

Vasundhara

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THE SIXTH EXTINCTION

EXPLORING THE UNPRECEDENTED DECLINE OF NATURE AND ITS SPECIES



EXCLUSIVE: INTERVIEW WITH
PURNIMA DEVI BARMAN

When superstition leads to
extinction, the only species left to
blame is humanity.
Hargilla (Stork) of Assam, India

Eco-Club TERISAS brings to you "The Sixth Extinction", the fifth issue of Vasundhara magazine, on the theme biodiversity and climate change. This is a free and creative initiative to educate young minds about the ongoing events in this field. The information in the magazine is for general use only and has been compiled from various research papers/articles/government databases. Some personal experiences and anecdotes have also been shared for which we extend our sincere gratitude to the contributors.

The information given in this edition is accurate to the best of our knowledge as of 17th March and we apologize for any inadvertent errors that may exist.

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In This Issue

Editor's Note	4
India's Environmental Commitments: <i>Everything You Need To Know</i>	5
Climate Change and Disease	6
Zoonotic Diseases and Biodiversity	7
The Battle For Belonging: <i>A Case Study of Mollem, Goa</i>	8
Decoding How Your Next Meal Can Help Save The Planet	9
At War With Wetlands	10
Kadar's: <i>Leading The Environmental Cause</i>	12
The Role of Individuals in <i>Conserving Biodiversity</i>	13
Where The Wild Things Were	14
Superstition Led Extinction: <i>Interview with Mrs. Purnima Barman</i>	16
Lost Paradise	18
The Science of Biodiversity and Conservation @TERISAS	21
Pre/ConServe: <i>Interview with Mr. Rituraj Phukan</i>	22
The Big Debate: <i>Economic Developments v/s Environmental Conservation</i>	24
Silenced Voices of Indigenous Communities: <i>Chamoli Tragedy</i>	25
Knowledge Upgrade	26
Leisure Spot	29

Editor's Note

For long humans have been extracting benefits from nature, be it for sustaining life or for progressing into the modern world. On the contrary, what man has bestowed upon nature is a hard question. I pondered upon it for a while and soon gave up.

Infrastructural and economic development at the cost of biodiversity is a loss, much bigger than humankind is anticipating at the moment. Although we are lately recognizing the recent catastrophes as man-made events, yet little is being done to recover from the losses and the saddest part being that the brunt of all these plights is faced by the most innocent dwellers and communities. The never-ending hypocrisy of our actions where on the one hand, we worship some animals as religious beings while on the other, we hunt, poach and kill the rest. We wander off to national parks and bird sanctuaries on weekends to de-stress ourselves but also we are the ones adding stress to their existence.

'The Sixth Extinction' speaks volumes about the ecological heritage of our motherland and will take its readers through the many glorious facets of our treasured biodiversity. I would not let go of this opportunity to show my gratitude for our faculty members, Dr. Fawzia for guiding us throughout and Dr. Jayati and Dr. Sudipta for their percipient contribution to this edition.

This edition explores the close-knit relationship between climate change and biodiversity and provides insights on several contemporary conflicts desperately seeking mass attention.

- **Kashish Bansal**
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India's Environmental Commitments: Everything you need to know

While environmental protection and conservation should be an innate value in every individual, laws, and agreements often hold countries accountable to their promises. India is no different and is a signatory to many agreements and has formulated many laws to achieve the same.

India: Convention on Biological Diversity



The Convention on Biological Diversity (CBD) is an international legal instrument for "the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources" that has been ratified by 196 nations. The Conference of Parties (CoP) through CBD monitors its implementation through periodic national reports.

India is one of the first delegates to the Convention on Biological Diversity (CBD) and became a party to the Convention in May 1994. It submitted its Sixth National Report to the CBD on 29 December 2018.

IUCN



IUCN's (International Union for Conservation of Nature) work assesses and preserves nature, ensures effective and equitable leadership, and implements nature-based solutions to combat global climate, food, and development challenges. It endorses scientific research, manages field projects around the world, and brings together governments, NGOs, the UN, and companies to build policy, legislation, and recommended practices.

India became a State Member of IUCN in 1969, through the Ministry of Environment, Forest and Climate Change (MoEFCC). The IUCN India Country Office was established in 2007 in New Delhi.

Millennium Ecosystem Assessment



The Millennium Ecosystem Assessment in India concentrates on how human ecosystems have changed, and how changes in ecosystem services have affected human well-being, how ecosystem changes can affect people in the upcoming years, and what types of responses can be adopted at local, national or international levels to improve ecosystem management and thus relate to social well-being and poverty reduction.

REDD+



Reducing Emissions from Deforestation and Forest Degradation (REDD+) is an organization dedicated to working towards conservation and enhancement of the carbon pool, through sustainable forest management.

The agenda of "Reducing emissions from deforestation and forest degradation in developing countries (REDD)" was first introduced in UNFCCC as a climate change mitigation option to address the emission from deforestation and forest degradation in 2005. With India's intervention for the inclusion of policy approach of conservation and sustainable management of forests, the concept of "forest conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries" was added and the concept is now collectively referred to as 'REDD+'.

The Ministry of Environment, Forest and Climate Change, Government of India initiated the preparation of the National REDD+ Strategy in the year 2013.

Existing Legal and Policy Framework in India

1. Indian Forest Act, 1927
2. Wild Life (Protection) Act, 1972
3. Water (Prevention and Control of Pollution) Act, 1974
4. Forest (Conservation) Act, 1980
5. Air (Prevention and Control of Pollution) Act, 1981
6. Environment (Protection) Act, 1986
7. National Forest Policy, 1988
8. Panchayat (Extension to Scheduled Areas) Act, 1996
9. Biological Diversity Act, 2002
10. National Environment Policy, 2006
11. The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006
12. The National Green Tribunal Act, 2010
13. National Water Policy, 2012
14. National Agroforestry Policy, 2014
15. National Working Plan Code-2014
16. National Action Plan on Climate Change

CLIMATE CHANGE AND DISEASE

The World Health Organisation has established clear links between climatic factors and the spread of infectious diseases. We intuitively know that the hot and humid season is when vectors breed and flourish. This is also a great setting for pathogens to incubate and stay longer outside the host, making it easier to get transmitted. For example, Punjab had frequent incidences of malaria at the beginning of the 20th century. WHO was able to link it to unprecedented levels of rain, which made it easy for mosquitoes to breed and survive. Their report on the effect of climate change on infectious diseases talks about specific human activities and their impact on disease propagation. Covid 19 is a more recent and relevant example of Zoonosis. So, what are some simple things that we know about Zoonotic diseases?

• They spread from animals to humans

• They spread when there is a change in the environment of the animal or human.

Data exists, from 1940 onwards, which shows that 71.8 percent of all zoonotic diseases emerge from wildlife. But it's uncommon for pathogens to jump from wildlife to humans directly. They need a bridge, which could be provided when wild animals are bought in close contact with humans, through wet-markets. Now map this to COVID 19. The wet-markets in China, where porcupines and the occasional crocodile is also sold for meat, could be such a bridge. There is evidence that past viruses may have also sprung from these but they continue to exist. Is this plain indifference of the affluent towards the rest of humanity, and themselves, for the sake of an exotic wildlife meal?

On studying epidemic events over the last century, it is noted that the occurrence of these events has been happening at an alarming rate over the past two decades, as compared to before. We have had Ebola, Zika, MERS, SARS, Nipah in a span of a few years. There is also evidence showing that as the planet warms up, gaps between pandemics will decrease further – as the environment gets more and more suitable for pathogens to live longer and move to newer regions that were earlier too cold. While it's critical to have a COVID 19 vaccine created and disbursed widely, is that the only sustainable solution as we wait for the next zoonotic waiting to happen? Or for the vaccine-resistant variant to hit us over the next few years? Also, the economically weaker sections will have to depend on the Public Health system of their countries, to get vaccinated. Will that be too late?

Organizations and countries are seeing the need to delve deeper, into understanding underlying causes and finding solutions that are long-term and alleviate the life of all people on earth.

While there are many causal factors, each interlinked with another complex set of variables, Climate Change does emerge to be a major contributor to human misery. If anything, warming earth will lead to multiple challenges for our species, besides pandemics.








Excerpt from *Why do humans cause pandemics?*

By Jayati Talapatra

(<https://jayati-talapatra.medium.com/why-do-humans-cause-pandemics-db2e5384239>)

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ZOOONOTIC DISEASES AND BIODIVERSITY

Disease	Hosts	Anthropogenic Activities	Initial Country/Continent	Year of Origin	How is spreads
Avian Influenza 	Ducks, Chickens and other poultry animals.	Live animal markets, Intensive wildlife farming.	First human infection reported in Hong Kong	1997	Direct contact with infected poultry
Bovine Tuberculosis 	African Buffalo, Greater Kudu, Cattle, Bison, Elk, and Deer.	Animal markets, Animal slaughtering.	The origin is believed to be in African countries.	Unknown	Inhaling infected droplets. Consuming raw and unpasteurized milk from infected cows
COVID-19 	Bats, Pangolins (as of now)	Live animal markets, Intensive wildlife farming destroying bat habitats.	China	2019	Coming in contact with infected persons, touching infected surfaces. Ironically enough, "squalene" an adjuvant to be used in COVID-19 vaccines is derived from shark liver oil
Ebola 	Fruit Bats, Gorillas, Monkeys, Forest Antelope, Porcupines	Wildlife Hunting and Deforestation.	Democratic Republic of Congo	1976	Direct contact with blood, body fluids of animals/ infected persons
Nipah Virus Infection 	Fruit Bats, Pigs	Deforestation, Habitat encroachment.	Malaysia	1999	Consumption of fruits contaminated by infected bats' saliva, Direct contact with pigs, Direct contact with an infected person's excretion
SARS 	Bats, Civets, Domestic cats	Live animal markets. Wildlife breeding	Guangdong province, South China	2002-2003	Direct contact with infected domestic animals, persons
Zika Fever 	Monkeys	Habitat destruction and bio diversity loss caused by activities like deforestation.	Africa-Asia	1952 - first human case reported	Mosquitoes



The Battle for Belonging: *A Case Study of Mollem, Goa*

Goa, a Portuguese colonial area back then, unlike other places in the country under British rule, did not have any biodiversity assessment provisions to determine the status of the forest and the associated biodiversity. In 1930, when Salim Ali, an Indian ornithologist, and naturalist, came to India, he surveyed several forest and biodiversity conditions in Goa. Analyzing the situation Salim Ali quotes that he did not see anything other than the Malabar Giant Squirrel in the Mollem National Park and Bhagwan Mahavir Wildlife Sanctuary as the entire forest was destroyed.

After liberation, the Goa government started declaring the forests as game reserves and wildlife sanctuary. Also, the Netravali reserve was declared as a wildlife sanctuary very recently. So, for a long time, these forests were not protected and currently, Goa is doing very well in terms of biodiversity assessment.

“*If I am the chief minister of the state and I am going for elections next year, and I have got a hundred crores with me. I would spend the hundred crores doing something that the people can see visually and they would say, 'oh the chief minister of my state has done this.' We have a park here. We have a road here. We have a railway line. But imagine, if I spent 50 crores out of that hundred crores in doing something like managing a park or managing a Wildlife Sanctuary, then what would people say? This is the mentality of our people and our politics and that is why mitigation doesn't work because we are more visually oriented.*”

Threats

Leopard cubs, Gaurs, Spotted Deer have been spotted being run over by a train, so the animals are extremely vulnerable to being run over on the road. Other instances include revenge killing since the tiger comes and eats the cow, so then farmers go and poison the tiger because for them, cows are the only source of income and if one kills the cow, he will be infuriated. That's why we have to manage the humans, not the tigers. Landslides are also a key threat. Instances of landslides will go up if the technology or the method by which the road and the railway line are expanded is not improved.

Project Processing

After a project is sanctioned, a feasibility report needs to be made. And as the next step Environmental Clearance (EC) is granted through Environmental Impact Assessment. After the assessment, mitigation strategies are recommended. Then the government needs to make sure that the strategies are actually executed on the ground. But, most of the time, to put these mitigation strategies or monitoring plans, there is a need for political will and budget allocation.

Unfortunately, in our country the political will and the budget reallocation, are very poor. And the sad part is, many of us think that mitigation and implementation of environmental concerns are of the least importance.



An excerpt from a conversation with Mr. Pronoy Baidya
Pronoy Baidya currently studies at the Centre for Ecological Sciences, Indian Institute of Science. Pronoy does research in Entomology, Ornithology, and Ecology. His current projects include 'Documenting Ant Diversity of Goa', 'Pelagic Bird Monitoring in India', 'Checklist of Birds of Goa', and 'Biodiversity Assessment and Management Solutions for Mining Sector in Goa.'



Decoding How Your Next Meal Can Help Save The Planet

In many societies, consumption of animal products is part of the traditional diets, and meat is often believed to be a superior form of protein for the human body. Furthermore, the production of animal-sourced products and livestock is often reinforced by government financial incentives in many countries. However, what we fail to account for is that livestock production is the single largest driver of habitat loss with cascading effects on biodiversity and ecosystem functions. Studies report that the conversion of land for food production has induced the loss of nearly one-half of all-natural grasslands and nearly one-third of all-natural forests worldwide. Land-use change is also projected to have the largest impact on biodiversity globally. The replacement of wild and biodiversity-rich agricultural lands with vast monoculture ecosystems is being driven by globalization of food trade, processing of international fodder sources, and standardization of food products. This industrialization threatens the diversity found in conventional mixed cultured systems, including declines in bees, butterflies, and plants.

According to current trends, the amount of land converted to agriculture to meet increasing global food demands will increase by about 18% from 2000 to 2050. This equates to the depletion of 1,000,000,000 hectares of natural habitat, a region greater than the United States of America.

While many developed countries have maintained high animal product-based diet rates, developing countries have begun to portray a per capita increase in consumption levels of animal products, along with rapidly growing populations. This will be a formidable force that drives habitat and biodiversity loss in the years to come. India has also shown a rise in the consumption of animal products in recent years. Given that in our current global agricultural systems, approximately 7.0 gigatons (Gt) of plant biomass is needed to produce 0.26 Gt of meat, even a small increase in the consumption of animal-based foods would result in a substantial increase in habitat conversion and greenhouse gas emissions.

Did you know?

The consumption of animal-sourced food products by human beings is one of the largest drivers contributing to the loss of terrestrial ecosystems and biological diversity. And by 2050, the projected land base required to support livestock production in several mega-diverse countries exceeds 30-50% of their present agricultural areas.

Reducing the production and consumption of animal products can help preserve the natural ecosystems and biodiversity, while meeting the nutritional needs of people, including the 2-3 billion people projected to be added to the present human population.

Given livestock production's huge ecological footprint, humans' negative effects on biodiversity can be substantially minimized by:

- Growing the proportion of plant-based foods in our diets
- Substituting monogastric, aquaculture, or other more effective protein sources for ecologically inefficient ruminants and bushmeat
- Applying ecologically integrated frameworks and functions to plant and livestock production processes in order to sustain a world of lower animal product food demands

This will considerably minimize ecosystem and biodiversity destruction, fossil fuel oil consumption, greenhouse gas emissions, and waste while delivering highly nutritious diets that would significantly enhance global human health.



At War With Wetlands

Wetlands are often referred to as “the kidneys of the environment”. Just like kidneys help in filtering waste in the human body, wetlands often absorb excess nitrogen and phosphorus and prevent them from traveling to water bodies, thus ensuring the safety of several aquatic animals. The three types of coastal wetlands—mangroves, seagrasses, and tidal salt marshes—commonly referred to as blue carbon ecosystems—provide a full spectrum of mitigation, adaptation, and resilience benefits.

Coastal wetlands are small but mighty. Although they cover less than 1% of the ocean, they store over 50% of the seabed's rich carbon reserves.

Mangroves are salt-tolerant plants and occur mainly between latitude 24°N and 38°S, and exhibit varied morphological and physiological evolutionary adaptations to survive the limiting factors imposed by lack of oxygen, high salinity, and diurnal tidal inundation. They play an important role in defending shorelines from the sea by withstanding 90% of the tidal waves thereby protecting an area from coastal storms, cyclones, high-velocity winds, etc, and thus helping in climate change mitigation and adaptation.

India possesses the world's 3rd richest mangrove biodiversity, occupying a whopping 3.2% of the global 6% mangrove forest. Sundarbans has the largest mangrove cover, occupying 43% and Gujarat has the second-largest cover with 23% of total cover in India. Interestingly the Andaman and Nicobar Islands have the third largest mangrove forest in India, occupying 13% of the total cover, located in low energy tidal coast with rich biodiversity.

"Confronted with global warming, coastal wetlands, Blue carbon habitats—including buried seagrasses, mangrove forests, salt marshes, and pelagic ecosystems—provide a vital service to the global community by retrieving massive amounts of carbon."

However, in the Era of Anthropocene, there are several concerns that are causing harm to these mangroves such as industrialization, mining, coastal pollution, tourism, dam and road construction, siltation, etc which needs to be addressed before it risks lives of 600 million people who reside in these coastal regions. These activities can also increase ocean acidification, coral bleaching, permafrost melting leading to the release of a huge amount of carbon dioxide, adding up to global warming. Mangrove forests perform a versatile role in addressing climate change - from carbon sequestration of more than 90% in their soils and branches to keeping the fabric of coastlines together in the rising tides, but still, these Blue Carbon habitats couldn't find a place in many Nationally Determined Contributions (NDCs) designed by country nations to meet their Paris Agreement Goals.

These mangroves contribute more than \$80 billion a year by avoiding losses from coastal flooding and protect 18 million people. They also provide around \$40–50 billion per year in benefits for fisheries, forestry, and recreation.

With the total estimated mangrove cover of 495,842 ha in 2020 (66% of the total coastline of India) and the value of the carbon stock as 386 ton/ha, the total carbon sequestration potential of the mangroves has been estimated as 702.42 million tons of CO₂ e. The potential of carbon sequestration will increase to 748.17 million tons of CO₂ e in 2030. Upon conservation and protection of mangrove cover, it has been estimated that there can be an additional sequestration potential of 207.91 million tons of CO₂ e. India has the highest record of biodiversity in mangrove forests of the world and no other countries have recorded so many species to be present in the ecosystem. So far, 4107 species including 23% of the flora and 77% of faunal species have been recorded.

Coringa wetlands: A Powerhouse in Peril

The Coringa Wildlife Sanctuary (CWLS) in the delta of River Godavari, Kakinada, Andhra Pradesh is estimated to be the second-largest stretch (following Sunderbans) of mangrove forests in India. The region is known to support 35 species of plants belonging to 24 families and over 120 species of birds.

- The proposed Polavaram Dam project poses an immediate threat to the sanctuary. The EIA of the project reveals that as many as 276 villages will be affected, and the project might also lead to a decrease in water supply from the Godavari river to the CWLS. Also taking into account the flood trends and the history, the dam clearly cannot withstand the peak flood scenario and may get washed off creating havoc in the nearby downstream areas.
- In May 2020 out of 120-acre of land acquired under the housing scheme 100 acres were already leveled by them.
- Also, at one point in time, GMR and the ECPL dredged the mudflat on the seafront to dump the dredge spoil causing destruction to the mangroves but was taken back when local villagers came to oppose the move.
- Environmentalist Mrutyunjaya Rao opines that the construction of seventh berth at the Kakinada seaport will obstruct the arrival of migratory birds in the area.
- The government has also planned to transform the Hope Island (a small Island, 16km long sand spit) inside CWLS to a tourist hub under the 'Swadeshi Darshan' scheme. Environmentalists have raised concern citing that the building of cottages and other infrastructure, boat connectivity for tourists may cause stress and lead to an increase in pollution leading to the extinction of plants and animal species.

Climate Change

The warming may lead to a shift in mangrove cover to high latitudes i.e., northward, affecting the structure and function of these coastal ecosystems. As a result of high temperature and increase in sea level, the mangroves may experience increased mortality and reproductive failure, owing to which many species dependent on these may become vulnerable as it might not be possible for other species to adapt soon. Degradation of coral reefs caused by mass bleaching and impaired growth can adversely affect mangrove systems that rely on reefs to provide refuge from strong currents. Mangroves can adapt to sea-level rise if it occurs slowly enough, if adequate expansion space exists, and if other environmental conditions are met.

Decreased precipitation results in a decrease in mangrove productivity, growth, and seedling survival, and may change the composition of the species favoring more salt-tolerant species. On the contrary, increased precipitation may increase mangrove area, diversity of mangrove zones, and mangrove growth rates in some species.

Flooding, caused by increased precipitation, storms, or relative sea-level rise may result in decreased productivity, photosynthesis, and survival. Inundation of lenticels in the aerial roots can cause the oxygen concentrations in the mangrove to decrease, resulting in death. Inundation is also projected to decrease the ability of mangrove leaves to conduct water and to photosynthesize. We aren't only putting biodiversity at threat but also our lives at stake.

Ramsar Convention

The Ramsar Convention was adopted in Ramsar, Iran, and came into force in 1975. Its mission is “the conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world”. India entered Ramsar Convention on 1st February 1982. The Chilika Lake in Odisha and the Keoladeo National Park in Rajasthan were the first declared Ramsar sites in India in 1981. Sundarbans Wetland with an approximate area of 4,23,000 hectares is the largest Ramsar site in India. Latest allocated wetlands in India:

- **The Tso Kar Wetland Complex (42nd Ramsar site), Ladakh (December 2020)**
- **Lonar Lake, Maharashtra (November 2020)**
- **Sur Sarovar aka Keetham Lake, Uttar Pradesh (November 2020)**
- **Asan Barrage, Uttarakhand (November 2020)**
- **Kanwar Lake/ Kabal Taal, Bihar (July 2020)**
- **Sundarbans Reserve Forest, West Bengal (February 2020)**



Kadar's: Leading the Environmental Cause

Malayalam for 'forest dwellers', Kadar's are an indigenous community living in the Western Ghats known for their nomadic lifestyle and shifting cultivation. However, their lifestyle changed over time and they soon became forerunners of biodiversity conservation in the area.

Image Source: Times of India

It began around 2017 when the traditional village gathering passed resolutions against the Athirappilly hydroelectric project which was estimated to destroy the habitat of about 196 birds, 131 butterflies, and 51 odonate species. Further, the region was also unique as it was home to all four south Indian species of hornbills.

The youth of the community also led the charge in conservation along with the Western Ghats Hornbill Foundation, the Forest department, and the World Wildlife Fund-India Ecological Monitoring Programme.

Image Source: Hornbill Foundation

Their activities also include- Keeping a close vigil on poaching activities by helping the forest department prevent illegal felling of trees and advocating against poaching rings. Ensuring non-interference from humans during the nesting season in December.

Image Source: Business Line

The Role of Individuals in Conserving Biodiversity

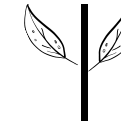
Although a large chunk of responsibility pertaining to the current state of biodiversity falls on governments and large industries, it would be incorrect to say that citizens are mere bystanders who must hope for the best. You too can play a part in helping conserve biodiversity through your actions and choices going forward. Some of these may include-



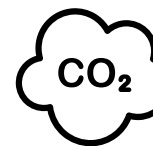
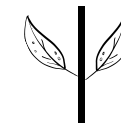
Learn more about native species in your surroundings and how they support the local ecosystem



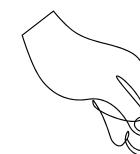
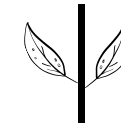
Volunteer for local organizations engaged in conservation efforts or spread awareness through any medium available to you



Use your power as a consumer to buy from brands that choose ethical and sustainable ingredients/materials. Labels like fair-trade, cruelty-free can help you identify the same



Remain conscious of your carbon footprint by reducing energy consumption, vehicular emissions, diversifying your diet to plant-based foods etc.



Support/Donate to local movements fighting for conservation



Practice sustainable tourism when visiting other cities, states or countries



Promote/Support native species as opposed to alien species which may negatively impact the existing ecosystem



Adopt a more minimalist lifestyle to reduce your impact on the environment. Try recycling or work towards generating lesser waste in your household for starters.



Encourage and support education around the same through formal and informal means about the critical nature of conservation right now

Where the Wild Things Were

7-8% of the world's biodiversity occurs in India despite its relatively small size.

4/36 of the world's biodiversity hotspots, namely, **The Himalayas, the Indo-Burma region, the Nicobar Islands (part of Sundaland) and the Western Ghats** lie in India. Each of these regions have a high degree of endemism, that is, they have at least 1500 species of vascular plants and are, at the same time, highly threatened.

As per the IUCN Red List, out of the total plant and animal species occurring in India, **17.3%** fall in the **Critically Endangered, Endangered and Vulnerable** categories. The adjoining map illustrates a few of these animal species.

MAJOR INSTIGATORS OF BIODIVERSITY LOSS

- Over exploitation** of natural resources
- Global warming & Climate Change**
- Wildlife trade, hunting, poaching & man-animal conflicts**
- Lack of genetic diversity**
- Land-use change** driven by human activities
- Pollution**
- Invasive alien species**

903 Protected Areas in the form of **101 National Parks, 553 Wildlife Sanctuaries, 86 Conservation Reserves and 163 Community Reserves** have been established as a crucial component of habitat conservation measures for biodiversity conservation.

Protected Areas

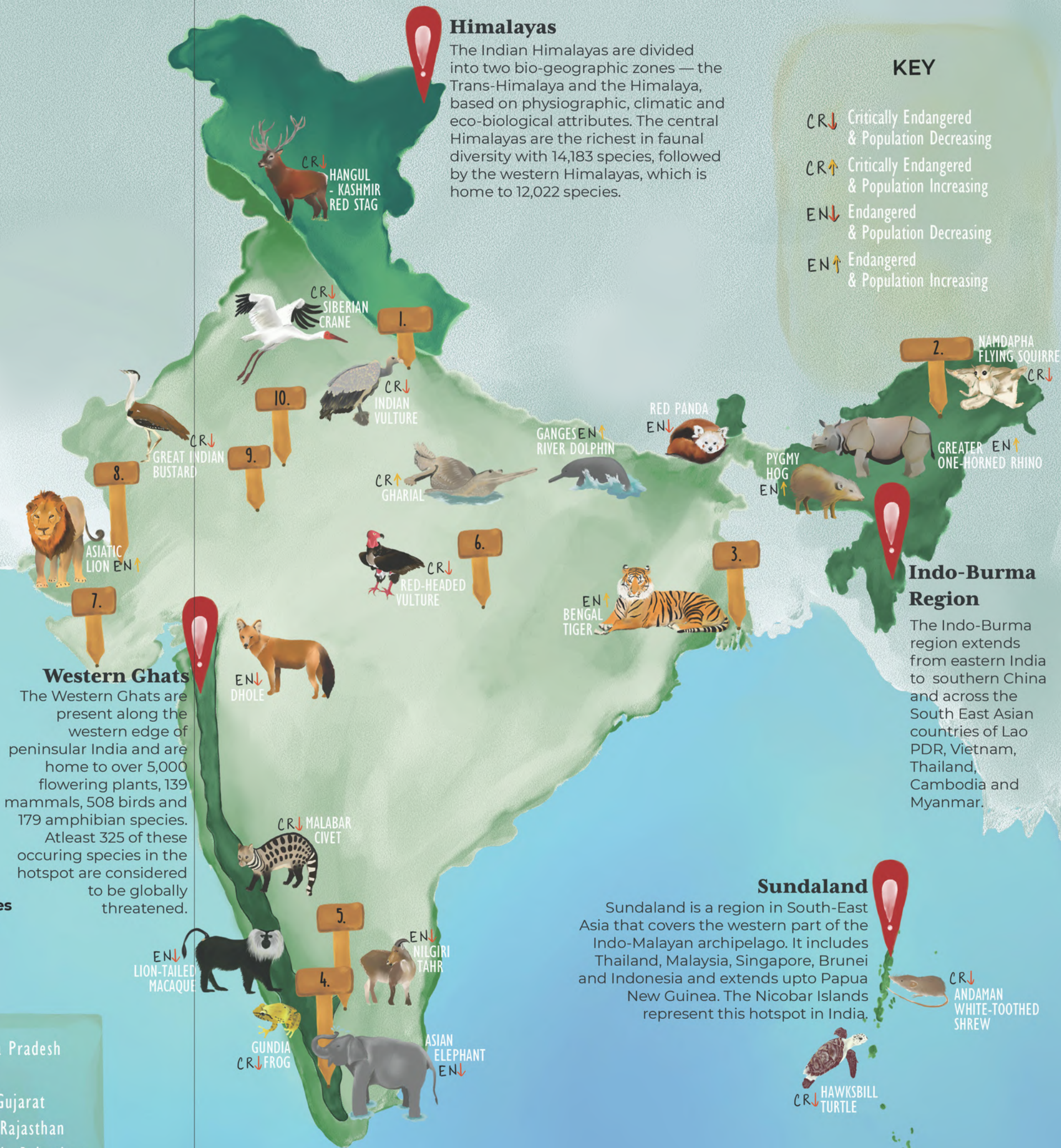
- | | |
|---|---|
| 1. Jim Corbett National Park, Uttarakhand | 6. Kanha National Park, Madhya Pradesh |
| 2. Kaziranga National Park, Assam | 7. Gir National Park, Gujarat |
| 3. Sundarban National Park, West Bengal | 8. Nal Sarovar Bird Sanctuary, Gujarat |
| 4. Periyar National Park, Kerala | 9. Ranthambore National Park, Rajasthan |
| 5. Bandipur National Park, Karnataka | 10. Keoladeo Ghana National Park, Rajasthan |

Himalayas

The Indian Himalayas are divided into two bio-geographic zones — the Trans-Himalaya and the Himalaya, based on physiographic, climatic and eco-biological attributes. The central Himalayas are the richest in faunal diversity with 14,183 species, followed by the western Himalayas, which is home to 12,022 species.

KEY

- CR↓ Critically Endangered & Population Decreasing
- CR↑ Critically Endangered & Population Increasing
- EN↓ Endangered & Population Decreasing
- EN↑ Endangered & Population Increasing



Indo-Burma Region

The Indo-Burma region extends from eastern India to southern China and across the South East Asian countries of Lao PDR, Vietnam, Thailand, Cambodia and Myanmar.

Sundaland

Sundaland is a region in South-East Asia that covers the western part of the Indo-Malayan archipelago. It includes Thailand, Malaysia, Singapore, Brunei and Indonesia and extends upto Papua New Guinea. The Nicobar Islands represent this hotspot in India.

- ANDAMAN WHITE-TOOTHED SHREW** (CR↓)
- HAWKSBILL TURTLE** (CR↓)

SUPERSTITION LED EXTINCTION:

The Tale of The Hargilla Stork

In conversation with Mrs. Purnima Barman



Q. Since you are from Assam, what are your views on the current trajectory of development in the northeast? And how can we consider the fragile biodiversity of the region while carrying out the infrastructure projects?

Nowadays this is the most challenging issue for everyone because we need development but it should not come at the cost of the environment. The environment should be our top priority and the policymakers should aim for sustainable development and I request them for the same. We all need prosperous life and luxury but that will not be possible without a healthy ecosystem. The policymakers must involve strategies to make the environment a priority with the planning bodies, communities, leaders, and environmentalists along with students like you. We overlook the real issue and people are unable to foresee their near future when we lose our biodiversity; we will also lose our identity. We cannot wait any longer since we've already lost a lot of our biodiversity.

Q. What is the Hargilla Army and what inspired you to take up this cause? And when was it when people started referring to you as "Hargilla Baido"?

What further steps need to be taken at the present time to aid conservation efforts?

Hargilla army is an all-women team. They are all rural women, housewives converted into conversationalists. It became my passion to save Hargilla. We're working in a human habitation area and my policy is to bring a lot of pride to this species and to integrate the bird into the cultural society. And for this, I think women can make a big difference. Currently, we have 10,000 women that have pledged to be a part and 400 forefront members who work on a daily basis.

When I'm called Hargilla baido, it feels like a doctorate degree to me. It is such an honor for me. But then who will think about our environment and birds like Hargilla? It seems like our duty is just restricted to visiting national parks or wetlands but it's not the ultimate solution. We have to act now. There are a lot of places like where we work, for Hargilla, which do not come under government-protected areas. There are so many species unexplored.

Q. What were some of the challenges that you faced while convincing the locals about this bird's importance?

It is really very hard to explain, especially in my earlier years. Greater adjutant stork is treated as a bad omen and as a disease-carrying, unhygienic bird because they are found in the garbage dump and seen consuming carcasses. So people did not accept it and it was hard to change their perceptions. I myself had a life-changing encounter with a tree owner who was cutting down a nesting tree of the bird with 9 nests on it. And this was where my journey started because earlier my plan was just to pursue Ph.D. on this Bird. I was trembling and I rushed to him and questioned him why he cut down the tree. The neighbors started pestering me but I pleaded with them for help since I saw some baby birds were still alive.

But they continued pestering me by saying that I wanted those birds so that I could consume them. Later, I realized what would my education do, if I couldn't even make a person understand the value of the tree, let alone the birds. From that day onwards, I decided to bring the bird into the hearts and minds of the people. Now, we have restless awareness campaigns in villages because a few explanations don't work and we have to heat the minds of people and policymakers all the time. We can't blame the people as well because they lack awareness.

Q. Are there any gender prejudices you had to face along the way? What is it like to be a woman in the conservation field (in India) and why do you think women play a major role in the conservation of flora and fauna?

When I started, almost 20 years back, even my parents were scared and they cannot be blamed because they were not aware of conservation. But I convinced them and that was my first challenge. I request the parents to encourage their daughters to move forward. I have also faced a lot of gender prejudices and then I realized that the rural women would be facing so much more and they don't get these opportunities.

In our society, there are a lot of gender differences and so women are not encouraged to come forward and work in conservation sectors where they would have to go for fieldwork. The change of mindset will take time. But these days we see a lot of young women coming forward. I particularly feel that women can make a big difference here. A woman is a creator, she is a nurturer. Even your magazine's name is Vasundhara, a goddess, and here lies the answer. Women should connect with others and she can influence and motivate very easily. They can do anything they want; they can connect the species with their tradition and culture. Women are very strong and they should be included in conservation projects.



Purnima Devi Barman is a wildlife biologist in Assam. She is the founder of the Hargilla army and known for her conservation work with the greater adjutant stork. She is the recipient of the Whitley Award and the Nari Shakti Puraskar. To restore populations, Purnima Barman of the NGO Aaranyak is rallying the people of Assam's Brahmaputra valley, turning bird haters into bird lovers. (Aaranyak is a society for biodiversity conservation in northeast India and was established in 1989)

Q. You have received so many prestigious awards such as the UNDP India Biodiversity Award, Green Oscar, etc., visited so many places, met so many people. Is there any unique thing you remember about such an event w.r.t conversation or anything in general, which you would like to share with us? What further steps need to be taken at the present time to aid conservation efforts?

This is an incident of the time when I had started the conservation work for Hargilla. I approached a local school and the headmaster liked my idea of meeting some women from the locality and convincing them to save the bird. So we made arrangements for 30 women and arranged 30 lunch boxes for them. But we were shocked to see that more than 600 women had gathered in half an hour and I got very nervous. Even the headmaster was shocked. Then, he asked me to give a talk and I thought how can I address such a big crowd. Then, I started telling them about my journey and how women can make a big difference, how powerful they are. Their roles are not just limited to cooking at homes but also beyond that, and how I desperately want their help to save Hargilla. They all were silent and listening, they befriended me and were ready to join me. We couldn't give out the lunchboxes though and I apologized to them too. In the end, someone informed me that they were actually headed to a different meeting by some politician in another school but they got mistaken! And that day, I recognized that I had the power to motivate.

"A woman is a creator, she is a nurturer. Even your magazine's name is Vasundhara, a goddess, and here lies the answer."

Q. Is there any message you would like to give for TERI students/the community/the world?

I would love to request our youth to be very innovative and creative and to be their best version. Love nature and raise your strong voice. Many areas are being government-protected but we still have so many species unexplored and the youth should keep thinking how they can contribute even if they do not want to be a conservationist by profession. If everyone came forward to save a species or a landscape, imagine how beautiful our world would be.. We all have to come forward to protect our trees which are being cut down in the name of development. We should bring more and more women into decision-making as both women and youth are the backbones.

Lost Paradise

Considered one of the 12 mega diversity-rich centers, India harbors a large floristic diversity. These include ornamentals in the RET (Rare, endangered, threatened) category. 387 Indian plants have been listed under the IUCN's red list and 77 of these are enlisted as "critically endangered". About 33.5% of India's flora is identified as endemic predominantly distributed in the Himalayas. Most of these have grown endangered due to habitat loss. Other anthropogenic activities like mining and quarrying combined with the disastrous effects of forest fires in the Himalayas and Southern India have threatened the flora and fauna beyond recovery.

Approximately **28%** of the total Indian flora and **33%** of angiosperms occurring in India are endemic.

Floriculture, in contemporary times, has imposed an added stress on the flora. Pot plants, seed bulbs, dried flowers, tubers, and cut flowers constitute the floriculture products. The annual international demand for flowers is placed at Rs. 90,000 cr. while domestic demand is growing at a rate of 25%. Orchids, gladiolus, tulips, rose, lilies and chrysanthemum are some of the important flowers in international trade.

As per the Handbook on Horticulture Statistics, 2014, 76731 million cut flowers were produced in 2012. Indian exports are dominated by fresh and dried cut flowers and India ranks the second largest in the world for area under floriculture. The major floriculture states are Karnataka, Andhra Pradesh, West Bengal, Maharashtra and Haryana.

The valley of flowers in the Himalayas was declared as the World Heritage site in 2005. It is known as 'Botanical Paradise' and consists of many aromatic and medicinal flowering plants.

Some rare and endangered floral species:



Phaius Tankervilleae
(Himalyan Orchid)



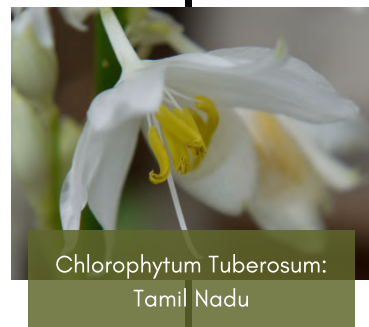
Meconopsis Aculeata
(Queen of Himalyan flowers)



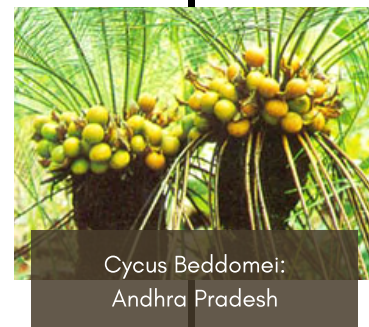
Magenta Ghost Flower:
Kerala



Pterocarpus Santalinus:
Eastern Ghats



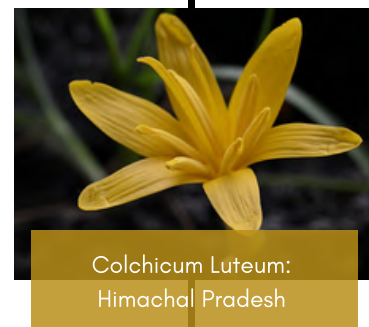
Chlorophytum Tuberosum:
Tamil Nadu



Cycus Beddomei:
Andhra Pradesh



Lotus Corniculatus:
Gujarat



Colchicum Luteum:
Himachal Pradesh



Zeuxine Rolfiana
(The rarest Orchid)



Saussurea Obvallata
(Sacred Himalyan Flower)

Strobilanthes Kunthiana, commonly known as Neelakurinji is a very rare species endemic to the Western ghats in Kerala which blooms once in 12 years. Its mass bloom covers the hills in a serene violet hue. This happens to help the species survive since each shrub reproduces once before dying, while the new seeds bloom after a specific duration, and in a large quantity so that some may survive the predators.



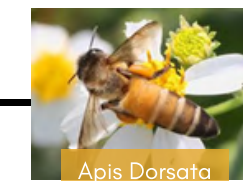
Bees



According to FAO, around **1,50,000** species visit flowers, out of which **25000-30000** are bees. A study tells that wild honeybee of the genus *Apis*, Asian bee and the little bee have declined considerably in the last 30 years. Poor waste management caused the death of 168 bees every day. Many reasons have accounted for the same that include changes in land use and fragmentation, clearing natural habitats for monoculture cultivation, excessive use of pesticides and fertilizers, pollution, and increased invasive species. Lowered apple tree yields in Kashmir have been an effect of the declining bee visits.

Insect Diversity and Flora

The enormous functional significance of insects lies in the fact that they contribute to a whole lot of ecosystem services including pollinating plants, dispersing seeds, maintaining soil structure and fertility, cycling nutrients and as a food source for various fauna. However, insects and pollinators are going through a sharp decline in their populations thus impacting the mega food chain. Lack of awareness about their importance coupled with the general dislike/indifference towards insects is a major hurdle to conserving them.



Apis Dorsata



Apis Bee



Asian Giant Hornet

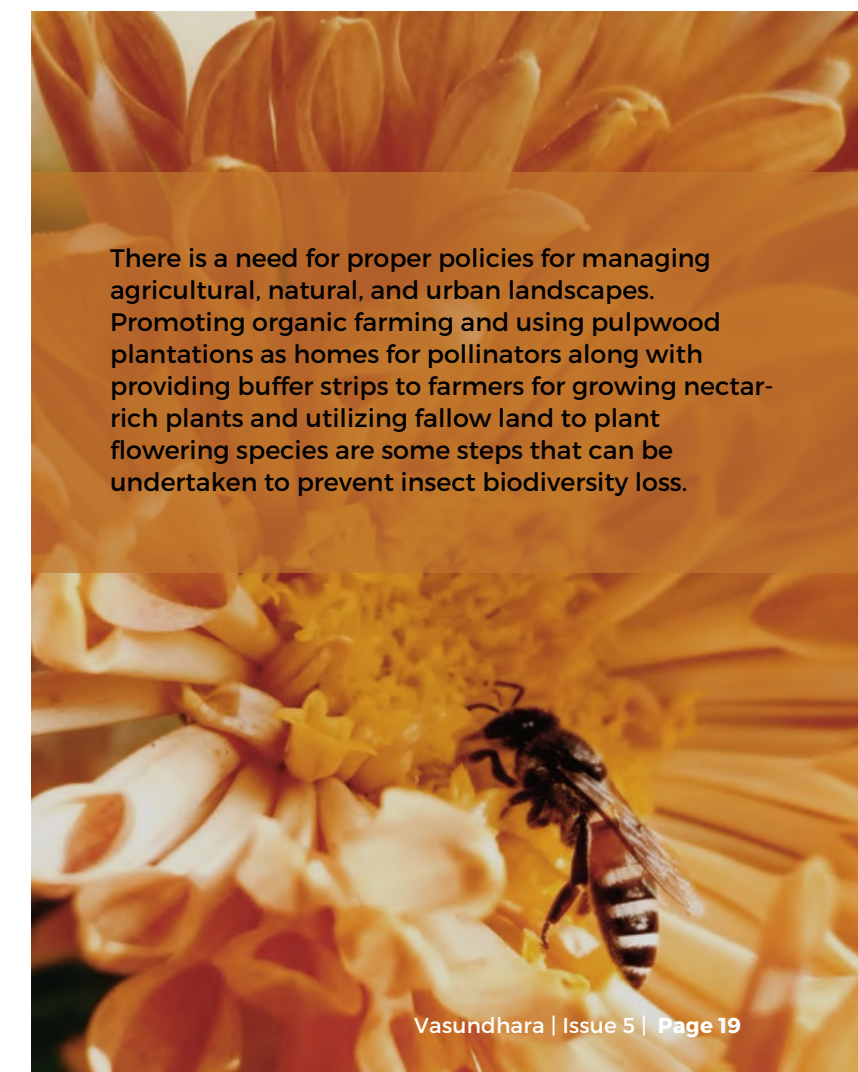
Dragonflies



Megalogomphus
Superbus



Rhodothemis
Rufa



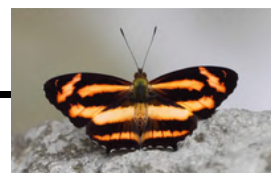
There is a need for proper policies for managing agricultural, natural, and urban landscapes. Promoting organic farming and using pulpwood plantations as homes for pollinators along with providing buffer strips to farmers for growing nectar-rich plants and utilizing fallow land to plant flowering species are some steps that can be undertaken to prevent insect biodiversity loss.

Butterflies



Some of the most unique butterflies of India reside in the Western Ghats, the Himalayas, the north-east region, and the Andamans. Harboring about 1,800 known species, India boasts a majestic 10 percent of the world's butterfly biodiversity. Their declining population would not only impact the flowering species and pollination but also the populations of their predators like wasps and birds. Various intentional and unintentional human interference has been leading to

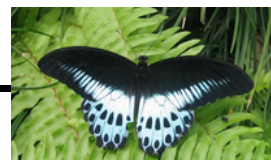
Commercialization and illegal trade to adorn jewelry and greeting cards has been the top reason to exploit the biodiversity hotspots and has priced the butterflies at an unimaginable 100 million USD at the global turnover. About 50,000 butterfly specimens are smuggled out of Lahul, Sikkim, Ladakh, and Meghalaya each month.



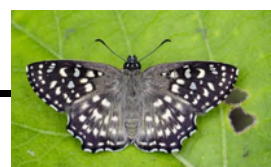
Jester butterfly (*Symbrethia Silana*) is a legally protected, rare butterfly endemic to Eastern Himalaya and NE India.



Branded Royal (rare), was seen in the Nilgiris after a gap of over 130 years



Blue Mormon, a black-coloured velvet-winged butterfly, showed up in Patna.



Spotted Angle butterfly, has been sighted in the reserve forests of Chhattisgarh.



The Lilac Silverline, a protected species was sighted for the first time in the Aravalli range of Rajasthan.

Climate Change: A Looming Peril

Climate change is posing a severe impact on all types of ecosystems including floral species, now more than ever.

The globally rising temperatures have been observed as the reason behind flowers losing their fragrance and interfering with plant-pollinator mutualism. Other studies have found that global warming upsets the critical relationship between flowers and insects, as is the case with the early spider Orchid and the minor bee which affects its reproduction.

Another grappling issue is the mismatch between the flowering time of plants and the flight time of insects disrupting the pollination further. According to an FAO report, pollinators contribute to 235-577 billion US dollars of global food production. Pollination issues would further enhance malnutrition and hamper food security across the world. Flora has not only been facing temperature rise but also climatic extremes and erratic rainfall patterns. Elevated concentrations of carbon dioxide and nitrogen dioxide are affecting plant growth and distribution.

The Science of Biodiversity and Conservation @TERI SAS

Biodiversity, the sum total of all life forms on this earth, has emerged as a subject area in the past three decades. Global emphasis through media coverage and its inclusion in the curriculum in schools, colleges, and universities has led to a general understanding of its definition and appreciation by global citizens that biodiversity must be cared for. We at TERI SAS have a course on Biodiversity and Conservation, and this brief provides an overview of how the subject area is addressed at TERI SAS.

While advances in science have led to a better understanding of the role of biodiversity in ecosystem functioning, the science of taxonomy as a subject area, the very foundation stone of documenting biodiversity has declined.

Biodiversity Conservation has been practiced in India since prehistoric times and well evinced through paleoecology, excavations, and cave paintings. Documents written in languages like Sanskrit, Pali, and Tibetan have enough transcripts available, yet waiting to be transcribed. Descriptions of floral and faunal elements of India find a mention in Greek literature, travelogues of chroniclers who visited the country for religion, trade, in search of medicines, and also for botanical curiosities. Museums, herbaria, and collections in India and abroad speak volumes.

Talking of globalization, it also brought Global Conventions where countries agreed or disagreed to address the present and potential threats to biodiversity. It's important that we appreciate the fact that domestic legislation is often the reflection of the global policy environment. Threats to biodiversity and conservation are often transboundary in nature. In addition, it's pertinent that we appreciate the significance of international, regional, national, and local institutions engaged in governance and implementation of biodiversity conservation.

In India, global priorities have led to species-focused conservation action, Project Tiger, Project Elephant, Project Hangul, Rhino Vision to name a few. It is not without a reason that the Prime Minister of India emphasized Biodiversity Conservation and Project Dolphin in particular during his Independence Day Speech 2020.

However, conservation comes at a cost. We should be able to analyze the severity and consequences of conflicts emanating from conservation. There have been conflicts with local communities while declaring Protected Areas (National Parks, Wildlife Sanctuaries, Reserve forests) as these decimate their rights to resources from such forests. These include the controversy of the Western Ghats Commission, The Dihang Dibang Valley, and the Tiger Census amongst others.

Many development agencies in the Corporate Sector have invested in Conservation to bring synergies. Initiatives like Business for Nature, conservation support through TATA Trusts, initiatives are taken by Indian Tobacco Company (ITC) do not get a mention they deserve. This volume will address the gap of investments in biodiversity and Conservation through Corporate Social Responsibility. Many of the conservation initiatives are by local communities. Sacred Groves and Community Conservation Areas are good examples that we need to appreciate. There are new approaches or financial instruments which are presently supporting and also likely to fund conservation activities. These shall include Global Environment Facility Grants (GEF), Clean Development Mechanisms (CDM), and Reduced Emissions from Deforestation and Degradation (REDD+).

The course at TERI SAS on Biodiversity and Conservation encapsulates the journey of Biodiversity Conservation in India from prehistoric times to the present era. Our students are apprised of the different aspects of conservation mentioned. The course is complemented with other courses in the University viz., Ecology, Conservation and Communities, Ecosystems and Climate, Vegetation Science and Management and Aquatic Systems and Management. Studying outside the classroom to better understand the functioning of nature and field based projects implemented by the University are a learning opportunity.

Author: Dr. Sudipta Chatterjee
Associate Professor
@TERI School of Advanced Studies

CONSERVE

In conversation with RITURAJ PHUKAN

Rituraj Phukan is an environmental activist and writer based in Assam. He is Secretary-General of Green Guard Nature Organization, a grassroots civil society group working with fringe forest communities to explore and establish sustainable solutions for management of man-animal conflict.



Q. We learned that you are a commerce graduate. Which was that moment of your life when you decided to quit your job and choose this path?

Those days I was working with the Ministry of Home Affairs and was posted in very remote areas like the hills of Nagaland and Sikkim. There, I developed a sense of connection to nature. Hunting was prevalent in these parts and the vast natural habitat was being destroyed, which gave me a deep sense of pain. I decided to leave my job to join the Green Guard Nature Organization. My first project was related to the rescue and conservation of frogs.

Q. How has the man-animal conflict-affected biodiversity loss in the context of one-horned rhinoceros in Northeastern India?

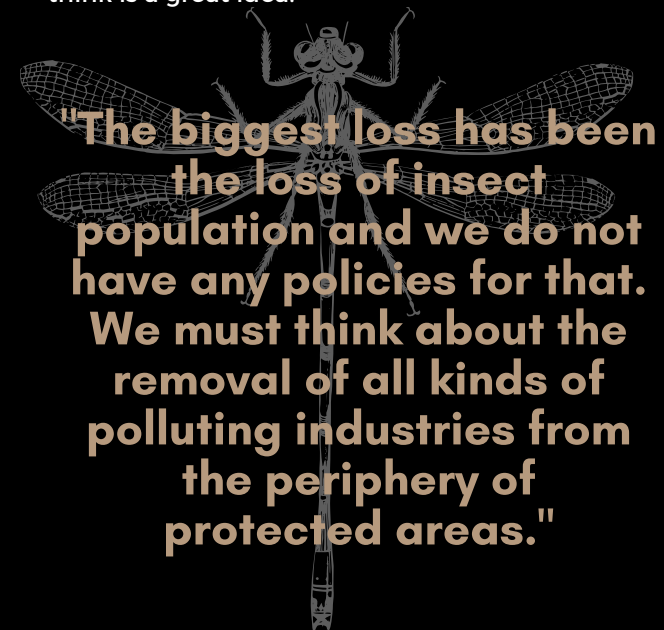
Human-wildlife conflict is prevalent across Northeast India and the manifestation of that is the human-elephant conflict. I believe, in the case of rhino conservation, the biggest obstacle is poaching rather than man-animal conflict because the rhinos are present in the protected areas (including the Kaziranga National Park, Manas National Park, Pobitora Wildlife Sanctuary, and Orang National Park).

"For elephants, man-animal conflict is a major concern because their habitat is being degraded due to encroachments and changing vegetation."

Here rhinos do tend to come out of their habitat but the villagers inform the forest officials and they are driven back to the forests. Stress to the rhinos comes from the poachers, as it is an international organized crime, a lot of money is involved in it and sometimes even the villagers are also involved making the rhino's horn trafficking a criminal syndicate. For elephants, man-animal conflict is a major concern because their habitat is being degraded due to various reasons like encroachments and changing vegetation.

Q. Recent years have seen children being more aware of climate change and being vocal about sustainability. What are your thoughts on the role of the younger generation in environmental issues?

I agree that there has been an increase in mass awareness among all sections of society but amongst all age groups, children have been at the forefront. Back in 1992, at the first Earth Summit, Severn Suzuki talked about the world leaders in her famous speech while she was barely twelve years old. In 2007, nine-year-old Felix Finkbeiner started 'Plant for the Planet' about planting a million trees when nobody else was doing that and since then his organization has planted over 100 million trees. Social media has also played an important role in spreading awareness. My good friend Jadav Payeng (Forest man of India) says that every student should be given two saplings at the time of admission and they should be asked to plant and water them every day, by the time they graduate to high school they would have not only learned a lesson but earned their oxygen that I think is a great idea.



Q. What connection can be established between biodiversity (tigers), climate change, and conservation needs?

The nature of forests is changing across India-Central India is getting drier, forcing the deer to migrate to the greener areas, which is, in turn, impacting the tiger population. Tigers are territorial animals so it is not easy for them to follow the prey, which can lead to conflicts amongst tigers. In Bhutan, the tigers have been moving higher in altitude due to change in climate, a troubling fact because the tigers are moving in the territory of snow leopards and both of them will compete for the same prey i.e., Ibex (mountain goat). India remains the last hope for the tigers because the Royal Bengal tiger represents nearly 90% of the world's tiger population. It is crucial for communities living close to the tiger habitat to be involved in tiger conservation. The tigers contribute immensely to the local economy. So they should be prioritized rather than approving other mining projects.

Q. We would like to know more about the Antarctic expedition that you were a part of and what were the ground realities there?

I went on an expedition to Antarctica in 2013 led by Robert Swan, who was the first man to have walked to both the poles. Until I reached Antarctica my ambition was to see penguins but once I reached there it opened doors for several other things. The first impression I got on reaching Antarctica was that we could have destroyed the remote continent 100 years back if electricity was not discovered because people used to go there hunting whales for blubber. Blubber was used as a fuel for lighting so whaling had a huge impact on the continent and whalers also hunted penguins to eat. As a result, the whole ecosystem was disrupted due to humans. One morning we were summoned up on the deck (it was very cold) and we saw a huge tabular iceberg coming into the view and Robert Swan pointed out to the remains of the Larsen B ice shelf which had started melting in 2002 and initially, people thought that it would take a long time to melt, but on the contrary, within a few weeks of the first crack, it melted completely, and eleven years later, those huge icebergs were still floating which gave me insight into sea-level rise and the vulnerability of the planet.



Q. What are the impacts of the current conservation policies on biodiversity in India and where do the policies lack?

I believe there is a problem with the implementation of laws. When the environment impact assessment (EIA) was framed, it had some loopholes, and later on, there were amendments to make it more effective but now the government wants to relax the laws to facilitate business. I think development is all that the government is concerned about and that impacts the wildlife habitat. The biggest loss has been the loss of insect population and we do not have any policies for that. If we think about that, we must think about the removal of all kinds of polluting industries from the periphery of protected areas. We should frame policies to contain warming at 1.5 degrees above the pre-industrial level and anything above that would be harmful to coral reefs and a large number of insects. With our policies, we should ensure that the polluter pays for emission, which goes back to the people in the form of dividends.

THE BIG DEBATE

Economic Development v/s Environmental Conservation

Ever since the conversation around the deterioration of the environment began, governments and international organisations around the world have been trying to navigate the line between conservation and development. This is primarily since the modern world is dominated by growing infrastructure and increasing resource use which often comes at the cost of the environment. Hence, the two are often pitted against each other.

However, are the two as far apart as we often think they are? Turns out, there are numerous ways in which natural resources and biodiversity can aid development all around the world. In fact, 40% of the world's economy is dependent on biodiversity and it is often the primary source of survival for low-income groups.

In March of 2007, a worldwide study on the economics of ecosystems and biodiversity concluded that the current pace of degradation and inaction towards climate change was actually costing us as much as 5-20% of the global GDP every year. Furthermore, the greenhouse gases that we are struggling to reduce can be cut down by 25% if the current rate of depletion is halted.

Thus, it is safe to conclude that efforts to preserve and regenerate this invaluable resource without compromising development in the traditional sense. The essence of this has been captured by the term sustainable development which has manifested into the sustainable development goals of 2015.

What can be done?

The need of the hour is the adaptation and prioritizing taking care of resources to ensure sustainability in the long run. This may be achieved through-

- ❁ **Identifying and protective bio-diversity rich areas:** Limiting human intervention or at the very least, industrial intervention in rich areas can work wonders in protecting the often fragile nature of the ecosystem
- ❁ **Understanding the impact of infrastructure on the environment:** A thorough study of the environment can help experts analyze the impacts of undertaking projects in an area
- ❁ **Local involvement:** The government and private organizations must take the local opinion and expertise upon the local ecology. This will also help promote employment amongst locals and subsequently, empowerment as well.
- ❁ **Incentives for "greener" practices:** The government should actively support sustainable systems in all sectors of the economy. Incentives could be given in the form of tax benefits, subsidies, etc.
- ❁ **Establishing Partnerships:** Many national-level and international level organizations are working towards conservation and can often aid people if properly funded or supported. These opportunities must be utilized by organizations and governments around the world.
- ❁ **Adapting economic practices:** A transition towards a more environment-friendly way of economic life is also necessary. A push to natural products, medicine, tourism, etc. can help the planet and foster economic growth.
- ❁ **Accompanying existing targets with proper tools of evaluation:** While many targets are set internationally and nationally by countries, quantifying conservation efforts appropriately is still a task. This must be taken up so as to increase the accountability of countries.

Lastly, what is most crucial is a change in attitudes towards the environment. Action at the individual level and the role of civil society can prove to be the most effective as seen in environmental movements around the world.

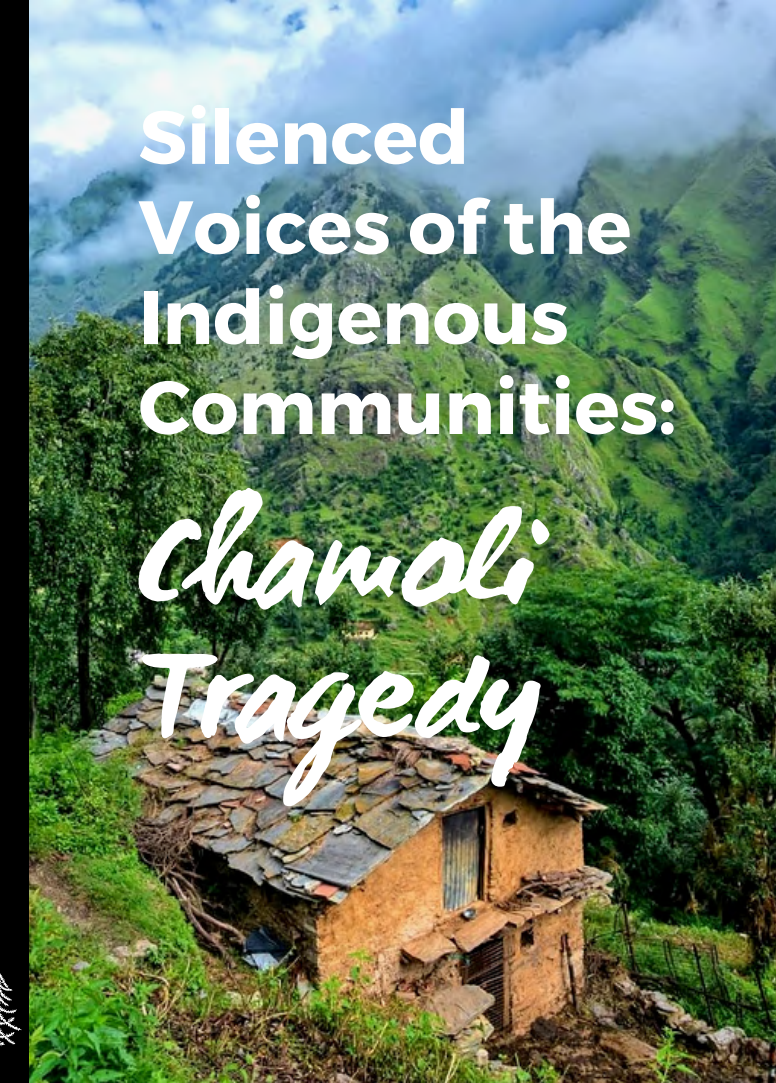
In the year 1973, in the erstwhile state of Uttar Pradesh (now Uttarakhand) several tribal women in the Chamoli district had embraced the trees and offered resistance against the felling of trees. This non-violent uprising called the 'Chipko movement' was aimed at conserving the flora of the region. Now, around 48 years later the same district has been devastated by flash floods due to the massive clearing of trees to pave way for the implementation of a hydel project.

The glacial collapse near Raini village above Joshimath in Uttarakhand's Chamoli district led to flash floods in the Dhauliganga and Rishi Ganga rivers, causing immense destruction along the route, including damage to major hydropower. After several rescue efforts, the Uttarakhand government has presumed 136 missing people to be dead.



Silenced Voices of the Indigenous Communities:

Chamoli Tragedy



Could the Uttarakhand disaster have been prevented?

Raini, the village in Chamoli where the disaster happened, is the birthplace of the Chipko movement which was initiated by the indigenous community of Uttarakhand to save the trees. The villagers have been crying over the catastrophe which has been caused by the implementation of a hydropower project in the hills of Uttarakhand.

The villagers had approached the officials of the Uttarakhand district administration, forest department, NGT to draw their attention towards the Rishi Ganga hydropower plant which was being built in an ecologically sensitive zone. According to a petition filed in the year 2019, the initiation of the Rishi Ganga Power Project was threatening the river, wildlife, and the life of the villagers of the Raini village.

This tragedy is one of the biggest examples of the negative impacts of development on the commoners and poor. It highlights the societal divide wherein one section enjoys the fruits while the other pays its price. It's high time the government starts paying heed to the demands of the local communities and works to prevent such 'man-made' disasters.

Knowledge Upgrade

ECOSYSTEM SERVICES

According to a study by The Energy and Resources Institute (TERI) commissioned by the Central Zoo Authority, the annual economic value of ecosystem services provided by the Delhi zoo works out to be ₹426 crore. These 'ecosystem services' constitute heads such as biodiversity conservation, employment generation, education and research, carbon sequestration and recreational and cultural contributions.

CIRCULAR BIOECONOMY



Recently, European Forest Institute (EFI) published the 10-point Action Plan for a Circular Bioeconomy of Wellbeing. The "Circular Bioeconomy" is defined as the intersection of bioeconomy and circular economy. The bioeconomy substitutes fossil carbon by renewable carbon from biomass from agriculture, forestry and marine environment (including by-products and wastes).

SEAGRASSES



Recently, Scientists have claimed that protection and restoration of sea grasses can play a significant role in mitigating climate change. Sea grasses are flowering plants that grow submerged in shallow marine waters like bays and lagoons found in many parts of the world, from the tropics to the Arctic Circle. Restoration of seagrasses has been taken up by the Tamil Nadu Forest Department in the Gulf of Mannar.

PROJECT LION: PROPOSAL IDENTIFIES 6 RELOCATION SITES

Six new sites apart from the Kuno-Palpur Wildlife Sanctuary were identified under Project Lion that was announced by Prime Minister Narendra Modi on August 15, 2020. The six new sites include:

1. Madhav National Park, Madhya Pradesh.
2. Sita Mata Wildlife Sanctuary, Rajasthan.
3. Mukundra Hills Tiger Reserve, Rajasthan.
4. Gandhi Sagar Wildlife Sanctuary, Madhya Pradesh.
5. Kumbhalgarh Wildlife Sanctuary, Rajasthan.
6. Jessore-Balaram Ambaji WLS and adjoining landscape, Gujarat.

Lion relocation has been talked about since 1995 when the Kuno Wildlife Sanctuary was identified as an alternate site.

PANNA TIGER RESERVE GETS UNESCO'S 'BIOSPHERE RESERVE' STATUS

Madhya Pradesh's Panna National Park has been declared a UNESCO Biosphere Reserve. UNESCO's recognition cited PTR as a critical tiger habitat. UNESCO's Man and the Biosphere Programme (MAB); UNESCO initiated the idea of the biosphere reserve in 1974 under the MAB with the objective of obtaining international cooperation for the conservation of the biospheres. Launched in 1971, UNESCO's (MAB) is an Intergovernmental Scientific Programme that aims to establish a scientific basis for the improvement of relationships between people and their environments.



WHAT ARE DEEMED FORESTS, AND WHY KARNATAKA WANTS TO DECLASSIFY SOME?

Karnataka government is planning to declassify 6.64 lakh hectares of the 9.94 lakh hectares of deemed forests in the state (nearly 67%) and hand it over to Revenue authorities. The issue of deemed forests is a contentious one in Karnataka, with legislators across party lines often alleging that large amounts of agriculture and non-forest land are "unscientifically" classified as such.



INDIA'S CLIMATE PERFORMANCE

India ranked 10th in the latest edition of the Climate Change Performance Index (CCPI). It was rated high for its performance in the Energy Use, GHG Emission and Climate Policy category and medium in Renewable Energy category. Some notable achievements include being on track to achieve and even exceed Paris Agreement targets, attaining fourth-largest renewable capacity in the world, increasing forest cover to 80.73 mn. Hectare. On the global stage, it also pioneered the International Solar Alliance and Coalition for Disaster Resilient Infrastructure.

PANEL FORMED TO OVERSEE INDIA'S PARIS CLIMATE GOALS



The Union Environment Ministry has constituted a high-level inter-ministerial apex committee for Implementation of Paris Agreement (AIPA) under the chairmanship of Secretary, MoEFCC. The committee has been constituted with the purpose of "ensuring a coordinated response on climate change matters that protects the country's interests and ensuring that India is on track towards meeting its climate change obligations under the Paris Agreement including its submitted Nationally Determined Contributions (NDCs)".

NGT SEEKS ACTION PLAN ON ELEPHANT CORRIDORS



Elephant corridors are crucial to reducing animal fatalities due to accidents and other reasons. The government had sought time to inform the NGT about an action plan to strengthen these corridors. It, however, failed to give a concrete action on physical progress on corridors. However, now the NGT has directed the Odisha government to prepare an action plan within three months on 14 identified elephant corridors for providing stress-free migration to jumbos from one habitation to another in the State.

POKHRAN'S 'FIREFLY BIRD DIVERTERS' SHINE TO SAVE THE GREAT INDIAN BUSTARD

The Ministry of Environment Forest and Climate Change (MoEFCC) along with the Wildlife Conservation Society (WCS) India has come up with a unique initiative – a "firefly bird diverter" for overhead power lines in areas where Great Indian Bustard (GIB) populations are found as power lines are the most important current threat for GIBs in the Thar region. This model has been endorsed by experts from the International Union for Conservation of Nature (IUCN) Species Survival Commission's (SSC) Bustard Specialist Group.



COMMUNITY FOREST RIGHTS

The new draft guidelines propose to form Community Forests Resource Management Committee (CFRMC) as an executive arm of the Gram Sabha in managing CFR areas. It further aims to empower Gram Sabhas by integrating the committees for the protection of wildlife, forest and biodiversity, catchment areas, water sources and other ecological sensitive areas located within which it has had traditional rights along with being able to file complaints, make rules, issue directions and finally, approve and modify CFR plans.

TSO KAR WETLAND COMPLEX

India now has forty-two Ramsar sites under the Ramsar Convention (international treaty for the conservation and wise use of wetlands) with the addition of Ladakh's Tso Kar wetland. Tso Kar Basin is a high-altitude wetland complex, consisting of two principal waterbodies, Startsapuk Tso, a freshwater lake and Tso Kar itself, a hyper saline lake, situated in the Changthang region of Ladakh, India.

DROP IN OCEANIC SHARK POPULATIONS



Image Credits: WWF

The global population of sharks and rays dropped more than 70% between 1980 and 2018 according to a study published in Journal Nature. While researchers have been noting a consistent decline in individual species, this collective data was eye-opening. The largest threat to them are fishing fleets along with the fact that their anatomy allows them to produce lesser offspring.

A CLUSTER OF VILLAGES CONSERVE SHY BLACKBUCKS IN ODISHA'S GANJAM

As many as 70 villages in Odisha's Ganjam district in the northern Eastern Ghats have been conserving blackbucks for a century. Local communities regard the animal as harbingers of wealth and prosperity. The community protection has led to an increase in the blackbuck population over time. Experts said government intervention is not required in Ganjam even as threats from industries, road kills and dogs have emerged in recent years.



Image Credits: OneIndia



DID YOU KNOW?

Pando, the world's largest organism, has survived for thousands of years within the Fishlake National Forest in Utah. It is a massive grove of quaking aspens covering 106 acres of land. Pando is dying because of animal grazing and human encroachments.



CLIMATE CHANGE IN NORTH EAST: ARUNACHAL'S SEIJOSA SHOWS CONNECT BETWEEN SHIFTING PATTERNS, DECLINING BIODIVERSITY

Climate change plays out slightly differently than usual and strongly in vulnerable areas such as a biodiversity-rich forest. They can be compounded by landscape changes due to human interventions, illegal or legal. Seijosa circle in Arunachal Pradesh's Pakke-Kessang district has been witnessing such impacts for the past decade-and-a-half.



BUDGET 2021

- Rs 2,217 crore allotted for tackling air pollution in 42 urban centers
- The climate change action plan's budget reduced to Rs 30 crore for the year 2021-22. Funds for Project Tiger, Project Elephant, National Mission for Green India, and the National Tiger Conservation Authority have also been reduced.
- A deep ocean mission with a budget outlay of Rs. 4000 cr. (over 5 years) announced

SPECIES VANISHING IN BIODIVERSITY-RICH MANIPUR

The Javan Rhinoceros, Wild Ox (Santhou), Pink Headed Duck (Nganu Kokngangbi), and the Manipur Jungle Bush Quail have reportedly vanished according to Manipur's forest. Environment and climate change minister. He also hinted at other vulnerable species that may face the same fate such as Manipur's state animal (Sangai), clouded leopard, etc.

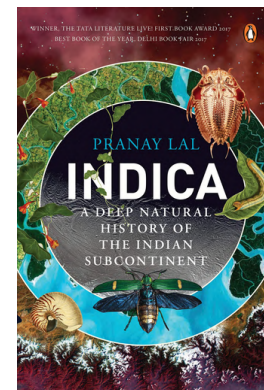
WILD BOARS SEEN AGAIN IN KASHMIR VALLEY

After almost 30 years, Wild Boar sightings are on the rise in the Kashmir Valley. The non-native species has managed to cause panic among locals for safety reasons as well as among conservationists who fear the impact of this invasive species on the local ecosystem and wildlife.

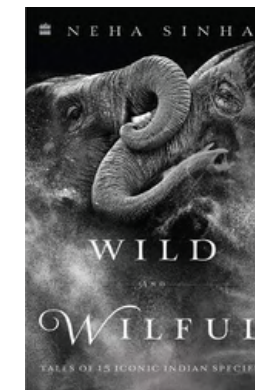


Image Credits: The tribune India

Recommendations



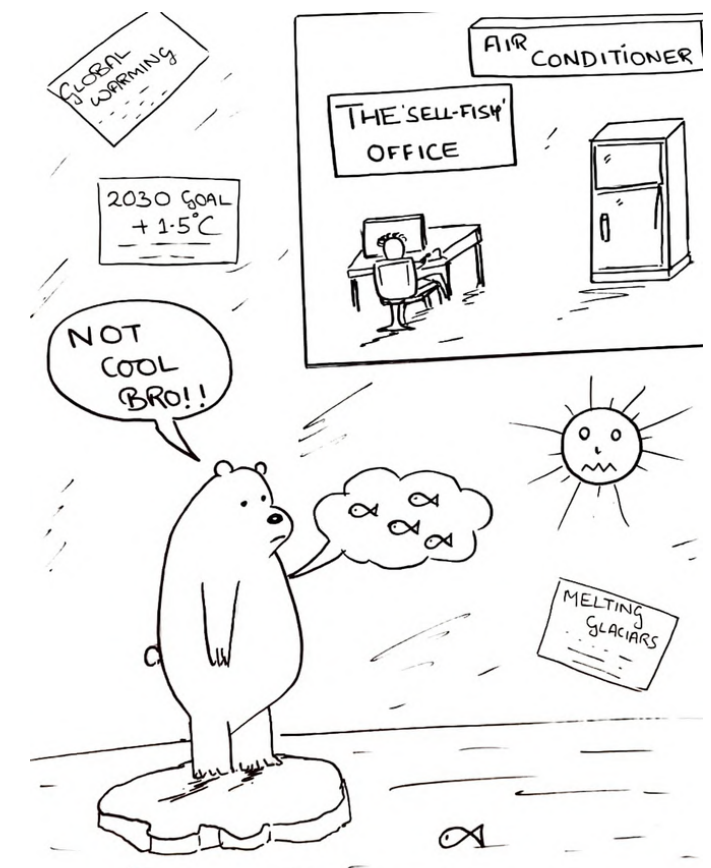
Indica: A Deep Natural History of the Indian Subcontinent
Author: Pranay Lal



Wild and Wilful
Author: Neha Sinha



Documentary: Fantastic Fungi (2019)



Comic by: Mansi Dave (MA SDP)

Comic Corner

References

India's Environmental Commitments: Everything You Need to Know

<https://www.cbd.int/doc/world/in/in-nbsap-other-en.pdf>

<https://pib.gov.in/newsite/PrintRelease.aspx?relid=183155#:~:text=REDD%2B%20aims%20to%20achieve%20climate%20change%20mitigation%20by%20incentivizing%20forest%20conservation.&text=India%20has%20communicated%20in%20its,and%20tree%20cover%20by%202030.>

<https://www.millenniumassessment.org/en/Framework.html>

<https://scialert.net/fulltext/?doi=rjf.2016.1.7#:~:text=In%20India%2C%20NTFPs%20are%20associated,their%20subsistence%20and%20cash%20lielihoods>

<https://fur.ca/conservation/iucn/>

Climate Change and Disease

Hilde Kruse, Anne-Mette Kirkemo, Kjell Handeland "Wildlife as a source of Zoonotic infections", December 2004, US National Library of Medicine, National Institutes of Health

Decoding How Your Next Meal Can Help Save The Planet

<https://www.sciencedirect.com/science/article/abs/pii/S0048969715303697>

<https://link.springer.com/content/pdf/10.1007/s10113-016-1057-5.pdf>

At War With Wetlands

<https://archive.unu.edu/inter-linkages/1999/docs/Faizal.PDF>

<https://www.thehindu.com/news/national/andhra-pradesh/coringa-faces-deforestation-threat/article6066924.ece#:~:text=Deforestation%20is%20posing%20a%20major,of%20endangered%20species%20and%20plants.>

<https://www.drishtiiias.com/daily-updates/daily-news-analysis/coringa-mangroves>

<https://sustain.round.glass/habitat/mangroves-coastal-superheroes/>

<https://sustain.round.glass/people/coringas-mangrove-forest/> <https://www.downtoearth.org.in/coverage/forests/why-polavaram-is-a-pointless-project-33445>

<https://portals.iucn.org/library/sites/library/files/documents/2006-041.pdf>

<https://www.pnas.org/content/111/2/723>

www.fao.org/3/X11/0894-B2.htm#:~:text=Sea%20level%20rise%20will%20affect,mudflats%2C%20especially%20in%20Gujarat%20State

<https://www.pnas.org/content/111/2/723>

www.fao.org/3/X11/0894-B2.htm#:~:text=Sea%20level%20rise%20will%20affect,mudflats%2C%20especially%20in%20Gujarat%20State

[B2.htm#:~:text=Sea%20level%20rise%20will%20affect,mudflats%2C%20especially%20in%20Gujarat%20State](https://www.fao.org/3/X11/0894-B2.htm#:~:text=Sea%20level%20rise%20will%20affect,mudflats%2C%20especially%20in%20Gujarat%20State)

Economic Development v/s Environmental Conservation

<https://www.homeworkjoy.com/infographics/what-is-biodiversity-importance-and-loss/>

<https://phys.org/news/2020-04-economic-growth-incompatible-biodiversity.html#:~:text=The%20increase%20in%20resource%20consumption,and%20sustainability%20advocate%20economic%20growth.>

https://www.longfinance.net/media/documents/biodiv_axa.pdf

https://www.longfinance.net/media/documents/biodiv_axa.pdf

Chamoli Tragedy

<https://timesofindia.indiatimes.com/india/village-struck-by-disaster-was-the-cradle-of-the-chipko-movement/articleshow/80741540.cms>

<https://timesofindia.indiatimes.com/india/village-struck-by-disaster-was-the-cradle-of-the-chipko-movement/articleshow/80741540.cms>

Paradise Lost

<https://www.downtoearth.org.in/coverage/the-butterfly-effect-33675>

<http://faunaofindia.nic.in>

<https://downtoearth.org.in>

https://chesci.com/wp-content/uploads/2017/08/V6i23_16_CS282048052_Sanchita_1457-1464.pdf

<https://www.thehindu.com/life-and-style/rare-butterflies-spotted-across-india/article33022475.ece>

[Fao.org.in](https://www.thehindu.com/life-and-style/rare-butterflies-spotted-across-india/article33022475.ece)

The population of Asiatic Lions residing in Gujarat's Gir Forest optimistically increased from 524 in 2015 to 674 in 2020.





An Eco Club initiative @ TERI SAS



"The diversity of life forms so numerous, that we are yet to identify most of them, is the greatest wonder of this planet."

- E.O WILSON, *BIODIVERSITY*
(1988)