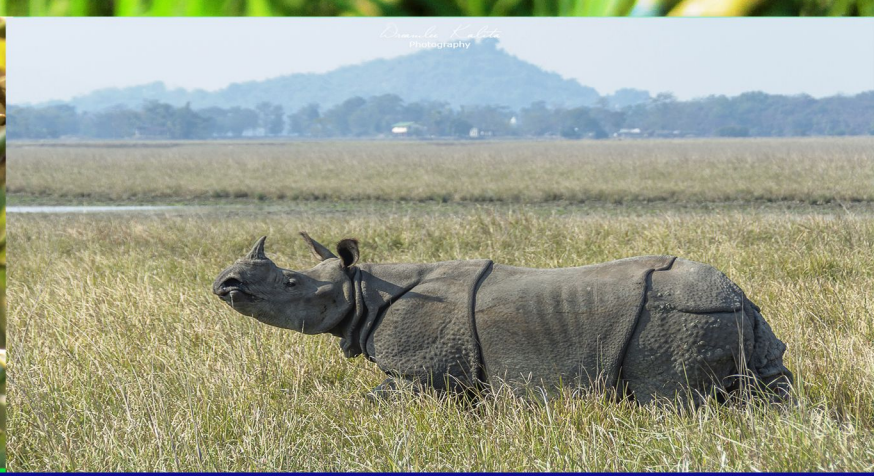
Voice of Environment

(Organisation for Clean, Green & Sustainable Environment)

Newsletter

Volume 02, Issue 01

"NATURE & WILDLIFE"



April, 2019

Website:www.voiceofenvironment.org

Email Id-voiceofenvironmentngo@gmail.com

Voice of Environment Newsletter

Volume-2, Issue-1

April, 2019

Editorial Team

Voice of Environment Newsletter

Volume-2, Issue-1, 2019

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FROM THE EDITORIAL DESK…

The springs gave way to scorching summer as we are back with a new issue of Voice of Environment Newsletter based on the central theme; Wildlife. Springs were silent and so are the summers, scorching heat waves in April like never before. We are facing incredible climate change effects as depleted ground water levels, vanishing forest covers and air pollution is turning our future bleak. As I am writing this, the extinction clock ticks for the little-known Philippine pangolin, rise in crocodile sightings being linked to habitat degradation in Indonesia, over 2700 elephant tusks being seized in China in a massive bust and last known female Yangtze giant soft-shell turtle dies in China. Human pressures on the Serengeti's fringes threatens the wildlife within, leopards being beaten to death in North-Eastern Himalayan tea gardens, nearly 1,50,000 orangutan lost to logging, palm oil and human conflict are no separate instances but are cumulative evidences of human greed blown out of proportions. The list is unending. Amidst all the negative news pouring in and disappointing us through this year's wildlife week and beyond, Sir David Attenborough has shown us a ray of hope in his latest video released on the occasion of Earth Day. In the video, titled *Our Planet, A Reason For Hope*, Attenborough talks about how it is now possible to save the planet, a possibility that did not manifest itself too clearly in the past few years. He lays out an "obvious plan" to save the Earth: stop doing the damaging stuff, roll out new green technology as soon as they arrive, stabilize the human population, and keep hold of the natural wealth that is currently available to us. If humans follow all these steps to secure a harmonious future for all living organisms on Earth, in eighty years' time the worst of the after-effects of the destruction will be past us, he assures further. We have no options to compromise with this planet. The beauty of wildlife in all its greatness lies undiscovered in front of us. We shouldn't lose hope but work for the betterment of this planet with war footing. The current issue of the Newsletter is a humble step in this regard as authors showcase a bouquet of experiences and tryst with wildlife across the country and beyond. I wish all the contributors and VOE editorial team a grand success on the occasion of the release of this special issue.

Editor-in-Chief

Voice of Environment

Dr. A. U. Choudhury, Ph.D, D.Sc., IAS
Commissioner & Secretary,
Pension & Public Grievances,
Hill Areas Departments,
~~Handloom & Textiles, Sericulture,~~
Mines & Minerals.
Government of Assam.

सत्यमेव जयते

Block-D, 2nd Floor, Janata Bhawan,
Dispur, Guwahati–781006
Tel. : 0361-2237227
Mobile : +91 9435079376

MESSSAGE

I am glad to know that the Volume-2, No.1 issue of "Voice of Environment" Newsletter is going to be published. This year the focus is on wildlife and conservation. Due to environmental degradation such as loss of habitat has resulted in decreasing in numbers of most of the wildlife. In addition, there is the direct killing of wildlife for local consumption and international trade of their body parts. Then there is a serious challenge from plastic pollution, which has even affected the marine life in a big way. Many of the life forms including mammals, birds, reptiles, fishes, insects, etc., have become extinct and many more are fast approaching towards that. It is high time that everybody should join hands to save environment, which will ultimately save the human kind.

It is hoped that the Newsletter "Voice of Environment" would be able to generate awareness and interest at least among some section of the society. This is at a time when the wildlife and other natural resources are facing serious pressure from human induced activities.

21-02-2019

(A.U.Choudhury)

Monali Sen, IFS

OSD Forest
Secretariat, Jaipur
Rajasthan

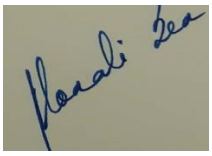
Message

It's indeed an ecstatic feeling to be a part of the latest edition of the **"Voice of Environment"** (VoE) newsletter targeting the conservation of our rich national heritage of wildlife as an indispensable part of environmental conservation. As always like the previous editions, this one will also undoubtedly be a successful & much appreciated act of awareness spreading cum conservation initiative.

The forests & predominantly the wildlife is in a high risk of extermination & extinction presently. As a species of the Earth it's our combined duty to save the other species from facing the devastating future down-spiral towards zero. Each of our tiniest contribution will matter, it will attract others' attention & initiation to join in this fight of saving our planet & its residents, holistically.

I sincerely wish VoE to be one of the pioneers of this fight, to conserve our future for all, to be the spokesman of those who can't speak or seek our help for saving them. The success of VoE to pave the path of environmental conservation is success for all of us.

To a brighter & safe wild future, holding hands with VoE always.



Invited Article:

INDIAN FOREST & WILDLIFE: NOTES OF A GYPSY FORESTER ABOUT WOODS OF THIS AMAZING LAND

Monali Sen, IFS

*"The clearest way into the Universe is through a forest wilderness"—**John Muir***

Why a Forester?

Nature is God's abode, the ultimate refuge of the civil animals like the ever-wandering human being. My thirst of nature has compelled me to disembark the path of a researcher forester in form of being an Indian Forest Service officer; thus, clubbing my professional commitment with my personal curious passion.

The exposure gained:

My service provided me the opportunity of visiting all the hitherto unexplored areas of my country, covering all the UNESCO Natural Heritage sites. The journey went through the course of service span of 5 years with privilege of exploring almost all the major forests & its rich faunal resources; starting from the Trans Himalaya & Himalayan alpine forest, gaining progress through central Indian deciduous temperate richness, off shooting via Rann of Kutch & tremendously bio diversified Western Ghats, taking penultimate break in mangroves of Andaman & Nicobar vis-a-vis Sundarban, finally reached to the rich moist tropical evergreen treasures of North East; developed acquaintance with one & all.

Amidst all this exposure, on one hand the traveler researcher mind sought more knowledge, on the other hand the incessantly inquisitive forester instinct queries for the future outcomes of our precious natural resources based on the present-day circumstances. Our forest stores an immense prospect in itself, the rich biodiversity & variability can continue mesmerizing future generations to come, 'IF'…… as will be elaborated later on, in today's context this "IF" being the main clause of sustained conservation…. Still before starting solving this singular word, the present scenario must be reviewed with an unbiased mind.

Our priceless wild treasures & the unique features:

India is a mega biodiversity country harboring about 45,000 plant species and 91,000 animal species. But in terms of environmental conservation we are presently moving through a development centric era & its unquestionably evident that forest is anti-developmental, so the developmental projects are moving through & causing massive loss in natural resources which are undoubtedly irreplaceable. The damage in turn is more strengthened by over exploitation, poor management of natural resources and degradation of the forests. Compensatory efforts are continuously being made in form of replanting. Alas! reforestation & afforestation can't compensate regeneration & natural growth. Another biggest challenge is pollution & habitat shrinkage, both leading to gradual reduction in undisturbed secluded survival scope of wildlife, which is the cause of vulnerability as well as their ability to be exposed to intense poaching. This grave scenario presents a possibility of impending extinction to all major species in coming times.

Yet amidst all these threats our UNESCO Natural World Heritage sites are sustaining camazingly in a thought-provoking manner. Can the reason lie in some of their unique characteristics? Any added administrative, local, traditional or geographical benefits? Western Ghats in Kerala, Karnataka, Tamilnadu and Maharashtra (having a shared & undisturbed stretch of natural forest where cooperation among states is must, so as the managerial grip on protection is more tightened) & Kaziranga National Park, Assam (singular most area with martial law enforced conservation approach) etc., true examples of natural or cultural heritage.

Thus, all these areas have some out of the box traits in them. In form of social cooperation between local people & administrators, strict law enforcement for conserving endangered species, difficult terrain providing natural safety & finally well managing capability with appropriate administrative inputs.

Can't avoid some cons though:

On the flip side there are many other areas which are more or less shrinking & depleting. The prominent issue can definitely be pin pointed as ineffective management. Wildlife needs observation-monitoring-analysis-implementation-observation in a clockwise circulating system.

The final managerial outcome should always include an analytical and knowledge-based perspective. Field working & conscious awareness clubbed with logical conclusion drawing ability is the need of the hour. Irrespective of its size, a forest or a protected area is a thriving biological entity on a whole. Single issue-based approach should immediately transform to a broader landscape-based approach with judicious administrative backup vis-a-vis quality research input. This input signifies the implementation of both knowledge of past experiences or present production of relevant, credible science. Where we are in dire need of mobilizing knowledge for achieving sustainable development, instead we are too wrapped up in solving insignificant managerial issues on a day to day basis. Unfortunately, the bigger perspective is being neglected day by day in preference to short sighted achievement and leading towards a disaster.

The pathway ahead:

Therefore finally we may return to the "IF"…… Our forest stores an immense prospect in itself, the rich biodiversity & variability can continue mesmerizing future generations to come, IF the production of usable knowledge started falling in the purview of sustainability science, or in other words a joint collaboration of knowledge, administration, experience & implementation for sustainability of our natural resources. Worldwide the present inclination is towards coupling & creating "social–environmental systems" in multiple scales, with the same joint effort as stated previously. It is pertinent to cite here example 'of the first green revolution in agriculture' from a recent publication (Clark, 2016) illustrating the importance of incorporating usable knowledge in the innovation system, like ancient art of calligraphy in China, where, craftsmanship of a policymaker must blend with swordsmanship of a frontline field worker. Such co-production will cumulate in salient & credible management.

This way of thinking can also be justified in case of wildlife as well. In case of wildlife, eco system & protected area, probably no management can be implied as best management. Wildlife have their own century old behavioral pattern, thus generating an either-or situation for the mangers. Either we should leave them free or we must study them & implement the suitable measures as resulted from the patient study. Prolonged understanding is basic criteria for every biology-based work and wildlife should get the topmost priority in this respect.

Future is wild & vast:

Such long & disastrous anticipation & feeling of serious necessity of more sustainable approach; still there are rays of hopes. Considering the rationality of both foresters & researchers, in addition enforced by the huge public sentiment & accumulating awareness among the tourist, the student & the general wanderers, the future of wildlife in India is still not too bleak. It's a wakeup call & high time to plunge in action review, not merely act review. The future sustenance of our natural gems & marvels will continue to flourish & fill the general mind in wonder, as stated by Ray Bradbury (Fahrenheit 451) "He stood breathing, and the more he breathed the land in, the more he was filled up with all the details of the land. He was not empty. There was more than enough here to fill him. There would always be more than enough."

This message is for all of us. There will always be more than enough if only our human mind starts learning the rule of nature.

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- Clark W. C. (2016) 'Crafting usable knowledge for sustainable development'. PNAS 113(17): 4570-4578

About the author: Mrs. Monali Sen (IFS batch 2011) is currently serving as OSD Forest, Secretariat Jaipur. She can be reached at email: monal7th@gmail.com

"Of dolphins and the sea…"

-Aashi

This is the breeze that stirs
That restlessness within,
Pulling at those who ache for the spray Of
salt upon their skin.
Follow its call yonder,
Past the horizons o low,
Heaveho, away we go,
Into the distant storm we row.

Some sail the seas for riches,

And some to touch faraway shores,
But we sail for a glimpse of what lies between
The wave and the ocean floor.
Hark! Look there, past star boardside–
Shapes glisten and shift in the sun, Silver
fins cut through the tide,
And leap out one by one.

Streaking now along the hull,
Riding the froth we churn.
You can travel the world from pole to pole,
But there's still more to see, more to learn…
No dusty extort mighty tome
Can help to comprehend
That spark that lives in the dolphin's eye,
That recognition o falost friend.

Oh, if I could only leave behind
My breath to dive down below
And follow you and your kind to shadowy depths,
Down wherever the dolphins go;
Where lurk the eels and octopi,
Where the sperm whale battles the squid...
Where a man can forget all he ever was And
all he ever did.

Man overboard!
Throw him aline,
He's hauled on deck and he opens his eyes,
Casts them around
In frantic hope,
Till reality settles and the light in them dies.

We live on the brink of understanding
The endless wonders of sea and land,
But the cogs of society keep us in place,
Leaving submission as our only playing hand.

PHOTO-STORY: A PICTURE IS WORTH A THOUSAND WORDS




Contributor: Neha Yadav

Conserve Wildlife; Save Humanity

- Shafa Sajjad

Why there is a rife
To conserve the wildlife
But save from whom??
When He has given us same room
If something is needed to be saved there
It should be human kindness & care.

All creatures used to flourish together
Man, animal & diversity of feather

Performing functions distinct
But now equilibrium crumbles
And creatures getting extinct.

We have taken big part of earth
As if it's in our jurisdiction
Creating existence problem henceforth
Leading to their eviction.

60% wildlife wiped out
Conservation efforts are in doubt
Forests & oceans enduring at our hands
Be the voice of voiceless
Let's together take stands.

"It's high time", planet call
Wildlife is experiencing fall
Have concern & stand tall
Save the living fabric,
That sustains us all.

WILDLIFE: After all these Years!

- Prashant Mahajan

After all these years animals disappears,
From the known noises,
To the extinct voices,
We try to redeem our mistakes,
By revolving around the same choice,
Hoping to see the beauty of nature,

By bringing down the home of beautiful creatures,

So, after all these years animals disappears,
Fulfilling our every need,
By killing animals for the greed,
In the riots of the reservation,
We neglected the wildlife conservation,
And if we are done with the claws, horns, skins and scales,
Let not bring it down for the future tales,

And after all these years animal disappears,
All we show them our rage,
By putting them inside the cage,
Shrinking the forests for our benefit,
Then complaining why so much of conflict,
But then also world is not at rest,
Trying to conserve the Wildlife at its best,
So that after few years animals can reappear.

Voices from the field:

SIZE TRULY DOES NOT MATTER – THE STORY OF DETERMINATION

Siddarth Kumar Gogoi

It was a busy day, infact it was the day when the country celebrates "the arrival of spring" or is fondly called the "festival of colors" Holi as the world knows it. Every evening from 5 – 6 pm we keenly observe the behavior of the Himalayan Goral or the mountain goat, there are about 6-7 of them up in the cliffs on the other side of the Kosi river. Kosi forms the western boundary of Jim Corbett National Park in Uttarakhand one of the most scenic states of the country. While everyone was busy enjoying the festival of colors in the lawn, we kept our eyes on the ghorals and for any suspicious behavior that would reveal a predator around. Not too long ago a pair of leopards tried to hunt the gorals but as sure footed as they are the gorals ran up the cliff with such ease which only mountain goats are capable of. It was an unsuccessful hunt.

This day though was very different and presented before us an event which I still find it hard to swallow. With our powerful scope we had our eyes on the gorals grazing on the cliff and did not notice any such behaviors that would have revealed a predator around. Things did not take too long to throw the surprise, we saw a goral losing its footing and fell in front of a cave with a loud thud. Himalayan gorals hardly lose their footing and their hooves are designed to climb up and down steep cliffs with ease. Armed with binoculars and a powerful scope we tried to find out the

cause of its misfortune when we spotted a Yellow Throated Marten an elusive animal running towards the fallen goral which now is struggling to get up on its feet. I have known the fact that martens are fearless hunters but to see this animal trying to hunt a goral which is more than 10 times body weight is something I'm still not able to come to terms with. An adult male marten would roughly measure about less than 30 inches and weigh not more than 4 kg compared to a goral which weighs around 45 kgs. I remembered seeing a video of a marten killing a langur which again was quite a feat but to have successfully hunted a Himalayan goral was a different ball game altogether.

It started feeding on it while its counterparts from high above kept watching the poor goral. There were two martens possibly a male and a female and we were looking at this nature spectacle from a distance of about 200 meters, undisturbed the martens fed well and they fed on it the second day before the carcass was completely stripped off. I have been visiting wildlife parks for more than 30 years but nothing comes close to what I saw that day, it was indeed one of nature's greatest surprises. The yellow throated marten sets an example of what grit and determination can deliver: and that size is merely a number.

Corresponding email: sunnybuddy@gmail.com

Photo Story:

"Eye to eye with unicornis, from ground level, at point blank range"

The above image was shot Dr. Simanta Kalita in Pabitora Wildlife Sanctuary, Assam in January, 2019.

"The Pride of India: Holding the horn high"

This image was shot by Dreamlee Kalita in Pabitora Wildlife Sanctuary, Assam in January, 2019. Dreamlee is 11 years old and is a Class VI student of Don Bosco High School, Guwahati. She is one of the youngest female wildlife photographers in India.

The photograph on the left is of Ms. Dreamlee Kalita, daughter of Dr. Simanta Kalita. Dr. Simanta Kalita is an ace Wildlife Photographer and Programme Director, Centre for Environment Education (CEE), India.

THE LAST FLIGHT

Neglecting the significant role of raptors in the ecosystem doesn't bode well for their conservation, writes Sanctuary's Assistant Editor Anirudh Nair

A regular winter visitor to the Indian subcontinent, the Steppe Eagle was up listed from 'Least Concern' to 'Endangered' in the Red List of Threatened Species released by the International Union for Conservation of Nature (IUCN) in 2015.

Pic Courtesy: Vinodh Venugopal

In a country where conservation concerns are more reactive than proactive, those that fly high, slip under the radar. Most raptors are large-ranging avian predators that are on the top of their food chain species and maintain the population structure of their prey. Their position at the top of the food chain means that their numbers are fewer and makes them sensitive to the introduction of toxins and harmful chemicals into the environment. Considering the plethora of ecological roles played by raptors, it is imperative to study these vulnerable birds of prey.

This study has done in the early 1970s that highlighted the harmful effects of dichloro-diphenyl-trichloroethane (DDT) on Bald Eagles and the study in the early 2000s that revealed precisely why vulture populations in India were declining – diclofenac. Raptors perform a sentinel role in

the ecosystem by issuing warning signals about food chain toxification, habitat degradation, and waste generation. Research on raptors, rather avians, is still at a nascent stage in India on account of lack of awareness coupled with the disproportionate allocation of funds for large-mammal conservation – a trend that the Raptor Research Conservation Foundation, Mumbai, has been trying to reverse.

For scientific researchers, conservation status of the raptors they wish to study, and other related factors come into play. Considered to be extinct for nearly 113 years, the rediscovery of the Forest Owlet in 1997, for instance, prompted researchers to study and subsequently understand many ecological and behavioral aspects vital to the survival of this critically-endangered species.

Urban areas may seem an easy place to study opportunistic raptors such as kites and kestrels, but researcher Nishant Kumar from the Wildlife Institute of India (WII) faces a new hurdle each day in the field. Referred to as cheel wale (kite people) by his own species, he and his group of volunteers studying the nesting and breeding habits of Black Kites in the National Capital Region must negotiate their way through filth, hooligans and research permits. Though his study site harbors the densest breeding colonies of Black Kites anywhere in the world, he and many of his peers are of the view that much more research is required before anyone is able to arrive at population estimates pan-India. In his words: “Immigrants to Delhi from Uttar Pradesh, Bihar, Rajasthan and Haryana tell us about the large-scale decline in kite numbers in their native states. I am from Bihar and the difference in the number of Black Kites seen now and during my childhood is stark, which is the likely consequence of urban foraging and felling large trees.”

Conducting a first-of-its-kind study in 2014, which seeks to explore the effect of habitat degradation on raptor communities of the Rajaji National Park, Monica Kaushik, a Fulbright Research Scholar working with the Wildlife Institute of India, highlighted the increasing rarity of the critically endangered White-rumped Vulture and Slender-billed Vulture. These birds are reported to be declining throughout their ranges, while other forest raptors such as Black Eagle, Shaheen Falcon and Short-toed Snake Eagle too were sighted very infrequently.

Kaushik writes: “Raptors are generally considered tolerant of habitat degradation due to their large home ranges. However, their response could vary during the breeding season. To investigate the effect of anthropogenic disturbance on occupancy of diurnal raptors, I studied their occupancy patterns in those areas which are close and far from human habitation. Three raptor species – the Crested Serpent Eagle, Shikra and Common Kestrel – preferred areas away from human habitation indicating their sensitivity during the breeding season. Raptors generally use a single nest over the years and therefore are more susceptible to loss of nesting sites and disturbance around it. In one instance, during my study in Rajaji, lopping of a nesting tree for fodder collection led a Crested Serpent Eagle to abandon its nest. Similar disturbance in the form of bhabar grass collection by villagers and Gujjars is expected to influence nest site selection and nest abandoning by cliff-nesting diurnals such as the Shaheen Falcon, Bonelli’s Eagle, Mountain Hawk-eagle and Black Eagle.”

In the past, alert researchers have helped to trigger concerned action for saving entire species, a recent case in this point having the successful campaign to stop the mass trapping of migrating Amur Falcons in Nagaland. Nevertheless, wild lifers would by and large concur that it is the decline of a species that draws the attention of researchers, funding agencies and policymakers. At this point, in some cases, the battle could already be lost. The need of the hour is effective policies that fund and support studies on changing land-use patterns and documentation of mounting pressures on habitat, both of which are responsible for a decline in virtually all raptor species in India. Conservation of raptors, dependent on larger landscapes, is further hampered by the fact that our Protected Areas are designed for the conservation of terrestrial mammals, largely ignoring the imperative of taking a landscape-level approach.

As this ominous narrative unfolds in a country whose environmental stewards are often accused of being just as reckless as their ‘pilots’, the next boarding call for raptors could well be their death knell.

Author: Anirudh Nair, First appeared in: Sanctuary Asia, Vol. XXXVI No. 8, August 2016.

WILDLIFE'S OF THE ARID LANDS OF WESTERN INDIA AND ITS CONSERVATION SIGNIFICANCE – A CASE OF KACHCHH DISTRICT, GUJARAT

Arun Kumar Roy Mahato

The natural systems of the planet support human life, by providing energy, food, water, and other resources. To create a proper balance on earth importance of wildlife is obvious beside of human existence. Wildlife is defined as 'living creature found in wilderness areas'. Wildlife includes all living organisms, which are out of the direct control of man, including undomesticated and free ranging animals. In other word wildlife comprises all living organism (plants, animals, microorganisms) in their natural habitats which are neither cultivated nor domesticated. India is one among the 17 mega diverse countries in the world, with only 2.4% of the world's land area, it contributes about 8% of the known global biodiversity. Gujarat is significantly rich in flora and fauna too what can spread throughout its' length and breadth. These are remarkably adapted to a wide range of habitats. Species diversity is also high in Gujarat. 4,228 species of plants and 2,728 species of animals been documented. The State harbors 14% of fish, 9% amphibians, 19% of reptiles, 37% of birds and 25% of the mammals recorded in India.

Kachchh and its Biodiversity wealth

Kachchh is the largest district of Gujarat as well as the country that encompassing an area of 45,674 km², located in the North-Western part of Gujarat state. The term 'Kachchh' is derived from "*Katchua* or *Kachbo*" meaning tortoise. Kachchh entirely falls under the arid bio-geographic zone of the country, and surrounded by Gulf of Kutch and Arabian Sea in South-Western part. About 23,310 km^2 (51% of the district) area is covered by saline marshy deserts (Great and Little Ranns) along the Northern and Eastern part of the district. The ecological features of Kachchh includes long coastline of 405 km, undulating terrain, saline marshy deserts, pristine grasslands, hillocks and *bets*.

This district has covered by scanty forest. The forest area encompasses 6.92% of the total geographical area of district and the forest cover of the district is 2,299 Km^2, which is about 5.04% of the total district area (FSI 2011). Here, two major types of forest can be shown i.e. Northern Tropical Thorn Forests and Swamp Forests. Banni and Naliya are the two major grasslands in Kachchh. Total grassland encompasses an area of 5077 Km^2 that supports about 65 grass species with low productivity. The district is enriched by wildlife also. The wild species diversity consisting of 987 species of plants, 44 species of mammals, 374 species of birds, 37 species of herpeto fauna with numerous species of invertebrates. The district's unique flourishing wildlife includes flamingos, bustards, wild ass, caracal, desert cat and many more.

Flamingos feeding at Little Rann of Kachchh

Importance of Wildlife Conservation

Wildlife plays important role in maintenance of ecological balance beside the other facts of economics and recreation. Human activities like agricultural expansion, road construction, urbanization, and other developmental activities are envisage as major threats to biodiversity that has resulted extinctions of species at a rate 1000 to 10,000 times than the ancient times (Wilson, 1988). The rapid pace of increasing human population, urbanization, infra-structural development, agricultural expansion has put acute pressure on the wildlife and as a result depletion in the wildlife population in many parts of India.

The wildlife conservation and management referred to as the development of wildlife and its habitat in such a manner so as to sustain and flourish the entire biodiversity and genetic resources

for the welfare of human societies and maintenance of the ecological balance in a long term prospective in a geographical region.

Protected Areas (PAs) and their threatened wildlife

Looking the biodiversity wealth and wildlife's of the arid district of Kachchh, 4 Wildlife Sanctuaries namely; Indian Wild Ass Sanctuary, Kachchh Desert Wildlife Sanctuary, Narayan Sarovar Wildlife Sanctuary and Kachchh Great Indian Bustard Sanctuary, and only Conservation Reserve of the state i.e. Chharidhandh Conservation Reserve were established. The PAs of Kachchh district spread in 13133.18 km^2, which is 76.8% of the total protected areas of Gujarat state. The Indian Wild Ass Sanctuary is the only place of world's last population of Indian Wild Ass locally known as 'Gudkhur', a sub-species of the Wild Ass. The UNESCO has designated Indian Wild Ass Sanctuary as World Heritage Sites (WHS) among 6 other WHS of India.

Indian Wild Ass(*Equus hemionus khur*) in Little Rann of Kachchh

The Kachchh Desert Wildlife Sanctuary is the largest sanctuary of the State, as well as of the country, established for the conservation of nesting ground of Lesser and Greater Flamingos, which is unique in the world for the breeding of Flamingos, habitually. The Sandal bet, right in the centre of the Great Rann of Kachchh, popularly known as Flamingo city, which is a part of Kachchh Desert Wildlife Sanctuary. It was first reported and discovered in 1886 by Maharao Khengarji. Dr. Salim Ali, a well-known Ornithologist, also visited Flamingo city and estimated a population of half a million birds. The Lala Bustard Sanctuary is the only site of Gujarat where the conservation of Indian bustard has been shown, whereas, this particular species enlisted as 'critically endangered'. The sanctuary is the only abode for three species of Bustards present in the country; Great Indian Bustard (GIB), Lesser Florican and Houbara Bustard.

Chharidhandh is a seasonal freshwater wetland located along the fringe of the Banni grassland and is one among the four Conservation Reserves of the country which wintering ground for large number of migratory birds coming from many parts of the world. In addition to these protected areas, Kachchh Biosphere Reserve (KBR) is recognized as the '13th biosphere reserve of the country' according to the framework of Man and Biosphere Program (MAB) of UNESCO. This is the largest Biosphere Reserve of the country spread over an area of 12, 454 km^2.

Conclusion

The wildlife's of arid land are surviving in the extreme environment with limited resources from millions of years of adaptation by the evolutionary process. Now, the challenges of ongoing climate change and anthropogenic pressure, the nature's treasure are losing their toehold and facing the threat of extinction in this extreme environment. Thus, comprehensive conservation and management measures are required to save precious wildlife in arid land for the ecological functioning and stability of our natural processes.

About the author: Dr. Arun Kumar Roy Mahato, Scientist and In-charge of the Terrestrial Ecology Division. He has obtained Ph.D. in Zoology from Vinoba Bhave University, Jharkhand. He has 5 years of research experience as Junior Research Fellow (JRF) and Senior Research Fellow (SRF) in Zoological Survey of India (ZSI), Kolkata on animal ecology and behavior and many aspects of biodiversity. He has 12 years research experience on behavioral ecology, animal taxonomy, wildlife biology, biodiversity conservation, ethno-biology and sociology.

ADMINISTERING A DOSE OF DEBUNK

Prateek Yadav

So, you think scientists indulge in frantic pedantry, huh? And you think snakes are poisonous, right?

Well, let me prove you right!

I and my school buddy had no idea that bunking the classes post our chemistry practical would be the genesis of a discussion on technical jargon.

Having ourselves over the wall into the surrounding forest, we began wading through. Fresh *aloo paranthas* smoked on *tawas*, longed for us at a famed *Dhaba*.

We had to tirelessly zig-zag our way through the dense vegetation since we weren't 'breathing in a bit of Gujarat' and this? This wasn't a flat salt marsh.

"Yaar, those *aloo paranthas* better be darn good", I chortled. My friend roared back.

Along we went, like two merry bandits who just had the greatest loot of their lives, laughing, trying to one-up the other in banter.

"Prateek!", He cried out under his breath, "Snake! Oye! Snake!"

"Haha! Dude, please. I'm not falling for that."

"Nooo! Fool, look down. It's there—"

"Stop speaking in hushed tones man! I know your games" I retorted, beginning to get peevish at his unrelenting pranks.

"Prateek, look! In. Front of you."

"WHOOAAAAAA!"

That shut me up good.

I was two steps ahead of him and yet, he was the one who spotted it first—long, smooth-scaled, pitch black, this snake was poised toward us.

"You. Owe. Me, Mr. Prateek.", proclaimed my beaming friend as he jabbed his finger in the air between us.

A stupid, sheepish smile became affixed to my face.

We kept ploughing through the thickets, still wide-eyed, we exchanged nervous chuckles, words of awe and shock as well as fear for what could have happened had I kept on trotting in the way of the snake, merrily.

"It must have been poisonous", he affirmed as he carefully held down a whippy, thorny twig which blocked our path.

Nuh-uh Bro.

Snakes, aren't poisonous. Well, except for one. But we'll get back to that later. When people say poisonous, what they actually mean is venomous.

A rather simple distinction is: if it bites you and you die, it's venomous; if you bite it and you die it's poisonous. Either way, you are dying. What a poor way to conduct an inquiry when the results are only out posthumously!

So, let's make a better job of it.

One would think that these two terms would be fairly easy to distinguish with a cursory foray into scientific literature. Turns out, it's far more muddled than that and the above distinction is only good enough for a layman. Nelsen et al. shed light on this pervasive confusion in their 2014 paper *Poisons, toxungens, and venoms: Redefining and classifying toxic biological secretions and the organisms that employ them*: "…a review of the literature reveals inconsistency and ambiguity in the definitions of 'poison' and 'venom'".

Only recently such attempts to establish universal definitions to these terms have been made and that too sparsely. How long will this process take? And how longer would it take for the proposed definitions to slither in common parlance, remains to be seen. Additionally, what

makes the matter messier is that any attempt of standardization is obstructed by exceptional cases.

Both poisons and venoms fall under the umbrella term, i.e., toxin. Toxins are substances that, when present in even minute concentrations, cause dose-dependent injury to a living organism, thereby reducing functionality or viability of the organism.

Here, though possibly digressive, it's pertinent to delve into the semantics of toxin vs. toxic. Simply, anything can be toxic but not everything is a toxin. Water, for instance, can be toxic if consumed in unusual high amounts but it can't consequentially be called a toxin since that'd require it to be harmful in low concentrations which it cannot be (it sustains life!).

The frustrating ambiguities around the two terms notwithstanding, there is indeed a distinction between the two: primarily, in the delivery mechanism. Poisons are passively transferred to the other organism via ingestion, inhalation or absorption without causing any injury/wound upon the organism; whereas venoms are actively (ignoring a few exceptions) transferred to the other organism via a specific puncture wound that could be created by specialized (front-fanged snakes) or unspecialized (Formicidae Ant Family) structures. These ants bite with their mandibles and then spray venom through their abdominal storage glands into the wound.

Uniquely, poison can cause self-induced toxicity courtesy a dysfunctional metabolism meaning the poisonous animal can in fact, poison itself.

In regards to the chemical differences, poisons are generally composed of secondary metabolites that are simpler than the venoms which are peptides or proteins. This is the reason why ingesting a cobra venom won't do any harm as your body would digest it like any other protein unless there's a laceration in the alimentary canal due to which the intact venom could enter the bloodstream, wreaking havoc on your body.

As a consequence of this difference in the structure, poisons are easily able to penetrate the external surface of the organism they come in contact with. Plus, they cannot be broken down when ingested by the organism thus retaining their toxic functions.

The structure and function of secondary metabolites such as poisons are generally not under the direct genetic influence of the body. Instead, they are formed via an array of complex chemical

reactions catalyzed by a variety of different enzymes present in the body. However, the production of protein toxins (venoms) are directly influenced by genetic control, as dictated by the central dogma of biology. Thus, venoms are much more likely to exhibit rapid evolution and hence demonstrate more frequent structural variation as compared to poisons.

Poisonous animals mostly use poison for defense whereas venomous animals use their toxin for predation as well as defense.

Coming back to snakes, most of the species do not harbor toxins at all—pythons, boas, wolf snakes and others far too many to list are neither venomous nor poisonous. However, amongst the ones that do harbor toxins, all are venomous. But there resides a lone outlandish case of the fantastically beautiful Tiger Keelback or the Yamakagashi (*Rhabdophis tigrinus*), found in East and South-East Asia which has the distinction of being both venomous and poisonous. Yes!

The Yamakagashi eats local poisonous toads and sequesters their toxins, *bufadienolides* in the specialized nuchal glands present on the back of its neck which renders itself poisonous if ingested by a curious predator.

Tiger Keelback is also venomous but it's of the rear-fang category of venomous snakes so bites are rare and possibly, made rarer by its antipredator poison tactic. It produces venom in specialized glands called, Duvernoy's glands and injects it via grooves present on its fangs that are located at the back end of its upper jaw. Interestingly, it's also been documented that pregnant female tiger keelbacks are able to pass the toxins acquired by eating poisonous toads to their progeny.

Things get spookier still. It's been found that gravid female tiger keelbacks actively seek out poisonous toads to feed on so its progeny could begin their lives with the security of a poison packed neck which is amazing because their diet otherwise mainly comprises of non-toxic toads.

To conclude, poisons and venoms are two kinds of toxins. Like all toxins, they cause dose dependent damage. There are 3 key differences between the poisons and venoms: chemical structure, presence/absence of a delivery mechanism and the presence/absence of a mechanical injury. Poisons are secondary metabolites—simpler structures than venoms which are proteins. In the case of poisons, they are always passively transferred to the internal milieu of an organism

via ingestion and/or absorption without causing a mechanical injury. Venoms, however, are *mostly* transferred actively into the internal milieu of an organism (by biting or stinging) via an established delivery mechanism that causes mechanical injury. Moreover, venoms undergo faster evolution than the secondary metabolites. Lastly, poisons are mainly used in defense tactics whereas venoms are used in both defense and offense.

So, that snake we saw when we skipped classes could have been venomous or not but it certainly wasn't poisonous because we weren't in Japan.

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Corresponding email: bhoirt908@gmail.com

EFFORTS TO CONSERVE TURTLE EGGS AT CHAVAKKAD BEACH, KERALA

Abdul Saleem, N. J. James and Sujit Sundaram

Turtles hatching on Kerala coast are not much documented. An effort is made to conserve turtle eggs laid on Chavkkad beach by Green Habitat, an NGO committed to the conservation of turtles. From the information gathered from local fishermen, it was known that turtles do come to Chavakkad beach for laying their eggs during the winter months. Following this, volunteer of the NGO have been keeping round-the-clock vigil on the beaches. Turtles coming to lay their eggs were observed at two places: Edakkazhiyoor and Panchvadi beach, Chavakkad, Thrissur district, Kerala. The turtle was identified as *Lepidochelys olivacea* (Olive ridly turtle).

On 04-01-19, a turtle laid 91 eggs at Edakkazhiyoor beach and on 09-01-19 another turtle was observed laying eggs at Panchavadi New Friends beach. 62 eggs were observed in the pit dug by the turtle on this beach. Both the observations were made during night time. Generally, turtles come to the beach during night to lay their eggs. However, these eggs were not safe from predators. During our visits, we observed dogs and even jackals digging the nests for eggs. So, to prevent predation, it was decided to transplant these eggs to other parts of the beach to avert any damage to the eggs. A hatchery was built for safe keeping of the laid eggs. The eggs were collected and kept in separate pits made for this purpose. Generally, it takes about 45-60 days for the eggs to hatch after incubation. Once hatched, these baby turtles make their first journey towards the sea. Efforts were made to keep the eggs safe from natural predators and even humans. Once the eggs hatched, efforts were made to ensure that aerial predators such as crows and eagles couldn't kill the baby turtles as they took their first walk.

Awareness programs were arranged in the form of village meetings, lectures, and exhibitions, including distribution of handbills, stickers, and posters regarding turtle conservation. Apart from collecting biological information and protecting nests, these hatcheries were used for nature education and public awareness programs.

Threats to turtle include loss of marine habitats, loss of nesting beaches due to erosion, sand mining, pollution and even beach lighting (which disorients the hatchlings going towards the

sea). Incidental catch in mechanized fisheries is also a matter of concern. The need of the hour is a nation-wide communication network to link all NGOs and environmental agencies; so that information can be shared and proper conservation measures can be carried out.

Corresponding Email: ***sujitsundaram@hotmail.com***

WILDLIFE PHOTOGRAPHY: A SERIOUS THREAT?

Tushar Bhoi

Source: Internet

Once I was just scrolling through my newsfeed on Facebook and I saw a picture which motivated me to write this article. That picture featured around 28 to 30 photographers eagerly waiting to capture a Muniya bird on their cameras. That image touched my soul.

Pictures do speak a thousand words and nowadays nearly everyone uploads and shares their photographs on social media. But these photographs can sometimes cause suffering and even death!

Let me tell you the story of the fan throated lizard.

As summer gives way for first monsoon rains, the reproductive phase of various animals, birds and insects begin. The mating period of the fan throated lizard begins one month before the end of summer. The life span of this lizard is just one year. Due to this short life span, the male lizard

can mate only once. Male fan throated lizards are very attractive. This attractiveness helps the male attract a female for mating. Huge numbers of males participate in this process. Thus, a competitive behavior is observed among the males. The males possess a seven-colored fan along his neck. He flaps this fan and tries to attract the female for mating. If successful, he gets a chance to participate in the mating ritual with her. This beautiful natural process is sometimes interrupted and harmed by wildlife photographers. Many photographers violate the privacy of the fan throated lizard.

There are a lot of things in nature which capture the attention of the human mind. One of them are wild flowers. But unfortunately, several species of these flowers are on the verge of extinction because of wildlife photography. Some careless photographers ironically forget about the wellbeing of the flowers and destroy them by trampling over them. This significantly reduces their numbers and ultimately results in their extinction.

The above discussed examples demonstrate that wildlife photography can also be a factor catalyzing the extinction of wildlife flora and fauna. Wildlife photographers and safari organizers should ensure that no damage is caused to the wildlife because of their actions. What is the point of wildlife photography if the very wildlife being photographed is destroyed because of it? Only if we take care of all of these, will the captured photos be meaningful.

Corresponding email: ***bhoirt908@gmail.com***

MUMBAI'S URBAN LEOPARDS

Anirudh Nair

This photograph has taken by Nayan Khanolkar titled the 'Alley Cat' won him the Natural History Museum's Wildlife Photographer of the Year 2016 Award in the Urban category.

Conservation photography can awe and appall in equal measure. For conservation photographer and naturalist Nayan Khanolkar's emotion was triggered in March 2011, when visuals emerged of a leopard being burnt alive by angry villagers near Corbett Tiger Reserve in north India. A few months later, images splashed across the front pages of India's newspapers of another stray leopard attacking several policemen and forest guards at a village near Siliguri in West Bengal's Darjeeling district shocked him and scores of others.

That year also saw the unfolding of the all-so-familiar narrative of leopard attacks in and around the largest national park located within any metropolitan city in the world. When seven-year-old Prakash Salunkhe was killed by a leopard at Aarey Colony on the outskirts of Mumbai's Sanjay Gandhi National Park (SGNP) in 2013, the last such incident reported from the city, public sentiment was against their feline neighbors, thanks to sensationalized reports in the media. Leopards belong to the jungle, and should not enter the city, was the common consensus. With little or no attention being drawn to the increasing encroachment and ghettoization around

SGNP, the possibility that it might not be the leopards that are entering the city, but the city that is overtaking the jungle itself wasn't fathomed. Misrepresentation of facts coupled with little knowledge of the area's ecology was disserving the human and leopard cause together.

It was around this time when Nayan realized that long-term monitoring of areas from where these conflicts were being reported was the need of the hour. An initial survey based on conflict history, media reports, infrared camera-trap images, local and forest department officials' accounts, was undertaken to find out indirect evidence of leopard presence in the form of scat and scrape marks outside the Protected Area of SGNP at Aarey Colony and Film City. Debunking the image of the snarling, apparently dangerous big cats shown on T.V and in newspapers, Nayan and his team used powerful DSLR camera trap imagery to show the quiet, everyday existence of urban leopards. They observed leopard movement, placed camera traps in these locations and waited. It took a few days, and sometimes weeks of uncertainty and perseverance, to obtain the images that Nayan had visualized. But the results were well worth the wait, more than capable of conveying the fact that these predators epitomized the adaptability and resilience of the very same Mumbaikars they were trying to convince that conflict is clearly a misnomer in a story essentially about coexistence.

Wildlife biologist Vidya Athreya's pioneering work in rural Maharashtra discovered that capturing 'problem' leopards from farmlands and releasing them in forests was probably the primary cause for attacks. Forest officials, who had trapped leopards outside SGNP and released them in the park, now had an explanation for the spate of attacks in the early 2000s, which had severely jeopardized the leopards' image as a coexisting neighbor.

Masters of stealth blessed with a sharp memory, these are intelligent animals that will go to great lengths to avoid humans. What were field lessons for the team, are life lessons for tribes such as Warlis and Mahadeo Kolis, who have historically inhabited this landscape. These tribes that depend on the forest have immense respect towards wildlife. It is not uncommon to see leopard paintings and motifs in the houses of Warlis, who worship the large cats and believe that harming the animal would invite bad luck. Such cultural and traditional practices have influenced the tremendous tolerance levels of communities lived in close proximity with wildlife across

India and the concrete jungles around SGNP, where the leopard has survived admirably, is no exception.

As the mad race of urbanization disconnects Mumbaikars from nature, it threatens the future of their urban neighbors. While the buffer between the city and its green lungs diminishes, a cancerous intolerance for straying cats looms. As a medium of communication, conservation photography is a tool like none other, which enters our collective consciousness to convince us of alternative realities. The photograph that you see on this page hopes to upturn the visual commentary of 'leopards and conflict' to 'leopards and coexistence'. For it is only when such visuals become the norm, and not the exception, will true urban conservation stories be told.

About the author: Anirudh Nair is an Assistant Editor with Sanctuary Asia magazine and has previously worked with two national newspapers.

This article was first published on Nayan Khanolkar's website and is the first in a series documenting Khanolkar's ongoing leopard tracking and camera-trapping exercise outside Mumbai's Sanjay Gandhi National Park.

LANTANA CAMARA SPREAD IN URBAN LANDSCAPE

Ridhima Solanki

Lantana camara is a terrestrial invasive plant which has found its place in IUCN's list of worlds' 100 worst alien invasive species (Lowe 2000) and is widespread in India, Australia and South Africa (Bhagwat, 2012). In India, it is said to have been introduced from Mexico (Iyengar, 1933). The plant is reserved in India's priority list. This plant described as much-branched, upright, scrambling shrub that usually grows 2-4m tall and forms dense thickness. The Aichi Biodiversity Targets of the International Convention on Biological Diversity (CBD) has one target as "By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment". Being a member of CBD, India is far from handling the Aichi target of alien species like *Lantana camara* by 2020. It is a pan-tropical weed and it has globally established itself in approximately 60 countries situated between 35°N and 35°S (Taylor et al 2012, Day et al 2003). In India it has invaded 13.2 Million Ha of land besides forests and fallow lands (Mathur et al 2015). Mapping of distribution of the species for pan India is available

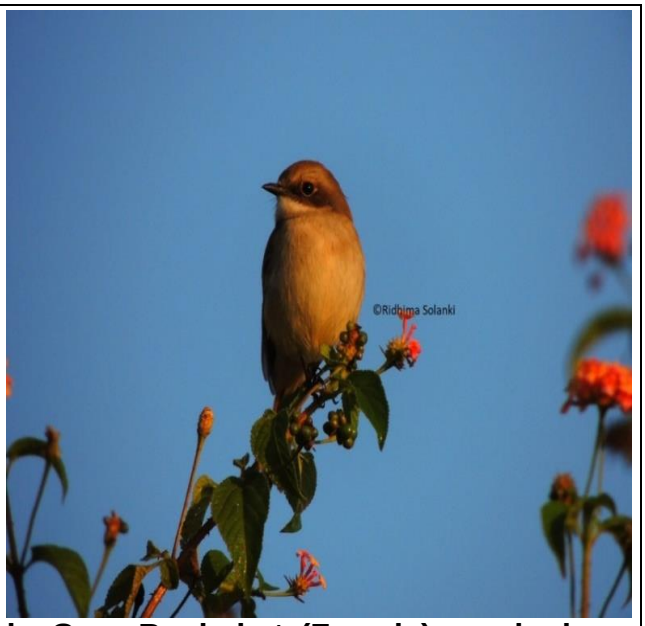
with Wildlife Institute of India, Dehradun. However, there is paucity of information regarding spread of lantana in urban landscape. The species ecology and mapping are done for forested landscape and the fact is established that it is more prone to human disturbance. The pollinator ecology has been researched into for Lantana [Dronamraju,(1960), Mathur, G., et al (1978), Bisht, R. S., & Bhatnagar, S. P. (1979), Aravind, N. A et al.(2010)]. Yet the pollinators of Lantana in urban areas is not a well-researched concept.

Lantana spread facilitation is due to disturbance and hence its presence in hill stations and tourist destination is very much visible. Coonor and Wellington is a renowned tourist locality which is situated near Ooty in Western Ghats. In these areas, red whiskered bulbil, oriental white eye and palm squirrel can be observed feeding on lantana seeds. Dehradun Valley and Mussoorie hills (Uttarakhand) are also quite notorious for Lantana invasion where bulbul can be found feeding on the seeds very often. In Doon Valley places like Forest Research Institute campus and Indian Military Academy campus present lantana bushes in abundance *(personal observation*). Such campuses are mostly disturbance free yet the spread is evident. Probably a contributing factor of considering the plant as decorating species also plays a role in such Bunglow and garden dominating campuses. A search on online shopping portal like Amazon would reveal the sale of *lantana camara* under decoration plant. Probably a lack in general awareness also promotes the plant spread, an area which can be researched into. The species is dominantly spread in Kasauli hills in Himachal Pradesh and also in Kathmandu (Nepal). Although the species invasion in Western Ghats and Western Himalayas is well documented, there is a paucity of its evidences in North-East hills. In protected areas of Nepal in Terai, *Lantana camara* is not considered as main weed, although in Kathmandu valley it is well spread. Probably besides soil, temperature and vegetation assemblages, certain pollinators which frequent the disturbed landscape is also contributing in lantana spread and can be researched into.

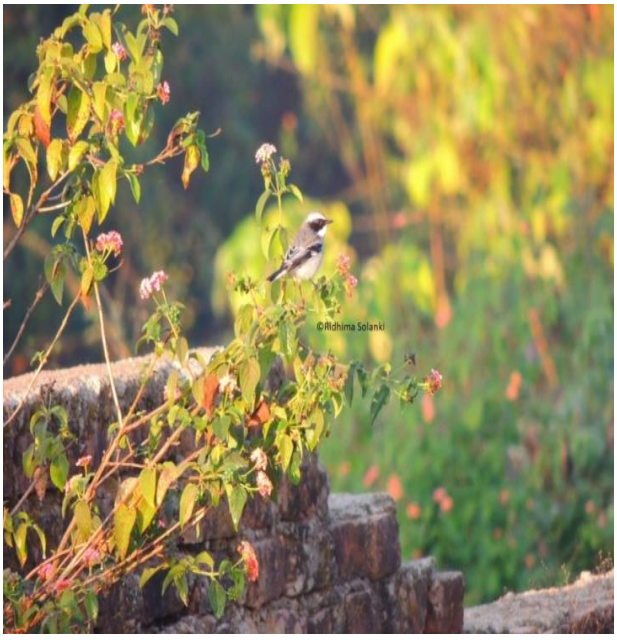
No major ungulate is observed feeding on *Lantana camara* but bright flowers and insects surviving on plant attract many bees, butterfly and birds which act as pollinators. In urban landscape, thriving of lantana could be a combined effect of its usage as decorator and the pollinators available.

Photographs of some species, which are found on lantana seeds and flowers has been presented below:

a. Bees pollinating bright Lantana flower



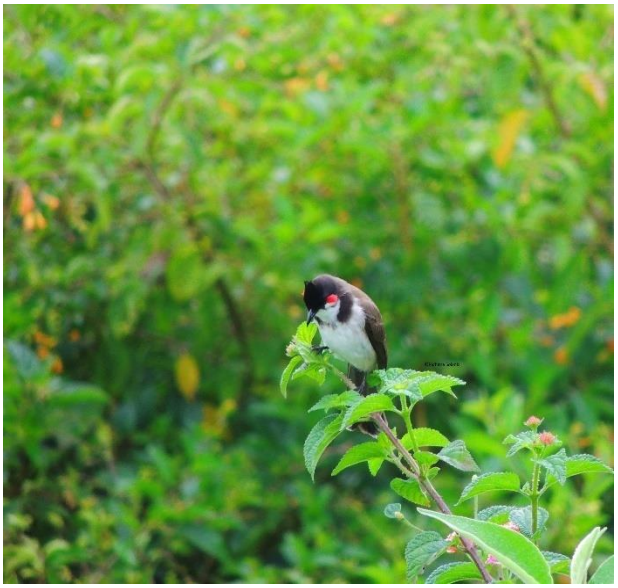
b. Grey Bushchat (Female) perched on *Lantana Camera* branch



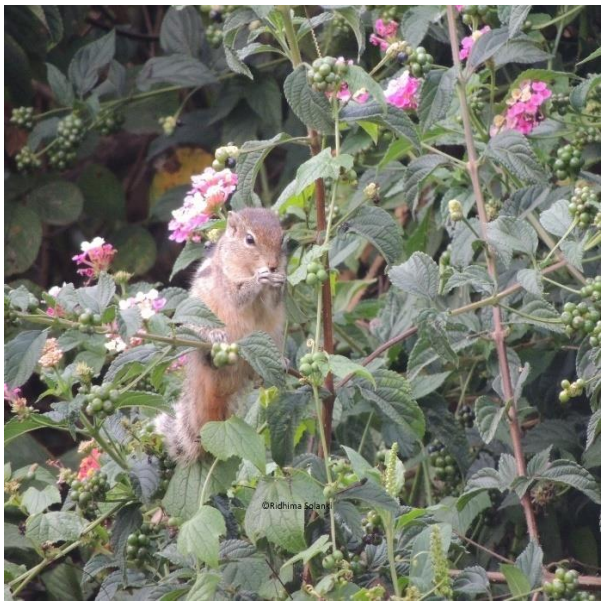
c. Grey Bushchat (male) perched on Lantana Camera branch

d. Oriental white eye feeding on seeds of *Lantana camara* as observed in Nilgiri hills

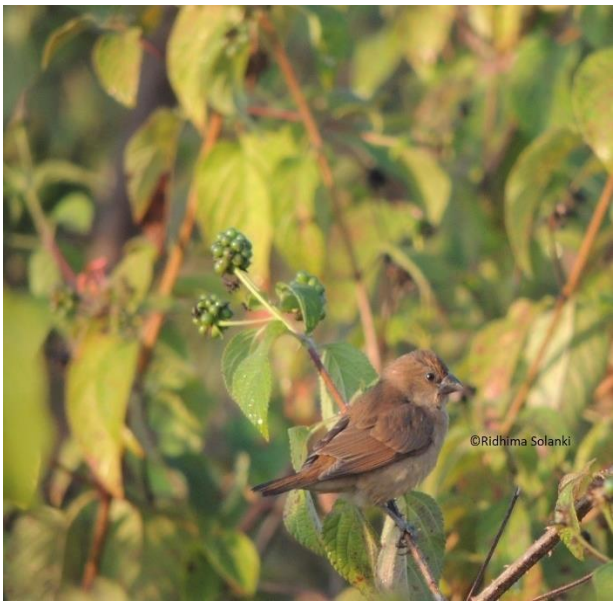
e. Oriental white eye feeding on seeds of *Lantana camara* in Shiwalikhs



f. Red whiskered bulbul is observed perched on the branch of *Lantana camara* in Nilgiris



g. Palm squirrel as observed feeding on seedsof *Lantana camara* in Nilgiris.



h. Scaly-breasted munia (juvenile) uses *Lantana camara* for perching and feeding.

A comparative study of *Lantana camara* spread in different urban landscape and the additional factor of people awareness about the same needs to be undertaken to understand the species in a holistic way. Also, the relationship between pollinators which frequent the disturbed landscape and *Lantana camara* distribution in the same can make a passage through further research.

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About the author: Ms. Ridhima Solanki is a Wildlife Biologist and GIS Expert representing Global Tiger Forum based in Jor Bagh, New Delhi. She can be reached by email: ridhimasolanki22@outlook.com.

LEUCAS SIVADASANIANA– AN ENDEMIC SPECIES OF GREAT CONSERVATION NEEDS FROM SOUTHERN WESTERN GHATS, KARNATAKA.

Dr. K.P. Vimal

Leucas sivadasaniana Sunojk is an endemic species only found in a single locality in the Kodachadri Hills of the Southern Western Ghats, Shimoga District, Nagodi village in Hosanagara taluk, Karnataka. Less than 100 plants are found in the margins of these mountainous evergreen forests at altitudes between 1200m and 1400m. Its conservation status was assessed as Critically Endangered by the original author (Dr. Sunojkumar, Assistant Professor, University of Calicut) while describing this as a new species in the year 2008.Although *Leucas sivadasaniana* is related to *L. beddomei*, *L. eriostoma* and *L. lamiifolia*., it differs in having broadly cuneate leaves, long and densely villous bracteoles and a non-ciliate calyx mouth with triangular teeth. Flowering and fruiting occur during December to March. *Leucas sivadasaniana* is distributed over a 10 square kilometers area, in the Kodachadri Hills of Mookambika Wildlife Sanctuary. Although no related taxa are found in the area where *L. sivadasaniana* is growing, they can be found about 250–490 km away, in very restricted distributions. Kodachadri hills have been regarded as an important tourist as well as pilgrimage center in the Western Ghats due to the presence of the Moola Mookambika Temple. Pollution caused by carelessly thrown plastic wastes and discards in and around the habitat of the L. *sivadasaniana* iscausing major threats to the existence of this species. So far, no initiative has been taken by the concerned Government officials to protect this Critically Endangered species.

About the author: Dr. K.P. Vimal is connected to the Life Science Department, University of Calicut, Kerala, India-673635. His corresponding em*ail is vimalkp2006@gmail.com*

Some up, close and personal glimpses of the endemic plant species



HERE TODAY, GONE TOMORROW? THE PANGOLIN PROBLEM.

Mrinmayi Dalvi

When Francis Rawdon Hastings, who was the 1st Marquess of Hastings, and the East India Company Governor General in Bengal, presented King George III with a coat and helmet made with pangolin scales in 1820, little did he know that the curious little mammal which had supplied the scales for the coat and was so commonly found, would soon be on its way to extinction because of those very scales. There are eight known species of pangolin in the world; four of which are in Asia while the other four are in Africa. All eight of these species are listed in the IUCN Red List, with designations ranging from Vulnerable to Critically Endangered. According to the IUCN, the population of all eight of these species is rapidly decreasing. As with almost all of wildlife, pangolins too are facing the brunt of development and habitat loss, in spite of having the ability to be able to survive in diverse habitats, including forest, grassland, and scrubland.

The name “pangolin” comes from the Malay word ‘pengguling’, meaning ‘one who rolls up’. This word certainly describes the pangolin, since its primary defense mechanism is to roll up into a ball. This defense mechanism works extremely well against its natural predators such as lions, tigers as they are not easily able to get through the scales that protect the pangolin’s body. Another method of self-defense used by pangolins is to spray predators with a substance produced in the anal scent gland, not unlike skunks. Unfortunately, none of these mechanisms are useful against its biggest threat, which is us humans. Pangolins have very specific dietary and habitat requirements that cannot be easily provided in artificial, man-made habitats, and hence keeping them in captivity, or captive breeding is a task that is extremely difficult, and not always successful. They breed only once in a year and the female gives birth usually just one to three offspring. The babies are born with soft, white scales that turn darker and become harder as they grows up. Pangolins have no teeth and most part of their diet consists of ants that they scoop up with their tongue which is almost as long as their body. All of these features put together, certainly produce a very, fascinating animal.

Of all the interesting characteristics possessed by the pangolin, the prominent one that sets it apart is that it is the only mammal to have scales. These scales are made of keratin, the same materials as human fingernails and rhinoceros horns. However, these seemingly ordinary scales are also one of the reasons why pangolins have the unfortunate title of being the most trafficked animal in the world Illegal wildlife trade, which is among the largest and most profitable organized criminal activities, alongside trafficking in drugs, weaponry, and humans. Pangolin trafficking makes up 20% of the total illegal wildlife trade, higher than that of any other animal. Pangolins are trafficked mainly for their scales, which are believed to treat a variety of health conditions in traditional Chinese medicine. Pangolin meat is considered to be a luxury food item in China and Vietnam, while pangolin fetus soup and pangolin wine are also considered to be rare delicacies in these regions. Apart from this, pangolins are also poached for other body parts that are sold for their alleged powers of improving luck, health, and wealth. Pangolin products are still sold openly in various markets across Asia, as well as online. All of these beliefs regarding pangolin products are completely unfounded and may possibly end up being responsible for the extinction of this creature, if the situation remains the same. Although there have been several laws against pangolin trafficking, law enforcement was not necessarily always

practiced with the intensity that is fortunately being done now. Lack of action, along with the lack of awareness, is the primary reason why pangolin trade has been on a rise. Spreading awareness is one of the most important things, which can be done, if this little animal is to be saved from its inevitable fate of extinction.

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Photo Story:

WILD BEAUTY OF INDIA

Uday Kiran

India serves homeland for four different species of forest Hornbills. These species niche on top canopy of forest and frequently flies down to enjoy their delicacy-figs and small mammals. They start their day diet feeding on fresh figs growing on the top branches and ends up with the figs of lower parts or next trees. They usually toss the fruits a couple of time before gorging it. Hornbills satisfying their appetite on figs were captured in pictures in day hours.




Species: Hornbills - Malabar Pied Location: Dandeli
Picture by- Uday Kiran

Species:
Bonnet Macaques
Location: Bandipur National Park
These young monkeys team up on top of the log scratching heads and watching each other's backs.

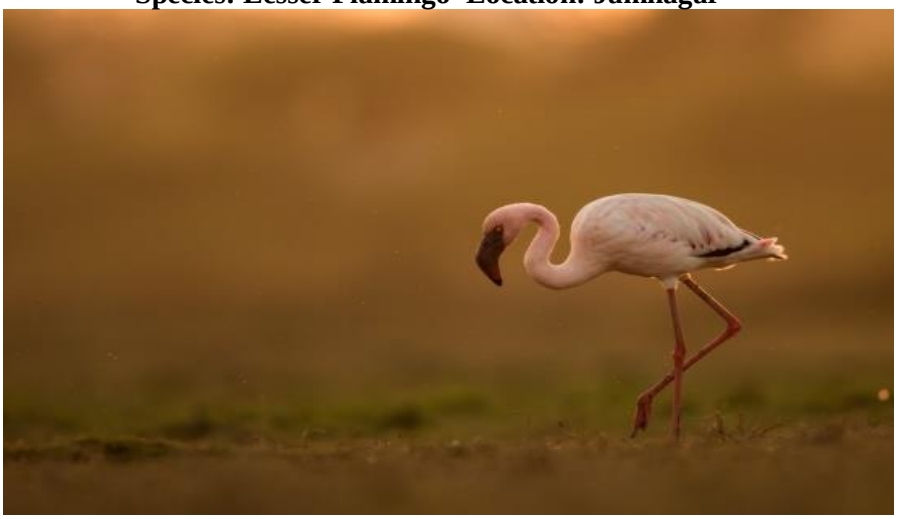
Species: Golden Jackal
Location: Bhadra Tiger Reserve

A Golden Jackal camouflaged in the grassland of Bhadra Tiger reserve has almost escaped my vision. At my first sight, I thought it was a stone but a sudden movement in the grass forced me to re-evaluate my observation. I saw a Golden Jackal stretching its neck out of the grasses to better its eyesight on us and disappearing again.

Species: Purple Sunbird -
Location: Hoskote lake, Bangalore.
Sunbirds feed largely on nectar, hence their family name –*Nectariniidae*. I believe that they also feed on small insects. They hover over flowers to feed on the nectar and are often confused with hummingbirds. Although this pattern of feeding on nectar might be similar, hummingbirds and sunbirds belong to entirely different families.

Species: Asiatic Lioness
Location: Gir National Park
I took this picture during a safari in Gir, Gujarat. I had instructed my Gypsy driver to park near an adult male, despite the fact that there was a lioness on the other side. My gut told me that she would walk towards her mate sitting near our jeep. When the lioness emerged, she walked in the opposite direction. However, after some time, she turned around and strolled back towards her mate. Better still, another lioness joined her shortly after. Better late than never!

Species: Lesser Flamingo Location: Jamnagar



These giant birds stroll on the top of water bodies mostly for algae. They insert their beak half way into the water to consume their food and continue walking in the same way. They are easily distinguishable from Greater Flamingoes as the former's body is more pinkish in color and they have dark beaks.

Species: Greater Crested tern
Location: Kundapura, Karnataka

These waders have a habit of flapping their wings before taking off and landing. They usually move in groups but are occasionally found alone. These birds migrate to India and are found in the coastal regions.

WILD

-Mrinmayi Dalvi

The whispering casuarina trees hid amongst them a winding path,
A path that opened up to me, a world untouched,
A world that had kept itself apart.
In a single glance there were a million things I could see,
I became one among them, and they a part of me.
This world was a world where reality became a myth and time just a facade;
where nothingness was all that was around and afar.
A world where the land was trod upon by the hooves of a thousand deer,
where the wind held traces of flights of a million feather.
Where the only human feet that touched it,
were the ones with a want to nurture it.
This world opened its arms wide and took me as its own,
where nature had reclaimed her territory,
and once again bore the seeds her predecessors had sown.
This world was a world so mysteriously divine,
A place where I felt me leaving myself behind.
The setting sun though burning bright,
veiled it all as he stole the light, but the moment I seized,
the hourglass seemingly freezed,
I caught what I thought was beyond my grasp,
and I discovered beauty running wild as she lost her civilized mask.

THE SONG OF THE MOUNTAIN

-Mrinmayi Dalvi

To the shepherd's flute, the mountain sings his song of the gloried days;
of men who embraced the wilderness and went about with mindful ways.
Of warrior cries meant only for survival, before guns were used, and arrows
thought medieval.
When the death of a doe meant life for the tigress, for her cubs to grow,
not a mere poacher's thrill, to adorn his wall with a trophy, to boast his kill.
When life meant more, and was revered in the earth, in the sky,
in every tree, every creature.
When not just in an idol, God was found in life, God was seeked in nature.
But the mountain has lived a thousand years, he's seen it come alive,
he's seen it all unravel.
And his song he sings with a hope for the shepherd to hear his plea,
to reach out to mankind, to let the earth be;
For although overdue it's never too late,
to save mother earth, once again make her our deity, we owe her life,
aren't we all a part of her entity?
And on the mountain top the shepherd now sings his song of the gloried days;
Of men who embraced the wilderness and went about with mindful ways.

SAVE MANGROVES: AN ECOSYSTEM WHICH NEEDS IMMEDIATE ATTENTION AND CONSERVATION

Dhanashree Bagade and Sujit Sundaram

Corresponding Email: sujitsundaram@hotmail.com

Mangroves are termed as *'tropical tidal wet lands'* and they are salt tolerant forest ecosystems in the tropical and sub-tropical intertidal regions of the world. Mangroves serve as natural barriers against the intrusion of the sea and dissipate wave action, mitigate the impact of storms, cyclones and prevent soil erosion. The network of root system helps in binding the nutrient laden soil from the uplands, which otherwise find their way to the sea. Probably, the mangroves are the best bio-shield for coastal stabilization; reduce the impact of natural calamity such as the devastating tsunami waves, besides accretion of sediments to form mud banks. Ironically, almost all the mangrove areas are under threat – mostly man made. Mangrove ecosystem serves as the reservoir of species of plants and animals and harbors much of the world's tropical biodiversity (Duke, 1992). Mangrove areas form the breeding and nursery grounds for the larvae and juveniles of many commercially important species of prawns and fishes. The high productivity resulting from mangrove litter fall supports a host of detritus feeding animals such as amphipods, mysids, harpacticoids, molluscs, crabs and larvae of prawns and fishes. The mangrove vegetation and associated creeks and channels provide habitats to these organisms especially in their critical stages of life-history (Gopinath and Selvaraj, 1996). The mangrove ecosystem, with its variety of habitats provides living space for various species of flora and fauna of resident, semi-resident and migratory modes of life. This estuarine ecosystem is not a closed system and it has free connection with the open Sea on one side and with the river on the other side with the exchange of organic and inorganic matter at every tide and by the flood flow (Selvaraj, 2000). Mangrove forests form an interface between marine and terrestrial environment and is one of the most productive ecosystems and a natural renewable resource (Sulochan, 2000). The tangled mass of roots provides safe havens and refuge for spawn, fry, fingerlings and juveniles of many species of finfish, shellfish and crustaceans. The mosaic of mangrove habitats provides a variety of biodiversity components that are important to the function and environmental quality of tropical

estuarine ecosystems (Sasekumar *et al.*, 1992). Thus, mangrove forests perform multiple ecological functions.

Extensive work on the mangrove ecosystem along with its biodiversity was carried out by CMFRI (2005). Some of the other basic works on Mangroves from India are by Banerjee *et al.* (1989), Rajagopalan and George (2005), Mandal and Naskar (2008) and from Maharashtra by Bhosale (2005). Maharashtra State has a 720 km long coastline and has 330 sq.km of mangroves (Selvaraj, 2000). According to Vasudevan and Fernadiz (2011), there are 18 species of mangrove found along Maharashtra coast.

The major starch of mangroves in and around Mumbai are observed along the Vasai Creek, Thane Creek, Manori and Malad, Mahim-Bandra, Versova, Seweri, Mumbra-Diva and few more places. In Mumbai, debris are usually dumped in to the mangroves to kill them and then brought into CRZ-2 for construction activities. The mangrove cover along Mumbai city is 43 km^2 (FSI report, 2015), which is considerable when taken in to account the amount of effluent discharge from the cosmopolitan city of Mumbai.

An attempt was made to assess the loss of aquatic life along Mumbai mangrove areas. Two types of fishing gears are exclusively used along mangroves areas for fishery and they are *Dol* net or bag net and the other being *Bokshi* net or barrier net. An extensive description of the *dol* net operations is given by Raje and Deshmukh (1989) and for *bokshi* net by (Mane and Deshmukh, 2007). Monthly field trips were carried out to exclusive *dol* net and *bokshi* net centres and where there is extensive mangrove coverage. The catch from these nets were analysed every month, to identify the species, ascertain the species composition etc. It was observed that 4 species of cephalopods, 18 species of crustaceans and 62 fish species were observed in the catch. The rich biodiversity supported by mangrove ecosystem is evident from the above observations and the majority of the species are juveniles. Apart from this, mangroves also support micro and macros fauna, benthos, avian diversity, higher animals etc. to name the few.

Mangrove forests are among the most threatened habitats in the world (Mathew *et al*., 2001). 50% of the world's mangrove forests have been lost as a result of clearing and alteration of

coastlines (Duke, 1992). In spite of their immense role in protecting human resource as well as biodiversity, these unique mangrove habitats have been facing tremendous threats due to indiscriminate exploitation for multiple uses like fodder, fuel wood, timber for building material, alcohol, paper, charcoal and medicine (Upadhyay, 2002). In recent years, the mangrove environment is getting polluted with different kinds of effluents and other contaminants from industrial wastes and most of the mangroves are on the verge of disappearance due to reclamation for housing, agriculture and salt evaporation site, sewage discharge, development of ports etc. (Gopinath and Selvaraj, 1996). Among the pollutants, oil could be the most serious problem, because it covers pneumatophores, suffocating mangroves and resulting in their mortality (Mathew *et al*., 2001). Climate change can also cause depletion of mangrove resources (Twelley*et al.*, 1996).

The degraded mangrove areas need to be restocked and fresh mud-flats need to be afforested. According to Gopinath and Selvaraj et al., studies a concerted and co-ordinated effort is necessary to undertake management measures to conserve these natural resources. With a view to preventing further destruction of mangrove forests, it is felt that an integrated approach is required. The conservation of the existing mangrove resources is the first step towards achieving this goal. The aspects which need immediate attention, i.e, evolving framework of conservation and management action plans. Some of the major strategies are: Identification of potential mangrove areas for declaring as 'Reserve' or 'National Park' and ‘Sanctuaries’ (Selvaraj, 2000). Techniques like regeneration, restoration and afforestation of mangroves can be the only answer to these problems (Gopinath and Selvaraj, 1996). Awareness among the public on the importance of mangrove ecosystem and the need for its preservation by educating the coastal people and keep a vigil on possible destruction of mangroves needs to be taken up (Gopinath and Selvaraj, 1996). According to (Nammalwar, 2008), marine ecosystems, with their variety of sub habitats, offer a wide range of recreational opportunities such as boating, bird watching, wild life observation, education trips for specimen collections, photography etc. These activates in the long run would conserve these unique ecosystems which would further sustain biodiversity.

In addition to the marine estuarine food webs and associated species, there are a relatively large number and variety of animals that range from terrestrial insects to especially birds that live in

and/or feed directly on mangrove vegetation. These include sessile organisms such as oysters, benthos, tunicates, microbial communities, nektons etc. (Twelley *et al.*, 1996). Degradation of mangroves directly affects a variety of life forms which are depended on the mangrove ecosystem during their life cycle hence the urgent need is to conserve this mangrove wetland ecosystem.

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About the Authors: Ms. Dhanashree Bagade Mangrove Foundation, 2nd Floor, A-Wing, SRA Building, Anant Kanekar Marg, Bandra (E), Mumbai 400 051 and Dr. Sujit Sundaram (Retd.), Mumbai Research Centre of Central Marine Fisheries Research Institute, Seven Bungalows, Andheri (W), Versova, Mumbai - 61.

CONSERVE WILDLIFE AND HABITATS FOR FUTURE GENERATION

Jayanta Kumar Mallick

Wildlife consists of all naturally-grown, undomesticated, life-forms which include terrestrial as well as aquatic plants, animals and microorganisms. Conservation aims at preserving and protecting them in their forests or non-forests natural habitats. Non-forest habitats are also eco-sensitive (fragile) areas. Saving wildlife plays a great role in maintaining a balanced healthy ecosystem and keeping the environment clean and pristine. Protecting wildlife had never been so essential in the history of humanity as it is now. Our future generation should be able to enjoy the beauty of Mother Nature while recognizing the unshaken role wildlife has in our well-being. If there were no animals, there would be no forests which would inadvertently lead to soil

erosion, warm weather, drying up of lakes and rivers, no rains, no crops and no vegetation. By conserving wildlife, we're ensuring that our future generations can enjoy our natural world and the incredible species that live within it.

Ideas for Action: Save, Recycle and Do Not Pollute

- During the twenty-first century, wildlife management needs to include multi-pronged efforts to increase wildlife conservation everywhere. My contemplation goes, through stages, from gross to subtle actions in the target areas, as follows:
- We should have both legal and moral obligations to follow the wildlife conservation laws in the country. Acts along with their subsequent amendments like Wildlife (Protection) Act, 1972; Convention on International Trade in Endangered Species of Wild Fauna and Flora; Indian Penal Code (particularly Sections 428 and 429), 1860; the Code of Criminal Procedure (Cr.P.C), 1973; Customs Act, 1962; Indian Forest Act, 1927; Forest Conservation Act, 1981; Prevention of Cruelty to Animals Act, 1960; etc. should be enforced.
- Engage with the conservation community for sustained and collective front-line enforcement.
- Develop consciousness and "green technology" to mitigate or reverse the effects of human activity on the environment.
- Comprehend how species interact within their ecosystems, phenology, food webs, bioaccumulation and how they are affected by environmental and human influences.
- Initiate WildAid campaigns at the grass-root level for raising public awareness, compassion, dispelling myths and organizing a conservation movement.
- Help to minimize human interferences, exploitations within the wildlife habitats.
- Do not destroy/disturb the habitat. Remember habitats are where wildlife lives.
- Do not hunt, kill or trap. You may be driving an important species to extinction. Take shots only from your camera.
- Have a united voice against all sorts of illegalities, identify crime activities, harassing, trapping and stop trafficking as suggested below:
- Weaken wildlife demand/markets
- Investigate the markets of live wildlife, materials and finished products from them. Possible places to investigate include pet shops; animal collectors and pet raisers; restaurants and

other food outlets; businesses involved in fashion accessories, guitar-making, manufacturers of shoes, bags, belts, etc.

- Trace sources/suppliers of wildlife
- Ingredients to exotic dishes e.g. Bird's Nest Soup is made from the nest of Swifts. Decorations on guitars come from tortoise shell. Bags, shoes, belts may come from reptile and snake skins, animal pelts. Fashion jewelry can come from corals, horns and teeth of deer, crocodiles, etc. Tortoise shell is also made into jewelry and combs.
- Some ingredients of cosmetics like perfume and lipsticks come from whales, cruets, etc. Don't purchase those illegal products.
- Campaign against buying live animals or materials made of animal horns, teeth, carapace, bird feathers, ivory and corals as gifts like combs and jewelry like earrings, pendants, necklaces, brooches and hair clips.
- Boycott illegal animal-performance shows.
- Never buy a caged bird and other wildlife peddled as pets. Campaign against and boycott restaurants serving exotic dishes from wildlife as well as those exhibiting wildlife, like talking mynas as added restaurant attraction.
- Try to stop trade at the source of hunting, hiding sites, transit points or when opportunity arises.
- Identify species being traded, their status (rare, endangered, threatened, endemic, migratory) and community values, which favor or deter conservation actions.
- Create an environment hostile to wildlife collection, hunting, poaching, trapping, etc. Some ways of doing this are:
- Deny hunters access to land to hunt on (educate and organize private land owners).
- Make noise, dismantle traps, alert forest guards or police (in public lands).
- Explore and promote alternative livelihood- conservation schemes for wildlife gatherers. Example: beekeeping projects.
- Restore habitat at micro-level and plant flower-fruit bearing trees encouraging animal-pollination, successful reproduction vis-à-vis extensive regeneration.

- Plant only native and non-invasive species in your yard or garden to create micro wildlife habitat.
- Establish secured nesting areas like heavily canopied trees along the sidewalks.
- Try to keep your house complex and surroundings wildlife-friendly by providing an environment that supports local wildlife.
- Reduce, Reuse, Recycle, Refuse carbon (ecological) footprint.
- Learn about the wild denizens in and around your neighborhood.
- Live harmoniously with the wild animals around your own locality and when visiting public lands elsewhere.
- Innovate better solutions for human-wildlife conflict in your locality.
- Help wildlife stay wild, in the wild.
- Do not cultivate a taste for dishes made of wildlife, their eggs or their nests.
- Don't store or leave human food outdoors. Cover or secure garbage to keep wildlife out.
- Don't feed wildlife (other than using a bird feeder for birds), especially in a way that makes them comfortable around humans. This may be dangerous for both you as well as the animal. They need natural, not human, food. Otherwise, it may cause disease, injury or even mortality. Help them remain healthy, safe and free.
- Don’t keep banned wild pets- for example, monkeys, birds like Rose Ringed Parakeet, Alexandrine Parakeet, Red Munia and Jungle Maina, African grey parrot, Blue-throated Macaw and Yellow-crested Cockatoo, tortoise and turtles like Indian star tortoise and Red Ear Slider. Home is no place for wild animals. While they are self-sufficient in their natural habitats, outside the wild, only experts with years of veterinary and animal behavior training can provide the care that wild animals need.
- Promote only eco-tourism, not mass tourism, by visiting national parks, wildlife sanctuaries, conservation areas, zoological parks under expert guidance.
- Become a Citizen Scientist by maintaining a notebook of wildlife sightings and observations and participate in data-gathering by sharing information, all of which may contribute to understanding and protecting the environment, ultimately helping protect wildlife.
- Prepare Biodiversity (richness or otherwise and diversity of both resident and migratory species) Checklist for every micro area (blocks) within your ambit.

- Use audio-visual documentations prepared on the basis of field survey and photographic records for conservation campaigns, which can be instrumental in assessing the environmental make-up or conditions of a particular place or ecosystem; and, can impart cultural, aesthetic and historical values to local people.
- Share your passion for wildlife conservation with your family, relatives, friends and associates so that everyone pledges to do what they can to stop wildlife-depletion.
- We should not let existing wildlife, big or small, go extinct. But we can actually achieve better outcomes by strategic prioritization, which may vary from site to site and be determined on the basis of reconnaissance survey. Although many government and non-government agencies have been on the lookout for viable conservation techniques, more balanced approaches and long-term initiatives are to be made for the ultimate success in wildlife conservation.

About the Author: Jayanta Kumar Mallick completed his post-graduation and research from Burdwan University and Calcutta University respectively. He served the Wildlife Wing, Forest Department, Govt. of West Bengal for 37 (1976-2012) years. He also worked in the NE India Elephant Project with Dr. Dhriti Kanta Lahiri Choudhury. And has more than hundred national and international publications. He is a journal reviewer and an adviser of NGOs. His biodata has been published in Marquis Who's Who (2015).

नीली-नीली पृथ्वी हमारी,
लगती कितनी प्यारी हैं।
पर क्या कहे इस पृथ्वी पर,
प्रदूषण की महामारी हैं।
इस पृथ्वी पर करोड़ो लोग,
जो इस समस्या के सहभागी हैं।
हमारी पृथ्वी प्यार से हम लोगो का पालन करती हैं,
और इसके बदले में केवल कष्ट ही पाया करती हैं।
पंचतत्व से निर्मित यह सुंदर कयायन्त्र हैं,
तत्वों का संतुलन और अनिवार्यता ही वातावरण हैं।
बिगड़े जब इनका संतुलन,
समझो वही प्रदूषण हैं।
इसी प्रदूषण के कारण ओजोन परत में होगयी छेद हैं,
जिससे पृथ्वी पर पहुच रहीं खतरनाक अल्ट्रावायलेट रेज़ ।
पेड़ हैं पृथ्वी के लिए वरदान,
जो मनुष्यो को दिया करते जीवनदान।
पेड़ ही पर निर्भर है मनुष्य की जीवन - मृत्यू,
और मानव करते उन्ही पेड़ो का जीवंहारण।
रोक सको तो रोक लो इसको,वरना तुम पछ्ताओगे।
पेड़ ही नही रहेंगे तो यारो जीवन कहा से पाओगे।
जो पृथ्वी के कष्ट न समझे, ये कैसे मानव हैं।
कभी-कभी तो समझ मैं नही पाती ये मानव हैं कि दानव है।
आइए, हम पृथ्वी के लिए कुछ कर दिखाये।
पेड़ लगाए और पृथ्वी को बचाएं।।

- Shreya Sarkar
Msc.Environmental sciences (2nd sem)
Allahabad central university

CLIMATE CHANGE AND ITS EFFECT ON FAUNA OF INDIAN SUNDARBANS

Dr. Sufia Zaman

Sundarban mangrove forest is the single largest home of the Royal Bengal Tiger. Sundarban is also the only mangrove forest in the world having the tiger as its indigenous population. As per the latest estimation made through Camera Trap experiment, the tiger population in Indian Sundarbans is more than 105, out of which Sundarban Tiger Reserve has at least 82 tigers and South 24-Parganas Forest Division has at least 23 tigers. There are 15 species of mammals, 8 species of birds and 17 species of reptiles, which are included in the Schedules I & II of Wildlife (Protection) Act, 1972. Total no. of species, included in Appendix I of CITES Regulation, are 14. Sundarban also harbors a good number of rare and globally threatened animals including estuarine Crocodile (*Crocodilus porosus*), Fishing Cat (*Felis viverrina* Bennett), Salvatore Lizard / Water Monitor (*Varanus salvator*), Gangetic Dolphin (*Platinista gangetica*), River Terrapin (*Batagur Baska*), marine turtles like Olive Ridley (*Lepidochelys olivacea*), Ground Turtle, Hawksbill Turtle and King Crab (Horse Shoe). These indicate that Sundarbans Reserve Forest is a natural biodiversity hot spot. The forest floor is the domain of the Royal Bengal Tiger (*Panthera tigris*). Among other mammals, ground fauna comprises of wild boars, spotted deer, porcupines, otter and monkeys. Among the reptiles, the king cobra, the common cobra, banded krait, Russells Viper comprise the community of venomous reptiles, while the Python, Chequered Kil- Back, Dhaman, Green Whip Snake and several other species constitute the non-venomous snakes. The tidal creeks harbor *Homalopsid* snakes adapted to living in water, the common being the *Cereberus rhynchops*. The lizards are mainly *Varanus salvator* which is a rare monitor, attaining about 2.4 mt in length. The sea-facing beach of the Reserve Forest forms the nesting ground for Olive Ridley Turtles (*Lepidochelys olivacea*). The water monitors along with wild pigs, terns and sea gulls are the greatest predators of their eggs and hatchlings. The endangered River Terrapin (*Batagur baska*) also uses the beaches as their nesting ground. Avifauna: The birds are in plenty including a large number of migrants from the higher latitudes that visit the area in winter. It consists of herons, egrets, cormorants, storks, green pigeons, sand pipers, large and small spoonbills, darters, seagulls, teal, partridges and a great variety of wild geese and ducks. The cetaceans like Gangetic Dolphin (*Platinista gangetica*) are frequently

found in the eastern side, particularly in the Raimangal River. The Black Finless Porpoise (*Necmerisporosus*) is also found in the rivers near the estuary. The marshes and river offer asylum to the Estuarine Crocodile, one of the most endangered and the largest of crocodiles. A wide variety and assortments of fish, molluscs, crabs and prawns inhabit the estuaries. The amphibious mud-skipper fish such as *Peripthalmus* and *Boleopthalmus* arouse considerable interest. Also found animals are Whale Shark, Tiger Shark, Hammer Headed Shark, saw fish, Guitar Fish and some common edible fish *e.g., Hilsa ilisha, Setipinnabreviceps, S. taty, Gudusia chapra etc*. Among the crustaceans, commonly found are the One Armed Fiddler Crab (Uca sp) and the two species of trilobite (*Tachepleursgygus* and *Carcinoscropius rotundicauda*). The latter is also known as the Horse Shoe Crab, which are living fossils and now protected owing to its medicinal value. Insects abound in the forests amongst which the honey bee (*Apis dorsata*) is a source of considerable income for the poor fringe people.

Faunal Diversity of Sundarbans at a glance

Total No of Species = 1586 Vertebrate Spp = 481 Hemichordate Spp = 1

Invertebrate Spp = 1104 Protozoan species = 106

Species included in Schedule I & II of Wildlife Protection Act, 1972

Mammals = 1Birds = 8Reptiles = 17

Total number of species included in Appendix I of CITES Regulation = 14

The impact of global warming, through the predicted sea level rise, on Sundarbans is an inevitable phenomenon. Emission of greenhouse gases, through deforestation/ degradation as well as industrial pollution and burning of fossil fuel elsewhere in the globe has put this mangrove estuary, along with many other coastal forests and habitations, under severe threat of degradation. While the mitigation measures have to be primarily at the global level as well as at local level, the adaptation strategy will also involve participation of global and local communities. As regards the destructive livelihood activities practiced by the villagers of Sundarbans, generating employment through other livelihood options and training in skill development have to be resorted to. However, all these socio-economic activities need huge amount of fund support at the beginning. Since

Sundarban mangrove, if properly conserved, can store billions of tons of carbon thus mitigating the effect of global warming, the people of the region also need to be duly compensated under REDD+ projects. The study has shown the prospect of conservation of Sundarbans mangrove flora and fauna through active participation of local people. The global community cannot avoid their commitment for conserving this World Heritage Site and one of the largest sink for atmospheric carbon.

About the Author: Dr Sufia Zaman is an Associate Professor from Department of Oceanography, Techno India University, Salt Lake Campus, Kolkata, West Bengal.

ON MIGRATIONS – A PERSONAL JOURNEY

Paul Pop

That the Arctic Terns migrate from one hemisphere of the Earth to another, a journey spanning thousands of kilometers (more than 90,000 Km in the non-breeding period by some individuals [1]), is a fact I couldn't help but be simply flabbergasted at, considering the fact that I myself was incapable of walking more than 5 kilometers without my leg muscles starting to ache. When I started college, I got into endurance running –10 Km, then 21 Km, then 42 Km. That's when I realized that runners perform actions analogous to that of migratory birds: carb-load (or in birds, mostly fat-load) before the race to sustain oneself during the arduous journey, and follow specific routes to and fro, from the start to finish. The Arctic Tern was perhaps my entry point into the fascinating world of migratory animals. My first significant sighting of migration at close quarters was that of a relative of the European Starlings (perhaps the most studied model species on the subject of migration – a bird I was able to see up and close in Europe). The Rosy Pastors, happened to pass via my former college in central Bengaluru (and still do) during the southerly leg of their long journey. At the time, I had moved north from the coasts of Kerala for my undergraduate studies, whereas the Rosy Pastors came south for their winter. The 'murmuration' of starlings is nothing short of a spectacle. Hundreds of individuals, making shapes in the skies with their areal acrobats, akin to the shapes one can see while moving black pepper on bamboo mats kept outside for sun-drying, when observed from a distance.

Though we assume them to arrive at a fairly predictable time, there has been some variation in arrival time, as has been noted from the collection of observations from my seniors and their seniors (a lag of 2-3 weeks has been noted, but not necessarily in an increasing manner). It's during September that they usually arrive (mostly towards the end of the month), and this coincides with the availability of figs on the Banyan tree. The tree is located at the center of what has been named the "quandrangle' because of the shape of the opening with a dais empting into it, where students congregate in swarms for chit-chatting. The swarms of birds that come and roost in the tree attract the gaze and ears of many college students and employees alike (even the ones with very little appreciation for nature), as they outnumber and drown the clamorous voices of the humans during the breaks, by their collective calls which sounds like hundreds of garrulous students chit-chatting. One among the former group was a professor, who would announce their arrival to everyone by using the whiteboard located within in the quandrangle. The flock size could even exceed 500 at times. They stayed for a few days (perhaps a week or more) before moving further south, as far as the tip of India, after which they made their way

Male Bluethroat in non-breeding plumage

back. As I followed my passion for wildlife, I ended up in Noida (Uttar Pradesh) for my Masters in Wildlife Science. During my tenancy in this place, I regularly visited Okhla Bird Sanctuary situated only an easily walkable distance away from the University. The best time for birding in the Sanctuary was during the winter seasons, when flocks of ducks and geese (many Anatidae members) as well as other birds arrived from faraway lands. During the first winter, I was not able to lay my gaze upon as many winter migrants as the second. The second one was most magical - Northern Pintail, Eurasian Teal, Greylag Goose, Common Pochard, Tufted Pochard, Ferruginous Duck, Eurasian Wigeon, Gadwall, Red-crested Pochard, Northern Shoveler and Garganey – all sighted. The Shovelers, Wigeons, Garganeys, Teals and Pintails were the most plentiful; covering much of the waterbody in sight; almost as if someone showered on it with confetti of silver, grey, brown and black. Gulls and Terns also arrived by the hundreds - Brown-headed and Black-headed Gull, Whiskered Tern and River Tern were the ones I was able to observe. Of all the winter migrants, the one I fell in love with is the gorgeous Bluethroat - especially the males in their non-breeding plumage.

In the month of March in 2017, I got the opportunity to visit Sariska Tiger Reserve as part of a field visit. During one of the forays inside the Reserve (in the peripheral/buffer zone), I finally got to see in person, a species I had seen plenty of times in wildlife documentaries – the Bar-headed Geese, resting and foraging in and near a small lake. A recent study has indicated that this highest flying species of birds (flying at 5000-6000 on an average at the zenith of altitudinal range, with extreme value claimed to be more than 8,000 metres), uses methods that are contrary to common sense explanations [2]. For example, one would assume that they would prefer to make use of the upslope tailwinds which are predominantly available during daytime to conserve energy. But, instead they were discovered to be mostly night-time flyers, individuals who flap hours at one stretch (flying upto 17 hours non-stop!) and rarely glide, even while going downslope. The reason behind have been posited to be the lessened threat from predators, the thicker air density and stable wind currents at night.

Himalayas – a view from the foothills at Nainital (left); The species which traverses the Himalayas – Bar-headed Geese, at Sariska Tiger Reserve (right)

When I was doing my dissertation in Munnar (Idukki district) on two non-migratory resident species of birds, I was able to witness a beautiful sight in a bright blue morning – strands of blue and black streaking above the road tracing the contour of the road and then the Muthiraupzzayar river close by. These were Blue Tigers and Crow species (nothing to do with mammals or aves, except similarity in pattern and colour). What connect these species that they travel in a mixed group? While in Bengaluru, my first visit to Lalabagh Botanical Garden with a group of wildlife enthusiasts, had led me to discovering a swarm of butterflies moving on and around a very familiar looking plant – the Milkweed plant with their unique purple/violet flowers that I used to enjoy popping in my hands as it exude a gooey liquid with fevicol-type consistency. Now, I just leave them alone knowing how important they are for the butterflies of Daniadae family (from where they get the name: "Milkweed Butterflies"). These butterflies sequester the toxins (alkaloids) from the plant, making them quite unpalatable for their prey, when they are in the caterpillar stage. New research has discovered that the primary participants of the butterfly migration in Southern India are Dakhan Dark Blue Tiger, Oriental Blue Tiger, Indian Common Crow and Double-branded Black Crow [3], all of which have been noted in Bengaluru.

Migration is not just taxing on the mind and the body; it can be lethal for many of the individuals. Many lose their lives in the path between point A and point B, for a plethora of reasons. Earlier, it used to be due to mostly natural causes. But now, the balance is shifting. The swarms of insects such as Blue Tigers, Crows and Wandering Gliders mentioned before, frequently run into the vehicles driven by people with not a care in the world, and die horrible deaths – bodies crushed or dismembered by the metal parts. I have personally noted a mangled body of a Blue Tiger during the sighting of the migrants.

In birds too, this is the case. Flamingoes and other birds have been recorded in India and elsewhere to be even electrocuted and killed for the crime of following their migratory pathways [4], because humans have reached the industrial age and is pushing forward – all at the cost of lives of other species. Like last year, this year's Asian Waterfowl Census (in January) too had a great surprise for me. While our team was coming to the end of survey at a different part of the Okhla barrage, I got a glimpse of the pink beauties with their long necks and clumsy-looking beaks – a flamboyance of the Greater Flamingo, partially hidden behind a thicket of reed, afar from the bund I was standing on. These filter feeders, standing together in tranquility, have become an icon for the migratory birds in India. I wonder how long until they stop visiting the small havens within the cities.

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Appendix: Common names, Alternate Common Names and Scientific Names (in chronological order, as appears in the text).

Common Name	Scientific name
Rosy Pastor/Rosy Starling	*Pastor roseus* (Linnaeus, 1758)
European Starling/Common Starling	*Sturnus vulgaris* Linnaeus, 1758
Banyan/Bagat/Badh	*Ficus benghalensis* L. 1753
Northern Pintail	*Anas acuta* Linnaeus, 1758
Eurasian Teal/Common Teal/Green-winged Teal	*Anas crecca* Linnaeus, 1758
Eastern Greylag Goose	*Anser anser* ssp. *rubirostris* (Linnaeus, 1758)
Common Pochard	*Aythya ferina* (Linnaeus, 1758)
Tufted Duck/Tufted Pochard	*Aythya fuligula* (Linnaeus, 1758)
Ferruginous Duck/White-eyed Pochard	*Aythya nyroca* (Güldenstädt, 1770)
Eurasian Wigeon	*Mareca penelope* (Linnaeus, 1758)
Red-crested Pochard	*Netta rufina* (Pallas, 1773)
Gadwall	*Mareca strepera* (Linnaeus, 1758)
Northern Shoveler	*Spatula clypeata* (Linnaeus, 1758)
Garganey	*Spatula querquedula* (Linnaeus, 1758)
Brown-headed Gull	*Chroicocephalus brunnicephalus* (Jerdon, 1840)
Black-headed Gull/Common Black-headed Gull	*Chroicocephalus ridibundus* (Linnaeus, 1766)
Whiskered Tern	*Chlidonias hybrida* (Pallas, 1811)
River Tern	*Sterna aurantia* J.E. Gray, 1831
Bluethroat	*Luscinia svecica* (Linnaeus, 1758)
Bar-headed Goose	*Anser indicus* (Latham, 1790)
Milkweed	*Calotrophis* sp. R.Br.
Dakhan Dark Blue Tiger	*Tirumala septentrionis* ssp. *septentrionis* (Butler, 1874)
Oriental Blue Tiger	*Tirumala limniace exoticus (* Cramer, [1775])
Indian Common Crow	*Euploea core* ssp.*core* (Cramer, 1780)
Double-branded Black Crow	*Euploea sylvester* ssp.*coreta* (Godart, 1819)
Greater Flamingo	*Phoenicopterus roseus* Pallas, 1811

WILDLIFE PICTURE GALLERY

Gouranga Upadhyaya