Newsletter

Volume 03 | Issue 01 | June 2020

Voice of Environment

(Organization for Clean, Green & Sustainable Environment)
Registered Under, Society Act. XXI of 1860

World Environment Day

Biodiversity

Website: www.voiceofenvironment.org | Email Id – voiceofenvironmentngo@gmail.com

Voice of Environment Newsletter

Volume:03 Issue:01

June, 2020

Send in your articles/letters/comments/suggestions to the Editorial Team

Email: voeeditor@gmail.com

From the Editorial desk…

Gung Ho!

The world is passing through a difficult time with a rapidly evolving pandemic enveloping all of us since the beginning of this year! The emerging public health emergency situation has claimed close to three and a half lakh lives and the figures are rapidly changing every second. We have not faced medical crisis of such magnitude during the last century post the Spanish Flu pandemic of 1918. As the world's leading health infrastructure collapses, our socio-economic systems are crumbling down under the pressures of complete countrywide lockdown announced in almost all major economies around the globe. This unprecedented crisis situation calls for urgent introspection. It raises the imminent question on our so-called growth and development trends. There was no looking back for us post industrial revolution as we rode the bulls of industrial revolution and economic boom often at the cost of our environment, Mother Earth. We have exploited and degraded our natural resources. Pollution has touched new records everywhere. The extinction rates of species touched new high as our cumulative greed skyrocketed. We have poisoned our fertile soils, choked our lifeline rivers and painted our azure blue skies dark as the spring fall silent. The oil-spills and coral bleaching never attracted our attention. We remained as mute spectators to the global climate catastrophe and our burning rainforests. We tend to forget that man does not possess nature but it's the other way round! Nature has retaliated with mass extinction events in the past. This is the time to pay back Mother Earth and start living harmoniously with nature. Sustainability is the key word and all our progresses in future must be shaped with the ethos of 'Sustainable Development'. This issue of Voice of Environment Newsletter is dedicated to the central theme of this year's World Environment Day- Biodiversity. Hope you will be enjoying the issue in these gloomy times. Let's stay united and safe until we meet again in a world free of Corona!

Happy Reading!

Dr. Dipankar Saha

Former Additional Director &
Divisional Head – Air Quality Monitoring Division &
Infra Structure Division,
Central Pollution Control Board
MoEF & CC, Govt.of India, Delhi 110 032
Presently, Expert Member, Environmental Apprisal Committee
MoEF & CC, Govt.of India, New Delhi 110 003
dsaha.cpcb@gmail.com

MESSAGE

The recent lockdown caused due to COVID 19 pandemic has given us the time to understand the devastating features of Corona virus. On the other hand, environment itself demonstrated its own self-purification capacity. Thus, Gangetic Dolphins are coming back, turtles are roaming in beach without fear, various kinds of melodious birds are coming back. Various sea animals are swimming in their home without any fear and restrictions. Deer and Peacocks are coming to visit us. May be to see, if we are still living!! It's all are looking like whole new earth and its biodiversity has reached its childhood, which are new to many of us. Our Holy Ganga it is also getting back its own beauty, it has reached its own early age, which many of was dreaming for. We talked about pristine but many of us never knew or no idea about pristine environmental quality. At least now onwards, we would be able to describe. Nature has demonstrated, then why we can't maintain that's the challenges for all of us. Let's realise that the improved version of our environment is the pristine version of our earth with more sympathy for us with all its own diversity or more specifically, biodiversity.

I'm happy that the Voice of Environment has taken pain to publish a special issue of newsletter on the occasion of world environment day 2020, with central theme on biodiversity. We humans being part of biodiversity, we should have compassion for all other living creatures of our world. It is time to realize that the tireless support of our environment which is of utmost importance for conservation, protection and propagation of biodiversity in this planet.

Merely surviving with ICU in Hospital should not be the dream, but living with adequate Environmental Support System should remain as permanent dream and desire of all. Maintaining Biodiversity is not luxury but necessity. Let's come forward to re-strengthen our bond with the nature.

Environment is always beautiful and graceful. Let's have compassion for environmental resources for our development.

Dr. Dipankar Saha

ROLE OF BATS IN OUR ENVIRONMENT

Sweta Prakash[1] and Shweta Saxena[2]
[1]Department of Botany, Govt. K.R.G., Autonomous P.G. Degree College, Gwalior (M.P.)
[2]Department of Botany, Govt. Science P.G. College, Gwalior (M.P.)
Email: sweta.shrivastava@gmail.com

INTRODUCTION:

Bats are mammals, warm-blooded, covered with hairsand nurse their young. Unlike humans, bats have wings, which allow them to fly. Bats play an important role in many environments and their processes around the world. Some plants depend partly or wholly on bats to pollinate their flowers or spread their seeds (ex: Guava, Banana, Cacao), while other bats also help control pests by eating insects. *Agave macroacantha* is extremely dependent on nocturnal pollinators for its reproductive success of which bats are especially important for its successful pollination. The Mahua tree (*Madhucaindica*) is pollinated by bats. (Arizaga*et.al*.,2000).Bats are indicator species because changes to these bat populations can indicate changes in aspects of biodiversity. Although a few mammals can glide through the air, bats are the only mammals capable of continuous flight. According to IUCN there are 1296 species of bats around the world, and 128 in India. The most common ones that people see in India are the large Common Indian flying fox, the short-nosed fruit bat (half the size of flying fox), and pipistrelles which are very small, five to six-gram bats.

A keen sense of hearing

Bats are nocturnal. To help them find food in the dark bats use high frequency sound waves and their echoes to find and catch their favourite food - insects. The sound waves are so high that humans cannot hear them, but bats and some other animals such as dolphins use sound waves and their echoes to navigate and locate food called echolocation (Kunz et. al., 2011). Some of bats' unique features like membrane wings and echolocation have inspired technological advances in engineering. Drones that have thin and flexible bat-like wings are in the works as well as tiny, more efficient sonar systems for navigation. The wing suits used by base jumpers take more than a few cues from bats' aerodynamic bodies.

Bats Are Important Pollinators

Over 500 plant species rely on bats to pollinate their flowers, including species of mango, banana, guava and agave (make tequila).

The pollination of plants by bats is called **chiropterophily**.Chiropterophilous plants even manufacture substances that are useless to the plant itself but helpful to the bat.

Plants pollinated by bats often have pale nocturnal flowers. These flowers are often large and bell shaped, and some bats have evolved specifically to reach the nectar at the bottom of them. The tube-lipped nectar bat of Ecuador and the banana bat that lives only on the Pacific coast of Mexico both have extraordinarily long tongues for this exact reason. The tube-lipped nectar bat's tongue is more than one and a half times the length of its body. Most flowering plants cannot produce seeds and fruit without pollination – the process of moving pollen grains from the male part of the flower (the stamen) to the female part (the pistil). This process also improves the genetic diversity of cross-pollinated plants. Bats that drink the sweet nectar inside flowers pick up a dusting of pollen and move it along to other flowers as they feed. Nectar-eating bats have special adaptations also. They tend to have fleshy bristles on their long tongues, as do many bees, to scoop out pollen as well as nectar.

Insect control

All bats in the UK are insectivores (waterways.org). Insect-eating bats are great for keeping bugs away from crops. The Brazilian free-tailed bat has been recognised as an important "pest management service" in cotton farming. Because bats eat so many insects in some regions, they can also reduce the need for pesticide sprays. Bats help to reduce the use of toxic chemical pesticides in the environment by being voracious feeder of insects. Bats help to control infestations of moths, mosquitoes, leafhoppers, aphids, fleas, flies, wasps, and beetles. Insects avoid areas occupied by bats. Some bats are actually pest controllers eating thousands of insects, mosquitoes every night. The little brown bat is a friendly creature found throughout the North western US. They can consume more than 1,200 nocturnal insects, such as mosquitoes, in less than an hour. West Nile Virus, a disease that kills horses and humans, transmits primarily by mosquitoes. In areas where West Nile Virus is prevalent, bat houses are encouraged as an effective and environmentally friendly method of mosquito eradication.

Seed dispersal

Like birds, some bats play a critical role in spreading the seeds of trees and other plants. These seeds drop to the ground in their own ready-made fertiliser, which helps them germinate and grow.

Bats are often considered "keystone species" that are essential to some tropical and desert ecosystems ex: great baobab tree of the East African savannah, often called the African Tree of Life (*Adansoniadigitata*). Without bats, the Tree of Life could die out, threatening one of our

planets richest ecosystems.*Terminalia catappa*, is one of the bat-dispersed trees with many human uses like shade, fuel-wood, edible nuts, timber, and tannin (extracted from the bark, leaves, roots, and the fruit shell)(Buddenhagen, 2008). Bats defecate when they are flying and their droppings also provide excellent fertiliser for plants.

Adansonia digitata: Tree of Life

Copyright: Science Photo Library

Throughout the US, scientists estimate, bats are worth more than $3.7 billion a year in reduced crop damage and pesticide use.

So far, there is no evidence that bats are carriers of SARS-CoV-2, the virus that causes COVID-19. Because the current pandemic virus, SARS-CoV-2 has not been identified in any bat species, till date (The Hindu, 2020). The statement came after a study by the Indian Council of Medical Research found cases of bat corona viruses in two Indian bat species from Kerala, Himachal Pradesh, Pondicherry and Tamil Nadu.

Conclusion

Thus, order chiroptera is the second most diverse and abundant order of mammals with great physiological and ecological diversity. They have some great economic importance associated with them. They act as biological pest control (arthropod suppression). They prey upon mosquitoes. Bats are one of the major pollinators. Large scale cash crops that are originally pollinated or dispersed by bats includes wild banana, bread fruits, mangoes, agave, mahua or honey tree and so many more. They have important role to play in seed dispersal so they are considered crucial to the survival of world's tropical forests. Apart from this bats have long been mined from caves (Guano mining) for use as fertilizers on agricultural crops due to its high concentration of nitrogen and phosphorous.

Bats are excellent ecological indicators of habitat quality. Thus they also act as bio-indicators to both disturbance and existence of the contaminants. They also serve as human food (meat) in many countries because of high protein, vitamin and mineral composition and low cost. Bats have played a very important and potent role in the field of education and research. All animals

have viruses that live inside them, and bats, as well as a range of other mammal groups, happen to be natural carriers of coronaviruses. But along with this bats too have a major role in disease transition and contamination. They represent a potential epidemiologic of several diseases that can be fatal to humans, including Rabies, Ebola, Leptospirosis, Histoplasmosis, and pseudo tuberculosis etc. In the present situation (COVID-19) because of the misconception on bats and COVID-19 linkages, peoples are removing bats from trees and also cutting trees. Bat populations appear to be declining due to human induced environmental stresses. Bats are among the most overlooked in spite of their economical and ecological importance, their conservation is mandatory. Bats are one of the most important groups of mammals in terms of ecosystem function. This is particularly true in a time where the world has undergone such considerable deforestation and habitat adaptation. Bats are often the best means of dispersing seeds and increasing the rate of recovery in these situations.

To help save this diverse group of animals, contribute to one of the many worthy bat-based conservation programmes. In India, they pollinate the flowers of mangroves and create our strong coastal shield to natural barriers. They also act as pest controllers in rice and tea plantations. Human activities and encroaching upon wildlife habitats puts us at risk of encountering new viruses. These viruses may come from any wildlife species and not necessarily just bats. Thus, we need to modify human practices to prevent the emergence of new pathogens.

References:

1) https://www.gardeningknowhow.com/garden-how-to/beneficial/bats-as-pollinators.html.
2) https://www.waterways.org.uk/wrg/resources/environmental_resources/protected/species/bats/protected_species_bats.
3) Riccucci Marco and Benedetto Lanza, Bats and insect pest control: a review, research gate. Net publication, Oct 2018, 161–169, 201.
4) www. The hindu.com, Amid COVID-19, let's not forget how bats help our environment, 12 may 2020.
5) Kunz T. H., Torrez E. B. de, Bauer D., Lobova T. and T. H. Fleming, "Ecosystem services provided by bats," Annals of the New York Academy of Sciences, 1–38, 2011, 1223,1.
6) Arizag S. a, Ezcurra E., Peters E., Arellano F. R. de, and E. Vega, "Pollination ecology of Agave macroacantha (Agavaceae) in a Mexican Tropical Desert: the role of pollinators," The American Journal of Botany, 2000, 1011–1017, 87, 7.
7) Buddenhagen. I. W, "Bats and disappearing wild bananas: can bats keep commercial bananas on supermarket shelves?" Bats, 2008, 1–6.

LATPANCHAR – AN UNEXPLORED HEAVEN OF BIODIVERSITY

Dr. Rwitabrata Mallick
Assistant Professor, Department of Environmental Science,
Amity University Madhya Pradesh, Gwalior
Email: *rmallick@gwa.amity.edu*

Latpancharis an area with bountiful of pristine natural beauty. It is located in (Fig 1) the Kurseong Sub Division of Darjeeling, West Bengal. With a magnificent view of Kanchenjunga amidst beautiful mountain slopes Latpanchar is blessed with umpteen numbers of birds and wild animals. With the presence of various plants, the area has become a paradise of biodiversity. Latpanchar is the top most section of part of Mahananda Wildlife Sanctuary (MWS) with an average altitude of 4200 ft.

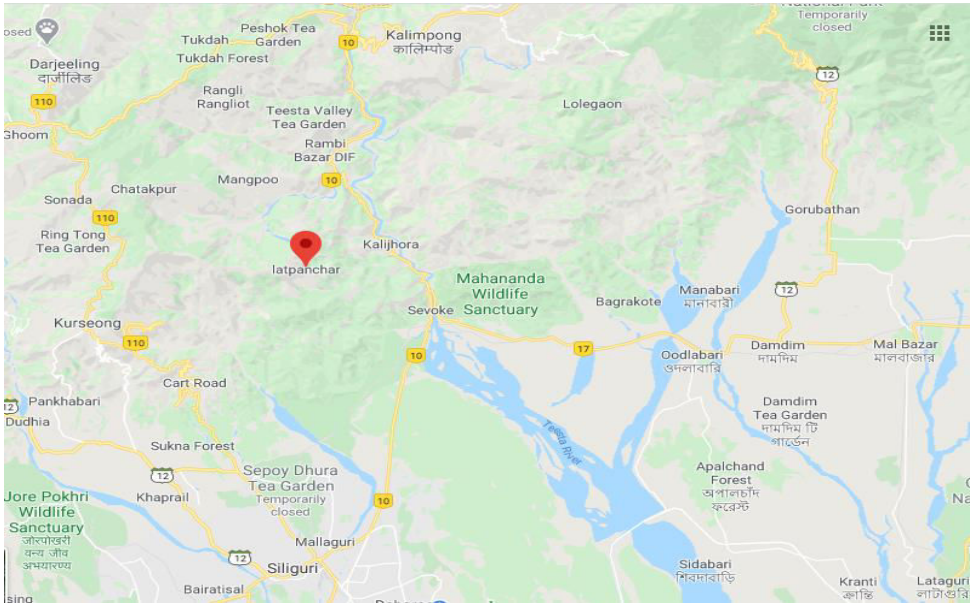


Fig 1: Site Map of Latpanchar Wildlife Sanctuary

Latpanchar is a place of peace and tranquillity with serene view even at the time of peak tourist season in Darjeeling hill area. One can enjoy the undulations of magnificent hilly terrain and lush green forests away from the cacophony of cities.. One can explore the place on foot by trekking down around 5-6 Km along the hilly road passing through Mahananda Wildlife Sanctuary. Jeep riding is also possible along the road with prior permission. After entering in the sanctuary, the biodiversity of the area can be explored in half day duration. Latpanchar is rich in avifaunal diversity. It is an ideal place for birdwatching. Latpanchar area is also famous for Cinchona cultivation.

Near about 1500 acre area has been designated for Cinchona plantation in a close proximity to the area. Cinchona is the prime ingredient for preparation of anti-malaria medicine quinine.

Beauty of Latpanchar

a) It gives a great pleasure and wonderful experience walking along the cinchona plantations. The meandering road passes through forests of sal, teak, pine and dense Cinchona.

b) *Ahal Dara View Point (Fig 2)* of Latpanchar rovides a mesmerising view of Kanchenjunga peaks. From the top spectacular view of river Teesta gives a great feeling. Gangtok and Kalimpong can be viewed when there is no cloud and fog in the sky. Even sometimes world-famous Silk Route is also visible.

Fig 2: Ahal Dhara View Point

c) *Sarsari Dara* also gives a prominent view of Kanchenjunga (Fig 3).

Fig 3: Sarsari Dara

d) *Namthing Lake* (Fig 4) gives a wonderful view amidst biodiversity rich Latpanchar area. Dense Pine trees are guarding the lake from one side. This area is famous for the rare Himalayan Salamander or commonly known as Himalayan Newt. The Himalayan newt (*Tylototritonverrucosus*) is a species of salamander which used to be found in the middle hills of South and Southeast Asia are now found only in few areas along with Latpanchar under Kurseong sub-division area.

Fig 4: Namthing Lake

Fig 5: Sitong Orange Orchardis another beauty of Latpanchar area.

Wild lives of Latpanchar: Latpancharis famous for the varied range of wild lives. Avian fauna is one of the major attractions of Latpanchar. Around 36 varieties of animals and near about 250 species of birds can be observed in the verse biodiversity enriched area.
Mostly Leopard (*Panthera pardus)*, Himalayan black bear (*Ursusthibetanus)*, deer (*Axis axis)*, wild boars (*Sus scrofa)*, mountain goats (*Capricornis thar)*, monkeys (*Macaca mulatta*) and elephants (*Elephas maximus)* are found in this area. One should have proper protection before entering the Sanctuary and exploring the Latpanchar area as wildlives can come across anytime. Famous Raja Rani Hill is in this area which is located at the other side of Forest Rest House of Latpanchar.

Among the birds, Yuhina, Woodpeckers (*Dendrocoposdarjeelensisdarjeelensis)*, Ashy Backed Shrike (*Laniusexcubitor)*, Scaly Thrush *(Zootheradauma),* Black Bulbuls *(Hypsipetesleucocephalus),* Magpie, Spotted Eagles (*Spisaetusnepalensisnepalensis)*, Drongo (*Surniculuslugubrisdicruroides)*, Minivets(*Pericrocotusethologulaetus)*, Kingfishers (*Haleyoncoromandacoramanda)*, Minla*(Minla ignotincta),* Robins *(Copsychusfulicatus)* are found in this biodiversity rich area. A patient birdwatcher can also get a glance of Himalayan Pied Hornbills (*Bucerosbicornis*). Proper Natural Resource Management and Sustainable Socio-Economic Development can conserve the biodiversity of the Latpanchararea. Too much tourist gathering might cause damage to the nature so it should be scientific, proper and methodical with suitable administrative expertise.

GUNG HO!

We are starting this section called ‘Field Notes’ from this issue of Voice of Environment Newsletter. Field Notes would include first hand experiences and voices from the field and to be particularly shared by budding ecologists of our country and the world. It would be written in active voice, just as a daily diary writing at the end of the day. The font size would be 12 and Font is Times New Roman. The maximum word limit is 1000 words with brief description of the author and citations wherever needed. However, the pictures to be shared with the write-up must be clicked by the author and is not to be copied from Internet.

Please also ensure to make the story crisp, in lucid language and innovative so that it makes for an interesting read!

Field Notes:

PLASTICS- A RISING THREAT TO THE BIODIVERSITY OF ANDAMAN & NICOBAR ISLANDS

Shivam Tiwari
Junior Research Fellow
CMLRE, Kochi, Kerala- 682598
Email: shivamecci00@gmail.com

The Andaman & Nicobar Islands are home to many things – un-contacted tribal people, the Sentinelese, the cellular/Kala Pani Jail, and also fantastic, rich biodiversity. There are more than 500 islands divided between North and Middle Andaman, South Andaman and Nicobar Islands. The beautiful beaches of Andaman and Nicobar Islands – including famous ones like Radhanagar Beach - attract thousands of people not only from India but from all over the world. There are also serious environmental issues lining the beaches of Andaman and Nicobar Islands – plastic pollution being a major cause of concern.

I was fortunate to see and explore the beautiful coastal biodiversity of Andaman and Nicobar Islands during my time as a master's student of Marine Biology at the Port Blair campus of Pondicherry University. As someone who was looking at the ocean for the first time in his life, I was particularly thrilled. I saw beautiful live corals and associated fauna. The richness of the aquatic and terrestrial biodiversity of the islands is immense. There are, however, serious threats to this biodiversity. The issue of plastic pollution particularly garnered all my attention. I saw beaches piled up with garbage – particularly plastic. These are not the kind of images that show up on a plain Google search; however the issue requires immediate attention.

Why is plastic pollution a problem?

When exposed to physical factors such as wave, wind and sunlight, plastic breaks down to meso (5-10mm) and micro (less than 5mm) plastic. These micro plastics – colourful and small – are consumed by phytoplankton. Phytoplanktons are consumed by zooplankton, which in turn are consumed by small or large fish. This is how micro plastic accumulates in the food chain. Small fibres suffocate fish by blocking gills. Micro plastics are also good carriers of persistent organic pollutants (Zhang, et al., 2015) and pathogenic microbes (Kirstein, et al., 2016). They can affect organisms at the cellular level in addition to physical damage to marine organisms.

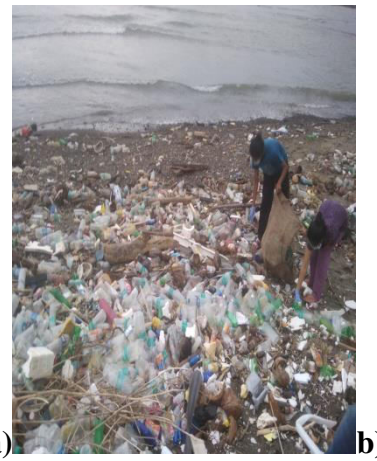
For my dissertation, I worked on estimating the abundance and characterisation of micro plastics in three beaches of Port Blair - namely Corbyns cove, Quarry and Wandoor beach. It is the first work of this kind on Andaman's beaches. Methodology of (Karthik, et al., 2018) was followed.

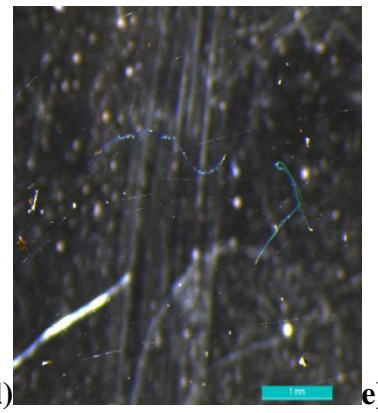
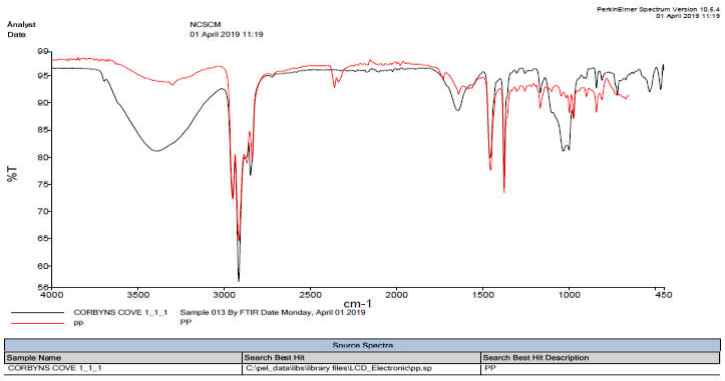
Beach sediment samples were collected from the high tide line at every 50m distance as water stands still at the high tide line for some time, and debris (including microplastics) settle down there. Corbyns cove and Wandoor beach - both sandy beaches - are sites of tourism and intense fishing activity, while Quarry is a rocky beach near the dumping ground of Port Blair. Significant quantities of microplastics were found in all the beach samples – including synthetic fibres from clothes, fibre lines of fishing nets, fragments of plastic cover and pellets from plastic containers. These samples were further analysed using ATR-FTIR (Fourier Transform Infrared Spectroscopy) at the Centre of Nanotechnology, Anna University, Chennai. The results indicated that these samples contained polypropylene, polystyrene, polyethylene terephthalate (PET) and high-density polyethylene (HDPE) microplastics.

Plastic pollution also impacts biodiversity (crustaceans in particular) in another, lesser known way. If you were to take a walk on the quarry area of Corbyns cove beach, you would be likely to encounter many plastic containers containing hermit crabs – both alive and dead. As dead hermit crabs release chemicals which attract other hermit crabs (possibly attracted to the now available shell), these containers effectively become death traps (Laversa, et al., 2020). The authors refer to this as the "lure of death". (Laversa, et al., 2020) found such containers containing as many as 526 hermit crabs! Polythene bags – which are disposed of so casually – are consumed by marine turtles as they are mistaken as jelly fish, eventually choking to death.

According to Ocean Crusaders,2020, the global ocean has around 5.25 trillion pieces of plastic floating on the surface – which is roughly 269,000 tons – and about 4 billion plastic microfibres per square kilometre in the deep sea. 100,000 marine organisms and approximately 1 million sea birds die each year from plastic entanglement and ingestion (EU Science Hub , 2017). According to (Gall & Thompson,2015), 17% of species are affected by entanglement and ingestion of plastics. They are now listedas **threatened or near threatened in the IUCN Red list.** Floating plastic containers transport invasive species across the ocean (Pipkin, 2018), responsible for competing with and wiping out endemic species. One can spot such debris on the beach with biofoulers (organisms that accumulate on submerged or floating objects in a water body) such as barnacles attached to them.

To make my stay in Port Blair productive and driven by the desire to give back to nature, I have started a beach clean-up initiative. I was soon joined by my classmates and juniors and we quickly became a small team. We would go to the Corbyns cove beach on weekends for clean-up. We spotted containers containing hermit crabs and – miraculously – we found marine organisms (seahorses, tiger shrimps, gastropods and the like) managing to survive and make space in hugely polluted environments. We risk losing them forever if we continue polluting our environment. We risk losing the rich biodiversity of these beautiful islands. I can gladly say we removed tons of plastic. This is a drop in the ocean, but any small action is better than no action at all. I remember having a conversation with a local fisher man at the Quarry side of Corbyns cove beach. He noted that garbage pile-up had increased over the past 10-15 years. We need to talk about this pressing environmental issue.

a)  **b)**  **c)** 

d)  **e)** 

a) Quarry (adjacent to corbyns cove beach) area beach cleaning.
b) Corbyns cove beach morning low tide.
c) Chatham beach.
d) Microplastics in sediment under microscope.
e) FTIR graph showing Poly Propylene (PP) in corbyns cove beach sample

References:

EU Science Hub , 2017. *From entanglement to invation of alien species: the harm caused by marine litter.* [Online] Available at: http://ec.europa.eu/jrc/en/new/entanglement-invasion-alian-species-harm-caused-marine-litter[Accessed 10 May 2020].

Gall, S. & Thompson, R., 2015. The impact of debris on marine life. *Marine Pollution Bulletin,* Volume 92, p. 170–179.

Karthik, R. et al., 2018. Microplastics along the beaches of southeast coast of India.. *Science of the Total Environment,* Volume 645, pp. 1388-1399.

Kirstein, I. V. et al., 2016. Dangerous hitchhikers? Evidence for potentially pathogenic Vibrio spp. on microplastic particles. *Marine Environmental Research.*

Laversa, J. L., Sharpb, P. B., Stuckenbrockb, S. & Bondc, A. L., 2020. Entrapment in plastic debris endangers hermit crabs. *Journal of Hazardous Materials,* 387(121703).

Ocean Crusaders, 2020. *Plastic Statistics.* [Online] Available at:oceancrusaders.org/plastic-crusades/plastic-statistics/[Accessed 10 May 2020].

Pipkin, W., 2018. *Invasive Species Are Riding on Platic Across the Oceans.* [Online] Available at:https://api.nationalgeographic.com/distribution/public/amp/environment/2018/08/news-invasive-spices-ride-plastic-across-ocean[Accessed 10 May 2020].

Zhang, W. et al., 2015. Persistent organic pollutants carried on plastic resin pellets from two beaches in China. *Marine Pollution Bulletin,* Volume 99, pp. 28-34.

Field Notes:

RESCUING INDIAN POND TURTLES, *MELANOCHELYS TRIJUGA*: A NEAR THREATENED SPECIES

Shivam Tiwari
Junior Research Fellow
CMLRE, Kochi, Kerala- 682598
Email: shivamecci00@gmail.com

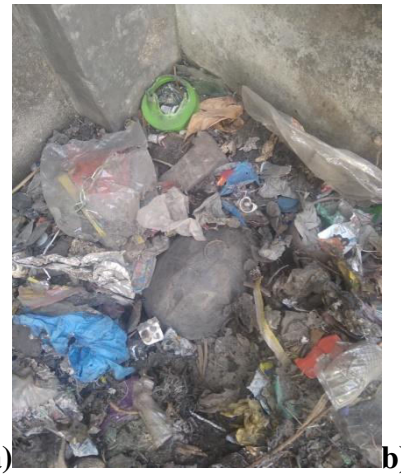
It was around 10:30 in the evening on a Friday night May 1, 2020. I was standing in the balcony of my apartment, when I suddenly heard the sounds of leaf litter and movement in the garbage dump nearby. I am new to this city, **Kochi**, and I had previously heard from neighbours about turtles and snakes living near my apartment in Panambukkadu, Vallarpadam Island. Excited at the prospect of spotting reptiles, I rushed outside with my phone and binoculars as it was pitch dark. I switched on the flash light and tried to see through the binoculars. To my great surprise, I saw two fully-grown turtles searching for food in a garbage dump. I found them there again the next morning - camouflaged and hiding in garbage. In subsequent days, I also found two juvenile turtles. The garbage enclosure had walls that were high enough that the medium- turtles couldn't possibly navigate their way out of it. There was a small pile of sand outside the enclosure that possibly allowed the turtles to enter, but it offered them no way out. I realised they were not merely there in search of food but that they were stuck inside the dump.

I have noted down its characteristic features like medium sized (size range- 38-45cm) black coloured outer shall (dorsal surface) with sub-pentagonal flower like formations and a lifted ridge like structure running from the middle dividing it equally into two halves. The Plastron (ventral surface) is slightly brown coloured, yellow streaks on face and scaly limbs.

I have talked to fellow conservationists and researchers working with turtles and figured out that these were **Indian Pond/Black turtles or Cochin black turtle** (***Melanochelystrijugacoronata*** Schweigger, 1812)**.** It is widely distributed in India, Bangladesh, Myanmar, Sri Lanka, the Maldives, Nepal, and the Chagos Archipelago. It lives in water bodies like ponds, marshes, streams and rivers and also been spotted in artificial water bodies such as rice-fields. This species found active usually during early morning and evening and like spending day time in sun basking. It is considered to have omnivorous diet ranging from aquatic plants to aquatic insects and carrion. This species is listed as **Near Threatened (NT)** by the **IUCN**. I spotted a pond

nearby and released them on the morning of 6th May, 2020. I spotted them three days later sun basking on a floating log.

There are bigger issues at play here. I realized the threats faced by these reptiles when I saw that someone had set the garbage on fire the day after I had released them. If we are to effectively protect our biodiversity, it is important to focus on the problem of mismanagement of waste in our cities and how it can affect not only human health, but also wildlife. **Household waste containing a lot of plastic - attracts foraging animals.** They consume this plastic and choke to death. As it can be seen in this case, wild animals can easily get trapped in plastic. Garbage burning also has adverse impacts on the environment, as it is responsible for air pollution. From trying to find food and home in garbage to getting stuck in such enclosures, the waste we generate poses great threats to biodiversity. I would conclude by saying we have to make an effort to reduce – and eventually stop – producing and disposing waste irresponsibly. **Garbage burning must be stopped**. We'll otherwise end up losing creatures that we share urban spaces with – in this case, three Indian Pond Turtles.

a)  **b)**  **c)** 

a) An adult turtle in the middle of the garbage.

b) A juvenile with yellow streaks on face and brown edged plastron.

c) Releasing turtles in the pond.

RIPARIAN VEGETATION ALONG A HILL STREAM IN THE NORTH-WESTERN HIMALAYAS, BHADERWAH, JAMMU AND KASHMIR

Dr. Anu Sharma
GDC, Bhaderwah, Jammu and Kashmir
Correspondence: anu0007sharma@gmail.com

Mother earth heals when human beings are at rest. No other species on the planet needs to be at rest for the mother to heal, it's only we the human beings. A treasure of diverse forms of life is the earth and this treasure is very truly called Biodiversity- a combination of two words 'Bio'(life) and 'diversity'(variability). So biodiversity or biological diversity is the variability among living forms. It comprises of all forms of living organisms including plants, animals, microbes, insects, reptiles etc. A variety of biological forms are studied throughout the world. Among the various diverse forms and variety of ecosystems the term riparian assumes a great significance which is often under studied and less researched topic among the ecologists. Riparian vegetation is the term which indicates the type of vegetation along a running water body in particular and around any water body in general. This article is focused at highlighting the significance of riparian ecosystem with reference to a hill stream named Neeru- a tributary of River Chenab in the mountains of Himalayas at a place called Bhaderwah, Jammu and Kashmir. The word 'Riparian' owes its origin from the Latin word 'Ripa', which means the bank of a river, pond or lake. They are also known by the names like gallery and streamside forests. (Fig 1.1).Neeru watershed, part of forests of North-western Himalayas is well represented by subtropical, sub-temperate, temperate and alpine elements of biodiversity along the elevational gradient. At the confluence point river Chenab provides sub-tropical climate at the elevation of 848 m supporting the Ban Oak-Chirpine-Himalayan Alder (*Quercus leucotrichophora-Pinus roxburghii-Alnusnitida*), Moru Oak-Bluepine-Himalayan Alder (*Quercus baloot-Pinus wallichiana-Alnusnitida*) associations at lower elevations followed by Bluepine-Himalayan Alder-Deodar (*Pinus wallichiana-Alnusnitida-Cedrusdeodara*), Moru Oak-Deodar-Bluepine (*Quercus baloot-Cedrusdeodara-Pinus wallichiana*) at mid, and, Deodar-Spruce-Fir (*Cedrusdeodara-Piceasmithiana-Abiespindrow*) at higher elevation of nearly 2200 m. The riparian zone is mainly dominated by *Alnusnitida* besides few isolated and mixed stands of *Ficus palmata*, *F. rumphii*, *Robiniapseudoacacia* and *Melia azedarach* interspersed with conifers along the river bed and flood plains. On performing the hierarchical cluster analysis the riparian forests along the study corridor are represented by eight major tree associations (Fig.1.2) dominated by

Alnusnitida. The dendrograms obtained rightly suggest the distribution of vegetation and plant associations as indicated with the level of similarity along the sites and their clustering thereof. *Alnusnitida* (west Himalayan alder) commonly called Alder, a member of family Betulaceae is the most common and frequently encountered tree species of the riparian zone of the Neeru stream (Fig.1.3 & 1.4, Plate-1). It occurs in gregarious congregations, isolated stands and sometimes interspersed with its broadleaved co-associates *Ficus palmata*, *Robiniapseudoacacia*, *Populus ciliata,* to name a few. A temperate deciduous tree going high up to 30 m is found in the Himalayas, from Kashmir to west Nepal at an altitude of 1000 m to 2700 m. A nitrogen fixing tree, it grows comfortably in medium (loamy) and heavy (clay) moist or wet soils. A true riparian tree, it is found close to water as well as in the flood plains of active water channels, streams and rivers across the North West Himalayas. The riparian corridor of the stream is quite distinctive in vegetation along the elevation. It is diverse and species rich. The riparian forests are well represented by pure and gregarious stands of *Alnusnitida* with few broad leaved tree species like *Ficus palmata*, *Ficus rumphii*, *Robiniapseudoacacia*, *Melia azedarach* interspersed with conifers at mid and higher elevations. The *Alnus* patches have well adapted to moist riparian regime along both the banks and river islands at the mid elevation of around 1300-1400 m.

Significance and Recommendations

The riparian vegetation assumes a great significance and has a great role to play in the management of the rivers and streams as well as taking care of the riparian biodiversity which includes terrestrial as well as aquatic plants and animals. The presence of trees, shrubs and herbs near and adjacent to the stream help in retaining the water quality and health of the ecosystem of the stream. Riparian buffers can act as corridor for wildlife including butterflies, birds. The stream is home to many riparian birds. Farmers can be benefited from the stream and its adjoining landscape as litter from the forest corridor acts as humus and improve the soil properties. Riparian forests provide shade to the stream, lower the water temperature thereby helping the aquatic life to survive better. These forests act as carbon sink, pollution absorber, bind the soil, stabilize the stream banks and prevent soil erosion. The stabilization of stream banks help in better flow and water level of the stream which further enhance the health of the riparian forests, recharge ground water and increase the water table. As far as Neeru stream is concerned it is an important source of fresh water to the nearby villages so the riparian forests become important to manage the channel flow, velocity and quality. The areas along the stream should be prioritized from conservation point of view. For example identification of those areas which are important for wildlife especially the small mammals. Digitization of the channel and adjoining landscape should be done and the disturbed and vulnerable areas be identified and remedied. The fragmented forest blocks and blanks should be planted with the local species to check soil erosion and run off besides the nutrient enrichment. This will improve microclimatic regime of the corridor and offer favorable environment to biodiversity contained therein. Since it helps in the ground water recharge the protection of riparian vegetation for the health of the stream assumes the greater significance. The presence of riparian vegetation helps in mitigating wind storms and reducing the rate of evaporation from the soil and transpiration of crops in the nearby fields. Keeping the significance of the riparian ecology in mind and particularly the Neeru stream the author is working on a comprehensive hill stream management plan and submit to the concerned line agencies highlighting the effective strategies and recommendations to be adopted for revamping and rejuvenation of the Neeru stream.

Fig. 1.1 Schematic diagram of a typical mountain Riparian corridor

Plate - 1

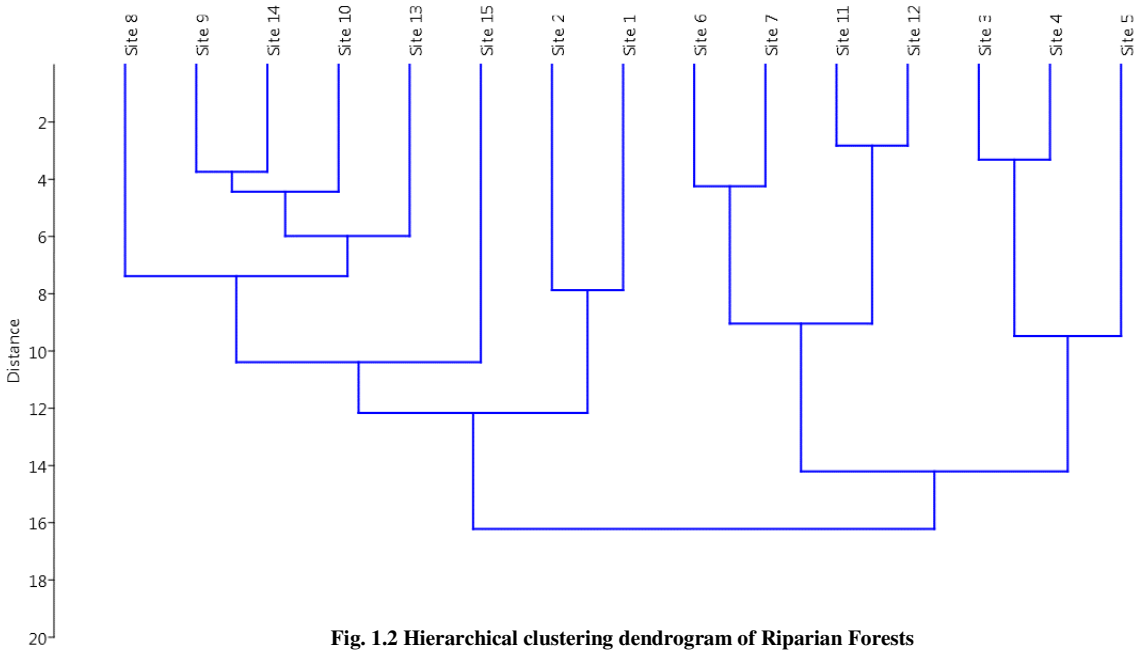


Fig. 1.2 Hierarchical clustering dendrogram of Riparian Forests

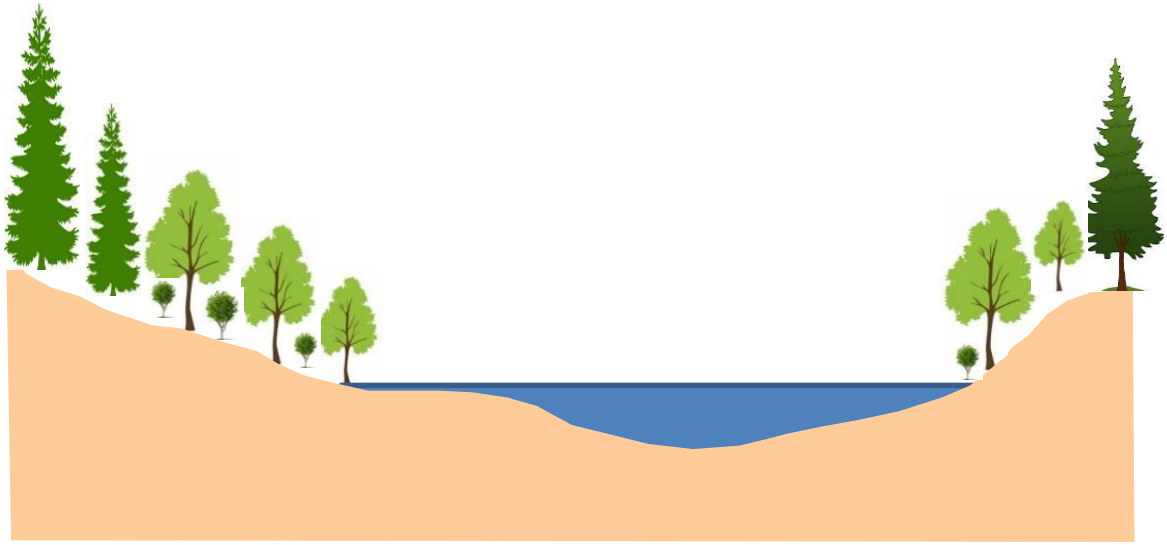


Fig. 1.3 Stream cross section showing the distribution of vegetation along the body (mid elevation)

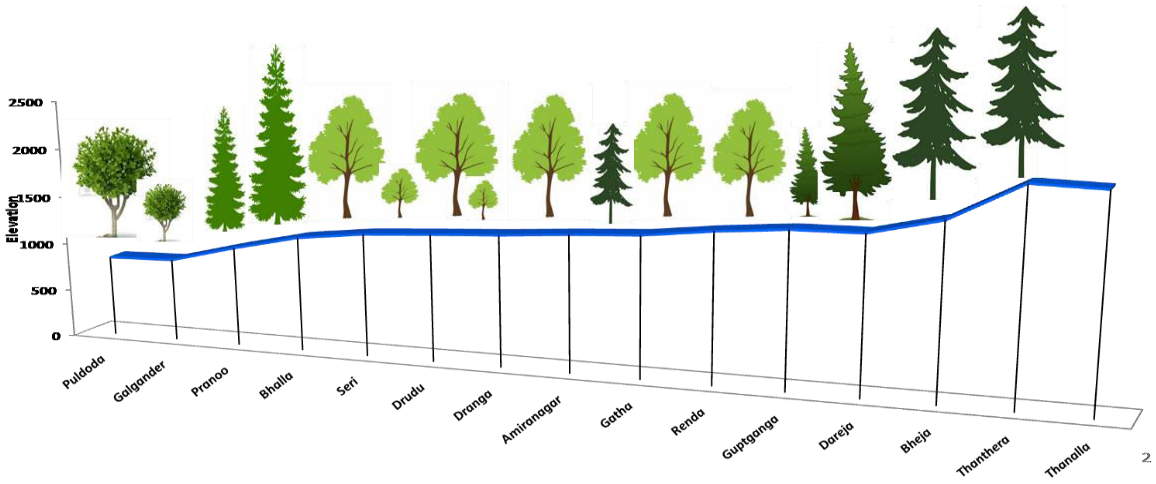


Fig. 1.4 Horizontal section showing the distribution of vegetation along the body of the stream

Poems:

Isthmus

In the sleepy blue oceans lies the giant blue whales filterfeeding on the miniscule creatures called planktons.
Wondering about our shady existence in the vast grasslands and the dark jungles with the range of organisms that can't be seen through the naked eyes to the giant tuskers weighing over tonnes.
The life processes are never understood within the limits of the notion of progression or retrogression.
Truly, there is a grandeur in this view of life that subtly questions creation.

The Amphibians, Reptiles, Mammals and Aves all the creatures that constantly evolved through times.
From prokaryotes to eukaryotes the intact cell and cellular organization exists in numerous size and shapes.
The enigmatic evolutionary tales with new evidences gradually sublimes.
With organisms seen persisting even in the extremes shaming the ones with the incredible capes.

The continental shift that promoted the fundamental genetic drift.
The geological events that changed the landmasses.
Natural selection that built up curiosity about the speciation of Darwin finches or the long flight of the alpine swift.
For the ease of understanding, the organisms were thus categorised into divisions and classes.

Started in the carboniferous period, from simpler life like blue green algae to complex life of the angiosperms, the number of gaps never declines.
Variation could be seen in the humongous human sized leaves of Pigeonplum trees in the tropics to the needle like leaves of pines in the northern hemispheres
With having no choice rather than adapting, in the dry and hot parts, the leaves became thorns and spines.
From the oceans to the coastlines to the mountains and in every springs it does smears.

Almost 95 % of the ocean is undiscovered and yet there are discoveries emerging from the inhabitable space.

Many have evolved to become distinct species, whether it is the majestic purple burrowing frog in the wet forests of Kerala or the enigmatic master of ambush Salazar pit viper of the Eastern Himalayas.

Life has come a long way, diversifying itself to a singularity point from cosmopolitan to endemism the diversity has a surprise in every case.

Gradually, learning the art of living with utmost grace.

Whether it's the usual or unusual symmetry of a flower or the magic of Fibonacci in the shell of snail or the flawless geometry of tiny glass houses called Diatoms, the diversity has never failed to attract the naturalist's eyes.

Some of them like Darwin, Wallace, Haeckel and many others witnessed the life on earth minutely.

Deciphering the longevity of the tortoises and the short life of the mayflies.

Ahead of future they thought and left the laws and logos to explore the nature's worth ultimately.

In the separate undisputed kingdoms we secretly unravel the kinship, similarities and the differences.

The wicked relationships are studied with the help of phylogeny, morphology, the proteins, the number of chromosomes and the DNA sequences.

The percentage of the shared sequences are then used for comparison.

All the matched and unmatched sequences that differentiates from a human to a python.

All the sequences that matches with us that suggests a shared common ancestry.

The web of life and the tree of life that is connected through diversity.

Maybe it's time to live unanimously and cherish every bird's call.

After all, biodiversity is the isthmus that connects us all.

- **Chintan Bhatt,**
M. Sc. Botany,

Associated with Red Leaflet India Pvt. Ltd.
Environmental Consultancy, Mumbai, 400077

SARUS CRANE AS FLAGSHIP SPECIES FOR CONSERVING THE WETLAND OF UTTAR PRADESH

Anjali Mehra and Ridhima Solanki
Global Tiger Forum, JorBagh, New Delhi
Email: ridhimasolanki22@outlook.com

The Sarus crane is traditionally revered and enjoys a status of sacred bird especially in agriculture rich plains of north India. According to the legend, the great saint Valmiki once cursed a hunter for killing Sarus and this incident motivated him to write the epic Ramayana. The tribal Gondi community considers it as sacred 'five-god worshipper'. The Nepalese cultural festivities of Dashain and Tihar are also known to coincide with the mating period of this bird. The Sarus Crane (*Antigone antigone*) derives its name from the Sanskrit term '*sarasa*', translating to 'bird of the lake', reflecting its preferred habitat. Uttar Pradesh with its Gangetic basin spread and numerous wetlands (Figure 1.) with mosaic of agricultural lands is a stronghold for this bird distribution. There are almost 300 wetlands along Ganga river alone in Uttar Pradesh (Figure 2.).

The bird needs urgent conservation attention with detail conservation plan to be developed by the concerned forest department with the facilitation of stakeholders of the region. However, although the flagship species status for wetland conservation is being utilized, the strategy seems to be failing in urban planning manifesto of most of the cities. Dadri wetland and Okhla Bird Sanctuary in Gautambuddhh Nagar can be counted as major loss of habitat due to developmental projects. With major metros suffering from natural calamity like floods (Chennai, Mumbai, Bangalore) the inclusive agenda of wetland conservation in urban planning is already established. However, the metro of north India (Delhi-NCR) seem to be ignoring the dilapidated status of its wetland. A alarm to the regressing condition of the wetland can be interpreted by the loss of its flagship species, i.e. Sarus crane.

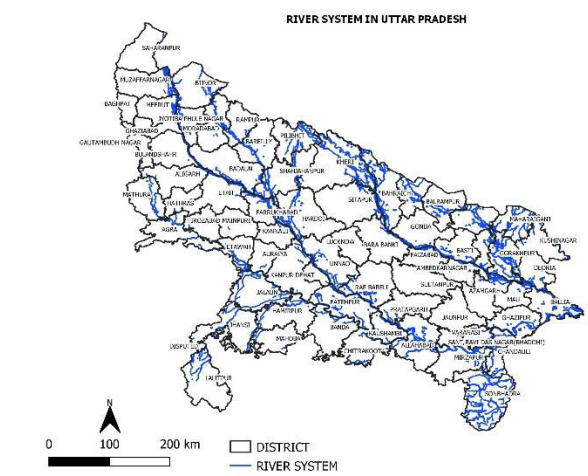


Figure 1; River system of uttar pradesh

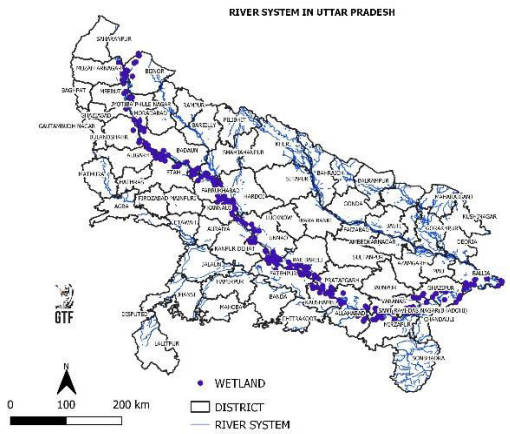


Figure 2; Wetland along ganga river in uttar pradesh

In the recent years, Sarus cranes have seen a drastic decline in their numbers, owing to a multitude of factors, habitat loss and degradation being the primary ones. According to a recent estimate by the Birdlife International less than 15000 individuals now survive globally, majority of the population restricted to certain pockets in Uttar Pradesh. Rampant deterioration of the wetlands and draining them for agricultural intensification poses a major threat to the conservation of this species. The recognition of small and large number of wetlands in Uttar Pradesh is focussing on "quantity" but not "quality" of this wetland. With the large sized water bodies suffering a major loss in water occurrence, the small water bodies' status is highly dubious. The bird sanctuary like Bakhira WLS in Sant Kabir Nagar and Surahi Taal in Ballia districts of Uttar Pradesh. However, the Occurrence Change Intensity map between 1984-1999 and 2000-2018 concludes the significant loss of surface water occurrence in these wetlands (Figure 3, 4).

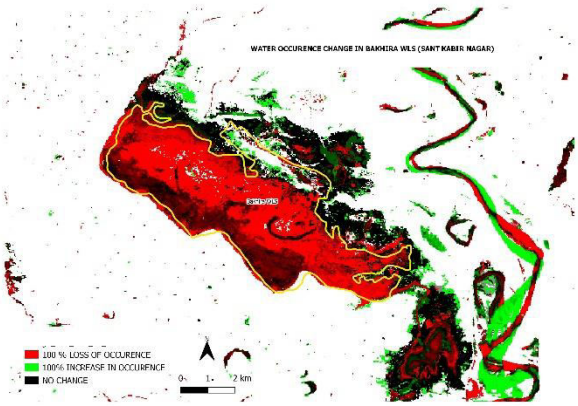


Figure 3: Water Occurence change in bakhira wls

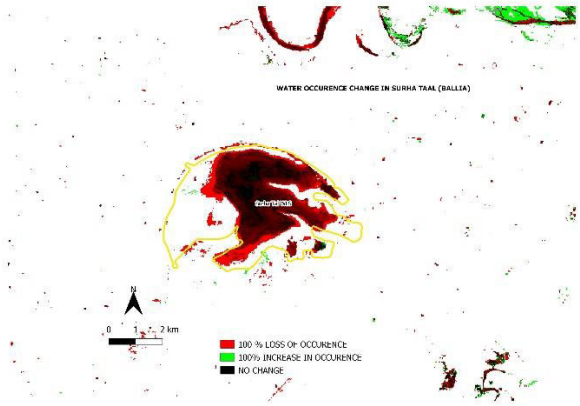


Figure 4: Water occurence change in surha taal wls

Apart from that, anthropogenic pressures, primarily, human encroachments into fertile alluvial lands, infrastructural development, dumping of industrial as well as human and agricultural waste, extensive growth of invasive species on prime ecosystem types, have all further prompted the loss of this species from their prime habitats. Deaths due to contact with overhead wires or powerlines has also been perceived as an emerging threat to these birds. According to a report by the Wildlife Trust of India (WTI), eight birds in ten districts of the state lost their lives to electrocution in 2018, as compared to just two cases in 2014.

To cope up with the loss of their natural habitat, Sarus crane now seems to have taken refuge in artificial habitats. Flooded agricultural fields, especially which of rice paddy, give a strong resemblance to their natural habitat thus providing an alternative place for them to roost on and feed for their survival amidst changing times. Approximately 75% of the total area of the Uttar Pradesh is cultivated so most of the Sarus sightings are from these agricultural fields.

The Citizen Science Survey data used by Adesh et al. (2019) documented 1902 individuals from 43 districts of the state, with Ganga basin being the major hotspot. Etawah and Mainpuri districts recorded the maximum sighting while minimum was recorded for Bundelkhand region. Alwara lake of Kaushambi district has been Sarus's abode for many years and has seen a steady increase in their population over the years. Large Congregations of these birds engaging in social displays are frequently sighted in the Unnao district of Uttar Pradesh in both wetland areas as well as agricultural lands. While they are more frequently sighted near the wetlands here, their density is greater in the agricultural areas. A study conducted in 2018 in the Jhansi and Lalitpur districts of

Uttar Pradesh recorded a total of 177 individuals. Sitapur district also holds a fairly good population of sarus with more than 200 adults as of a survey conducted in the year 2012-13. Rohilkhand Forest zone, comprising of nine districts of Moradabad and Bareilly divisions, has also seen a steady increase in their population, from 1516 individuals in the year 2017 to 1867 individuals in 2018. 140 sarus cranes were counted across the Dhanauri wetland in Gautam Buddha Nagar as in 2019. Despite the area of the wetland shrinking from 76 hectares in 2015 to just 31 hectares in 2019, Dhanauri still presents a strong candidature for harbouring the species. However, provided no legal protection to Dhanauri wetland, the water change occurrence data already predict its habitat loss (Figure 5).

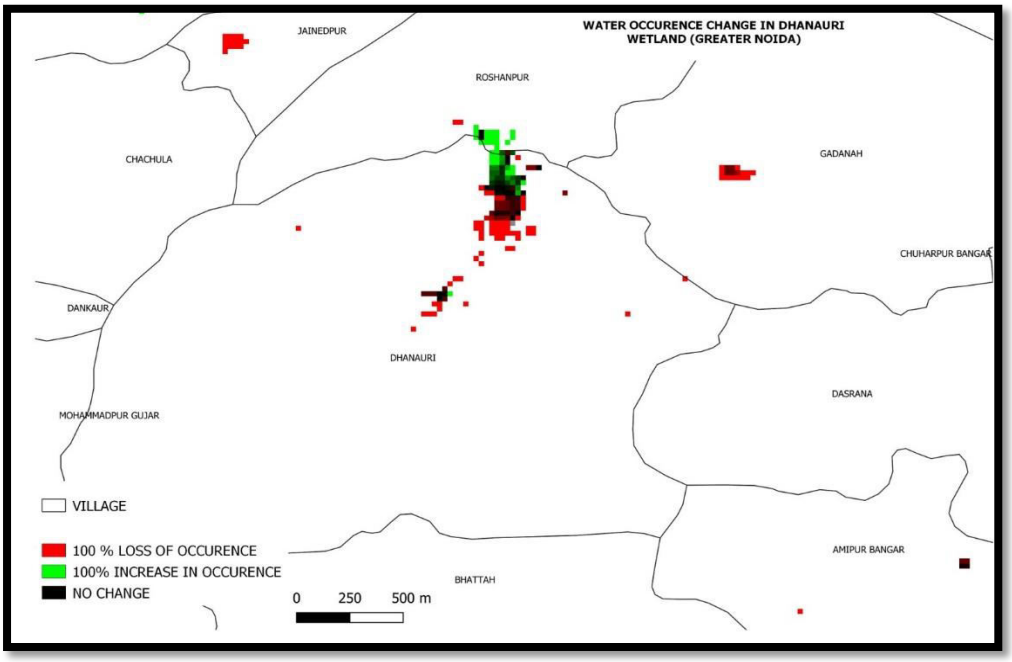


Figure 5 Water Occurence change in Dhanuri wetland

Several projects and initiatives have been taken up by the government and various organisations firming up the conservation and habitat management for this species. The 'Sarus Crane Conservation Project' jointly handled by the WTI, the Tata Trusts and Uttar Pradesh Forest Department, actively running across ten districts in Uttar Pradesh, the project involves involvement of local volunteers, also recognised as 'Sarus Mitra' and the 'Sarus Protection Committees', for regular monitoring and protection of their nesting sites and overall habitat in these areas. As per the National Wetland Atlas of India, wetlands represent 5.16% of the total geographical area of Uttar Pradesh. Recognisingthe importance of these areas to people and wildlife,the state government announced the formation of the State Wetland Authority in the year

2018, adding another step towards the conservation of the species. WWF which has also played a major role in establishing the Sarus Crane Conservation Committee in Uttar Pradesh has been providing support to the restoration and management of several pre-existing wetlands. The beginning of this year saw a further addition of six new wetlands for the state to the list of Ramsar Sites in India, these being, Nawabganj (Unnao district), Parvati Agra (Gonda District), Saman (Mainpuri District), Samaspur (Rae Bareli), Sandi (Hardoi District) and SarsaiNawar (Etawah District). Celebrating the success of these joint efforts, the State Forest and Wildlife Department recently announced the 2018 summer census report highlighting a jump of 5.2% of their population across the state which already holds 73% of the Indian sub-species.

The state of India's Birds 2020 report did highlight Sarus Crane as the key species of three states, Uttar Pradesh, Madhya Pradesh and Gujarat. Since various studies on Sarus reflect the critical habitat for Sarus Cranes lies outside the premises of protected areas, planning a roadmap for the conservation of such habitat should be the state priority. There is urgent need to not only conserve the legally protected wetland taking into consideration Sarus crane habitat but also take a cue from the bird sighting and catalyse the legal protection status to these wetlands. Conservation of wetland should also count on people perception and co-occurrence agenda with a culturally significant flagship species like Sarus Crane.

About Sarus:

Recognised as the tallest flying bird in the world, Sarus Crane is the only resident breeding crane found in India. It has been classified as 'Vulnerable' under the IUCN Red List of Threatened Species (2016), Schedule IV of the Wildlife Protection Act, 1972, Appendix II of the CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) and the CMS (Convention on Migratory Species). The Sarus Crane has three disjunct populations found in the Indian subcontinent, South-East Asian, and the one in northern Australia. Its distribution in India occurs in pockets of Uttar Pradesh, Madhya Pradesh, Haryana, Rajasthan and West Bengal, with Uttar Pradesh being one of the strongholds of this species and also recognising it as its state bird.

Sarus are known to live and breed in and around marshy areas and shallow water bodies. Their optimal habitat consists of an amalgamation of small marshlands, floodplains, reservoir edges with agricultural fields, wetlands, ponds, uncultivated and cultivated fields. The bird forages on underground parts of wetland vegetation which includes roots, tubers, corms of aquatic species as well as grassy shoots, seeds and grains from cultivated crops. It is also known to feed on fishes, frogs, crustaceans, lizards, locusts, and other insects. Sarus is a sociable bird that maintains marital fidelity, a pair of male and female stick together for a lifetime. It is believed that if one partner dies, the other is also infatuated to death. The breeding period of Sarus cranes, also identified as monsoon predictors, usually coincides with the rainy season, July-September being the peak breeding months. Breeding males, symbols of territorial fidelity, engage in extensive courtship displays and dance like movements to attract the females. Their loud trumpeting can be easily heard from a distance.

Reference:

1. SoIB 2020. State of India's Birds, 2020: Range, trends and conservation status. The SoIB Partnership. Pp 50.
2. Jean-Francois Pekel, Andrew Cottam, Noel Gorelick, Alan S. Belward, High-resolution mapping of global surface water and its long-term changes. Nature 540, 418-422 (2016). (doi:10.1038/nature20584)]

THE PLIGHT OF "AJAYAMERU"

Akansha Verma (Naturalist)
Email: akanshaverma2k18@gmail.com

It's 10.30 in the late evening of mid-May. Up in the sky I look for the planet Jupiter. It's about time it rises from the sleeping summer skies and reign over the moonlit canvas. All the other usually bright stars have been out shined by the bright silver sheen of moon while Jupiter boasts its brightness in front of the giant satellite of the Earth. I was dwelling in my thoughts about the celestial objects when the corner of my eye caught attention of flickering yellow lights, not much above the hills of the Aravallies. There were three lights constantly changing directions and moving around. Though the wind was chilly but I was sure that it was the horror and not the cold which sent down the shiver through my spine. I focused on that direction and the moon was emitting as much light as it could to uncover the disastrous proceedings in the shadow of the night. Those were possibly the cranes and bulldozers. Another dwarf Aravalli hills fell prey to their horrendous jaws.Next day, the monstrous machines were still moving around. The sun was out and about, uncovering all the detrimental activities and laying them bare in front of the supreme and intelligent species on Earth, we humans; who possibly chose to go blind about it. No one was talking about it. No one cared enough. Everyone must have seen another Aravalli being stripped bare of its sparse vegetation. What reasons can we possibly assign to this act of cruelty on mother nature? The Aravalli didn't cover itself properly with enough vegetation to protect itself from going down this fate? Or was it not modest enough to be called an "Aravalli"?
The cold winds in this summer might be a result of the pre-monsoon showers, but the chills it carries with it are the muted screams of another mountain being flattened to death. The hill lay naked like a helpless victim. It has no sound and no expression. It's shape has been changed forever. It cannot be called an Aravalli anymore. A barren land now shimmers in the glow of crimson dawn, the sister ranges might me bidding farewell to the fallen fawn.
The description of Ajmer on Wikipedia states: 'The city was established as "Ajayameru" (Translated as 'Invincible Hills') by a Shakambhari Chahamana (Chauhan) ruler, either Ajayaraja I or Ajayaraja II, and served as the Chahamana capital until the 12th century CE. Ajmer is surrounded by the Aravalli Mountains.'
At this rate of degradation of the Aravallies, we might need a new name for our city. Maybe something which translates to "Vulnerable hills"?

Aravallies hosts many plants—trees like dhau *(Anogeissus pendula)*, salai *(Boswellia serrata)* and babool *(Acacia nilotica)* , lots of shrubs and the wide range of ephemeral grasses that spring up in the rainy season. This hosts as a haven for many animals like porcupine, hare, various snakes, lizards and a spectrum of invertebrate fauna like beetles, butterflies, scorpions, etc. The loss of land to gruesome activities leads to a great loss of habitat and food for all the species which were depending on it. Such myriad losses compound to contribute to the greater loss to our biodiversity.

The area in the pictures I have attached with this email is clearly visible from Ajmer (Latitude: 26.4618°; Longitude: 74.6794°).

Fig 1: The current status of Aravalli (picture has been taken from Ajmer)

It could be legal or illegal, but the speed with which we are flattening the Aravallies will soon be a reason of numerous environmental problems for us. It may seem to be a very tiny issue at this moment but if we map down the face of the city and compare it with the previous Google Earth data, we will be shocked to see the changes in the last decade. At this rate, we will lose our heritage before we are even thoroughly aware of its importance.

AUSTRALIAN FOREST FIRES 2019 AND ITS IMPACT ON BIODIVERSITY AND ENVIRONMENT: A CASE STUDY

Mohammad Sibtain Kadri
M.Sc. Environmental Science and Technology (2018-2020) Department of Environmental Biotechnology School of Environmental Sciences
Bharathidasan University, Tiruchirappalli, Tamil Nadu- 620024
Email: kadri.sibtain@yahoo.com

Australia and its history of Forest Fires

In late 2019, Australia, a large continental landmass floating with the Indian Ocean to its west, the Pacific Ocean to its east, and the Antarctic Ocean to its south appeared like a burning bowl floating on the surface of the water. It was nothing but the forest fires which kidnapped Australia from all its corners. The forest fires in Australia are not a new subject as its inception began millions of years ago which has been significantly contributing to the shaping of its landscape. It all started with lightning.

A few comprehensive records of bushfires in the early stages of European settlement can be traced since 1851 where approximately 12 lives, one million sheep and thousands of cattle were lost. Since then there is a record of loss of life, property, and economy. It seems that since 1851, 800 people and billions of animals have been destroyed. The cause of these forest fires is usually anticipated by extremely high temperatures, low relative humidity, and strong winds which fuels the fires. As these promote firestorms which have been named according to the day on which they peaked two most deadly blazes: Black Saturday 2009 in Victoria (173 people killed, 2000 homes lost); Ash Wednesday 1983 in Victoria and South Australia (75 dead, nearly 1900 homes); It seems that 1974-75 fires had affected 15% of Australia. In January 2020, it was estimated that over 1.25 billion animals have died in the 2019-2020 Australian bushfire season.

Causes of Forest Fires

According to me, a constant increase in the temperature of the summer season is the main cause of the Forest Fires of Australia 2019 and the blowing dry winds propagates the fire hence it spreads rapidly. Moreover, the severe drought conditions prevailing in Australia are a major cause of the bushfire. A heat wave in December broke all prior records as nationwide average temperatures reached beyond 40 degrees Celsius that aggravated the fires even more. Other natural causes such as dry lightning and incidental sparks also exist.

Apart from this, a police statement of the New South Wales Police shows that they have charged about 20 people with setting things ablaze. Cases of arson make the situation graver.

Climate Change is a major issue

There is a mind-boggling accord over the role of an unnatural weather change in the Australian bushfires. As per a BBC November 2019 report, the hardship of the overall air can increase and haul out the negative impact made by the wild flames. The Australian bushfire is no special case to the equivalent. Examining the 2019 Australian bushfire as a contextual investigation shows that the nation is 1 degree Celsius hotter than its normal recorded temperature. The fire season has retreated as of late because of a dangerous atmospheric deviation, and in this way, the 'total fire threat' is expanding step by step.

The Impact of 2019 Australian Bushfire on Biodiversity

As indicated by Gary Nunn of Sydney it appears that Koalas were crying for help, bee sanctuaries were trapped in the way of peril, natural ways of life were interfered with: Australia's bushfire emergency has destructively affected the country's untamed life. The lethal spring blasts have consumed just about 2,000,000 hectares in New South Wales and Queensland alone. It is estimated that there was an average of 17.5 mammals, 20.7 birds, and 129.5 reptiles per hectare (10,000 square meters, so a square 100m on each side). Numerous creatures are flexible however others, tragically, don't endure, frequently in light of the fact that their latent capacity gets away from environments that have just been decimated by human action.

Koalas are ordinarily moderate moving and their typical risk evasion technique - twisting into a ball on a tree - has left them caught in outrageous flames. As a result of a blast, frogs and skinks (reptiles) are among the creatures that were left powerless, according to natural life scientist Prof. Euan Ritchie of Deakin University. Disengaged patches of environment left because of bushfires and human clearing additionally represent a risk to an effectively imperilled species. These include the western ground parrot, the Leadbeater's possum, the Mallee emu-wren and Gilbert's potoroo. Beekeepers have likewise recounted losing hives in fire-hit timberlands. Ongoing reports say that regarding a large portion of a billion creatures stand influenced by the flames, including fowls, reptiles, creepy crawlies, and warm-blooded animals. Environmentalists state that various creatures are probably going to get wiped out. The fire has cleared out colossal quantities of the locale explicit to species that live in more specialty situations having lower populaces.

Measures were taken by the Australian Government

As the entire world is talking about the Australian bushfire debacle, the state and government experts in Australia are attempting their best to end the calamity. Out of the individuals revealed dead, many incorporate firemen and dynamic volunteers taking a chance with their lives to drench the lethal blazes. In excess of 2000 firemen are busy working in the NSW alone.

The central government is using military help like cruisers for firefighting while thusly putting forth clearing attempts. In any case, the legislature is under intense analysis as individuals state that it seems to be 'shifting responsibility elsewhere' on environmental change. Accusing superfluous variables like the land as opposed to assuming liability for the flames isn't reasonable to people in general.

Australian Forest Fires 2019: A lesson to be learned by Humanity

Most researchers concur that Climate Change has significantly expanded the danger of extraordinary fire events. Be that as it may, the political initiative of Australia is as yet isolated on the issue, following 20 years of an impasse over global settlement commitments to decrease carbon outflows. Fire fighting and risk decrease measures ought to be joined with driven focuses to control carbon outflows from all segments. These measures can relieve environmental change and diminish the danger of bushfires in the long haul, just as giving better regional air quality and improved wellbeing in the short and medium terms.

References:

- 2019–20 Australian bushfire seasons. (2019, November 10). Wikipedia, the free encyclopaedia. Retrieved May 8, 2020, from https://en.wikipedia.org/wiki/2019%E2%80%9320_Australian_bushfire_season
- BBC News. 2020. *How Do We Know How Many Animals Died In Bush Fires?* [online] Available at: <https://www.bbc.com/news/50986293> [Accessed 8 May 2020].
- 2019 Australian bushfire as a case study. (2020, March 13). SimplyRaw. **https://www.simplyraw.in/2019-australian-bushfire-as-a-case-study/**
- Vardoulakis S, et al. (n.d.). Lessons learned from the Australian bushfires: Climate change, air pollution, and public health. - PubMed - NCBI. National Center for Biotechnology Information. **https://www.ncbi.nlm.nih.gov/pubmed/32108854**

BIODIVERSITY- DECLINE IN SPECIES OBSERVED FROM MY BALCONY IN MUMBAI

Dr. Sangeeta Dhanuka
Corresponding Email: drsangeeta.dhanuka@gmail.com

Over the years and more in recent times, environmentalists and scientists have repeatedly raised concerns about the declining numbers of species in the face of unplanned and relentless development. While there have been numerous studies in the protected areas as well as urban habitats, this article is about the decline in the number of bird species I have observed over the last 20 years from the window of my house in the concrete jungle called Mumbai.

I am not a professional scientist or biologist, but a naturalist by passion. I started birding in 1999, and naturally the first habitat I observed was the one I saw from my window. From the balcony we could see salt pans in the very far distance and a huge peepal tree stood in the open ground near my building. A large fig tree and a jamun tree provided shade right inside the compound of our building. The open ground also ensured we had fresh breeze all-round the year. Another window of my house faced a laburnum tree that almost touched the window. Not far away were the acacia, jarul, jackfruit, yet another peepal and some others.

The purple rumped sunbirds and tailor birds were daily visitors to these trees throughout the day. Alexandrine parakeets were cacophonic and flying all over in the morning. The magpie robin was an early riser and its calls often woke me up. Between February and May, koels sang almost throughout the day. Bulbuls were among the other regular species. The coppersmith barbet flitted between the laburnum and acacia, and its calls could be often heard all day. Mynas and sparrows were their usual vocal selves and would often fight for nesting holes. I loved watching sparrows retire for the night on the acacia tree with every branch occupied. Of course, there were the crows and pigeons, with the crows always on guard to protect their nests from the black kites. Although they usually won, at times the kites had an upper hand and some chicks were lost. The flying fox bats would also roost among the trees at night. The sunbird was omnipresent trying to suck nectar from every possible flower on every tree. In winter, the peepal tree near the balcony was a sight to behold. Rosy and white headed starlings would occupy the tree, with yellow-throated sparrows vying for their share of the space. Ashy drongos would try to be the police as is their wont, and the golden orioles tried their luck with caterpillars on the jamun tree. I would

wake up early in the winters to do this balcony and window birding. I felt lucky that I could do so much birding from home in Mumbai. The coppersmiths nested in the laburum tree abutting my window and I was able to observe and document their nesting behaviour closely. I would wait as eagerly as the parents to see the chicks leaving the nest for the first time. In monsoon, the sunbird would nest on the same tree. I remember that, those were my most frequent subjects when I was trying to learn photography. One monsoon, I saw a grey heron out of nowhere and was ecstatic. Similarly, one winter, a male paradise flycatcher visited the jamun tree for the first time and called up my friends to share my joy. Large numbers of little and cattle egrets roosted daily. Put together, I had counted close to 20-25 species of birds just from my window and balcony. One morning, about 15 years ago, I woke up to find that the peepal tree in the ground had vanished. I was shocked!! What could one do to such a huge tree in one night? There was simply no trace of it. I got my answer some days later, when a building started coming up at the same spot. There was no breeze ever again and the winters held no excitement for me. I shed quiet tears. Some months later, the jarul, jackfruit, and another peepal trees that I used to see from my window met the same fate. I have never had to use my binoculars or camera at home since then. Although the laburnum, acacia and jamun trees still stand where they are, most of the bird species have left the locality. Of course, no winter migrants have visited the area since then. It has been ages since I heard the coppersmith. No bats, no alexandrine parakeets. Not even the egrets. Bulbuls and magpies are heard very occasionally. The fights between the mynas and sparrows have stopped simply because there are barely few sparrows left. The tailor birds have vanished without a trace too. The flying foxes and egrets have hopefully found better places to roost. An occasional golden oriole does visit the place in winter. The koels do still sing their songs during the breeding period. The kites have also become a rare sight. So the only species still visible regularly now are the crows, pigeons, mynas, purple rumped sunbirds and a few rose-ringed parakeets. If the felling of 2 peepal trees, one jackfruit tree, and a jarul tree has reduced the biodiversity to this extent, I shudder to think what the mindless hacking of a few hundreds or thousands of trees for building one road here, or one commercial area, highway, train route there can lead to. If we think that we can live very well with our own intelligence and the other lesser mortals can be done away with, we are in a way also preparing for our own extinction from the face of the earth. Well, maybe the mother earth needs a break and will get it in her own way. A few tsunamis and the recent COVID pandemic are a warning, and humans can ignore these signs only at their own folly.

METHODS OF BIODIVERSITY CONSERVATION IN BANGLADESH

Nargis Akter Shapna
Department of Soil and Environmental Sciences, University of Barishal, Bangladesh
Email: **nargisshopna1997@gmail.com**

Simply biodiversity, or biological diversity, is the variety of life on Earth, whereas, biodiversity conservation is the protection, enhancement and development of the biodiversity. Biodiversity conservation saves life on Earth in all of its forms and ensures sustainable management of the biodiversity. Because of its geophysical location, Bangladesh has a rich biodiversity with 5700 species of angiosperms, 3 species of gymnosperms and 1700 pteridophytes. But IUCN has enlisted a total of 40 species of inland mammals, 41 species of birds, 58 species of reptiles and 8 species of amphibians under various degrees of extinction risks in the country. So, Government has taken several steps to conserve biodiversity of Bangladesh including two methods of conservation namely in-situ conservation and ex-situ conservation. Statuses of these two methods of biodiversity conservation in Bangladesh are discussed below:

1. In-Situ Conservation Method

   In-situ conservation means the conservation of species in their natural habitat. According to FRA-2005, management of about 20.9% of forests has been taken for conservation. In-situ conservation method has been practiced in the following areas:

   i) Protected Areas: Bangladesh has 38 notified protected areas including 17 national parks and 21 wildlife sanctuaries that are distributed across the country. Protected areas of Bangladesh cover nearly 17.5% of total forest area and 1.8% of total land area. But the distribution, area, and number of these protected areas are inadequate in case of conserving the rich biodiversity. However, the protected areas are -

   - ❖ National Park: National park is a large area of natural beauty with the protection of wildlife where people can enter due to their recreational, educational and research purpose. There are 17 national parks in Bangladesh.
   - ❖ Wildlife Sanctuary: Wildlife sanctuary is maintained as an undisturbed breeding ground for fauna with the protection of habitat for the continued well-being of the resident or migratory fauna. Bangladesh has 21 wildlife sanctuaries.

   ii) Ecologically Critical Area (ECA): While declaring any area as an ecologically critical area the following factors are taken into consideration: (a) human habitat;

(b) ancient monument; (c) archeological site; (d) forest sanctuary; (e) national park; (f) game reserve; (g) wetland; (h) wild animal's habitat; (i) mangrove; (j) forest area; (k) bio-diversity of the relevant area; and (l) other relevant factors. The Director General of the Department of Environment (DOE) officially declared nearly 40,000 ha, within seven separate wetland areas, as Ecologically Critical Areas (ECAs) in April 1999. Declared ECAs till 2012 are: strip of 10 km. outside the Sundarbans Reserved Forest, sea front of Cox's Bazar and Teknaf, St Martin's Island, Sonadia Island, HakalukiHaor, TanguarFaor, MarjatBaor, Gulshan-Baridhara Lake, Buriganga River, Sitalakhaya River, Turag River, and Balu River.

iii) Game Reserve: Comparatively, game reserve is an isolated area which is used to protect wildlife in general and to increase the population of specified species. At present, Bangladesh has only one game reserve.

iv) Nature Reserve: Nature reserve protect communities and species to maintain natural processes and thus, acting as an ecologically representative example of natural environment. Bangladesh also has several nature reserve.

v) Eco parks and Safari parks: Eco park simply means ecological park, whereas, safari park means wildlife park. At present, Bangladesh has nine eco parks and only one safari park. These eco parks and safari park has been established and declared by Government to conserve biodiversity and genetic materials.

2. Ex-Situ Conservation Method

Ex-situ conservation is the maintenance and breeding of endangered plants and animals under controlled conditions in specific areas outside their natural habitat. In Bangladesh, these kinds of conservation effort are limited to Bangladesh Forest Research Institute (BFRI). Ex-situ conservation in Bangladesh includes the followings:

i) Mirpur Botanical Garden (area 85 ha) includes 255 tree species, 310 shrub species, and 385 herb species.

ii) Baldha Garden (area 1.15 ha) includes 18,000 trees, herbs, shrubs from 820 species.

iii) There are five preservation plots at different hill forest areas and 27 at the Sundarbans forest areas. All of these preservation plots has been established by BFRI.

iv) The BFRI has also established two clonal banks. One of these situated at Hyko, Chittagong with area 4 ha and another at Ukhia, Cox's Bazar with area 4 ha. Seven tree species are preserved in these two locations. These are –

Tectonagrandis

Gmelina arborea

Bombax ceiba

Syzygiumgrande

Swieteniamahagoni

Dipterocarpus turbinatus

Paraserianthesfalcateria

v) BFRI has established several Arboretums. These are pointed out below:

- ❖ One bambusetum with area 1.5 ha that contains 27 bamboo species including 6 exotic species. It has been established at the BFRI campus.
- ❖ One arboretum of medicinal plants (area 1 ha) containing 40 species has also been established at the BFRI campus.
- ❖ One cane arboretum (area 0.5 ha) contains seven species of cane.
- ❖ Three arboreta of tree species have been established at the BFRI-HQ containing 56 species, Keochia Forest Research Station containing 56 species, and Charaljani Silviculture Research.

At last it is concluded that in-situ and ex-situ conservation methods are more important to conserve Bangladesh's rich biodiversity. The effectiveness of these conservation techniques can understand by monitoring the changes in biodiversity status of the specific areas.

AMATEUR NATURE PHOTOGRAPHY: A THREAT TO WILDLIFE

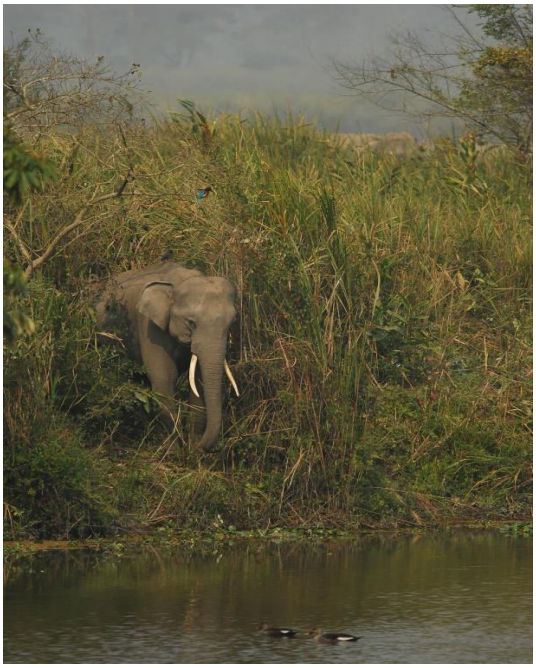
Soumi Paul
Research Scholar
Department of Environmental Biotechnology
Bharathidasan University, Tiruchirappalli
Email: soumi.edward@gmail.com

Land of Mega Herbivores
Photo Courtesy: ***Siddarth Kumar Gogoi***

Undisturbed Environments
Photo Courtesy: ***Siddarth Kumar Gogoi***

Photo Courtesy: Priyanka Vedula

Urban environments
Photo Courtesy: ***Tushar Kumar Bhoi***



Peaceful Coexistence
Photo Courtesy: ***Siddarth Kumar Gogoi***

BIODIVERSITY CHALLENGES AMID COVID-19 PANDEMIC

Sandeep Kumar[1]*, Lal Chand Malav[2], Sunita Yadav[1]
[1]CESCRA, IARI, New Delhi 110012, India
[2]ICAR-NBSS & LUP, Nagpur 440033, India

Email: **sandeep2011iari@gmail.com**

The COVID-19 pandemic is reshaping all the sections of society and ecosystem. The COVID-19 pandemic is causing the deaths of thousands of people and forcing economic and social lockdowns across nations which is in turn negatively impacting environmental actions. Like everyone else, scientist and biologists are concerned about how the pandemic will affect the world's biodiversity and our ability to conserve it. Across the world, universities, organizations, NGOs and research institutes have shut down. Several conservation organizations, (governmental and NGOs) recruit large numbers of periodical employees, as short-term local contractors, student interns, and volunteers, to carry out fieldwork, environmental education, trail maintenance, and other activities. Almost all the training programs of conservation biologists and managers are being derailed or moved online (Corlett et al., 2020). The ultimate consequences of this pandemic will depend on how long the shutdown continues globally. The COVID-19 pandemic has pushed this year's prepared schedule of international conferences and negotiations to hash out what the future will hold for Earth's ecosystems and wildlife.

The consumption and trade of exotic animals have two significant consequences. First, they raise the risk of an epidemic by putting us in contact with rare infectious means. While they're often trained by species and thus cannot overcome our immune system and use our cells, trafficking and confinement of diverse wild animals together allows infectious agents to recombine and cross the barrier between species. In the case of SARS this was the case and this may have been the case for Covid-19 as well.

Second, catching and selling exotic animals puts tremendous pressure on wild populations. This is the case with the pangolin, recently brought to light by the Covid-19 pandemic. The eight species of this mammal, which are found in Africa and Asia, are poached for their meat and scales despite their protected status. More than 20 tons of meat are seized each year by customs, leading to an estimate of almost 200,000 individuals killed each year for this traffic (Grandcolas and Justine**,** 2020).

Many experts are concerned that the world will lose critical time to turn around terrifying trends in biodiversity loss and climate change, and that the resources designated to fight COVID-19 might mean fewer resources for biodiversity initiatives later on. This new viral pandemic likely originated in an animal; however, some specialists believe the pandemic will stimulate efforts to address the relationship between drivers of biodiversity loss and human health (Dinneen, 2020). But, the crisis has shed new lights on wildlife management hurdles in China, and has started new developments of potential policy responses, including (but not limited to) bans on wildlife trade. The IUCN declared that its World Conservation Congress, scheduled for June in Marseille, France, has been delayed to January, 2021. The news comes after a series of decisions of postponing key U.N. summits on biodiversity and climate change, among other disruptions**.**

The final year of the U.N.'s Decade on Biodiversity was fixed to complete in October in Kunming, China, with the CBD's 15th Conference of the Parties (COP). The representatives from 196 countries planned to assemble to finalize the global biodiversity policy framework to replace the 2010 Aichi Biodiversity Targets expiring at the end of the year. The COVID-19 pandemic has also postponed major world meetings on climate change, including the COP26 U.N. climate change conference scheduled for Glasgow, Scotland, in November 2020. The World Health Organization's "One Health" initiative supports handling the issue of human health with the environment and biodiversity. It has three main purposes: combating zoonoses, ensuring food safety and fighting antibiotic resistance (Fig. 1) (Grandcolas and Justine**,** 2020).

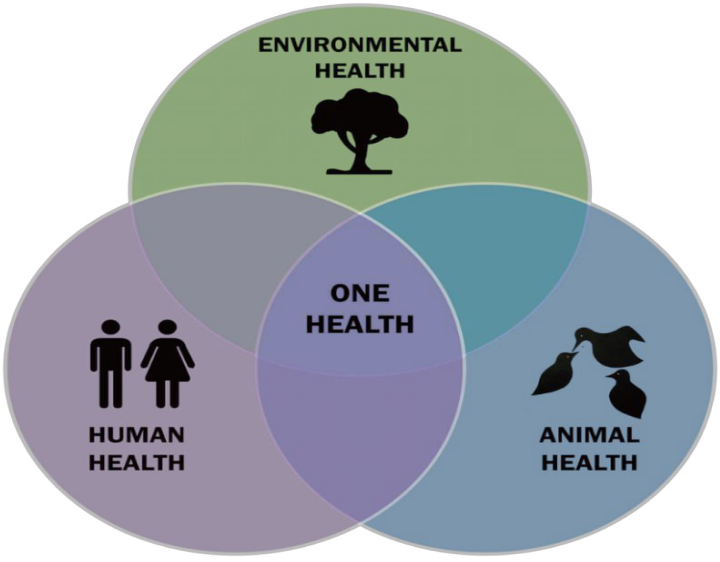


Fig.1 One Health initiative framework (Grandcolas and Justine**,** 2020)

We believe it demands to be transformational. It is too early to assess the overall impacts of the COVID-19 pandemic on biodiversity and our ability to protect it, but some preparatory inferences are possible. At this point, protected areas appear to be secure and, in many places, biodiversity is profiting from reduced human movements. Though this may not be true throughout, especially where implementation has weakened, but not threats.

References:

Corlett, R.T., Primack, R.B., Devictor, V., Maas, B., Goswami, V.R., Bates, A.E., Koh, L.P., Regan, T.J., Loyola, R., Pakeman, R.J. and Cumming, G.S., 2020. Impacts of the coronavirus pandemic on biodiversity conservation. Biological Conservation 246: 108571.

Dinneen, J. 2020. COVID-19 disrupts a major year for biodiversity policy and planning. on 3 April 2020. https://news.mongabay.com/2020/04/covid-19-disrupts-a-major-year-for-biodiversity-policy-and-planning/

Grandcolas, P. and Justine, J. L. 2020. Covid-19 or the pandemic of mistreated biodiversity. The conversion.https://theconversation.com/covid-19-or-the-pandemic-of-mistreated-biodiversity-136447.

HUES OF NATURE

Ankita Das
PhD scholar
Wildlife Institute of India, Dehradun
Email: ankitadas22.ad@gmail.com

With the summer in full swing
the sun shines resplendently.
But the sweltering heat brings
the luscious plums and the melons.

After months, the cocktail-blue firmament
darkens into pitch black.
Then starts the pitter patter
and the time for splish-splash in the muddy puddles.

Now I see the distant majestic mountains
laden with snow.
The chilling wind freezes the blood
and makes the spirit within more sturdy and strong.

Then with the arrival of spring
comes the new leaves on the twigs.
It fills the air with the aroma of the wild flowers
and the melodious symphony of the bird songs.

I bow down before your grace
and beauty Mother Nature.
You bestow us with life
and portray with vibrant hues.

ALIENS IN INDIA: INVASIVE FISHES IN OUR FRESHWATER ECOSYSTEMS

Nobin Raja M.[a] and Priya Ranganathan[b]
[a]Ph.D. Scholar (Invasion Genomics), ATREE, Bangalore
[b]Research Associate (Ecohydrology), ATREE, Bangalore
Email: [a]nobin.raja@atree.org, [b]priya.ranganathan@atree.org,

India's Freshwater Ecosystems and Biodiversity:

Globally, freshwater ecosystems include lakes, ponds, rivers, streams, groundwater, springs, floodplains, as well as bogs, marshes, and swamps[1]. India is home to four percent of the world's freshwater resources with 14 major and 48 mid-sized rivers (29,000 km length), 3.15 million hectares of reservoirs, 2.35 million hectares of ponds and tanks, and 0.2 million hectares of floodplains[1]. India's largest river system is the Ganges-Brahmaputra-Meghana system, spanning 110 million hectares[2]. In peninsular India, the most prominent river systems are the Godavari, the Krishna, and the Cauvery.

Apart from providing habitat for prolific biodiversity, freshwater ecosystems have many associated ecosystem services including potable water supply, flood control, climate regulation, tourism and recreation, livelihoods, and food production. Tropical inland fisheries bring in 5.38 billion USD per year[3] and in India alone, 5.5 million people are employed in inland fisheries, 55 percent of whom are women[4].

Globally, freshwater systems contain some of the Earth's most threatened taxa despite taking up 0.8 percent of land surface. Freshwater systems in India occur across a wide range of climate and vegetation zones and host 9.7 percent of the country's total fauna (9,456 species)[1]. Freshwater chordates in India include fishes (1027 species), amphibians (272 species), reptiles (46 species), birds (245 species), and mammals (6 species)[1,5]. However, India's freshwater biodiversity is not immune to negative impacts from humans, much like terrestrial ecosystems. There are five main threats to India's freshwater biodiversity: overexploitation; water pollution; flow modification; habitat degradation; and introduction of invasive or exotic species[2].

A Threat from Far Far Away: Why are Invasive Fishes so Problematic for Native Species?

Invasive fishes all over the world have wreaked havoc on the native ecosystem[6,7]. These fishes compete for resources, predate on native flora and fauna, and often carry parasites that can cause communicable diseases[8]. An exotic fish becomes invasive after going through four main phases of biological invasion: introduction, acclimatization, spread, and negative impacts. India is

infested with 14 well known invasive species, from which four have been globally recognized by the IUCN as the worst invasive species[9]. Growing evidence suggests that invasive fishes have reached hotspots which harbor endemic flora (>600) and fauna (>300)[10]. The freshwater ecosystem in these protected areas are somewhat protected from other threats except invasive species. Countries like Australia had lost their endemic fishes to invasive fishes[8]. Multiple studies across the globe is showing the impacts of invasive fishes on amphibian communities. India has 272 amphibian species of which approximately 242 are frogs and toads[5]. Additionally, invasive fishes are a big challenge for commercial fisheries which support millions of people. The USA and China lose around 5.4 and 73.9 million USD per year to invasive fish impacts[11].

India does not have a wide scale study to show the full impacts of invasive fishes on our native biodiversity and economy. It is essential to take required action before the impact reaches tipping point.

So what can we do about this problem?

Address the gap

India must strictly focus on creating policies to manage invasive fishes with a scientific approach. Based on the phase of invasion, the invasive fish either can be prevented from introduction, eradicated in the initial stages or can be managed to prevent further impacts. The impact of biological invasion can vary. The number of peer reviewed studies published on this topic in India is considerably less; we need more studies focusing on impacts of invasive fishes in our native freshwater ecosystem.

Technology to the Rescue

Advanced tools in niche modelling and genetics can help us in managing biological invasion[12]. Species Distribution Modelling (SDM) globally used in invasion ecology and conservation[13,14]. In terms of aquatic ecosystems we must choose environmental variables that better explain the occurrence of a species and account for niche shifts and climate change scenarios. Technological advancements in molecular ecology gave us the insight of tracking environmental DNA (eDNA) of the invasive fishes[15]. It has been proven to be highly effective, non-invasive and less costly compared to traditional ways of monitoring freshwater species[16]. Simultaneously, employing gut content analysis using molecular tools can help us understand feeding behaviour of the invasive fishes[17]. Accelerating growth in multimedia and mobile app development can involve citizen science in contributing to dispersal studies[18].

The Holy Trinity: Science - Management - Policy

In order to successfully address the complex issues stemming from invasive species' introduction in freshwater ecosystems, a three-pronged approach is imperative[12]. First, the dispersal of the species and its impacts on local environments must be assessed using above mentioned technologies. This will allow for researchers to pinpoint high-risk areas of invasion and which local species are impacted. Using this scientific evidence, the next step is management, which involves deciding whether and how to conduct risk analysis and budgeting for multiple aspects of the issue[19,12]. These aspects include the monetary impact of invasive fish species on economically-important fish that play key roles in local livelihoods, the cost of running a risk analysis, the cost of eradicating the invasive species, and the cost of reintroducing or restocking native fish that were negatively impacted[12]. Policy is the third key player that brings science and management together to combat freshwater invasive fish species. Policies should be tailored to address state-specific needs, given potential differences in levels of invasion and species affecting ecosystems in those states. States should also invest in neighboring states, as watersheds often span multiple governing boundaries, and should be prepared to assist each other in eradicating invasive species on either side of state borders to avoid cross-contamination and rampant spread. Joint management and policy approaches are required at multiple jurisdiction levels to successfully combat the threat of invasive fishes. For example, the National Biodiversity Authority (NBA) has listed mosquitofish (*Gambusia* sp.) as invasive but they are still introduced by governmental and non-governmental bodies to control mosquito populations[20]. Freshwater ecosystems are some of the most valuable, life-giving systems on the planet, yet without proper scientific research, management, and relevant policy, they face multiple threats. Invasive species are one such major threat that needs to be addressed immediately in order to contain their spread and preserve native species richness.

References:

[1] Chandra, K., Gopi, K.C., Rao, D., Subramanian, K.A. and Valarmathi, K., 2018. Current Status of Freshwater Biodiversity of India: An Overview. In book: *Status of Freshwater Biodiversity of India.*

[2] Ghosh, S.K., and Ponniah, A.G., 2008. Freshwater fish habitat science and management in India. *Aquatic Ecosystem Health & Management,11(3),* 272–288. doi:10.1080/14634980802319044

[3] Dugan, P., Delaporte, A., Andrew, N., O'Keefe, M. and Welcomme, R., 2010. Blue Harvest. Inland Fisheries as an Ecosystem Service. World Fish Centre, Penang, Malaysia.

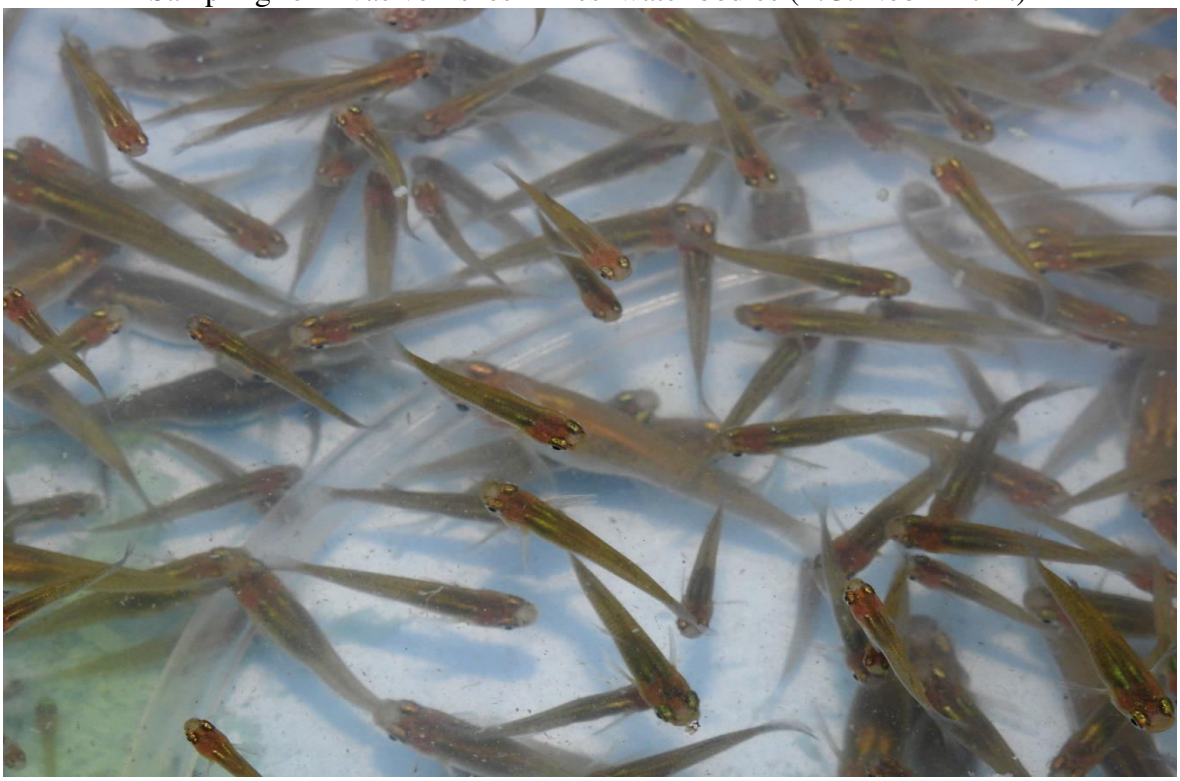
[4]Neiland, A.E. and Bene, C. (eds.), 2008. Tropical river fisheries valuation: background papers to a global synthesis. The WorldFish Centre Studies and Reviews 1836. The WorldFishCenter, Penang, Malaysia, 290pp.

[5] Biju, S.D., 2008. Taxonomy-the tragedy of nameless extinction. *The Hindu Survey of the Environment*, *2008*, pp.123-129.
[6] García-Berthou, E., 2007. The characteristics of invasive fishes: what has been learned so far?.*Journal of Fish Biology*, *71*, pp.33-55.
[7] Khan, M.F. and Panikkar, P., 2009. Assessment of impacts of invasive fishes on the food web structure and ecosystem properties of a tropical reservoir in India. *Ecological Modelling*, *220*(18), pp.2281-2290.
[8] Rowe, D. K., Moore, A., Giorgetti, A., Maclean, C., Grace, P., Wadhwa, S., and Cooke, J., *Review of the impacts of Gambusia, redfin perch, tench, roach, yellowfin goby and streaked goby in Australia*. Draft report prepared for the Australian Government Department of the Environment, Water, Heritage and the Arts, Canberra. 2008.
[9]Lowe, S., Browne, M., Boudjelas, S. and De Poorter, M., 2000. *100 of the world's worst invasive alien species: a selection from the global invasive species database* (Vol. 12). Auckland, New Zealand: Invasive Species Specialist Group.
[10]Chitale, V.S., Behera, M.D. and Roy, P.S., 2014. *Future of Endemic Flora of Biodiversity Hotspots in India. PLoS ONE, 9(12), e115264.*doi:10.1371/journal.pone.0115264
[11] Xia, Y., Zhao, W., Xie, Y., Xue, H., Li, J., Li, Y., Chen, W., Huang, Y. and Li, X., 2019. Ecological and economic impacts of exotic fish species on fisheries in the Pearl River basin. *Management of Biological Invasions*, *10*(1), p.127.
[12] Lodge, D.M., Simonin, P.W., Burgiel, S.W., Keller, R.P., Bossenbroek, J.M., Jerde, C.L., Kramer, A.M., Rutherford, E.S., Barnes, M.A., Wittmann, M.E. and Chadderton, W.L., 2016. Risk analysis and bioeconomics of invasive species to inform policy and management. *Annual Review of Environment and Resources*, *41*.
[13] Srivastava, V., Lafond, V. and Griess, V.C., 2019. Species distribution models (SDM): applications, benefits and challenges in invasive species management. *CAB Reviews*, *14*(020), pp.1-13.
[14]Seo, C., Thorne, J.H., Hannah, L. and Thuiller, W., 2009. Scale effects in species distribution models: implications for conservation planning under climate change. *Biology letters*, *5*(1), pp.39-43.
[15] Adrian-Kalchhauser, I. and Burkhardt-Holm, P., 2016. An eDNA assay to monitor a globally invasive fish species from flowing freshwater. *PloS one*, *11*(1).
[16] Collins, R.A., Armstrong, K.F., Holyoake, A.J. and Keeling, S., 2013. Something in the water: biosecurity monitoring of ornamental fish imports using environmental DNA. *Biological Invasions*, *15*(6), pp.1209-1215.
[17] Harms-Tuohy, C.A., Schizas, N.V. and Appeldoorn, R.S., 2016. Use of DNA metabarcoding for stomach content analysis in the invasive lionfish Pterois volitans in Puerto Rico. *Marine Ecology Progress Series*, *558*, pp.181-191.
[18] Delaney, D.G., Sperling, C.D., Adams, C.S. and Leung, B., 2008. Marine invasive species: validation of citizen science and implications for national monitoring networks. *Biological Invasions*, *10*(1), pp.117-128.
[19] Andersen, M.C., Adams, H., Hope, B. and Powell, M., 2004. Risk assessment for invasive species. *Risk Analysis: An International Journal*, *24*(4), pp.787-793.
[20]Sandilyan, S., Invasive alien species of India, National Biodiversity Authority,http://nbaindia.org/uploaded/pdf/Iaslist.pdf. (accessed on 8 December 2019)

Chelonodontopspatoca, a native species of fish that requires fresh to slightly brackish water tosurvive (P.C. Nobin R.M.)

Etroplussuratensis, a native species of freshwater fish (P.C. Priya Ranganathan)

Sampling for invasive fishes in freshwater bodies (P.C. Nobin R.M.)



Invasive *Gambusia* spp. prior to genetic analysis (P.C. Nobin R.M.)

Gambusia holbrooki, one of the IUCN-ranked worst invasive fish species globally (P.C. Nobin R.M.)

CHECKLIST OF SPIDERS (ARACHNIDA: ARANEAE) OF THE NILGIRIS, TAMILNADU, INDIA

Jayaraman Dharmaraj[1] ,Chinnappan Gunasekaran[2]Vallavan Rajkumar[3]
[1,2,3]Department of Zoology, Bharathiar University, Coimbatore, Tamilnadu, India. 641046.
(Corresponding author)
Email: [1]dharmaraj590@gmail.com,[2]chrisguna@gmail.com,
[3]rajkumar.justin@gmail.com

INTRODUCTION

The spider is one of the biological indicators of forest and other ecosystems. In the last decade's spider community indirectly benefits in pest control in agricultural and forest. This would hamper research and needless to say has important ramifications in terms of assessing the local biodiversity. The Nilgiri district is located in the north-western portion of Tamil Nadu state in India between the 11' 10"and 11' 45" North latitude and 76' 14" and 77' 2" East longitude. It has a total geographical area of 2,543 sq. km covering almost 1.95 percent of the area of the state. It is bounded on the North-West by Kerala State, on the North by Karnataka State, on the South-East by Coimbatore and in the North-East by Erode Districts of Tamilnadu. The Nilgiri is situated at the junction of the Eastern and Western Ghats. On average, it has an elevation of 2000 mts. above the Mean Sea Level (MSL); the highest peak is Doddabetta at 2640 mts.

Despite being the key invertebrate predators of almost all terrestrial ecosystems, spiders are a comparatively neglected group of animals. The invertebrate fauna of the state has not been documented properly. Most of the recorded checklists are either about butterflies or contain other economically important species like mosquitoes. Arachnids had no exception. Even to this date, the only reference for spider identification in Indiais the Pocock's Fauna of British India (Pocock, 1900)[1].Aim of the study is to enlist thecomplete spider fauna of the Nilgiris with its distribution areas and their recent references.

MATERIALS AND METHODS

The checklist is based on the review of the published literature, including the World catalogues of spiders (Platnick 2018). We also examined the Zoological Survey of India database. The checklist includes families, genera, and species in alphabetical order along with the name of the person who identified the species and distribution.

CONCLUSION

The study investigates diversity in communities of spiders in different habitats of the Nilgiris. The checklist provides a baseline data of distribution from the Nilgiris, which can be useful for various research studies. It was found that the structural complexity of the environment is directly related to spider density and diversity which provides an argument to enhance the natural ecosystems to make a favourable environment for the conservation and increase of the spider population. Also, necessary steps should be taken to reduce pesticide application in agriculture, which affects the natural population dynamics of spiders.

ACKNOWLEDGEMENTS

[1]*Pocock 1899, 1901; Narayan 1915; Gravely 192, 1924, 1931, 1935; Reimoser 1934; Tikader 1972a,b, 1977, 1980, 1987; Tikader & Gajbe 1976, 1977; Majumder & Tikader 1991; Proszynski 1992a,b; Barrion & Litsinger 1995, Coyle 1995; Smith 2004; Gajbe 1999, 2008; Ganeshkumar & Mohanasundaram 1998; Logunov 2001; Logunov & Hereward 2006; Siliwal & Molur 2009; Siliwal et al. 2007, 2011; Sanap & Mirza 2011; Platnick et al. 201, 2012; Baehr & Baehr 1993; Baehr et al. 2012; Gupta et al. 2013; Caleb & Mathai 2013, 2014a,b,c; Caleb et al. 2014, 2015; Karthikeyani & Kannan 2013 and Tanasevitch 2015. Studies on biodiversity of spiders were carried out by Sugumaran et al. 2007; Kapoor 2008; Jayakumar & Sankari 2010; Shunmugavelu & Karthikeyani 2010; Karthikeyani & Kannan 2012; Karthikeyani & Muthuchelian 2014; Muthuchelian & Karthikeyani 2015; Moinudeen and Samson 2017; Jayaraman Dharmaraj 2017; Jayaraman Dharmaraj 2018.*

We are grateful to Dr. C. Gunasekaran for his valuable guidance. With the help of my field collection and Department of Zoology, Bharathiar University for providing helps to literature collection.

REFERENCES:

1. **Baehr, B. C., Harvey, M. S., Burger, M., &Thoma, M., (2012).** The new Australiagenus Globin spider genus *Prethopalpus*(Araneae: Oonopidae). *Bull. Amer. Mus. nat. Hist*., 369: 1-113.
2. **Baehr, M., &Baehr, B., (1993).** The Hersiliidae of the Oriental Region including New Guinea. Taxonomy, phylogeny, zoogeography (Arachnida, Araneae). *Spixiana,* 19 (Suppl.): 1-96.
3. **Barrion, A. T., &Litsinger, J. A., (1995).** Riceland Spiders of South and Southeast Asia. *CAB International, Wallingford, UK*, xix + 700 pp.
4. **Caleb, J. T. D., & Mathai, M. T., (2013).** New species of *Poecilochroa*Westring and *Zelotes*Gistel (Araneae: Gnaphosidae) from Tamil Nadu, India. *Indian Journal of Arachnology,* 2 (2): 1 6.
5. **Caleb, J. T. D., & Mathai, M. T., (2014b).** Description of some interesting jumping spiders (Araneae: Salticidae) from South India. *Journal of Entomology and Zoology Studies*, 2 (5): 63-71.
6. **Caleb, J. T. D., & Mathai, M. T., (2014c).** Record of *Araneus viridisomus*Gravely, 1921 (Araneae:Araneidae) from Tamil Nadu, India. *Indian Journal of Arachnology*, 3 (2): 1-5.
7. **Caleb, J. T. D., & Mathai, M. T., (2015).** Description of a new species of *Harmochirus*Simon (Araneae: Salticidae) from South India. *Munis Entomology and Zoology*, 10 (1): 117-121.
8. **Caleb, J. T. D., (2014).** A new species of *Phintella*Strand (Araneae: Salticidae) from India. *Munis Entomology and Zoology*, 9 (2): 605-608.
9. **Caleb, J. T. D., & Mathai, M. T., (2014a).** A new species of *Deinopis*MacLeay (Araneae: Deinopidae) from India. Indian Journal of Arachnology, 3 (1): 1-7. *Mun. Ent. Zool*. Vol. 12, No. 1, January 2017 191
10. **Caleb, J. T. D., Christudhas, A., Laltanpuii, K., & Chitra, M., (2014).** New species of *Hyllus* C. L. Koch (Araneae: Salticidae) from India. *Munis Entomology and Zoology*, 9 (2): 634-637.
11. **Caleb, J. T. D., Karthikeyani, R., &Muthuchelian, K., (2014).** Description of *Drassodesluridus*O. P. Cambridge (Araneae: Gnaphosidae): First record from Tamil Nadu, India. *Journal of Entomology and Zoology Studies*, 2 (4): 135-138.
12. **Caleb, J. T. D., Mungkung& Mathai, M. T., (2015).** Four new species of jumping spider (Araneae: Salticidae: Aelurillinae) with the description of a new genus from South India. *Peckhamia*, 124 (1): 1-18.
13. **Coyle, F. A., (1995).** A revision of the funnelweb mygalomorph spider subfamily Ischnothelinae (Araneae, Dipluridae). *Bulletin of the American Museum of Natural History*, 226: 1-133.
14. **Dharmaraj, J., Gunasekaran, C., and Rajkumar, V., (2018).** Diversity and plethora of spider fauna at different habitats of the nilgiris, Tamilnadu, India. *International journal of recent scientific research*, Vol, 9. March,2018.
15. **Dharmaraj, J., Gunasekaran, C., and Rajkumar, V., and Chinnaraj, P., (2017).** Diversity of spiders (Arachnida: Araneae) in Nilgiris, Tamilnadu. *International journal of advanced research in biological sciences*, Volume 4, Issue 5.
16. **Gajbe, U. A., (1999).** Studies on some spiders of the family Oxyopidae (Araneae: Arachnida) from India. *Zool. Surv. India*, 97 (3): 31-79.
17. **Gajbe, U. A., (2008).** Fauna of India and the adjacent countries spider (Arachnida: Araneae: Oxyopidae). Rec. *Zool. Surv. India*. III: 1-117.
18. **Ganeshkumar, M., &Mohanasundaram, M., (1998).**A new species of ant-like spider from cotton fields of Tamil Nadu (Araneae: Salticidae). *Zoo's Print Journal*, 13 (11): 27-28.
19. **Gravely, F. H., (1921).** Some Indian spiders of the subfamily Tetragnathinae. Records *of the Indian Museum*, Calcutta, 22: 423-459.

20. **Gravely, F. H., (1924).** Some Indian spiders of the family Lycosidae. *Records of the Indian Museum, Calcutta*, 26: 587-613.
21. **Gravely, F. H., (1931).** Some Indian spiders of the families Ctenidae, Sparassidae, Selenopidae and Clubionidae. *Records of the Indian Museum, Calcutta*, 33: 211-282.
22. **Gravely, F. H., (1935).** Notes on Indian mygalomorph spiders. II. *Records of the Indian Museum, Calcutta*, 37: 69-84.
23. **Gupta, N., Ganeshkumar, M., Das, S. K. &Siliwal, M., (2013).** Three new species of *Idiops*Perty, 1833 (Araneae: Idiopidae) from India. *Zootaxa*, 3635: 237-250.
24. **Jaykumar, S., & Sankari, A., (2010).** Spider population and their predatory efficiency in different rice establishment techniques in Aduthurai, Tamil Nadu. *Journal of Biopesticides* 3 (1 Special Issue): 20-27.
25. **Kapoor, V., (2008).** Effect of rainforest fragmentation and shade-coffee plantations on spider communities in the Western Ghats, India. *J. Insect Conserv*, 12: 53-68.
26. **Karthikeyani, R., & Kannan, S., (2012).** Diversity and bio-control Potential of Huntsman spider *Heteropodavenatoria* Linnaeus (Araneae: Sparassidae). *J. Bio sci. Res.,* 3 (4): 240-244.
27. **Karthikeyani, R., & Kannan, S., (2013).** A new *Plexippus*spider from the Western Ghats, Kumbakarai Falls, Theni, Tamil Nadu, South India (Arachnida: Araneae: Salticidae). *Indian Journal of Arachnology*, Maharashtra, 2 (2): 42-46.
28. **Karthikeyani, R., &Muthuchelian, K., (2014).** Proceedings of the seminar on "Importance of taxonomy in conservation of faunal diversity in Tamil. Organized by ENVIS Centre on Faunal Diversity, Zoological Survey of India, Kolkatta&Southern Regional *Centre and Marine Biology Regional Centre of Zoological Survey of India*, Chennai. (1st and 2nd September 2014) Pp. 191-197.
29. **Karthikeyani, R., Caleb, J.T.D., Gajbe, U.A. and Muthuchelian, K., (2017).** Checklist of spiders (Arachnida:Araneae) of the state of Tamilnadu, India. *Applied Entomology and Zoology*, January, 2017.
30. **Logunov, D. V., & Hereward, J., (2006).** New species and synonymies in the genus *Synagelides*Strand in Bosenberg & Strand, 1906 (Araneae: Salticidae*). Bulletin of the British Arachnological Society*, 13: 281-292
31. **Logunov, D. V., (2001).** A redefinition of the genera *Bianor*Peckham & Peckham, 1885 and *Harmochirus*Simon, 1885, with the establishment of a new genus *Sibianor*gen. n. (Aranei: Salticidae). *Arthropoda Selecta*, 9: 221-286.
32. **Majumder, S. C., &Tikader, B. K., (1991).** Studies on some spiders of the family Clubionidae from India. *Records of the Zoological Survey of India*, Occasional Paper, 102: 1-174.
33. **Moindudheen, D., Jayabalan, D., Samson, A., (2017).** Sighting of Nilgiri Large Burrowing Spider Hapaloclastusnilgirinus from Nilgiris, Tamilnadu, India. *Indian journal of Arachnology*., 6 (1):30-33,2017.
34. **Muthuchelian, K., &Karthikeyani, R., (2015).** Biodiversity of Spiders (in Tamil Language). Published by *New Century Book House Pvt. Ltd*., Chennai, pp. 156.
35. **Narayan, K., (1915).** Notes on ant-like spiders of the family Attidae in the collection of the Indian Museum. *Records of the Indian Museum, Calcutta*, 11: 393-406.
36. **Platnick, N. I., Duperre, N., Ott, R., & Kranz-Baltensperger, Y., (2011).** The goblin spider genus *Brignolia*(Araneae, Oonopidae). *Bulletin of the American Museum of Natural History*, 349: 1-131.
37. **Platnick, N. I., Duperre, N., Ott, R., Baehr, B. C., & Kranz-Baltensperger, Y., (2012).** The goblin spider genus *Pelicinus*(Araneae, Oonopidae), Part 1. American Museum Novitates, 3741: 1-43.
38. **Pocock, R. I., (1899).** Diagnoses of some new Indian Arachnida. *Journal of the Bombay Natural History Society*, 12: 744- 753.
39. **Pocock, R. I., (1900).** The fauna of British India, including Ceylon and Burma. *Arachnida. London*, pp. 1-279.

40. **Pocock, R. I., (1901).** Descriptions of some new species of spiders from British India. *Journal of the Bombay Natural History Society*, 13: 478-498.
41. **Proszynski, J., (1992a).**Salticidae (Araneae) of the Old World and Pacific Islands in several US collections. *Annales Zoologici*, Warszawa, 44: 87-163.
42. **Proszynski, J., (1992b).** Salticidae (Araneae) of the Old World and Pacific Islands in several US collections. *Annales Zoologici*, Warszawa, 44: 87-163.
43. **Reimoser, E., (1934).** Araneae aus Sud-Indien. *Revue Suisse de Zoologie*, 41: 465-511.
44. **Sanap, R. V., & Mirza, Z. A., (2011).** Two new trapdoor spider species of the genus *Scalidognathus*Karsch, 1891 (Araneae: Idiopidae) from the southern Western Ghats of India. *Acta ZoologicaLituanica*, 21: 96-102.
45. **Shunmugavelu, M., &Karthikeyani, R., (2010).** Spider fauna of the family Araneidae from Kumbakarai Falls, Theni Dist, Tamilnadu, South India. *Proc. Zool. Soc. India*, 9 (2): 25-31.
46. **Siliwal, M., &Molur, S., (2009).** A new species of the genus *Sason*(Araneae: Barychelidae) from Rameshwaram Island, Tamil Nadu, India. *Zootaxa*, 2283: 60-68.
47. **Siliwal, M., Gupta, N., Sanap, R. V., Mirza, Z. A., & Raven, R., (2011).** First record of the genus *Tigidia*Simon, 1892 (Araneae: Barychelidae) from India with description of three new species from the Western Ghats, India. *Journal of Threatened Taxa*, 3: 2229-2241.
48. **Siliwal, M., Molur, S., & Raven, R., (2007).** A new species of the genus *Plesiophrictus*(Araneae: Theraphosidae: Ischnocolinae) from Western Ghats, India. *Zoo's Print Journal*, 22: 2853-2860.
49. **Smith, A. M., (2004).** A new species of the arboreal theraphosid, genus *Poecilotheria*, from southern India (Araneae, Mygalomorphae, Theraphosidae) with notes on its conservation status. *Journal of the British Tarantula Society*, 19: 48-61.
50. **Sugumaran, M. P., Soundarajan, R. P., & Lakshmanan, V., (2007).** Spider fauna in Horticultural crops of Yercaud Hills. *Zoos' Print Journal*, 22 (6): 2721-2722.
51. **Tikader, B. K., &Gajbe, U. A., (1976).** Studies on some spiders of the genus *Zelotes*Gistel from India (family: Gnaphosidae). Proceedings of the *Indian Academy of Science*, 83 (B): 109-122.
52. **Tikader, B. K., &Gajbe, U. A., (1977).** Studies on some spiders of the genera *Gnaphosa*Latreille and *Callilepis*Westring (family: Gnaphosidae) from India. Records of the *Zoological Survey of India*, 73: 43-52.
53. **Tikader, B. K., (1965).** On some new species of spiders of the family Thomisidae from India. Proceedings of the *Indian Academy of Science*, 61 (B): 277-289.
54. **Tikader, B. K., (1972a).** Spider fauna of India: Catalogue and bibliography. Part IV. J. *Bombay Nat. Hist. Soc*, 68 (3): 609- 618.
55. **Tikader, B. K., (1972b).** Spider fauna of India: Catalogue and bibliography. Part V. J. *Bombay Nat. Hist. Soc*., 69 (1): 91-101.
56. **Tikader, B. K., (1977).** Studies on some mygalomorph spiders of the families Ctenizidae and Theraphosidae from India. *Journal of the Bombay Natural History Society*, 74: 306-319.
57. **Tikader, B. K., (1980).**Thomisidae (Crab-spiders). Fauna India (Araneae), 1: 1-247.
58. **Tikader, B. K., (1987).** *Handbook of Indian Spiders*. Calcutta, Zool. Surv. India, 251 pp.
59. **World Spider Catalog., (2019).***Natural History Museum* Bern online at http://wsc.nmbe.ch,version 17.0, accessed on 2019).

Table 1. The number of genera and species of spiders recorded from The Nilgiris.

S.No	Family	Number of Genera	Number of species
1.	Araneidae	6	9
2.	Barychelidae	1	1
3.	Clubionidae	2	5
4.	Corinnidae	3	3

S.No	Family	Number of Genera	Number of species
5.	Ctenidae	1	1
6.	Eresidae	1	3
7.	Eutichuridae	1	1
8.	Gnaphosidae	1	1
9.	Hahniidae	1	1
10.	Hersiliidae	1	2
11.	Idiopidae	1	1
12.	Linyphiidae	1	2
13.	Liocranidae	2	5
14.	Lycosidae	5	9
15.	Mimetidae	1	1
16.	Nephilidae	2	3
17.	Oonopidae	1	1
18.	Oxyopidae	2	3
19.	Philodromidae	1	1
20.	Pholcidae	1	1
21.	Salticidae	8	10
22.	Selenopidae	1	1
23.	Sparassidae	2	8
24.	Tetragnathidae	3	4
25.	Theridiidae	1	1
26.	Theraphosidae	3	3
27.	Thomisidae	6	8
28.	Titanoecidae	1	1
29.	Zodariidae	2	2
Total	29	62	92

Table 2. A checklist of spiders from the Nilgiris

S.No	Family	Genus	Genus species	Distribution
1	**Araneidae (Clerck, 1757)**	Argiope (Audouin, 1826)	*Argiope aemula* (Walckenaer, 1841)	Avalanche, Ooty
2			*Argiope pulchella* (Thorell, 1881)	Nilgiri Hills
3		Chorizopes (O.P. Cambridge, 1870)	*Chorizopes frontalis* (O. Pickard-Cambridge, 1870)	Coonoor
4		Cyrtophora (Simon, 1864)	*Cyrtophoramoluccensis* (Doleschall, 1857)	Nilgiri Hills
5		Eriovixia (Archer, 1951)	*Eriovixiaexcelsa*(Simon, 1889)	Coonoor
6			*Eriovixialaglaizei*(Simon, 1877)	Ooty
7		Gasteracantha (Sundevall, 1833)	*Gasteracanthageminata* (Fabricius, 1798)	Emerald Valley
8			*Gasteracantharemifera* (Butler, 1873)	Ooty
9		Neoscona (Simon, 1864)	*Neoscona vigilans* (Blackwall, 1865)	Ooty

S.No	Family	Genus	Genus species	Distribution
10	**Barychelidae (Simon, 1889)**	Tigidia (Simon, 1892)	*Tigidianilgiriensis* (Siliwal et al., 2011)	Kothagiri, Nilgiri Hills
11	**Clubionidae (Wagner, 1887)**	Clubiona (Latreille, 1804)	*Clubionaacanthocnemis* (Simon, 1906)	Coonoor, Nilgiri Hills
12			*Clubionanilgherina* (Simon, 1906)	Coonoor, Nilgiri Hills
13			*Clubionashillongensis* (Majumder &Tikader 1991)	Coonoor
14		Simalio (Simon, 1857)	*Simaliocastaneiceps* (Simon, 1906)	Coonoor, Nilgiri Hills
15			*Simaliopercomis* (Simon, 1906)	Coonoor, Nilgiri Hills
16	**Corinnidae (Karsch, 1880)**	Aetius (O. P. Cambridge, 1896)	*Aetius decollatus* (O. P. Cambridge, 1896)	Mudumalai
17		Castianeira (Keyserling, 1879)	*Castianeiraflavipes* (Gravely, 1931)	Nilgiri Hills
18		Corinnomma (Karsch, 1880)	*Corinnommarufofuscum* (Reimoser, 1934)	Mudumalai
19	**Ctenidae (Keyserling, 1877)**	Ctenus (Walckenaer, 1805)	*Ctenus indicus* (Gravely, 1931)	Ooty
20	**Eresidae (C. L. Koch, 1845)**	Stegodyphus (Simon, 1873)	*Stegodyphuspacificus* (Pocock, 1900)	Nilgris Hills
21			*Stegodyphussarasinorum* (Karsch, 1892)	Ooty, Nilgris Hills
22			*Stegodyphus tibialis* (O. Pickard-Cambridge, 1869)	Coonoor, Nilgris Hills
23	**Eutichuridae (Lehtinen, 1967)**	Cheiracanthium (C. L. Koch, 1839)	*Cheiracanthiumconflexum* (Simon, 1906)	Coonoor, Nilgiri Hills
24	**Gnaphosidae (Pocock, 1898)**		*Zelotesnilgirinus* (Reimoser, 1934)	Nilgiri Hills
25	**Hahniidae (Bertkau, 1878)**	Scotospilus (Simon, 1886)	*Scotospilusmaindroni* (Lehtinen, 1967)	Coonoor
26	**Hersiliidae (Thorell, 1870)**	Hersilia (Audouin, 1826)	*Hersiliasavignyi* (Lucas, 1836)	Nilgiri Hills
27			*Hersilia tibialis* (Baehr&Baehr, 1993)	Ooty
28	**Idiopidae (Simon, 1889)**	Scalidognathus (Karsch, 1892)	*Scalidognathusnigriaraneus* (Sanap& Mirza, 2011)	Ooty
29	**Linyphiidae (Blackwall, 1859)**	Oedothorax (Forster &Bertkau, 1883)	*Oedothoraxcunur* (Tanasevitch, 2015)	Coonoor, Nilgiri Hills
30			*Oedothoraxparacymbialis* (Tanasevitch, 2015)	Coonoor, Nilgiri Hills
31	**Liocranidae (Simon, 1897)**	Oedignatha (Thorell, 1881)	*Oedignathacarli*(Reimoser, 1934)	Coonoor
32			*Oedignathalesserti*(Reimoser, 1934)	Mudhumalai

S.No	Family	Genus	Genus species	Distribution
33			*Oedignathamicrosculata* (Reimoser, 1934)	Coonoor
34			*Oedignathatricuspidata* (Reimoser, 1934)	Coonoor
35		Sphingius (Thorell, 1890)	*Sphingiusnilgiriensis* (Gravely, 1931)	Nilgiri Hills
36	**Lycosidae (Sundevall, 1833)**	Arctosa (C.L.Koch, 1847)	*Arctosalesserti* (Reimoser, 1934)	Mudhumalai
37		Draposa (Kronestedt, 2010)	*Draposaatropalpis*(Gravely, 1924)	Gudalur, Nilgiri Hills
38			*Draposaoakleyi* (Gravely, 1924)	Ooty, Nilgiri Hills
39		Geolycosa (Montgomery, 1904)	*Geolycosacarli* (Reimoser, 1934)	Coonoor
40		Hippasa (Simon, 1885)	*Hippasagreenalliae* (Blackwall, 1867)	Ooty
41			*Hippasalycosina*(Pocock, 1900)	Ooty, Nilgiri Hills
42			*Hippasaagelenoides* (Simon, 1884)	Avalanche, Ooty
43		Pardosa (C. L. Koch, 1847)	*Pardosabirmanica*(Simon, 1884)	Ooty, Nilgiri Hills
44			*Pardosasumatrana*(Thorell, 1890)	Ooty, Gudalur, Nilgiri Hills
45	**Mimetidae (Simon, 1881)**	Mimetus (Hentz, 1832)	*Mimetus indicus* (Simon, 1906)	Coonoor
46	**Nephilidae (Simon, 1894)**	Herennia (Thorell, 1877)	*Herenniamultipuncta* (Doleschall, 1859)	Ithalar
47			*Nephila pilipes* (Fabricius, 1793)	Ooty
48		Nephilengys (L.Koch, 1872)	*Nephilengysmalabarensis* (Walckenaer 1841)	Ooty
49	**Oonopidae (Simon, 1890)**	Brignolia (Dumitresco and Georgesco, 1983)	*Brignolianilgiri*(Platnick et al., 2011)	Coonoor, Nilgiri Hills
50	**Oxyopidae (Thorell, 1870)**	Oxyopes (Latreille, 1804)	*Oxyopeshindostanicus* (Pocock, 1901)	Nilgiri Hills
51		Peucetia (Thorell, 1869)	*Peucetiagraminea* (Pocock, 1900)	Kotagiri, Nilgiri Hills
52			*Peucetiaviridana*(Stoliczka, 1869)	Emerald Valley
53	**Philodromidae (Thorell, 1870)**	Tibellus (Simon, 1875)	*Tibellusvitilis* (Simon, 1906)	Coonoor
54	**Pholcidae (C. L. Koch, 1850)**	Belisana (Thorell, 1898)	*Belisanadodabetta* (Huber, 2005)	Nigiri Hills
55	**Salticidae (Blackwall, 1841)**	Brettus (Thorell, 1895)	*Brettusanchorum*(Wanless, 1979)	Nilgiri hills
56		Myrmarachne (MacLeay, 1839)	*Myrmarachneroeweri* (Reimoser,1934)	Ooty, Gudalur

S.No	Family	Genus	Genus species	Distribution
57			*Myrmarachnemegachelae* (Ganesh Kumar &Mohanasundaram, 1998)	Katteri, Nilgiris
58		Phintella (Bosenberg& Strand, 1906)	*Phintellacoonooriensis*(Proszynski, 1992)	Coonoor
59			*Phintellanilgirica* (Proszynski, 1992)	Nilgiri Hills
60		Pilia (Simon, 1902)	*Piliaescheri*(Reimoser, 1934)	Karteri valley near in Ooty
61		Stenaelurillus (Simon, 1886)	*Stenaelurilluslesserti*(Reimoser, 1934)	Masinagudi near Mudhumalai
62		Synagelides (Strand, 1906)	*Synagelideslehtineni* (Logunov& Hereward, 2006)	Doddabetta, Nilgiri Hills
63		Viciria (Thorell, 1877)	*Viciria minima* (Reimoser, 1934)	Coonoor
64		Zeuxippus (Thorell, 1891)	*Zeuxippushistrio* (Thorell, 1897)	Aravankad, Nil iris
65	**Selenopidae (Simon, 1897)**	Makdiops (Crews & Harvey, 2011)	*Makdiopsnilgirensis*(Reimoser, 1934)	Nilgiri Hills
66	**Sparassidae (Bertkau, 1872)**	(HeteropodaLatreille, 1804)	*Heteropodahampsoni*(Pocock, 1901)	Emerald
67			*Heteropodaleprosa*(Simon, 1884)	Ooty, Nilgiri Hills
68			*Heteropodamalitiosa*(Simon, 1906)	Coonoor
69			*Heteropodanilgirina*(Pocock, 1901)	Kotagiri, Ooty, Coonoor, Nilgiri Hills
70			*Heteropodavenatoria*(Linnaeus, 1767)	Ooty
71		(ThelcticopisKarsch, 1884)	*Thelcticopis ajax* (Pocock, 1901)	Ooty
72			*Thelcticopismaindroni*(Simon, 1906)	Coonoor
73			*Thelcticopisrufula*(Pocock, 1901)	Nilgiri Hills
74	**Tetragnathidae (Menge, 1866)**	Leucauge (White, 1841)	*Leucaugedecorata*(Blackwall, 1864)	Nilgiri Hills, Emerald Valley
75		Orsinome (Thorell, 1890)	*Orsinomemarmorea*(Pocock, 1901)	Nilgiri Hills
76		Tetragnatha (Latreille, 1804)	*Tetragnathacochinensis*(Gravely, 1921)	Nilgiri Hills
77			*Tetragnathajavana*(Thorell, 1890)	Ooty, Nilgiri Hills
78	**Theridiidae (Sundevall, 1833)**	Theridion (Walckenaer, 1805)	*Theridionnilgherinum*(Simon, 1905)	Nilgiri Hills
79	**Theraphosidae (Thorell,**	Haploclastus (Simon, 1892)	*Haploclastusnilgirinus*(Pocock, 1899)	Nilgiri Hills

S.No	Family	Genus	Genus species	Distribution
80	**1869)**	Plesiophrictus (Pocock, 1899)	*Plesiophrictusnilagiriensis* (Siliwal, Molur& Raven, 2007)	Nilgiri Hills
81		Poecilotheria (Simon, 1885)	*Poecilotheriaregalis*(Pocock, 1899)	Mudumalai, Masinagudi
82	**Thomisidae (Sundevall, 1833)**	Angaeus (Thorell, 1881)	*Angaeuspentagonalis*(Pocock, 1901)	Nilgiri Hills
83		Dietopsa (Strand, 1932)	*Dietopsaparnassia*(Simon, 1895)	Coonoor
84		Lycopus (Thorell, 1895)	*Lycopustrabeatus*(Simon, 1895)	Coonoor
85		Oxytate (L. Koch, 1878)	*Oxytatechlorion*(Simon, 1906)	Coonoor
86		Runcinia (Simon, 1875)	*Runciniaescheri*(Reimoser, 1934)	Mudhumalai
87		Thomisus (Walckenaer, 1805)	*Thomisusrigoratus*(Simon, 1906)	Coonoor
88			*Tmarusfasciolatus*(Simon, 1906)	Coonoor
89			*Tmarussoricinus*(Simon, 1906)	Coonoor
90	**Titanoecidae (Lehitinen, 1967)**	Anuvinda (Lehtinen, 1967)	*Anuvindaescheri*(Reimoser, 1934)	Mudhumalai
91	**Zodariidae (Thorell, 1881)**	Cryptothele (L. Koch, 1872)	*Cryptothelecollina*(Pocock, 1901)	Ooty
92		Mallinella (Strand, 1906)	*Mallinellanilgherina*(Simon, 1906)	Nilgiri Hills

KURUVI

Vishvak Kannan

Email: vishvakannan@gmail.com

"I remember those days, we used to go to the nearby park and feed the birds while people were strolling or chatting sitting at benches and eating at the roadside stalls," said thatha, re-tying his lungi as he stared at the empty skies. He had gotten into one of his reminiscent moods again. I guess age does that - pining for a past that was supposedly better and happier. "Kids these days don't even know what a sparrow is. It's very unfortunate."

"Yes thatha, sparrows were awesome, we all miss those birds," I said sardonically as I shrugged and walked away, leaving his coffee at the foot of his chair. I'd heard this story too many times and my friends were waiting for me to start another game of Overwatch. I could hear thatha getting into another one of his coughing fits as I shut my bedroom door and put my headphones on. He'd had a bad cold and fever for a few days now. Some people from the corporation came

and did some tests. He didn't test positive for COVID-19 so we could still walk out to the nearby grocery store, albeit with face masks on.

That night he got worse. We share a room and he started having coughing fits. The kind where you would normally take thatha to the hospital. I asked him if he wanted me to fetch some hot water but he just grunted and went back to sleep. I didn't give it a second thought as I went back to sleep. I had a lot of studying to do the next day.

The following morning thatha went out to the balcony and sat there with his newspaper - just as he had done for the last 20 or so years since his retirement. Suddenly he started screaming! As Amma and I ran to the balcony, "Lakshmi! Kuruvi di! LAKSHMI!" he yelled. A few birds got startled and flew away just as we entered the balcony. "Seri pa why are you screaming for that?" "Really, I saw two sparrows. They were building a nest on that tree!" he exclaimed, pointing at the guava tree outside our compound wall. I saw nothing. My mother went back indoors remarking, “Okay let them be there but don’t shout, you’ll make your cough worse!” But after 19 years of hearing about these sparrows and seeing pictures of them, I was a little curious. So I brought another chair out and sat with thatha. "Where was it thatha?" He just pointed at the tree again.

After about five minutes I got bored and went back indoors. I didn’t see any sparrows and I had just woken up. It was breakfast time.

About two hours later I went back outside to ask if thatha wanted coffee. It was around 11am and I was going to make one for myself anyway. "Amma come here, fast, thatha is not breathing!" I grew very frantic, running inside and running back out with Amma, not knowing what to do. As she went to find her phone to call the hospital, I stood there stunned, staring at the empty chair beside him.Two sparrows are chirping and flitting about under it.

WHY IS VALUATION OF ECOSYSTEM GOODS AND SERVICES IMPORTANT IN CONSERVATION ?

Sushmita Krishnan
Bharathidasan University, Trichy
Email: sushmitakrishnan1999@gmail.com

Oversized population, overflowing plastics, expanding cities, fading stretches of greeneries, starving animals, and a disturbed ecosystem are welcome to our mother earth. Your nightmare has just begun. Urbanization stands both as one of the highest goals of the human race and the deepest fears of the future. This massive ravager has grown exponentially leaving behind no room for the environment. In this scenario, valuating the ecosystem goods and services may help us in many aspects. It can impact people's view on environment conservation and can go up to policymaking. To define ecosystem goods, they are the products obtained from the natural processes in the ecosystem. For example, clean water. The services that the ecosystem offers to us are called the ecosystem services. For example, groundwater recharges. When we communicate nature in terms of economics, doesn't it look like all the pollution that man has created is amounting to a debt which needs to be repaid in the form of conservation?

Total economic value can help us define a value for the ecosystem goods and services. Provisioning goods and services, regulating services, cultural services and supporting services make up the total economic value. Valuation needs to take into account both the market and non-market values. In the case of non-market values, the use and non-use value are to be considered. Use values are those that do not possess a market value but can be directly taken from the ecosystem for example fishing on the beaches. Non-use values include option value, existence value, bequest value, and altruistic value.

Other economic methods like market price method, productivity method, hedonic pricing method, hedonic wage method and travel cost method are the revealing preferred approaches of valuation. Some of the cost-analysis methods are damage cost avoidance method, replacement cost method and substitute cost method.

Upon drawing so many methods to assess the value ecosystems, it draws us to conclusions on the importance of conserving the ecosystem. Waste management is another mammoth problem disturbing the environment to a great extent. Researchers who rescue animals, from oceans to polar region, find plastics choking them to death. Humans are considered as divine and educated with fancy degrees, but what about social and environmental literacy? Why are humans the

reason of all complexities on Earth? For instance, deforestation, waste mismanagement, pollution, global warming, climate change, loss of biodiversity, and above all are irreverence of the fact that there will be generations after us.

According to a study, a person requires seven trees to obtain sufficient oxygen to survive. But now in reality, with vanishing green covers, there will not be enough trees to support all humans in the future. It is evident that most of our population has to improve environmental literacy, which is becoming the need of the hour. Don't the little strokes fall great oaks? We are losing a variety of species that co-existed with us. When is the last time you woke up with the birds chirping outside your window as the sun rose? Why kids of this generation are not fortunate enough to play with butterflies, and are instead forced into the screens of the smartphone? The speed of our network is connecting us by disconnecting the biodiversity around us. These are serious matters of concern, which are very complex and need urgent action.

To conclude, valuation and conservation of ecosystem go hand in hand to promote a healthy environment. Paraphrasing John F Kennedy, "The highest form of appreciation is not to merely utter words but to live by it".

ENDANGERED AND ENDEMIC- A CASE OF THE HUMAN IMPACTS ON OLIVE RIDLEY SEA TURTLES (*LEPIDOCHELYSOLIVACEA*) AT SRIKAKULAM DISTRICT OF ANDHRA PRADESH

Lalitha Maharana
Science Faculty
Glentree Academy, White Field, Bengaluru, Karnataka
Email: lalita.maharana@gmail.com

India is one of the global biodiversity hotspots and home to many endemic species. Unfortunately, today the endemic species are becoming vulnerable and declining due to rapid industrialization. India is having the longest coastline and occupies the seventh position in terms of coastal area in the world. It occupies around 7516.6 km of the coastal belt. The Bay of Bengal is home for many endemic species. One of the significant species is the **Olive Ridley sea turtle** which has nesting sites in the east coasts, especially the Andhra Pradesh and Odisha coasts. The **Olive Ridley sea turtle** (*Lepidochelysolivacea*), also called the **Pacific Ridley sea turtle**, is the second-largest sea turtle all over the world. It grows to about 61 cm (2ft) in carapace length which is measured along the curve. The turtle gets its name from the olive-coloured carapace, which is round and heart-shaped. In this species, females have a slightly more rounded carapace as compared to males, however both males and females grow to the same size.

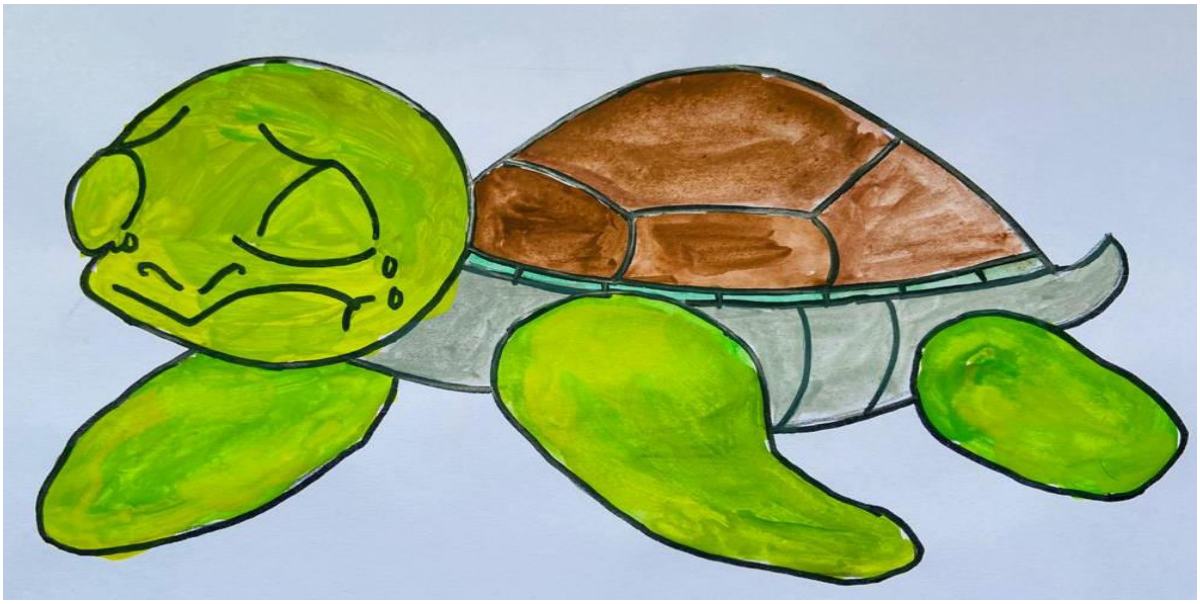
The Olive Ridley turtles are a Schedule I species of the Wildlife Protection Act, 1972 and are also listed in Appendix I of the CITES Convention which prohibits the trade of turtle products. The coastline of northern Andhra Pradesh is considered to be the crucial sporadic nesting habitat of these turtles (Rajasekhar & Subba Rao, 1993; Priyadarshini, 1998) which includes mainly three districts viz. Srikakulam, Vizianagaram and Visakhapatnam. The Kottapeta coast (near Bhavanapadu Fishing Harbour) of TekkaliMandal is also an Olive Ridley sea turtle nesting site. Interestingly, it is also known for the pelicans. These migratory birds of Siberia travel around 3000Km every year for nesting.

Even Rajarampuram, Kalingapattanam of the Srikakulam district constitute a few of the nesting sites of this remarkable species. According to a survey conducted at Vishakhapatnam, there are five officially identified nesting grounds in Andhra Pradesh, yet less than 200 sea turtles are coming to these areas.

The Olive Ridley turtles are facing a number of challenges across their migratory route, habitat and nesting beaches. These challenges arise due to human activities such as turtle unfriendly

fishing practices, developmental interventions and exploitation of their nesting sites (beaches) for sports and tourism.

Every year due to trawling nets these magnificent creatures are dying and their death rates are also high. Out of 250-300 eggs, only around 5-6 will reach the ocean. The adults alsosuffer injuries and die terrible deathswhen they come in contact with these trawling nets.There are also a few cases where they lose their limbs as they strike the motor fans of the motorboats. Their eggs are also damaged due to the activities of stray dogs and humans. A few deaths also happen when the turtles mistake plastic waste for food and consume it.



The rate of mortality is alarming every year. Around ten years back, broken shells of hatched baby sea turtles were a very common sight to see at the nesting sites in the Rajaramapuram and Kottapeta areas.

Now it is very hard to even witness any of the nesting sites, as only dead sea turtles can be seen on the shores. The drastic change in technology is harming these silent creatures. Plastic also plays a prominent role and has become one of the main concerns to rescue the limited number of Olive Ridley turtles.

To conserve the Olive Ridley population, the forest department in the district of Srikakulam (Tekkali division) is working towards the improvement of the nesting grounds through awareness camps and implementation of boundaries around the nesting sites with the help of fishing communities. This has created a positive impact towards conservation efforts as no

animals or other disturbances can easily perturb the turtles, thus promoting the abiding survival of this amazing reptile.

References:

1. Murthy K.L.N. & Ramana Murthy K.V., Mass mortality of *Lepidochelysolivacea*observed at Kottapeta beach innSrikakulam along the east coast of Andhra Pradesh, India,Indian Ocean Turtle Newsletter No. 14 (pg.no 15-16); July 2011
2. Rajasekhar, P.S. & M.V. Subba Rao. 1993. Conservation and management of the endangered OliveRidley sea turtle *Lepidochelysolivacea*(Eschscholtz) along the northern Andhra coastline. *B.C.G. Testudo* 3(5): 35–53.
3. https://www.thehindu.com/sci-tech/energy-and-environment/saving-the-olive-ridleys-of-visakhapatnam-coast/article26720689.ece
4. https://www.freepressjournal.in/cmcm/indias-coastline-some-amazing-facts-and-4. figures.
5. https://www.indiancoastguard.gov.in/content/461_3_OliveRidley.aspx)

THE HUNGRY GIANTS

Aman Kumar
Research scholar, Guru Ghasidas Vishwavidyalaya, Bilaspur (Chhattisgarh)
Email: amn.wildlife@gmail.com

In this hard time of lockdown due to COVID-19, an incident from my field is revolving around my head. I want to share it with all of you. That incident is all about the necessity of food and water and how its shortage spares no one.

I used to observe the parade of 24 giant elephants, including 18 female, 3 calves, and 3 bulls, from Mahasamund Forest division in Chhattisgarh moving on a daily basis. The area is on the border of Barnawapara wildlife sanctuary. Most of the time the herd moves to the edge of the Barnawapara wildlife sanctuary, but sometimes they also step inside the sanctuary.

From the last seven days, 21 elephants including 18 female & 3 calves from the herd were standing on the islet formed due to a decrease in the water level in the Mahanadi River. Mahanadi River is the boundary of the Mahasamund district and the capital of the Chhattisgarh, Raipur. The river is about 10 Km to 15 Km far from the forest area and on both sides of the river there are several small villages. Two resting bulls were moving together in the forest and one bull was moving towards the herd.

This was the month of May and very few water holes were alive, due to extreme heat in the area. In search of water, the female along with the calves moved towards the river and gave an invitation to another problem of food scarcity. On average, elephants need 170 kg to 200 kg of food per day and the villages on the side of the river had no crops due to lack of water in this season.

Photo: Elephants standing on an islet

They used to search for food daily as they came out in the night and moved a few kilometres from the river and returned before morning. Every day they failed to satisfy their hunger completely. The river water was just enough for the calves to stand into it. They are always swimming or either standing or sleeping on the islet.

On the day seventh, one bull finally enters in the river. The herd was happy on the bull's return and suddenly their happiness turned into sadness as one male calf was found dead on the eighth day.

The herd gave their condolences to the parade on the ninth and tenth day as they moved back towards the forest. We were there observing their painful situation. On the ninth evening, a dead calf's body was pulled out from the water and an autopsy was done. The report came as expected; a clear case of death due to starvation was reported.

Sometimes nature is very flinty for its creatures and sometimes the creatures take wrong decisions for solving one problem which consequently summons another one.

Hope, you all are safe and helping each other to get food and essential items for survival.

WORLD MIGRATORY BIRD'S DAY: 9th MAY 2020

Tripti Shukla
Natural Heritage Division, INTACH, Lodhi Estate, New Delhi
Project: Cultural Documentation of Ganga River
Email: triptis249@gmail.com

World Migratory Bird Day is an annual awareness-raising campaign to protect migratory birds and their habitats, highlighting their ecological importance and the threats faced by them. Every year various organizations and people from around the globe organize public events like education programs, exhibitions, bird festivals and bird-watching to raise awareness among the people.

The Triveni Sangam, for which Prayagraj is known, is the unification of the mighty river Ganga, the Yamuna and the Saraswati, which is believed to be secretly-underground now. The confluence point is sacred to millions of Hindus worldwide and also the site of the Mahakumbh. Every year, a crowd of about 80 million pilgrims arrive here during the Magh (11th month of the Hindu calendar, corresponding to the months of January/February) mela and spend the entire month in prayers.

Image 1: Triveni Sangam, Prayag

Coinciding with the vast gathering of pilgrims, the site welcomes flocks of Siberian seagulls *(Larus sp.)* who visit the subcontinent to escape the harsh Siberian weather. These migratory birds usually leave the higher latitudes in winter and move from areas of low resources to the areas with high resources especially in the search for food and nesting locations. The presence of numerous birds moving up and down presents a mesmerizing view as if waiting to take a holy

dip along with the lakhs of pilgrims. According to the local community, the tradition of migratory birds coming to Sangam is long back.

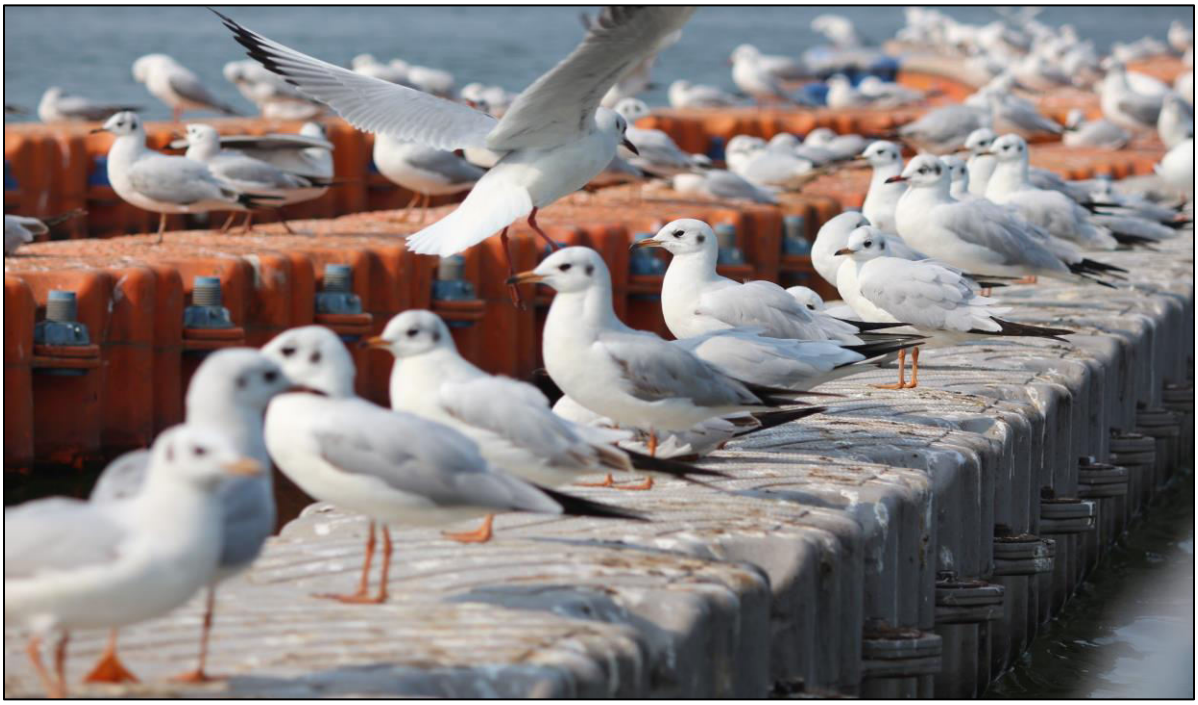


Image 2: Flocks of Black-headed gulls (*Larusridibundus*)

Image 3: Black-headed gulls (*Larusridibundus*)

As the birds flock in the thousands they are often fed by pilgrims who arrive to bathe in the river. With the increase in tourists, the boat operators have started to lure the migratory birds with balls of flour. This attracts the birds all around the boat greatly delighting the people sitting inside.

These migratory birds face numerous threats both from natural predators but also from anthropogenic activities like feeding them junk foods and items that are packed in plastics which are then discarded carelessly. Confusing plastic waste with food fills their guts causing them to starve and also harm their chicks.

Image 4: Migratory bird feeding on plastic

According to the Indian Express article dated March 10th, 2019 reveals Seagulls gain their muscles by eating fish and other insects that are rich in protein but the junk food becomes an obstacle when they have to migrate back, as it does not provide anything but fats creating indigestion and other illnesses in their bodies (Deepak Apte, BNHS Director & Pawan Sharma, President of RAWW, 2019). Some studies have also highlighted changes in the behaviour of these migratory birds where there have been reports of seagulls attacking humans, those who feed them (Sunish Subramaniam, PAWS, 2019).

Image 5: Pilgrims feeding Migratory birds

The whole world is choking on plastic and so too are the birds, an assessment of Paulson Institute, Chicago published in 2019 stresses on the point that nearly one million seabirds die due to effects of plastic every year. Sad to say but having wings does not help birds escape the threat of plastic. Imagine how many of these tiny lives are lost every day that we do not even know about.Our study indicates that improving the current state of waste management would directly benefit biodiversity. Single-use plastic under 50 microns is banned in Uttar Pradesh state since the year 2018 and also under the National Mission for Clean Ganga (NMCG), yet the hurdle of convincing the crowd has to be dealt with. There are several other measures that we can put into action, such as reducing plastic used in packaging, proper discarding of fishing nets and rings along with raising awareness on a local level.

This World Migratory Birds Day 2020 is a chance to stop plastic pollution and irresponsible tourism by highlighting its negative impact on migratory birds. There is an urgent need to address this environmental concern growing rapidly in our holy waters.

Let us treat them with love and care, after all, they are our guests and we were taught **"*Atithi Devo Bhava*" – meaning 'Guest is equivalent to God'.**

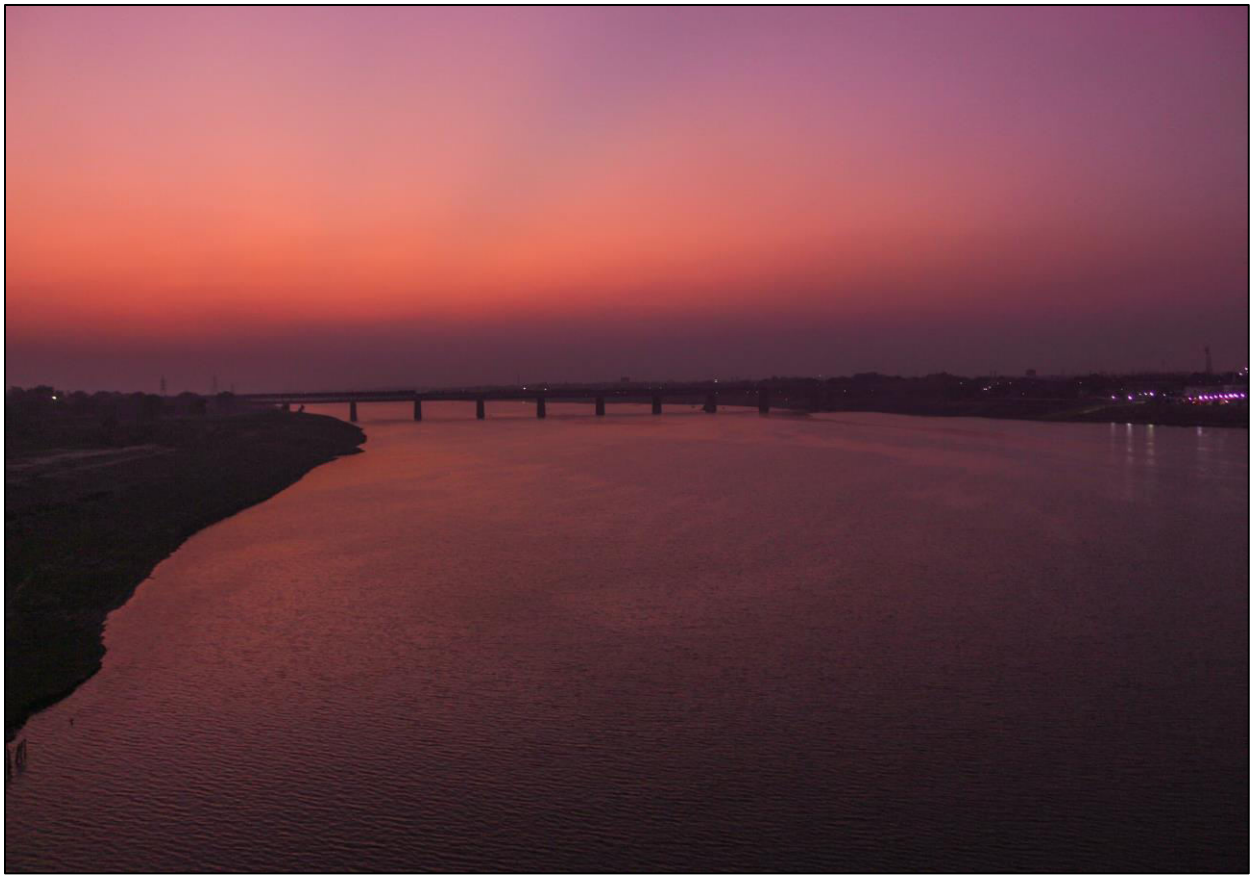


Image 6: Rivers of Prayagraj continues to be its symbol of constancy in the flux of history

References:

- Anonymous, it's a shame these birds had to die: even a tiny piece of string can kill. Bird watching bliss. https://www.birdwatching-bliss.com/plastic-trash-birds.html.
- Anonymous, 2019, May 2019, World Migratory bird day: birds globally threatened plastic waste, UN environment programme. https://www.unenvironment.org/news-and-stories/press-release/world-migratory-bird-day-birds-globally-threatened-plastic-waste.
- Anonymous, 2019, March 6. World Migratory day 2019 - Protect birds: Be solution plastic pollution. https://www.worldmigratorybirdday.org/news/2019/world-migratory-bird-day-2019-protect-birds-be-solution-plastic-pollution.
- Anonymous, the holiday spot, Kumbh Mela. https://www.theholidayspot.com/kumbh_mela/magh_mela.htm
- Anonymous, 2019, July 8. The plastic problem: how does plastic pollution affect wildlife (blog). The ocean aquarium. https://www.aquarium.co.za/blog/entry/the-plastic-problem-how-does-plastic-pollution-affect-wildlife
- Begum, T., 2019, September 20. Where to report birds tangled in plastic rubbish. Natural history museum. https://www.nhm.ac.uk/discover/where-to-report-birds-tangled-in-plastic-rubbish.html.

- Devanagari, P., 2019, March 10. Don't feed junk to Migratory birds - environmentalists (article). Indian express. https://indianexpress.com/article/cities/mumbai/dont-feed-junk-to-migratory-birds-environmentalists-5618909/
- Lockett,J., 2018, May 17. Water Dump: national geographic images of birds trapped in plastic bags and a seahorse clutching a cotton bud reveal reality of ocean pollution, The Sun UK news. https://www.thesun.co.uk/news/6308904/national-geographic-ocean-plastic-pollution-seahorse/.
- Picheta, R., 2019, July 30. Plastic pollution is making seabirds smaller and sicker, a study has found. CNN. https://www.cnn.com/2019/07/30/health/seabirds-plastic-pollution-health-problems-scli-intl/index.html.
- Striner, H., 2019, May 11. World Migratory Bird Day; Time To Stop Feeding Birds Plastic, fired earth. https://www.tiredearth.com/articles/world-migratory-bird-day-time-stop-feeding-birds-plastic.
- Sugden,J., 2013, February 1. The 80 Million-Pilgrim March. WSJ.
- https://www.wsj.com/articles/SB10001424127887323701904578275961736436782. https://www.telegraph.co.uk/news/2018/09/23/seabirds-found-250-pieces-plastic-lodged-stomachs/a

WHAT LIES BENEATH? FISH DIVERSITY IN THE 'ONLY MANGROVE TIGERLAND IN THE WORLD', THE INDIAN SUNDARBANS

Priyankar Chakraborty
Email: priyankarchakraborty1991@gmail.com

When people think of the Sundarbans, the indomitable royal Bengal tiger is what they first picture followed by picturesque scenes of snaking rivers fringed with mangrove tree species and their adventitious roots. The rivers' spiralling through the deltaic mangrove forests looks homogenous. They seem to be of the same murky colouration and featureless facade, but inside they harbour a myriad of life forms with fishes being the most diverse of the vertebrates. In this article, we take a look at the underappreciated diversity of fishes from the Indian Sundarbans, commemorating the theme of 2020s World Environment Day-Biodiversity.

WHY THE MANGROVES?

The Indian Sundarbans is a UNESCO world heritage site that spans more than 2000 square kilometres and is home to a variety of fauna. The mangroves act as a perfect breeding ground for several fish species. Most of the fishes are 'euryhaline' i.e. they can tolerate a wide range of salinity. Besides providing an array of ecosystem services, the fishes of the region contribute to the livelihood and economy of the Sundarbans.

The most recognisable fish of the mangroves, the Mudskipper is often seen prancing around the mudflats chasing each other. Pictured is a Pearse's Mudskippers Periopthalmus novemradiatus (Hamilton, 1822).

A NEVERENDING LIST

Scientific interest in the fishes of the Sundarbans dates back to the early 1800s, when British Surgeon-Naturalist, Francis Hamilton worked upon the fishes of these brackish water zones. Since then, countless surveys have been conducted by scientists. Currently, there are an estimated 375 species of fishes that have been reported from the Indian Sundarbans.

***Prionobutismicrops* (Weber, 1907) an unusual fish related to the gobies from the Indian Sundarbans.**

The Silver Tigerfish *Datnioidespolota* (Hamilton, 1822) a perch like fish, highly valued for consumption and in the aquarium trade as well.

Juvenile *Atropusatropos* (Bloch & Schneider, 1801) from the Sundarbans. Juveniles of many pelagic marine fishes seek refuge in the Sundarbans.

Bar-tail flatheads *Platycephalus indicus* (Linnaeus, 1758) for sale in a wet market in the Sundarbans.

Acanthopagrus sp. and *Scatophagusargus* with spots (Hamilton, 1822) two perches from the Indian Sundarbans.

A large Slender giant moray, *Strophidonsathete* (Hamilton, 1822) found in the muddy estuaries of the Sundarbans.

An unusual looking fish, the Toadfish *Allenbatrachusgrunniens* (Hamilton, 1822) is also found in the Sundarbans.

Newly discovered *Omobranchussmithi* (Rao, 1974) from the Sundarbans by the author.

IMMINENT THREATS TO FISH DIVERSITY

Some critically endangered fish species like Largetooth sawfish, Pondicherry shark, Ganges river shark, Giant Grouper and Crocodile tooth pipefish call the Sundarbans their home. Though they are protected under the Wildlife Protection Act of India, 1972, some wet markets brazenly sell 'banned' fishes and the sellers are often unaware of their legal status.

Whitespotted Stingray (*Maculabatisgerrardi*) on a fisherman's boat in the Sundarbans. This species is listed as vulnerable in IUCN Red List.

Several species of endangered Guitarfishes has found in Sundarbans. Guitarfishes were enlisted in CITES only recently and are very poorly known and pictured a *Glaucostegus sp*. in the Sundarbans.

THE FUTURE

Imagine there are no fishes in the rivers of the Sundarbans, fishermen of the region dread such a day and say that a decade ago, things were not so bleak. Destructive fishing practices are the broad reason for the decline of fish abundance in the region. It is imperative to generate interest among people about the diversity of fishes in the region. This article hopes to do so and aspires to get people (scientists and other workers in the field) involved to come up with sustainable management plans for fishery resource that is found there. Scientific recommendations for consumption should be made available to the public (both fishermen & consumers).

A creek in the Sundarban. The net seen in the picture is to keep tigers in and fishers out. The decrease in fishes makes the fishermen often venture illegally.

About the author:

Priyankar Chakraborty has done his MSc in Wildlife Conservation Action from BVIEER in Pune, India and he is captivated about fish systematics and conservation of elasmobranchs. He currently works as an independent researcher.

TREES FOR LIFE: ROLE OF WOOD RESOURCES IN ARTISANAL LIVELIHOODS IN CHANNAPATNA, KARNATAKA

Samudyatha R[1] and Dhanya B[2]

[1]The University of Trans-Disciplinary Health Sciences and Technology, Bengaluru, India, samudyatha1096@gmail.com

[2]School of Development, Azim Premji University, Bengaluru, India, dhanya.b@apu.edu.in

Biodiversity underpins the multitude of benefits (ecosystem services) we derive from food, medicine and raw materials to habitat management and climate regulation in addition to various intangible benefits such as recreation, cultural and spiritual values (Millennium Ecosystem Assessment, 2005). Almost 1.6 billion of the world population is directly or indirectly dependent on diverse forest resources (IPBES, 2019). In India, Non-Timber Forest Produce (NTFPs) alone contributes to over one-fifth of cash income. Similarly, other fragile habitats like marine ecosystems and mangroves are crucial for livelihoods and economy as in the case of Africa where fishing itself contributes to 1.26% of country's total GDP. Despite the vital role that biodiversity plays in sustained well-being of humans, many drivers of human origin including habitat fragmentation, unsustainable resource use, large scale climate change have pushed biodiversity to irreversible tipping points of (Dasgupta, 2020). The latest UN report from the Inter-Governmental Science Policy Platform on Biodiversity and Ecosystem Services (IPBES) shows that over 2 billion people depend on wood resources for subsistence whereas the forest cover itself has witnessed 50% reduction from 1990 to 2015 (IPBES, 2019).

Millions of people throughout the world make extensive use of biological products that are harvested for both subsistence and commercial use, either regularly or as a fall back mechanism. These products add to peoples' livelihood security, especially in rural settings (Shackleton et al., 2007). Wood carving is one such natural resource dependent-livelihood means that supports several artisans and has immense cultural heritage value blending tradition and aesthetics. We studied the traditional wooden toy-making craft in the city of Channapatna in Karnataka that celebrates a native biological resource, 'ivory wood' and with a history that dates back to 1700s (Sengupta, 2019). Ivory wood (*Wrightia tinctoria sp.*) belongs to the Apocynaceae family and mostly distributed in dry-deciduous forests of India (Prajapati, 2010). In Channapatna this is a common agroforestry species in drylands that grows without any special care. The soft nature of

wood allows easy carving and the white colour takes up dyes easily, making them aesthetically attractive.

A sample of 23 artisans in Channapatna were interviewed to understand wood resource use in toy-making. Ivory wood was most preferred (used by 90% of artisans) due to its suitable carving properties and availability at cheaper prices. While teak wood (*Tectona grandis*) and rosewood (*Dalbergia latifolia*) are suitable alternatives, most of the artisan community, especially women artisans belonging to marginalised caste groups cannot afford such costly raw materials. Lack of alternative sources of income puts these artisans in vulnerable positions making the local availability of ivory wood crucial for the craft.

The utility of ivory trees was recorded from 20 tree-growing farmers in and around the city. While primary use of the tree remained to be toy-making, other uses of manure and firewood for domestic purposes, leaf fodder for livestock and medicinal uses from its bark were identified. Ivory trees are relatively slow growing species (Orwa, 2009) and regenerate through insect pollination and wind dispersal of seeds. It also coppices on harvest and requires little maintenance. In spite of holding great importance to artisans, ivory wood has received very little attention in terms of protection and management. Farmers sell the trees at throw away prices to middlemen who then supply the wood to artisans. Most farmers notice a decline in tree populations in local farmlands due to early harvesting for toy-making. Artisans also complained about local scarcity of wood, as a result of which they are forced to source it from other districts of Karnataka increasing the raw material costs. Trees are cut much earlier than their mature age (10-15 years) in order to meet the intense demands for toy industry with its trade reach all over India and abroad. Though the species is listed as an NTFP (Ramanagara District Census Handbook, 2011), management efforts have been poor. There is urgent need for the concerned institutions to step in to protect and promote the growth of the species through captive plantations. It is also important to ensure sustainable harvesting so as to maintain good populations of ivory trees and hold a steady supply to the industry. Assured prices to farmers will incentivise them to maintain the trees. The study highlights the need to recognise the role of natural resources and biodiversity for supporting sustainable rural livelihoods.

Ivory tree showing characteristic coppicing nature

Ivory tree in flowering season with opened pods ready for dispersal

Traditional hand lathe being used to carve out ivory wood.

A toy-making woman artisan belonging to a marginalised community in Channapatna city.

All the photographs have been taken during the field visits in and around Channapatna city.

References

1. Cunningham, A., Campbell, B., & Belcher, B. (2005). Carving out a future (pp. 1-5,11-27,103-119,199-268). Sterling, VA: Earthscan.
2. Interim Report, Dasgupta.P, (2020), Independent Review on the Economics of Biodiversity.
3. Karnataka State Handicraft Development Corporation Ltd. (KSHDC) (A Govt. of Karnataka Undertaking), 17th May 2019, http://cauverycrafts.com/about.html.

4. Millennium Ecosystem Assessment, M. E. A. (2005). Ecosystems and human well-being. *Synthesis*.
5. Orwa, C. (2009). Agroforestry Database: a tree reference and selection guide, version 4.0. http://www. world agroforestry. org/sites/treedbs/treedatabases. asp.
6. Pandey, N., Garg, A. K., Malhotra, R., & Pandey, D. N. (2007). Linking local knowledge to global markets: livelihoods improvement through woodcarving in India. World Development, 1-9.
7. Prajapati. R.C, 2010, "Biodiversity of Karnataka" At A Glance, Karnataka Biodiversity Board (Forest, Ecology and Environment Department, Government of Karnataka, 19th May 2019, http://www.indiaenvironmentportal.org.in/files/Biodiversity%20of%20Karnataka%20at%20a%20Glance_0.pdf
8. Ramanagara District Census Handbook, 2011, Village and Town Directory, Part XII-A, Series 30, Table 33, Part XII-B, Village and Town Wise Primary Census Abstract (PCA).
9. Sengupta, N. (2019). Traditional Knowledge in Manufacturing and Industry. In Traditional Knowledge in Modern India (pp. 105-125). Springer, New Delhi.
10. Shackleton, C., Shackleton, S., Buiten, E., & Bird, N. (2007). The importance of dry woodlands and forests in rural livelihoods and poverty alleviation in South Africa. Forest Policy and Economics, 9(5), 558-577. doi: 10.1016/j.forpol.2006.03.004
11. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), UN Report, (2019), Nature's Dangerous Decline 'Unprecedented'; Species Extinction Rates 'Accelerating.
12. http://img.teebweb.org/wp-content/uploads/2013/04/D0-Chapter-2-Biodiversity-ecosystems-and-ecosystem-services.pdf
13. http://www.cifor.org/publications/pdf_files/AReports/AR2004.pdf
14. http://www.teebweb.org/resources/ecosystem-services/
15. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/882222/The_Economics_of_Biodiversity_The_Dasgupta_Review_Interim_Report.pdf
16. https://www.annualreviews.org/doi/full/10.1146/annurev-resource-100815-095521
17. https://www.un.org/sustainabledevelopment/blog/2019/05/nature-decline-unprecedented-report/

THE CORONA PAUSE APPLIES TO ONLY ONE SPECIES – *HOMO SAPIENS*

Dr N Ganga Vidya and Prof Dr. A.R. Chandrasekaran
Email: gangavidya@gmail.com

Introduction

Human beings are interwoven into Biodiversity. It consists of ecosystem diversity, species diversity and genetic diversity. Currently the fabric of biodiversity with all its layers is going through an exotic wash at one go as though someone from the space put out a hand bundled the earth and chucked it into a giant size washing machine with COVID 19 as detergent. What will come out of this churn, how many would be carriers of the virus and how many victims? The puzzles are a plenty and unfigured yet.

As the population is on rise the probability to contract a virus, carry it and spread it is also on rise. A virus that finds a new carrier, can reach new ecosystem and population. But then this Corona virus thus far has not encountered animals, birds and plants on its own and forced any of the other species to join in with us in this destruction cycle. The truth is we will never be able to predict each next emerging virus or re-emergence of an old virus. Viruses from time to time and put a loaded gun straight on our forehead. It all happens before we finish batting our eyelids.

Here is a tracker of only the worldwide ones.

Globally we have gone into "Corona Pause". We can be sure by now since we have crossed 100 days that we don't have any other species from the family of animals or plants or birds suffering along with the species called Homo Sapiens. And if there were rampant deaths of plants or any other animals we would surely have been notified by nature. But that is not the case.

Timing the Pandemic

Time Magazine named its January 1989 (1), issue as "Endangered Earth" nominating Earth as the "Planet of the Year" instead of a person. The magazine devoted that complete issue only accusing climate change as the reason for Endangered Earth. Climate change seems to have always been thought as a more powerful threat than the direct work on self-annihilation done by

humans. In fact viruses are found in almost every ecosystem on Earth and are the most numerous type of biological entity. (2) Viruses have probably arisen numerous times in the past by one or more mechanisms. The origins of such viruses are unclear: some may have evolved from plasmids—pieces of DNA that can move between cells—while others may have evolved from bacteria. It seems unlikely that all currently known viruses have a common ancestor. Thus we can see that viruses are much much more powerful than the climate change when it comes to annihilation – complete destruction of a targeted species.

A miniscule of a bio tussle called COVID-19 weighing 0.85 attograms (10^{-18} grams) which is about one millionth of a trillion grams slithers into our body. 0.0000005 grams are required to make one-person sick that is ~70 billion viruses. It is using the growth formula $A= P (1+ r)^{n.}$ We now compute the rate of growth $\{1+ 1/ (365\text{days } 24 \text{ hours } 60 \text{ seconds})\}^{(365*24*60)}$ and it turns out to be equal to 2.71828 and lo and behold it is "**e**". So, we know it is exponential growth. So that one bullet fired multiplies and spreads just little slower than light.

Till date across 212 countries 2 million plus Homo sapiens have been fired into. Which means with just ½ half gram as the limits of exponential function is ½ for $0 > a > 1$ of ammunition a life form so small will be able to take on infinite (∞) pieces of mankind. This could be the most pessimistic calculation.

On the timeline of biodiversity, it is an insignificantly small period when we human beings have currently gone into a forced pause on time. But for the mankind it has been a repeated step. We have come across this kind of bullet being fired many a times before but we never learnt our lessons and found "Prevention" as a method yet.

World over all countries, all markets, all products, all industries, have had a pause of not a day, not a week, not even just a month, but almost 3 months or one quarter of a business year. The observers of the biodiversity, observers of planet earth, market observers are searching century old patterns to see if there are any old lessons. Everyone can obviously see the turning point, inflex, watershed, landmark, critical point, kairotic in all very decisive.

But then we if we noticed something there have been no stop on any natural activity. In fact the complete biodiversity has not stopped any of its activity of the ecosystem, species nor even

genetics. Yes, including human babies are taking birth globally. None of those natural activities has come to halt. Only all MAN-MADE activity HAVE HALTED. We the humans have chosen this time of extinction as we choose to weaken not only our body and reduce its immunity but also have weakened the very species Homo Sapiens.

The Corona Pause Applied on Biodiversity

The Corona Pause is on all the human activities that threaten the Biodiversity. Please see we did not come to this pause willingly. CORONA brought us to this pause On the 100th day we are at two hundred and seventy seven thousand (2, 77,007 source worldometers.in) and still counting only humans…. We don't know if all those animals which, came to the human zones now evacuated by lockdown will lead to the death of those animals. Or have Homo sapiens finally lost immunity of all sorts and live only on vaccines. If so we ought not to be proud of being species with higher skills then all the rest on planet earth. As they are all able to survive all viruses this far and we are busy becoming extinct species.

Cretaceous period the time when Dinosaurs walked this Earth lasted from 135 million BC to 65 million BC which was around 70 million years during which the slow extinction of dinosaurs happened. Over many lifetimes later it is generally thought that the extinction of dinosaurs was caused by the impact of a massive comet or asteroid, which devastated the global environment, mainly through a lingering impact winter, which halted photosynthesis in plants and plankton.

But then this time there is no comet coming as an excuse. The human beings may have Endangered Earth but they surely have endangered themselves. We don't have to be surprised that we won't need 70 million years to vanish from the face of the Earth.

It is well observed that wherever humans inhabit automatically plants and animals and other species move out and make that zone biodiversity poor lacking species richness. Some days back during the lockdown we saw a video across all continents and countries wherein all the animal species came out into those human inhabited areas. From Albatross to the Zebra all first in their life time experiencing a different calm and clear earth, filtered air with almost zero human generated pollution, and lesser work for the Biological Oxygen Demand (BOD) of the water bodies to break down organic matter.

The human population growth and resource utilization never follow patterns of natural laws. They follow the laws of greed. Humans have made all efforts on elongation of life of both man and resources. Resource utilization on the whole has increased by the laws of multiplication of greed. The wealthy, the middle and the poor all class has simply moved parallel on the same percentage. Which means. The world's wealthiest 16 % on Earth use the world's 80% of the resources and continuously keep on doing so. WHO Director-General Dr Tedros Adhanom Ghebreyesus on 8th May 2020 (3) said and here we quote "On May 8 1980, the World Health Assembly confirmed the eradication of smallpox, marking the end of a disease that had plagued humanity for at least 3000 years, killing 300 million people in the 20th century alone. Smallpox eradication was only possible because of a safe and effective vaccine, administered to half a billion.in a 10-year global effort, spearheaded by World Health Organization. Many of the basic public health tools that were used successfully then (meaning during small pox) are the same tools that have been used to respond to Ebola, and to COVID-19: disease surveillance, case finding, contact tracing, and mass communication campaigns to inform affected populations. "It is very surprising and sad that no one is discussing or bringing up action towards building a STRONG HUMAN IMMUNO SYSTEM.

Conclusion

The timing of the Pandemic is pure human creation and we cannot fix it on any one or anything. The Corona pause is for us to understand that minimalism and frugal are the best preventive care. The COVID-19 lesson is that we OUGHT NOT TO GO BACK TO THE LIFE THAT WE LIVED THUS FAR. We ought to do everything of our everyday life differently. Otherwise we will be happily pressing the accelerator to human extinction. You may ask what is doing differently? It may seem very immature but strangely it all boils down to stop thinking/ studying and dreaming to satisfy our greed. Just be self-sufficient, happy interdependent animals caring for basic needs and not bloom into resource usurping machines. This paper pins all fault on the education system as we animals are supposed to be the highest and most intelligent form of species. But all we seem to learn and exchange is sadly greed, and subconsciously translate it all into misuse of resources, and under valuing lives and livelihoods. The current style of education pollutes the mind, heart and soul and finally the entire Earth with what is all within in it. People are busy discussing economic losses, as we cannot see the lives saved are priceless.

The Corona Pause makes us ask questions

1. What are all necessary what are luxury and how much is sufficient?
2. How do we minimise waste of all resources including time?
3. When is the right time to move out?
4. Where is the virus and How to live along with the virus?
5. Why they (who died), Does anyone know when is my turn (to be infected)

As from our previous lessons, viruses are born without origin and without ancestors and when they enter a living cell they multiply as an exponential function. They are omnipotent omniscient and omnipresent. They are the deciding factors of plants and animals' existence. As we approach May 22nd the Biodiversity day we should change our slogan from "Stay Safe Stay healthy" and say "Stay Minimal Stay Frugal Stay Healthy". We should learn to exist along with the corona and the corona carriers. As it is inevitable new sleeping cells COVID 19 carrier Homo sapiens. The best solution before the vaccine arrives is for us to stay dormant. The longer we stay dormant the slower is our reach to annihilation. Once we come out of this giant washing machine, we surely know that we will not be bio clean rid of this virus but we will only be reduced in the count of our species. We are the only ones allowing our body to be used for multiplying the virus hence we ought to borrow immunity vaccines from plants and animals. The vaccine may even be like the snake anti venom which comes from the snake venom itself. You never know it could come from the human being itself. After all one man's poison can be the cure for another. Hence may be we ought to develop the VACCINE FROM AFFECTED COVID-19 patients themselves.

References

- http://content.time.com/time/subscriber/article/0,33009,956627-2,00.html
- https://en.wikipedia.org/wiki/Virus
- https://www.who.int/emergencies/diseases/novel-coronavirus-2019/events-as-they-happen
  https://en.wikipedia.org/wiki/List_of_epidemics

Authors *both are development sector consultants.*
Dr ***N Ganga Vidya****, Co-author Sustainability Sciences Course IGNOU gangavidya@gmail.com*
Prof ***Dr. A.R. Chandrasekaran****, Formerly Principal Investigator-SRM University*
chandru51@gmail.com

RECENT INITIATIVES BY VOICE OF ENVIRONMENT

Initiative for Umanada Island (The Smallest River Island of World) Biodiversity Conservation by Voice of Environment

Green drive in Umananda to bring back golden langurs

Kangkan.Kalita1
@timesgroup.com

Guwahati: In an effort to protect the biodiversity of Umananda island in the Brahmaputra and make it habitable for the rare golden langur, environmentalists in Guwahati have started a plantation drive in the zone.

Voice of Environment (VoE), a youth environmental organisation, has been planting fruit-bearing plants to bring back one of the most endangered primate species to the peacock island from where the last surviving pair of golden langurs were shifted to the Assam state zoo following persisting environmental threats.

Environmentalist Moharana Choudhury of VoE said the organisation was taking steps to protect the riverine island. "We are planting fruit-laden trees to enhance food reserves for animals and birds on this peacock island. We have been working in three major iconic heritage sites — Maa Kamakhya, Basistha and Umananda temple in Guwahati — to make these areas clean and plastic-free."

Voice of Environment has signed an MoU with Umananda Temple Trust to create awareness among people to make the area plastic-free

VoE also signed an MoU with the Umananda Temple Trust to create awareness among people to make the area plastic-free. "Last year, the last pair of golden langurs in Umananda were taken away to the Assam state zoo as their survival was getting threatened here. Besides shortage of fruits, pollution caused by waste materials added to the threat. The zoo authorities had promised to return the langurs if the island was made habitable for them again," said head priest and secretary of Umanada Develaya Parichalona Samiti (temple authority) Anil Bhattacharya.

ভইচ অৰ এনভাইৰনমেণ্টৰ উদ্যোগত স্বচ্ছ ভাৰত অভিযান

ঐতিহাসিক উমানন্দ দেৱালয়ত গছপুলি ৰোপণ কার্যসূচী সম্পন্ন

মহানগৰ বার্তা, ১৬ ফেব্রুৱাৰী ঃ আজি উমানন্দ দেৱালয় প্রাংগণত 'voice of enviornment' নামৰ পৰিৱেশ বিষয়ৰ স্বেচ্ছাসেৱী সংগঠনে এলানি স্বচ্ছতামূলক আৰু ফলমূলৰ বৃক্ষ ৰোপণৰ কার্যসূচী অনুষ্ঠিত কৰে। আৰম্ভণিতে উমানন্দ দেৱালয়ৰ সম্পাদক অনিল ভট্টাচার্যই বৃক্ষৰোপণৰ কার্যসূচী আৰম্ভ কৰে। লগতে সংগঠনটোৰ সদস্যসকলেও এই কার্যসূচীত অংশগ্রহণ কৰে। ভাস্কৰ হাজৰিকা, মহাৰাণা চৌধুৰী, পার্থ ধৰ, নলীনাক্ষ চমুৱা, দেৱপাম পুৰকায়স্থ আৰু সবিতা দত্তৰ লগতে অৱসৰ প্রাপ্ত আৰক্ষী গিৰীশ কটকীদেৱে বৃক্ষৰোপণ কৰে। 'উমানন্দ' পৃথিৱীৰ আটাইতকৈ ক্ষুদ্র নদীদ্বীপ, য'ত প্রতিদিনে হাজাৰ হাজাৰ পর্যটক তথা তীর্থযাত্রীয়ে মন্দিৰ দর্শন আৰু নৈসর্গিক শোভা উপভোগ কৰিবলৈ আহে। সেইবাবে এই মন্দিৰৰ চৌপাশ পৰিষ্কাৰ-পৰিচ্ছন্ন কৰি ৰখাটো আমাৰ প্রধান উদ্দেশ্য আৰু সেই উদ্দেশ্য আগত ৰাখি আজি 'voice of enviornment'-য়ে এক সজাগতামূলক স্বচ্ছ অভিযান চলায় আৰু প্লাষ্টিকমুক্ত উমানন্দৰ বাবে ৰাইজক আহ্বান জনায়। উমানন্দৰ এক বিশেষ

আকর্ষণ 'সোণালী বান্দৰ' বর্তমান লুপ্ত হৈছে। তাৰ বাবে ফলমূলৰ বৃক্ষৰোপণৰ জৰিয়তে আকৌ সেই আপুৰুগীয়া সোণালী বান্দৰৰ বাসোপযোগী স্থান হিচাপে গঢ়ি তুলিবলৈ প্রচেষ্টা হাতত লোৱা হয়। সংগঠনটোৱে এই ধৰণৰ সজাগতা অনুষ্ঠান সময়ে সময়ে অনুষ্ঠিত কৰি আহিছে। উমানন্দ নদীদ্বীপক এক স্বচ্ছ আৰু জৈৱ বৈচিত্র্যপূর্ণ ঐতিহাসিক স্থান হিচাপে অসম তথা ভাৰতবর্ষৰ লগতে সমগ্র বিশ্বত বিখ্যাত কৰি তুলিবলৈ এক প্রয়াস হিচাপে স্বচ্ছতা অভিযান আৰু বৃক্ষৰোপণ কার্যসূচী লোৱা হয়।

Cleanliness and plantation drive at Umanada island

CHRONICLE NEWS SERVICE

GUWAHATI: Voice of Environment (A Youth Environmental Organization) conducted a cleanliness & plantation drive for an eco-friendly sustainable & plastic free Umananda Island by generating a mass awareness to build the heritage site a clean & sustainable eco-friendly premise. Umananda temple is one of the highest visiting devotee's destinations after Maa Kamakhya Temple in Guwahati & it is a challenge to generate awareness minimizing the amount of single-use-plastics being traded inside the premise of the temple. This is part of the smaller steps taking a bigger leap for protecting this riverine island comprising an abundant biodiversity.

Umananda Island is one of such astonishing ecotourism & cultural destinations in the heart & core of the State Capital of Assam which symbolizes braided stream of mighty Brahmaputra & the rarest ecological landscape. Voice of Environment, a frontrunner Guwahati based Environmental Organization has been working continuously on ecology, biodiversity & risk assessment of this smallest river island. Voice of Environment has signed a Memorandum of Understanding/MoU with Chief Doloi/Secretary, of Umananda Temple trust committee to create a plastic free premise, an inclusive effort to beat plastic pollution & protect some wonderful native biodiversity in the fragile ecosystem including the rare species of Golden Langur/Trachypithecus geei. A Plantation Drive with fruit bearing plants started at Temple premise by the Head priest and Secretary Umanada Develaya Parichalona Samiti (Temple Authority) Shri Anil Bhattacharya, Nalinakshya Chamuah VoE Member, and Environmentalist Moharana Choudhury.

Afterwards a signature campaign and interaction session for biodiversity and Cleanliness aspects with devotees and visitors led by Bhaskar Hazarika and Sabita Dutta(VoE Member). The team also contacted a cleanliness drive at Umananda Island by collecting the plastic waste items lead by Partha Dhar and Bhaskar Hazarika, Debopam Purkayastha and Senior Member as Shri Girish Kotoki.

Kumar Deepak, Environment Officer, United Nations Development Programme in a message states, Umananda Island features one of the smallest river islands having not only a cultural emblem of the State of Assam but it comprises a rich ecosystem & biodiversity including a remarkable infrastructure of ecosystem based disaster risk reduction. We need to work on protecting island ecology & its biodiversity vulnerable to climate change. Mitigating single-use-plastics is a key challenge to make tourism sustainable & mindful." Environmental Activist Moharana Choudhury talks of in brief about Voice of Environment's leading campaign on mitigating plastics from significant temple sites. We are inching forward to become a zero-plastic zone by the end of the year. We have been working in three major iconic heritage sites viz; Maa Kamakhya, Basistha & Umananda in Guwahati to make it clean & plastic free. These iconic are situated on hills & river-island comprising a fragile ecosystem with distinct species & biodiversity. Everyday thousands of devotees visit to all three destinations carrying out tons of single-use-plastic everyday which is alarming to their respective ecosystem. We are conducting regular awareness drive to mitigate single-use-plastic. Our efforts are bringing a paradigm shift. Last year Maa Kamakhya Temple bagged 'Swachh Iconic Temples' under Swachh Bharat Mission. We are fortunate to be a small part of such prestigious moment. Voice of Environment shall send a proposal to the Government of Assam for installing metal hoardings & small boards passing out bold messages to avoid single-use-plastics within the premise of Umananda Temple. Chief Doloi pledged us to inform the State Government to install recycle bins at different points on the island. Single-use-plastics must be mitigated & it could happen only with the support of the Government, temple authority, devotees, vendors & local community. We are planting fruit trees to enhance food reserves for animals & birds on this peacock islands so that food scarcity would be avoided in near future said Mr. Choudhury. Voice of Environment and the team is thankful to Environment and Forest Department Assam for providing the saplings especially to Dr. C. Muthu Kumarvel, IFS, CCF for his support, guidance and encouragement for this initiative. Team is working to create the site as eco-friendly and sustainable tourist destination in the country and in the region.

The Telegraph
online edition

Home Opinion India States World Bu

North East

Bid to make island temple plastic-free

Mass awareness generated to make the heritage site clean, eco-friendly and sustainable

By Satananda Bhattacharjee in Hailakandi

Published 17.02.20, 12:04 AM • Updated 17.02.20, 12:04 AM

Get Notifications

Volunteers take part in the campaign at Umananda island
Picture by Satananda Bhattacharjee

cleanliness and plantation drive was

Tweet

Republic
@republic

In Assam, cleanliness & plantation drive held at world's smallest river island - Umananda

In Assam, cleanliness & plantation drive held at world's smallest river island - Umananda -...
republicworld.com

17:21 · 17 Feb 20 · Republicworld

8 Retweets 55 Likes


প্রদূষণমুক্ত উমানন্দ
সকলোবে আনন্দ


REDMI NOTE 7 PRO
AI DUAL CAMERA


হনুমান মন্দিরলৈ
TO HANUMAN MANDIR
Say No To Single Use Plastic
#Beat Plastic Pollution
UMANANDA, The Heart of Brahmaputra
CLEAN UMANANDA SAVE UMANANDA
Let's create together "Clean and Green Umananda Island" #VoE
"CLEANLINESS IS NEXT TO GODLINESS"
CLEAN UMANANDA SAVE UMANANDA
PAPER BAGS & BILLS CARRY CHARGES.

Voice of Environment (A Youth Environmental Organization) conducted cleanliness & plantation drive for an eco-friendly sustainable & plastic-free Umananda Island by generating a mass awareness to build the heritage site a clean & sustainable eco-friendly premise. Umananda temple is one of the highest visiting devotee's destinations after **Maa Kamakhya Temple in Guwahati** & it is a challenge to generate awareness minimizing the number of **single-use-plastics** being trading inside the premise of the temple. This situation is part of the smaller steps taking a more significant leap for protecting this riverine island comprising abundant **biodiversity**. Umananda Island is one of such astonishing **ecotourism & cultural destinations** in the heart & core of the State **Capital of Assam**, which symbolizes braided stream of the mighty **Brahmaputra** & the rarest ecological landscape. Voice of Environment, a frontrunner Guwahati based Environmental Organization, has been working continuously on ecology, biodiversity & risk assessment of this smallest river island. Voice of Environment has signed a ***Memorandum of Understanding/MoU*** with **Chief Doloi/Secretary**, of Umananda Temple trust committee to create a plastic-free premise, an inclusive effort to beat plastic pollution & protect some incredible native biodiversity in the fragile ecosystem including the rare species of **Golden Langur/*Trachypithecusgeei***. **A Plantation Drive** with fruit-bearing plants started at Temple premise by the Head Priest and Secretary Umanada Develaya Parichalona Samiti (Temple Authority) **Shri Anil Bhattacharya**, **Nalinakshya Chamuah VoE** Member, and **Environmentalist Moharana Choudhury**. Afterward, a signature campaign, interaction session for biodiversity and Cleanliness aspects with devotees and visitors led by **Bhaskar Hazarika and Sabita Dutta (VoE Member)**. The team also contacted a cleanliness drive at Umananda Island by collecting the plastic waste items lead by **Partha Dhar and Bhaskar Hazarika, Debopam Purkayastha,** and Senior Member as **Shri Girish Kotoki**.

Environmentalist Moharana Choudhury talks of in brief about **Voice of Environment's** leading campaign on mitigating plastics from significant temple sites. We are inching forward to become a zero-plastic zone by the end of the year. We have been working in three major iconic heritage sites viz; **Maa Kamakhya temple, Basistha Temple & Umananda**

Island in Guwahati to make it clean & plastic-free. This iconic island situated on hills & river-island, comprising a fragile ecosystem with distinct species & biodiversity.
Every day thousands of devotees visit all three destinations carrying out tons of single-use-plastic every day, which is alarming to their respective ecosystem. We are conducting regular awareness drive to mitigate single-use-plastic. Our efforts are bringing a paradigm shift. Last year Maa Kamakhya Temple bagged **'Swachh Iconic Places' under Swachh Bharat Mission Phase- 2019 at Vigyan Bhawan in New Delhi by Honorable President of India.** We are fortunate to be a small part of such a prestigious moment. We are planting fruit trees to enhance food reserves for animals & birds on this peacock islands so that food scarcity would avoid shortly said, **Environmentalist Choudhury**. **Voice of Environment** and the team is thankful to **the Environment and Forest Department Assam** for providing the saplings, especially to **Dr. C. Muthu Kumarvel, IFS, CCF** for his support, guidance, and encouragement for this initiative. The team is working to create the site, an eco-friendly and sustainable tourist destination in the country and the region.

Wetland Biodiversity Day 2020 celebration
At DeeporBeel, Guwahati by Voice of Environment


WORLD WETLAND DAY
AT
DEEPOR BEEL, 2ND FEB, 2020
"দীপৰ বিল সংৰক্ষণৰ সজাগতা"
An Initiative by: "VOICE OF ENVIRONMENT"

Voice of Environment (A Youth Environmental Organization) organized an event **'Wetland Day for Biodiversity'** to commemorate this year's World Wetlands Day 2020 on February 2, Sunday at one of the **Ramsar Sites** of **'Wetlands of International Importance'** in Guwahati. **Voice of Environment,** hosted a day program in collaboration with **the Environment & Forest Department, Assam, Department of Environmental Science, Royal Global University, Guwahati, and Colours of North-Eastern India**. The program commenced with interactive dialogue on wetlands & biodiversity and followed by a series of events having a community walk conducted and led by **Partha Sarathi Dhar** and **Bhaskar Hazarika**. The introductory speech was given on Wetland and Biodiversity by **Dr. Ritusmita Goswami** and **Dr. Queen Sarma and followed** by this session a photo competition, distribution of information broachers on biodiversity aspects to school students and others. A discussion session has conducted with students and locals, especially with the picnic teams near DeeporBeel.

It has undertaken regarding its cleanliness, and ecological importance, which was led by **Nalinakshya Chamuah** from **IIE Guwahati,** followed by a signature campaign led by Environmentalist **Moharana Choudhury** end up a productive day at Deepor Beel, the lifeline of the Smart City Guwahati. Student representatives such as **Shuvendhu Khan** and **Aref Abdal** from **TISS Guwahati** led the bird watching session. The Commitment of Parties to the Ramsar Convention designating Ramsar sites, wetlands of International importance to conserve & wisely use all their wetlands is critical in achieving the **Sustainable Development Goals**."

During the event Senior Wildlife Warden **P.K Saharia, AFS**, **G.N Borah, AFS Range Forest Officer** Deepor Beel under the **Guwahati Wildlife Division** along with other forest department officials were present. The meeting at the end has discussed Deepor Beel and its biodiversity aspect and appreciated the team's initiative.

Every year February 2 is celebrated as World Wetlands Day to raise international awareness about the significant role of wetlands for people & our planet. This day earmarks the date of adoption of the Ramsar Convention on Wetlands of International Importance' in 1971. **Currently, India has 37 Ramsar designated wetlands of international importance**. This year's theme for World Wetlands Day is '**Wetlands & Biodiversity.'**

Wetlands are pertinent for our wellbeing, inclusive economic growth & climate mitigation & adaptation. They are the most significant source of freshwater for our consumption, agriculture, and maintaining our groundwater table by naturally recharging and filtering it. They act as a natural water sink. They are the most significant terrestrial ecosystem for carbon sequestration & working as a natural systematic carbon sink system. They act as an **'Ecosystem System Based Disaster Risk Reduction'** structure protecting shores and providing cities and settlements with a safe and climate-resilient prospect. They provide sustainable livelihoods for the community welfare and offer a healthy ecosystem for exploring multiple ecosystem services and benefits in parallel to abundant biodiversities, such as ecological systems support. These low-cost **EcoDRR** structures provide not only community resilience against water-related risks but enabling communities to provide multiple ecosystem services better. Wetlands serve as upstream retention basins protecting downstream cities from flood risk.

Wetland Day for Biodiversity observed at Deepor Beel

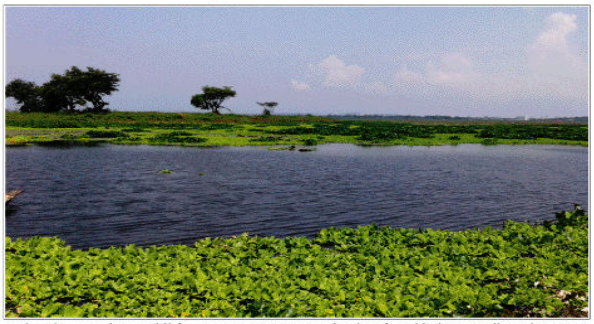
CHRONICLE NEWS SERVICE

GUWAHATI: Voice of Environment (A Youth Environmental Organization) organized an event 'Wetland Day for Biodiversity' to commemorate this year's World Wetlands Day 2020 on February 2nd, Sunday at one of the Ramsar Sites of 'Wetlands of International Importance' in Guwahati. Voice of Environment hosted one day programme in collaboration with Environment & Forest Department, Assam, Department of Environmenal Science, Royal Global University, Guwahati and Colours of North-Eastern India. The programme commenced with an interactive dialogue on wetlands & biodiversity & thereafter followed by a series of events having a community walk conducted and led by Partha Sarathi Dhar and Bhaskar Hazarika.

Introductory speech on Wetland and Biodiversity by Dr. Ritusmita Goswami and Dr. Queen Sarma, photo competition, distribution of information broachers on biodiversity aspects, a brief session of discussion with students & locals especially with the picnic teams who were near to Deepor Beel regarding its cleanliness and ecological importance which was led by Nalinakshya Chamuah from IIE Guwahati followed by a signature campaign led by Environmentalist Moharana Choudhury to end up a productive day at Deepar Beel, the lifeline of the Smart City Guwahati. During the event student representatives as Shuvendhu Khan and Aref Abdal from TISS Guwahati led the bird watching session.

Kumar Deepak, Environment Officer, United Nations Development Programme in a message stated, "Assam Government should work on strengthening wetlands governance in the State. Wetlands provide a wide range of natural capital flow in terms ecosystem services for the life & livelihood of people & community. The Commitment of Parties to the Ramsar Convention designating Ramsar sites, wetlands of International importance to conserve & wisely use all their wetlands is critical in achieving the Sustainable Development Goals."

During the event Senior Wildlife Warden P.K Saharia, AFS, G.N Borah, AFS Range Forest Officer Deepor Beel



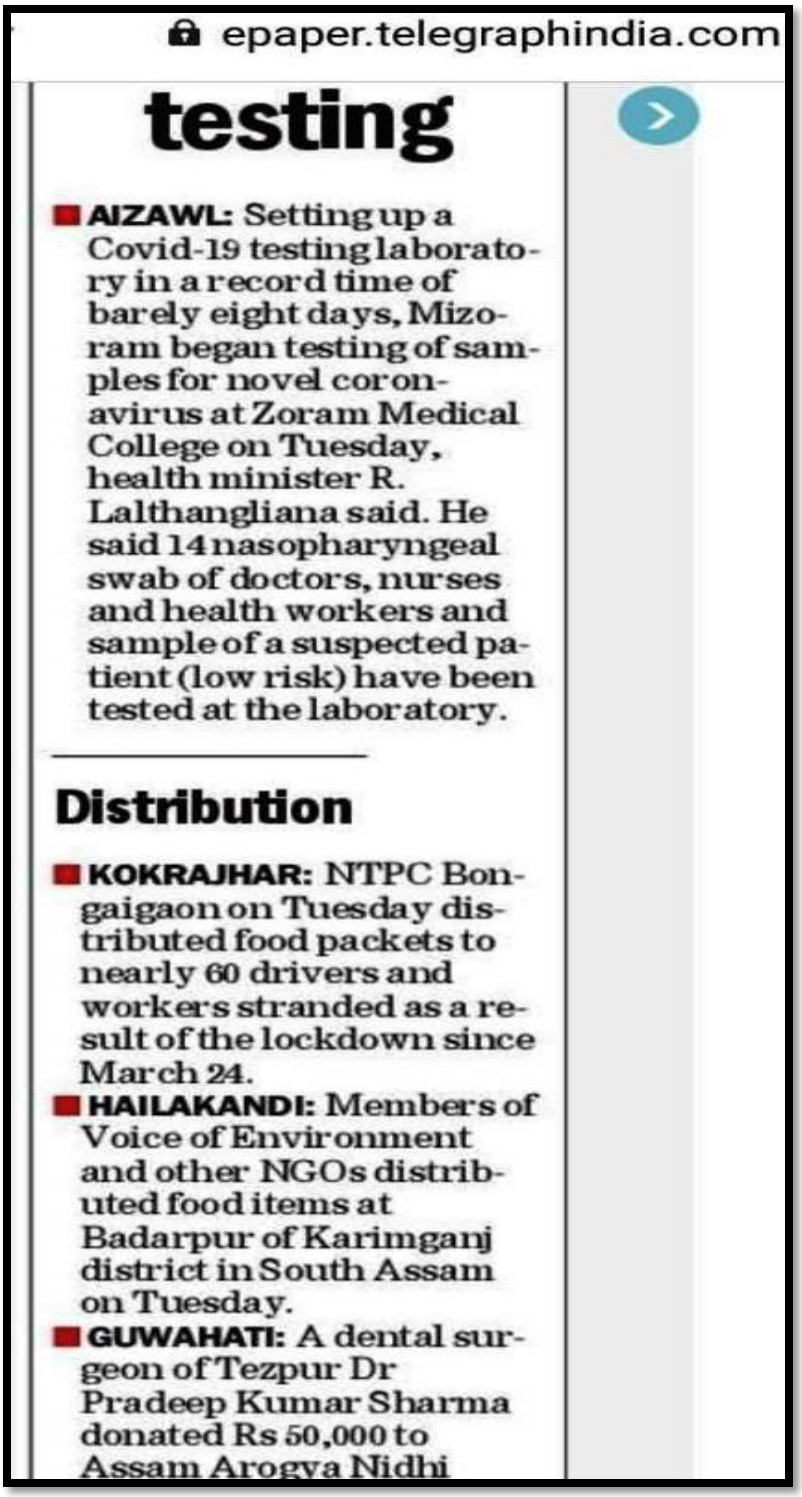
under the Guawhati Wildlife Division along with other forest department officials were present in the meeting at the end they have discussed about Deepor Beel and its biodiversity aspect and also appreciated the initiative by the team.

Every year February 2 is celebrated as 'World Wetlands Day' to raise international awareness about the significant role of wetlands for people & our planet. This day earmarks the date of adoption of Ramsar Convention on Wetlands of International Importance' in 1971.Currently India has 37 Ramsar designated wetlands of international importance. This year's theme for the World Wetlands Day is 'Wetlands & Biodiversity'.

Wetlands are pertinent for our wellbeing, inclusive economic growth & climate mitigation & adaptation. They are the biggest source of fresh water for our consumption, agriculture & maintaining our ground water table by naturally recharging & filtering it. They act as a natural water sink. They are the biggest terrestrial ecosystem for carbon sequestration & acting as a natural systematic carbon sink system. They act as an 'Ecosystem System Based Disaster Risk Reduction' structure protecting shores & providing cities & settlements a safe & climate resilient prospect. They provide sustainable livelihoods for the community welfare & offer a healthy ecosystem for exploring multiple ecosystem services & benefits in parallel to abundant biodiversity such ecological systems support. These low cost EcoDRR structure provide not only community resilient against water related risks but enabling communities to better adapt to climate change, & provide multiple ecosystem services. Wetlands serve as upstream retention basins protecting downstream cities from flood risk.

Voice of Environment shall submit a detailed pledge paper to the State Government for sending proposal to Ramsar Committee for designating Sonbeel as a Ramsar Site. Our Pledge Paper shall cover an integrated plan of capacity building to create community, schools, universities etc. informed about the comprehensive role of wetlands in creating a water surplus future. Voice of Environment shall organize series of programmes this month to raise voice about the role of Deepar Beel for a smart & sustainable Guwahati City. We are pledging the State Government to revive & rejuvenate Borsola Beel, Xorusola Beel & Silsaku wetlands in the Guwahati city.

Support to Community during the Global COVID-19 Crisis



epaper.telegraphindia.com

testing

AIZAWL: Setting up a Covid-19 testing laboratory in a record time of barely eight days, Mizoram began testing of samples for novel coronavirus at Zoram Medical College on Tuesday, health minister R. Lalthangliana said. He said 14 nasopharyngeal swab of doctors, nurses and health workers and sample of a suspected patient (low risk) have been tested at the laboratory.

Distribution

KOKRAJHAR: NTPC Bongaigaon on Tuesday distributed food packets to nearly 60 drivers and workers stranded as a result of the lockdown since March 24.

HAILAKANDI: Members of Voice of Environment and other NGOs distributed food items at Badarpur of Karimganj district in South Assam on Tuesday.

GUWAHATI: A dental surgeon of Tezpur Dr Pradeep Kumar Sharma donated Rs 50,000 to Assam Arogya Nidhi

CHRONICLE NEWS SERVICE

BADARPUR : Voice of Environment (Youth Environmental Organisation) in association with Wings of Youth and Anurtha extended their helping hands towards the needy people at Badarpur in Cachar district. They distributed food items, mainly grocery essential items among the needy people. It was led by Gaurab Roy, an active member of Voice of Environment.

A total number of seven members of these three NGOs were present. They abided by the rules and regulations while distribution these food items. They visited door to door to distribute the items.

The team tried to reach around 70 families at different places at Badarpur town. The members maintained proper hygiene and social distancing norms while distributing the goods, as directed by government. The team also conveyed the family members to stay at home, not to go outside except under extraordinary circumstances.

They distributed rice (2.5 kgs), pulses (500 gms), oil (200 ml), soya bean (100 gms), biscuit (1 packet), potato (1 kg), haldi, chilli, jeera powder (1 packet each) and puffed rice (muri - 200 gms) to each family.

www.indigenousherald.com

Indigenousherald

Face of Northeast India

Estd. 2006

Voice of Environment distributes food items

PR / IH Desk

GUWAHATI, April 07, 2020: COVID-19 appeared in the shape of pandemic and spreading rapidly globally, therefore, Govt. of India declared Lockdown to save our citizens from this pathetic situation caused due to deadly CORONA Virus. It is true that due to

The Assam Tribune

Search | Past Week

Guwahati, Tuesday, April 14, 2020

Today's Edition | Main | Weather | Backissues | Epaper | Dainik Asam | Videos | Contact Us

Silchar gurudwara, bank associations, NGOs distribute food items during lockdown

STAFF CORRESPONDENT

SILCHAR, April 14: Gurudwara Sri Guru Singh Sabha Silchar, a Sikh sangat, offered prayers on the occasion of Baisakhi to save the entire world from the coronavirus (COVID-19) pandemic.

Sandip Singh Walia, a member of the Gurudwara, informed that a langar was prepared for 230 people at the gurudwara kitchen and along with Aabeg NGO, the food packets were taken for distribution to people at Bishfuti, Krishnanagar areas of the town.

Meanwhile, Babul Hore, president of District Sports Association Silchar, informed that they have handed over food items 60 players from different sports.

Members of the Assam Provincial Bank Employees' Association, Cachar district committee, also reached out to provide assistance to the people during the lockdown.

Association district secretary Dhiranjan Bhattacharjee informed that 200 packets of essential food items were distributed in Kali Bari char adjacent to Janiganj here.

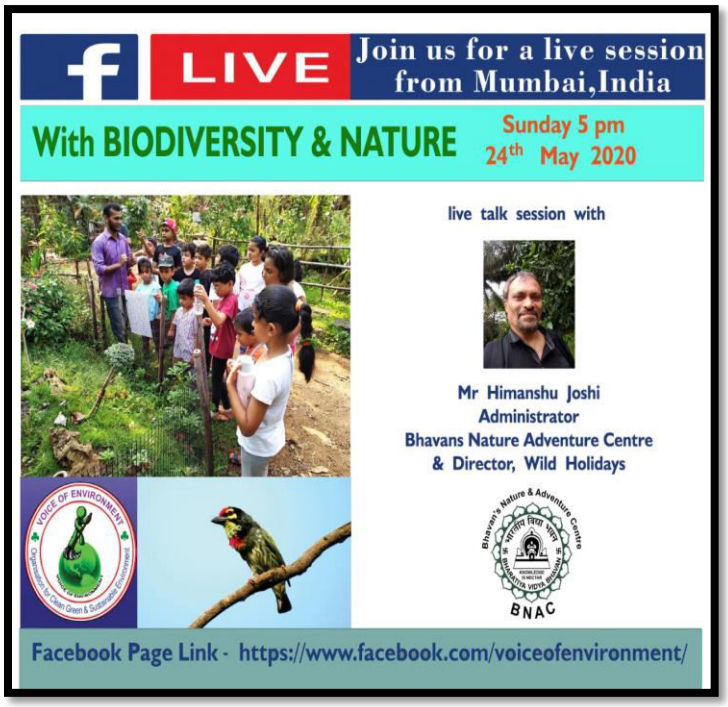
NGO Voice of Environment in association with 'Wings of Youth' and 'Anurtha' extended their helping hands towards the needy people by distributing essential food items door-to-door at Badarpur. Gaurab Roy, a member of the NGO, said they reached out to around 70 families with food packets.

ONLINE LIVE TALK SESSION BY EMINENT EXPERT SPEAKER

Dr. Dipankar Saha

Dr. Vinaya Kumar Sethi

Mr. Himanshu Prem Joshi



https://twitter.com/voiceofenviron

www.voiceofenvironment.org

https://www.facebook.com/Voiceofenvironment/

YouTube

https://www.youtube.com/channel/UCW-1arDauhriUt3lApBC8ZQ

https://in.linkedin.com/in/voice-of-environment-voe-511821b7#: