger-

attack deaths, compared to 53 casualties to predator attacks (46 by tiger attacks and seven by leopards) in 2022.

The way Uttarakhand Forest Department has prepared a comprehensive plan in August 2023 to protect tigers and check human-animal conflict after 229 tigers were found outside the Jim Corbett Tiger Reserve can well be a case study.

Some of the areas of focus of this plan were, according to then DFO Diganth Nayak, were on community connect, involving locals in protecting tigers and keeping a check on these conflicts, making the villagers conscious of the patrolling measures with emphasis on technology to keep a watch on the tiger movement.

One of the welcome moves of Uttarakhand plan is to strengthen the prey base in forests, developing and improving grasslands, have more water holes and increased surveillance through camera traps.

According to a report, these conflicts are more in and around Pilibhit because of “the intersection between the region’s unique geography and the high dependence of its people on forest resources.

The crop fields, which I the eyes of the feline are essentially grasslands and hence extended wildlife habitats, along the edge merge almost seamlessly with the forests, it is said.

The fact that the tigers try to avoid humans during time and quietly criss-cross these farm fields should itself be a pointer that they don’t want these conflicts.

Corbett Tiger Reserve, according to the Tiger Census Report, has one of the highest density tiger population in the world itself. And, it suggested setting up an early warning system to alert nearby villages of tiger movement, radio collaring of tigers in the tiger reserve.

The other glaring rise in human-animal conflicts is recorded in Uttarakhand where 444 lives were lost in the last seven years and not just tigers but also leopards, bears, elephants and crocodiles too.

Well, there is a negative side to the increased number of tigers - increase in poaching activity too! It is not that the State Governments are naive to the serious challenges this animal-conflict poses.

There have been conscious efforts to reduce these conflicts by digging trenches, experimenting with various types of fences involving the community, using radio collars and re-relocating villages. In some cases, drones were used to track animals and alert the villagers and even

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artificial intelligence warning systems are also being contemplated.

In some States, mechanisms to identify and relocate the conflict-causing tigers, establishing quick response teams including villagers as volunteers trained specifically for the job, enhanced preparedness for the conflicts and reduction in casualties are in place. Community guarding with villagers forming groups and warning systems in place, setting up community-based solar power fences that deter the animals with non-lethal shocks are said to be one of the better options to minimise these conflicts. But, again, these require sustained efforts and a lot of commitment, passion and a concern for Mother Nature.


Role of media? It must focus not just on spreading news of these attacks but also educating all concerned about the urgent need to be involved in the efforts to reduce the number of these conflicts.

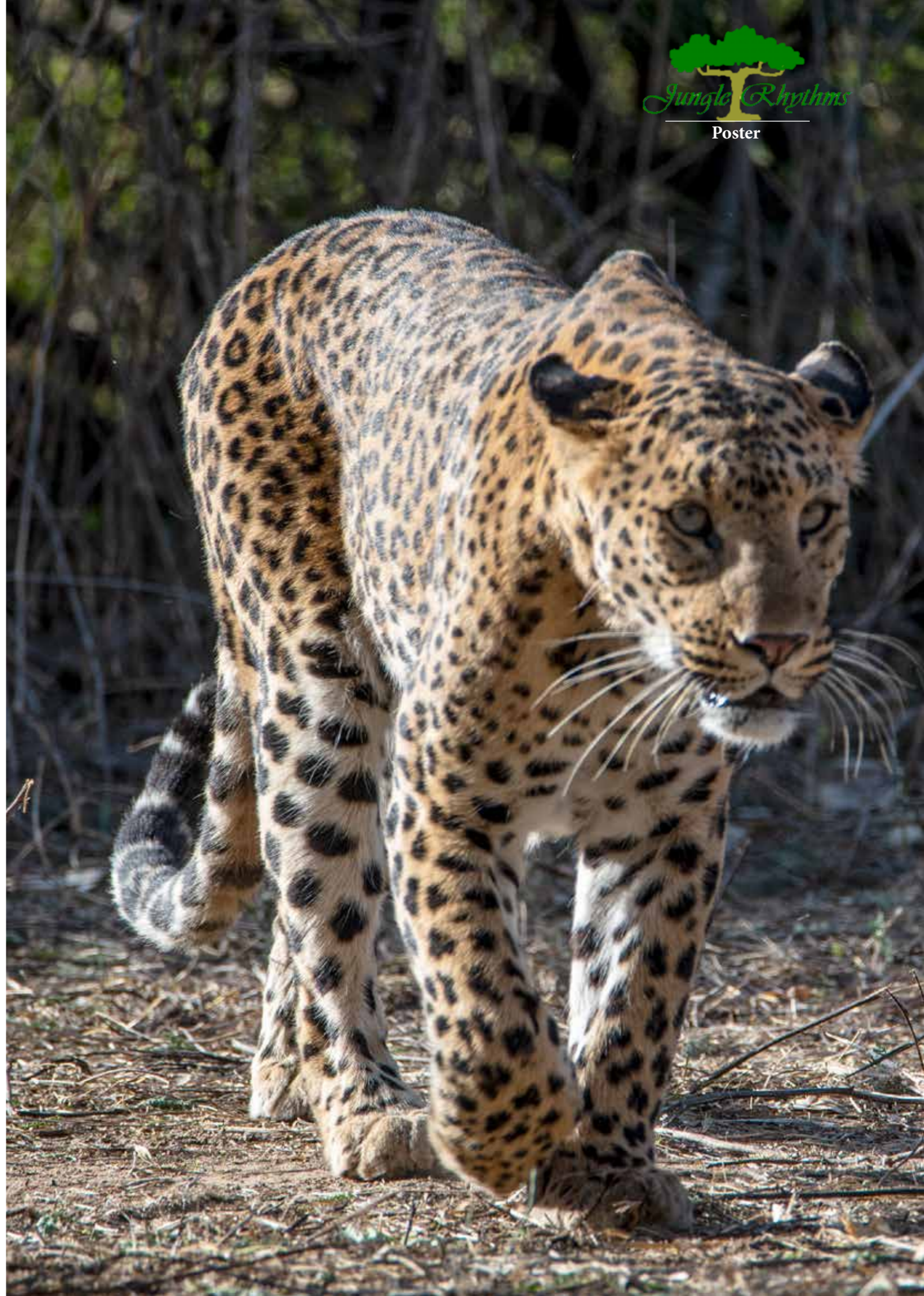
There is a thin dividing line - between giving news and being sensational for the sake of a few TRP ratings (in the case of electronic media).

A classic example is how most of the media reported on the ambitious Cheetah Reintroduction Project in India. Whenever there is a death of a cheetah, it was given extensive coverage and when there was a litter from the ‘imported’ cheetahs, the coverage was not on the same wavelength. There has to be a balance - constructive criticism highlighting the fault lines in any policy is a must but at the same time, appreciating some good points is also expected.

Yes, the citizens must be aware of these conflicts but at the same time, the media can play a significant role in educating the villagers by stressing on the importance of living harmoniously with nature and not trying to lord over it.

Importantly, the media should also highlight the conservation efforts, tigers ecological importance and how the human activities inside the forest threaten their very survival.

By all means, there has to be a multi-pronged approach to reduce these animal-conflicts and no one should indulge in blame-game. Instead, team spirit, as they, is the key to success as one study pointed out that one of the better ways is to look to temporary restrictions on human movement in conflict hotspots, responsive land use planning and avoiding anything that would aggravate the conflicts.. 





Chain link Fenced livestock as a low-cost community involved method to reduce tiger human conflict

- a case study from Kaziranga National Park, India

■ **Sumanta Kundu**

The rural setup of Assam is highly dependent on agricultural activities and cattle and livestock plays an important role in the rural economy of Assam. Many villagers are dependent on milk produced by cows for their day-to-day earnings and bullocks are an essential part of farming in many parts of Assam. When a farmer or villager loses a cow or bullock due to an unnatural way, such as being killed by tigers, it imparts a significant financial loss. Cattle or livestock lifting/depredation by tigers is common in India, and Kaziranga National Park and Tigers Reserve is no different. The landscape of North Eastern Hills and Brahmaputra Plains Landscape (NEHBPL) has recorded 194 distinctive tigers captured in camera traps in 2022 and Kaziranga National Park is home to 70% of these tigers, i.e. 135 Tigers.

Along with the tigers, the Park houses a good population of mega species like the Asian Elephant, Water Buffalo, and Indian Rhinoceros. One major problem of living around KNP is the damage caused by wildlife. The population of all the wild animals is rising in the Park. Therefore, the spillover population of wild animals from Kaziranga regularly comes in contact with humans. As a result, the lives and

property of the people on the fringe of the park have been adversely affected. There have been several incidents of loss of life, accidents and crop and property damage by wild animals. These incidents are steadily on the rise. In 2013, 246 incidents of cattle depredation by tiger alone were reported.

When I got the opportunity to join The Corbett Foundation's Kaziranga unit as a Sr. Programme Officer, the livestock depredation issue was discussed internally and a search was initiated to find a suitable low-cost method to reduce the local community conflict. In-depth discussion and research have found that most conflict cases are reported from the Central and Eastern Range fringe villages. During field investigation, it was also found that the majority of the cattle sheds are built with bamboo and wooden poles, which are not sufficient to prevent Tigers from breaking through (personal observation), thus making them more vulnerable to attacks from Tiger and other carnivores present in KNP and TCF also noticed that due to inadequate and lengthy process of ex-gratia payments in case of depredation

of domestic animals leaves many cases unrecorded with KNP authority's database. Thus, tiger depredation has become an essential issue in KNP, which has generated a negative attitude among the local community towards tiger conservation and intensifies the daily human-tiger conflict in the area.

After much research and desktop studies, we found that community-based modified cattle sheds/corrals with chain link fences proved to be very effective in reducing cattle and sheep lifting by Snow Leopard and Lions drastically and strengthened the conservation initiative by reducing negative attitudes of the local community (Maheswari et al. 2012, Lichtenfeld et al. 2015, Jackson and Wangchuk, 2004). We decided to follow the findings and replicate the model in Kaziranga area.

In 2018, with support from Axis Bank Foundation, India, TCF experimented with 33 households to understand the efficacy and sustainability of the modified cattle shed with chain link fences to prevent tigers from entering into cattle sheds as a pilot project. The team held several meetings with cattle shed owners to make them understand the experiment's principles.

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chain link fences to prevent tigers from entering into cattle sheds as a pilot project. The team held several meetings with cattle shed owners to make them understand the experiment's principles. It was decided that TCF would support the necessary materials (Chain Link fence and Aluminium Wires). The community must provide bamboo and volunteer support for the modification work. Community involvement was crucial; through the investment of their materials (Bamboo) and voluntary service, they gained a sense of belonging and ownership of the initiative. The fencing (TATA Wiron Premium, Galvanised Wire of 10SWG thickness, Gap Size: 4" x 4",

Height: 5') materials were fixed and secured with bamboo poles with the help of Aluminum wire(to prevent rusting). Bamboo is abundant in Assam and known for its comprehensive strength, thus, the team chose Bamboo over iron poles and this step also reduced project cost. The whole installation was done under the guidance of myself, and I kept visiting the site almost daily and continued monitoring. After installation, no cattle lifting has been reported from these sheds and community members were also felt positive about the initiative.

With the success of the pilot project, I wanted to the



work in more extensive scale and approached

The Van Tienhoven Foundation for International Nature Protection (Netherlands) and got support for replicate the same model in 200 more households. Through this project, the team reached 201 households and protected 1079 livestock in 4 villages, with a commercial value of 1,07,90,000(Average price of ₹10000.00 per livestock). All these four villages are situated on the boundary of the Kaziranga National Park, and at times, in some cases park boundary is merely 50 meter. All this 4 villages were having high conflict incidents and regular movement of tigers are reported by the villagers. The team also documented failed attempts by tigers to break the fence in some particular locations.

This successful low-cost conflict mitigation model also caught the attention of the Kaziranga Park authority in 2020 when a sudden surge in conflict cases in Bagori, a small village situated on the fringe of Bagori Wildlife Corridor which connects Kaziranga National Park with forests of Karbi Anglong Hills. At the beginning of September 2020, the village was shaken by series of lifting and killing of cows, goats and pigs by tigers. A total 10 household animals, including 4 adult cows and six mature goats, fall prey to tiger. This sudden severe tiger depredation created panic

among the inmates of this corridor-dependent village, and community members staged a series of agitations to provide protection and safety for both human lives and household animals. Through this project, with support from Bigcat Rescue(USA), the team reached 60 households in Bagori village. After modification, Tiger conflict reduced drastically and no cattle losses were reported. With the project's successful implementation, the team protected 438 livestock (cow, goat and pig) in this village, which has a commercial value of ₹38,78,886.

In 2023, I received another grant of Euro 9906 from DierenPark Amersfoort Wildlife Fund

To carry out this model in 100 more households.

Thus, this conservation action effectively reduced conflict with large cats. It is very low-cost and durable. This low-cost solution proved that, with very little investment, immense cattle wealth in a high-conflict zone could be protected and the rural economy could be boosted. This model also showcased how local community could be made an active partner of conservation action and reduce negativity towards conservation actions.

This model could be replicated anywhere in any location to reduce conflict with wild mega carnivores. [JR](#)



THE PLIGHT OF ASIAN ELEPHANTS IN INDIA

“If anyone wants to know what elephants are like, they are like people only more so.” – Peter Corneille

■ Diptarka Ghosh

Elephants – the largest living terrestrial mammal in the world and India’s Heritage Animal accorded the highest degree of protection under Schedule I of the Indian Wildlife (Protection) Act, 1972, has always been considered as an embodiment of strength, power, intelligence, and auspiciousness across various cultures. As Keystone, Flagship, and Umbrella species and more so as ‘ecosystem engineers,’ Elephants play vital roles in a tropical forest ecosystem through seed dispersal, biomass removal, nutrient cycling, and assisted vegetation generation through trampling that is, in turn, critical in shaping forest communities.

Asian Elephants In India

Asian Elephants (*Elephas maximus*) previously believed to be widely distributed extending from West Asia’s Tigris-Euphrates River basins through Persia into the Indian subcontinent, South and Southeast Asia including Sri Lanka, Java, Sumatra, Borneo, and up to North China; is currently confined only to the Indian subcontinent, Southeast Asia, and some Asian Islands. India holds by far the largest number of wild Asian Elephants, estimated at 27,312 elephants, approx. 55% of the world’s wild Asian Elephant population, which survives in less than 2% of the country’s total geographical area. (MOEFCC, Elephant Census, 2017).

“Asian Elephants are companion species par excellence: too social and sagacious to be objects; too strange to be human; too captive to be wild, but too wild to be domesticated. Humans and elephants have co-evolved, they are companions.” – Lorimer (2010)

Current Status of Asian Elephants In India

The historical range of the elephant in India has shrunk, confining elephants into distinct geographical zones. As of 2023, the elephant population in India currently ranges in 33 Elephant Reserves across 14 states encompassing about 80,777 sq. km in North-East, North-West, Central, and South India. The Elephant Census, 2017, revealed that elephants in India are found across 1,63,000 sq. km of heterogeneous habitats spanning the four major elephant-bearing regions. Anthropogenic activities such as mining, linear infrastructure intrusions into natural habitats, changes in land use, industrial developments, and expansion of agricultural lands and human settlements have led to fragmentation and habitat loss of elephant habitats in all these elephant-range states of India.

The North-Eastern Population: Elephants in north-eastern India range in the states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, and Tripura. Although in earlier times, this north-eastern elephant population was contiguous with that of Bhutan, Bangladesh, Nepal, and Myanmar, the 9650-odd elephants in this region are now discontinuously distributed and exist as 15 populations in an area of 8900 sq. km. These elephants use tea plantations and agricultural lands while migrating from one area to another.

The Northern West Bengal Population: Being the westernmost extension of the north-eastern population, this region has about 489 elephants spread over the Darjeeling and Jalpaiguri districts, covering 9 forest divisions. Even though this region’s elephant population is only 1% of India’s total elephant population, the human-elephant conflict here is the highest in the country. The elephant habitat which mainly includes North Bengal’s terai and western Duars region has patchy forests with tea gardens and human habitations through which the elephants regularly move.



The North-Western Population: At present, elephants range across 9000 sq. km of forests in the outer Himalayas and the Shivalik Hills and portions of terai and bhabar tracts. Approx. 2,272 elephants are distributed in six isolated populations in Uttarakhand, Uttar Pradesh, and Himachal Pradesh. However, it is to be noted that due to a rise in human population and exponential increase in developmental activities, there has been severe fragmentation and degradation of the elephant habitat. The growing population has also encroached on elephant habitats: as people depend on the forest for fuel, timber, fodder, graze livestock, etc. Furthermore, the growth of invasive species like Lantana and Parthenium, the conversion of natural forests into monoculture plantations, and railway tracks passing through Dudhwa Tiger Reserve and Rajaji National Park have undoubtedly added to the woes.

The Central Population: The elephant habitats here extend over 21,000 sq. km in the states of Odisha, Chhattisgarh, Jharkhand, southern West Bengal, and sometimes Bihar

and Madhya Pradesh, holding a population of 3128 elephants. It is to be noted that the elephant habitats composed of tropical moist deciduous forests strewn with dry deciduous forests in the Bankura, Purulia, and Midnapore districts of southern West Bengal are believed to be range extensions of the adjacent Dalma Wildlife Sanctuary in Jharkhand. During the paddy season usually from September to February, over 100 to 125 elephants migrate annually to West Bengal. Besides boasting a resident population of around 50-60 elephants, the area is almost entirely under agricultural cultivation with no Protected Areas.

Due to iron ore and coal mining activities, shifting cultivation, linear development, and encroachments, the central Indian elephant habitat is one of the most degraded and fragmented. In the last decade, there have been approx. 398 human deaths in Odisha, 164 deaths in Chhattisgarh, and 354 deaths in Jharkhand. Moreover, over a hundred elephants have died in Odisha due to collisions with iron-ore-laden trucks, and trains, as well as intentional or accidental electrocution.

The Southern Population: The South Indian Elephant population (about 14,606 elephants) is mainly distributed over the Western Ghats and portions of the Eastern Ghats in Karnataka, Kerala, Tamil Nadu, Andhra Pradesh, Andaman & Nicobar, and Maharashtra. Motivated greatly by dietary needs and climatic conditions, elephants migrate all year round from wet evergreen forests to deciduous ones in the Nilgiri hills of southern India. A study commissioned by the Kerala Forest Department in 2021 has identified 18 interstate migratory routes used by elephants for migration between Kerala and Tamil Nadu.

However, Elephant habitats in India extend beyond Protected Areas including multiple-use forest areas outside the Protected Area Network. In fact, <25% of the elephants' distributional range falls within the Protected Areas. Outside the Protected Area Network, several large tracts of forests constitute the elephant habitats.

Securing Elephant Corridors

“Do animals have funds or votes – Or anything but vocal

Wildlife Trust of India and other conservation agencies have identified a minimum of 101 elephant corridors in India. Of the corridors that are currently in use, 28 are in Southern India, 25 in Central India, 23 in North-eastern India, 14 in Northern West Bengal, and 11 in North-western India. An estimated 69.3% of these corridors are regularly used by pachyderms either all year round or during specific seasons, and 24.7% are used occasionally.

throats, Will you help me get reelected? You are speechless, Just as I expected.” – Vikram Seth, ‘The Elephant and the Tragopan,’ *Beastly Tales From Here And There*.

Elephants are wide-ranging, herd-living mammals with extensive habitat (about 550 to 700 sq. km area is the typical home range for female Asian Elephants in India) and nutritional requirements (150 kilograms of forage and up to 190 liters of water per day). Also, to ensure long-term viability, the pachyderms require mostly unhindered gene flows across populations, thereby increasing the necessity for traversing vast terrains and diverse habitats, as they move from one place to another.

In recent decades, the demands of development have led to rampant destruction and fragmentation of elephant habitats across the nation. Several researches have shown that more and more there is a degradation of forest habitats, the farther the elephant herd must roam in search of food and water resources. Over the years, as forest lands continue to be incessantly decimated, the comparatively narrow, linear patches of natural vegetation form crucial habitat linkages between expansive forest patches. These so-called ‘corridors’ allow the gentle giants to move between secure habitats freely. Nonetheless, in India’s severely fragmented, human-dominated landscapes, the corridors that ensure the demographic, nutritional, and genetic needs of the animals are likely to be abutted by human settlements and their resulting biotic pressures. The usage of such disturbed corridors by elephants has therefore inevitably led to an increase in human-elephant conflicts.

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■ Cover Story

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Human-Elephant Conflict

In 2023, the IUCN's Species Survival Commission for Human-Wildlife Conflict and Coexistence defined human-elephant conflicts as "struggles that emerge when elephant presence or behavior poses actual or perceived, direct and recurring threats to human interests or needs, leading to disagreements between groups of people and/or wildlife."

The fragmentation and loss of natural habitats have brought wild elephants closer to human habitations, sparking human-elephant conflicts that are a significant conservation concern across the nation. Elephants are frequently found in human-dominated areas characterized by a high interspersion of forests and agricultural lands, with the latter being more prevalent. It is often in these mixed landscapes – particularly at the interfaces of elephant habitats and along their perimeters, where human-elephant conflicts mostly take place.

Additionally, encroachment and development programs within and around elephant habitats have led to a loss of the traditional movement paths of elephants. When elephants find their familiar migratory routes blocked by barriers, trenches, and barbed wires; and sidewise being driven from multiple sides by surrounding villagers, they become panicky and lose their orientation, deviating from their intended path of movement, consequently turning hostile to humans. As human dwellings and livelihoods continue creeping into the wildlands, the human-elephant conflicts increase exponentially. Likewise, illegal poaching for elephant tusks (ivory) has led to an incessant slaughter of the animals making them insecure and much more aggressive towards humans.

As per government records over the last five years (2015 to 2020), 395 persons have been killed and 186 persons injured in human-elephant encounters, while more than 28,740 ha of crops have been damaged. Migrating elephants spend around 40% of their time in human-use areas for both movement and feeding on cultivated crops. Besides crop-raiding, elephants also damage properties and negatively affect the emotional well-being of local people. A considerable number of human deaths also occur from accidental or surprise encounters with elephants in and around the croplands, or in the forests during collection of non-timber forest products. These incidences have resulted in farmers resorting to desperate measures to drive elephants away from their farmlands. Revenge killings, installation of crude metal spikes on forest floors and boundary walls, knee-jerk captures, bursting crackers, throwing fireballs at elephant herds, and attempts to translocate herds without understanding either elephant biology or individual herd dynamics are increasing in many elephant range states. Political pressure is mounting to demonstrate close to zero tolerance towards elephants that stray out of forests.



A Few Examples of Conflicts

1. A burning elephant calf and its mother flee a mob throwing firecrackers and fireballs at them in West Bengal's Bankura district. The incident took place in an area that straddles a traditional elephant corridor stretching from southwestern West Bengal to Saranda Forest in Jharkhand. Titled 'Hell is here,' the photograph taken by photographer Biplab Hazra in 2016 won the 2017 Photograph of the Year award from Sanctuary Asia magazine.

2. A 15-year-old one-month-pregnant elephant died in Kerala in mid-May 2020 after she ate a pineapple stuffed with firecrackers that exploded in her mouth. The elephant belonged to the Silent Valley National Park in Palakkad and ate the fruit in a forest area close to the Palakkad-Malappuram border.

3. An adult pregnant elephant, part of a herd of five that strayed into the vicinity of Jhargram Raj College on August 15, 2024, morning, was killed after being speared by a fire-tipped spear supposedly by members of a hulla party, hours after a male elephant (of the same herd) reportedly killed a senior citizen in a neighboring colony. However, the use of fire-tipped spears to drive away elephants is in contempt of a December 2018 Supreme Court order that explicitly banned the use of such inhumane practices. The Supreme Court mandated the strict regulation of mashaals, only authorizing their use under controlled circumstances or as a last resort.

The West Bengal Forest Department deploys hulla parties to deter migrating elephants in southwestern West Bengal. Hulla parties comprise mobs of men holding aloft oil-soaked, burning gunny sacks tied to wooden sticks or metal rods. Elephants that migrate out of the forests have these lit gunny bags flung at them and are harassed and chased by the surrounding crowds. Members of these hulla parties are usually employed on a daily wage basis from local villages and receive no training, sensitization, or orientation for their own or the animals' safety. Even after many unfortunate incidences over the years, the state of West Bengal continues to use this barbaric and outdated practice in complete violation of the Supreme Court order as well as disregarding the guidelines set forth by the MOEFCC for compassionate management of human-elephant conflicts.

Killer Tracks: The Asian Elephant – the mascot of the Indian Railways itself has been a victim of train collisions. Railway tracks pass through migratory elephant corridors in Assam, West Bengal, Jharkhand, Odisha, Tamil Nadu, and Kerala with accidents resulting in over 200 elephant deaths every year. Recently a proposal has been given to convert a 282.78 km railway line from meter gauge to broad gauge on a route from Siliguri (West Bengal) to New Bongaigaon (Assam) which passes through Buxa Tiger Reserve, Jaldapara Forest, Chapramari Forest, Kalimpong Forest Division, Baikantapur Forest, Mahananda Wildlife Sanctuary and Jalpaiguri Forest Division. The existing line which runs through Buxa Tiger Reserve has been



responsible for the death of more than 60 wild elephants in the past decade. Conversion to broad gauge means there would be increased traffic on the route including fast long-distance trains greatly increasing the threat to wildlife in these areas. To boot, the laying of the broad-gauge railway line would lead to the felling of trees on either side, further disrupting the elephant corridors.

Way Forward

Being a country harboring 27,312 Asian elephants, India stands at a crucial point in balancing the welfare of elephants and the safety of human communities besides ensuring the long-term survival of the elephants. Therefore, an introspection of institutional arrangements by elephant conservation enablers is the need of the hour. Measures like maintaining & restoring corridors identified by vigorous field studies, addressing the proximate causes of human-elephant conflict, developing strategies to minimize threats to human lives and livelihoods, lowering train speeds in elephant crossing areas, implementing scientifically sound mitigation measures, fostering community support for conservation, and preventing further fragmentation of elephant habitats should be a priority. Elephant reserves and corridors need to be declared as Ecologically Sensitive Areas, with all the proposed development projects in these areas halted or permitted only under strict ecological safety standards. Each elephant-range state should also draft a master plan to identify elephant habitats outside Protected Areas and allot funds to secure these in a tactical and time-bound manner.

All Hope is not lost yet. Let us stand together to raise awareness for the elephants and do our bit to protect them.

Photo: Dr. Nirmalya Chakraborty

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SUNDARBAN DIARY – NYLON NET FENCING AND TIGER STRAYING

■ *Uddalak Das*

The problem of tiger straying into forest adjoining villages of Sundarbans has been a long-standing occurrence very important to the tiger management exercise at Sundarban. The introduction of nylon net fencing along the forest-village interface has been a huge conservation success. The yellow 4×4 inches net fencing made of polypropylene has been a landmark in the field of mitigating tiger- human conflict in Sundarban.

The process started in the second decade post the establishment of Sundarban Tiger Reserve under the aegis of Project Tiger in 1973 and underwent a number of stages before reaching its sharp, secure pinnacle today. Straying tigers and illegal forest entry along the interface had always been problems which the Department has had to face. The late 80s and early 90s saw sporadic attempts at tiger - human management with a view to mitigate conflict in the form of death and injury to humans and tigers as well as livestock depredation. Fencings of the goran tree (called 'goran chhite' were done along straying - prone stretches, besides installation of electricity - wired fencings managed from a central unit in the adjoining forest camps in an effort to dissuade the tiger from crossing over the numerous water channels which separate tigerland from human habitations. The turn of the century saw the present net fencing protocol being initiated in stretches. Its resounding success led to its gradual extension to other parts of the interface. The present management protocol takes off from the initial exercise, fine- tuned and sharpened over the last two decades, making the net fencing management one of the finest conservation stories across the world. Keeping the harshness of the ground realities and the



not only the risk of the dreaded Sundarban tiger, but also the exacting terrain and unfavourable weather to work upon.

Tiger straying into villages occur mostly between December to February (42 per cent) and July to September (31 per cent). Strayings have been recorded all over the year with a significant dip noted during the summer months. Of the available data, 21 villages in 5 tiger straying affected blocks have recorded nearly 85 per cent of all strayings. 96 per cent of strayings have happened at night. 68 per cent of recorded strayings have been male tigers and 32 per cent have been tigresses. About 68 per cent of straying tigers have been aged tigers and 22 per cent have been injured tigers. There have also been strayings of healthy individuals as well as cubs accompanying their mothers during the winter months.

The blocks of Gosaba, Hingalgaon and Kultali are most affected due to tiger strayings. Data of straying tigers in South 24 Parganas Forest Division in the blocks of Kultali and Patharpratima have largely been unavailable. The data available from tiger straying affected villages opposite to Sajnekhali Wildlife Sanctuary as well as Basirhat Range demonstrates that Samsernagar 3, 4 in Basirhat Range has records of maximum tiger strayings, and the numbers are significantly higher than other straying-prone villages. Other than Kalitala- Samsernagar, the narrow



fieldwork challenges in mind, the officers and frontline workers committed to the health of the net fencing and of wildlife and humans, deserve a special round of applause.

The nylon net fencing cannot technically prevent a straying tiger from crossing over, but it has impacted tiger straying behaviour for sure. It acts as a psychological deterrent, helping the tiger keep to its territory and out of harm's way for itself and humans. Post nylon net fencing, there has been a sharp decline in the number of tiger strayings into forest- adjoining villages of Sundarban.

Today, approximately two hundred kilometres of fencing

have been erected along the boundary separating humans and tigers. The interlying river, canal or creek can range from just a few feet in breadth to a few kilometres wide. Till a few decades ago, an uneasy calm defined the cycle of humans-tiger-department-forest, a relation which has steadily improved over time thanks to the fencing which drastically reduced man-animal conflict in the villages. Today, the forest department staff keep a keen eye on portions where the fencing has become old and needs replacement, or has been damaged naturally or has been tampered with by locals during their forest entry. The work involved is very risky with staff having to navigate





interfaces of Rajatjubilee - Jamespur-Anpur as well as the Deulbari - Debipur, Gurguria - Bhubaneswari and Maipith - Biaikunthapur interface stretches (especially the last two of late) in Kultali have emerged as straying hotspots. Mention must also be made of villages in Patharpratima block right next to Dhanchi island which have recently had net fencing installed on the forest side due to recent tiger strays. Dhanchi used to be a non - tiger forest, but with their rising numbers, has seen recent occupancy of the forest by the dreaded lord of the mangroves.

The village- forest interface varies from broad to narrow at places. This necessitates improvised fencing along the settlements right opposite the forest. The height of the fencing on the forest side, the double layered netting as well as the preparedness of the villages today are clearly an indicator of the problem

A healthy relation between tigers and humans is integral to Sundarban forest management. Despite a few environmental concerns such as decayed net fencing polluting the water and the fencing acting as a barrier to natural movement of wildlife, its overall success is undeniable to the conservation story of the mangroves.

which has to be kept at bay. The fencing has improved the relation between the villages and the department and has also helped in improving public clarity about the problem and the remedial measures besides reducing illicit forest - dependent activity.

A healthy relation between tigers and humans is integral to Sundarban forest management. Despite a few environmental concerns such as decayed net fencing polluting the water and the fencing acting as a barrier to natural movement of wildlife, its overall success is undeniable to the conservation story of the mangroves. The health of the forest flora and fauna has been restored to a great extent by this exercise which has helped change human attitudes towards the swamp tiger is no longer one of mistrust and hatred. It has helped reinforce the idea that the tiger's well - being is intricately linked to the well - being of the forest and of the multitude of villagers and their families who are directly dependent on the forest and the waters for livelihood. **JR**

EXPLORING THE HIDDEN GEM: SATPURA TIGER RESERVE

■ *Mahammad Ghouse*





Nestled within the ancient Satpura Ranges, one of the oldest mountain ranges in the world, the Satpura Tiger Reserve is a well-kept secret that promises an enchanting experience for nature enthusiasts. The name “Satpura,” meaning “Seven Folds,” aptly describes the region’s rugged terrain, forming a natural watershed between the Narmada and Tapti Rivers. The reserve’s forests are predominantly Moist Mixed Deciduous, featuring a rich diversity of both Sal and Teak trees.

A Biodiversity Hotspot

Satpura Tiger Reserve is renowned for its incredible biodiversity. The reserve is home to 26 species typically found in the Himalayan region and 42 species common to the Nilgiri Hills, earning it the nickname of the northern extremity of the Western Ghats. Notable species shared with the Himalayas include *Asterella khasiana*, *Bambusa polymorpha*, *Rubus ellipticus*, and *Berberis asiatica*. Additionally, species like *Cochlospermum religiosum* and *Pterocarpus santalinus* (Red Sandalwood) are found here, linking it to the Western Ghats.

Archaeological Significance

The archaeological richness of Satpura cannot be overstated, with more than 50 rock shelters adorned with paintings dating back 1,500 to 10,000 years. These ancient artworks offer a fascinating glimpse into the cultural heritage of the region.

Flora and Fauna

The lush forests of Satpura are a haven for wildlife, hosting a variety of species such as tigers, leopards, sloth bears, wild dogs, Indian gaur, spotted deer, sambar deer, and the four-horned antelope. The reserve is also home to arboreal animals like the Indian giant squirrel and the flying squirrel.

Famed Hindi poet Bhawani Prasad Mishra beautifully captured the essence of these dense jungles in his poetry:

“Satpura Ke Ghane Jungle

Neend Me Doobe Huye Se

Unghte Anmane Jungle

Lataon ke Banne Jungle”

(Bhawani Prasad Mishra)

Tourist Attractions

Pachmarhi, located within the Satpura Tiger Reserve, is one of the region’s most celebrated tourist destinations. Known for its scenic beauty, lush greenery, and pleasant climate, Pachmarhi attracts visitors with its picturesque landscapes, including the highest peak in central India, Dhoopgarh. The unique geographical formations, dense forests, cascading waterfalls, rich flora and fauna, ancient rock shelters, pilgrimage sites, colonial architecture, and vibrant tribal culture make Satpura Tiger Reserve a must-visit destination for wildlife and nature lovers alike.

Conservation Efforts

The Satpura Tiger Reserve is a well-managed park in terms of wildlife conservation and village relocation. A total of 49 villages have been relocated from the STR, creating contiguous forest corridors for wildlife. More than 3,243 families were relocated and gained access to facilities such as electricity, drinking water, schools, marketplaces, and health centers. Over 10,000 hectares have been reclaimed for grassland management, resulting in an increase in ungulate populations.

As a result of these conservation efforts, the MP government has created alternative livelihoods for the local community, training villagers to be guides



Cycling Adventure in Satpura: An Unexpected Encounter

and drivers in the national park.

Satpura: A Wilderness Close to My Heart

Having worked in multiple wilderness areas, Satpura Tiger Reserve holds a special place in my heart. This reserve offers a breathtaking journey through diverse landscapes—from lush green forests to expansive grass fields, from towering peaks to cascading waterfalls.

Booking a safari in the Madai region unveils the awe-inspiring sight of the Denwa backwater set against the magnificent hill ranges of Satpura. It feels as if you've ventured into a prehistoric world where the jungle and its inhabitants never cease to amaze.

While most people associate tiger reserves solely with tigers, it's essential to remember that every animal here has its own story to tell. All we need to do is pay attention, observe, and listen. The small islands formed by monsoon rains provide perfect resting spots for migratory birds from distant lands, adding another layer of wonder to this enchanting place.

Exploring Satpura is more than just a wildlife adventure;

it's a journey into the heart of nature's grandeur, where every moment is a discovery waiting to happen.

Conclusion

Satpura Tiger Reserve, with its unique blend of natural beauty, biodiversity, and historical significance, offers an unparalleled wildlife experience. Whether you're a seasoned naturalist or a curious traveler, the reserve promises an adventure that is both enriching and memorable. **JR**

As a naturalist working in the Satpura Tiger Reserve, I've always been captivated by the dynamic beauty of its landscapes. It was that time of the year when ghost trees shed their leaves and the teak trees' foliage turns from green to brown. With our guests having checked out the day before, my colleague Sanal and I found ourselves pondering over what to do next. An idea sparked—why not go for a morning walk? This idea quickly evolved into an adventurous plan: a cycling expedition through the forest.

At the break of dawn, the next day, Sanal and I set out on our bikes, intending to take a short ride around the countryside. However, what started as a brief tour turned into an exhilarating 20 km journey. We began in the buffer area and planned to loop back to our camp.

After covering nearly 5 km, Sanal accidentally took a wrong turn. They say unexpected moments are always sweeter, and this certainly proved true for us. As I pedaled behind Sanal, I saw him abruptly halt, transforming into a signpost, his finger pointing towards a forest patch. Confused, I followed his gaze.

To my utter shock, right next to the road, a sloth bear was standing on its hind limbs, curiously observing us. My heart raced as I processed the sight. We were incredibly fortunate that a bike happened to be passing by at that very moment. The noise of the engine startled the sloth bear, causing it to retreat

swiftly into the forest thickets.

Reflecting on this unexpected encounter, I couldn't help but feel grateful for the serendipity of the wilderness. It was a reminder of the unpredictable and thrilling nature of the Satpura Tiger Reserve, where every moment holds the potential for surprise.

A Nighttime Safari: Experiencing the Magic of Bioluminescence

One of the most cherished moments of my life as a naturalist in the Satpura Tiger Reserve happened during a time of year when the night is alive with the cacophony of crickets, intermittent drizzles, and a soothing chill breeze. It's the perfect setting for a night safari—a thrilling adventure that few can resist.

One off-season evening, with the lodge hosting only a few guests, a couple expressed their desire for a safari. Given the low occupancy and off-season restrictions, we could only venture into the buffer zone. I suggested a night safari, an experience that, even in the 21st century, feels like stepping into another world.

As we embarked on our nocturnal journey, the dark, dense forest enveloped us, heightening the sense of adventure and thrill. The light drizzle added a magical touch,



Ratapani Wildlife Sanctuary: a hidden jewel of Madhya Pradesh

■ *Mr. D.P. Srivastava & Shibajee Mitra*

like a cherry on top of an already enchanting cake. But the best was yet to come.

Driving deeper into the forest, we suddenly entered a patch where the trees were adorned with countless fireflies. Their bioluminescence made the trees look as though they were decorated with fairy lights, welcoming us into their mystical realm. This natural light show left us utterly awestruck, soaking in the moment of pure joy.

Bioluminescence in fireflies is not just a captivating spectacle; it's also a form of communication, used by these insects to find a mate and interact with one another. Understanding this added another layer of wonder to the experience. We were witnessing a beautiful and intricate aspect of nature's communication in real time.

That night, surrounded by glowing trees and the soft hum of the forest, I felt an overwhelming sense of gratitude for the privilege of witnessing such a spectacle. It was a moment close to my heart, a reminder of the extraordinary beauty and mystery that the natural world holds.

Exquisite Elusiveness

It was October, a time when the season was just beginning. My colleagues and I were preparing for the busy weeks ahead. As naturalists, we often stay in remote areas close to the forest, and this time I was working with Forsyth Lodge in Satpura. To stock up on supplies for the month, we decided to make a trip to the nearby town of Sohagpur for groceries.

One evening, as we returned from town with our purchases, we reached the camp and parked the jeep in the garage. To our surprise, our chef, who had followed us back on his bike, approached us with an intriguing question. "Would you like to see a leopard?" he asked. At first, we thought he was joking. He repeated, with a cool demeanour, "Do you want to see a leopard?"

Excited and curious, we quickly said yes. He informed us that a leopard was sitting on a mahua tree, which we had passed on our way to the garage. Shocked and eager, we jumped back into the jeep and hurried to the spot he mentioned.

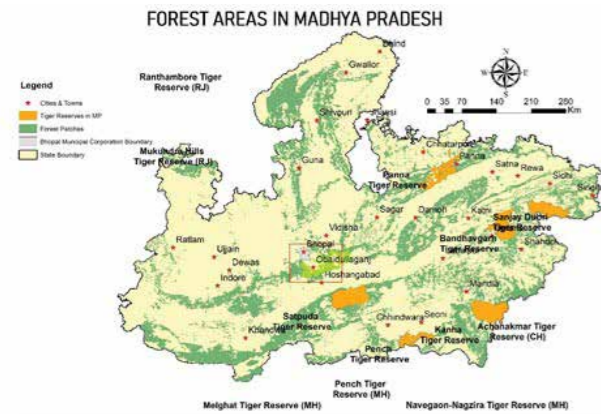
To our amazement, there she was, perched gracefully on a mahua tree, watching us with keen eyes. We watched in awe as she elegantly climbed down the tree and concealed herself in the grass field beneath. As we searched for her, there she was, watching us as if nothing had happened. She gave a nice yawn, perhaps bored by her fans following her, and then gradually moved into the forest patch near our lodge. The moment was fleeting but unforgettable—a perfect example of the exquisite elusiveness that defines the wildlife we cherish. JK

Madhya Pradesh is the second-largest state of the country having a geographical area of 3,08,245 sq km which constitutes 9.4 % of the country's geographical area. The diverse and rich biodiversity of this central Indian state can be allocated to its strategic position in the subcontinent. It is present in the genetic highway connecting the Western Ghats and North–East India, two of biodiversity hotspots of India. It has the largest forest area of 94,689.38 sq. km² in the country. Total forest and tree cover in MP is 85,487 sq. km (Total forest cover 77,414 sq. km) which constitutes 27.73% of

the state's geographical area (India State of forest report, 2017). The forest can be classified as reserved forest 65.36 per cent (61,886 sq. km), protected forest 32.84 per cent (31,098 sq. km) and unclassified forest 1.7 per cent (1,704 sq. km) of the total forest area (MP forest website). Distribution of total forest in the state is as follows: 6,563 km² is the very dense forest, 34,551 km² is the moderately dense forest, and 35,889 km² is an open forest, 6,222 km² is Scrub and 2,24,328 km² is Non-forest (India State of Forest Report, 2017). Majority of these forest patches are small and fragmented. As per India State of Forest report,

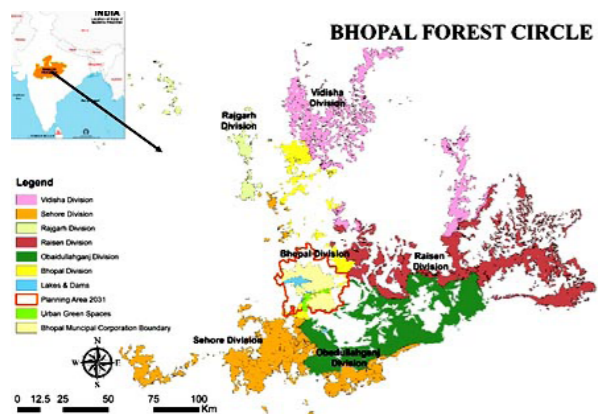


Cover Story



2017 there are 48,950 patches of less than 1 sq. km, 1,387 patches of 1-10 sq. km, 260 patches of 10-100 sq. km and only 115 patches having area more than 100 sq. km.

These forest patches are divided into 16 territorial forest circles, 9 National Parks, and 25 wildlife sanctuaries. Ratapani Wildlife Sanctuary is part of Obedullaganj Division of Raisen which is part of Bhopal Forest Circle. Bhopal Forest Circle of Madhya Pradesh includes 6 forest divisions (FD) i.e. Bhopal, Sehore, Raisen, Obedullaganj, Vidhisa & Rajgarh. The adjoining forest divisions of Ratapani WLS includes Sehore FD on western side, Raisen FD on eastern & Northern side and Bhopal FD on North-western side. The Bhopal Forest Circle (BFC) consists of tropical dry deciduous forests. BFC has a total forest area of about 6906.93 Km². Out of which reserved forest is 4076.72 Km², the protected forest is 2761.98 Km², and the unclassified forest is 68.23 Km² (MP forest website).



Establishment and location of RWLS

Ratapani Wildlife Sanctuary, is proposed for Madhya Pradesh's seventh Tiger Reserve since last 11 years. RWLS is located in Raisen District of Madhya Pradesh on the Vindhyan Ranges. It was designated as Wildlife Sanctuary in 1976 and later, extended in 1983 under Wildlife Protection Act, 1972. The sanctuary is extended in 823.84 sq. km of the area. The sanctuary is 70Km long and 15 km wide running parallel to the northern side of Narmada

River. The RWS is part of Kheoni-Ratapani-Sighori Landscape. Kolar River forms the western boundary of sanctuary. Major parts of the sanctuary is hills comprising Vindhyan hill ranges spreading East-west. The Sanctuary situated at the distance of 45 km from the state Capital Bhopal.



Administratively Ratapani WLS is part of Obedullaganj Forest division and includes four ranges-Dahod range, Delawwari Range, Barkheda Range and Bineka Range within Ratapani WLS.

Past Management of Ratapani WLS

It is not known exactly about management of forest patches in Bhopal Forest Circle before 1868. It was supposed to be managed by Village Landlords. In 1868, for the first time forest land management was initiated. Apart from forest lands used by village farmers, all the forest land was brought under State controlled management. The lease holders were compensated based on the forest area acquired by forest and later with the increasing conflict land was given back to the lease holders. With the continuing conflict forest areas have experienced everlasting destructions between 1868 - 1916. In 1914 the forest department was transferred to Bhopal Estate under Nawab Nasrullah Khan Bahadur.

In 1905, Shri Nar Singh Rao was appointed as Forest Officer, who have established a different department in 1907. He mapped Bhopal Forest Division and controlled unchecked tree felling. This was later transformed as Forest Coops. In 1927 Rao has developed improved felling system and systematic forest fire safety policies.

Scientific Techniques was incorporated for the first time by Shri M.M. Sarkar in 1937, although it was not accepted by government, yet the Forest management was based on these new developed techniques which includes development of compartment and holistic mapping. It was used till 1961 for management of forest in and around Bhopal.

Later, proper working plans were developed in 1962 by



Shri B.C. Tiwari for 1962-63 to 1976-77; Working scheme developed by Shri Senapati Joshi for 1968-69 to 1977-78; Working scheme developed by Shri LP Dondiyal in 1972; Working Plan for 1983-84 to 1997-98 by Shri R.K. Varma; and Working plan for 2003-04 to 2012-13 by Shri B.P. Gupta.

Agro-Climatic region

Madhya Pradesh has 11 agro-climatic regions (Figure 2). These regions are different from each other regarding climate, soil type, crops, topography and rainfall. The Obedullaganj Division & Ratapani WLS are a part of the Vindhyan Plateau agro-climatic region.

Geology, Rock and Soil

Vindhyan Range is escarpment of broken hills running parallel to Narmada-Son trough in an east-west direction from Jobat in Gujrat to Sasaram in Bihar for a distance of over 1200 km acting as a boundary of central India landscape on the north. The topography of the areas in Vindhyan hills can be described as "step" topography with one plateau steeping down onto the lower one. The elevation of the range is 300-650 m and is composed of horizontally bedded sedimentary rocks. The major agro-climatic regions of the Vindhyan Landscapes comprises the Vindhayna Plateau, Malwa Plateau in Centre; Kaimur & Satpuda Hill Plateau on the Eastern side and Jhabua Hills on the western limit. The major part of the central vindhyan landscape compromises the Hill

and steep escarpments; and flat woodlands and savannah type grassland areas (Mattai, 1999). The main rock formation is sandstone, basalt and shale from Vindhyan origin while the soil types are laterite, black cotton and alluvium. On the river banks alluvial soil is found. Black cotton soil is found on the Deccan Trap Basalt areas. The major soil types includes Vertisols, Inceptisols and Entisols.

Topography

Topographically it can be divided into three parts: Malwa plateau in north, Vindhyan series in the middle and Narmada valley in the south. Mainly two types of hills are met with in the tract are: the trap hills and the Vindhyan and Laterites.

Drainage

Vindhyan series of mountains spread all over the Raisen and Obedullaganj division. These ranges divide the area into two drainage systems. The northern portion forms the drainage basin of river Yamuna and the southern forms basin of Narmada. The Raisen area is drained by Betwa, Halali, Bina, Bewas & Tenduni rivers. The catchment area of Obedullaganj is drained by mainly Betwa, Barna, its tributaries.

Climate and Rainfall

The study area falls under sub-tropical Climatic Region with three distinct seasons viz., winter season (Dec-Feb),



summer season (Mar-May) and the rainy season (June – Oct). During winters the mean temperature remains around 10oC and mean maximum temperature remains 25oC and the minimum temperature goes o down to 1oC in some regions. During summers, the o mean minimum temperature is 22oC and mean maximum is 38oC. The maximum temperature during summer can go up to 48oC, especially in May and June which are the hottest months. Vindhyan plateau receives an average annual rainfall between 1200-1400mm while Malwa plateau receives around 1000-1200mm. Rainfall is received from south-west monsoon from June to September (SAPCC, 2014).

Forest Types and Patches

Eighteen forest types have been identified in Madhya Pradesh. These forest types belong to three groups of classification given by Champion and Seth i.e. Tropical Dry Deciduous forest, Tropical Moist Deciduous Forest and Tropical Thorn Forest. Tropical Dry Deciduous forest is the dominant group. Within sub-groups, Southern Dry Mix Deciduous Forest is dominant (33.51%) followed by Dry Teak Forest (27.26%), Northern Mix Dry Deciduous Forest (11.81%). Rest of the forest types occupy less than 6% of forest cover (FSI, 2015). The BFC is characterized by Tropical dry deciduous forest (Group 5) and Tropical thorn forest (Group 6) (Champion and Seth, 1968).

The major sub-groups of Group 5 and Group 6 forest types found in the Bhopal Forest Circle encompasses following (Champion & Seth, 1968)

1. 5A/C 1b Dry Teak Forest
2. 5A/C3 Southern Dry Mixed Deciduous Forest
3. 5/D51 Southern tropical Dry Deciduous Scrub
4. 5/D54 Southern tropical Dry Deciduous Dry

Grassland

5. 5/E1 Anogessius Pendula Forest

The major species is Teak (*Tectona grandis*) in Dry Teak Forests while *Butea monosperma*, *Diospyros melanoxylon*, *Acacia catechu*, *Anogessius latifolia*, *Wrightia tinctoria*, *Lannea coromandelica* and *Cassia fistula* are major species of mixed forests. *Anogessius pendula* Forest is dominated by *Anogessius pendula* along with *Anogessius latifolia*. Tree species found in Dry Deciduous Scrub forests are *Butea monosperma*, *Acacia leucophloea*, *Lannea coromandelica*, *Diospyros melanoxylon* and *Anogessius latifolia*.

The forest of Ratapani is dry deciduous and moist deciduous type, with teak (*Tectona grandis*) as the main tree species. About 55% of the area is covered by teak. The remaining mixed forests consist of various dry deciduous species. Bamboo (*Dendrocalamus strictus*) overlaps the two aforementioned forest types and covers about one quarter of the forest area. As per Ashok K Rathoure, 2018, 129 tree species, 73 herbs and shrubs species, 33 climbers and parasites, 35 grasses and bamboo species. As per the management plan of Obedullaganj Division the major forest types are

1. 5A/C 1b Dry Teak Forest
2. 5A/C3 Southern Dry Mixed Deciduous Forest
3. 5/DS1 Southern tropical Dry Deciduous Scrub
4. 5/D54 Southern tropical Dry Deciduous Dry Grassland

The composition of trees in different tiers are as follows

1. Upper Tier: *Tectona grandis*, *Terminalia tomentosa*, *Anogeissus latifolia*, *Lannea coromandelica*, *Pterocarpus marsupium*, *Bridelia retusa*, *Madhuca latifolia*, *Dalbergia paniculata*, *Boswellia serrata*, *Sterculia urens*,

Terminalia bellerica, *Soymida febrifuga*, *Albizia procera*, *Lagestroemia parviflora*, *Schleichera oleosa*, *Hadina cordifolia*, *Dalbergia sisoo*, *Mitragyna parvifolia*, *Terminalia arjuna*

2. Second Tier: *Diospyros melanoxylon*, *Ougenia oojeiensis*, *Buchnanian lanzan*, *Embllica officinalis*, *Gardenia latifolia*, *Aegle marmelos*, *Swietenia chloroxylon*, *Acacia catechu*, *Ziziphus xylopyra*, *Writia tinctoria*, *Nyctanthes arbortristis*, *Holarrhena antidysentrica*, *Flacourtia indica*, *Cassia fistula*, *Casaria grabelons*

3. Third Tier: *Maytanus sylvestre*, *Ziziphus mauritiana*, *Carissa opaca*, *Grewia tilliaefolia*,

4. Ground cover: *Ziziphus nummularia*, *Cassia tora*, *Xanthium strumarium*, *Woodfordia fruticosa*, *Helicteres isora*, *Ocimum basilicum*,

5. Climbers: *Ichnocarpus frutescens*, *Cryptolepis buchani*, *Celastrus paniculata*, *Aburus perceterious*, *Asparagus racimosus*.

PROTECTED AREAS

The protected areas near the Ratapani WLS includes three other wildlife sanctuaries and one national park.

FAUNAL DIVERSITY

The variety of habitats including forest, grassland, scrublands and precipitous hills that have cliffs, have large rock blocks and talus at the base which provide habitat for faunal diversity. As per Ashok Rathoure, (2018) 35 mammals, 205 birds, 14 fish, 33 reptiles and 10 species of amphibians have been recorded in Ratapani Wildlife Sanctuary.

The mammalian diversity includes Tiger, leopard, sloth bear, hyena, jackal, Jungle cats, Bengal fox, chital, sambar, nilgai, four-horned antelope(Chousingha), wild boar, langur and rhesus macaque. Smaller animals, like squirrels, mongooses, gerbils, porcupines, hares, etc. are of common occurrence. Ratapani Wildlife Sanctuary has a population of about 40 tigers while the movement of 12 tigers has been reported in the forest area of Bhopal.

Among reptiles, important species include different kinds of lizards, chameleon, snakes and turtles, etc. Among snakes, Spectacled Cobra, Rock python, Russell's viper, Saw Scaled Viper and Common krait, Rat Snakes, Green Keelback, Kukri, Bronze Back Tree Snake, Sand Boa etc. are common.

Giri's Geckoella (*Cyrtodactylus varadgirii*), Spiny-

Table 1: Protected areas in Bhopal Forest Circle

S. NO.	NAME OF AREA	PROTECTED YEAR ESTABLISHMENT	OF AREA (SQ.KM)	DISTRICT (S)
1	Narsingharh WLS	1978	59.19	Rajgarh
2	Kheoni WLS	1982	122.70	Sehore, Dewas
3	Van Vihar National Park	1979	4.45	Bhopal
4	Ratapani WLS	1978	823.84	Raisen
5	Singhori WLS	1976	287.91	Raisen



Table 2: List of Schedule I mammals

S.I.	SCIENTIFIC NAME	COMMON NAME	SCH. WPA 1972	IUCN STATUS
1	<i>Panthera tigris</i>	Tiger	Sch I (Part I)	Endangered
2	<i>Manis crassicaudata</i>	Pangolin	Sch I (Part I)	Endangered
3	<i>Panthera pardus</i>	Leopard	Sch I (Part I)	Vulnerable
4	<i>Melursus ursinus</i>	Sloth Bear	Sch I (Part I)	Vulnerable
5	<i>Tetracerus quadricornis</i>	Four-horned Antelope	Sch I (Part I)	Vulnerable
6	<i>Gazella gazelle bennetti</i>	Chinkara	Sch I (Part I)	Least concern
7	<i>Antelope cervicapra</i>	Black buck	Sch I (Part I)	Least concern
8	<i>Mellivora capensis</i>	Indian Ratel	Sch I (Part I)	Least concern



Headed Fan Throated Lizard (*Spinoccephalus* sp.), Bengal Monitor Lizard etc are very common and unique in the landscape.

Few common bird species includes common babbler, brown-headed barbet, bulbul, bee-eater, baya, cuckoo, kingfisher, kite, lark, vulture, sunbird, crow pheasant, jungle crow, egrets, myna, jungle fowl, parakeets, partridges, hoopoe, quails, woodpeckers, , dove, black drongo, Paradise flycatcher, and rock pigeon.

The area is also marked with hilly cliffs providing habitat for Vultures. The vulture species commonly found

includes Egyptian Vulture, Indian Vulture, White-rumped Vulture, Red-headed Vulture, Eurassian Griffon and Himalayan Griffon. They can be easily seen basking or feeding on carcasses outside forest villages.

VILLAGES AND ANTHROPOGENIC PRESSURE

There are 26 villages inside sanctuary and another 109 villages situated around the sanctuary are also dependent for their day needs on the biomass resources of the WLS. The main constraint of management is illicit grazing by the cattle of surrounding villages. About 20, 000 heads of cattle from in and around villages graze in the area. Illicit felling of timber, firewood and bamboo, poaching and encroachment in the forest area are other problems. Forest fire is major problem in the summer.

CROPPING AND AGRICULTURE

The major crop in the study area is Rabi (winter crops) and Kharif (summer crops); this cropping pattern depends on water from Narmada River. The crop occupying the highest percentage of the sown area of this region is taken as the major crop such as Rice, Wheat, Soyabean, Peanuts, Mustard, Sesame, Cotton, Maize and Sorghum. It is observed that, the different parts of the study area were practicing different crop pattern based on the season and availability of irrigation facility. The pulses cultivated in this region were Gram; Mug, Arhar, Urad etc.

The general crop patterns practiced in the study area

were maize, wheat and others. Major horticultural crops: Plantation of Chikku, Kela, Papaya, Amla and mango. Major vegetable corps: The major vegetables grown in the study area were: Bhindi, Brinjal, Cabbage, Tomato, Karela and Onion.

TOURISM

The Sanctuary is famous for wildlife tourism as well as historical and scenic tourism. These includes the largest rock shelters of Bhimbetka located inside Ratapani WLS. These rock shelters were inhabited by man hundreds of thousand years ago and some of the rock paintings of the Stone Age are more than 30,000 years old. It has been declared a World Heritage Site by UNESCO. The tourist places include Bhimbetka, Delawari, Ginnorhgarh Fort, Prisoners of War Camp, Ratapani Dam, Kairi Mahadeo and Kherbana Mandir, Salkanpur Devi Dham, Sar-maru Monastic enclave etc.

Many of the precipitous hill slopes and tops contain series of caves and rock shelters some of which contain prehistoric rock paintings.

Proposed Tiger Reserve

It has been a wildlife sanctuary since 1976. As of March 2008, in principle approval by the National Tiger Conservation Authority (NTCA) has been granted for upgrading it to a status of tiger reserve. It will become a tiger reserve by the notification of the Government of Madhya Pradesh.


Ratapani Wildlife Sanctuary has a population of about 40 tigers while the movement of 12 tigers has been reported in the forest area of Bhopal. The whole area will be combined as one to declare it as a tiger reserve. The area of about 3,500 sq km of Raisen, Sehore and Bhopal districts has been reserved for this project. The 1,500 sq km will be designated as a core area while 2,000 sq km as a buffer zone. The declaration of the sanctuary as a tiger reserve will help in better conservation of tigers in the area which is facing the problem of illegal mining and poaching. 

Photo courtesy :- D. P. Srivastava, Shibajee Mitra and Arijit Das

The above writing is a comprehensive study of Mr. D. P. Srivastava who did his PhD. on the Tigers of Ratapani WLS and during that period he has done the extensive study on the WLS. He is a naturalist and conservationist by heart and passion. Shibajee Mitra is also a naturalist and conservationist who did worked in eco-tourism in Ratapani WLS and currently doing some of the privately managed habitat conservation work in the landscape along with his special interest in reptiles. The above writing gives an idea and overview of the Ratapani WLS. All the camera trap images has been provided by D.P. Srivastava and the other photographs of villages, reptiles etc has been provided by Shibajee Mitra.





ROYALS OF ARAVALLI

■ *Arnab Basu*

Environmental Writer, Sustainability Consultant and Natural History Commentator

In ecology, “cohabitation” means two different species living together in the same environment. It sounds quite harmonious when we look at it from human animal relationship point of view. This cohabitation has two different dimensions in the dry deciduous forest of Aravalli range in Rajasthan.

The first dimension is the story of Jawai Bandh, a leopard conservation reserve as decreed by the government on 23rd February 2010. Today, this place is gaining popularity because of the growing wildlife; it is not just a habitat for leopards, but also home to several species of migratory birds, crocodiles, sloth bears, chinkara, and wolves. In the month

of July in 2016, one of my photography partners visited the forest of Jawai. He was guest of Thakur Devi Singh Ji Ranawat, known as Thakur Sahib of Bera and stayed in The Leopard Lair Resort of Devi Singh. The resort is available for wildlife photographers and leopard photography is the main attraction.

During his interaction with Thakur Sahib, it was revealed by him how leopards were killed by his ancestors and even by him, in his teenage in this region, until Wildlife Protection Act was enforced in 1972. Even after that, the practice to tie goats to attract leopards (baiting, which is also illegal as per the Act) for foreign tourists, continued. There are around 70 wild leopards in this area surrounding Jawai Bandh. The most amazing fact as per Thakur Sahib is that; no news of

severe human leopard conflict was sited here for decades. There is not plenty of kills for leopards there. Leopards mainly live on livestock of nearby villages, but villagers never complain.

I would like to quote an excerpt of this human leopard cohabitation story as narrated by my photography partner in his tour report, written right after his Jawai exploration and was published in e-magazine Holocene published by the NGO named Exploring Nature, which was ran by both of us for few years.

“The male (leopard) visited nearby Pola village last night and attempted cattle killing which went in vain. Then it killed a stray dog on a street of the village and came towards this direction carrying the carcass. “You must feel petrified

living with wild leopards around and suffer unrecoverable loss of your livestock”, I tried to console the villagers as I presumed their anger. But there were more elements of surprise waiting for me. “They live on our livestock and stray dogs, and they have every right to live. “We all are children of the nature”, one of them replied. “Yes, sometimes we suffer losses of livestock, but if we report the loss to the local Forest Authority, we get enough compensation on proof”, he explained, and others were nodding in agreement. They were not complaining about the animal that is responsible for the most human killing across the country for centuries. I went to Sundarbans, where I saw people worshiping tigers as “Dakshinray”. Nevertheless, that was due to the fear of its man-eating nature. But here the story was totally different, and I found a respect for the most elusive cat of the world. There was no fear factor but an eagerness for co-habitation.”

The villagers of Jawai believe “leopards have every right to live”; and the hunter turned conservationist Thakur Devi Singh, who apparently devoted his life teaching local villagers how to cohabit with the most elusive cat in the world, converted his ancestral mansion into an ecotourism resort for the urban wildlife photographers.

Now, whether the story of Jawai is the story of cohabitation, influenced by thoughts of deep ecology or is the story of deep ecology turning into tourism opportunity? I would leave that for the readers to decide.

The other dimension of this human leopard cohabitation is centred on Jhalana – the urban forest and for the urban leopard.

Let us pay little attention to the history of this “urban forest”, as encrypted in a huge glass frame in the museum near the entry gate of the reserve.

“The historical city of Jaipur is nestled on three sides by the beautiful Aravalli ranges. A stone’s throw from the heart of the city lies a beautiful forest of Jhalana Doongri; these are home to the majestic and not so elusive cat belonging to the family of Panthera pardus – the leopard. The sumptuous sanctuary with its dry deciduous forests towering Aravallis and the beautiful valleys has for centuries been the preserve and hunting grounds for the erstwhile royal families of Jaipur.

The growing pressure of urbanisation in Jaipur has taken its toll on the forests of Jhalana, which has now shrunk to its current shape, and size. The leopards are not only surviving but also thriving in the forests of Jhalana is nothing sort of a miracle.

Today, Jaipur holds a unique place in the world in having a 23 sq km wildlife reserve within the heart of the city which boasts not only the highest density of leopard population in the world but, more importantly, has showcased the peaceful co-existence of man and animal.”

In 2017, Rajasthan became the first state in India to announce Project Leopard with a sum of Rs. 70 million (Rs. 7 crores) set aside to conserve leopards. It eventually kicked



off in 2018 with the launch of a leopard reserve in Jhalana Forest Reserve.

Now the question could be raised whether it is a natural cohabitation or an inevitable impact on nature due to urbanization.

Both the dimensions of human leopard cohabitation, whether in village forest of Jawai or urban forest of Jhalana, it is the leopards who were left with no choice but living with the “so called superior species of the planet”. That is why the animal, master of adaptation, is thriving in both the situation. And human found a commercial interest in that while turning these places into most sought-after leopard safari destinations of the country.

One of these above-mentioned places was explored by me in the Good Friday weekend of 2021 between 1st and 3rd April.

As natural history commentator, I have always considered myself lucky in terms of sighting leopards in wild. But at the same time, I have a jinx with this animal as a wildlife photographer. I had seen leopards in tiger territory, for about four to five different occasions before my Jhalana visit. In Bandipur, the leopard pair in courtship was in a thicket, which was at my side of the gypsy, but that time I was a beginner in photography and failed to set my camera according to light condition. In the evening of the same day in Bandipur, again I repeated the mistake of wrong camera setting when I saw the leopard on tree at the last hour of our safari. Therefore, in both the cases I missed the opportunity of getting any decent shots. In Satpura, I saw three cubs, but again light condition and position of our safari gypsy was not favourable enough to get any satisfactory shots.

In Kabini leopard appeared in front of me like an orange flash of lightning and disappeared quickly. In Dandeli, I got a glimpse of a mother and a cub in the darkness of early morning with the help of gypsy’s headlights. In Sariska, the animal was stalking quietly a herd of sambar probably when I spotted him at the last hour of our safari. But again, after hearing the first click of shutter it was rushed inside the forest, without giving much photo opportunity.

All the above incidents were fabulous memory of leopard sighting and observing their characteristic behaviour, the only thing missing was a decent image of leopard.

In Jhalana that jinx too was broken, when on 1st April, in our evening safari I got alert by the alarm call of squirrel. I saw a female leopard, locally known as Flora, was slowly walking in. She was stalking her prey, apparently a squirrel on a tree. Yes, “urban leopard” of “urban forest of Jhalana” in the heart of the pink city of Jaipur, feeds upon squirrel, francolin, monitor lizard, pea fowl etc.

Allen Jacob of Nature Wanderers (a wildlife photography tour organizer), our guide for this exploration told us that urban leopards of Jhalana are shorter and skinnier than other leopards we see in the tiger reserves or in other wildlife sanctuaries. This size difference is primarily due to their food habits, as they don’t get bigger herbivore like sambar, wild boar or spotted deer, therefore they have no choice but depending upon small prey. The vegetation of Jhalana as well as its proximity to city is not suitable for big herbivores. However, forest department of Jaipur has undertaken a job of creating grasslands for the herbivores to increase their population who in turn would form the bulk of the prey for leopards and other carnivores.

In Jhalana, I was particularly astonished by looking at the position of this leopard reserves. The reserve lies at the Southeastern part of the capital city of Jaipur; the Aravalli ranges run from the top to bottom in the forest; the Northern part is divided by the National Highway (NH 11) and human settlement; the Western and Southern boundary touch the heavily populated Jawahar Nagar, Malviya Nagar and Jagatpura areas of Jaipur; and the Eastern boundary has villages and new settlements that are slowly coming up. Out of all these the Malviya Nagar area is nothing but an Industrial area and part of Rajasthan State Industrial Development and Investment Corporation (RIICO), comprising multiple chemical and automobile industries located just at the entry gate of the reserve. In fact, the industries end and the reserve start. Declaration as Project Leopard site indeed has saved this parcel of forest from the greedy hands of “development”.

Basically, leopards of Jhalana are surrounded from all side by the human beings. How dare they don’t cohabit with them?

Although the forest has good population of nilgai, the forests of Rajasthan and Central India are known as habitats of healthy nilgai population, but leopards hardly make any attempt to kill such big animals.

On 2nd April, during our morning safari we got to witness interaction of urban leopard of Jhalana with a male nilgai, the biggest antelope of India. We saw one male leopard, locally known as Rana, stalking, and approaching towards a huge male nilgai. He was crouching and looking at the nilgai; then he sat on the ground, just 10 meters away from him. Both the animals were sitting peacefully for some

time. After a while, the leopard slowly and stealthily got disappeared in the forest. Later Allen told us although we saw the leopard approaching to the nilgai, but his crouching posture was indicative more of a defensive stance than an offensive one.

The reason the male leopard did not make any attempt to kill the adult male nilgai was at times such attempt could be a fatal mistake.

Both the morning and afternoon safari on that day, in this one and only project leopard site of India, gave me a feeling of déjà vu; as they reminded me Tadoba and Corbett Park at same time. All the time on that day we were busy in chasing, tracking, and shooting the star sub adult male of Jhalana, Rana. There was similar excitement and emotion; competition among gypsy drivers to get best position to take his images; abusing each other in failure to do so; commotion, collision; chaos and blocking the path of the animal and eventually disturbing the animal. All these we typically experience in tiger reserves of India upon sighting of “showstopper” Maya or Sharmili. Only instead of tiger, here it was leopard.

That was 2nd day of April, on that very day in 1973, the then Prime Minister of India; Mrs. Indira Gandhi had launched Project Tiger. On that day in 2021, we were busy in replicating the “flagship species centric ecotourism behaviour” for another member of big cat family. The behaviour probably we learnt from the national parks of India where “tiger centric” ecotourism is promoted and practiced. The display of “ecotourism behaviour” by the wildlife photographers and ecotourists alike, even in a leopard reserve was very



much in the shadow of the Bengal Tiger!

In the forest of Jhalana in my four safaris between 1st and 3rd April, we saw three female and two male leopards. Although leopard is the apex predator of this forest, but they were always being compared with tigers of other national parks of India – in terms of their sighting frequency, behaviour in front of the tourists and providing photo opportunities. That was resonated too in our local guide Kunal's statement. During our last safari when we were searching for another dominant male leopard, known as Simba, he said, "Simba is doosra sher (Hindi word for the second tiger) of Jhalana, after Rana. He never shies away from giving enough photo opportunity to the visitors."

It was rightly mentioned in the encryption in glass frame kept in the museum of Jhalana reserve that the leopard in Jhalana is "majestic but not so elusive cat"; whereas ecologically it is always considered as an elusive animal in wild.

In context of my "leopard safari" in India's first project leopard site, there is an interesting comment made by another eminent wildlife photographer and ex-official of India Government, Vinod Goel, in an article titled, Leopards in a spot in Rajasthan, written by Sneha Mahale in 8th April, 2020 edition of online journal Mongabay. Goel, who has been photographing the leopard in the state since 2013, said, "Big cat safaris in India are all about the tiger. It is only in recent years that the leopard has started getting the attention it deserves. Still, it is a shy and elusive animal. Sightings during the daytime are almost impossible. But there are a few places such as Bera (Jawai) in the Pali district of Rajasthan where there is almost a 98 to 99 percent chance of a sighting during a safari."

Big cat safaris in India are all about the tiger. It is only in recent years that the leopard has started getting the attention it deserves. Still, it is a shy and elusive animal. Sightings during the daytime are almost impossible. But there are a few places such as Bera (Jawai) in the Pali district of Rajasthan where there is almost a 98 to 99 percent chance of a sighting during a safari.

So, the wildlife photographers think being a big cat, leopard also deserves their attention as a photography subject, not just tigers. Fair enough, now my first question is do they get same attention in the forest where tiger is the apex predator?

In the above two leopard dominated ecosystems (Jhalana and Jawai), we saw enough downpour of attention on this deserving creature. My second question is do they even get same attention everywhere, where no other predators are more dominating than they do?

The answers to these two questions lie in the "real status" of leopard in anthropocentric ecology.

We define animals by their relationships to us. Through this lens, non-human species are categorized into two forms; domestic – dependent on humans for survival and augmented to live as companion species to humans, and wild – independent, capable of sustaining life without anthropogenic support. These relationships are based broadly on the level of human intervention required for an animal to survive.

In ecology there is another condition called synanthropy. Synanthropes are species, which exist between domestic and wild, which benefit from living in close proximity to humans yet, remain beyond their control.

Now this otherwise wild species, leopard, is getting close to become synanthrope in few parts of India. The examples are Navi Mumbai, Bangalore, Chandrapur and Alipurduar. The news of leopard sightings or leopard picking up stray dogs or even human baby or taking shelter in city schools are not so uncommon in these cities or urban settlements. Based on a newspaper report in 2018, the survey conducted by

forest departments found there were around 41 leopards in Sanjay Gandhi National Park, Borivli, which is outskirts of Mumbai. Similarly, the leopard, which intruded a school in heart of the city of Bangalore, was believed to be a resident of Bannerghatta National Park, which is again situated at the outskirts of the city. Whereas leopards sighted in Chandrapur and Alipurduar are believed to be from Tadoba and Buxa tiger reserves respectively.

According to biologist, teacher, and photographer Nayan Khanolkar from Mumbai, who has spent months documenting life with leopards, "the primary reason that the leopards have left the national park and forests adjacent to cities is to access easy food. It's a pattern that is replicated not just in Mumbai, but all over India and Asia", as mentioned in an article published in an online news portal Natural History Museum. Nayan, who had won the award for his image "The alley cat" in urban category in 2017 Wildlife Photographer of the Year competition, was quoted in that article, "It is our mistake. Humanity has created a food chain for them. People throw food outside and it attracts pigs and dogs, which leopards can hunt much more easily than running after a deer in the park."

This could be synanthropic behaviour of leopards. But what we witnessed in Jawai and Jhalana respectively, were different. And that was termed as "Cohabitation". In that case, leopards do not come from nearby national parks or reserve forests to human settlement in search for food. They live in their own natural habitat and feed on their natural prey. It is the human settlements, which were grown adjacent to their habitat.

Interestingly, although there is dedicated "leopard safari" in Jawai and Jhalana, but nobody thought about introducing leopard safari in the heart of Mumbai, Bangalore, Chandrapur or Alipurduar.

But why is that disparity? Wildlife photographers are interested to capture images of "leopard in cohabitation" but not "leopard in synanthropy"?

Not at all, there are photographers like Nayan who won

award for capturing synanthropic behaviour of leopard.

Actually, roaming through slums of Mumbai or under-construction metro railway project in Bangalore to capture images of leopards does not qualify as "ecotourism". It is like capturing image of Brahminy kite from the balcony of my Bangalore apartment. When city dwellers are the customers of ecotourism, how can it be developed in their own habitat?

Therefore, Jawai and Jhalana are the dedicated ecotourism destinations to witness human leopard cohabitation. Clearly, every leopard does not equally deserve to get attention of all wildlife photographers, unless there is someone like Nayan available for them.

In the tiger range forests of this subcontinent, having dedicated ecotourism destinations under their belt itself is a big achievement for leopards. Although technically dry grassland and hot deserts are not the known habitat of Bengal Tigers in this subcontinent. Among grassland habitats, we only find them in wet grasslands (like Terai and North-East India), shola of Western Ghats and tropical short grasslands plains of Central India and Deccan area. Grasslands, which are moist and cool, are favourable for them.

If we go by the Status of Leopard in India, 2018, published by Ministry of Environment, Forest and Climate Change, like Bengal Tigers, in case of leopards also states of Madhya Pradesh, Karnataka and Maharashtra enjoy the status of top three leopard populated states. Whereas apart from Kabini in Karnataka (that is also for black leopard sighting), these all three states are premier tiger tourism destinations. On the other hand, with just 476 leopards, Rajasthan has become the hot spot of leopard tourism. But that doesn't include famous Ranthambore or Sariska tiger reserves of this state.

The unwritten norm in ecotourism is, if you have Bengal Tiger in forest, your USP of ecotourism cannot be leopards or anything else. Vinod Goel has rightly said, "Big cat safaris in India are all about the tiger".



EXPLORING THE HIDDEN DEPTHS OF THE ANDAMAN SEA: A DEEP-SEA BIODIVERSITY TREASURE TROVE

■ Dr. Sabyasachi Sautya

The Andaman Sea nestled in the northeastern part of the Indian Ocean, lapping the shores of Thailand, Myanmar, and India's Andaman and Nicobar Islands, isn't just a paradise for beach bums. Beneath the turquoise surface lies a hidden world, a natural laboratory teeming with mysteries that scientists are itching to unravel. The Andaman Sea is a realm of wonder, where the secrets of the deep sea beckon to be uncovered. While its turquoise waters and pristine beaches captivate travellers, beneath the surface lies an enchanting hidden world, a natural laboratory teeming with mysteries and lives that scientists are itching to unravel.

Geomorphology

The Andaman Sea's geomorphological structure is characterized by its complex and dynamic seafloor topography, influenced by tectonic activity and volcanic

processes. It lies between the Andaman and Nicobar Islands and the coastlines of Myanmar and Thailand, featuring a series of deep basins, ridges, and trenches. The sea is bounded by the Andaman-Nicobar Ridge to the

east and the Sunda Trench to the west. Notably, the sea floor is marked by numerous seamounts, submerged volcanic mountains that rise from the ocean bed, as well as extensive areas of sediment deposition and fault lines resulting from the ongoing collision between the Indo-Australian and Eurasian tectonic plates. This intricate geological landscape supports diverse marine habitats and complex oceanographic processes.

The Deep-Sea Environment: A Mysterious Frontier

The deep-sea environment of the Andaman Sea, stretching beyond the continental shelf, is one of the last frontiers of marine exploration. Plunging to depths of over 3,000



meters, this dark, cold, and high-pressure world is vastly different from the sunlit shallows. The lack of light and extreme conditions might seem inhospitable. Despite these extreme conditions, the deep-sea environment is far from lifeless. It is a dynamic ecosystem teeming with a variety of organisms, many of which are yet to be discovered and cataloged.

Deep-sea corals, unlike their shallow-water counterparts, do not rely on sunlight. These ancient structures provide habitat and shelter for numerous marine species, contributing to the high biodiversity of the region. Gorgonian corals, sea fans, and black corals create intricate underwater landscapes that are as stunning as any terrestrial forest.

Despite the challenging conditions, the deep sea of the Andaman Sea is a biodiversity hotspot. It harbours a multitude of life forms, many of which are yet to be discovered and cataloged.

In this article, we explore seamounts one of the wonders of the Andaman Sea.

Unveiling the Hidden Wonders: Seamount Biodiversity in the Deep Andaman Sea

We have travelled to many terrestrial mountain ranges and hill stations located in India, such as the Himalayas, Western Ghats, Eastern Ghats, Aravalli Range, Satpura Range etc. These regions boast rich biodiversity, which we have had the pleasure of



witnessing. Imagine a submerged mountain rising from the ocean floor, cloaked in mystery and teeming with life. These underwater giants, known as seamounts which are formed by volcanic activity, are scattered across the deep Andaman Sea. Unlike the surrounding flat seabed, their towering structures create a variety of habitats at different depths and form some of the most biodiverse ecosystems on our planet. Yet, they remain one of the least explored and understood environments.

Seamounts in the Andaman Sea are adorned with deep-sea corals, which form complex and colorful gardens. These corals, unlike their shallow-water counterparts, do not rely on sunlight. They provide habitat and shelter for a multitude of marine species, from tiny invertebrates to larger fish.

Seamounts are home to many species found nowhere else on Earth. These include rare and endemic fish, cnidarians

(gorgonians, corals etc.), crustaceans, echinoderms, mollusks, poriferans (sponges) etc. that have adapted to the unique conditions of these underwater peaks. Scientists have discovered new species of sponges, brittle stars, shrimp, and deep-sea fish during their explorations.

Examples of biodiversity from one of our expeditions along the seamount CSM, Andaman Sea in 2007. a: Holothurid; b: Euplectella sp.; c: Gorgonian; d: Squat lobster - Galatheidae; e: Demospongiae attached to a big rock, onboard sample; f: the squat lobster-Liogalatea laevirostris; g: brittle star-Ophiophyllum sp; h: dense population of megafaunal communities (gorgonians, sponges, sea urchins, brittle stars, galatheids) lived on the big boulders and uplifted slabs; i: dense patches of corals (gorgonians); j: Ophiuroidea laid on the cobbles substratum. (black & white images are underwater images taken during the seabed survey along the seamount).

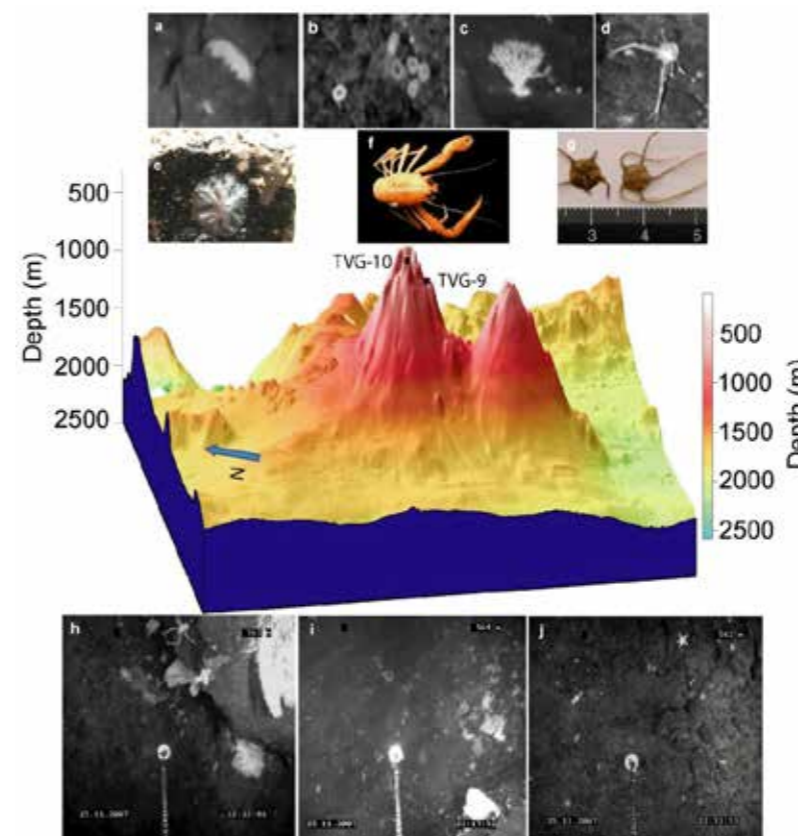
The nutrient-rich waters around seamounts attract large predators, such as sharks, rays, and even deep-diving cetaceans like sperm whales. These apex predators play a crucial role in maintaining the balance of the ecosystem.

The Importance of Seamount Biodiversity

The biodiversity of seamounts is essential for the health of the ocean. These ecosystems contribute to nutrient cycling, support commercial fisheries, and are potential sources of new medicines and biotechnological applications. Moreover, seamounts act as stepping stones for species migration and genetic exchange, enhancing the resilience of marine populations.

The Exploration

For deep-sea exploration, a multidisciplinary team of scientists participates in a well-equipped research cruise. The vessel carries a variety of scientific equipment and instruments, including an onboard laboratory with various sampling devices (such as sediment collector grabs, box corers, and dredges), a CTD rosette for water collection, and multiple plankton nets. Exploring the deep-sea seamounts of the Andaman Sea is a formidable challenge. The depths, often exceeding 2,000 meters, combined with strong currents and rugged terrain, make these areas difficult to access. However, advancements in technology, such as remotely operated vehicles (ROVs) and autonomous underwater vehicles (AUVs), are enabling scientists to venture into these remote regions.



To protect the unique biodiversity of seamounts, there is a growing call for conservation measures. Establishing marine protected areas (MPAs) around seamounts can help safeguard these ecosystems from destructive activities. International collaboration and policies promoting sustainable practices are also crucial for preserving these underwater treasures.

Threats to Seamount Ecosystems

Despite their remoteness, seamounts are not immune to human impact. Deep-sea fishing, particularly bottom trawling, poses a significant threat, as it can decimate fragile coral communities and disrupt the ecosystem. Additionally, deep-sea mining for minerals and climate change further threaten these delicate environments.

Conservation Efforts

To protect the unique biodiversity of seamounts, there is a growing call for conservation measures. Establishing marine protected areas (MPAs) around seamounts can help safeguard these ecosystems from destructive activities. International collaboration and policies promoting sustainable practices are also crucial for preserving these underwater treasures.

The seamounts of the Andaman Sea are among the last frontiers of marine exploration. Each expedition uncovers new species and reveals the intricate connections within these ecosystems. As we continue to explore, it is imperative that we also commit to protecting these biodiversity hotspots.

The hidden wonders of the Andaman Sea's seamounts remind us of the incredible diversity of life beneath the waves. By exploring and conserving these underwater mountains, we not only enrich our understanding of the natural world but also ensure that these ecosystems continue to thrive for future generations.

GUARDIANS OF THE WILDERNESS

■ Bhavna Menon



Bhavna Menon

I was 22 when I first met with community members living around tiger reserves. On assignment for a socio-economic survey, I was attempting to complete a form sitting in the shade of a Mango tree, while the locals wanted to focus on who I was, and what I was doing in their midst. Closing shop for the day with barely a few lines jotted down on one of the sheets, as I walked around the village, I noticed a few children hard at play. Happy shrieks reverberated through the air as they ran around with shiny marbles, clearly an important tournament for them. They eyed me suspiciously when I asked whether I could join in, but when I brought out a few color pens and paper, they dropped their inhibition, pocketed their marbles, and asked me my name while letting their imagination take course on the white sheet. Watching the children grow a little less suspicious of me, some of the adults came forward for a conversation and I was formally invited over for a cup of 'chai' or tea to one of the houses. Chai, according to me is the best way to break ice and build long-term friendships. The chai session in fact was my first brush with the concept of Human- Wildlife as well. During an informal conversation with them, I realized that locals although most in tune with the way of the wilderness, were unsure of their role in the forest ecosystem, which I assured them was actually the most important. This led to

the creation of a conservation outreach program, specifically aimed at reaching out to the children in the villages about the importance of forests, their role in protecting the same, while also taking precautionary measures while living around the reserve to ensure their own well-being.

With the program running for almost 8 years and covering 96 villages, the incidents of Human- Wildlife conflicts did go down, and community engagement for conservation of the wilderness spaces strengthened. An emotional moment for me was, when we were conducting a similar conservation outreach program

in another protected area close to Bandhavgarh, years later, when someone from the audience gathered waved excitedly, her bangles jingling with happiness. "Remember me? "I was part of the outreach program as a young student and today I have got my children to attend the program!"

Garnering support over the years and learning much from community members, I have always been able to rely on their promise of supporting the cause of conservation, given their voices are heard too. A stellar example of this



is a recent fire awareness initiative I undertook with the help of the Lodge association of Bandhavgarh, and the Forest Department. Forest fires are a significant during the months of April to June. In order to collect forest, produce like Mahua flowers in a faster and more convenient fashion, locals often burn the undergrowth under the tree, which may spread courtesy the dryness in the season and harm the ecosystem. To this effect, a project was created to help children and adults (from particularly sensitive villages) experience the forest, observe the wilderness in all its glory, address their concerns, and gain their support in protecting the forest against incidents of major forest fires. True to their word, and of course due to the continued efforts of the Forest Department, Bandhavgarh was not affected by any major forest fires, thereby proving yet again the power of dialogue and voices heard.

Speaking of dialogue, another wonderful tribe I had the opportunity of working with at Kanha Tiger Reserve on the recommendation of the Forest Department was the Baiga tribe. Dependent on the forest produce for their daily living, and means of income via sale of forest produce, the idea was to wean the tribe away from over dependence on the forests, especially with regard to collection of the Mahul leaf which is used to make leaf and bowls locally. The collection would not only lead to degradation of the habitat, but also cause incidents of Human- Wildlife conflict, as the community members spend much of their time in the forest for maximum collection of the leaves. The initiative was also undertaken to help them explore a means of livelihood keeping in mind their traditional knowledge, and culture. It took us nearly 1 year to understand what could be a sustainable livelihood for the community members without introducing anything new and foreign in the landscape. With these thoughts in my head, and while walking down the village path and from in front of the house of a Baiga elder, I got called in by the matriarch of the house. "What are you looking for?" she asked As I was about to answer, my eyes fell on this beautiful necklace around her weathered, yet graceful neck. "Who





has made this beautiful necklace 'mataras' (roughly translates as mother). "I have, none of our jewellery is from outside, we make it in the village itself." she replied with a chuckle. What followed that one moment of discovery was continued dialogue, and engaging with women from the village to understand whether they would be interested in using the traditional art of jewellery making as a means of livelihood.

With constant encouragement over the year, the women produced the first batch of jewellery. Before we knew it, the jewellery had gained popularity not only domestically, but internationally as well. With several requests for jewellery streaming in, almost the entire village was involved in the project. When women were busy with household chores, it was their husbands who helped us fulfil orders. Close to 40 women were soon part of the workforce. Through word of mouth, the want to be engaged in this initiative spread to other villages as well.



Suitably trained, and for the initiative to be sustainable, the initiative, was ultimately handed over to the women and the Forest Department to take forward. During the time of working with the Baiga tribe, we saw a significant reduction in dependence on the forest products and reduction in cases of conflict.

When talking about conflict, how can I not talk about one of my most favourite tribes I have had the honour of working with? Infamous for the decimation of tiger numbers from the Panna Tiger Reserve, the tribe since the time of the kings, is naturally skilled with tracking and mimicry of sounds of the forest. The first time I met with the Pardhi community members was at the hostel that had been constructed especially for them by the Forest Department in partnership with other stakeholders. I remember how every part of my body had been hugged by the children with two of them literally hanging from my shoulders, thrilled that someone had come to visit them. The management

had worked tirelessly to make sure that the community had been comfortably relocated to outside of the reserve and their children put in the hostels. This was also the time that the community had given up hunting, surrendered their weapons of traditional hunting, and opened their arms wide open instead to opportunities in mainstream society. It was during this time of brainstorming solutions, and working with this community, I had the opportunity to meet with entrepreneur Shatakshi Singh, a local from Panna with whom we developed the idea of ethical souvenirs.

Under the ambit of WildPines Art (Handicrafts | Wildpines Art), which is a social enterprise run by Shatakshi, a dialogue was set up with interested youth from the community for creation of alternative livelihood using products. As interested youth started flocking to Shatakshi's beautiful haveli inspired home, set in a narrow lane at Panna city, community members were taught how to make bag, car charms, earrings, anklets, tea coasters, wall hangings and finally their best sellers the art of block printing.

Duly supported by Bhopal based textile designer and entrepreneur Gaura Joshi Nenwani (Studio Gaura) the community members have now become adept as block printing shirts, stoles, kurtas and dupattas. The block printing model, which is the first of its kind with the community, has become a huge success and guests traveling to Panna have started opting for workshops and interactions with the community. Today, the love and success of the model, has translated into an art center at Manaur located at a short distance from the main park gate of Panna TR. While here, guests can engage in interaction with the Pardhi artists, walk around the center learning about Panna, and also buy products of their choice. It heartens me to share that after continued dialogue with the community, whether it's been the work of the Forest Department, tireless efforts of local NGO's or the alternative livelihood project spearheaded by Shatakshi, the Pardhi

families at Panna have given up hunting, and today, are a significant reason for the comeback of the tiger reserve with regard to tiger numbers. I personally believe that reserves like Panna, Kanha, Bandhavgarh boast of a beautiful forest and a thriving ecosystem, complimented with the strongest backbone that is the communities.

Bhavna Bio: Bhavna Menon has worked as the programme manager with a non profit organisation in the field of wildlife conservation for 14 years wherein she was involved in conservation outreach, capacity building with the frontline staff, and creation of alternate livelihoods. Today, she works as an independent conservationist, communications consultant, and as a freelance writer contributing to different publications, with a strong focus on covering conservation stories and people who are making a difference on the ground. [BR](#)



THE MADLY SUBTLE SCENT

Mahua is a medium to large, fast-growing deciduous tree, Photo: Dipanjan Ghosh



■ Dipanjan Ghosh

The natural habitat of the Mahua tree is in the dry tropical and subtropical forests of the Gangetic plains of northern and eastern India, the whole of central India and the plateau region of western and southern India with an annual rainfall of 500 mm to 1500 mm and a temperature range of 2°C to 46°C. Mahua is very hardy and thrives well on rocky, gravelly red soils and also on saline and sodic soils. It can grow even in pockets of soil between crevices of barren rocks. However, for its better growth and productivity, well-drained deep loam soil is ideal.

The people of the Gond tribe once lived in a forested environment surrounded by many hills and hillocks rising in the undulating landscape, geographically known as the Chhotanagpur Plateau. It is believed that the entire region later came to be known as 'Gondwanaland' from the name of this Gond tribe. Their main livelihood was hunting and farming. When they returned home at night, they used to be intoxicated with the Mahua liquor. They believed that the Mahua tree was eternal, which kept them alive. Practically, from birth to death, Mahua is involved in every level of life of the tribal people of Chhotanagpur. Hence they call Mahua the 'tree of life'.

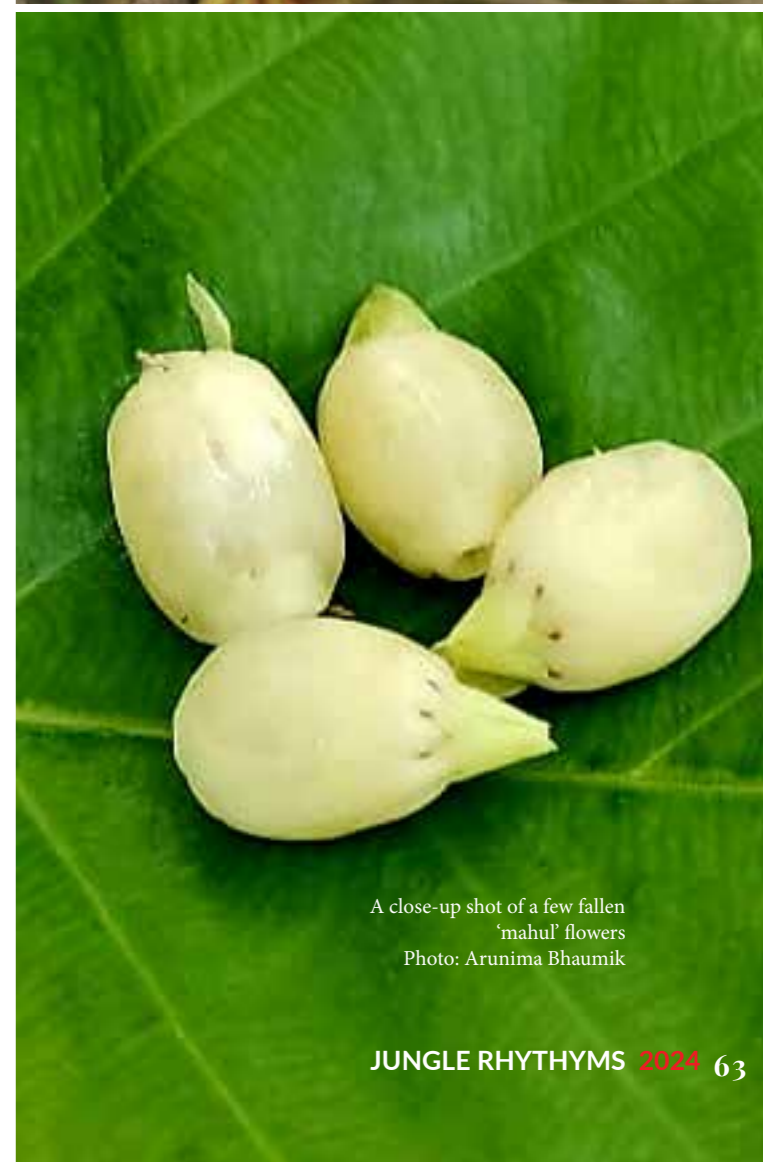
The dominance of the Mahua tree in the socio-economic, religious and cultural spheres of the entire plateau is noteworthy, since ancient times. Over thousands of years, a countless number of Jhumur songs, rhymes, poems, riddles and proverbs have been written on the Mahua tree. Chhotanagpur Plateau's very own religious place, the 'Jaher Than' has been developed mainly by sheltering the Sal and Mahua trees. The people of the Kherwal community do not perform puja by applying vermilion on any trees except the Mahua and Sal trees. Moreover, among the Kurmi community, the marriage remains incomplete if a fresh Mahua branch is not put on the so-called marriage roof or 'Chhadnataala' during a marriage ceremony. In particular, just as boys have to marry a mango tree before marriage, the custom of marrying a mahua tree before marriage for girls is still followed.

Mahua (*Madhuca longifolia*) is a native Indian plant belonging to the Sapotaceae family. The Sanskrit name of Mahua is 'Madhukam' or 'Madhuk'. Moreover, the tree is known by different names like 'Mole', 'Mahul', 'Madhuka', 'Mova', 'Mahubha', etc., depending on the place of occurrence. Mahua trees are found almost everywhere in India and can withstand drought admirably. The natural habitat of the Mahua tree is in the dry tropical and subtropical forests of the Gangetic plains of northern and eastern India, the whole of central India and the plateau region of western and southern India with an annual rainfall of 500 mm to 1500 mm and a temperature range of 2°C to 46°C. Mahua is very hardy and thrives well on rocky, gravelly red soils and also on saline and sodic soils. It can grow even in pockets of soil between crevices of barren rocks. However, for its better growth and productivity, well-drained deep loam soil is ideal. Even the trees can grow up to an altitude of 1200 m in the Himalayan foothills. Outside India, Mahua trees are growing in Bangladesh, Nepal, Sri Lanka and Myanmar.

Mahua is a medium to large-sized, fast-growing, dicotyledonous, deciduous tree, usually 10–16 m tall. The stem is covered with 1.3 cm thick greyish-brown bark. A milky liquid oozes out when the stem bark is injured. The leaves are stipulate, simple, and arranged in clusters at the tips of the branches (Figure 1). The leaf lamina is quite large, 10–25 cm long and 6–12 cm wide, elliptic and leathery. Leaf surfaces and leaf margins are smooth and have reticulate veins.



On the onset of spring, the mahua tree has bloomed, Photo: Dipanjan Ghosh



A close-up shot of a few fallen 'mahul' flowers Photo: Arunima Bhaumik



Mahua fruit is locally known as 'kachra'
Photo: Dinesh Valke

The name 'Butter Tree' is probably due to the thick ghee-like oil of the Mahua. A recent research paper, however, claims that Mahua seed oil contains a mildly toxic compound 'Mowin', which is harmful to the human body. However, the adverse effects of this compound can be easily avoided if the oil is extracted properly.

The flowers of the Mahua tree are called 'Mahul' in the local language. The flowering period is from February to April. At this time, the Mahua tree remains almost leafless. The flowers hang from the tips of the branches in small clusters (Figure 2) with long pedicels. The calyx is rust-coloured, 4-lobed, each with greyish-pink bracts. The base of the cream-coloured succulent petals (Figure 3) is ball-shaped and the tip is divided into 6-12 small lobes. The structure of Mahul flowers easily attracts attention as the style of the gynoecium extends far beyond the corolla tube. Mahul flowers are bisexual; stamens are 16 in number, ovary is syncarpous and the style is about 2.5 cm long. The Mahua trees bloom at night and all the flowers fall to the ground before dawn. Mahul flowers have a sweet smell. The intoxicating fragrance of the flowers can be found not only under the tree but also standing far away from the tree. However, not only humans, elephants and bears visit under the Mahua tree during the blooming season in search of juicy fragrant flowers.

Mahua fruit is called 'Kachra' in the local language. The fruit is a berry, oval in shape and almost looks like a betel nut. Fruit stalks are quite hardy. Fruits are green when unripe (Figure 4) and turn yellow when ripe. Each fruit contains a pair of seeds which are 3-5 cm long, oval and brown. Fruit peel and pulp are both edible. The pulp contains 16.9 per cent protein and 51.5 per cent oil. This natural oil has been proven in tests to be superior to mineral diesel.

Mahua tree has gained special recognition



Picking Mahua flowers and selling them in the local markets is the main source of earnings for the marginal people of Jangalmahal, Photo: Dipanjan Ghosh

as one of India's major cash crops of deciduous forests. The economic importance of various parts of the Mahua tree is immense, which keeps the rural economy strong. In early spring, when the Mahua tree flowers, many people both males and females, collect the fallen flowers from the ground (Figure 5). Later, many marginalized people make a living by drying those flowers and selling them in the markets. Dry Mahul flowers are lightly fried and mixed with fried rice or boiled tamarind seeds to make their dish 'Mahul Latha'. This recipe is highly nutritious and full of energy and can be kept for a long time. Moreover, dry Mahul flowers are powdered and mixed with flour to make a kind of bread, which is very tasty.

The juicy flowers of Mahua (Figure 6) have been used as the main ingredient in making alcohol or wine since ancient times. It is pertinent to note that the people of the Kherwal community have been skilled in making traditional country liquor from Mahul flowers for generations. Chinese traveller Hiuen Tsang noted the class discrimination in Indian drinks during his travels. Brahmins, Kshatriyas, Vaishyas and lower castes did not have the same drink of choice according to their social status. But among the lower caste people especially in the tribal society, liquor became indispensable at every level of life, society and culture. And in this case, Mahua had no other option but to get drunk.




The fresh as well as stale Mahua flowers are fermented to produce an alcoholic drink or country liquor, Photo: Dipanjan Ghosh

Raw fruits of Mahua are used in cooking. Many people also eat the sprouted green part of the seed as a vegetable. However, oil and oil cakes are mainly produced from the seeds. This thick ghee-like oil is used in the cooking and cosmetic industries. Even about a decade ago, kachra oil was the number one choice as an edible oil in villages. The tribal people of central India still use Mahua oil as a substitute for ghee. The name 'Butter Tree' is probably due to the thick ghee-like oil of the Mahua. A recent research paper, however, claims that Mahua seed oil contains a mildly toxic compound 'Mowin', which is harmful to the human body. However, the adverse effects of this compound can be easily avoided if the oil is extracted properly.

Many of us are little familiar with the benefits and healing powers of the different parts of the Mahua tree. The Mahua tree is mentioned in Charaka Samhita, an Ayurvedic treatise written in the third century BC. Some parts of the Mahua tree have properties that are used as a gastric carminative, as an expectorant, help to regulate body temperature and increase the secretion of breast milk in the mother's body. The oil extracted from Mahua fruit (Figure 7) and seeds cure arthritis, tonsillitis, chronic ulcers and stop swelling and bleeding gums. The bark of the Mahua tree is believed to cure diabetes. Moreover, the Mahul flower relieves constipation as well as relieves colds, bronchitis, hemorrhoids and eye infections.

Apart from the Gonds, most of the tribes of the Chhotanagpur plateau are blessed by the Mahua. Not only intoxicants, they prepare food by boiling, grinding or making juices from the fruits and various parts of this plant. Teeth are brushed with branches of the Mahua tree. Moreover, its wood is mainly used for fuel and furniture. The people of the Koa tribe decorate their pyres with the wood of the mahua tree. It is

their firm belief that without the fire of Mahua wood, the real death of the human body does not take place.

In tribal society, the New Year begins in the month of Chaitra. During this time the tribal festival is celebrated with great fanfare, where Mahul or Mahua flower is an essential ingredient. The mahua tree blooms full of flowers from February to April. After that on the onset of the rainy season, the 'Mahua Festival' is celebrated among tribal people. On the other hand, the Santhals observe Poila Magh as the first day of the beginning of the crop year. On that day they ploughed the land and started cultivation. After Dol Purnima, the second major festival 'Baha Parav' is celebrated in every Santhal village till the Chaitra month. The presence of Sal (*Shorea robusta*) and Palash (*Butea monosperma*) in the surroundings brings the message of the arrival of Baha Parav. As soon as the buds of Mahua flower emerge, preparations for the festival begin among the youths. Men go hunting in groups, girls decorate themselves with new flowers. The word 'Baha' in Santhali means 'Flower'. Santhal society begins to use the new flowers, fruits and leaves of plants through the Baha Parav. Munda or Ho tribes celebrate this festival as 'Sahrul'. But in one place, the entire tribal community is united! They all believe that Mahua stems, branches, flowers, fruits etc. are very sacred. Such role of a tree in tradition, culture and life is rare all over the world. 

Dipanjan Ghosh is a well-known popular science writer and science communicator. As an active science educator for the past thirty years, he is associated with the popularization of science and the extension of scientific temper among students and common people. Apart from that he is a member of the editorial board of an international science journal published from Kolkata for about fifteen years. Outside of work, he loves to travel and take photographs.

COMMON LIZARDS OF CENTRAL INDIA

■ Animesh Manna

The midday scorching heat of Central Indian forest, when most of the mammals and birds are looking for a shade, the landscape is conspicuous by the four common lizards of Central India

The midday scorching heat of Central Indian forest, when most of the mammals and birds are looking for a shade, the landscape is conspicuous by the four common lizards of Central India. These diurnal species are highly active especially the males, who display their best to show the rival and to attract the females at the same time. The most common is the:

Indian Garden Lizard (*Calotes versicolor*): Either on the tree branch or perched on any vantage point, the male will showcase flamboyance with blood red head. Whenever other male breach the territory line, first it shows-off gently with the bobbing of the head and if it's still approaches further, the fight can take place with very faint hiss... sound and biting on the face or on the belly, trying to knock off the rival. But it generally never goes brutal. On observation, the male changes its



colour sometimes. It turns pale brown to blood red in a few minutes from which it got its common name Blood Sucker. It feels like it is slowly sucking your blood while watching you and changing the colour. While attracting the female, males are very active throughout and constantly bobbing the whole body and chasing the female. Whenever it gets a suitable chance it will mount on it. Later female lay a clutch of eggs in a sandy or soft soil patch by digging a hole.

Peninsular Rock Agama (*Psammophilus blandfordanus*): They are mostly common in rocky outcrops. In summer, males turn dark black with bright orange-red head and the upper part of the body. Sometimes during a safari, the bright red male on the background of a black rock is mistaken by a flower. Same as Indian Garden Lizard, Rock Agamas also very territorial and chase away any rival males around. Females are much smaller with dull olive-brown small round head with faint reddish tinge.



Fan-throated Lizard (*Sitana* sp.): In Central India, this is a very distinct lizard in the breeding season. The males have a loose throat patch. It perches on a rock or any vantage point to flicker the loose yellowish-white fan like throat to rival males or to attract females. Like other subspecies of Fan-throated Lizard in different parts of the counter has vibrant blue gular skin. This subspecies is not very vibrant, and is identified by their diamond like structure at the back when not in display. Very faint and small violet mark on the nape is also an identification key in a close observation. Females are dull without the fan like skin on the throat.



Indian Chameleon (*Chamaeleo zeylanicus*): This does not belong from the above family (Agamidae). This is the only representative species in India from the family Chamaeleonidae. Although they are not as flamboyant as the other three species here. But their stealth is their key to their success of hunting. In summer they are active during the day time but it's hard to see them. Their colour blends so well with the surroundings that until and unless they move to an open area, it is almost invisible. When it gets threatened they change their body colour and make it very dark on the side from where it gets approached.

*We didn't add Monitor Lizard here. May be we need a separate space to dedicate for it. **JR**

CHUPI: WHERE THE SITAR RESONATES IN BIRDS' WINGS



■ Anjan Sarkar

Splish... it sounded softly twice... it was the last week of December... My boat emerged from the veil of fog. There was a slight ripple in the emerald green water of Chupi. The circles formed on the water were slowly spreading over. The Little cormorant received a circle by her bosom and then waded out with its velvet black wings. The water droplets from its feet were lost in the green water.

There was call of the spring in the mustard yellow banks of the lake... in the light and shadows... the Red crested pochards from Central Asia or Mongolia were flying over forming a clique. As soon as I came a little closer, they were framed on the background of the fog, in the sky. The Pied kingfisher was drying himself on the head of a dry branch floating in the water. A Purple moorhen was hiding its face



behind the water-hyacinth... seeing this, the Cotton teals burst into laughter. The Coots also accompanied them. The Stork billed kingfisher was scowling at their activities. While I was busy framing the Pintail, the Egret flapped its wings. The vermilion sun came out from behind a shirish tree. My boatman Saibul called me out, "Only photographs! Won't you take any food?" I had to take a break and both of us concentrated on our breakfast. Our boat floated on...

I am in Kasthashali Pakhiralaya, in the bank of Chupi lake at Purbasthali, East Bardhaman. The place is almost like a wetland. What is a wetland? Wikipedia says, a wetland is a semi-aquatic ecosystem whose groundcovers are flooded or saturated in water, either permanently or only seasonally. Wetlands form a transitional zone between water bodies and dry lands. The Ox Bow lake of Pakhiralaya covers an area of

approximately 3.5 sq. kms and encloses an islet with three villages. The Ox Bow lake formed from the river Ganges caresses past villages like Chupi and Kasthashali to become thousands of migratory birds. The crystal clear waters of the 9 km long channel of the Ox Bow lake and the surrounding farmlands and fruit orchards harboured more than 235 species of migratory as well as residential birds. The migratory winged beauties from Siberia Russia, Europe and many parts of the world makes this a hotspot for bird watchers. But this paradise remains unexplored to many visitors due to lack of proper guidance.



At present, there are about 40 boatmen in Chupi, who take people to watch birds in their hand-drawn country boats. In most cases, tourists depend on these boatmen as their guides. Though some of them have some knowledge about birds, mostly these people do not have





sufficient idea about the species, they are not aware of the main features of the common residential and migratory birds which are very important for bird watchers, bird photographers and normal tourists to spot the birds. It was almost an hour's journey and when I was returning after capturing the moment of the Osprey's fishing, the flock of Whistling Teals standing were thinking with surprise—"What's this! Why didn't he take our photos!" The Bronze winged Jacana with its long legs crossed the the water-hyacinths floating on the water. Far away, near the bank, the Open billed stork was looking for food. The Pheasant tailed Jacana was just like a puppet... When the boat turned, the magical-eyed Pratincole was looking so charming! When we were returning the rays of the sun had softened. We were watching the mischief of the River Lapwing... it was a golden hour... the little Grebe with its scowling eyes was gliding over the water... the Bran swallows were touching his head again and again... A flock of Black winged stilt left the water and spread their



wings in the sky, it seemed like a cadence! A Common kingfisher silhouetted against the setting sun. At the end of the day, in the magical soft vermilion light... like a resonance of sitar on raag Pilu... I kept the camera off and wished that may this vision of mine never end... When my car crossed the Purbasthali station and passing through Samudragad on the way to Kalyani Express way, some thoughts came to my mind—can't we plan to promote this Pakhiralaya of Chupi like Manglajori or Bharatpur! That's not impossible, but some things to be remember:

1) The part of Ganga with which the Ox Bow lake joins needs proper dressing so that silt cannot deposit and tide-water can enter or exit in a certain amount in the lake, which will enrich the aquatic life of the lake. And it will only be possible when the DMs of the two districts will





work jointly, which is necessary to keep this bird sanctuary alive. Otherwise, as the water level decreases, the number of birds will also decrease.

2) In different times, the abundance of water-hyacinth here becomes a hindrance to habitat maintenance. So the hyacinth should be cleaned from time to time, otherwise the birds will stop coming due to lack of habitat.

3) Jute is grown on banks of the lake. As jutes decomposed, the rotten wastes in the water can make a hindrance to the aquatic environment of the lake for the habitat of the birds. So point is also to be remembered.

4) Every boatman should be made aware of the habits and habitat of birds of this lake through proper training. Only then can they become real guides.

5) The authorities of the designated department should

also ensure that the small fish and other aquatic animals can live properly in the lake water. If there is food, the birds will definitely come.

6) Capture of birds must be prohibited here.

7) In winter, when the migratory birds come here, any car or picnic party should not be allowed within at least a kilometer distance from the lake, and loud speakers should not be played. In this regard, local clubs and gram panchayat should take active roles.

8) It is true that the DM, BDO, Panchayat and local club members of Purbasthali area have worked a lot for the development of this area. But more initiative should be taken to develop awareness to keep this bird sanctuary alive.

Only then the resonance of sitar in the wings of Chupi-birds will last forever in our hearts. **JR**



JUNGLE RHYTHMS WILDLIFE AWARDS 2024



Jungle Rhythms Awards 2024 was organized in a heritage school within the Tadoba-Andhari Tiger Reserve landscape - Zilla Parishad School Mohurli. The celebration was kickstarted with a "Nature" Art Competition for the in-house students, followed by Awards Ceremony and saplings plantation and finally ended with a Wildlife Documentary (The Land of the Tiger) and high tea.

The event was attended by Moharli Gram Panchayat Sarpanch Smt. Sunita Katkar, former Sarpanch Sanjay Monde, former Deputy Sarpanch Raju Dhawle,

Jungle Rhythms Green School Award 2024



Ramkrishna Sakarkar (Police Patil Moharli), Vilas Soyam (Field Assistant) Moharli (Core) Tadoba-Andhari Tiger Reserve, Dr. Ajay Gupta, Gypsy Welfare Society President & Naturalist Sanjay Mankar, Shahanaz Baig (Tadoba's first female guide), Birdman of Tadoba Sumedhbodhi Waghmare, Naturalist cum safari driver Sanjay Petkule, school teachers and students of the Zilla Parishad School.

Online Art Competition Award winner- Sanika Tatghare was also present to receive the Award. Nidhi Sanjay Mankar co- award winner was not available and Sanjay Mankar ji received the award on behalf of her.
#JungleRhythms #junglerhythmsawards #junglerhythmsevents .

Jungle Rhythms Green School Award 2024: Jungle Rhythms Green School Award 2024 has been bestowed on our heritage school of Tadoba-Andhari Tiger Reserve landscape- Mohurli Zilla Parishad School for their adoption of green agenda and continuous initiatives towards making the students aware of environment and small steps to maintain our love for nature and a ecosensitive lifestyle.
Under the strong leadership of honourable principal

sir and teachers - Mohurli Zilla Parishad School have attained high levels in nature education and inculcating eco-friendly lifestyle.
Jungle Rhythms hopes that many other schools will follow Mohurli Zilla Parishad School and help make better citizens with green minds.
Jungle Rhythms since last 15years have been connecting People to Forests and Wildlife.




Jungle Rhythms is privileged to award the prestigious Jungle Rhythms Green Teacher Award 2024 to our honourable and respected Sri. Vitthal Tadghare.

Vitthal Tadghare has been instrumental in spreading awareness on environmental protection and restoration in forest villages of Maharashtra. He has been posted at the epicenter of tiger habitat- Tadoba-Andhari Tiger Reserve, Mohurli for over 15years. As a primary teacher at the Zilla Parishad Upper Primary School he has spread the key messages of a ecosensitive lifestyle and enrich local biodiversity in simple practical ways to the village kids.

His leadership and mentoring skills have helped the green agenda by involving students into initiatives of BNHS, ACF Foundation, Satpuda Foundation etc.

Vitthal Tatghare is now working at the Zilla Parishad Upper Primary School at Sumthana and is continuing his great work with the kids of the local communities, actively working to help shape our green minds and future.

Jungle Rhythms wishes Shri. Vitthal Tadghare- a very long journey of success happiness and a great life.
#JungleRhythms #JungleRhythmsEvents
#JungleRhythmsAwards. 

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JUNGLE RHYTHMS SERVICE EXCELLENCE AWARDS 2024



Jungle Rhythms Biodiversity Protection and Sustainability Award 2024 - Forest Department (Tadoba-Andhari Tiger Reserve) : It was a historic day for Jungle Rhythms where awards were presented to great servicemen and organisations from the wild in the heart of tiger country - Tadoba-Andhari Tiger Reserve. Tadoba-Andhari Tiger Reserve has been one of the most successful parks where tiger habitats have been protected, extended and conserved. Tadoba-Andhari Tiger Reserve has been able to actively perform rainwater harvesting,

grassland creations, species conservation, ecotourism initiatives and local communities connects. On behalf of the Forest Department - Vilas Soyam Field Assistant Moharli (Core), Tadoba-Andhari Tiger Reserve was kind enough to grace our award ceremony and accept our prestigious award. Jungle Rhythms jointly with Shri. Vilas Soyam planted sampling for a strong commitment towards green initiatives.



Jungle Rhythms Service Excellence Award (Nature Educator) 2024: "Birdman" Naturalist - Sumedhbodhi Wagmare from Tadoba-Andhari Tiger Reserve has been bestowed on our famous, talented and award winning. Sumedhbodhi Wagmare has the unique talent of mimicry of over 200 birds and mammals calls of central India. He uses his special talent to provide nature education and help in

conservation awareness. He performs various street plays in various villages and help inspire the local communities to convert bird lovers and protectors. He spreads the key messages of contribution of birds as seed dispersal agents and rodent regulators and help in the green initiatives. Jungle Rhythms wishes Sumedhbodhi Wagmare a very long journey of success happiness and a great life.



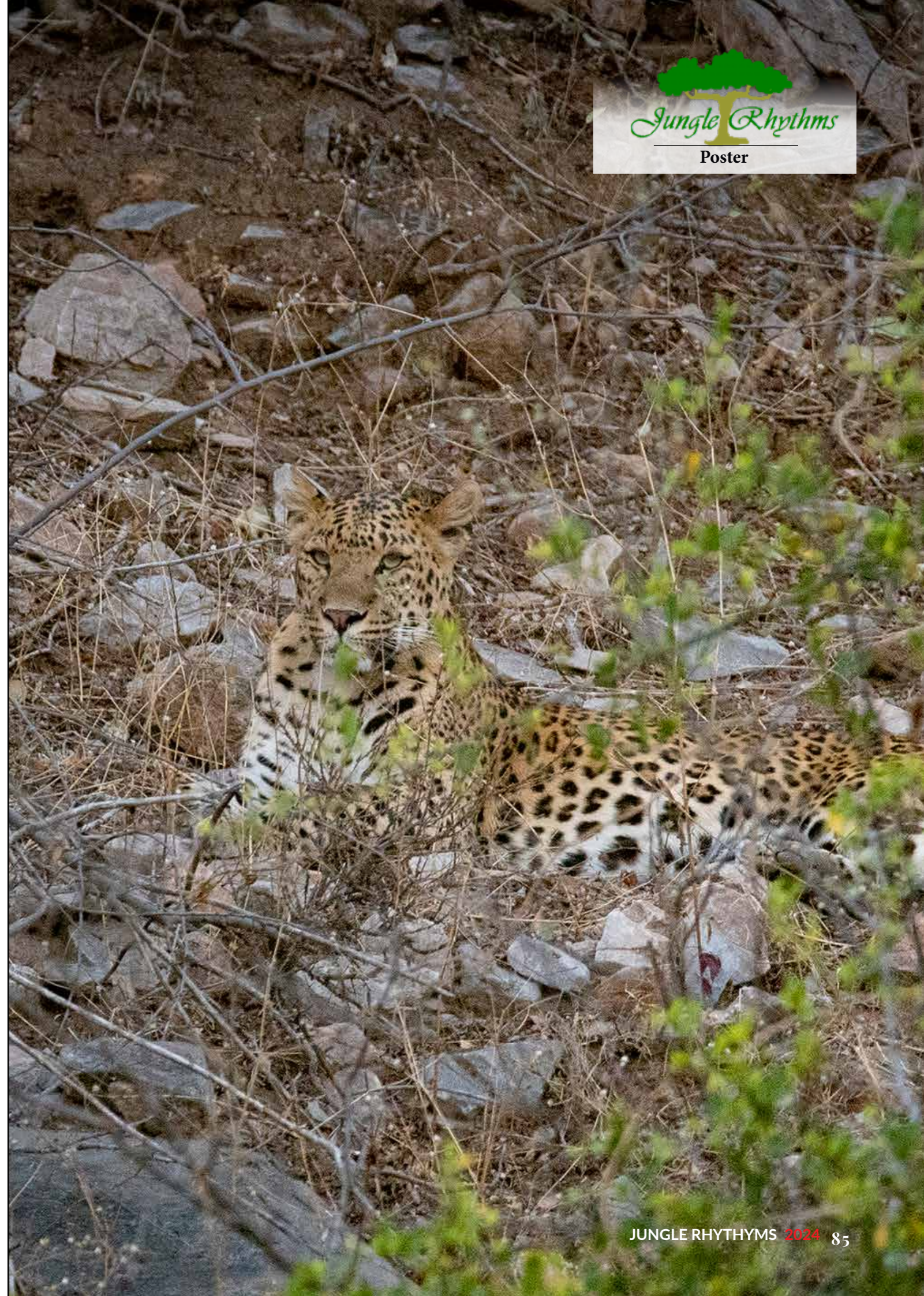
Jungle Rhythms Service Excellence Award (Naturalist) 2024: It was a historic day for Jungle Rhythms where awards were presented to great servicemen from the wild in the heart of tiger country Tadoba-Andhari Tiger Reserve.

Jungle Rhythms Service Excellence Award (Naturalist) 2024 has been bestowed on our "Man of the Land" Sanjay Mankar and Sanjay Petkule- both talented trackers and one of the oldest Naturalist of Mohurli Tadoba.

The Mankar family has been working with the forest department for many years (second generation now) and ensuring sustainable ecotourism is implemented from the core. Their dedication and sacrifices have changed the face of Tadoba in many ways.

Jungle Rhythms wishes both Sanjay Mankar and Sanjay Petkule a very long journey of success happiness and a great life.

#JungleRhythms #JungleRhythmsAwards
##JungleRhythmsEvents





Jungle Rhythms is fully dedicated to nurture our future minds to think green. St Francis High School has been working closely with Jungle Rhythms to have a focused agenda to continue on their green obligation as part of their curriculum and education. They are our esteemed Green School partner.

We all celebrated Global Tiger Day 2024 (our third year event in this school) along with the children of Class 6 to Class 8 where they actively engaged in various activities as Wild Art Competition, Tiger Day Essay Competition, interactive Conservation Talkshow and Van Mahotsav Sapling Planting.

Our event was opened with an informative Tiger Day speech by the head girl and boy of Class 10 followed by an inspiring and engaging speech by the honourable principal mam - Sri-devi Narayanan.

The Art and the Essay competition was organized in the school hall followed by an interactive tiger conservation talkshow by our junior Diya Chakraborty and formally concluded by co-founder and editor - Dr. Nirmalya Chakraborty. Prize distribution was at the end of the event post screening of the Jungle Rhythms production wildlife documentary - "The Land of the Tiger Ep2".

As a mark of Van Mahotsav 2024 - celebrated every July, Jungle Rhythms also planted saplings in the school's little garden.

Key events:

1. Wild Art Competition
 2. Tiger Day Essay Competition
 3. Conservation Talkshow
 4. Wildlife Film show
 5. Van Mahotsav Sapling Planting
- Save the Tigers- The cubs roared loud!





Jungle Rhythms Global Tiger Day Celebrations 2024 Results

Hearty Congratulations to all our winners. A big thank you to all our dear participants. You all were splendid in your work.

Global Tiger Day Online Competitions 2024

Powered by **Indian Mist**

JR Online Competitions - Art (Sunna village - Tippeswar Wildlife Sanctuary)

- 1st: Sujal Datta Sirsagar
- 2nd: Savariya Gajanan Aggilwar
- 3rd: Sonam Suresh Medpatlawar

JR Online Competitions - Art (Chandrapur District - TATR)

- 1st: Sanika V Tadghare
- 2nd: Shreyas Y Padole
- 3rd: Swara Mahadeo Kaler

JR Online Global Competitions - Art

- 1st: Shikhar Kashyap
- 2nd: Priyashree Bordoloi
- 3rd: Debolina Neye
- Special Award: Shreyank Bhowmick

JR Online Global Competitions - Essay

- 1st: Satyaki Majumdar
- 2nd: Lakshit Kakkar
- 3rd: Sayan Maity

The Jungle Rhythms Awards are being powered by Indian Mist



78th Independence Day celebration with Finland Indo Global School - Pune

A nature conservation talkshow was organized by the school where Jungle Rhythms provided awareness on India's rich biodiversity through special footage of natural history directly from our own pristine habitats of India.

Our junior - Diya Chakraborty expressed her feelings on how Independence Day - Feel of Freedom - Mother Nature are all intertwined. She told in very simple language how nature bounces back and heals herself and how we must live ecosensitively and protect all natural beauty for our future generations.

Founder and Editor Dr Nirmalya Chakraborty then showed how beautiful Incredible India is through his wild frames, followed by the wildlife documentary - The Land of the Tiger Ep2

The session was interactive and was very participative by both students and their parents.

Jungle Rhythms presented Dr. Nirmalya Chakraborty Black Leopard from Pench as a mark of continued green relationship.



Jungle Rhythms Global Tiger Day Awards 2024 Tippeswar Wildlife Sanctuary





Jungle Rhythms spent the eve of Global Tiger Day along with the children of Zilla Parishad School at Sunna village just outside the Tippi's Wildlife Sanctuary. The children with full passion painted the

life of tiger as they feel about their most special neighbor they live so close by.

Jungle Rhythms yesterday awarded the students with the most provoking Art and inspired them to stay green.

Jungle Rhythms paid respect to honourable principal sir - Shri. Vijay Ganavir ji with a token of appreciation.

Special thanks to Sahil Sheikh - our Jungle Rhythms field member for making this special event possible. JR



