

ZOO'S PRINT

Communicating Science for Conservation

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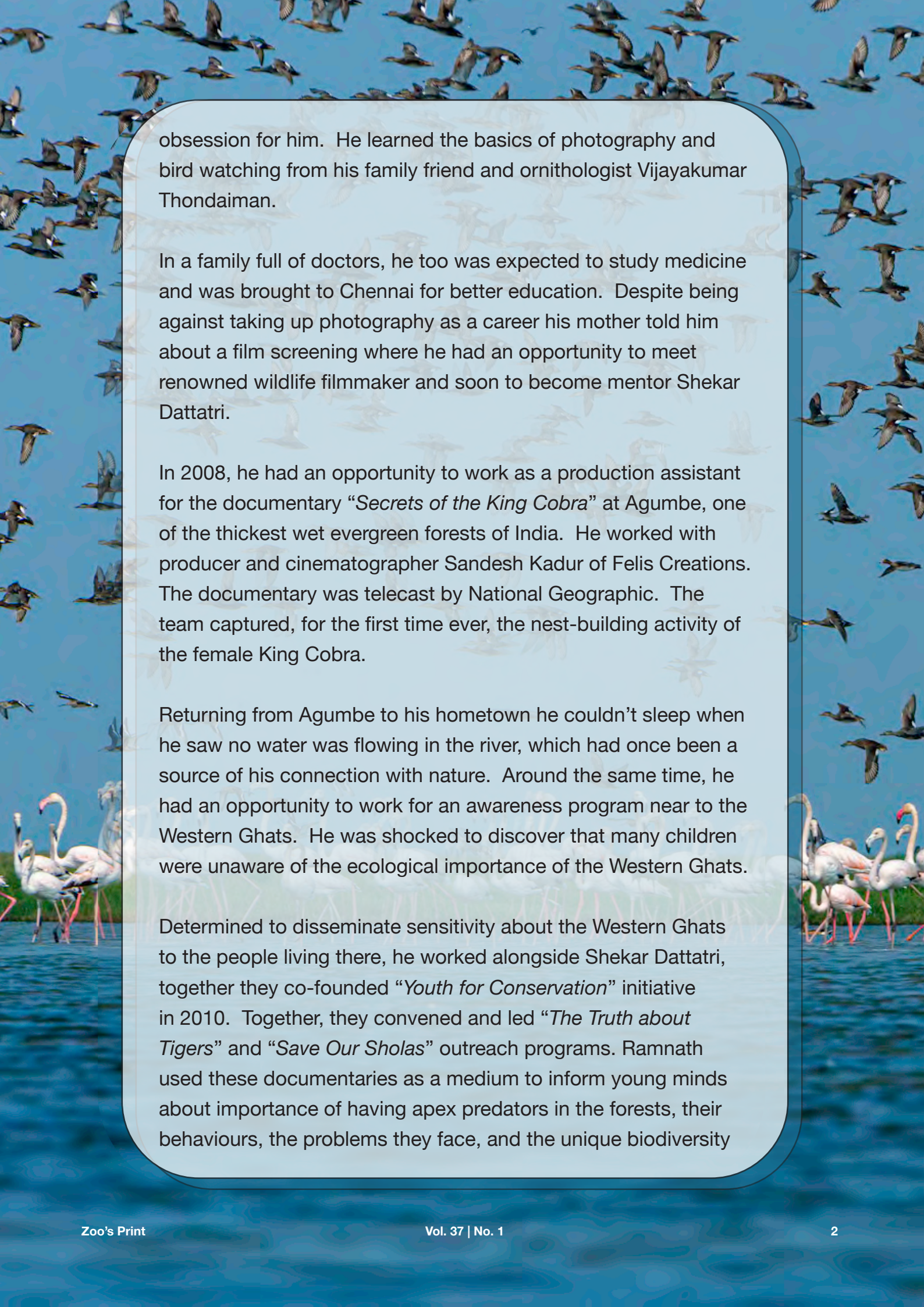
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You Can be a conservationist too...

Ramnath was enamoured by nature from his childhood. Born and brought up in Pudukottai, Tamil Nadu, his fascination with nature only grew with time. His home was surrounded by scrub jungle and lots of ponds. He spent most of his time after school hours with birds, lizards, monkeys, and collecting frog eggs and putting them in a tub, waiting for them to hatch into tadpoles. When he was thirteen his father gifted him a camera and capturing nature and its beauty became an

At Moyar Gorge_Mudumalai.



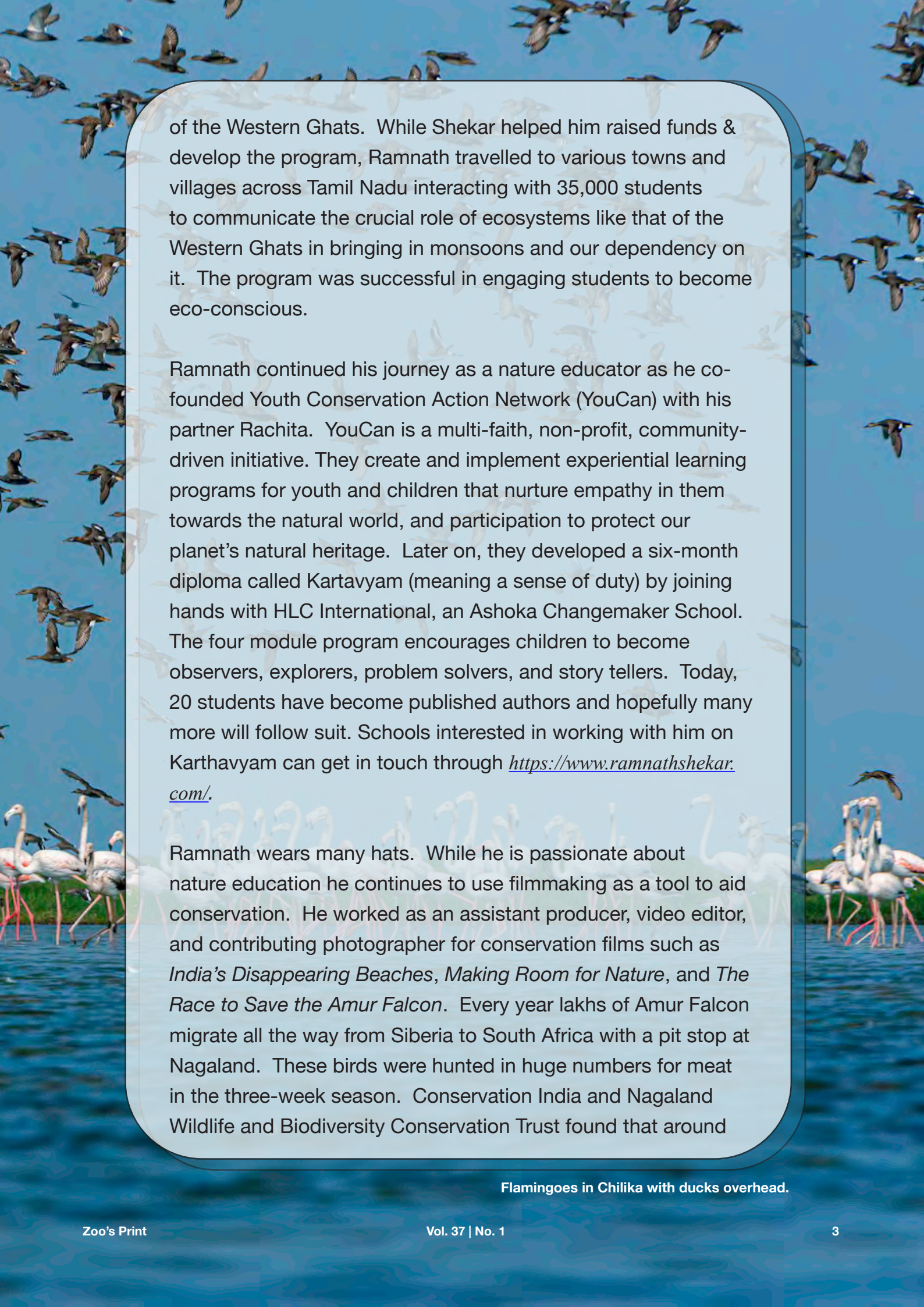
obsession for him. He learned the basics of photography and bird watching from his family friend and ornithologist Vijayakumar Thondaiman.

In a family full of doctors, he too was expected to study medicine and was brought to Chennai for better education. Despite being against taking up photography as a career his mother told him about a film screening where he had an opportunity to meet renowned wildlife filmmaker and soon to become mentor Shekar Dattatri.

In 2008, he had an opportunity to work as a production assistant for the documentary “*Secrets of the King Cobra*” at Agumbe, one of the thickest wet evergreen forests of India. He worked with producer and cinematographer Sandesh Kadur of Felis Creations. The documentary was telecast by National Geographic. The team captured, for the first time ever, the nest-building activity of the female King Cobra.

Returning from Agumbe to his hometown he couldn't sleep when he saw no water was flowing in the river, which had once been a source of his connection with nature. Around the same time, he had an opportunity to work for an awareness program near to the Western Ghats. He was shocked to discover that many children were unaware of the ecological importance of the Western Ghats.

Determined to disseminate sensitivity about the Western Ghats to the people living there, he worked alongside Shekar Dattatri, together they co-founded “*Youth for Conservation*” initiative in 2010. Together, they convened and led “*The Truth about Tigers*” and “*Save Our Sholas*” outreach programs. Ramnath used these documentaries as a medium to inform young minds about importance of having apex predators in the forests, their behaviours, the problems they face, and the unique biodiversity



of the Western Ghats. While Shekar helped him raised funds & develop the program, Ramnath travelled to various towns and villages across Tamil Nadu interacting with 35,000 students to communicate the crucial role of ecosystems like that of the Western Ghats in bringing in monsoons and our dependency on it. The program was successful in engaging students to become eco-conscious.

Ramnath continued his journey as a nature educator as he co-founded Youth Conservation Action Network (YouCan) with his partner Rachita. YouCan is a multi-faith, non-profit, community-driven initiative. They create and implement experiential learning programs for youth and children that nurture empathy in them towards the natural world, and participation to protect our planet's natural heritage. Later on, they developed a six-month diploma called Kartavyam (meaning a sense of duty) by joining hands with HLC International, an Ashoka Changemaker School. The four module program encourages children to become observers, explorers, problem solvers, and story tellers. Today, 20 students have become published authors and hopefully many more will follow suit. Schools interested in working with him on Karthavyam can get in touch through <https://www.ramnathshekar.com/>.

Ramnath wears many hats. While he is passionate about nature education he continues to use filmmaking as a tool to aid conservation. He worked as an assistant producer, video editor, and contributing photographer for conservation films such as *India's Disappearing Beaches*, *Making Room for Nature*, and *The Race to Save the Amur Falcon*. Every year lakhs of Amur Falcon migrate all the way from Siberia to South Africa with a pit stop at Nagaland. These birds were hunted in huge numbers for meat in the three-week season. Conservation India and Nagaland Wildlife and Biodiversity Conservation Trust found that around

Flamingoes in Chilika with ducks overhead.

1,50,000 were being killed during this time. Conservationists like Bano Haralu, a native from Nagaland and others alike put in colossal efforts to bring the community together and put an end to this massacre. Today the same people who hunted the bird of prey are working for their conservation. Documentaries such as *The Race to Save the Amur Falcon* bring positive news on the conservation front and keep us conservationists motivated to work for wildlife.

In 2017 Ramnath was selected for The Asia-Pacific Leadership Program Fellowship (APLP) which seeks outstanding individuals from all walks of life to participate in an innovative leadership development program at the East-West Center in Hawaii. The program through place-based, experiential and transformative learning aims to create leaders that the world needs. As part of the program Ramnath travelled to Asia where he made short videos for different organizations like East-West Center, Hawaii Nature Center, and The Green School in Bali.

We must create space for people to understand that nature can take care of us if we take care of nature. Ramnath through his life's work has directed young and old to truly understand nature, protect nature, and lead sustainable lives through small steps. A nature educator, trained filmmaker, and passionate conservationist, Ramnath continues to work tirelessly to create an eco-conscious future.



Nambi teaching about plants.



Rohit Varma taking children on a field visit to a museum.



Nisha Bhakat conducting a session on birds.



From the friends of the Amur Falcon education program.



Children observing a session.



Dragon fly in a Shola forest.

C.V. Nishanth¹ & Shweta Madgulkar²

¹ Zoo Outreach Organization

² RHATC Fellow, 2021–22

Zoo Outreach Organization
Coimbatore, TN, India.

We fellows at RHATC were all curious to know who is Neethi Mahesh and about her work in river ecosystem. The journey in wildlife conservation is more fascinating when you can follow your passion. Neethi Mahesh is one such person who was fascinated by rivers and followed her passion to conserve the habitat. Her wildlife journey started with tracking a King Cobra from Agumbe and by mapping all the headwaters of Sita Nadi. For many a wildlife conservationist, one of the favourite places would be Agumbe, and so is ours.

The radio telemetry work at ARRS (Agumbe Rainforest Research Station) on King Cobra led an opportunity to track a male, named M2 by exploring the evergreen forest inside a protected area where she first got interested in freshwater ecosystem. The streams and waterfalls in the habitat fascinated her to consider freshwater ecosystem in the long-term to understand and study the river system in future.

Neethi had an opportunity to study streams and river ecology where the project focused on mapping the headwaters of Sita Nadi. During the monsoon she looked at the small fishes, the flux of migratory fishes from the



GUARDING THE RIVER CAUVERY IN COORG: NEETHI'S LOVE FOR STREAMS AND PASSION TO SAVE RIPARIAN HABITAT

hill stream without knowing their taxonomy. Migration of fishes caught her attention and she wanted to know more about large fishes found downstream which migrated from the upstream of the river. Her first schooling of migration of mahseer was by the tribals from that region. Mahseer are good indicators of the healthy river ecosystem. Since this was inside the protected area the fishes are safe but as the stream flows down where there are destructive fishing practices and various threats such as dynamite fishing, poison fishing, pollution, and others.

The restoration, conservation, collaboration, and awareness of riparian habitats:

The conservation effort to protect the riparian habitats comes with a lot of challenges as the rivers are being highly polluted and there is less effort to save such habitats. The use of native flora is crucial for restoration of riverine habitats. Involving local communities matters in conserving the habitat in future. Neethi is working with the local Jenu Kuruba (honey-collector) tribals and their knowledge on local native species is tremendous in identifying indigenous riparian trees which is also well documented. The tribals help in restoring the riparian flora of the Cauvery River in Dubare Reserve Forest, Kodagu District, Karnataka.



more happy moment to cherish as it was our first team assignment from first batch of RHATC which had reached one of the main stakeholders which is the forest department which gives us hope in conservation and importance of science communication. We would like to thank Dr. Sanjay Molur and Dr. Rajeev Raghavan for all their support on the mahseer article.

The assessment on riparian habitat was carried out in the same region which involved conservation efforts in the field to collect seeds. The collected seeds are then stored in seed bank and later used in nursery through which she supplies saplings to the forest department and citizens groups for plantation drives. Neethi is presently working hard to save the riparian habitat of river Cauvery along with other stakeholders which is important in conservation.

In this new era of technology, Neethi has developed a River Watch app to monitor water quality along the river Cauvery. This work is ongoing in collaboration with government schools through training workshops for teachers and students on the use of water quality monitoring kits. The work on education and awareness to local school children will help install love to save the streams and her unwavering work on

bridging the knowledge gap with local communities and other stakeholders is amazing. A field guide of riparian flora and restoration methods has been published to aid plantation activities in the area.

Neethi being from garden and electronic city of India, Bengaluru, is passionate to save the king of the waters and her work on spatial ecology of Mahseer which is a pilot project will provide a baseline data for others to do more research. We Fellows were fascinated to know about her work on riparian habitat. We were all happy she used the Zoo's Print November edition cover page in her presentation, which is about Mahseer.

She also mentioned that the article had reached the DCF of Cauvery for discussing on hybridization of Mahseer, one

Ashritha Anoop
 RHATC Fellow, 2021–22,
 Zoo Outreach Organization,
 Coimbatore, TN, India.





The journey of a multitasking man and his ongoing contribution to conservation

Along with my RHATC Fellow colleagues, I had the pleasure of interacting with a man who wears multiple hats. H. Byju, the section editor of the Journal of Threatened Taxa, executive committee member of Wildlife Information Liaison Development, a business man, and a conservationist. This is his story and how he inspired us all.

After completing his masters in zoology from American College, Madurai, H. Byju worked in the Ministry of Home Affairs. After three years of hard work, he decided to start his own business and became quite successful at it. After

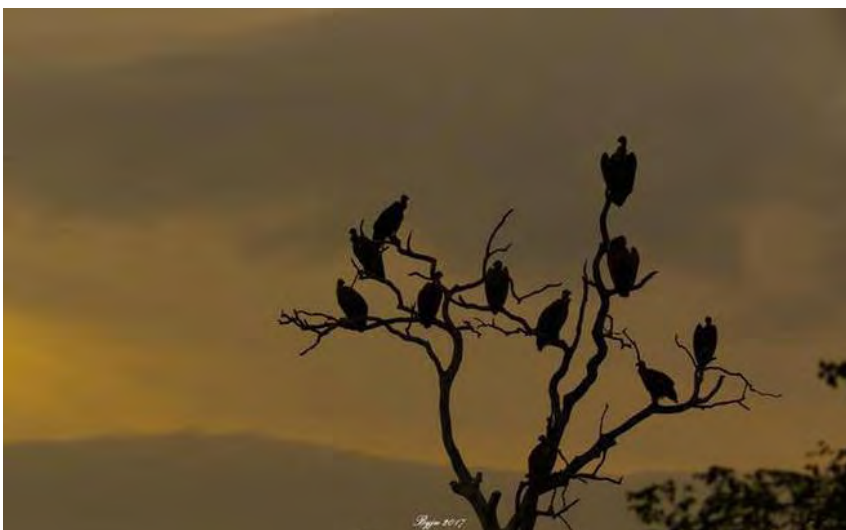
establishing his company, he came back to his passion and love for wildlife. And he started birding.

Taking baby steps, he started with bird photography and also started volunteering with the forest department. On one such birding trip to the Western Ghats, he saw a mother macaque die while trying to take the food from travellers on the road. This moved him to come up with an idea to travel all across the country from the Western Ghats to the Himalaya educating people and making them aware about how they were harming animals by offering them food and also to study road kills. He along with three of his friends made his idea come true, and named this excursion as PATH in 2016. Their journey covered a distance of 23,000 km across 20 states, within 46 days. Not only this, they carried out their awareness



program in 73 national parks and reserves and 80 colleges across the journey. This was the first trip he planned and also looked for funding all by his own and managed to raise Rs. 3.5 lakhs from Sanctuary Asia and WWF. The stay and food in most of the places was organised by his Facebook friends, most of whom he had never met earlier. As Byju stated, “Just ask your questions to people, tell them your plans. You have to get out of your comfort zone”, a quote that seems to have helped him.

Amazingly, none of the people he travelled with besides himself knew Hindi. One of the biggest lessons he learnt during the trip was not to trust Google maps blindly, inferred after going round and round across the same place a number of times. The four met forest department officials all across the 20 states, and also set up sign boards to make people aware about the extent of road kills in an effort to reduce the impact on wildlife. Understanding that the greatest risk was from heavy vehicles, they carried out most of their awareness programs at dhabas for truck drivers and told them what to do and what not. Then came a dark night to this trip, counting 120 road kills in six hours across the road from Jaisalmer to Kutch in Gujarat. The RHATC Fellows were shocked and dismayed to hear such a high number of road kills. He followed up with how they came up with solutions



that they then guided the forest department to take up solutions such as canopy bridges, sign boards, speed breakers, road engineering, education, and enforcement.

On this trip he saw Himalayan Griffon Vultures in Manali, Himachal Pradesh, and the birder in him got intrigued about vultures and back home he went for raptor surveys along with other birds in Kerala and Tamil Nadu. During one such survey, he got a chance to explore vultures with shore birds in Gulf of Munnar through BNHS. An interesting fact that he shared with the Fellows was that vultures have a very acidic stomach which helps them to digest carcass. Also, we came to know about the four species of vultures found in the Moyar Valley, Tamil Nadu, that he saw from Kodanad view point. His findings from the camera traps revealed some startling behaviour on how 60–70 vultures can feed on a dead elephant in a day. He also found that the vultures in this area nest usually on *Terminalia arjuna* and said that the nesting pattern needs changed based

on livestock patterns. Also, an amazing fact that the Fellows came to know from him is that vulture poop is also very acidic and the leaves of the tree sheds from the poop.

And then came the sad story, that we conservationists come across every day, the threats. Diclofenac, that is given to cattle as a painkiller, biomagnifies down the line, affecting the vulture population, when fed on it. But seldom do we get to see happy stories, and here it is driven by emotions. The Toda tribes believe vultures to be their forefathers and worship them and have a temple for them. They feed the vultures and have the food only after the vultures have them. Just like other stories we hear, this is one of a kind, where superstitions and culture saves wildlife. Byju had one more skill that he pulled out of his hat – as a writer. He has a major contribution, in a book called Birds of Tamil Nadu (Tamil version), published by the Tamil Nadu Forest Department (TNFD). He is the author of 'Valley of Hope' a book on vultures and the RHATC Fellows were lucky enough to attend the

most recent launch of his book entitled 'Matriarch'.

Just like a true leader, Byju ended his talk by explaining to us the importance of honing our skills in leadership and handling multitasking. He gave us the example of flamingos, and how they always move in flocks and everyone is as equal as the other. This explains how leadership is all about equality. He also used the analogy of how mothers multitask, how they keep track of everything and how that deeply influenced him. Putting that in his own life, he is today a successful businessman and conservationist. He asked us to incorporate the same in our lives. He gave us insights on working with species and conservation as a whole. He gave all the 10 of the Fellows his books. He has been a true inspiration for all of us and I guess just like me all the other Fellows are waiting for an opportunity to work under his guidance.



Arpan Joshi, RHATC Fellow, 2021–22, Zoo Outreach Organization, Coimbatore, TN



Abhishek and Anna Magnolia Mist

A view from Magnolia
Mist Cottage.

Abhishek and Anna are the owners of a beautiful plantation and homestead located in Galibeedu, Coorg known as Magnolia Mist. It is a certified organic farm which covers 25 acres of land with secondary tropical evergreen forest and vast coffee plantations.

The land is very rich in biodiversity with reports of almost 50 different species of epiphytes and approximately 70 different species of Orchids. Besides its floral biodiversity, the place also houses 79 different species of butterflies, Asian Palm Civet *Paradoxurus hermaphroditus*, Brown Fish Owl *Ketupa zeylonensis*, Spiny-backed Tree Mouse *Platacanthomys lasiurus*, Malabar Slender Loris *Loris lydekkerianus malabaricus*, and Indian Crested Porcupine *Hystrix indica*.

Abhishek was born and raised in Bangalore. He is a wildlife



enthusiast/ photographer and has a degree in zoology. He has also worked with various nature conservation NGOs and botanical sanctuaries like Gurukula Botanical Sanctuary where he worked on orchids for a project and then got fascinated by them.



A hut inside Magnolia Mist.

Now he conserves varieties of orchids in his estate, Magnolia Mist in Coorg, Karnataka including bulbophyllums and leafless orchids. He also has a small coffee processing plant set up there, where he produces organic coffee powder using slow roast.



Abhishek briefing the RHATC team on the biodiversity found in Magnolia Mist.

He also produces various other organic farm products like green tea, black tea, kachampulli liquid, kachampulli dry fruit, black pepper, red rice, and costus tea. One wonderful product which works as a substitute for maida is raw banana chips powder which is produced by sun drying the sliced



Sun dried Banana chips.

Abhishek, Anna and Aria

raw bananas and then grinding it. It is rich in fibre and is much healthier and can be used for making rotis and cakes. Bee keeping is also practiced.

Abhishek and Anna became friends when they were in school (Jiddu Krishnamurti School). They are now married and have a 2-year old daughter named Aria. Anna did her master's in child psychology and had worked with various communities and schools like Azim Premji University for helping people with disabilities. After 8–10 years of thorough searching for a suitable place to live they found a land in Galibeedu and bought it in partnership with four other people, which is now

known as Magnolia Mist. They cultivate Coffee, Tea, Rice, Cardamom, Pepper, and vegetables in the estate. They completely follow a self sustaining lifestyle, although they have to buy some vegetables during wet season because of the inability to grow them due to heavy rains.

Abhishek and Anna strongly believe in conserving and protecting the wildlife and biodiversity around them and don't overweigh profits or money against it. They are truly inspiring!

Nilesh Murmu, RHATC Fellow, 2021–22,
 Zoo Outreach Organization, Coimbatore, TN, India.



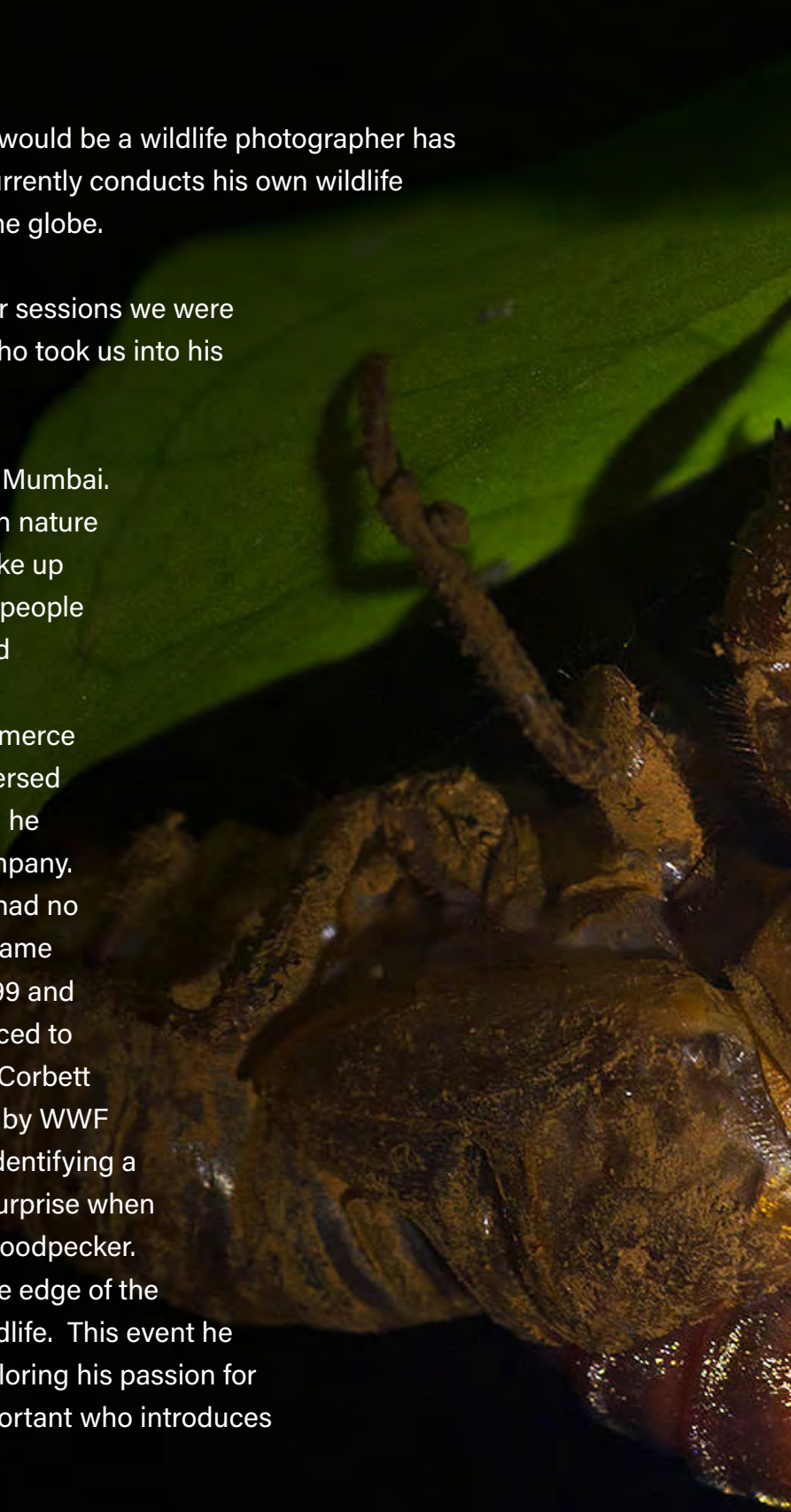
The Robin Hood of Wildlife Photography

An IT job holder who never thought he would be a wildlife photographer has won multiple awards in this field and currently conducts his own wildlife photography tours and travels across the globe.

As a part of RHATC's Follow The Leader sessions we were privileged to interact with Sachin Rai who took us into his journey of wildlife photography.

Sachin Rai was born and brought up in Mumbai. Growing up, he was always interested in nature and wildlife but had no choice but to take up commerce after school like most of the people back then. Right after his 12th he started teaching computer courses as he loved teaching and did his Bachelor's in Commerce as a distance course. As he was well versed with computers and photoshop by then he immediately got into Dotcom, an IT company. He never had much of a social life and had no clue where to spend his earnings. He came across a tour conducted by WWF in 1999 and enrolled himself into it. He was introduced to wildlife by Kedar Gore – director of the Corbett Foundation, when he attended the tour by WWF to the Sundarbans. Back then, he felt identifying a Vulture was difficult and was in sheer surprise when he heard people identifying a Pygmy Woodpecker. Throughout the tour he was glued to the edge of the boat with excitement to learn about wildlife. This event he reckons was the opening point into exploring his passion for wildlife. He quotes, "it is extremely important who introduces you to wildlife".

Since then, he started spending his time and money for wildlife tours and got an SLR with a film roll camera by his second trip. He recalled how hard it was using those cameras because of limited shots in a reel and unable to view the photo until developed in the dark room unlike the cameras we have now which have the magical button to delete pictures we do not need and it costs nothing to do it. While working as a web designer at Dotcom he followed his passion for wildlife photography simultaneously and got to travel to different parts of the country. He started off with





the birds then got into mammals, reptiles, and then frogs and it goes on. He was perplexed at the fact that not much work had been done on frogs and that there were no proper reference pictures for frogs back then.

Though he loved to be a web designer and enjoyed his time in IT he wanted to pursue wildlife as a full-time career. He picked up photography very seriously for the documentation purpose and never considers himself to be a professional photographer because he does not sell his photographs. Realizing the love he has towards teaching, he wanted to connect it to wildlife to make a living. His career growth in wildlife photography happened in 2007 when he won the first and second prizes in Sanctuary Asia which got him a lot of fame and people started approaching him for his photography tours. Taking that as a good opportunity he completely switched his career to wildlife photography from being a web designer.

For the last 15 years he has been conducting wildlife photography tours across the globe and he also promotes the brands he is associated with on his Instagram handle. He finds travelling to multiple places for his work very fascinating. During the photography tours he sensitizes the clients about the wildlife and the need for conservation.

His awareness sessions got many of his clients to raise funds for NGOs working for wildlife conservation.

In an hour Sachin made us travel to some of the most amazing places across the world which are close to his heart.

Starting from India where he screened his photographs of

- Malabar Pied Hornbills locking beaks which got him the second prize in Sanctuary Asia in 2007. Until then the behavior of locking beaks in Malabar Pied Hornbills wasn't seen.
- Ward's Trogon – Phantom of the forest, from Arunachal Pradesh which got him first



prize making him shift the career.

- Bengal Tiger stalking its prey.
- Desert Fox in ravine lands from Rajasthan which are sadly considered as wastelands and are being converted by the government.
- Male Rat Snakes combating for a mate in Kabini which was an action-oriented picture.

- Bengal Tigers and Rhinos in the same grassland in Kaziranga, and
- Tigers in the mating ritual in Ranthambore in a palace which was used to hunt the Tigers years ago but now is taken over by Tigers for their mating.



- *Raorchestes jayarami* – Jayaram Bush Frog, which is the only species named after a wildlife photographer.
- Wrinkled frog eggs in Amboli.
- Cicada coming out of its molt.
- Stump-tailed Macaque from Assam.
- Asian Elephant from Jim Corbett.

He always looked up to Nick Nichols – an American wildlife photographer, as an inspiration. He added, the beauty of photography is that no one can replicate the pictures and photography is learned through experience. He never restricted himself to

any species and photographed everything under the Sun. He talks to his clients about wildlife through storytelling which has a greater impact on them.

From the photographs of India, he then moved to Kenya and showed us,

- African Elephants while speaking about the importance of the landscape.
- Black Rhinos from Nakuru. There are White and Black Rhinos in that landscape, he shared, funny how both of these species are actually grey in colour but they got those names because the White Rhinos actually

- Wildebeests jumping in water.
- Vultures waiting for the Wildebeests as they were in huge groups unable to cross the river, slipping off into the river and drowning, making it easy for the Crocodiles to hunt.

Then he moved to Tanzania showing us,

- Zebras, and
- Wildebeests with a just born calf. We got to know that Wildebeests migrate south to Tanzania following the rain for the grass and at Ngorongoro all the pregnant Wildebeests give birth to young ones in a span of 10 days where a lot of hunting scenes by Cheetahs,



have wide square shaped lips as they are grass eaters and the Britishers for the sake of ease called it White Rhino and the other species were given the complementary name, the Black Rhino who have a curled lip because they are leaf eating species.

- African Lions from Nakuru.
- Thomson's Gazelles.
- Lions from Mara.

Lions, and Leopards can be witnessed. Next place was Ndutu,

- Bat-eared Fox and
- Cheetahs with cubs.

Then to Ethiopia, land full of endemic species where we were shown,

- Walia Ibex.
- Spot-breasted Lapwing.
- Blue-winged Goose.
- Nyala.
- Gelada, and

- Ethiopian Wolf who only eats rodents.
- Then to Madagascar – the land of chameleons, where we got to see,
- Red Ruffed Lemur.
 - Black and White Ruffed Lemur.
 - Indri.
 - Parson's Chameleon which is the world's biggest chameleon.
 - Brown Leaf Chameleon.
 - Green Bright-eyed Frog, and
 - Fossa which is the only predator of the Island.

Next was a beautiful Island called Borneo – home for the oldest rainforests in the world, which is owned by Malaysia and Indonesia where rapid deforestation is happening and only a little patch of forests on either side of rivers flowing there. But in those little patches live

- Orangutans – the man of the forest, who are very calm primates and pluck only the ripened fruits without even looking at them to eat.
- Proboscis Monkey.
- Lantern fly.
- Crested Fireback.
- Malayan Horned Frog who is very huge and croaks like a truck horn, and
- Cinnamon Frog.

Then came Pantanal where we saw,

- Jaguars peeping through the water.
- Giant River Otter.
- Giant Anteater.
- Bare-faced Curassow with its amazing hairdo.
- Agami Heron, and
- Red and green macaws in flight.

Next stop was Costa Rica, a dream place for any wildlife photographer. But sadly, it is also a place where the locals have fake setups for wildlife photography.

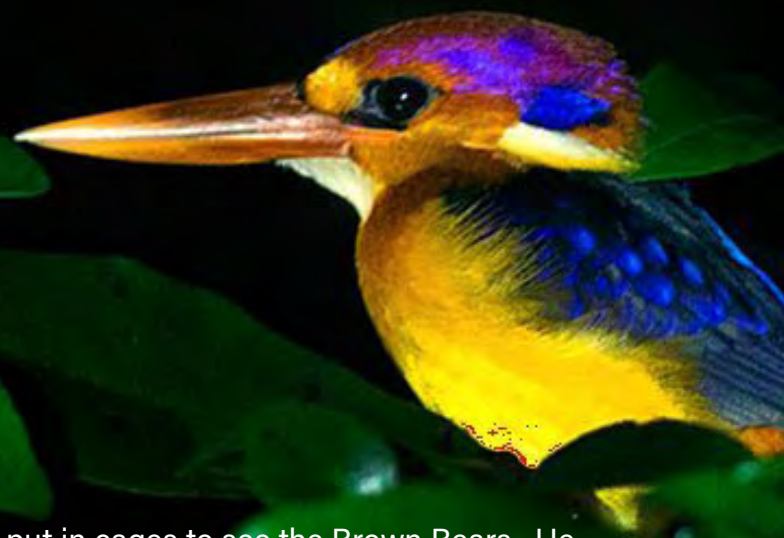
- Keel-billed Toucan.
- Chlorophonia.
- Talamanca Hummingbird.
- Green Hermit.
- Long-tongued Bat, and
- Blue Jeans Frog.

And the last place screened was Kamchatka, a small island in Russia. Only twelve people can stay on the island at a time and for a maximum of three nights. The tourists are

put in cages to see the Brown Bears. He showed us

- Kamchatka Brown Bears who fish in the river and the cubs wait on the banks for the mothers and
- Arctic Fox.

The stories his photographs carried were very invigorating. The excitement Sachin had during the whole talk never went low. The way he described the grasslands, spoke about animal behaviors shows what a beautiful story teller he is. Listening to him



feels as if we are in that scenario looking at the live animals rather than looking at his pictures. He is an ethical and easily approachable wildlife photographer who feels privileged in teaching people. He feels sad that in this era of social media where posting pictures have no restrictions, many wildlife photographers click pictures by unethical means such as capturing animal, using excessive flash on frogs, handling and placing the animal outside its natural habitat just for an aesthetic background, placing prey and predator together to get the feeding shot and many more. He and his fellow wildlife photographers often discuss do's and don'ts of wildlife photography on Conservation India website run by Ramki eight years ago. He now and then drops messages to the wildlife photographers if he comes across any unethical photo and most of them respond in a positive way.

He is one among very few photographers who gives importance to conservation and scientific research more than his possession on his photography.

He gives out his pictures for free to be published in scientific papers, articles and to NGOs. His photography also helped in the rediscovery of Annamalai Dart Frog.

He ended with a note that, "If we get possessive about our pictures, it is of no use. One should be very open to give one's photographs to be



used and that is the least we can do for wildlife”.

He is definitely a Robin Hood of wildlife photography who won Wildlife Photographer of The Year- Sanctuary Asia in 2007, Second prize- Sanctuary Asia in 2007, Special mention- Sanctuary Asia in 2007, Special mention- Better photography in 2008, Special mention- Sanctuary Asia in 2009, Special mention- Sanctuary Asia in 2009, Wildlife Photographer of The Year- DJ Memorial Photography Contest in 2013, Third prize- Sanctuary Asia in 2014, and Wildlife Photographer of The Year- DJ Memorial Photography Contest in 2017. Plethora of awards, and we are sure many more will come down his way. But it matters not, to a person whose joy lies in sharing the stories behind his photographs.



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How to make “rescue’ of wildlife’ conservation relevant?

Introduction

In the current times, considering how fast the IUCN Red Listing status of native wild animals is moving up the ladder, an alarming exponential growth of anthropogenic elements in the biodiversity, the growing habitat degradation and its effects on the fauna, it has become very crucial that we practice conservation welfare and adhere to conservation principles in every aspect of our decisions/steps.

There exists various ‘rescue’ operations/cases of wildlife in India, where a subset or the whole set of the existing ‘rescue’ methods/procedures, actions taken after ‘rescuing’ the animal, aim and subject of the ‘rescue’ has failed to incorporate the essence of conservation as its prime focus. ‘Rescuing’ invasive species, relocating native species from their original habitat, releasing a captive native wildlife which has risk of transferring diseases into the wild etc. come in direct conflict with what conservation stands for.

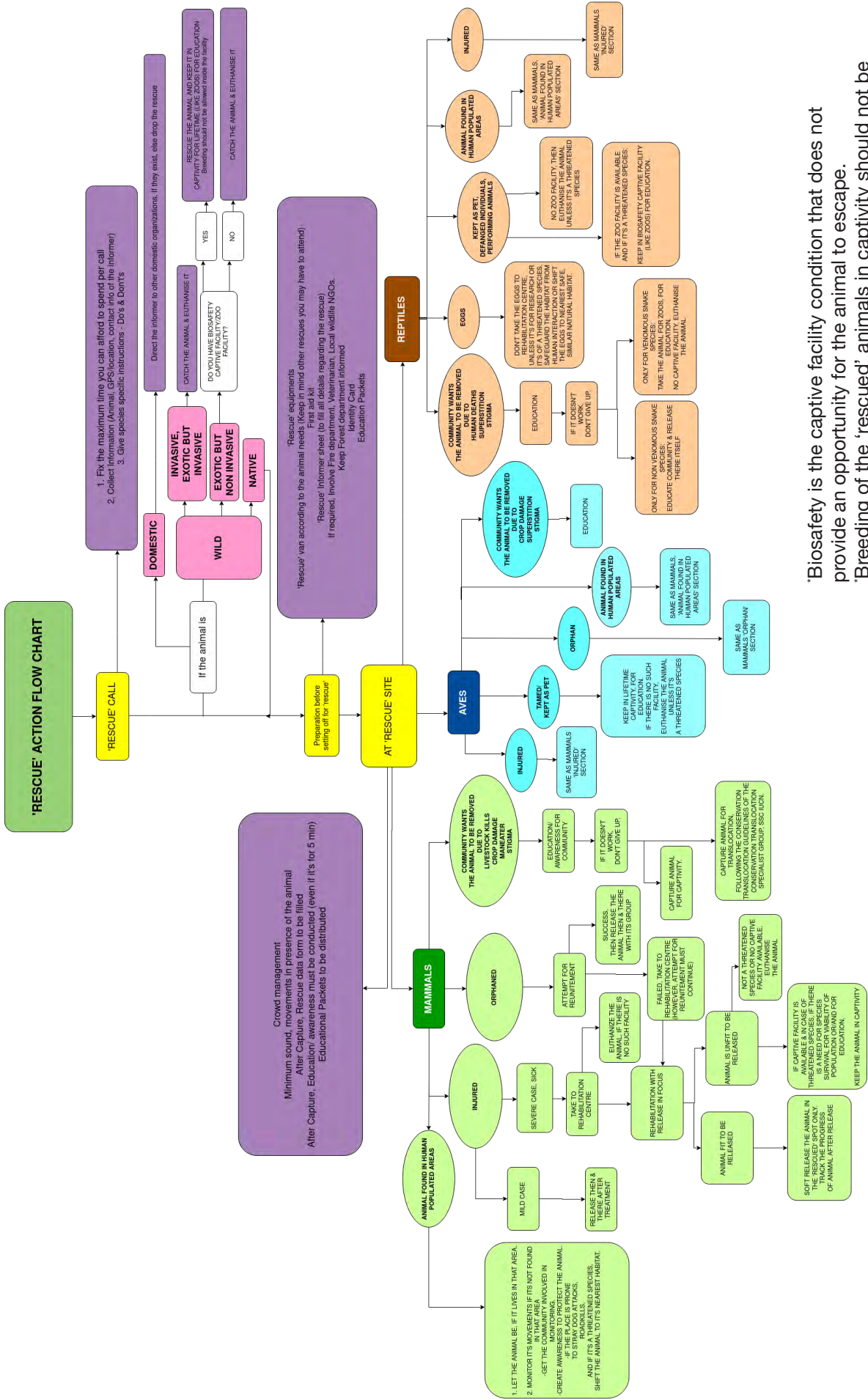
The current state of ‘rescue’ organisations being a standalone entity, bound to ethics of animal welfare rules, yields very limited results and narrows our perception/capabilities in our much broader goals of species, ecosystem restoration & their protection. It is of dire necessity that the ‘rescue’ is recognised as one of the wings of

the conservation, which can happen only if it binds itself to the principles of conservation. Conservation is not just a goal, it is a way of life, an embodiment of holistic views, actions that focuses not only on saving wildlife, but also in devising action plans in protecting species from extinction, maintaining and restoring habitats, inculcating eco-friendly sustainable way of living, in protecting biological diversity and in eliminating the causes that upsets the ecological space, clock and rhythm of our realm.

A group project with the objective to come up with action points that can help align the ‘rescue’ methodologies in accordance with the conservation principles was assigned to us Fellows, as part of the RHATC program by Sanjay Molur, our course coordinator & executive director of Zooreach Outreach Organisation.

After a few group discussions, we decided to make a hundred case studies of ‘rescues’ covering the whole of India from 2000 to 2020 to understand the current causes of ‘rescues’, actions taken by stakeholders after ‘rescuing’ the animal and identify the grey areas of ‘rescue’ where conservation is poorly focused.

Thereby we came up with a brief ‘rescue’ action plan flow chart that can aid in conservation of the species & populations.



'Biosafety is the captive facility condition that does not provide an opportunity for the animal to escape. 'Breeding of the 'rescued' animals in captivity should not be allowed unless it's crucial for species restoration.

Dynamics of our 'rescue' study.

Defining Terminologies

'Rescue': An interaction or interference with the wildlife individuals that are injured or sick or orphaned or are found in human populated areas that aim at the individual's recovery and it's welfare.

'Rescuer': The person or the body who 'rescues' the wildlife.

'Rescue' Action: Actions that are taken after 'rescuing' the wildlife. This is also a type of iteration that adds to defining what 'rescue' is. Look at table 1 for more information.

Release: The action of putting back an animal from where it was 'rescued' or to another location.

Rehabilitation: An exhaustive process where an effort is made to recover the injured or orphaned or sick animals' health to good condition.

Stakeholders: People impacted by or have impact on the 'rescue' of wildlife. For example, local wildlife NGOs, animal welfare organizations, community, individual 'rescuers', forest department, and others.

Native species: A native species is indigenous to a given region or ecosystem if its presence in that region is the result of natural evolution though often popularized as "with no human intervention". Source: Wikipedia

Exotic species: Exotic species, often referred to as alien, nonnative, nonindigenous, or introduced species, are those that occur in areas outside of their natural geographic range. Not all exotic species are invasive in nature. Source: Wikipedia

Invasive species: An invasive species is an organism that is not indigenous, or native, to a particular area. Invasive species can cause great economic and environmental harm to the new area. Source: Wikipedia

Translocation: Relocating an animal or plant away from its original habitat to another location within its native distribution range based on a scientific and systematic programme following the guidelines of conservation translocation (of the Conservation Translocation Specialist Group, SSC IUCN).

Threatened species: Species which are vulnerable to endangerment currently or in the near future.

Redefining Terminologies

Human-wildlife Conflict: The term 'conflict' creates a bias against the idea of co-existence. Also, conflicts better reflect the interactions between humans. Hence the term is replaced with 'Human-Wildlife Interaction'.

'Rescue' data Compilation:

-A hundred case studies on 'rescues' reported in the media in the timeline 2005 to

2021 were covered, on average four cases per state.

-The locations were taken from all over India, covering 25 states: Tamil Nadu, Karnataka, Kerala, Madhya Pradesh, Uttarakhand, Uttar Pradesh, Delhi, Assam, Punjab, Rajasthan, Goa, Gujarat, Sikkim, Arunachal Pradesh, Andhra Pradesh, Telangana, Odisha, West Bengal, Jharkhand, Nagaland, Haryana, Bihar, Chhattisgarh, Maharashtra, & Himachal Pradesh; and three union territories: Pondicherry, Ladakh, and Jammu & Kashmir.

-Data points were date, location, animal category, species, type of interference, action taken by the 'rescuer', stakeholders.

-Information was collected from media sources, personal observations, magazines, facebook, and newspapers.

Articles from the following sources: Times of India, India Today, Indian Express, Daily

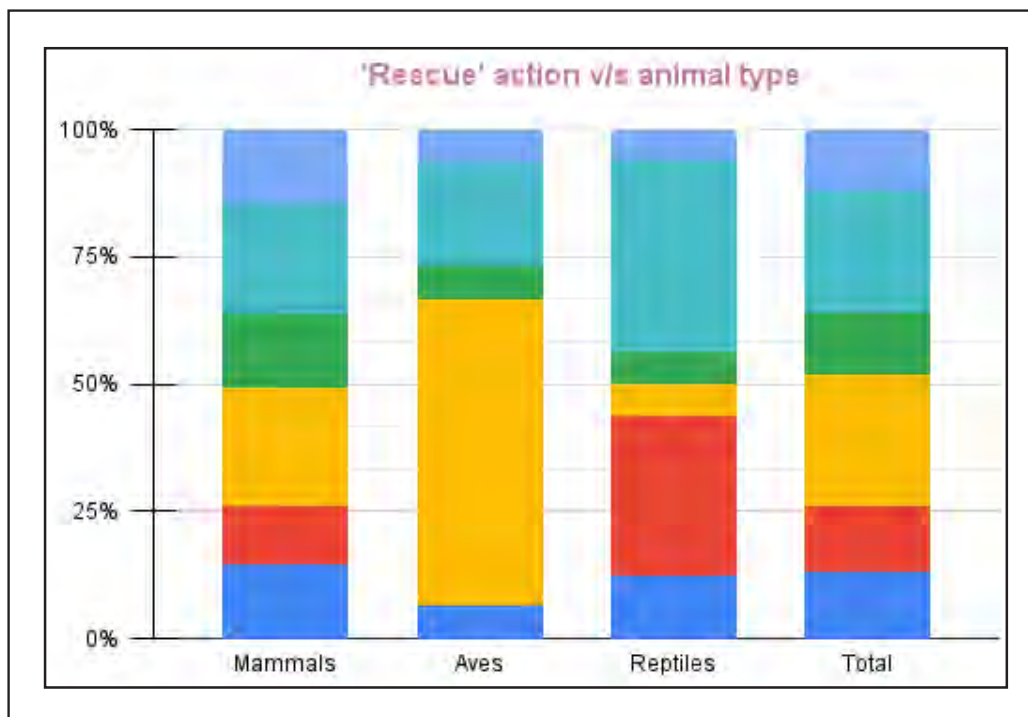
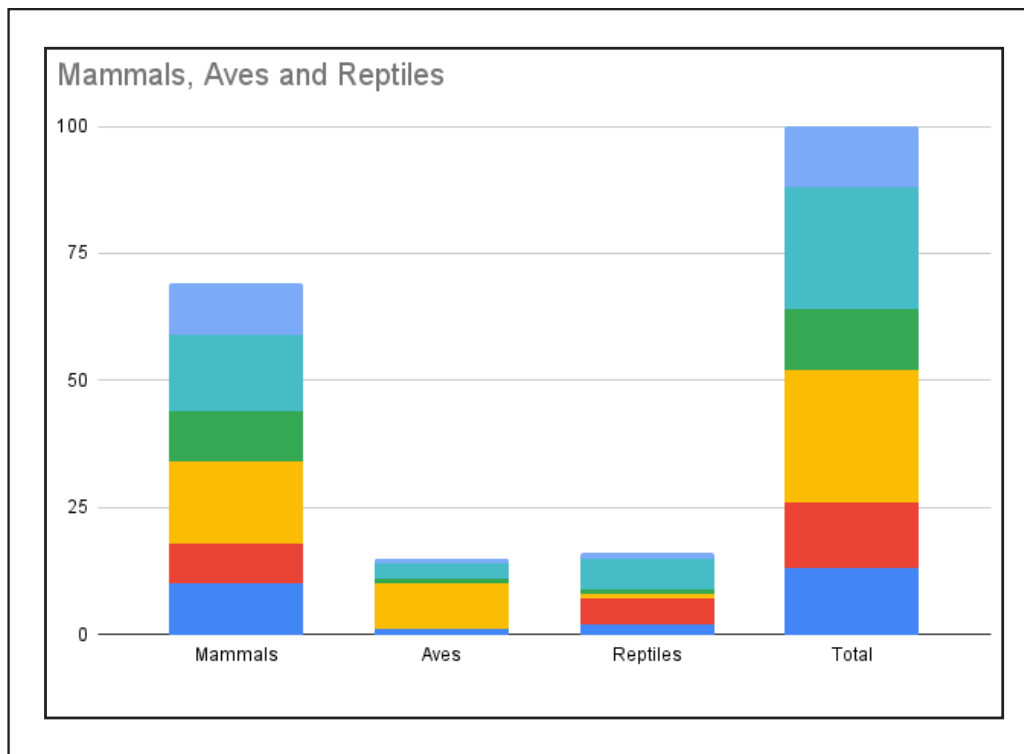
Excelsior, Hindustan Times, India Today, Deccan Herald, NDTV, News18, Asian life International: Environment and wildlife, Arunachal 24.in, The Assam Tribune, East Mojo, Forest News, Tiger Paper, Regional Quarterly Bulletin on Wildlife and National Parks Management, Down To Earth, Wildlife Trust of India, The Telegraph, ANI, The new Indian Express, Facebook, The News minute, The Hans India, NDTV, Indian Today, Snakes & Wildlife Conservation Punjab, Wildlife SOS, Turtle Survival Alliance, The Freepress, Times now, -The Better India, The Scroll, Journal of Threatened Taxa, Zoo's Print, Conservation India.

Personal Observations: Aakanksha Komanduri, Shweta Madgulkar, Arpan Joshi, Payal Molur, Sanjay Molur, Ashritha Anoop, Trisa Bhattacharjee, Usha Ravindra.

Table 1. 'Rescue' action categories. The action taken by the rescuer was divided into the following categories:

'Rescue' Action	Explanation
'Rescue' Action 0	'Rescue' of the animal is still in process (for example, forest department is still tracking the animal) or the animal died in the 'rescue' process.
'Rescue' Action 1	Released immediately after capturing the animal at the same spot (e.g., The animal was stuck in a pit).
'Rescue' Action 2	Captured, taken to rehabilitation centre and released after 'x' period of time at the same 'rescue' spot.
'Rescue' Action 3	Captured and taken to captivity centres like zoos for life time care.
'Rescue' Action 4	Captured and euthanised.
'Rescue' Action 5	Captured and released at a spot other than from where it was 'rescued'.
'Rescue' Action 6	Captured, taken to rehabilitation centre and no update on what action was taken next.

Analysis: Graph of 'Rescue' actions with respect to the animal categories: mammals, aves, and reptiles, was plotted and the results were analysed.



- unsure or no report on 'rescue' action (unsure) (6)
- Captured and released at a spot other than the 'rescued' spot (5)
- Captured and euthanised (4)
- Captured and taken to life time captivity centres like zoos (3)
- Captured, taken to rehabilitation centre and released after 'x' period of time at the same rescue spot. (2)
- Released immediately after capturing the animal at the same spot (1)
- 'Rescue' in process/animal died during 'rescue' (0)

Observations (O)-cum-Inferences (I).

ANIMAL CATEGORY	OBSERVATIONS (O)	INFERENCE (I)
MAMMALS	<p>O1: The majority of the animals are - taken to rehabilitation centres and released back at the same spot (23.2%) - released to another spot (21.7%).</p> <p>O2: Percentage of release immediately after 'rescue' (no rehabilitation) is the least, i.e, 11.6%.</p> <p>O3: Percentage of animals taken for lifetime captivity (like zoos) reported is 14.5%</p>	<p>I1: O1 & O3 indicates that there is a prevalence of human-wildlife negative interaction as 21.7% of the animals were released at a spot other than from where they were 'rescued' and 14.5% were taken for lifetime captivity (like zoos). O1 also indicates that awareness exists among the 'rescuers', to release the animals in the 'rescued' spot after rehabilitation.</p>
AVES	<p>O1: According to the reports, 60% of the aves were taken to rehabilitation centres and released at the same spot.</p> <p>O2: Percentage of aves released to a spot other than where they were 'rescued' is 20%.</p> <p>O3: Release immediately after 'rescue' (no rehabilitation) for aves is not reported.</p>	<p>I1: O1 & O2 indicates that the birds are susceptible to more injuries as 80% of them required rehabilitation/ treatment.</p> <p>I2: O2 also indicates the presence of negative perception society may have towards birds as at least 20% of them were released to a spot other than where they were 'rescued' or/and it also implies that there is lack of awareness among the 'rescuers' about the territorial nature of birds and that they are to be released back in the area where they were 'rescued'</p> <p>I3: There is more clarity on what the 'rescue' actions can be for aves compared to other animal categories.</p>
REPTILES	<p>O1: 37% of the reptiles were released to a spot other than where they were 'rescued', highest of all 'rescue' actions, according to the reports</p> <p>O2: 31.3% of the reptiles were released immediately after 'rescue' at the same spot</p>	<p>I1: O1 & O2 indicates both the lack of awareness in 'rescuers' on the negative effects of releasing reptiles to a spot other than where they were 'rescued' as well as it indicates that there are a good fraction of 'rescuers' who are aware of the territorial nature of snakes as they chose to release the snakes in its respective original habitat & home range.</p> <p>I2: O2 also indicates that the snakes which were released right after 'rescue' may not have required a 'rescue' as they could be nonvenomous but since the 'rescuer' chose to release them in the near vicinity of the 'rescue' spot it sheds light at the continuing presence of stigma or fear people have towards the snakes.</p>

ANIMAL CATEGORY	OBSERVATIONS (O)	INFERENCE (I)
GENERAL	<p>O1: Animal released to a spot other than where they were ‘rescued’ cases reported is more than 20% in all three (mammal, reptiles, aves) animal categories.</p> <p>O2: There were zero cases reported on the animals being euthanized.</p> <p>O3: Most number of reportings were on mammals, i.e, 69 as compared to reptiles (16) and aves (15).</p> <p>O4: According to the reports, rehabilitation, and release of animals at the same spot is more in aves, i.e., 60% as compared to mammals and reptiles.</p> <p>O5: Very few cases, i.e., 13 out of 100 were reported as ‘rescue’ in process or animals dead during ‘rescue’.</p>	<p>I1: O1 implies that there is a dire need for creating more awareness to ‘rescuers’ on the negative effects a released animal can have on the habitat, other species that live there & the stress it creates on the released animal itself, if its released at a different spot other than the rescued spot.</p> <p>I2: From O2, Euthanasia is not recognised as an effective ‘rescue’ action; or/and euthanasia is perceived as unethical by the people, making it a taboo topic for media to report about; or/and euthanasia has not happened so far.</p> <p>I3: From these 100 case studies, we can infer that the ‘rescue’ actions used in all three categories are dependent on the facilities availability, ‘rescue’ situation and the condition of the animal and the type of interaction the animal shares with the locals.</p> <p>I4: O3 indicates media coverage is more on mammals than reptiles and aves. This could imply the focus is more towards charisma, emotional imagery, negative interactions, and attention-grabbing factors mammals carry as compared to others. In other words, it implies less media attention goes to reptiles and aves as compared to mammals.</p> <p>I5: O4 implies that the ‘rescue’ action is more in accordance with conservation principles with respect to aves as compared to reptiles and mammals.</p>

METHODOLOGY DRAWBACKS:

- In the ‘rescue’ action 0 where it groups two totally different ‘rescue’ scenarios, i.e., ‘rescue’ in process and animal died in process, it becomes unclear or invalid to derive any conclusions.
- As most of the ‘rescue’ reports were highly reliant on the news media, the credibility of the sources is questioned.
- The sampling was opportunistic rather than

random as generated by the listing in Google search engine.

RESULTS / LEARNINGS / TAKEAWAYS

- In the 100 cases sampled, there were no translocations carried out. In instances where animals survived and were not kept in captivity after ‘rescue’, they were either released into the same area or to a different spot without following the scientific and

systematic guidelines of translocation.

- There is a dire need for education/training sessions for ‘rescuers’ about conservation welfare and principles.
- Euthanasia for cases indicated in **the ‘rescue’ flow chart** (refer ‘rescue’ action flow chart) needs to be recognized as effective conservation solution only provided all other proposed solutions are exhausted.
- Given how the human-wildlife interaction is bound to increase in the future, the present case study could be a gateway for future ‘rescue’ analysis and helps us know the trends/shifts in people’s perception towards wildlife.
- It is crucial that the rehabilitation centres

write scientific reports of the whole method of ‘rescue’, rehabilitation, and release they followed for bettering practices in the future.

- There were a few media reports of ‘rescues’ on invasive and exotic species. It is high time that ‘rescuers’ understand the biggest threats invasives pose to the habitat and native species. Invasives must be euthanized after capturing. As for exotics, it is impossible to know beforehand whether the species will become invasive or not. Also, they must not be released into the wild as they do not belong here. If there is no biosafety captive facility available then exotics are to be euthanized.

CAUSES OF ‘RESCUES’

The cause of the ‘rescue’ of all the animals is due to the presence of high anthropogenic pressure.

Most common causes of injury reported in these 100 case studies were:

Stray dogs attack, use of chemical sprays & pesticides, hunting, use of killer manjha thread, dehydration, orphan, roadkills, kept in captivity, electrocution, animal found in human populated areas, pit, pond, road, mesh, well, drain, road, school, agricultural fields, residential area, trapped inside stone structure, factory, clinging to a log, found in branch of a hollowed tree near paddy fields, attacked human, infant separated from herd, habitat flooded, illegal trade, used as performing animal, injured orphans, fallen tree with holes, stuck in stream, entangled in fishing nets, caught in snare, trapped in noose, stranded in the canals, stuck in the agricultural fencing, injured by spears, maneater.

Eliminating these causes should be the prime focus of the ‘rescue’ organizations and the forest department.

EUTHANASIA, a plausible tool for conservation

The act of euthanizing wild animals has perplexed conservationists, decision-makers, and animal welfare groups for a long time. The topic of euthanasia not only poses a moral dilemma but the lack of a legal and binding protocol makes the process arduous.

Euthanasia becomes the last resort for a multitude of reasons like when a ‘rescued’ animal is terminally ill, severely injured, or the ‘rescue’ center lacks the resources for permanent biosafety captive care. Even though euthanizing animals can be sensitive, emotional, and sometimes controversial, the decision should primarily be based on conservation welfare and considerable evaluation must be done in understanding the negative effects the animal can have on the habitat and other wild species, if released into the wild.

Euthanasia of sick or injured animals that are unlikely to survive; euthanasia of exotic species in case of non-availability of biosafety captive facilities; and euthanasia of the captured invasive species regardless of the extent of injuries must be considered, if one is to work for the benefit of the species, habitat, & ecosystem, and not just limit ones view to the welfare of the individuals.

If the decision to euthanize an animal has been taken, the act of euthanising should be done in the most humane way possible. The method of handling and the degree of restraint required needs to be taken into consideration when evaluating the choice of euthanasia. The safety of the people involved in euthanasia must also be considered, as some native and exotic animals can be dangerous or carry zoonotic diseases.

No set of guidelines can provide easy answers to the toughest calls. However, they can help fast-track the process, save crucial time, energy, and resources that can be invested in eliminating the factors that are causing these ‘rescues’ in the first place.

CONSERVATION WELFARE

The idea of conservation welfare introduced by Sally Walker is different from the idea of animal welfare. While animal welfare is centered on the welfare of an individual (be it wildlife or domestic), conservation welfare focuses on the welfare of the wild species and its populations. The subject being different in these two ideologies, it brings a massive difference on the impacts it can have on wildlife population, policy, decision making pertaining to wildlife, and therefore conservation.

For example, let's say 1 out of 10 frogs is down with a life threatening contagious disease. While animal welfare rules work on recovering this one infected frog, conservation welfare dictates one to quarantine the infected frog to understand the cause of disease. In case of non-availability of quarantine-cum-biosafety facility, it guides us to euthanize the infected frog as the disease can spread to the other nine frogs if not kept in isolation. Here conservation welfare ensures not all frogs die and that the population survives.

From the above example it is evident that the vision of conservation welfare entails a much broader, holistic view and it becomes very crucial to adhere to it, if we are to conserve the various elements of biodiversity in the long run. However, one must not forget that animal welfare is the utmost basis of all our conservation endeavors. It is given that we incorporate it in our every practice and rethink it only when it becomes irrational and stands in the way of conservation.

EDUCATION, a dire need....

'Rescue' sites are the key opportunistic hotspots to create awareness among the locals on the need to save wildlife, their ecological role, the ecosystem services they provide and the need for us to coexist with them. Education being the highest sustainable solution for any issues of the world, it must be given the highest priority at any given space and time, when the opportunity presents itself. In addition, the stakeholders responsible for the 'rescue' of wildlife should keep enough educational packets, hand pockets, pamphlets on the local species ready, distribute them to locals at 'rescue' sites and encourage them to report to the authorities when a wildlife in distress is seen. An impact a 'rescue'-cum-education can have on the locals at 'rescue' sites is tremendous. Hence the newly coined term, '**RescuEdu**'.

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About time for a system update for Indian zoos?

While growing up most of us would have visited zoos, either with family during holidays or from school as a field trip. We went to zoos in the hope to see tigers roar, peacocks dance and monkeys swing from one tree branch to another, but many of us would have seen the animals in distress or other tourists teasing them. The state of most zoos in India is just as disheartening today as it was many years ago. This goes to show that the existing model is not working.

While comparing the Indian zoos to other international zoos we see there is tremendous scope for improvement. In India we need a new way to manage zoos in order to move forward, if something hasn't worked for 30 years, don't you think it's about time to change it? Perhaps, introducing some ways in which multinational corporations work could help in better zoo management.

Did you ever wonder how a multinational corporation has business running across the globe, day after day, and manages thousands of employees to get their work done on a timely basis? Well, they are able to get things done in a timely manner because the management system they use makes each individual at every level of the hierarchy accountable for their own work. To ensure every individual is accountable, the work one does will be checked by another person, and theirs by another, and this cycle goes up to all levels in the organization. And because

there is a check at every level there is no alternative, but to get the work done correctly and on time.

The intention is to see if some of the findings by CAG on compliance audit of the zoos under the Zoo Association of Karnataka can be resolved with controls and checks similar to ones in a corporate. We understand that a zoo is a place for education, conservation and recreation, so a full-fledged corporate system will not work, but the idea is to see if the non-negotiables can be met through the implementation of some controls and solutions similar to a corporate model.

Method:

Analysis of Chapter II Compliance Audit ¹, pages 7–26 (pages 30–49 in pdf)¹. The audit objective of that compliance audit was to assess whether the nine zoos under Zoo Authority of Karnataka (ZAK) were functioning as per the provisions of the Act, Rules, guidelines and circulars issued for achieving their objective of ex-situ conservation, animals and their welfare, research, education, and visitor management.

The CAG compliance audit report provides baseline information of the current conditions

¹ In: Report of Comptroller and Auditor General of India on Economic and Revenue Sectors for the year ended March 2019, Government of Karnataka, Report No.4 of the year 2020 accessed on 15 October 2021.
[https://cag.gov.in/uploads/download_audit_report/2020/Audit%20Report%20\(E&RSA\)-2018-19%20\(English\)-05fd715a-fe7edb0.27080904.pdf](https://cag.gov.in/uploads/download_audit_report/2020/Audit%20Report%20(E&RSA)-2018-19%20(English)-05fd715a-fe7edb0.27080904.pdf)

and limitations of the existing zoos in Karnataka. Through the analysis of CAG report we suggest using a few principles from the corporate model to improve the current state of affairs in Indian zoos.

Key Findings from the Compliance Audit report:

1. Recognition of zoos and their renewal by Central Zoo Authority (CZA)

Every zoo in the country is required to obtain recognition from CZA under Section 38H of the Wild Life (Protection) Act, 1972 (Act) for its operation. Some of the zoos in Karnataka have lost their recognition because of the following reasons:

- I. They were suspended because they failed to provide a full-time officer-in-charge, failed to remove domestic animals, housed rescued animals, housed single animals etc.
- II. Certain other zoos in Karnataka were operational without being recognized by CZA.

2. Planning and Development

A. Approval of Master Plan

As per Recognition of Zoo Rules (RZR), 2009, the recognized zoos had to prepare a Master Plan of the zoo for its long-term development on scientific lines and it should have been approved by CZA within one year from the date of commencement of the rules. The Master Plan is prepared for a period of 20 years with a provision for revision after 10 years.

As of March 2020, the approved Master Plan was not in place for six zoos under ZAK. The

CAG noted that this indicated ineffective monitoring, both by CZA and ZAK, as without an approved Master Plan, the zoos would lack the strategic focus to make their operations more efficient.

B. Management Plans

CAG's scrutiny showed that the planned works could not be taken up due to short release of funds by Government. The shortfall in expenditure mainly pertains to veterinary care and development works.

a. Zoos had planned to spend ₹ 92.54 crore on **development works** but only spent ₹ 61.22 crore, a shortfall of ₹ 31.32 crore (33.84%). They therefore could not achieve their planned development goals. Consequently, the development works as per approved Master Plans could not be taken up by the zoos.

b. Animals are the heart of any zoo and hence having proper health care facilities is of great importance. However, due to lack of budgetary support during the period 2014–15 to 2018–19, compared to ₹ 11.40 crore planned, only ₹ 5.16 crore was spent towards veterinary care indicating a shortfall to an extent of ₹ 6.24 crore (54.73 per cent). This had a negative impact on animal health, further details on this will be listed under the section '**Veterinary Infrastructure and Animal health**'.

CAG noted that increased financial assistance from the government was necessary to take up development works envisaged in the Master Plan, otherwise the Master Plan could become redundant.

3. Animal Upkeep

- a. The CAG report records the improper management of animal upkeep in many zoos in Karnataka.
- b. According to the report, more than one zoo had not prepared a Master Plan. The lack of a Master Plan prevents zoos from bringing in new animal species which in turn affects their ability to attract crowds, donations, adoption programs, gate collections, etc.
- c. Though the CZA norms clearly prescribe the optimum number of individuals for different species, multiple zoos were observed to violate these guidelines. For example, they found 43 stone tortoises in one of the zoos and 173 star tortoises in another zoos, which is against the recommended 20 individuals per species as per the Collection Plan. Keeping more than optimum number of individuals not only disregards CZA guidelines but leads to population explosion, inbreeding and its adverse consequences, and increased expenses.
- d. The total number of herbivores in six zoos was 619 which included 354 spotted deer (in six zoos) and 201 black bucks (in five zoos) among other herbivores. As all the zoos have one enclosure for each species and considering the optimum capacity of 20 animals per enclosure, there was surplus of 234 spotted deer **(195 per cent over optimum capacity)** and 101 black bucks **(100 per cent over optimum capacity)**.
- e. The RZR (Recognition of Zoo Rules) 2009, advocates against keeping single/ mono-sex individual animals for more than six months but the audit indicates that zoos have kept single/mono-sex animals for more than 30 species as long as one to five years.

4. Breeding and Rescue Centre

- a. The CZA has prioritized 23 critically endangered animal species for a coordinated breeding program in Indian zoos that will act as insurance for the future. One of the animal species identified for this program is the Indian Gaur. The zoo responsible for the program spent ₹ 2.13 crore for a Gaur Breeding Enclosure where one male and one female were introduced. But due to the death of the male Gaur the program came to a standstill. No record was provided for not identifying alternatives, rendering the ambitious but expensive project unfruitful.
- b. CZA Guidelines mandate that animal keepers should be screened for zoonotic diseases annually. Similarly, animals also need to be screened to make sure that they were not infected by any diseases. However, the audit did not observe any screening being conducted in one of the rescue centers.

5. Animal welfare

Existing animal enclosures- Exhibition areas and other issues.

RZR, 2009 and CZA provides guidelines for designing enclosures for the animals. Of the nine zoos audited, only two zoos conformed to the advised parameters.

Some of the flaws observed were: inadequate screening between adjacent enclosures, not limiting viewing area which makes animal enclosures susceptible to vandalism, granite/ cement flooring which causes inflammation, swelling of foot/pad and can possibly in the long run cause conditions like Pododermatitis (Bumblefoot) etc.

6. Feed and Fodder

The RZR advocates for a timely supply of food that meets nutritional and behavioral requirements of each animal. The audit examination found gross violation of the RZR guidelines in terms of procurement of feed and fodder. In three of the zoos chicken procurements exceeded the requirement by 250% to 274% which led to extra expenditure of ₹ 48 lakhs.

Along with mis-procurement of food the zoos were observed to not follow the dietary charts. Food items like oats, honey, sweet potato, soya bean meal were not procured at all, while food items like minced meat, fish, wheat, etc. that were not mentioned in the dietary charts were procured. The cost of such unrequired food items amounted to ₹ 66.48 lakhs for three zoos.

7. Zoo enrichment

Zoo enrichment is nothing but the behaviour enrichment where the species exhibit their natural behaviour within the enclosures along with other challenges. Zoo enrichment is important to reduce the stress of the animals in captive conditions hence there are two types of enrichment which are **habitat enrichment** and **food enrichment**. To implement these enrichment activities, biologists play a vital role and the allocation with the expenditure to make sure of execution of these activities.

The habitat enrichment is by providing animals with wooden logs, rocks and boulders for resting/hiding and also for natural movements in the enclosure.

Feeding enrichment is to delay the feeding time by hiding the food in tree logs or boxes and spilling over the food in the open enclosure. This stimulates their natural instincts such as smelling, digging, searching abilities, etc. This in-turn reduces the “stress” levels of animals, thereby promoting their health and increasing reproduction due to increased well-being.

Zoo enrichment being one of the key management issues but the welfare of the captive wild animals, only few zoos had put in place some enrichment activities for few species.

8. Veterinary infrastructure and animal health

As per RZR guidelines, all zoos, except mini zoos, should have a separate Veterinary hospital with all equipment including an operation theatre and an observation room. Mini zoos should at least have a treatment room. Further, it was stipulated that all zoos should also have feed store, basic monitoring equipment (stethoscope, digital thermometer, etc.), post mortem set, emergency first aid kit for animals and humans, medicine/ anesthesia kit, cold storage for keeping emergency medicines, animal history card, emergency medicines like anesthesia and anti-venom, etc.

Further, the Guidelines for Establishment and Scientific Management of Zoos prescribe that every zoo should have a Health Advisory Committee (HAC) to establish networks with relevant local institutions to help /guide zoo staff in proper upkeep and

healthcare of animals. In addition, CZA in its communication issued in May 2017 had advised that a State Level Health Advisory Committee for zoos be created for the state on priority.

However, it was observed that the State Level Health Advisory Committee was not formed and only three zoos had HACs.

8.1 Scanning for zoonotic diseases

RZR 2009 guidelines provides that “All staff involved with upkeep and healthcare of zoo animals shall be screened against zoonotic diseases once every year and those found positive to any communicable disease shall be provided appropriate treatment till they get cured and freed of the infection. During the period of such treatment, the infected employees shall be kept away from the responsibility of upkeep and healthcare of the animals”.

Incidentally a sloth bear died of TB in the zoo during the year 2017–18. Since it is a known fact that bears get infected with TB from humans, its death due to a possible spread of TB from one of the keepers cannot be ruled out.

9. Research and Education

9.1 Research at large zoos

Every zoo shall endeavour to carry out collaborative research for evolving innovative strategies for providing the animals housed in the zoo a better quality of life, enhanced longevity, higher genetic and behavioural viability and improved reproduction potential.

One of the zoos had booked an

expenditure of ₹ 26.03 lakh towards research activities from 2014–15 to 2018–19. Audit scrutiny of records showed that only ₹ 8.80 lakh was spent towards research while the major portion of the expenditure (₹ 17.23 lakh) was spent towards non-research activities like road survey, website designing, purchase of mementos to events, etc. Thus, funds earmarked for research activities were diverted for non-research activities which was irregular.

Further, one of the zoos spent ₹ 1.50 lakh (October 2014) on a project titled “Physio biochemical and reproductive endocrinological parameters in captive tigers”. However, the details like project report, completion report, etc., were not on record. In absence of these details, the positive impact of this project on the management of the zoo could not be ascertained.

9.2 Education

As per the Rule of RZR, “every zoo shall endeavour to educate the visitors to the zoo and people at large about the significance of wildlife conservation for the general well-being of the people and keeping the life support system of nature intact”.

The audit noticed that only three zoos were conducting different education programs. There were no Education Officers/Resource Persons in other zoos and hence no such activities were conducted. Sensitization about protecting wildlife and importance of biodiversity

through conservation measures was thus a neglected activity.

In the absence of Education Officers and involvement of locally available resource persons, the zoos have lost an opportunity in reaching out to masses on conservation activity.

10. Visitor's amenities

10.1 Visitor facilities

Visitors' facilities are an important aspect in the management of zoos. Sub rule 12 of RZR states that, "every zoo officer shall provide adequate civic facilities for visitors at appropriate and convenient places in the zoo including for physically disadvantaged persons and such facilities shall be so located that they do not mask or impact the view of enclosures. Besides, the first aid facilities including anti-venom and life-saving drugs should be readily available.

It is appreciated that visitor facilities like drinking water, working toilets, pathways, display signs, first aid and parking were provided in all the zoos".

One of the zoos did not have facilities regarding shelter, route map display and path-way directions. Another zoo did not have wheelchairs/ ramps for physically challenged. And one other zoo did not have a canteen.

11. Good practices

11.1 Adoption of animals

Adoption of zoo animals involves the public which is an important programme in management of zoo. The rates of

adoption of different animals were communicated to different zoos by the Member Secretary of ZAK during January 2012. Scrutiny revealed that adoption of animals happened only in four zoos during the last five years. Maximum receipt from adoptions was majorly in one with highest amount being ₹ 208.84 lakh, followed by other zoos with ₹ 63.88 lakh and ₹ 8.15 lakh.

11.2 Solid waste and Plastic management

The Central Zoo Authority had issued (November 2016) an advisory on waste management in zoos besides listing out the activities to be taken up in all zoos. It was observed that while one zoo established a vermicompost plant for addressing the solid waste problem and generated a revenue of ₹ 34.65 lakh. One more zoo did not have a vermicompost plant, it was generating money from the sale of leftover bones. The Government of Karnataka in its order (October 2003) had banned plastics from other zoos of the state. It was observed that except for two zoos, strict ban on plastics was yet (February 2020) to be implemented in the other zoos.

With reference to addressing the problem of disposing of plastic water and juice bottles, few zoos had come up with an innovative idea of collecting a deposit of ₹ 10 from the visitors and bottles being provided with stickers. At the exit, the deposit would be refunded to visitors who show the bottles with the sticker.

This acted as an incentive to visitors for not throwing the plastic bottles in the zoo premises. This innovative procedure which could have been helpful to reduce plastic bottle menace in zoos, had not been implemented in other zoos.

12. Manpower management

The posts sanctioned under different cadres in all the nine test checked zoos as seen 762 personnel were functioning against the sanctioned strength of 388 posts. The excess number of employees engaged as compared to the sanctioned posts indicate that the sanctioned strength of employees did not truly reflect the actual requirement of zoos (either there were more number of people working in the zoo than required or the sanctioned strength was not adequate enough to ensure that the entire workload was taken care of). The matter needs to be examined for necessary corrective action in this regard.

13. Conclusion by CAG:

CAG concludes that CZA norms should be complied by all zoos operating in the country and ZAK should ensure the same for the zoos under its jurisdiction. However, recognition of eight zoos were yet to be renewed and two suspended zoos were kept open to the public. One of the zoos was operated without a recognition from CZA during the years 2017–18 and 2018–19. Only three zoos had approved Master Plans while two zoos did not even have approved Master (Layout) Plans. As adequate population control measures were not in place, there were surplus animals in the zoos and CZA

norms on pairing of single animals were not complied with. Adequate veterinary infrastructure was not in place in seven of the zoos. Only one zoo had conducted screening of animal keepers for zoonotic diseases for only one year, though the same was to be conducted annually. Health advisory committees mandated by CZA were not in place in six zoos. Research and Education, which are important for conservation and protection of wildlife, were not given adequate priority. Visitor facilities were mostly provided in all the zoos. The staff deployed was more than the sanctioned posts in the zoos.

Though there were some positive steps taken by some zoos to improve the facilities and attract visitors, ZAK can take steps to enhance the quality of all zoos by implementing these good practices. The issues mentioned in the Report may be addressed on priority to ensure better management of zoos and welfare of animals.

14. Recommendations by CAG:

As per CAG report, audit recommends the following to Government for ensuring zoos are maintained and operated effectively:

- i) Strengthen veterinary infrastructure and deploy services of regular qualified personnel to ensure better ex-situ conservation of captive animals.
- ii) Put in place a monitoring mechanism to ensure that there are no unauthorized deviations in procurement of feed and fodder.
- iii) Ensure preparation and implementation of Master Plan and other sub-plans for scientific management of the zoos.

Indications of possible ways of how a corporate would deal with the shortcomings

The following section will describe some of the principles that are used by corporates that could be implemented for zoos for some of the problems identified by the CAG in their report and to other problems based on anecdotal data.

Some of the common principles used in a corporate environment that could be implemented for zoos to improve the problems stated by the CAG are:

1. Segregation of duties – The duties within a process is segregated to two or more employees. This is to ensure that one person does not have the ability to perpetrate an error or fraud and conceal it. For example, the maker-checker process. The maker-checker process requires two separate people to authorize a transaction – the first user (“maker”) creates a transaction request, and the second user (“checker”) validates and approves the activity².

2. Independence – The concept of being independent of an entity is used to avoid conflicts of interest and to ensure integrity. Corporates usually have an independent auditor, but the concept of independence can be used in other ways such as having an independent veterinary doctor (vet) who reports directly to the Board of Directors (BOD) for inspection purposes.

In the following section we are indicating possible solutions for some of the

shortcomings identified by CAG in zoos under ZAK and for some other problems based on anecdotal data from zoos across India. Although the shortcomings were identified by CAG for zoos under ZAK, much of these apply to all the other zoos across India.

1. Problems within health care of animals:

A. Deficient health care for animals

Due to limited vets in the zoos, there is inadequate health care. The vets also work on a rotation basis and move from the animal husbandry department to zoos and vice-versa. This is not good for the zoo animals because each time the new vet has to get to learn the ropes of wild animal care.

Due to limited vets in the zoos, there is inadequate health care. Overall, in India the number of vets is lesser than the requirement. “In a year there are only 2,100 vets graduating from India. There are 63,000 registered veterinarians today, whereas the requirement is between 1.1-1.2 lakh” estimates Umesh Chandra Sharma, president, Veterinary Council of India (VCI)³.

B. Inadequate preventive care for animals

Some zoos in India, especially the smaller ones, do not have the capacity to vaccinate animals.

² <https://www.saggezza.com/robotic-process-automation-my-coworker-is-a-robot/#:~:text=The%20maker%2Dchecker%20process%20requires,validates%20and%20approves%20the%20activity.>

³ <https://indianexpress.com/article/india/india-others/30-crore-cattle-and-rising-but-where-are-the-countrys-vets/>

C. Infrequent testing for zoonotic diseases

The test for zoonotic diseases needs to be done for both humans and animals. The measures to check for zoonotic diseases are not done frequently for humans and in many instances, it is not done for animals at all.

Possible solutions:

- i. The solution for the above three problems would be to have an independent vet for inspection who reports directly to the BOD. Every month an independent vet (with expertise in wildlife veterinary practices) can visit the zoos once for inspection, to check on the health of the animals, to check the status of preventive care and to ensure testing for zoonotic diseases is done periodically. As the external vet does not deal with the zoo management and reports directly to the BOD, he acts a quality check on the internal vet.
- ii. The smaller zoos need to channel some of their existing funds towards vaccinating the animals. The government should also give these small zoos additional aid so they can vaccinate animals. Zoonotic diseases (e.g., SARS) aren't to be taken lightly, the respective state governments along with the central government need to take immediate action on this subject matter.

2. Lack of documentation and trails

of evidence – Most zoos in India today use a hybrid of electronic systems and physical paper or only physical paper for documentation purposes. The disadvantage of paper documentation is that information

and evidence can be meddled with or removed.

Possible solutions:

- i. Zoos in India should have all their documentation online through software and applications, that will help leave a trail of evidence that cannot be misused. An example of a trail of evidence from the corporate working model that many would be familiar with is returning a product you had purchased online. When you request to return a product, you immediately receive a system generated message confirming your return request and a ticket is raised for the same within their system. Your return request cannot be deleted without your permission or knowledge.
- ii. Zoos in India should use project management tools like Microsoft Project to track the status and progress of projects. The zoos must invest in and meticulously use softwares such as ZIMS/ARKS/ SPARKS or Species360 that are made specifically for zoo management.

3. Problems related to funds

A. Lack of transparency for funds:

- i. Not all zoos give a break up of their income and expenses. For example, the Statement of Income and Expenditure in the Annual report for National Zoological Park, New Delhi for 2020–2021⁴ only had two line items in total, they were '**total allocation of budget**' and '**expenditure incurred**'. There was no break up given

⁴https://nzpnewdelhi.gov.in/system/publications/documents/000/000/007/original/NZP_Annual_Report_2021-Readable.pdf?1628850874

for what constituted the income or expenses.

ii. Donations made by the public towards the adoption of an animal and the usage of these funds are not available on the annual report. Funding needs to be transparent. Transparency is the key. Donors will be happy to know how the funds were used and honesty will be much appreciated, which gains the trust in people to donate more.

Possible solutions:

- i. It should be a mandatory requirement by CZA and CAG to have a breakup of their income and expenses so that we know where the money is being allocated and used.
- ii. All donations must be online to ensure there is a trail of evidence of how much money was donated. This will also reduce the chance of swindling away donated funds.
- iii. The accounting and spending of funds for government and private zoos should be like the mandates non-governmental organizations (NGOs like societies, trusts, and section 25 companies) in India currently follow.

B. Lack of prioritization of funds and fraudulent expenses:

As per our review of the annual reports of some of the zoos in India that give a break up of their expenses, it shows that they spend the majority of their funds on administrative expenses while only a small fraction is spent on the animals and their veterinary care and maintenance.

As seen in excerpts from the CAG Compliance audit report above, the zoos under ZAK have misallocated funds.

Possible solutions:

- 1. With both CAG and CZA being government bodies, CAG should use its expertise to help CZA come up with a mandatory framework that will help close the loopholes the zoos use to swindle money. Considering that both are government bodies wouldn't that be a win-win situation?
- 2. There should be controls around the access and dispensation of funds, similar to the maker-checker process mentioned earlier. There should also be an internal auditor appointed, who's role will ensure that these controls put in place are working effectively.

C. Collusion between employees: In the current zoo setup, employees from different levels in the hierarchy collude and skip their duties. This is evident in CAG's findings within ZAK because if an error is happening over a long period of time and there is no rectification, it shows that the people at all levels within the hierarchy are aware and are working in unison.

Possible solution:

The introduction of zoo management software, project management tools and internal controls will reduce the collusion between employees as it acts as a check point between employees at different levels in the hierarchy. Each person will have to take up ownership for their work, and assigned duties, if not, the software or tool will show who hasn't performed their duties. This

check will ensure that employees at all levels will become accountable for their work.

Practical applications of controls through technology:

1. For feeding on time - Once the food has been served to the animal, a live photograph or selfie with time stamp and location (similar to the function in apps like Huli, Hejje & Gastu) should be updated into the application. If it is not served on time and there is no photo uploaded within the window of feeding time, a notification in the project management tool will be generated. The number of notifications per individual will also help monitor the performance of the employee.

2. Having mandatory online systems – Currently, not all zoos in India maintain their data electronically. To ensure there is a trail of evidence all documentation must be moved to a safe electronic system. The current system fails to document the birth, health, death and injury, migration of animals accurately. As seen above, it also fails to account properly for funding, income, and expenses.

It's quite shocking that all zoos aren't yet maintaining their data securely in an electronic version through applications even in 2021. While the whole world is running on tech and artificial intelligence (AI) in this day and age, it's high time all zoos across India make the switch.

3. For project management – To ensure work is done on time, not missed out

or deleted zoos should use a project management software that tracks all projects, from the past, ongoing ones and or ones planned for the future. Having a one stop place to look up all projects will help the management in monitoring projects better and ensure that projects are completed.

4. Having annual third-party anonymous surveys for employees – The annual third-party anonymous surveys will help the higher management and BOD be aware of employee concerns and issues that they would be afraid to bring forward in person. Employees being heard will also boost their morale.

Finance and budget concerns for the above proposed controls and technology:

1. Although the implementation of technology can be expensive, it is a one-time investment. In the long term it could actually help decrease cost. Introducing technology will also prevent employees from colluding, which will help the zoos in achieving its goals and objectives more efficiently.
2. CZA can get the required software created by competent students from reputed colleges as an internship program. This will be cost effective from CZA's point of view and work experience for the students. A standard software for management can be created and this can be used by all zoos in India.
3. Although the overall budget allocated to zoos needs to increase in the long run, the starting point would be to reallocate funds based on priority. Priority should be given for animal health, conservation, research, and maintenance over administrative expenses.

4. Zoos should have more volunteer programs to fill in human resource crunch. The volunteers should be recognized for their efforts publicly and they should also be given certificates for their contribution to the zoo. An example of an effective program is the docent program in the United States.

Education in zoos:

Zoos play a major role in education. Unfortunately, the information boards and signages in the zoos across India are not interesting or compelling. In many cases, the signages are either broken or in bad condition.

A different approach to educate the visitors in the zoos is to have a full-time permanent education team, who can also work with and train volunteers. These trained volunteers can then guide and educate the visitors during their tour of the zoo.

Actions to be taken by Indian Zoos and related authorities:

1. CZA should make it a mandatory requirement that CAG compliance audit findings such as the ones mentioned earlier in this article should be mentioned, addressed and fixed in the specific zoo's subsequent years Annual report.
2. CZA should have a mandatory requirement for an internal auditor. The role of an internal auditor is to provide independent assurance that an organization's risk management, governance and internal control processes are operating effectively.

3. Many of the zoos in India will benefit from partnering with the World Association of Zoos and Aquariums (WAZA). WAZA is the global alliance of regional associations, national federations, zoos and aquariums, dedicated to the care and conservation of animals and their habitats around the world. The membership consists of nearly 400 leading institutions and organizations around the world, and this number continues to grow.⁵ Some of the best zoos around the world have partnered with WAZA. While comparing the international zoos that partnered with WAZA and the Indian ones that have partnered with WAZA, we can see the Indian zoos are still lacking.

WAZA should make it a requirement that any zoo they partner with in India must have an internal auditor to ensure the controls are working and those in charge are accountable.

4. Even if CZA and WAZA choose to not make it a rule to appoint an internal auditor, the BOD can appoint an internal auditor.
5. The BOD in Indian zoos should be appointed based on their background and knowledge of zoos and wild animals, not only because of the influence they have in society. The BOD should have independent authority and should make use of it to work independently to oversee the zoo management.
6. The BOD should also appoint an independent vet for inspection who reports to them directly them.

⁵ <https://www.waza.org/about-waza/>

7. The employees should get hikes in their salary in regular intervals. This will help them stay motivated to do the work they do.

8. The zoos should provide their employees and families with good health insurance coverage.

9. CZA should make CCTVs mandatory at all enclosures within the zoos.

10. To prevent unethical practices, they should have an online portal for feedback and complaints. This way the public, employees or volunteers of the zoo can give feedback/complaints and if there is any evidence in the form of photos or videos that can be uploaded too. If there is a complaint of an unethical practice without any footage or photo the zoo management can look into their CCTV footage for verification.

11. Indian zoos can also partner with other international zoos and have a sister zoo concept, where they can assist, help and learn from each other.

12. CZA has to rate

zoos across India based on compliance of CZA guidelines and the parameters used by CAG in their compliance audit.

13. The veterinary courses in India are currently only for domestic animals. Hence, the domestic vets train for wildlife directly on field or in the zoo. There needs to be a veterinary course for wildlife in India where the vets can learn before they directly treat wild animals.

Conclusion:

We think that the analysis of the CAG compliance audit report and the possible solutions indicated in this

article is just the beginning of the conversation. Perhaps, we need a larger discussion with different stakeholders on how zoos in India need to engage themselves to be better organizations for conservation, education, and welfare. The idea is not to dwell in the past or point fingers at each other but to move forward from here on, and to keep pushing the boundaries to get better.

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 RHATC Fellows, 2021-22,
 Zoo Outreach Organization,
 Coimbatore, TN, India.



Masinagudi trip report

Day 1 (03/ 12/ 2021): It was a chilly morning with a fresh cool breeze in the air. The RHATC team packed up and got ready to leave for the trip early around 4 am. Driving at a speed of 70 kmph, Mr. Byju's car took the lead while the other three cars followed. Even though sleep deprived, everyone seemed to be in high spirits and the casual trip conversations in the cars have already started. Me being in Byju's car, I remember him starting up the talks by casually asking how's the course going on for everyone. With two of the most silent fellows in the car, i.e., Usha and I, the talks did not seem to progress much, but with Byju's interventions, it soon started to turn into a livelier situation. The talks started becoming more intense when Byju started talking about his encounters on dealing with unethical people in conservation, as guidance for us to be wary of these people and such situations. These small stories led me to realize the importance of being affiliated to a proper and trustworthy funding agencies and conservation organisations.

With constant conversations going on, the stories never seemed to end but unfortunately we had to take a stop since one of the cars had to get a tire puncture fixed. That's when one of the quieter members from our car has to swap seats with Supriyo from another car due to a bit discomfort regarding the air conditioning. Then the fun started. The Ghats started, the car windows were lowered, and fresh cool air was let in. With it came Supriyo's jokes. The atmosphere went vibrant. This is when Byju was given the nickname 'Chellam sir'. Fun and jokes aside, the view outside was mesmerising and we couldn't resist taking a stop to feel the vibe. We stopped beside a small waterfall and took a breather while waiting for the members from other cars to join in.

Another half hour drive and we soon reached the highest point in Ooty. The temperature drop was significant and our fellow car mates had to shut the windows to stop shivering. It was still early morning with minimal traffic and we decided to take another stop to rejoin with the car gang. Once rejoined we started off. Here Byju proved his car driving skills by taking on a different route to get us a glimpse of the golf course and still reaching back to the car gang on time.



Overtaking every other car, Byju again led the group. Crossing the police check post, we got into the area of beautiful Mudumalai Tiger Reserve. I could already feel the wildlife vibe looking at the vast stretch of lush green hills. I wanted to get off the car to get a closer look and luckily my thoughts were heard. We had to take a stop to wait for the other cars and Byju found us a good viewpoint for the scenery. The view was beautiful and we could not resist taking out our cameras and binoculars to capture it and get a closer look at it. The landscape, the birds, the bonnet macaques, the clouds, the sounds of birds and flowing water descending off a cliff; everything seemed mesmerizing. Well, on a side note, the funny guy Supriyo also captured a picture of Bonnet Macaques mating.

The car gang was back, so we bid our farewell to the macaques while one of

them desperately clung to our car but then soon let go as the car started off. The journey from here on was a bit slow paced. The Ghats have ended but the cars took small stops to look at groups of Spotted Deer and Wild Boars grazing close to the roads. Our hunger did not let us stop for a longer duration, so we drove off. Finally we reached the village, Masinagudi. Byju found us a good spot to eat. It was a small, friendly restaurant with a beautiful view of Ooty and a pretty looking temple just in front of it. We had a light breakfast, the menu included masala dosa, puri bhaji, and idlis. Then we headed off to our resting dorms at Sylvan dormitory to drop off our luggage and get prepared for the next outing.

After an hour of resting, we started off for our visit to Moyar Valley. This is one of the places where Byju has worked on

Vultures extensively over the past years. He has also written an excellent book called 'Valley of Hope- Moyar and Vultures' which he describes as a perspective of an environmental enthusiast and not a scientific or fictional one. Through this book he has tried to display the original inhabitants of the landscape, its diverse wildlife and the importance of vultures in the valley.

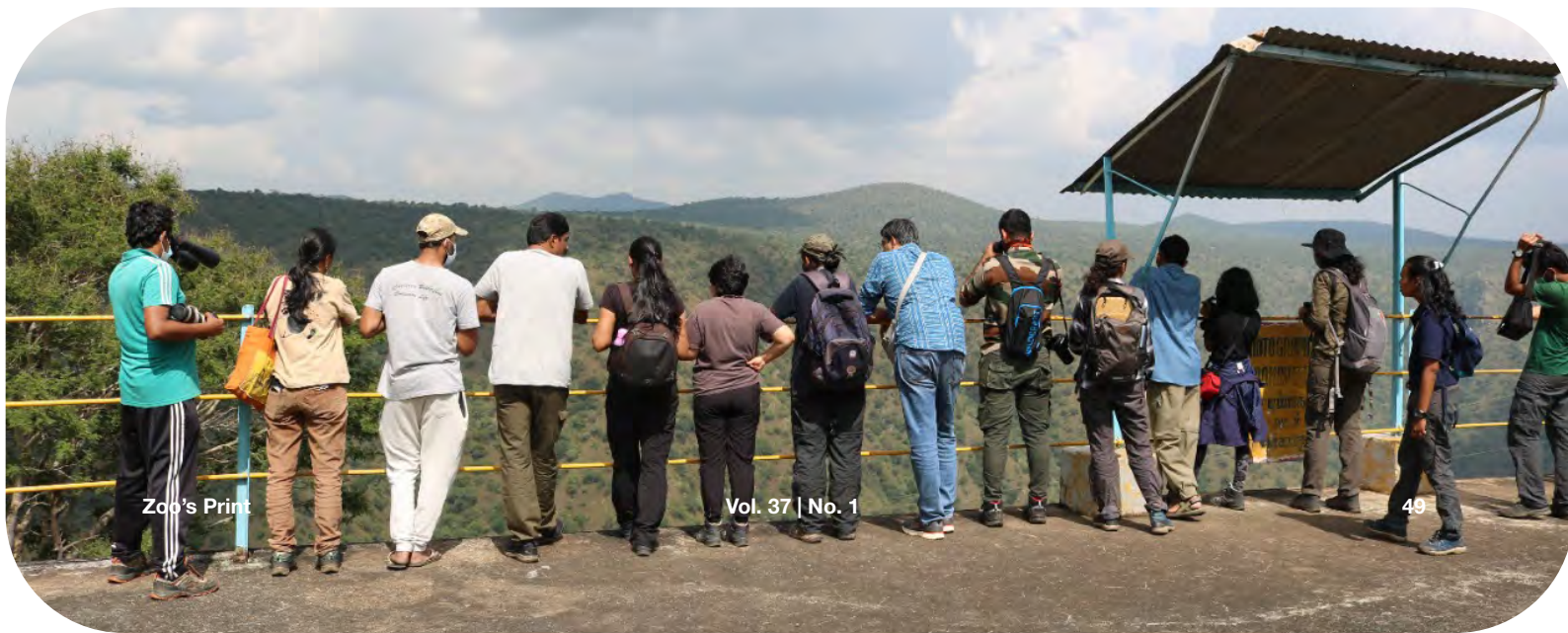
The sun was overhead when we reached the spot. One could sense the warmth in the air and the anticipation in the fellows. Everyone stood astounded at the view. The vast stretch of mountain with clouds floating over them giving varying shades to the underlying vegetation and a lone elephant in the wilderness feeding on the grass; all of it was so captivating that one would not forget it in a lifetime.

After enjoying the moment and clicking a whole load of pictures, we set out to get ourselves some lunch, but to our surprise we got an even better treat. Byju showed us a Cinereous Vulture which is one of the largest raptors and is a very rare find in this part of the country. It did fulfil our appetite but our stomachs were empty so

we returned to our usual temple food place and had a hearty meal to prepare for the next adventure which awaited us.

Our next destination lied in the core area of the reserve and the excitement kept on growing. Each of us were on our toes while Chellam sir kept on cracking his jokes to break the monotony. Silently moving through the jungle in our cars, we were able to spot numerous species of birds and mammals including the Crested Hawk Eagle, group of deer, pack of Dhols and the vulnerable Gaur. Every sighting was a thrilling experience. Unfortunately, the thrill soon ended as we reached a village where we had to take a halt. A break was very much required and we all took a good one by resting around a beautiful stream winding its way along the forest. Fresh air, fresh water, and fresh conversations; everyone was relaxed.

After a long refreshing break, we decided to head back to our accommodation. The night was falling upon us and it started to drizzle. As we rushed back to the dormitory in our cars, we could spot families of Gaur grazing along the side of roads, since they have become much more nocturnal due to





Day 2 (04/12/2021): The morning dawned. As usual, the RHATC fellows in our dorms took their own leisure waking up. Today's plan was a bit different. We had to visit Dr. Priya Davidar's place who is a conservation biologist, a researcher, and a retired professor from Pondicherry University, India. She has done her major work on island biogeography in the Andaman Islands and large scale patterns of tree distribution in the Western Ghats of India. She has also guided over 13 PhD and around 50 master's student in ecology and has published over 90 scientific research papers.

We reached the place around 9 am. It was an estate located deep inside the forest area and is considered an important wildlife corridor in the Sigur plateau of the Nilgiri Biosphere Reserve. We could already see groups of Spotted Deer and Sambar grazing just a few yards from their home. Priya introduced herself, her husband Jean and her brother Peter to everyone in the RHATC group and vice versa. She briefly told us a few stories of them with the wildlife there and everyone was fascinated. Ah, and she also told us not to run when we see an elephant close by since elephants even come as close to their house's door sometimes. After the introductions, the RHATC fellows were assigned different tasks to perform in the area. One group has to do behavioural studies on the spotted deer which included feeding, alarm calls, fighting, sleeping, sitting, and scanning behaviours, while the other groups had to make species response curves for the butterflies, birds, fungi and invasive species of plants present

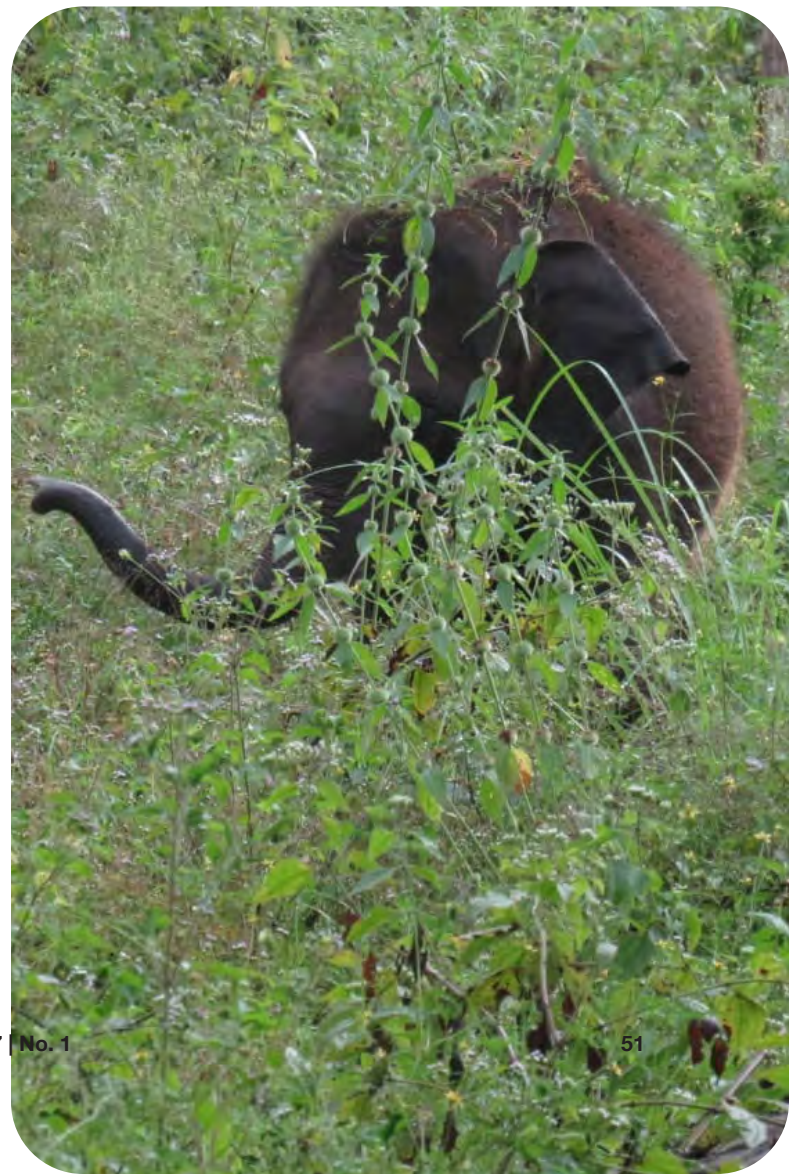
human disturbances in the area. We soon reached our cosy dorms, tired but happy from the trip we just experienced. The day ends.

Wait! There's more. It's Priyanka's birthday! The celebration is pending. Everyone gathered up at the men's dorms. It's party time. Happy birthday to you, Happy birthday to you, Happy birthday dear Priyanka, Happy birthday to you, applauded everyone. The drinks started and so did the conversations. Everyone got the task to speak something about Priyanka and with it came the stories which included moments of sadness and moments of joy. What a way to end the night.

in the area. The various methodologies to carry it out were described and were left up to the groups to decide on which to choose out of those.

Before the groups were left alone with their tasks, Dr. Jean-Philippe Puyravaud took us near the stream in their place and explained to us how they managed to get the water flowing back in the stream which had helped a lot in the ecological and wildlife restoration of the area. He also told us that there are no life forms in the stream because the fishes are just not able to survive because of the small dams which had been created along the stretch of the stream. After that, he showed us various invasive species of plants which have invaded the landscape and how they are causing damage and loss to the ecology of the area. Most of it would have almost totally covered the area if Priya and Jean did not intervene and started mechanically removing them with the help of local labour. The problems which these invasive plant species had created are devastating. They form dense and impenetrable thickets and cover all the land area reducing the visibility of mammals and restricting the human access to the land. It poses a huge fire risk and in addition to this, its consumption is toxic to sheep and cattle. Priya showed us the bio control measure for Opuntia which was done in the form of cactoblastis moth whose larvae burrows in the cacti and eats its leaves and seed pods and finally kills the plant. It has been considered a successful control measure in the past but now it has itself become an invasive in many parts of the world and needs to be controlled.

After finishing up the tasks, the RHATC team left for lunch and returned soon after. It was time for us to get more knowledge and insights from Priya and Jean on their works. Jean started first with his presentation on the research he had done on landscape connectivity for the Asian Elephants in the Nilgiris Biosphere Reserve using GIS and models which took into consideration various variables such as habitat, resources and human disturbances just to name a few. He also demonstrated how deforestation has been leading to an increase in human elephant interaction. Next Priya gave a talk on the need to conserve plant-pollinator mutualism. She talked about various pollinators and how the flowers have evolved to attract the pollinators. Giving us a good example of Bt



brinjal, she also discussed the importance of crop wild relatives (CWR) which contain adaptive genetic variations missing from domesticated crops. Lots of questions and lots of discussions happened, after which a refreshing break was required. The break turned out to be an exhilarating one since we got to see an infamous tusker whose stories have often been discussed by Sanjay and Priya in their talks. We spotted it just a few yards across the stream at Priya's place. The evening went well. With heads full of information, everyone was tired. So we headed back to our dorms, had some nice dinner and took a good night rest to prepare for the next day's adventure.

Day 3 (05/12/2021): Safari! This was the first word which came into everyone's mind while waking up. Loaded up with binoculars and cameras, the RHATC team got ready early morning to experience some more wildlife in Mudumalai tiger reserve safari trip. We hopped on the bus and prepared ourselves for the thrill. The very first animal we saw were the chained camp elephants just as the trip started. Just a few minutes later, the driver spotted a Sloth Bear walking slowly into the wilderness. The foggy weather combined with the enormous stretch of invasive plants hindered the visibility, but we still managed to get a glimpse. The vehicle accelerated as we all waited eagerly to spot our next beast. Soon after, we came across groups of spotted deer, all grazing in peace. In fact, all throughout the safari we could see spotted deer in abundance. Next we spotted a herd of elephants with babies. One could already hear the rush inside the bus and

the sound of continuously shuttering cameras. After embracing the moment for a while, we headed on. For minutes on end we could spot nothing but invasive plant species all throughout the landscape. As wildlife conservationists, it was very sad for us to see this. "Tiger!" blurted someone and with it followed a sudden silence. Everyone went vigilant as their eyes kept on scanning through the bushes for the big cat. We waited and waited while the other passengers in the vehicle behind us kept on shouting at us to move ahead. 15 minutes in but the cat was nowhere to be seen, so we moved ahead in disappointment. A chance was missed but on our way back we got a wonderful view of an elephant family of three including a baby feeding on grass. Finally the trip ended.

Our next destination once again was Priya's place, this time to debate on whether it is better to promote conservation by just eradicating *Lantana camara* or by providing livelihoods using it. With agreements and disagreements, the fiery discussion went on for quite a while and the participants really got into it. Unfortunately, we were short on time since we also had to return back to Coimbatore that day. So bidding our farewell to Priya and family, we slowly started our way back.

The trip back home was as fun as the trip beginning. This time I travelled in Sanjay's car, accompanied by Payal and my RHATC fellow mates. There is always something that one can learn while travelling with Sanjay and Payal. Be it something related to wildlife, evolution, psychology, philosophy

or be it the stories and experiences he had gained all these years. They always have something in their treasure trove of knowledge which would intrigue anyone who is keen on learning. Oh, and of course their jokes. It's a great opportunity to be able to be in the same room as them.

With all the incoming insights and cool music playing in the background, one would never wish for the car trip to end, but unfortunately it had to. Before reaching back to Coimbatore, Sanjay and Payal gave us the biggest surprise of the day. We got to meet and share thoughts with the almighty Rakesh Sharma, the first Indian citizen to go into space. The emotions were indescribable.

With all these memories and emotions, we reached back to our place. We bid each other goodnight and went to sleep. It was a trip to remember.

Nilesh Murmu
 RHATC Fellow, 2021–22,
 Zoo Outreach Organization
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Nilgiri Biosphere Nature Park: a success story of a restoration project

About the destination: Nilgiri Biosphere Nature Park was established by the Coimbatore Zoological Park and Conservation Centre (CZPCC) in 1986 to conserve and introduce people to the great biodiversity of Nilgiri Biosphere Reserve. The Park is located on 70 acre land at Thuvaipathy, Anaikatti, 32 km from Coimbatore in Tamil Nadu, India. Some facilities present in the NBNP are the amphibian pond, aquarium, arboretum, herbal garden, pollinator garden, rockery, zodiac garden, amphitheatre, forest zone, educational & recreational activity area, nature trails, kid's play area, greenhouse (nursery), resting huts, and cafeteria. It is home to 300 invertebrates, 22 species of amphibians, 100 species of birds, 18 species of mammals, and 20 species of reptiles. NBNP was awarded the Gerald Durrell Memorial Award and received a Botanic Gardens Conservation International (BGCI) UK grant to establish an arboretum for the endemic and endangered plants of the Nilgiri Biosphere Reserve at Anaikatti in 2004.

Trip Diary: We reached at NBNP at 9 am. A 150-year-old Banyan tree welcomed us. That was the only tree that existed

before restoration of the park. Mr. Kandaswamy, a botanist from NBNP guided us through our tour. He showed us the apiculture area and demonstrated some techniques used in apiculture. As the park hosts various species of native flowering trees, it is a good place for honey production. Then we visited the open-air butterfly garden. Twenty-seven species of butterflies are recorded so far from that butterfly garden. It was good to know that just planting the right native plant can attract butterflies.

We encountered Striped Tiger *Danaus genutia*, Plain Tiger *Danaus chrysippus*, Dark Blue Tiger *Tirumala septentrionis*, Blue Tiger *Tirumala limniace*, Common Crow *Euploea core*, and Double Branded Crow *Euploea Sylvester*. After that we visited a artificial pond what was developed for turtle and frogs. We travelled through the entire park. During the walk, Kandaswamy introduced us to many trees and their economic or ethno medicinal values. We saw *Xylia xylocarpa* that was used for making railway sleeper, Devil's Tree or *Alstonia scholaris*, Red Silk Cotton whose dried fruit have cotton which used for making pillow, *Hydnocarpus pentandra* whose seed oils is used for leprosy treatment, Monkey Tree *Calophyllum inophyllum* whose dry fruit is used as

mosquito repellent, *Dalbergia latifolia* or Rosewood, *Streblus asper* whose leaves are identical to sand paper, *Acacia leucophloea* whose bark is used to make local alcohol, lemon grass, rosemary, sprout leaf plant, sea lettuce tree, *Butea monosperma* or Flame of the Forest, Fishtail Palm *Caryota urens*, black pearl tree, star apple, *Rauvolfia serpentina*, pepper mint, *Phyllanthus niruri*, *Cycas circinalis* gymnosperm, *Santalum album* or Indian Sandalwood, among others. The park also had small huts at regular intervals which not only provide temporary resting place but also had interactive educational and informational boards and carvings to give more insights on biodiversity of the area. After that we went to the recreational or kids play area where we spent some time. There was a tree house which used for bird-watching.

We spent some time at the cafeteria for food. Before heading back we visited the medicinal plant garden which has

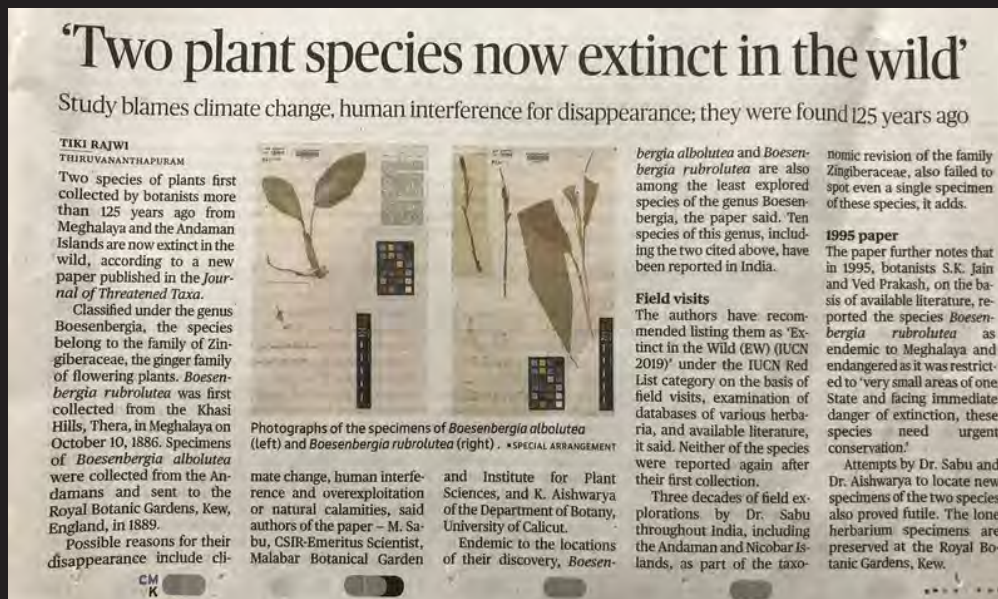
various types of medicinal herbs and shrubs. It also has a Miyawaki forest which is a technique to plant maximum plants in a little urban space.

Conclusion: Often restoration projects in India fail as those projects lack scientific approach. NBNP is a success story showing how scientific approach based on knowledge of local biodiversity help in restoring large area. This restoration project reduced human-elephant negative interaction in nearby villages as it provides alternative food source for elephants. It also provides a corridor and refuge for various ungulates and birds. We can say NBNP is a celebration of conservation efforts.

Supriya Samanta, Vardhini Suresh, Nilesh Murmu, Shweta Madgulkar, Ashritha Anoop, Aakanksha Komanduri, Usha Ravindra, Dhanush Shetty, Arpan Joshi & Trisa Bhattacharjee, RHATC Fellows, 2021–22, Zoo Outreach Organization Coimbatore, TN, India.



Print Media Interpretation!



Understanding science communication & the importance of fact check.

The slip between the cup and the lip THE HINDU article on 09 December 2021

1. The main heading - 'Two plant species now extinct in the wild' based on a publication in the *Journal of Threatened Taxa* (JoTT) seems misleading. The authors of the paper recommended to assign these species under the IUCN Red List category as 'Extinct in the Wild' (EW). The status is not true until it is accepted on the IUCN Red List.

2. The sub heading - Study blames climate change, human interference for disappearance; they were found 125 years ago. This was never mentioned in JoTT and the authors do not blame but they have mentioned the possible reasons for the disappearance of these species.

While reporting on a public platform like print media one needs to be very cautious on the use of words and provide accurate information.

Ashritha Anoop
RHATC 2021-22



#216
21 January 2022

Myths and road kills put the docile chameleon in trouble in MM Hills

The Indian Chameleon *Chamaeleo zeylanicus* is a fascinating reptile of the family Chamaeleonidae; is primarily arboreal found on trees or on small bushes; is best known for their ability to change body colour; and is found in Indian states of Tamil Nadu, Gujarat, Kerala, Goa, Chhattisgarh, Rajasthan, Maharashtra, Karnataka, Madhya Pradesh, Andhra Pradesh, & Odisha and also in countries like Sri Lanka and other parts of southern Asia.

The term 'chameleon' is a combination of two Greek words, 'Chamai', meaning 'on the ground/earth' and Leon, meaning 'lion'. Thus, 'chameleon' means 'earth lion'. This is the only species of chameleon found in Indian subcontinent. However, they



The Indian Chameleon *Chamaeleo zeylanicus* © Ashritha Anoop.



Moist deciduous habitat at MM Hills Wildlife Sanctuary
©Ashritha Anoop



Chameleon road kill: Hanur to Ellemala road © Abhishek M Palya.

are rarely seen in areas that receive heavy rainfall. Unique features of the Indian chameleon are not just restricted to its ability

to change its body colour; it has a long, slender projectile tongue with a sticky end, which helps it in catching prey.

Vision is the primary sense for prey detection in chameleons. The bulging eyes are nearly covered by eyelids and have independent movement of up to 360° rotation. Its feet are shaped like bifid claspers with sharp claws that help in climbing trees. It has a prehensile tail by which it can cling to branches of trees and bushes.

It survives by feeding on locusts, mantis, crickets, and other insects like cockroaches keeping their numbers in check. It is an important food for larger animals like snakes thus helping in keeping them out of our homes.

The Malai Mahadeshwara Wildlife Sanctuary (MMWS in MM Hills) is located in the Chamarajanagara district of Karnataka which was notified as a wildlife sanctuary in 2013 with an area of 906.1



km². The forest vegetation is dominantly dry deciduous, scrub woodland, scattered patches of moist deciduous and riparian habitat (Harisha & Padmavathy 2013; Gubbi et al. 2017). The altitudes ranges 400–1,200 m with rugged terrain. The temperature ranges 18–40 °C and annual rainfall is less than 900 mm (Gubbi et al. 2017; Aravind & Páll-Gergely 2018).

Indian Chameleons are docile creatures. They move slowly with a bobbing or swaying movement. Unfortunately, these harmless animals are killed by people out of fear because of superstitious beliefs related to these species and are also subjected to roads kills. I have observed these both live and dead in and around MMWS during my travel to the field from one village to another along with my colleagues. Usually, they



Chameleon killed by using stones at Sulekobe-Yarambadi Corridor. © Ashritha Anoop.



Chameleon covered with leaves after being killed at Sulekobe-Yarambadi Corridor. © Ashritha Anoop.

are seen on roads moving slowly during the months of July to November and their slow movement acts as a disadvantage to these reptiles as they become victims of road kills. The breeding season falls around

the month of October, however, maximum deaths are also recorded during these months.

People believe chameleons are omens of bad luck; that they are poisonous and are



Sharing is caring: three bat species eating from the same tree in a village of Purulia district, West Bengal, India.

Fruit plants act as a major food source for frugivorous bats in semi-urban or cultivated ecosystems (Chakravarthy & Girish 2003). In return, fruit bats disperse the seeds and pollens of those plant species (Hodgkison et al. 2003). A Guava *Psidium guajava* tree (23.192°N, 86.051°E) at Baghmundi village, Purulia district, West Bengal, India was observed at night in August 2021 to identify the bat species dependent on it as literature showed August is the peak time when bats eat most of the Guava fruits (Chakravarthy & Girish 2003).

Three frugivorous bat species were sighted and photographed using Canon EOS 750D with 18–55 mm lens during the observation. The bat species were Greater Short-nosed Fruit Bat *Cynopterus sphinx* Vahl, 1797, Lesser Short-nosed Fruit Bat *Cynopterus brachyotis* Müller, 1838 & Indian Flying Fox *Pteropus*



Cynopterus sphinx resting on guava tree. © Supriya Samanta.



Cynopterus brachyotis feeding upon guava fruit. © Supriya Samanta.



Different moth species sucking the fruit sap.
© Supriya Samanta.

medius Temminck, 1825. *P. medius* always visited the high canopy fruits whereas *C. brachyotis* and *C. sphinx* targeted the under canopy fruits. They regurgitate the solid substance after sucking the juice from the fruit. Many other species are also dependent on the visit of bats to the tree. Various moths like *Anomis* sp., *Ercheia* sp. and one unidentified species of subfamily Herminiinae were observed to feed on the fruit saps opened by the bats. In daytime the Common Evening Brown *Melanitis leda* (Linnaeus, 1758) butterfly was observed to feed on fruit saps felled by the bats.

References:

Chakravarthy, A.K. & A.C. Girish (2003). Crop protection and conservation of frugivorous bats in orchards of hill and coastal regions of Karnataka. *Zoos' Print Journal* 18(8): 1169–1171.

Hodgkison, R., S.T. Balding, A. Zubaid & T.H. Kunz (2003). Fruit Bats (Chiroptera: Pteropodidae) as Seed Dispersers and Pollinators in a Lowland Malaysian Rain Forest. *Biotropica* 35(4): 491–502.

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Citation: Samanta, S. (2022). Sharing is caring: three bat species eating from the same tree in a village of Purulia district, West Bengal, India. *Small Mammal Mail* #441, In: *Zoo's Print* 37(1): 61–62.



Observation on peculiar roosting behaviour of Greater False Vampire Bat

Greater False Vampire Bat *Megaderma lyra*, a medium-sized carnivorous bat species, is though known to be reported countrywide relatively common in southern parts of India. It usually preys upon large insects, spiders, and small mammals alike bats and rodents. It belongs to the family Megadermatidae, suborder Yinpterochiroptera, and order Chiroptera in class Mammalia. Its global distribution is known to range in Asia from the Afghanistan to southern China, Pakistan, India, Sri Lanka, and southeastern Asia.

Morphologically *Megaderma lyra* is a robust species with an average forearm length of 66.4 mm (56-0 - 71.5 mm) and significantly exceeds that of Lesser False Vampire bat, *Megaderma spasma*. The head is characterised by its large and oval ears which have a fringe of white hairs on their inner margins. The ears are joined medially



An individual of False Vampire Bat roosting over the branch of *Prosopis juliflora* grown wildly in the premises of Thalaiyathu Ayyanar Temple located at base of Kurumalai hills near Kurumalai village in Kayathar tahseel of Thoothkudi district of Tamil Nadu, India. © Arpan Joshi.



Individuals of False Vampire Bat *Megaderma lyra* roosting at the wooden frame ceilings of 'kelu' type rooftop old and unattended house structure of Mr. Mariapan located at Vadakvandhanum village in Kayathar tahseel of Thoothkudi district of Tamil Nadu, India. © J. Dharmaraj.



Individuals of False Vampire Bat roosting at the wooden frame ceilings of 'kelu' type rooftop old and unattended house structure of Mr. Mariapan located at Vadakvandhanum village in Kayathar tahseel of Thoothkudi district of Tamil Nadu, India. © Arpan Joshi.

for between one third and half their length. Each ear has a bifid tragus, the posterior process of which is taller. The face is hairy on the forehead and upper cheeks. However, the snout is essentially naked and is flesh coloured but with some well-defined papillae.

During our recent extensive bat diversity research survey conducted through the period of 12–18 August 2021, we observed collative populations of around 230 individuals of *Megaderma*



K.R. Senacha while demonstrating the morphology of an individual of False Vampire Bat *Megaderma lyla* to Arpan Joshi which was handled for identification and then released back at its old and unattended roadside factory / storage roost premises near Government Water Pump House located at Eppodhumbendranvillage in Ottapidaram tahseel of Thoothkudi district of Tamil Nadu, India. © J. Dharmaraj.



Table 1. Detailed account of morphological measurements noted of a male individual of False Vampire Bat *Megaderma lyra* found roosted at an old and unattended ruined building located inside premises of Thalaiyathu Ayyanar Temple at base of Kurumalai hills near Kurumalai village in Kayathar tahseel of Thoothkudi district of Tamil Nadu, India.

	Name of the characteristic morphological part	Measurements in millimetres (mm)
1	Head and Body length (HB)	80.25
2	Tail length (T)	31.25
3	Forearm length (FA)	62.78
4	Foot length (HF)	16.2
5	Thumb length (Thumb)	20.65
6	Nose leaf length	17.61
7	Ear length (E)	30.85
8	Femur length (F)	20.45
9	Tibia length (TIB)	35.02
10	Wing Span length (WSP)	413.21
11	2nd Metacarpal length (2 Mt)	55.28
12	3rd Metacarpal length (3 Mt)	49.21
13	1st Phalanx of the 3rd Metacarpal length (1 Ph 3 Mt)	27.91
14	2nd Phalanx of the 3rd Metacarpal length (2 Ph 3 Mt)	45.75
15	4th Metacarpal length (4 Mt)	53.28
16	1st Phalanx of the 4th Metacarpal length (1 Ph 4 Mt)	16.16
17	2nd Phalanx of the 4th Metacarpal length (2 Ph 4 Mt)	21.72
18	5th Metacarpal length (5 Mt)	55.82
19	1st Phalanx of the 5th Metacarpal length (1 Ph 5 Mt)	19.79
20	2nd Phalanx of the 5th Metacarpal length (2 Ph 5 Mt)	20.34

lyra at 10 different places across five (Ottapidaram, Thoothukudi, Ettayapuram, Kayathar, and Vilathikulam) of the total 12 tahseels of Thoothukudi district in Tamil Nadu state of India.

While surveying diversity of bats in the villages of Thoothukudi district we went to investigate an old and unattended ruined building (9.064°N, 77.877°E) located in the midst of lush green premises of Thalaiyathu Ayyanar Temple at base of the prevailing

hills near 3 km to the Kurumalai village in Kayathar tahseel. Thereon, we observed a mixed colony of *Megaderma lyra* (30–35 individuals) and Dusky Leaf-nosed Bat *Hipposideros ater* (4–5 Individuals). So as to confirm species we caught a male individual of *Megaderma lyra* using a hand net, handled scientifically and took required morphological measurements (Table 1) and released back safely to the said roost premises. Once we completed our scientific investigations



and about to move from this place we were thrilled to note that about eight individuals of *Megaderma lyra* were roosting calmly in the daylight on the branches of the trees of *Prosopis juliflora* grown in close proximity of the said roost premises. At all the other nine roosting sites of *Megaderma lyra* explored and investigated during the said bat research survey we have seen that individuals of this species roosted in semi-dark wooden base ceilings and upper parts of the fore walls of the dilapidated and isolated structures of old houses but not over the foliage of any trees. We have monitored the individuals roosted on branches of the trees of *P. juliflora* for about 45 minutes time period but they have not opted to move inside the adjoining old and unattended ruined building roost. We therefore believe those individuals of *M. lyra* roosted on the branches of the trees of *P. juliflora* by their choice but not due to any anthropological disturbance. We therefore consider it as a peculiar roosting behaviour of *M. lyra*.

Acknowledgements: Being first author of this research note I wish to thank my mentors and Co-authors, Dr. Sumit Dookia for providing me privileged opportunity to be part of this bat research survey team and Dr. K.R. Senacha for enabling me to not only learn the tools and techniques of bat research but inspire to inculcate the sense of appreciation and zeal to pursue quality research on species of Indian bats. My special thanks to Ms. Trisa Bhattacharjee, my co-fellow at the Ram Hattikudur Advanced Training in Conservation, Coimbatore, India for helping me in writing this research article.

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Odonata diversity of Ajodhya Hills, West Bengal, India

Odonates (dragonflies and damselflies) are considered as bioindicators of aquatic ecosystem and associated habitats (Golfieri et al. 2016). They play important ecological role as predators in aquatic food chain (Robinson & Wellborn 1987). Odonata larva feed on mosquito larva thus controlling the mosquito population (Saha et al. 2012); 488 species of Odonata are present in India (Subramanian & Babu 2017). In West Bengal, there are 239 species (Dawn 2022).

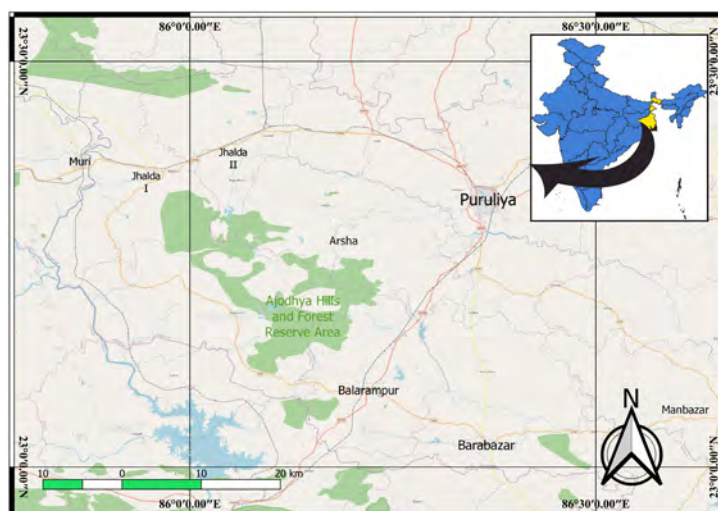
We surveyed the Odonata diversity of Ajodhya Hills (23.165°N, 86.126°E) of Purulia district, West Bengal, India by using opportunistic sighting method between October 2017 to September 2021. Ajodhya Hills is situated in the easternmost part of Chotanagpur plateau with highest elevation of 699m. It is a tropical dry deciduous forest with temperature ranging from 2.8 deg in winter and 52 deg in summer and average annual

rainfall varying from 1,100 mm to 1,500 mm (Samanta et al 2017). It has many streams and irrigation dams that make it perfect habitat for odonates.

This study reports 61 species of Odonata including 35 species from suborder Anisoptera or dragonflies and 26 species from suborder Zygoptera or damselflies. Family Libellulidae is the most abundant family with 29 species followed by family Coenagrionidae with 15 species, family Platycnemididae with five

species, families Aeshnidae & Gomphidae with three species each, and family Calopterygidae, Chlorocyphidae & Lestidae with two species each. The odonate diversity of Ajodhya Hills is 12.5% of the Indian odonate diversity and 25.52% of West Bengal state. *Anax immaculifrons*, *Heliocypha bisignata*, and *Caconeura ramburi* are being reported for the first time from West Bengal.

The identification of odonates was based on Nair (2011).



Map of Ajodhya Hills, Purulia, West Bengal.

Bugsn'All

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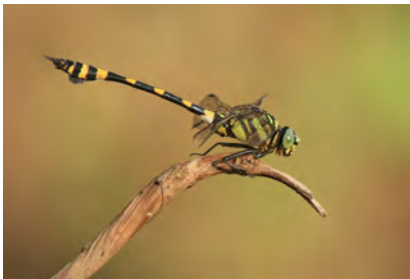
*Anax guttatus*².



*Anax immaculifrons*².



*Gynacantha dravida*².



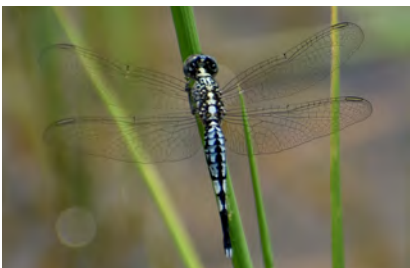
*Ictinogomphus rapax*¹.



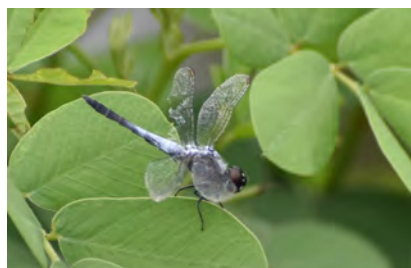
*Macrogomphus annulatus*¹.



*Paragomphus lineatus*¹.



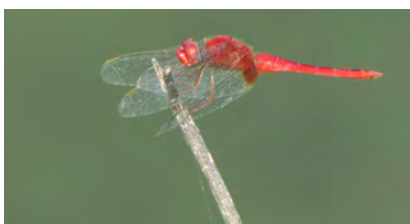
*Acisoma panorpoides*².



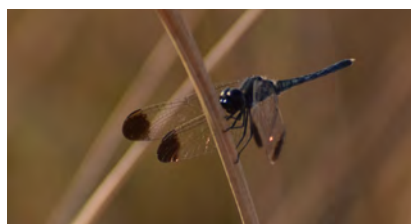
*Brachydiplax farinosa*².



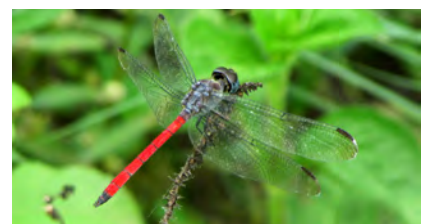
*Bradinopyga geminata*¹.



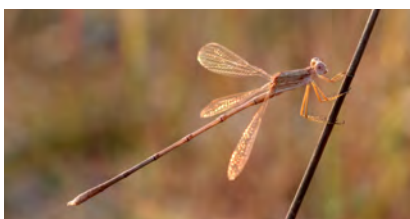
*Crocothemis servilia*¹.



*Diplacodes nebulosa*².



*Lathrecista asiatica*¹.



*Lestes umbrinus*¹.



*Caconeura ramburi*¹.



*Copera marginipes*¹.

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*Neurothemis fulvia*¹.



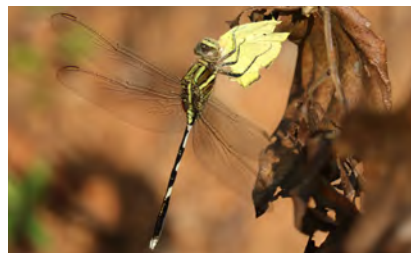
*Neurothemis tullia*².



*Orthetrum glaucum*².



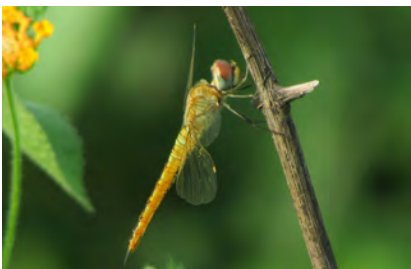
*Orthetrum pruinosum*¹.



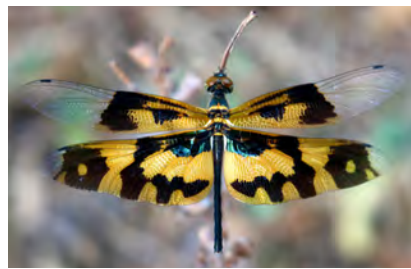
*Orthetrum sabina*¹.



*Tholymis tillarga*².



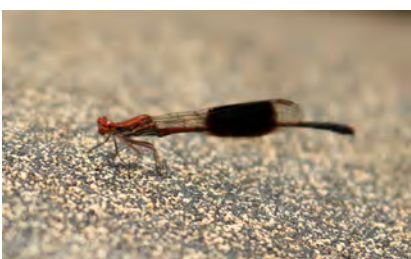
*Pantala flavescens*¹.



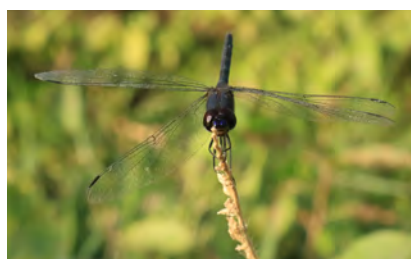
*Rhyothemis variegata*¹.



*Orthetrum taeniolatum*².



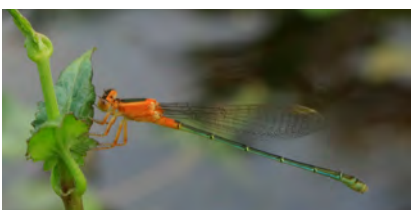
*Disparoneura quadrimaculata*¹.



*Trithemis festiva*¹.



*Trithemis pallidinervis*².



*Ischnura senegalensis*¹.



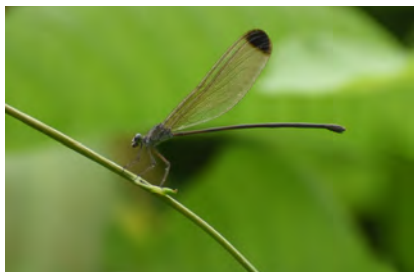
*Pseudagrion decorum*².



*Pseudagrion rubriceps*¹.

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*Vestalis apicalis*².



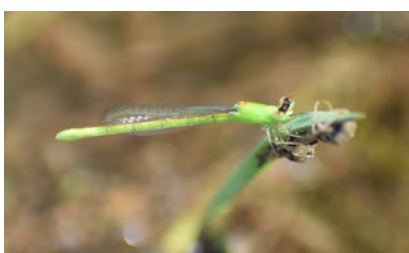
*Vestalis gracilis*¹.



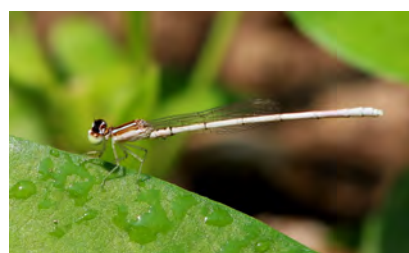
*Heliocypha bisignata*¹.



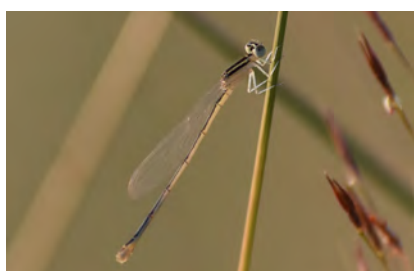
*Libellago lineata*¹.



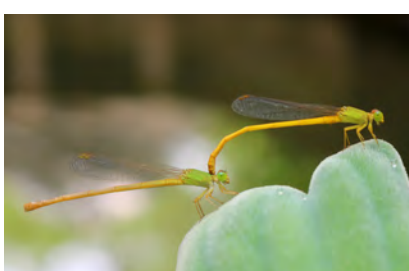
*Agriocnemis kalinga*².



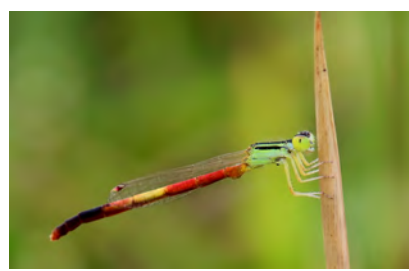
*Agriocnemis lacteola*¹.



*Amphiallagma parvum*².



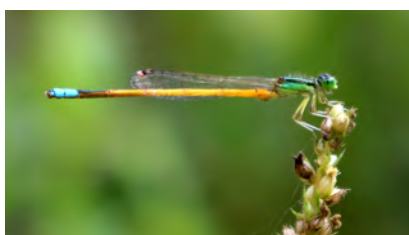
*Ceriagrion coromandelianum*¹.



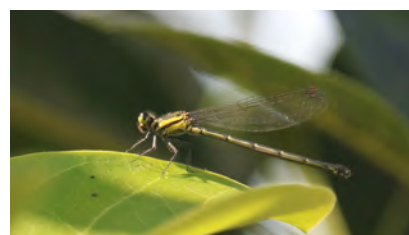
*Ischnura nursei*¹.



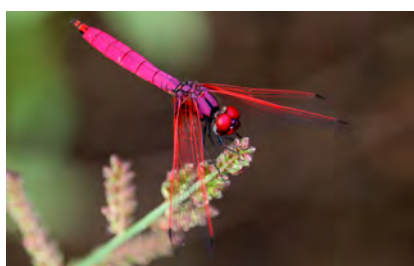
*Pseudocoperia ciliata*².



*Ischnura rubilio*¹.



*Onychargia atrocyana*¹.



*Trithemis aurora*¹.



*Lestes viridulus*¹.

Photo credits: ¹Supriya Samanta,
²Adarsha Mukherjee



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List of dragonflies and damselflies of Ajodhya Hills.

	Scientific name	Common name	IUCN Status
Suborder: Anisoptera			
Family: Aeshnidae			
1.	<i>Anax guttatus</i> (Burmeister, 1839)	Lesser Green Emperor	LC
2.	<i>Anax immaculifrons</i> (Rambur, 1842)	Magnificent Emperor	LC
3.	<i>Gynacantha dravida</i> (Lieftinck, 1960)	Brown Darner	DD
Family: Gomphidae			
4.	<i>Ictinogomphus rapax</i> (Rambur, 1842)	Indian Common Clubtail	LC
5.	<i>Macrogomphus annulatus</i> (Selys, 1854)	Deccan Bowtail	DD
6.	<i>Paragomphus lineatus</i> (Selys, 1850)	Lined Hooktail	LC
Family: Libellulidae			
7.	<i>Acisoma panorpoides</i> (Rambur, 1842)	Trumpet-Tail	LC
8.	<i>Aethriamanta brevipennis</i> (Rambur, 1842)	Scarlet Marsh Hawk	LC
9.	<i>Brachydiplax farinosa</i> (Krüger, 1902)	Black-Tailed Dasher	LC
10.	<i>Brachythemis contaminata</i> (Fabricius, 1793)	Ditch Jewel	LC
11.	<i>Bradinyopyga geminata</i> (Rambur, 1842)	Granite Ghost	LC
12.	<i>Crocothemis servilia</i> (Drury, 1770)	Scarlet Skimmer	LC
13.	<i>Diplacodes nebulosa</i> (Fabricius, 1793)	Black-tipped Ground Skimmer	LC
14.	<i>Diplacodes trivialis</i> (Rambur, 1842)	Blue Ground Skimmer	LC
15.	<i>Lathrecista asiatica</i> (Fabricius, 1798)	Asiatic Blood-Tail	LC
16.	<i>Macrodiplax cora</i> (Brauer, 1867)	Estuarine Skimmer	LC
17.	<i>Neurothemis fulvia</i> (Drury, 1773)	Fulvous Forest Skimmer	LC
18.	<i>Neurothemis intermedia</i> (Rambur, 1842)	Ruddy Meadow Skimmer	
19.	<i>Neurothemis tullia</i> (Drury, 1773)	Pied Paddy Skimmer	LC
20.	<i>Orthetrum glaucum</i> (Brauer, 1865)	Blue Marsh Hawk	LC
21.	<i>Orthetrum luzonicum</i> (Brauer, 1868)	Tri-coloured Marsh Hawk	LC
22.	<i>Orthetrum pruinosum</i> (Burmeister, 1839)	Crimson-tailed Marsh Hawk	LC
23.	<i>Orthetrum sabina</i> (Drury, 1770)	Green Marsh Hawk	LC
24.	<i>Orthetrum taeniolatum</i> (Schneider, 1845)	Taeniolate Marsh Hawk	LC
25.	<i>Pantala flavescens</i> (Fabricius, 1798)	Wandering Glider	LC
26.	<i>Potamarcha congener</i> (Rambur, 1842)	Yellow-tailed Ashy Skimmer	LC



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	Scientific name	Common name	IUCN Status
27.	<i>Rhodothemis rufa</i> (Rambur, 1842)	Rufous Marsh Glider	LC
Family: Libellulidae			
28.	<i>Rhyothemis variegata</i> (Linnaeus, 1763)	Common Picturewing	LC
29.	<i>Tholymis tillarga</i> (Fabricius, 1798)	Coral-Tailed Cloudwing	LC
30.	<i>Tamea basilaris</i> (Palisot de Beauvois, 1805)	Red Marsh Trotter	LC
31.	<i>Tamea limbata</i> (Desjardins, 1832)	Black Marsh Trotter	LC
32.	<i>Trithemis aurora</i> (Burmeister, 1839)	Crimson Marsh Glider	LC
33.	<i>Trithemis festiva</i> (Rambur, 1842)	Black Stream Glider	LC
34.	<i>Trithemis pallidinervis</i> (Kirby, 1889)	Long-legged Marsh Glider	LC
35.	<i>Urothemis signata</i> (Rambur, 1842)	Greater Crimson Glider	LC
Suborder: Zygoptera			
Family: Calopterygidae			
36.	<i>Vestalis apicalis</i> (Selys, 1873)	Black-tipped Forest Glory	LC
37.	<i>Vestalis gracilis</i> (Rambur, 1842)	Clear-winged Forest Glory	LC
Family: Chlorocyphidae			
38.	<i>Heliocypha bisignata</i> (Hagen in Selys, 1853)	Stream Ruby	LC
39.	<i>Libellago lineata</i> (Burmeister, 1839)	River Heliodor	LC
Family: Coenagrionidae			
40.	<i>Aciagrion hisopa</i> (Selys, 1876)	Violet-striped Slender Dartlet	LC
41.	<i>Agriocnemis femina</i> (Brauer, 1868)	Pruinosed Dartlet	LC
42.	<i>Agriocnemis kalinga</i> (Nair & Subramanian 2015)	Indian Hooded Dartlet	LC
43.	<i>Agriocnemis lacteola</i> (Selys, 1877)	Milky Dartlet	LC
44.	<i>Agriocnemis pygmaea</i> (Rambur, 1842)	Pygmy Dartlet	LC
45.	<i>Amphiallagma parvum</i> (Selys, 1876)	Azure Dartlet	LC
46.	<i>Ceriagrion coromandelianum</i> (Fabricius, 1798)	Coromandel Marsh Dart	LC
47.	<i>Ischnura nursei</i> (Morton, 1907)	Pixie Dartlet	LC
48.	<i>Ischnura rubilio</i> (Selys, 1876)	Western Golden Dartlet	
49.	<i>Ischnura senegalensis</i> (Rambur, 1842)	Senegal Golden Dartlet	LC
50.	<i>Paracercion malayanum</i> (Selys, 1876)	Malayan Lilly-Squatter	LC
51.	<i>Pseudagrion decorum</i> (Rambur, 1842)	Three-lined Sprite	LC
52.	<i>Pseudagrion microcephalum</i> (Rambur, 1842)	Blue Sprite	LC
53.	<i>Pseudagrion rubriceps</i> (Selys, 1876)	Saffron-faced Blue Sprite	LC

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	Scientific name	Common name	IUCN Status
54.	<i>Pseudagrion spencei</i> (Fraser, 1922)	Brook Sprite	LC
Family: Lestidae			
55.	<i>Lestes umbrinus</i> (Selys, 1891)	Brown Spreadwing	DD
56.	<i>Lestes viridulus</i> (Rambur, 1842)	Emerald-striped Spreadwing	LC
Family: Platycnemididae			
57.	<i>Caconeura ramburi</i> (Fraser, 1922)	Indian Blue Bambootail	DD
58.	<i>Copera marginipes</i> (Rambur, 1842)	Yellow Bush Dart	LC
59.	<i>Disparoneura quadrimaculata</i> (Rambur, 1842)	Black-winged Bambootail	LC
60.	<i>Onychargia atrocyana</i> (Selys, 1865)	Black Marsh Dart	LC
61.	<i>Pseudocopera ciliata</i> (Selys, 1863)	Pied Bush Dart	LC

References

Dawn, P. (2022). Dragonflies and damselflies (Insecta: Odonata) of West Bengal, an annotated list of species. *Oriental Insects* 56(1): 81–117. <https://doi.org/10.1080/00305316.2021.1908188>

Golfieri, B., S. Hardersen, B. Maiolini & N. Surian (2016). Odonates as indicators of the ecological integrity of the river corridor: Development and application of the odonate river index (ORI) in northern Italy. *Ecological Indicators* 61(2): 234–247. <https://doi.org/10.1016/j.ecolind.2015.09.022>

Nair, M.V. (2011). Dragonflies and Damselflies of Orissa and eastern India. Wildlife Organization, Forest & Environment Department, Government of Orissa, Bhubaneswar, 254 pp.

Robinson, J.V. & G.A. Wellborn (1987). Mutual Predation in Assembled Communities of Odonate Species. *Ecology* 68(4): 921–927. <https://doi.org/10.2307/1938363>

Saha, N., G. Aditya, S. Banerjee & G.K. Saha (2012). Predation potential of odonates on mosquito larvae: Implications for biological control. *Biological Control* 63(1): 1–8. <https://doi.org/10.1016/j.biocontrol.2012.05.004>

Samanta, S., D. Das & S. Mandal (2017). Butterfly fauna of Baghmundi, Purulia, West Bengal, India: a preliminary checklist. *Journal of Threatened Taxa* 9(5): 10198–10207. <http://doi.org/10.11609/jott.2841.9.5.10198-10207>

Subramanian, K.A. & R. Babu (2017). *A Checklist of Odonata (Insecta) of India. Version 3.0.* Zoological Survey of India, Kolkata.

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Butterflies of the Liana Forest farm

The Liana Forest farm (12.237° N, 76.334° E) is situated in Ratnapuri village of Hunsuru, Karnataka, India. Hunsuru at 792 m receives an average rainfall of 760 mm. The total area of the liana forest farm is approximately 4 ha. The nearest national park is Nagarahole, 20 km to Veerana Hosahalli check post. The liana forest farm contains flora like *Ficus virens*, *Caryota urens*, *Psidium guajava*, *Syzygium* sp., *Zizipus mauritiana*, *Terminalia catappa*, *Thunbergia erecta*, *Heliconia rostrata*, and *Allamandra cathartica* out of which some are nectar and host plant for butterflies to complete its life cycle.

Nishanth CV, Dhanush Shetty & Supriya Samanta documented the butterflies

for two days 29–30 October 2021 with Nikon D7200 with 105 mm lens & Canon 750D with 55–250 mm lens.

The butterflies were identified using Bhakarae & Ogale (2018). This study is supported with a preliminary checklist of the butterflies prepared by volunteers Kiran Bagade & Divya Shree of the Liana Trust during the month June 2020. Both the

documentation of butterflies were opportunistic.

The high abundance of family Nymphalidae in the area may probably be attributed to the high abundance of grasses and reeds, which form the major food plants of these butterflies. The localities which yielded higher diversity have very good flowering plants; dense vegetation which provide





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Butterflies of the Liana Forest farm

	Scientific Name	Nomenclature	Common Name	Schedule WPA-1972	October 2021	June 2020
Papilionidae (Swallowtails)						
1	<i>Graphium teredon</i>	C. & R.Felder, 1865	Southern/ Narrow-banded Bluebottle	-	Y	N
2	<i>Graphium doson eleius</i>	Fruhstorfer, 1907	Common Jay	-	Y	N
3	<i>Graphium agamemnon menides</i>	Fruhstorfer, 1904	Tailed Jay	-	Y	N
4	<i>Pachliopta hector</i>	Linnaeus, 1758	Crimson Rose	I	Y	Y
5	<i>Pachliopta aristolochiae</i>	Fabricius, 1775	Common Rose	-	Y	N
6	<i>Papilio polytes romulus</i>	Cramer, 1755	Common Mormon	-	Y	Y
7	<i>Papilio helenus daksha</i>	Hampson, 1889	Red Helen	-	Y	N
8	<i>Papilio polymnestor polymnestot</i>	Cramer, 1775	Blue Mormon	-	Y	N
9	<i>Troides minos</i>	Cramer, 1779	Southern Bird Wing	-	Y	Y
10	<i>Papilio demoleus demoleus</i>	Linnaeus, 1758	Lime Swallowtail	-	N	Y
Pieridae (Whites & Yellow)						
11	<i>Eurema hecabe hecabe</i>	Linnaeus, 1758	Common Grass Yellow	-	Y	N
12	<i>Eurema blanda silhetana</i>	Wallace, 1867	Three-spot Grass Yellow	-	Y	N
13	<i>Catopsilia pomona pomona</i>	Fabricius, 1775	Lemon or Common Emigrant	-	Y	Y
14	<i>Hebomoia glaucippe australis</i>	Butler, 1898	Great Orange-tip	-	Y	N
15	<i>Pareronia hippia</i>	Fabricius, 1787	Common Wanderer	-	Y	Y
16	<i>Colotis amata</i>	Fabricius, 1775	Small Salmon Arab	-	N	Y
17	<i>Delias eucharis</i>	Drury, 1773	Common Jezebel	-	Y	N
18	<i>Cepora nerissa phryne</i>	Fabricius, 1775	Common Gull	-	Y	N
Nymphalidae (Brush-footed)						
19	<i>Tirumala limniace exoticus</i>	Gmelin, 1790	Blue Tiger	-	Y	N
20	<i>Tirumala septentrionis dravidarum</i>	Fruhstorfer, 1899	Dark Blue Tiger	-	Y	N
21	<i>Danaus chrysippus chrysippus</i>	Linnaeus, 1758	Plain Tiger	-	Y	Y
22	<i>Danaus genutia genutia</i>	Cramer, 1779	Striped Tiger	-	N	Y
23	<i>Euploea core core</i>	Cramer, 1780	Common Crow	-	Y	Y
24	<i>Euploea sylvester coreta</i>	Godart, 1819	Double-branded Crow	-	Y	N
25	<i>Mycalesis patnia junonia</i>	Butler, 1868	Glad-eye Bushbrown	-	Y	N
26	<i>Ypthima baldus madrasa</i>	Evans, 1924	Common Five-ring	-	Y	Y



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	Scientific Name	Nomenclature	Common Name	Schedule WPA-1972	October 2021	June 2020
27	<i>Ariadne merione merione</i>	Cramer, 1777	Common Castor	-	N	Y
28	<i>Mycalesis perseus tabitha</i>	Fabricius, 1793	Common Bushbrown	-	N	Y
29	<i>Euthalia aconthea meridionalis</i>	Fruhstorfer, 1906	Common Baron	-	N	Y
30	<i>Melanitis leda leda</i>	Linnaeus, 1758	Common Evening Brown	-	N	Y
31	<i>Ypthima huebneri</i>	Kirby, 1871	Common Four-ring	-	Y	N
32	<i>Ypthima ceylonica</i>	Hewitson, 1865	White Four-ring	-	Y	N
33	<i>Neptis hylas varmona</i>	Moore, 1872	Common Sailer	-	Y	Y
Nymphalidae (Brush-footed)						
34	<i>Orsotriaena medus mandata</i>	Moore, 1857	Medus Brown	-	Y	Y
35	<i>Elymnias caudata</i>	Butler, 1871	Tailed Palmfly	-	N	Y
36	<i>Junonia iphita pluviatalis</i>	Fruhstorfer, 1900	Chocolate Pansy	-	Y	Y
37	<i>Junonia lemonias vaisya</i>	Fruhstorfer, 1912	Lemon Pansy	-	Y	N
38	<i>Junonia almana almana</i>	Linnaeus, 1758	Peacock Pansy	-	N	Y
39	<i>Junonia atlites atlites</i>	Linnaeus, 1763	Grey Pansy	-	N	Y
40	<i>Hypolimnas misippus</i> *	Linnaeus, 1764	Danaid Eggfly	I	Y	Y
41	<i>Hypolimnas bolina jacintha</i>	Drury, 1773	Great Eggfly	-	N	Y
Lycaenidae (Blues)						
42	<i>Prosotas dubiosa indica</i>	Evans, 1925	Tailless Lineblue	-	Y	N
43	<i>Jamides celeno aelianus</i>	Fabricius, 1793	Common Cerulean	-	Y	N
44	<i>Zizula hylax hylax</i>	Fabricius, 1775	Tiny Grass Blue	-	Y	N
45	<i>Zizeeria karsandra</i>	Moore, 1865	Dark Grass Blue	-	Y	N
46	<i>Anthene lycaenina lycaenia</i> ^	R. Felder, 1868	Pointed Cilate Blue	II	N	Y
47	<i>Castalius rosimon rosimon</i>	Fabricius, 1775	Common Pierrot	-	N	Y
48	<i>Caleta decidia</i>	Hewitson, 1876	Angled Pierrot	-	N	Y
49	<i>Arhopala amantes amantes</i>	Hewitson, 1862	Large Oakblue	-	N	Y
50	<i>Iraota rochana</i> ^	Horsfield, 1829	Scarce Silver Streak Blue	II	N	Y
51	<i>Arhopala bazaloides bazaloides</i> ^	Hewitson, 1878	Tamil Centaur Oakblue	II	N	Y
Hesperiidae (Skippers)						
52	<i>Iambrix salsala luteipalpis</i>	Plotz, 1886	Chestnut Bob	-	Y	N
53	<i>Sarangesa dasahara davidsoni</i>	Swinhoe, 1912	Common Small Flat	-	Y	N
54	<i>Pseudocoladenia dan dan</i>	Fabricius, 1787	Fulvous Pied Flat	-	Y	N
55	<i>Udaspes folus</i>	Cramer, 1775	Grass Demon	-	N	Y

* WPA 1972 Schedule I ^ WPA 1972 Schedule II

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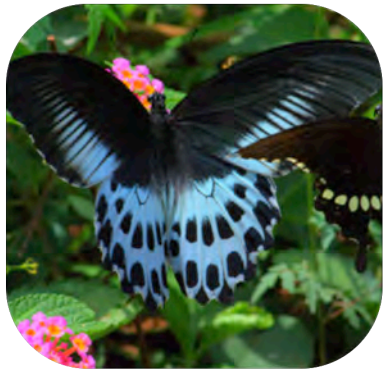
Common Mormon.



Tailed Jay.



Blue Bottle.



Blue Mormon.



Common Jay.



Lime Butterfly.



Southern Bird Wing.



Common emigrant.



Common Grass Yellow.



Common Wanderer.



Small Salmon Arab.



Three Spot Grass Yellow.

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Common Gull.



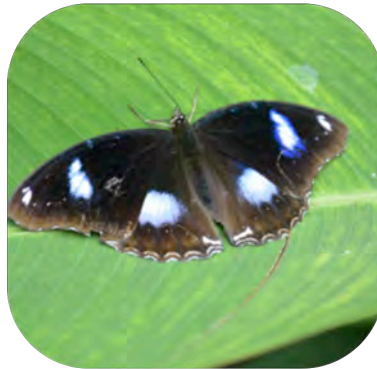
Common Jezebel.



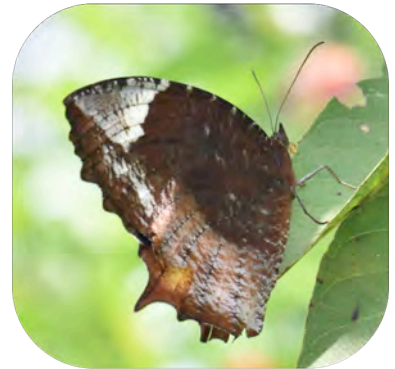
Double Branded Crow.



Blue Tiger.



Great Eggfly.



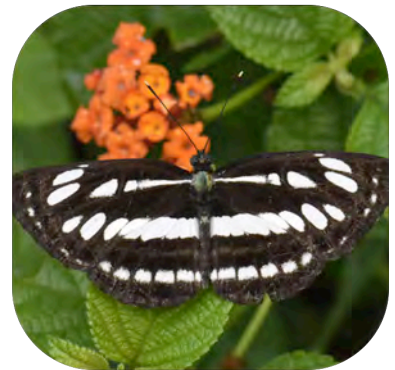
Tailed Palmfly.



Chocolate Pansy.



Common Four-ring



Common Sailer.



Dark Blue Tiger.



Grey Eye Bush Brown.



Grey Pansy.

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Lemon Pansy.



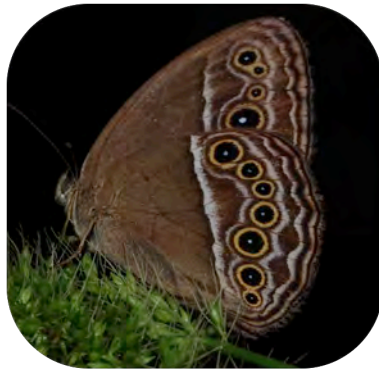
Medus Brown.



Plain Tiger.



Striped Tiger.



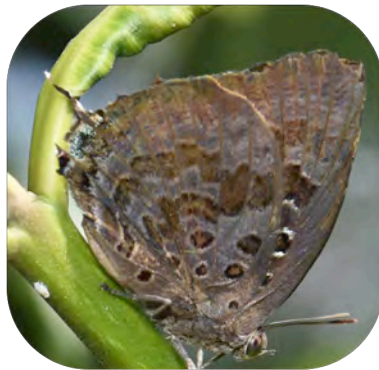
Common Bush Brown.



Common Crow.



White Four-ring



Large Oak Blue.



Pointed Ciliate Blue.



Tiny Grass Blue.



Common Cerulean.

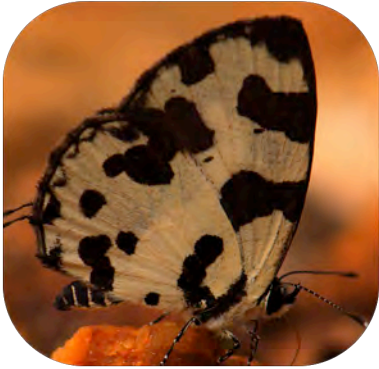


Tailless Lineblue.

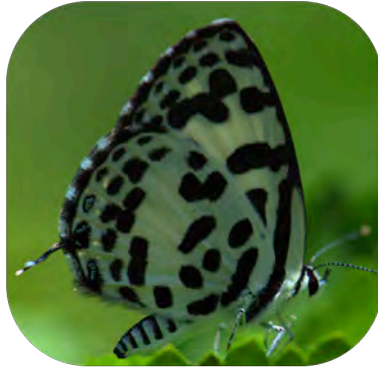
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Angle Pierrot.



Common Pierrot.



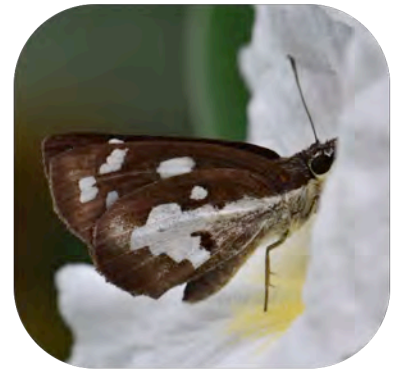
Dark Grass Blue.



Common Small Flat.



Fulvous Pied Flat.



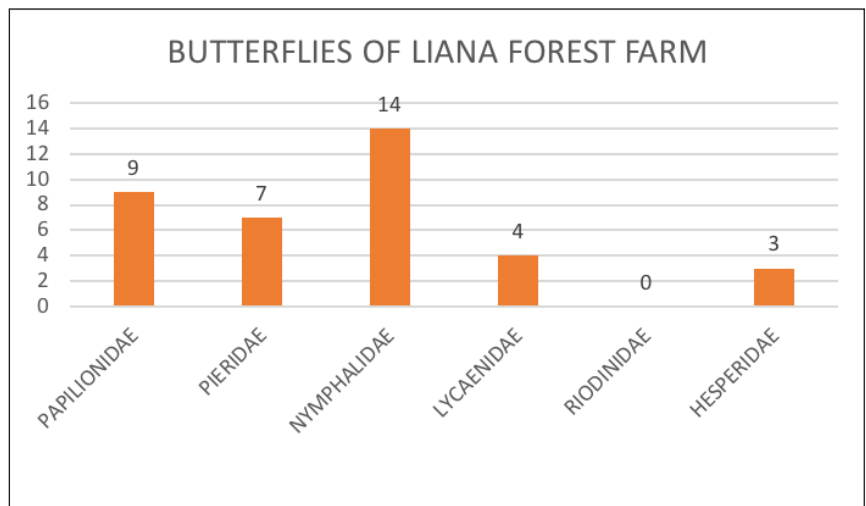
Grass Demon.



Chestnut Bob.

Photos by Nishanth CV

Number of butterfly species recorded under different families.



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favourable habitat for butterflies.

Two species are protected under Schedule I, three species under Schedule II of the Indian Wildlife (Protection) Act 1972. The native tree composition and farming may have helped to support this great variety of butterflies.

Conclusion

Opportunistic surveys done during the study to create this preliminary checklist, which would form the baseline data for future studies in the study area. The dominance of Nymphalidae and Papilionidae indicates the presence of open vegetation areas.

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Reference

Bhakare, M. & H. Ogale (2018). *A Guide to Butterflies of Western Ghats (India). Includes Butterflies of Kerala, Tamil Nadu, Karnataka, Goa, Maharashtra, and Gujarat states.* Authors and publishers, Satara & Sindhudurga, x+496 pp.

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Rare sighting of Sociable Lapwing in Jaisalmer, Rajasthan



Two individuals of Sociable Lapwing in Khetolai. © Mayank Bohra.

An IUCN Red List ‘Critically Endangered’ bird was sighted in the Jaisalmer district of Rajasthan after 15 years. The Sociable Lapwing *Vanellus gregarious* migrates from Kazakhstan, for over 10,000 km every year.

The species lives its life across several habitats, including dry subtropical and temperate grasslands, wetlands, and temperate deserts. Its population has declined by about 40% between 1930 and 1960, and further got halved between 1960 and 1987 in northern Kazakhstan (Birdlife International 2019).

In 2020, an individual of Sociable Lapwing was seen in the waterbodies of three villages in Jaisalmer, namely, Khetolai, Chacha, and Lathi sitting

among a flock of Red-Wattled Lapwing *Vanellus indicus*. Again on 8 November 2021, two individuals were observed in waterbodies at Khetolai and Chacha amidst Red-Wattled Lapwing flock. Individuals of Sociable Lapwing were seen flying and feeding across different water bodies, in these villages. Radheshyam Bishnoi has made a video and reported the Sociable Lapwing in eBird in 2020. This is a report to publish the finding formally along with photograph and [video](#).

Reference

BirdLife International (2019). *Vanellus gregarius* (amended version of 2018 assessment). The IUCN Red List of Threatened Species 2019: e.T22694053A155545788. Accessed on 11 January 2022. <https://doi.org/10.2305/IUCN.UK.2019-3.RLTS.T22694053A155545788.en>.

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