# LIFE STREAM

ANNUAL ISSUE – 2024 *SAVE OUR FORESTS-NOW OR NEVER?*

*The decisions we make in the coming years will shape the future of humanity for centuries—and perhaps, millennia.*

# *SAVE OUR FORESTS---NOW OR NEVER?*

## *CONTENTS*



***Cover Page:*** *In the 1970s, women from the Himalayan villages of Reni and Mandal in India hugged trees in the nearby forests to protect them from the commercial loggers. Photograph: Creative Commons.org BY SA 4.0.)*


***LIFE STREAM ANNUAL ISSUE-2024*** **is a publication of Life Science Foundation**


"Forests are the tapestry of life, each tree a thread weaving together the story of our planet. As they vanish, so does a part of our shared history."

***WE PRESENT***

*The Sanskrit term **Pragyaparadham** (Pragya = consciousness, Aparadham = wrongdoing) describes the act of knowingly making a mistake. Deforestation and the destruction of our environment are prime examples of this—conscious wrongdoing, despite a full understanding of their disastrous consequences. With this in mind, we've chosen "Save Our Forests—Now or Never?" as the theme for the 2024 issue of Life Stream.*

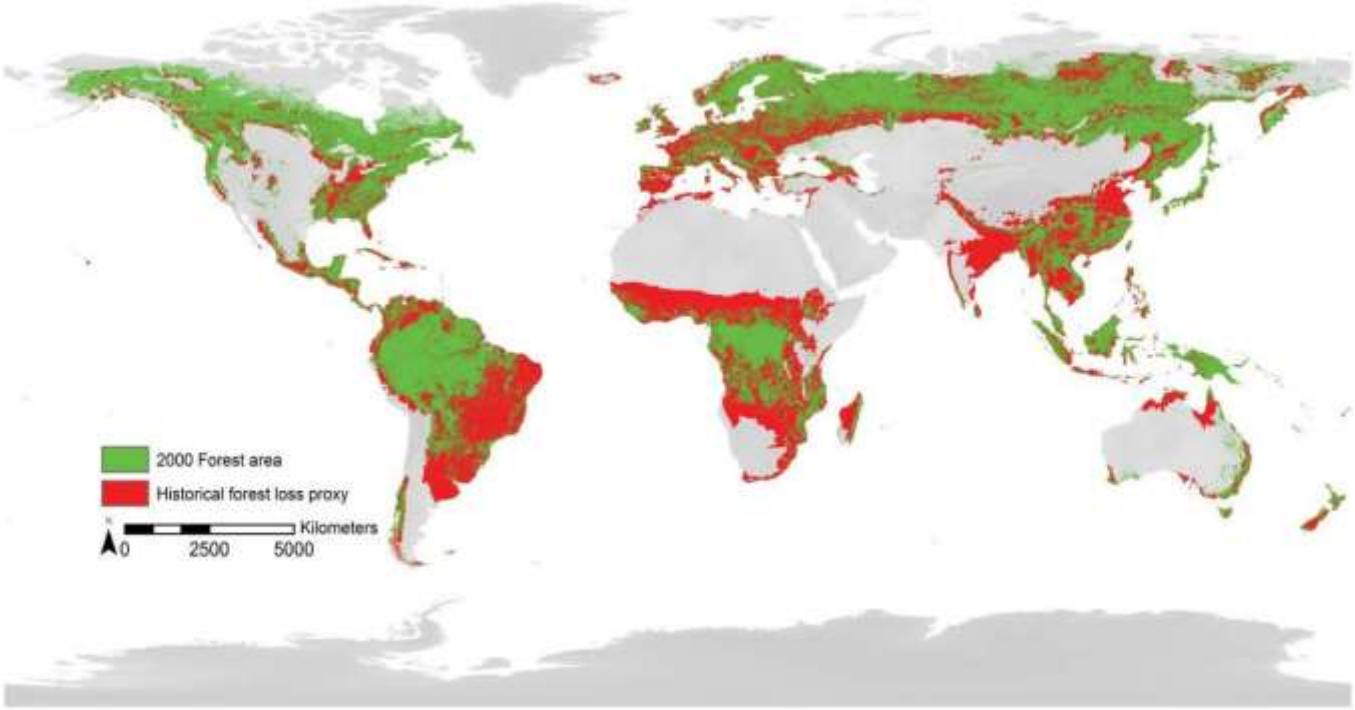
*In this edition, we examine the key factors driving the decline of forests, assess the profound impacts of their loss, and explore meaningful and durable solutions to address this urgent global crisis. Additionally, we've included other forest-related topics we believe will engage and inform our readers.*

*Our content has been carefully curated from various sources—electronic and print media, reports, books, speeches, and more—bringing together a wide range of perspectives on this critical issue.*

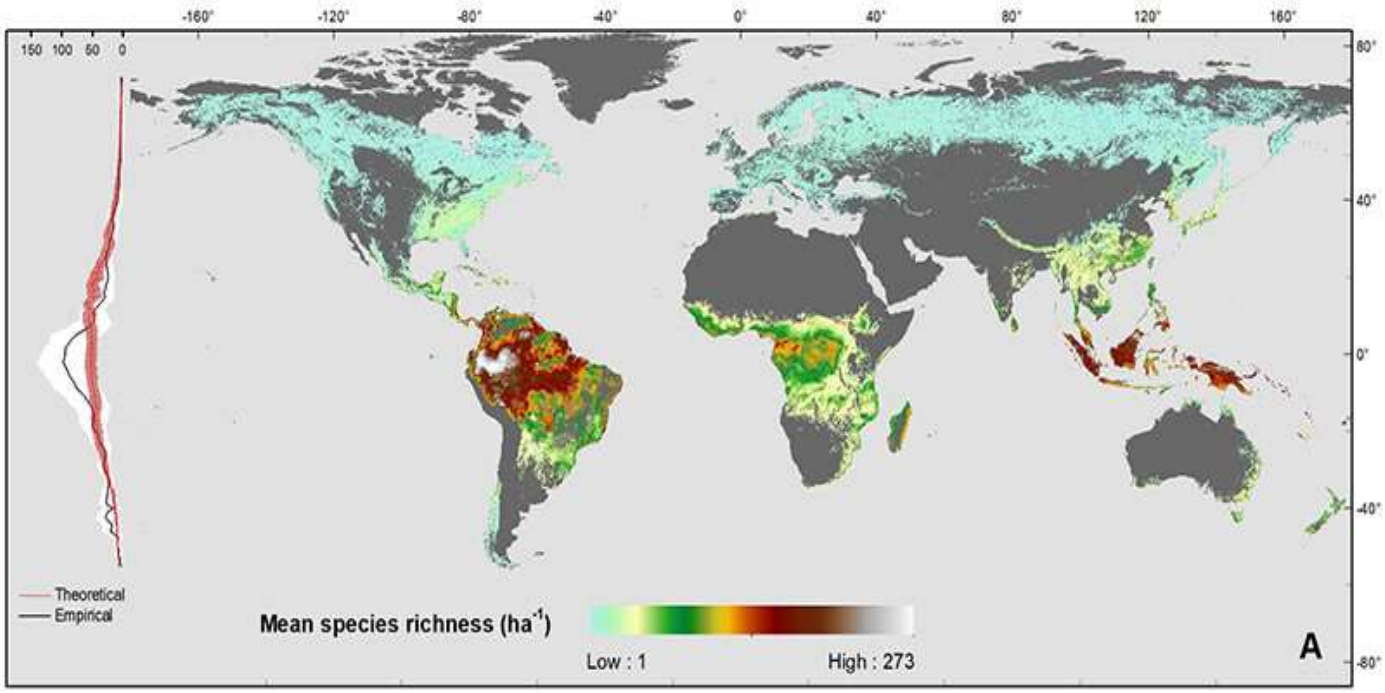
*We take great pleasure in presenting the 2024 Annual Issue of Life Stream and welcome suggestions and feedback from our readers*

***Life Science Team***

The forest is not just a place, but a feeling – a sense of wonder, a sanctuary for the soul. To see it vanish is to lose a part of ourselves."



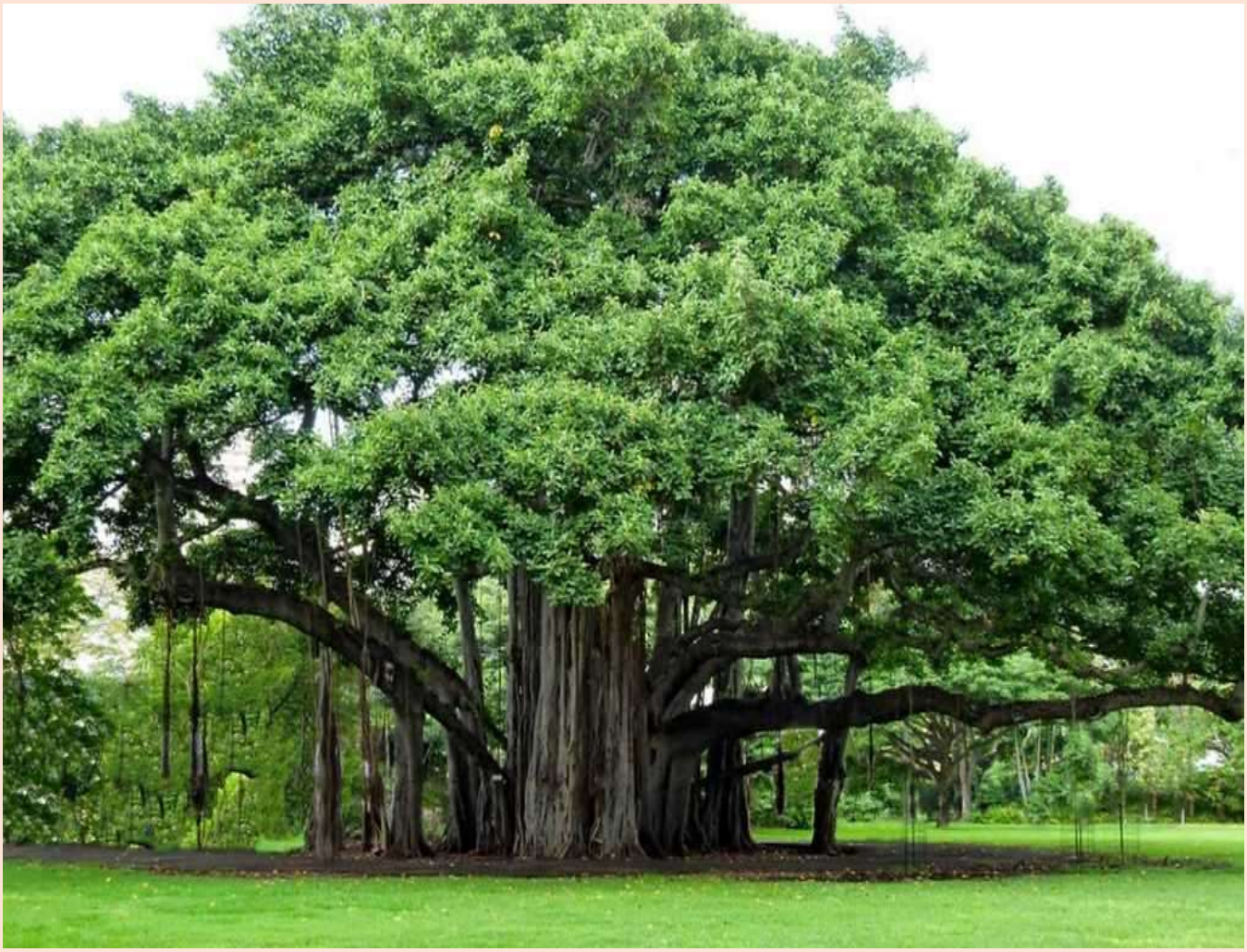

*Global Deforestation Patterns: Comparing Recent and Past Forest Loss (Credit: bioone.com)*




*This map shows the number of tree species per hectare across the global forest range, which was derived using data from ~1.3 million global forest inventory plots compiled and standardized by the research team (Credit: Purdue University)*

In the dance of sunlight and shadow, the forest whispers secrets of life itself. Its disappearance is a silent lament, a farewell to nature's symphony."

***"Learn character from trees, values from roots, and change from leaves."***
*– Tasneem Hameed*



***World's largest single tree canopy---The Indian banyan tree Thimmamma Marrimanu, is a globally recognized marvel. It is located in Anantapur district, about 25 kilometers from Kadiri, Andhra Pradesh, India. Over 800 years old, it has the world's largest canopy, spanning an astonishing 2.19 hectares with nearly 4,000 roots***

*"Every forest branch moves differently in the breeze, but as they sway, they connect at the roots."-Rumi*

"A tree is an incomprehensible mystery."

— **Jim Woodring**

## SCIENCE: OUR DISAPPEARING FORESTS

***'You don't know what you've got until it's gone. We might never sufficiently understand what was even lost"*** ------ *Victorine Che Thoener, Senior Advisor, Greenpeace International*

**Forests were damaged after Hurricane Gudrun and the fallen trees were removed by loggers. The route they created for clearing the logs formed the landscape for this image. reddit.com**

It is astonishing to learn that Global maps of places where people and forests coexist show that, as of 2020, around 1.6 billion of us live within five-kilometer radius of a forest!

We keep believing that these forests will last forever, until one day we suddenly find that they are simply gone. We don't care to notice that the little birds that visit us daily, the butterflies hovering in our gardens, and the wild creatures that hide in the nearby bushes are also vanishing one by one.

According to the Food and Agriculture Organization (FAO), an estimated **420 million ha** of forest has been lost worldwide through deforestation since 1990, but the rate of forest loss has declined substantially. In the most recent five-year period (2015–2020), the annual rate of deforestation was estimated at 10 million ha. The vast majority of the remaining ecosystems are heavily degraded.

It's true that, for many, the significance of forests only becomes apparent when their absence *directly impacts* their own lives like flash floods, prolonged dry spell, air- pollution lasting for days and months together, devastating forest fires, massive landslides and sudden subsidence. One may cynically say that while conservation of nature is a matter of survival for the victims of natural calamities, it is an ideal preached by politicians; a subject of study for academicians; a project for social organizations, a subject matter for books and periodicals, or a theme for discussion in international conferences.

In this article, for the benefit of the readers, we recapitulate the facts already known to us on forest conservation-- like the importance of the forests, why they are being destroyed relentlessly and what are the consequences. We discuss how historically the rulers in the past had tried to maintain the ecological balance, and how and why that balance got upset. Taking from there we look at the global and local initiatives in conservation that still give us hope. And, finally, we stress the need for each of us to behave as responsible

> "In the quiet of the forest, nature speaks volumes. Its disappearance leaves us with a deafening silence, a reminder of what we stand to lose."

citizens in conserving our precious forests.

### 1. Why do forests matter?

- Cover one-third of the Earth's land mass- critical pillars for both environmental health and human well-being.
- House three quarters of terrestrial biodiversity.
- Home to over half of the world's terrestrial species, including 80% of amphibians, 75% of birds, and 68% of mammals.
- Play a pivotal role in combating climate change. Mitigation potential estimated between 4.1 and 6.5 GtCO2e by 2030- indispensable role in meeting international climate goals.
- Regulate clean air, and filter water
- Provide 40% of the planet's oxygen, help carbon sequestration, biodiversity preservation, and regulation of water cycles.
- Vital shields against extreme weather conditions, such as storms and floods.
- Essential in supplying drinking water to nearly half of the world's largest cities.
- Home to many Indigenous peoples and communities.
- Globally, over 2 billion people live in and around forests and rely on it for food, shelter, water fuels, medicines and livelihoods.
- Offer invaluable resources and protection for communities that rely on them for their livelihoods and security.
- Forests also provide more than 86 million green jobs.
- An estimated 880 million people worldwide spend part of their time collecting fuelwood or producing charcoal, many of them women
- Forests are considered worth more dead than alive- whether it be logging for valuable woods like mahogany or making space for cattle ranching
- Forest ecosystems share food, water and even signal warnings to each other through an underground network of fungi
- Forests remain places of mystery that continue to confound us.

### 11. Why do Forests disappear?

- Two-thirds of global forest cover loss – occurring mainly in the tropics and sub-tropics (WWF)
- Driven primarily by human activities such as deforestation
- Large-scale commercial agriculture (e. g. Soya bean, oil Palm)-accounts for 40% of tropical deforestation 2000-2010
- Local subsistence Agriculture- 33%
- Shifting agriculture or "slash and burn" - 24 percent.
- Urbanization and infrastructure development.
- Unsustainable mining
- Bad logging practices

The gnarled trees are what show the harshness of the tortured landscape."— Anthony T. Hincks

## The Extent of Damage

- Between a third and a half of the world's trees are at risk of extinction
- Every year, around 10 million hectares of forests globally are destroyed.
- About 178 million ha has been lost since 1990, an area about the size of the country of Libya.
- In 2021, 3.75 million of hectares disappeared, producing 2.5 gigatons of carbon dioxide emissions, contributing to climate change, loss of biodiversity, soil erosion, and disruption of local ecosystems
- Over 43 million hectares, an area roughly the size of Morocco, was lost in deforestation hotspots between 2004 and 2017

**The aftermath of hydraulic mining (Getty Images)**

## The Consequences

- Deforestation contributes to about 25% of global greenhouse gas emissions
- Deforestation results in water shortage,
- emerging infectious diseases
- crop failures
- Spread of unsustainable and harmful monoculture e.g. vast palm oil plantations of Borneo (Indonesia)
- Industrial-scale destruction
- Deforestation of tropical forests could lead to the loss of as many as 100 species a day.
- **Deforestation** and climate change could cause the destruction of nearly a quarter of all natural **habitats** around the world.

**Deforestation in action.** Photo credit: AP

"People are eager to take whatever is left, like gold and timber--------It's hard to get people to let go of something that's making them so much money" ---Article in **NY Times**

## A CANOPY UNDER THREAT

***"A forest fire, dynamite explosion, or just a simple axe can destroy a thriving, bio-diverse landscape in a matter of seconds"***

**Brazilian police guard a raft loaded with confiscated logs that were illegally cut from the Amazon rain forests (AP)**

**Blogspot.com**

**An aerial view of a deforested area of the Amazon jungle due to illegal mining (Credit: Reuters)**

When the axe came into the forest, the trees said the handle is one of us---**Alice Walker**

**Forest Fires** 'A wildfire is defined as an unplanned, uncontrolled and unpredictable fire in an area of combustible vegetation which includes the burning of forests, shrublands and grasslands, savannas, and croplands'. Ferocious forest fires are reported in one part of the world or the other every now and then.

### What causes forest fires?

- An increasing share due to human activity, intentional or otherwise.
- By negligence -burning rubbish and debris, industrial accidents, agricultural overspill etc.
- Also fueled by persistent hotter and drier weather due to climate change.
- In some tropical and subtropical regions, forest fires are mostly intentionally set for land conversion for agriculture
- Poor forest management

### Forest Fires Around the World

- Devastating forest fires in 2022 in the Brazilian amazon --- highest level they've been in 12 years.
- The carbon dioxide released into the atmosphere from the California wildfires in 2020 was 25% more than California's annual emissions from fossil fuels.
- In summer 2022, carbon emissions from wildfires in the EU and UK reached the highest level since 2007.
- Even the Arctic, previously all but immune, faces rising wildfire risk

### Impact

- They destroy vital ecosystems. The 2019-20 wild fires in Australia killed or displaced an estimated 3 billion animals.
- Impact economies and people
- Release millions of extra tons of carbon into the atmosphere
- Devastating consequences on human health and wellbeing, biodiversity and economies around the world.
- Increases global heating. Globally, fires emit carbon dioxide emissions equivalent to the European Union every year
- Wildfires and climate change are "mutually exacerbating"
- Global increase of extreme fires will be up to 14 per cent by 2030, 30 per cent by the end of 2050 and 50 per cent by the end of the century, according to the UNEP

### What it means to us?

- A hotter world means a greater risk of heat stroke for outdoor workers, particularly in agriculture and construction.
- Air conditioning saves lives and improve the quality of life, but it also uses a massive amount of power and releases heat as a byproduct
- The effects of wildfires linger long after the flames die down, hitting public health and wellbeing far into the future.
- Every year, an estimated 340,000 premature deaths occur from respiratory and cardiovascular issues attributed to wildfire smoke.
- The economic costs of rebuilding after wildfires can be beyond the means of low-income countries and people.
- Watersheds are degraded by wildfires' and also can lead to soil erosion
- Wastes left behind are often highly contaminated and require appropriate disposal.

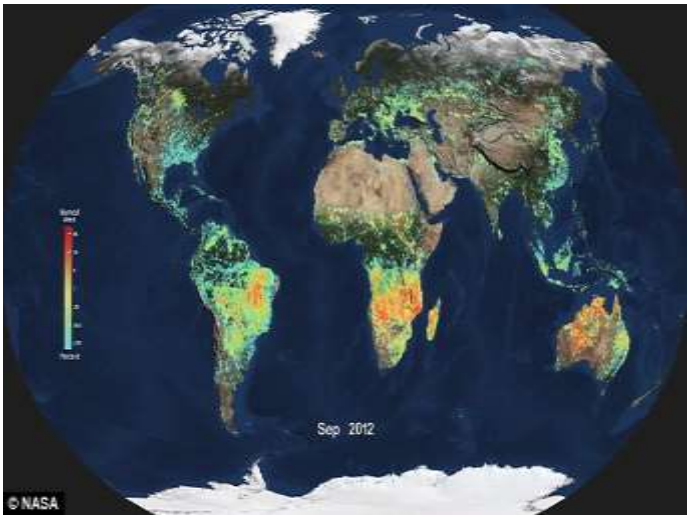
"A spark can set a whole forest on fire. Just a spark. Save it-----**Charles Bukowski**

Northern California fires **(recordnet.com)**

**Forest fires in Northern Canada (HuffPost)**

**Raging fires in Australia (Yahoo!)**

Forest fire in the Indian Himalayas (Reddit)




**NASA - Fire map of the world**


**Map shows devastating scale of wildfires across Europe | Metro News**

According to WWF, from the Amazon to the Arctic, wildfires around the world are increasing in frequency and intensity every year,

> "The forest fire burns even a tree like sandalwood."
> — **Chanakya**

causing severe long-term problems for the health of the planet and people. Climate change and wildfires mutually reinforce each other. The fires burning today in many parts of the world are bigger, more intense, and last longer than they used to be.

Most of the data on forest fires is sourced from the Global Wildfire Information System (GWIS), a joint initiative of the Group on Earth Observation (GEO) and Copernicus, the Earth observation component of the European Union's space program. GWIS detects wildfires through the use of satellite imagery and provides excellent, up-to-date reports on wildfire extent, emissions, and pollution at a very high resolution (see photos)

**Solutions** Experts say that since humans are responsible for around 75% of all wildfires, the solutions are also in our hand. They recommend that governments should adopt a new **'Fire Ready Formula',** with two-thirds of spending devoted to planning, prevention, preparedness, and recovery, with one third left for response. They point out that 'direct responses to wildfires typically receive over half of related expenditures, while planning receives less than one per cent'.

It is more about preventing fires than about extinguishing them. To prevent fires, a combination of data and science-based monitoring systems with indigenous knowledge and drive towards a stronger regional and international cooperation are needed.

**Historical**

Throughout history, various civilizations recognized the importance of maintaining the ecological balance. These efforts were shaped by cultural, economic, and environmental factors and they varied greatly in their methods, with varying degrees of success and impact. As societies evolved and technology advanced, they often prioritized short-term gains over long-term sustainability.

**Ancient Civilizations:** Societies recognized the importance of forests. Practices such as controlled burning, selective logging, and taboos on tree felling followed to ensure the sustainable use of forest resources.

**Mesopotamia:** **The Code of Hammurabi** (circa 1754 BC) had regulations aimed at preserving forests and controlling deforestation.

**China:** Ancient Chinese civilizations recognized the importance of forests for soil conservation and water management. They implemented measures such as afforestation and regulations against excessive logging.

**India:** The ancient Indian texts, such as the *Arthashastra*, prescribed rules for forest management, including regulated cutting and protection of certain species.

**Classical Period: Greece and Rome:** Both civilizations valued forests for timber, fuel, and wildlife. They had laws to protect certain forests, and leaders like Julius Caesar in Rome implemented policies for forest management.

**Medieval Europe:** Feudal System: Forests were often controlled by the nobility for hunting and timber. Kings, like William the Conqueror in England, established royal forests and implemented regulations to preserve them.

**Early Modern Period:** In Europe, the enclosure of common lands led to deforestation in some regions. However, this period also saw the rise of forest reserves and early conservation efforts by individuals like John Evelyn in England.

**Modern Era:** The Industrial Revolution increased the demand for timber and led to widespread deforestation in many regions.

"Destroying rainforest for economic gain is like burning a Renaissance painting to cook a meal." – **E.O. Wilson,**

**Colonial Era: North America:** Indigenous communities had longstanding practices of sustainable forest management. European settlers initially exploited forests for timber and agriculture, leading to deforestation. However, as resources became scarce, conservation efforts emerged.

**Asia and Africa:** Colonial powers often exploited forest resources, leading to deforestation and degradation. However, some areas were set aside as protected forests or game reserves.

**The 19th century-** emergence of organized conservation movements- Advocacy by Influential figures such as John Muir and Henry David Thoreau in USA. Establishment of the world's first national parks, such as Yellowstone National Park in 1872.

**Enactment of legislations** In the United States, the Forest Reserve Act of 1891 authorized the President to set aside forest reserves from the public domain.

Countries around the world began implementing forestry laws and regulations to manage and conserve forest resources.

**International efforts**

- Organizations such as the **International Union for Conservation of Nature (IUCN) and the World Wildlife Fund (WWF)** were established to coordinate global conservation efforts and advocate for the protection of natural habitats.
- Major development agencies, such as the **World Bank, Food & Agriculture Organization (FAO) and the United Nations Development Program (UNDP),** are working towards combating deforestation on the ground.
- Initiatives such as the **United Nations REDD+ Program** (Reducing Emissions from Deforestation and Forest Degradation) aim to incentivize forest conservation and sustainable management in developing countries.

**International Agreements and Protocols**

- **The United Nations Conference on Environment and Development (UNCED)** held in Rio de Janeiro in 1992 -- adoption of the Rio Declaration on Environment and Development.
- **The Kyoto Protocol (1997**) and **the Paris Agreement (2015**), recognized the role of forests in mitigating climate change and provided mechanisms for forest-related climate finance.
- **The UN Climate Change Conference of the Parties (COP26) held in Glasgow** in 2021 vowed to halt and reverse deforestation involving more than 90 per cent of the world's forests by 2030 at the pledging about $19.2 billion of public and private funds.
- **Stockholm +50** held in 2022 in which leaders recommended bold environmental action to accelerate the implementation of the 2030 Agenda

**Community-based conservation approaches** and the recognition of indigenous land rights are increasingly being integrated into forest management strategies.

**Efforts by Governments, non-governmental organizations, and international bodies** include protected area designation, sustainable forest management practices, reforestation and afforestation projects, and initiatives to combat illegal logging and wildlife trafficking.

Conservation is a state of harmony between men and land—**Aldo Leopold**

### Analyzing Household Economic Foot Prints

- While climate change is a global concern, issues such as water scarcity and air pollution are often localized or regionalized. For example, excessive water use in one region may not directly affect water scarcity elsewhere. Therefore, focusing on local environmental issues is crucial; hence the importance of understanding household environmental footprints.
- A recent study titled 'Water, air pollution and carbon footprints of conspicuous/luxury consumption in India', highlights the environmental impact of affluent individuals, particularly those who engage in consumption beyond basic needs. The analysis compares these luxury consumption footprints with those associated with non-luxury consumption.
- The study reveals that environmental footprints increase as households move from poorer to richer economic classes. Specifically, the footprints of the richest 10% of households are approximately double the overall average across the population (Credit: The Hindu dated May 22, 2024)

## Issues

- Competing land-use interests, and limited capacity in developing countries and weak enforcement of environmental regulations,
- Studies show that the carbon credit trading system has not proven to be very effective in reducing greenhouse gases.
- Simply planting trees in ad-hoc and scattered manner can never replicate the diversity of life in a natural forest; few schemes monitor how many saplings survive.
- Giving space to forests to grow and regenerate naturally may be the best way, but it is a slow process.
- Investigation by *The Guardian*, *Die Zeit* and *others* found that the financing mechanism, which aims to provide private funds to protect primary forests, has reduced deforestation only in a very small number of cases.
- The Global North (relatively less populated) largely drove forest development, while most major forests existed in the Global South (relatively densely populated) – made a global accord unlikely. Inadequate funding, weak enforcement of environmental regulations, competing land-use interests, and limited capacity in developing countries.
- Inadequate funding. At least US$130 billion (around €118 billion) a year is needed to protect the most at-risk areas of tropics.

## Reversing Environmental Damage: Inspiring Global Efforts

Across the world, numerous initiatives are proving that environmental restoration is possible, offering hope for a sustainable future. The United Nations has recognized 10 innovative efforts globally, seven of which focus on land and forest restoration.

- **Trinational Atlantic Forest Pact:** The Atlantic Forest once stretched across Brazil, Paraguay, and Argentina. To date, 700,000 hectares have been restored, with the goal of reaching 1 million hectares by 2030 and 15 million hectares by 2050.
- **Great Green Wall for Restoration and Peace:** This ambitious initiative aims to restore savannas, grasslands,

> We have to stop the devastating loss of our forests…end the role of humanity as nature's conqueror, and instead become nature's custodian."- **Boris Johnson, former British Prime Minister**

and farmlands across Africa. Launched by the African Union in 2007, the project seeks to restore 100 million hectares, sequester 250 million tons of carbon, and create 10 million jobs by 2030. It aims to transform the Sahel region through a green belt spanning 11 countries. As of March 2019, only 15 per cent of the wall was complete with significant gains made in Nigeria, Senegal and Ethiopia.

- **Multi-Country Mountain Initiative**: Based in Serbia, Kyrgyzstan, Uganda, and Rwanda, this initiative focuses on restoring mountainous ecosystems across multiple nations.
- **Small Island Developing States Restoration Drive**: Focused on Vanuatu, St. Lucia, and Comoros, this project supports environmental recovery in small island nations.
- **Altyn Dala Conservation Initiative**: Active since 2005 in Kazakhstan, this initiative works to restore steppe, semi-desert, and desert ecosystems.
- **Central American Dry Corridor**: By 2030, the initiative aims to restore 100,000 hectares and create 5,000 permanent jobs across the region.
- **Shan-Shui Initiative in China:** Launched in 2016, this initiative operates on a landscape scale, integrating agriculture, urban areas, and natural ecosystems to promote sustainable development and support local industries.

In addition to these, numerous other global initiatives are making significant strides:

- **China's Solar Capacity**: China installed more solar capacity in the first half of 2023 than the US has in its entire history.
- **Fire-Proof Forests:** Since 2017, 2 million hectares of forests across Lebanon, Morocco, Tunisia, and Turkey have been restored. This is the largest restoration effort of its kind in the Mediterranean region.
- **Seoul's Air Quality**: The Seoul metropolitan area, one of the most industrialized regions in the world, has installed hundreds of air-quality monitoring stations over the past two decades, significantly improving pollution data collection.
- **Re-greening Africa:** This initiative has restored 350,000 hectares of land across eight African countries by involving farming communities. The goal is to regreen 5 million hectares by 2030.
- **Costa Rica’s De-Forestation Reversal:** Costa Rica, the only tropical country to successfully halt and reverse deforestation, has seen its forest cover rebound from one-third to nearly two-thirds of its land area since the 1996 implementation of a revolutionary policy that compensates citizens for preserving forests.
- **Forest Preservation in Gabon and Guyana:** Both countries have managed to maintain nearly all their forest cover over the past 20 years, losing only about 1% each.

> The best time to plant a tree was 20 years ago. The second-best time is now.” **— Chinese Proverb**

- **Kichwa People's Forest Vision:** The Kichwa people of Sarayaku in the Ecuadorian Amazon have proposed an alternative economic model that centers the forest in social and economic systems, promoting areas free from resource extraction and ensuring rights for both nature and humans.
- **Trees for Bees in Rwanda**: In Rwanda, a program teaches beekeepers to plant trees, providing bees with shade and protection from heat, which boosts their productivity.

## Keeping the Forests Alive

Despite increased awareness of their importance, forests continue to face unprecedented

### Some Important Facts

- Restoring damaged ecosystems to their original state is harder and takes longer
- Nearly 27 percent of all forest loss - 31,000 square miles per year — caused by deforestation due to demand for food and another 40% due to commercial agriculture
- Forest loss caused by the production of food will likely never regrow and are lost forever.
- 23 percent of global forest loss was due to wildfire
- Most efforts focus on urban planning and development; yet that accounts for less than 1 percent of all forest loss
- Tropical forests cool the world by more than 1°C

(Photo credit wwF)

### Enhancing Conservation Outcomes

- To follow a multi-faceted approach
- Address root causes and involve diverse stakeholders.
- Promote community involvement and empowerment
- Strengthen law enforcement and governance mechanisms
- Incentivize sustainable land-use practices
- Invest in prevention of forest fires
- Follow sustainable mining practices- stop illegal mining and logging- look for alternatives
- Invest in research, monitoring, and technology
- Create awareness through mass media
- Sensitize people who face imminent danger from natural disaster
- Recognize the tree species that are not right for the forest and diversify the species planted
- Governments, global organizations, businesses, consumers and Indigenous peoples and local communities need to work together.
- Empower local bodies (clear mandate; provide funds and functionaries)
- Bring businesses on board; Support credible NGOs

threats from deforestation, degradation, and fragmentation.

**How Individuals can contribute**

- Eco-friendly approach to life
- Build eco-friendly houses
- To have plants and trees wherever possible
- Protect the wilderness and trees around
- Segregate and recycle waste
- Practice fire control measures
- Make responsible consumer choices
- Support conservation organizations
- Advocate for policy change
- Participate in reforestation and restoration initiatives.
- Teach and train children and youth
- Create awareness amongst forest dwellers

**The way Forward** A 2020 study mapping global carbon accumulation potential found that naturally regenerated forests store nearly 32% more carbon than those created through tree planting. As a result, **forest restoration** has become a preferred method over traditional afforestation. In this UN Decade on Ecosystem Restoration (2021–2030), restoration has gained prominence due to its cost-effectiveness and ability to conserve biodiversity more effectively than planting trees alone.

**Miyawaki Method:** One innovative approach to forest restoration is the Miyawaki Method, developed by Japanese botanist Akira Miyawaki in the 1980s. This technique involves planting native species closely together to create dense, fast-growing forests that mimic natural ecosystems.

In Kalimantan, Indonesia, forest restoration is about more than just reforestation. It seeks to restore ecosystems by re-establishing the complex interactions between plants, animals, soil, and water. Native species are planted to restore soil health and revive natural hydrological cycles. As these ecosystems regain balance, they provide habitats for diverse species and contribute to carbon sequestration, mitigating climate change. **(Ref: canindonesia.id)**

spicetreemunnar.com

Key elements include dense, multi-layered planting, enriched soil, and minimal

> Conservation is a cause that has no end. There is no point in at which we will say that our work is finished—**Rachel Carson**

maintenance. This method accelerates forest growth, achieving maturity in 20 to 30 years—ten times faster than traditional forests.

The benefits include increased biodiversity, enhanced carbon sequestration, urban greening, and improved ecosystems. The Miyawaki Method has been successfully implemented worldwide, transforming degraded lands into thriving green spaces, particularly in urban areas.

Mulching plays a crucial role in this method by enhancing soil fertility, preventing dryness, reducing erosion, suppressing weeds, and protecting seedlings from cold. As the mulch decomposes, it enriches the soil, further supporting forest growth. Using this method, "indigenous forests by indigenous trees" can be restored in 20 to 30 years, compared to the 200 years required in temperate regions like Japan or the 300 to 500 years needed in tropical climates.

India has committed to adopting the Miyawaki Method under the Paris Agreement, with a goal to increase its green cover from 25% to 33%.

## The Forest Man of India

**Jadav' Molai 'Payeng** (born 31 October, 1959) is an environmental activist and forestry worker popularly known as born in the indigenous Mising tribe of Assam.

(Credit: onedio)

(Credit:doerlife.com)

Over the course of 40years, he has planted and tended trees on a sandbar of the river Brahmaputra turning it into a forest reserve. The forest, called Molai forest after him, is located near Kokilamukh of Jorhat, Assam, India and encompasses an area of about 1,360 acres / 550 hectares. In 2015, he was honored with Padma Shri, the fourth highest civilian award in India. **(Ref: en.wikipedia.org)**

**Ref: unesco.org; oneearth.org; frontline.thehindu.com; unesco.org; Ourworldindata.org; Oneearth.org; www.unep.org; oneearth.org**

---

Never underestimate the power of One---**Jadav Molai Payeng**

# FOREST CONSERVATION IN INDIA: ARE WE DOING ENOUGH?

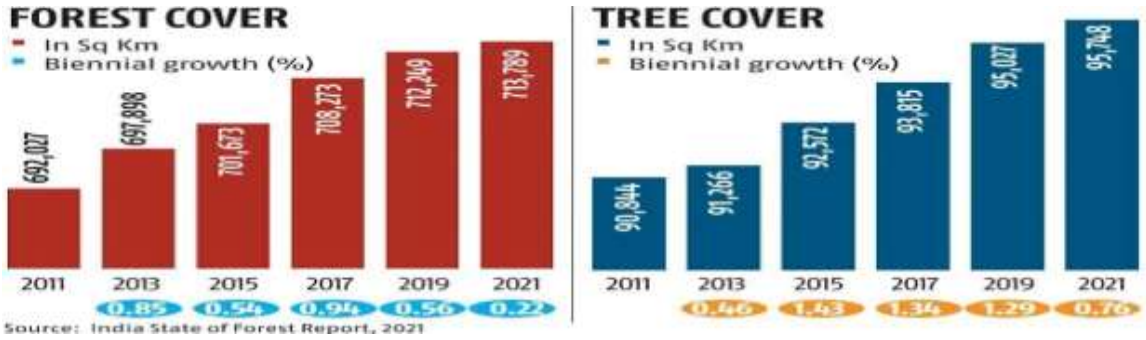
***Achieving a balance between human progress and environmental sustainability is critical for India's climate and development goals.***

India is home to some of the most biodiverse forests in the world. According to the National Forest Policy, at least 33% of the country's total geographical area should ideally be under forest cover to maintain ecological stability. While forests currently cover around 80.73 million hectares, or 24.56% of India's geographical area, the forest ecosystems support the livelihoods of approximately 300 million tribal and local people. India is also home to four of the world's 34 biodiversity hotspots. Forests supply 40% of the country's energy needs and 30% of its fodder.

**Data on Forests** Let us now have a look at the data on our forests.


geographyhost.com

- **Very dense forest: All land with tree canopy density of 70% and above.**
- **Moderately dense forest: All land with tree canopy density of 40% – 70%.**
- **Open forest: All land with tree canopy density of 10% – 40% (Source: State of the Forest Report 2023)**




**Note: The Ministry of Environment, Forest & Climate Change defines 'forest cover' in India as "all lands, more than one hectare in area with a tree canopy density of more than 10%", and 'tree cover' as "tree patches outside recorded forest areas exclusive of forest cover and less than the minimum mappable area of one hectare".**

"The one who plants one *Peepal*, one *Neem*, one *Bar*, ten flowering plants or creepers, two Pomegranates, two oranges and five Mangos, does not go to hell. ------**Varah Purana**


(mungfali.com)

**States/UTs with forest cover less than 10% of their geographical area**

**Ladakh: 1.35 %**
**Haryana: 3.63 %**
**Punjab: 3.67 %**
**Rajasthan: 4.87 %**
**Uttar Pradesh: 6.15 %**
**Gujarat: 7.61 %**
**Bihar: 7.84 %**

(geographyhost.com)

**Top 5 states/UTs with most forest cover area**

Madhya Pradesh: 77,493 sq km
Arunachal Pradesh: 66,431 sq km
Chhattisgarh: 55,717 sq km
Odisha: 52,156 sq km
*Maharashtra: 50,798 sq km*

A tree starts with a seed---**Indian Proverb**

**Top 5 states/UTs with the most forest cover percentage (of their geographical area)**

**Lakshadweep: 90.33 %**

**Mizoram: 84.53 %**

**Andaman and Nicobar Islands: 81.75 %**

**Arunachal Pradesh: 79.33 %**

***Meghalaya: 76.00 %***

**States with the maximum tree and shrub biodiversity**

- **The tropical wet evergreen and semi-evergreen forests of Western Ghats**

**(Tamil Nadu, Kerala, and Karnataka)**

- **The forests of North-east India.**
- **Karnataka has the highest tree species richness followed by Tamil Nadu and Andhra Pradesh.**

**Claims & Counter Claims** Government of India claims that India ranks third globally for annual net gain in forest area and is the only G20 nation on track to achieve its Paris Agreement climate goals.

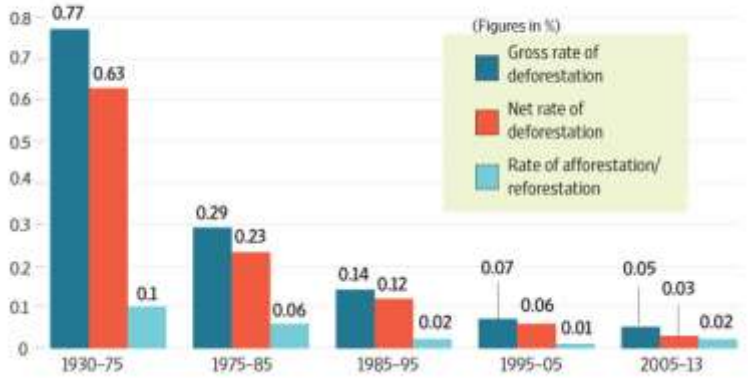
The *India State of Forest Report* (ISFR) 2021 reported a marginal 0.22% increase in forest cover between 2019 and 2021, with a net gain of 1,540 square kilometres. However, these claims have been met with scepticism. Experts argue that the ISFR's methodology is flawed, counting plantations (rubber, coffee, tea), roadside trees, and small patches of trees as part of the forest cover. Additionally, the quality of India's forests has deteriorated across 15,200 square kilometres. Between 2019 and 2021, 9,117 square kilometres of forests turned into scrub and barren lands. Despite restoring 9.8 million hectares of deforested and degraded land since 2011, the overall forest cover has barely increased.

**What we have lost** Analyzing deforestation trends of 98 countries in the last 30 years, a U K-based site for comparison of energy and utility costs, points out that India has seen a dramatic rise in deforestation over the last 30 years, ranking second globally, after Brazil. Between 2015 and 2020, India lost an average of 668,400 hectares of forest annually. Over the past 30 years, 14,000 square kilometres of forests have been cleared for over 23,000 development and industrial projects. Unsustainable harvesting of fuelwood, fodder, and timber has further degraded forest health. Annual harvesting of an estimated 850 million tons of fodder, 100 million tons of fuelwood, and 15 million tons of timber exceeds sustainable limits.

India is also witnessing a significant decline in *forest health*, with the growing stock (GS) of Indian forests has declining by 12.26%, or 586.39 million cubic meters. Official reports show that 94.96% of forests are prone to injuries, and nearly 40% suffer from inadequate re-generation. Between 2015 and 2021, the quality of existing forests degraded across 74,457 square kilometres, an area larger than half the state of Telangana.

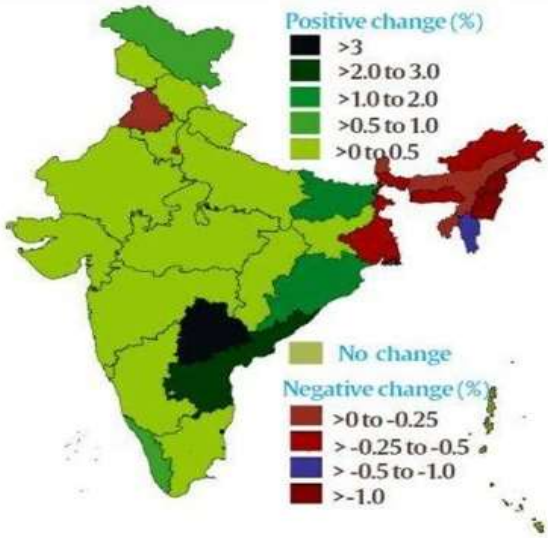
"If a tree is saved even at the cost of one's head, it's worth it."
**Amrita Devi Bishnoi** (circa 1730, during the Bishnoi Movement)

## ANNUAL RATE OF FOREST COVER CHANGE IN INDIA




livemint.com

## GAINS & LOSSES IN FOREST COVER SINCE 2019

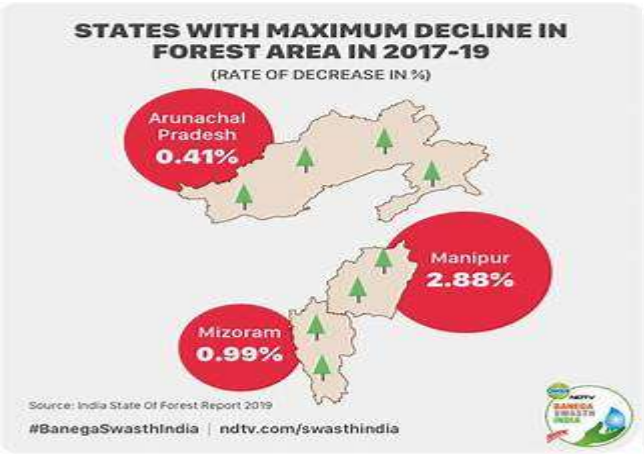


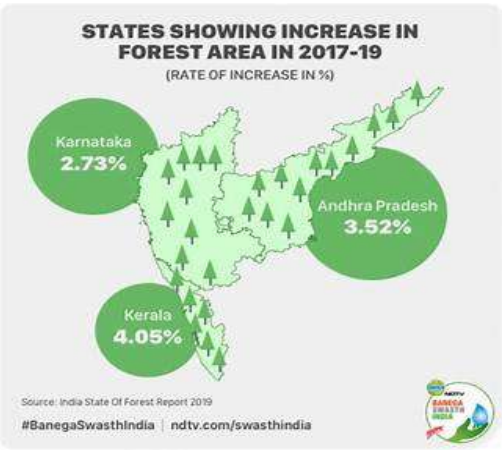

**GAINS**

| State | (sq km) |
|---|---|
| Andhra Pradesh | 647 |
| Telangana | 632 |
| Odisha | 537 |
| Karnataka | 155 |
| Jharkhand | 110 |

**LOSSES**

| State | (sq km) |
|---|---|
| Arunachal Pradesh | 257 |
| Manipur | 249 |
| Nagaland | 235 |
| Mizoram | 186 |
| Meghalaya | 73 |




(optimizeias.com)

"What we are doing to the forests of the world is but a mirror reflection of what we are doing to ourselves and to one another."
**Mahatma Gandhi**

**India-Conservation History** India has framed several policies and taken initiatives to conserve her forests. The creation of forestry policies in India traces back to British rule; forest governance was then highly centralized.

- Systematic forest management began with the passing of the Charter of Indian Forests by the British colonialists in 1855
- The appointment of an **Inspector General of Forests** in 1864.
- The **Indian Forest Act (1927)**- faced criticism due to its outdated provisions and lack of alignment with modern conservation needs.
- Framing of the **Indian Forest Policy** of 1952 and setting a national target of 33 percent for forest cover.
- Enactment of the **Forest (Conservation) Act 1980** (amended in 1988 and 2003) and **Wildlife (Protection) Act 1972**
- **National Forest Policy** in 1988--- shift from revenue-oriented forest management to conservation-orientation.
- Promotion of **Joint Forest Management** involving local community-- A paradigm shift from timber production to forest conservation-
- **Environment Protection Act of 1986**
- **Framing of the National Forestry Action Program** in 1999; target of raising forest cover to 25 percent by 2007 and 33 percent by 2012.
- **Consolidating** all afforestation schemes under the **Ministry of Environment and Forests**
- **Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006**
- The **National Action Plan on Climate Change** (NAPCC) 2008 commits to bring one-third of India's geographic area under forest cover, through afforestation.
- Launching of the **National Afforestation Program (NAP)** in 20024

Despite these rigorous efforts in policy and program, India's combined forest and tree cover has only increased to 24.56 percent of the geographical area.

## What is at stake?

The National Capital Planning Board reported that in Delhi alone, one in seven Natural Conservation Zones (NCZ) disappeared between 2005 and 2012. Additionally, 70% of rivers across India, including the country's 400 major rivers, are classified as critically threatened, due to deforestation.

Farmland trees like mahua, neem, jackfruit, and jamun provide shade, fodder, fuel, and fruit and play an essential role in ecosystem services.

The paper, *Severe decline in large farmland trees in India over the past decade*, published in the journal *Nature Sustainability*, analyzed satellite imagery from 2010 to 2022. Researchers noted that farmlands in many regions lost up to half of their large trees between 2010 and 2018. The loss of trees on farmlands, particularly in Maharashtra and Telangana, has been severe. These areas lost nearly 2.5 million trees between 2011 and 2018.

> "The greed of modern civilization will, if unchecked, exhaust all its natural resources and the future will have nothing left to live on."
> **Rabindranath Tagore**

The highest densities were observed in Rajasthan and Chhattisgarh, with 22 trees per hectare. Over 5 million large trees (5.6 million to be exact), with a crown size of about 67 square meters, disappeared from farmlands between 2018 and 2022 alone.

## Forest Fires in India

Forest fires are a recurring challenge, with 46% of India's forests prone to fire. Forest fires are reported in half of India's 647 districts every year. Himachal Pradesh, for example, recorded 2,763 incidents of forest fires this year from April 1 to June 30, which is the highest figure recorded by the state's Forest Protection and Fire Control division, since 2007. While three forest officers lost their lives in efforts to control the fires, over 23,000 hectares of forest area were affected, including thousands of hectares of new plantations. The forests of the North-east, Odisha, Uttarakhand, Chhattisgarh, Maharashtra and Jharkhand are the most vulnerable. India loses an estimated ₹1,100 crore annually to forest fires.

Based on forest inventory records maintained by the Forest Survey of India, only occasional fires are reported from 54.40% of forests in India; moderately frequent fires occur in 7.49 of the forests and 2.4 per cent are prone to high incidence of fires. Around 35 percent of forests have not reported fires of any significance.

Advanced satellite-based fire detection systems and awareness campaigns are part of the government's efforts to address the problem.

In Kerala, WhatsApp groups play a crucial role in combating forest fires. These groups, often comprising local volunteers, forest officials, and community leaders, share information on fire alerts, mobilize resources, and coordinate firefighting efforts. The Forest Survey of India's alert system also supports these efforts by providing satellite-based fire alerts via SMS and email to registered users, which helps in prompt detection and response to forest fires (Ref: The Hindu)

## Forests & people

Approximately 200 to 400 million Indians depend on forests for their livelihoods, with about 173,000 villages located near state-controlled forests. However, past conservation efforts often alienated forest communities by separating them from their traditional lands and practices. These efforts have had detrimental effects on both the environment and the people dependent on forests.

"Forests are the lungs of our land, purifying the air and giving fresh strength to our people."-**Jawaharlal Nehru**

## THE CHIPKO MOVEMENT

***"Our bodies before our trees."***

**Women in action during the Chipko movement (Credit: bolgspot.com)**

The Chipko Movement, launched in the 1970s in India's Himalayas, was a non-violent, grassroots environmental protest where villagers—particularly women—embraced trees to prevent deforestation. Sparked by the destructive floods in the Alaknanda Valley, leaders like Chandi Prasad Bhatt and Sunder Lal Bahuguna advocated for forest protection to reduce disaster risks. Women played a central role, as they depended on forests for daily needs.

**Sunder Lal Bahuguna leader of the Chipko movement (credit indiatoday.in)**

Despite halting logging and inspiring a 15-year logging ban in Uttarakhand and Himachal Pradesh, some locals later felt disillusioned, as government policies restricted their traditional forest rights. Nevertheless, Chipko is celebrated for demonstrating that marginalized communities value environmental conservation. "The concept of hugging a tree to defend it was so powerful that it brought a new consciousness to the country, placing the environment at the forefront." Its legacy includes the Forest Conservation Act of 1980, the establishment of India's Ministry of Environment, and recognition through the Right Livelihood Award, making it a pivotal movement in Indian environmentalism.

To preserve forests, it's important to listen to tribal communities----**Draupadi Murmu, The President of India**

**The Wayanad tragedy** refers to a devastating series of landslides and floods that struck the Wayanad district in July 2024, triggered by heavy monsoon rains.

Mundakai, Wayanad, before landslides 2024

After the landslides

The region's steep slopes and unstable soil made it prone to such disasters, and the intense rainfall led to landslides in several villages, resulting in over 429 deaths, 378 injuries, and 130 missing.
This disaster underscored environmental concerns, particularly deforestation, unplanned construction, and mining, which have increased the region's vulnerability. It highlighted the urgent need for sustainable development and better disaster preparedness in sensitive areas like the Western Ghats.
The 2011 **Gadgil Report**, led by Dr Madhav Gadgil, called for the creation of ecologically sensitive zones with strict limits on development, a ban on mining, sustainable agriculture, and eco-tourism. However, it faced resistance from state governments and industries. In response, the 2013 **Kasturirangan Report** proposed a more lenient approach, allowing greater development in the region. Both reports' recommendations remain largely unimplemented, with dire consequences.

## Key Challenges

- India's forest conservation policies are hindered by legal ambiguities, implementation gaps, and evolving environmental needs.
- Experts point out that the Act not only dilutes protections, but also clears projects with scant environmental scrutiny.
- Many conservation programs fail to account for the links between ecological and social processes, while there is a lack of effort to decentralize conservation governance.
- Identification and availability of area, lack of research with suitable strategy, conflict of interest among stakeholders are other important constraints.
- The degradation of forests is directly linked to poverty, as nearly 275 million people living under the poverty line rely on forests for subsistence.
- Grazing affects more than 75% of forest areas, while shifting cultivation and encroachment impede conservation efforts across 10 million hectares.
- Finding alternate sources of income for those who are dependent on forests

"Human beings indulge themselves in selective amnesia when it comes to fathom the significance of forests… It's the spirit of the forest that moves the earth."-**The Supreme Court of India**

- Development projects have adequate legal safeguards-problem lies in their implementation

**Amendments to Forest Conservation (Amendment) Act, 2023**

- The contentious Forest Conservation (Amendment) Act, 2023 (FCAA), became operational on December 1, 2023, amidst widespread criticism from different organizations, scientists, non-profits, and even legislators, giving a free hand to States to regularize encroachments and decide on diversions of forestlands.
- Exemptions from the Act include allowing up to 0.10 hectares of forest land for connectivity purposes along roads and railways, up to 10 hectares for security-related infrastructure, and up to 5 hectares for defense- related projects.
- Additionally, strategic projects related to national security within 100 kilo meters of international borders, Line of Actual Control (LAC), and Line of Control (LoC) are also exempted.
- Permitted activities in forest lands include conservation, management, and development efforts, with additional activities like zoos, ecotourism facilities, silvicultural operations, and specified surveys being exempted from non-forest purposes.

Many point out that the Act not only dilutes protections, but also clears projects with scant environment scrutiny.

**Government Schemes & Initiatives**

1. **Green India Mission (GIM)**: Focuses on afforestation, with ₹755.28 crore released to 17 states since its inception in 2015.
2. **Compensatory Afforestation Fund (CAMPA)**: Supports compensatory afforestation efforts. Recently, ₹47,436 crore was transferred to 27 states.
3. **Nagar Van Yojana (NVY):** Launched in 2020 to create 600 urban forests and 400 gardens by 2025.
4. **Biosphere Reserves**: Designed to conserve biodiversity and promote sustainable development.
5. **National Action Plan for Climate Change (NAPCC)**: The government has implemented various schemes under NAPCC, including those related to forest conservation and climate resilience.
6. **National Mission for Sustaining Himalayan Ecosystem**: Focused on preserving the fragile Himalayan region, this mission aims to protect forests, biodiversity, and water resources.

While these schemes have made progress, challenges remain in the form of inadequate resources, lack of local involvement, and poor implementation

**Funding: -** The Union Budget 2024-25 has allocated Rs 3,330.37 crore to the Union Ministry of Environment, Forest and Climate Change (MOEFCC), a 24% increase over the revised

> If man doesn't learn to treat the oceans and the rain forests with respect, man will become extinct---**Peter Benchley**

estimates of 2022-23.
The central government has increased funds for assisting state governments in green matters. In comparison to the revised figures for 2023-24, the allocation this year has increased to 576.58 crore from Rs 430.48 crore.

**State initiatives** Some of the state governments in India are experimenting with innovative solutions, to expand the forest cover in their states. Two note-worthy examples from the states of Telangana and Uttarakhand are discussed below.

### Van Panchayats

- Formed in 1931 after protests against forest reservation, Uttarakhand's Van Panchayats cover areas from under a hectare to over 2,000 hectares, mainly in Almora, Pithoragarh, and Chamoli.
- Village councils manage these forests under the Forest Department's guidance, supporting both conservation and local livelihoods. However, since 1972, amendments have reduced their autonomy, transferring power to officials.
- Currently, about 6,000 of 12,092 Panchayats actively manage 405,000 hectares.
- Despite limited ownership rights and bureaucratic barriers, Van Panchayats are vital in forest fire prevention and resource conservation.
- A 2019 state policy aims to enhance their effectiveness through better resources and decentralization.

**(Ref: theutterakhand.in; www.indiaspend.com)**

(Credit: telanganatoday.com)

### Harithaharam

- Launched in 2015, Telangana's *Harithaharam* (Green Garland) is the world's third-largest afforestation program, using the Miyawaki method to expand forest cover.
- Aiming to green 33% of the state's land, the initiative combats forest degradation and illegal activities.
- Soil conservation, tree planting, and nurseries with species like silver oak and neem are key components.
- Supported by Telangana Haritha Nidhi, the program has planted 2.73 billion saplings, with a 6.85% increase in forest cover and a 14.52% rise in tree cover since 2015, adding roughly 336,000 acres.
- Challenges include indigenous displacement and conflicts with *Podu* cultivators, and the program's future under successive governments remains uncertain.

(Credit: telanganatoday.com)

## Afforestation Vs Restoration

India has largely focused on afforestation programs, but experts recommend a shift towards ecological restoration. The World Resource Institute (WRI) estimates that India has 140 million hectares of potential for forest

"Plans to protect air and water, wilderness and wildlife are in fact plans to protect man." – **Stewart Udall**

protection and landscape restoration, which could sequester 3 to 4.3 billion tons of carbon by 2040.

However, challenges to restoration include:

1. Lack of scientific benchmarks for identifying degraded forests.
2. Insufficient local research on natural regeneration.
3. High costs of restoration.

There is a growing need to involve non-governmental organizations and private stakeholders to scale up efforts.

**Meeting Forest Conservation Challenges in India** We are aware that forest conservation in India faces multifaceted challenges that include governance issues, inefficiencies and corruption, the weak enforcement of existing laws, insufficient training and lack of personnel, conflicting interests between various stakeholders, urbanization, socio-economic pressures, over-extraction and unsustainable use of forest resources, poverty and lack of alternative livelihoods, bureaucratic hurdles and resistance to the implementation of the forest rights, deterioration in the quality of forest administration and lack of political will. Accordingly, some steps have been taken to counter each of these issues. But are they enough? Can India's growing economy handle the contradiction between economic growth and climate action? In this technological era, apart from the Central and State governments, can new ideas and innovative solutions be offered by non-governmental actors as well for the conservation of forests? Here we discuss these issues.

**Forest Conservation Vs. Economic Growth**

India's rapid economic expansion poses a significant challenge to forest conservation. With its population set to increase by 200 million over the next three decades, resource use and infrastructure development will likely intensify. Despite this, a *World Research Institute* report suggests that India can achieve economic growth while decarbonizing its economy by adopting key policies in energy, industry, and transportation.

1. **Electricity:** Introduce a carbon-free electricity standard to ensure at least 75% of electricity is generated from fossil-free sources by 2050, from about 20% at present.
2. **Phase out** the existing coal-based capacity (currently around 200 gigawatts), by the 2040s by closing down inefficient thermal power plants.
3. **Industry**: Improve the efficiency of energy use by at least 25% by strengthening and expanding the coverage of existing programs like the Perform, Achieve Trade (PAT) energy trading scheme.
4. **Introduce** material efficiency, longevity and re-use standards that reduce the projected use of emissions-intensive materials, such as cement and steel, in the economy by at least 15% by 2050.
5. **Fossil Fuels** Substitute approximately half of the fossil fuel used to generate energy for industrial processes with electricity and green hydrogen by 2050.
6. **Transport:** Introduce fuel economy standards- mode shifting from private to public transport and from road to rail transport. Phased electric vehicle (EV) sales to ensure freight

> It's very easy to have slogans and rhetoric that people will follow, but eventually the slogans fall away — **Saad Hariri**

that all two- and three- wheelers, half of all cars, half of all buses and half of the trucks sold in the market are electric (or run by Hydrogen) by 2050.

7. **Enforce** a carbon tax, which is increased in a phased manner over time to reach approximately $75 per ton of CO2e emissions in 2050.
8. A**dopting environmental, social and governance** (ESG) strategies and investments in trees and forests by Indian companies

### Innovative Solutions for Forest Conservation

In recent years, several initiatives have emerged with innovative solutions for forest conservation.

In September 2021, the World Economic Forum launched the *Trillion Trees: India Challenge* to drive innovative solutions for forest conservation and landscape restoration.

Organizations have developed community-centric and technology-driven models to promote afforestation, agroforestry, and sustainable land use practices.

These are some of the top innovators:

- **Acacia Eco Plantation Services (Gujarat)**: Specializes in urban forests and large-scale plantations using the Miyawaki method.
- **Avani (Uttarakhand)**: Turns pine needle litter into electricity, reducing wildfire risk and creating energy.
- **Centre for Wildlife Studies (Karnataka)**: Works on reducing human-wildlife conflict and promotes agroforestry around wildlife reserves.
- **Farmers for Forests (Maharashtra, Jharkhand, Madhya Pradesh)**: Uses Payment for Ecosystem Services (PES) to prevent deforestation and promote reforestation, linking projects to carbon markets.
- **Good Food Village (Tamil Nadu)**: Promotes community-led natural food forests with diverse fruit trees.
- **Gratitude Farms (Pondicherry and Tamil Nadu)**: Converts infertile lands into organic soil, providing livelihoods to veterans and rural women.
- **Isha Outreach (Cauvery Calling)**: Aims to plant 2.42 billion trees across the Cauvery basin to shift to tree-based agriculture and meet carbon sequestration goals.
- **Orgro Fiber (Gujarat)**: Produces biodegradable sapling bags from agro-waste to reduce plastic use in large-scale plantations.
- **SAI Products (Odisha)**: Supports farmers in intercropping traditional crops with high-value trees.
- **Say Trees Environmental Trust**: Reforests 20,000 hectares of degraded land in Andhra Pradesh with multilayer cropping.
- **St. Jude Herbals**: Develops affordable, sustainable alternatives to pesticides.

> "I never feel danger in the forest. It's my biggest home." "I see God in nature. Nature is God. It gives me inspiration. It gives me power … As long as it survives, I survive"-**Jadav Payeng, the Forest Man of India**

- **Sustainable Green Initiative**: Helps farmers plant fruit trees with innovations in low-cost seedling supply.
- **TERI**: Patented Mycorrhizal technology improves plant nutrient uptake and restores barren lands, used in various regions in India and abroad.

This highlights the innovative strides made toward forest conservation and sustainable land use in India.

## The Way Forward

India's forest conservation efforts need to be more inclusive, decentralized, and collaborative. Key steps include:

1. Creating a nationwide conservation movement involving media, influencers, and voluntary agencies.
2. Strengthening political will by prioritizing conservation in election manifestos and public discourse.
3. Mobilizing financial support from corporates, NGOs, and international agencies.
4. Training school children and communities in forest conservation practices.
5. Decentralizing conservation efforts by empowering local governments and communities.

**Ref: Frontline. the hindu.com Frontline; Indiamongabay.com; www.researchgate.netwww.researchgate.net; www.dhrishtiias.com; geographyhost.com; the www.orfonline.org; Theutterakhand.in; www.indiaspend.com**

---

> Conservation is now a dead word. … You can't conserve what you haven't got. That's why we are for restoration— **Marjory Stoneman Douglas**

# THE FOREST LAWS IN INDIA

-------**SUDHA SHRORTRIA**

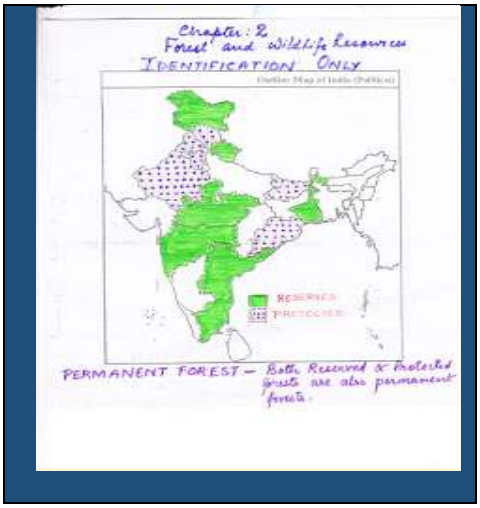
(Photo credit: aequivic)

> *"Forests are national assets; their conservation is the paramount duty of every citizen."*
> — Supreme Court of India (T.N. Godavarman Case, 1996)
>
> *"The state must act as a trustee of natural resources for the benefit of the people."*
> — Supreme Court of India (MC Mehta v. Kamal Nath, 1997)
>
> *"The balance between economic growth and environmental protection is not a choice but a necessity."*
> — Supreme Court of India (Lafarge Umiam Mining Case, 2011)

## Introduction

The forests in India during the colonial period were considered a source of revenue for the government. The British introduced a system of management of forests by enacting the Indian Forest Act in 1865. They amended the Act twice, first in 1878 and then in1927.
In 1894, the National Forest Policy was enunciated by the British Government. The main aim of the policy was on giving the control of the forests to the State and using the forests to generate revenue for the government. To manage the forests, the Government created the post of an Inspector General of Forests (IGF) and established a Forest Department under him.

## The Indian Forest Acts (1865, 1878, and 1927)




A Class X map on Reserved and Protected Forests in India (Ref: blogspot.com)

The Indian Forest Act 1865 was a landmark Act which gave powers to the State to regulate the local use of forests and levy tax on timber and the forest produce. The 1927 Act defined the 'Forest' as an area occupied by the Government for conservation and management of biological and ecological resources.
The forests under the Act were classified into three types – reserved forests, protected forests and village forests. The Government had full authority over the forests and was empowered to demarcate reserved and protected forests.

**The Reserved Forests** under the Act gave proprietary rights to the government, as these were declared so for the conservation and of forests and of wildlife protection

> The word 'forest' must be understood according to its dictionary meaning. This description covers all statutorily recognized forests, whether designated as reserved, protected, or otherwise"---**Supreme Court of India**

resources in the country. Section 3 of the Act empowers the State Government to reserve forests– “The State Government may constitute any forest-land or waste-land which is the property of the Government, or over which the Government has proprietary rights, or to the whole or any part of the forest-produce of which the Government is entitled, a reserved forest in the manner hereinafter provided.”

Activities such as hunting and cutting of trees are strictly banned in Reserved Forests unless a special permission of the concerned authority is obtained by giving a valid reason.

The Eravipuram National Park, Idukki Kerala (Photo: Sudhir Shivaram)

**Protected Forests** are forests declared as such by the State Government for the purpose of conservation and protection. These forests are not reserved under the state government, but the Act empowers the State Government to declare any land as protected forest. The State Government has the power to make rules on the use of these forests and the forest department may allow local people restricted use. Under the protected forests the locals are not given any rights. Breaches under the Act are considered an offence, resulting in imprisonment and fines.

**The Village forests** are ones that the State Government grants rights to certain village communities to manage their own resources in a sustainable manner. The Act provides how village forests can be established and managed.

The State Government can set rules for management and give rights to any village group over land that has been reserved enabling local communities to manage their own resources in a sustainable manner.

**The Forest Conservation Act, 1980**

The Forest Conservation Act,1980 is a Central Act of Parliament, applicable to the whole of India. It is an important piece of legislation which was enacted with the purpose of protecting the forests and ensuring their sustainable usage by restricting the diversion of forests for non-forest purposes. The Act prevents deforestation and ensures that any changes

"It is the spirit of the forest that moves the earth."
**Supreme Court of India, 2024**

made to existing forests are done taking into account the protection of the environment. The Act restricts the State Governments and other authorities from diverting forest land for non-forest purposes without the permission of the Central Government. These cases have to be referred by the State Government to the Ministry of Environment, Forests and Climate Change for approval. Section 2 of the Forest (Conservation) Act, 1980 states as under-

“Notwithstanding anything contained in any other law for the time being in force in a State, no State Government or other authority shall make, except with the prior approval of the Central Government, any order directing-

(i) That any reserved forest (within the meaning of the expression "reserved forest" in any law for the time being in force in that State) or any portion thereof, shall cease to be reserved;
(ii) that any forest land or any portion thereof may be used for any non-forest purpose;
(iii) that any forest land or any portion thereof may be assigned by way of lease or otherwise to any private person or to any authority, corporation, agency or any other organization subject to such terms and conditions, as the Central Government may, by order, specify; [Inserted by the Forest (Conservation) Amendment Act (69 of 1988)]

**Gir Forest National Park (artoftravel.tips)**

(iv) that any forest land or any portion thereof may be cleared of trees which have grown naturally in that land or portion, for the purpose of using it for reafforestation.

[Explanation. [Substituted by the Forest (Conservation) Amendment Act (69 of 1988)] - For the purpose of this section, "non-forest purpose" means the breaking up or clearing of any forest land or portion thereof for-

(a) the cultivation of tea, coffee, spices, rubber, palms, oil-bearing plants, horticultural crops or medicinal plants;

(b) any purpose other than reafforestation; but does not include any work relating to or ancillary to conservation, development and management of forests and wildlife, such as—

(i) silvicultural operations including regeneration operations;

"The provisions enacted in the Forest Conservation Act, 1980 for the conservation of forests and the matters connected therewith must apply clearly to all forests so understood irrespective of the ownership or classification thereof------"**T.N. Godavarman**

(ii) establishment of check-posts and infrastructure for the front- line forest staff;

(iii) establishment and maintenance of fire lines;

(iv) wireless communications;

(v) construction of fencing, boundary marks or pillars, bridges and culverts, check dams, waterholes, trenches and pipelines;

(vi) establishment of zoo and safaris referred to in the Wild Life (Protection) Act, 1972, owned by the Government or any authority, in forest areas other than protected areas;

(vii) eco-tourism facilities included in the Forest Working Plan or Wildlife Management Plan or Tiger Conservation Plan or Working Scheme of that area; and

(viii) any other like purposes, which the Central Government may, by order, specify.";

(2) The Central Government may, by order, specify the terms and conditions subject to which any survey, such as, reconnaissance, prospecting, investigation or exploration including seismic survey, shall not be treated as non-forest purpose."[Inserted by the National Green Tribunal Act (19 of 2010), Section 36, Schedule III (18.10.2010).
Any person aggrieved, by an order or decision of the State Government or other authority made under section 2, on or after the commencement of the National Green Tribunal Act, 2010, may file an appeal to the National Green Tribunal established under section 3 of the National Green Tribunal Act, 2010, in accordance with provisions of that Act.

The law became effective on October 25, 1980, and consists of five sections outlining measures to control and prevent further damage to the country's forests. The Act provides for formation of Advisory Committees to advise the Government. Its importance lies in stopping deforestation, increasing carbon sink effectiveness, and promoting sustainable development.

**Major Differences between the Indian Forest Act,1927 and the Forest (Conservation) Act, 1980**

| **Aspect** | **Indian Forest Act, 1927** | **Forest (Conservation) Act, 1980** |
|---|---|---|
| **Enactment Era** | Colonial-era law (1927) | Post-independence law (1980) |
| **Primary Focus** | Forest regulation and revenue generation | Conservation and environmental protection |
| **Scope** | Classification of forests and control | Restriction on land diversion, afforestation |
| **Community Involvement** | Limited recognition of community rights | Focus on conservation, though not fully addressing local rights |
| **Authority** | State governments have more control | Central government plays a key role in approvals |
| **Nature** | Exploitative (historically) | Conservation-oriented |

"Environment is more important than your civil rights... The environment must prevail over all other rights" -- **Supreme Court of India**

### 3. National Forest Policy

In 1952, the first National Forest Policy was laid down which was revised in 1988. The main aim of the policy was to ensure that the management of forests is undertaken in a sustainable manner and that local communities are involved in their protection and development. One of the important outcomes of this policy was the establishment of Joint Forest Management (JFM). The Policy also sought to regulate utilization of forest resources such as fuelwood, fodder, and small timber to ensure that these activities did not lead to deforestation. It emphasized on protecting the biological diversity.

The National Forest Policy has been under revision for a number of years but has not been finalised. The new policy includes steps to meet the challenge of climate change in India and aims to bring a minimum of one-third of India's total geographical area under forest cover. It also aims to protect the interests of forest- dwellers and tribal people.

### 4. Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006

Photo credit: dreamstime.com

The National Forest Policy of 1988 recognized the link between forests and forest-dwellers which led to the enactment of the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006The law concerns the rights of forest-dwelling tribal communities to land and other resources denied to them as a result of the continuance of colonial laws for decades. It provides rights for habitation, grazing, fishing, access to water bodies, habitat rights for particularly vulnerable tribal groups, traditional seasonal resource access of nomadic and pastoral communities, etc. The Gram Sabha, under this law has been made responsible for conservation and protection of biodiversity, wildlife, forests and other ecologically sensitive areas.

The law has been subject to criticism with opponents claiming it will lead to massive destruction of forests. However, it is important that these rights are recognized in order for justice to be served for those who have been historically wronged.

> The Gram Sabha has a role to play in safeguarding the customary and religious rights of the STs and other Traditional Forest Dwellers (TFDs) under the Forest Rights Act." **Orissa Mining Corporation v. Ministry of Environment & Forest & Others (2013):**

### 5. Forest Conservation Rules, 2022

The Forest Conservation Rules of 2022 are a set of regulations under the Forest Conservation Act to ensure that forest conservation is properly managed. The rules provide for setting up Advisory and Project Screening Committees in each state/UT to advise on matters related to forest conservation. The committees have been given specific timelines for reviewing non-mining projects between 5-40 hectares and mining projects within 75 days. For larger projects, the committee gets more time to review.

As per the rules private developers may clear forests without first seeking permission from the forest dwellers, as well as permit the clearance of a forest without informing its authentic residents.

The Forest Conservation Rules 2022 have been met with criticism from environmental activists and forest dwellers. The rules shift the responsibility of taking the consent of forest dwellers before the approval of a project onto the state governments, allowing private developers to cut down forests without consulting the forest dwellers. Furthermore, the Union Government has the right to permit the clearance of a forest without informing its authentic residents. This contradicts the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, which requires governments to seek free, prior, and informed consent of forest dwellers before allowing a project on their traditional lands.

The rules have been criticized for impacting the indigenous rights of forest dwellers and have caused much distress to those who depend on their livelihood on the forests.

### Forests and the Indian Constitution

When the Indian Constitution was adopted in 1950, the makers of the Constitution did not envisage the magnitude of the forest issues that would arise due to deforestation and inadequate management of the Forest resources.

The subject ‘Forests’ which was originally in the State List meant that the State alone could legislate on issues relating to the Forests. However, it was transferred to the Concurrent List (Entry 17A of the Concurrent List) by the Constitution (Forty Second Amendment) Act,1976 empowering the Central Government to deal with Forest issues.

By the same Amendment Act of 1976, Article 48A was added in the Directive Principles to protect and safeguard the forests, and 51A(g) as part of the Fundamental Duties of the citizens to protect and improve the environment including the forests, lakes, rivers and wildlife.

> The Forest Conservation Act, 1980 ------the provisions made therein for the conservation of forests and for matters connected therewith, must apply to all forests irrespective of the nature of ownership or classification thereof." **Nature Lovers Movement v. State of Kerala & Ors. (2009): Supreme Court of India**

Article 48A: “The state shall make laws to protect and improve the environment to safeguard the forests of the country.”
Article 51A(g): “It is the duty of every citizen of India to protect and improve the natural environment including the forests of the country.

## 6. Forest laws and the Supreme Court

The Supreme Court of India plays a crucial role in upholding and enforcing forest laws by interpreting constitutional provisions, issuing landmark judgments like the *Godavarman Case* (1996) to expand the definition of forests, monitoring forest conservation through committees, and ensuring sustainable development while balancing environmental and economic concerns.

**In a landmark judgment passed in 2013 the Supreme Court of India passed orders to stop the mining of bauxite by Vedanta in the state of Orissa; A photo of Dongria Kondh tribe of Odisha who stood up against the mining by the conglomerate (Credit: kaleidoscope.in)**

Some important judicial interventions by the Supreme Court of India in forest conservation include:

1. **T.N. Godavarman Thirumulpad v. Union of India (1996)**: Expanded the definition of forests and introduced continuous monitoring of forest conservation.
2. **MC Mehta v. Kamal Nath (1997)**: Emphasized the Public Trust Doctrine, asserting that natural resources like forests must be protected for public use.
3. **Lafarge Umiam Mining Case (2011)**: Mandated environmental clearance for projects impacting forests and stressed sustainable development.
4. **Samatha v. State of Andhra Pradesh (1997)**: Prohibited private companies from mining in tribal forest lands.
5. **Interventions in the Forest Rights Act (2006)**: Clarified the rights of forest-dwelling communities while ensuring ecological balance.

These interventions strengthened the framework for forest protection and sustainable use.
In recent years, the Supreme Court of India has continued to play a pivotal role in forest conservation through several significant interventions:

> ""Environmental protection is not merely a legal issue but a moral obligation. Forests are not only a source of economic activity but also play a crucial role in maintaining ecological balance." **State of Himachal Pradesh vs. Ganesh Wood Products (1995)**

1. **Orissa Mining Corporation v. Ministry of Environment & Forest & Others (2013)**: The Court upheld the authority of Gram Sabhas (village councils) in safeguarding the rights of Scheduled Tribes and other traditional forest dwellers under the Forest Rights Act, 2006. It mandated that any diversion of forest land for industrial purposes requires the consent of the affected Gram Sabhas, thereby empowering local communities in environmental decision-making.
2. **State of Himachal Pradesh v. Yogendera Mohan Sengupta (2022)**: The Supreme Court emphasized the necessity of balancing developmental activities with ecological preservation. It reiterated that state authorities must ensure that projects do not compromise environmental integrity, highlighting the duty of the state to protect the environment while pursuing development goals

These interventions reflect the Supreme Court's ongoing commitment to enforcing forest laws, protecting the rights of indigenous communities, and ensuring that development projects adhere to environmental sustainability principles.

## Forest laws and their positive impact

Over the years, due to the enactment and implementation of the Forest Laws is the Country, the indiscriminate diversion of forest lands for non-forestry uses has been restricted. The laws also provide a logical balance between the developmental needs of the country and the conservation of natural heritage. The, guidelines have been issued under the Act from time to time, to simplify the procedures, to cut down delays and to make the Act more user friendly.


**(blogspot.com)**

According to the Ministry of Environment, Forests, and Climate, Change, the Act has succeeded in controlling the indiscriminate release of forest land for non- forestry purposes. Prior to 1980, the rate of diversion of forest lands for non- forestry purposes was about 1.43 lakh ha. per annum. But, with the advent of the Forest (Conservation) Act, 1980, the rate of diversion of forest lands has come down to around 15000 ha.

> ""Preservation of the environment and keeping the ecological balance unaffected is a task that not only the Government but also every citizen must undertake." -**Supreme Court: Rural Litigation and Entitlement Kendra vs. State of Uttar Pradesh (1985)**

per annum and mostly diversion of forest land is allowed to meet the developmental needs for Drinking water projects, Irrigation projects, Transmission lines, Railway lines, Roads, Power projects, Defense- related projects, Mining etc.

**Criticism:** India's forest laws, while instrumental in conserving forests, have faced significant criticism for their top-down approach and impact on forest-dependent communities. The Indian Forest Act of 1927 and subsequent amendments have often prioritized state control over forests, marginalizing indigenous tribes and local communities who have traditionally coexisted with and sustainably managed these ecosystems. Critics argue that these laws emphasize commercial exploitation and conservation from a bureaucratic lens, overlooking community rights and ecological sustainability. The Forest Rights Act (FRA) of 2006 sought to rectify these injustices by recognizing the rights of forest dwellers, but its implementation remains fraught with challenges, including bureaucratic resistance, lack of awareness, and the slow processing of claims. Additionally, recent policy changes, such as those permitting greater industrial access to forest lands, have raised concerns about undermining environmental protection and community livelihoods. This critique underscores the need for reforms that balance ecological conservation with the rights and welfare of forest-dependent communities.

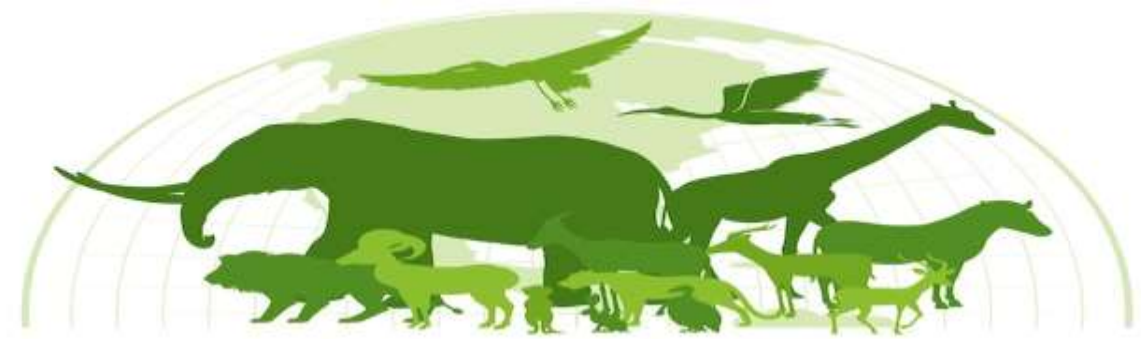
**Conclusion** In conclusion, Indian forest laws have laid a strong foundation for the country's conservation efforts and continue to evolve toward greater inclusivity and sustainability. The Forest Rights Act, 2006, represents a transformative step in recognizing the rights of indigenous and local communities, empowering them as stewards of their natural heritage. While challenges remain in implementation, there is growing momentum for participatory forest governance that values both ecological preservation and the well-being of forest-dependent populations. By building on these positive strides, India has the opportunity to create a model of sustainable forest management that harmonizes conservation with community development.

*(Ms. Sudha Shrortria is a member of the Life Stream Team)*

---

"Forest has to be preserved... It is only because of strict interpretation and exposition by this court that the forest cover is increasing." **State of Kerala v. Valliyamma Chandravally & Ors. (2022): Supreme Court of India**

## WILD LIFE: HUMAN - WILD LIFE CONFLICTS



*(Credit: freepik.com)*

The sight of villagers in Kerala bidding good-bye to their tormenter -a wild tusker named *Arikomban* (rice-raider)- drugged, tied with ropes and being carried in a truck, to be left loose deep inside the Tamil Nadu side of the forests, is an ever-lasting image for the people of Kerala**.** Nearby, wild elephants, belonging to *Arikomban's* herd, too had assembled, quietly watching the show from a distance. Many of the villagers wept, for, *Arikomban* was a daily visitor to their households, appearing suddenly at night, uprooting trees, destroying their crops, and raiding their homes, in search of food. They had a love-hate relation with *Arikomban.*

**Arikomban images 1. In the forest (First Post)**

**2. In captivity (change.org)**

### The importance of wild life

**Wild life** is an essential part of our ecosystem and helps to maintain the ecological balance**.** They contribute to local economies and support livelihoods; wildlife provides 'essential ecosystem services that enhance human well-being'. However, the relationship between people and native wildlife is often fraught with conflict.

### Human-Wildlife Conflict: What It Means

Human-Wildlife Conflict (HWC) arises when encounters lead to negative outcomes such as property damage, loss of livelihoods, or even human fatalities. According to a report by the World-Wide Fund for Nature (WWF) and the United Nations

> The greatness of a nation and its moral progress can be judged by the way its animals are treated-**Mahatma Gandhi**

Environment Program (UNEP) in 2021, over 75% of the world's wild cat species, along with many other terrestrial and marine carnivores, are impacted by conflict-related killings. This includes large herbivores like elephants, which are increasingly endangered due to such conflicts.

HWC is fast becoming a major threat to endangered species like the Sumatran tiger and Asian lion, as well as less endangered species such as the snow leopard and red colobus monkey.

**Four endangered Lion cubs (Credit: Irish Sun)**

**One of the rarest primates The Red Colobus monkey (credit: the Safari world)**

**White Bengal Tiger (Credit: Fatih Turan**


**Leopard resting on a tree (Credit Stock photos)**

The wild life and its habitat cannot speak, so we must and we will—**Theodore Roosevelt**

## Human-Wildlife Conflicts

Some causes underlying these conflicts and how they impact wild life are listed below: -

**Conflicts-why they happen?**

- Human population growth
- Land use transformation
- Species habitat loss
- Forest degradation and fragmentation
- Infrastructure development
- Mining, quarrying and developmental activities along the fringes
- Encroachments
- Break in corridors along which the animals move
- Forest fires

- Effects of climate change
  Illegal wildlife trade
- Growing eco-tourism and increasing access to nature reserves
- Competitive exclusion of wild herbivores
- Abundance and distribution of wild prey
- Increasing wildlife population as a result of conservation
- Increasing livestock populations

## Animals as "Nuisances"

Dr. Ravi Chellam, a conservation biologist, highlights that species such as coyotes, wolves, and beavers are often labelled as nuisances, leading to unnecessary and brutal killings. He argues that terms like "man-eater" are frequently misused, without proper investigation into whether the animal is indeed a threat to human life.

## Mitigating Human-Wildlife Conflicts (HWC)

- Efforts to reduce human-wildlife conflicts include various strategies such as those included in the list below: -

**Mitigating HWC**

- Digging trenches and building fences, wildlife corridors, and erecting beehive fences around farms to deter elephants as cost-effective strategies.
- Effective land-use planning
- Translocating problematic animals:
- Using radio collars and trip alarms
- Deploying sensory-based alarms and drones
- Artificial Intelligence-based warning systems
- SMS or WhatsApp messaging systems
- Relocating villages
- Improving community education and perception of animals
- Use of volunteers for tracking movements

## Innovations

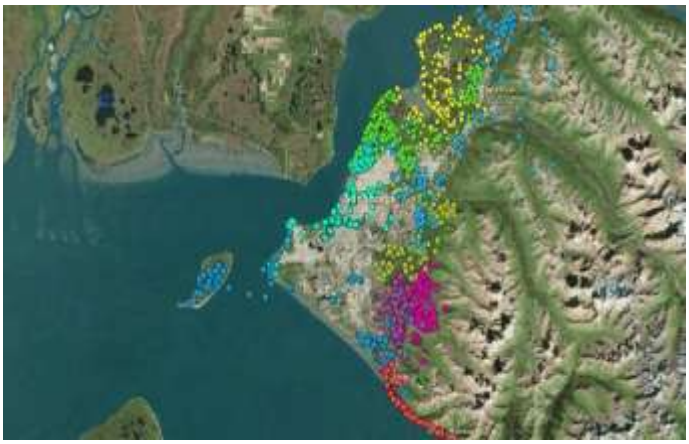
Innovations in wildlife protection are combining technology and community involvement to reduce human-wildlife conflict. A few examples are: -

"The conservation of wildlife and nature is akin to preserving the beauty of the world and its myriad wonders for future generations." **Dr Salim Ali (Ornithologist, Naturalist):**

Alasdair David

Laurence de Groot and Tim Van Dam (Photo Credit: WWF)

- British technologist Alasdair Davies developed an early detection system using infra-red and thermal sensors to identify species like polar bears and tigers, alerting people to their presence.
- **Laurence de Groot and Tim Van Dam** of Shadow View Foundation's solution use LoRaWAN™ technology, linking sensors to monitor animal movements and electric fence breaches, sending alerts via alarms or SMS.
- In Southern Africa's Kavango Zambezi region, lion-proof corrals have reduced livestock killings by 95% and prevented retaliatory lion deaths, aiding lion population recovery.



**1. This wildlife overpass in Canada helps. to cross roads safely. Photo credit: K Gunson 2. 13 'urban' brown bears were tracked in Anchorage, Alaska using GPS study instances of human wildlife conflict. Each dot represents a transmission from a collar to a satellite, while each color represents an individual brown bear. Photo credit: Alaska DP&G.**

- In Canada, wildlife corridors and GPS tracking help researchers predict conflict zones, enabling proactive measures.
- Kerala, (India), uses WhatsApp groups to detect forest fires, demonstrating the power of grassroots efforts. In the Western Ghats, elephant tracking collars with SMS chips warn residents of elephant movements, cutting human deaths by 50%.
- Eco-tourism, run by local communities, provides economic opportunities while supporting conservation efforts.

These innovations highlight the role of technology and local engagement in wildlife protection.

"We still have substantial amounts of forests left in some areas, particularly in the huge swathes of the tribal belts of Central and North East India, but they are "empty forests" --

**-Dr. K. Ullas Karanth**

**Man-Elephant Conflicts- India** Asian elephants range across 13 countries in South and Southeast Asia. While all elephant species face numerous threats, Asian elephants may be the most endangered.

India is home to 30,000 wild Asian elephants, with around one-fifth residing in Assam. They inhabit dry deciduous to wet evergreen forests and grasslands.

As in other parts of the globe, the conflicts between humans and animals have been steadily rising in India. The growing human population has increased pressure on natural resources, leading to habitat modification and increased human-wildlife conflicts. "Our Protected areas, which comprise a mere 4% of India's landscape, are now mere islands amidst a sea of people, with tremendous demands and pressures being put on them".

Elephants, being large bodied animals, require large space and resources—they are said to spend up to 18 hours a day eating and travel many miles daily in search of food and water. They stray into human settlements due to habitat loss, leading to property damage and fatalities.

Habitat fragmentation in states like Assam and the northeast is severe, with limited corridors for elephants to migrate. Human-elephant conflicts result in over 500 human fatalities annually, with over 100 elephants killed due to poaching, electrocution, and train hits.

**A herd of wild elephants are seen near a village in Nagaon district of Assam, India, Dec 9, 2021. Photo: Xinhua**

According to an article in The Hindu, due to habitat loss in Asia, about 70% of the Asian elephant population is found outside protected areas. Further, in India, elephants affect crops over an area of 0.8 to 1 million hectares annually, impacting the livelihoods of at least 500,000 cultivators through persistent attacks. These conflicts result in economic losses, damage to property, and disruptions to livelihoods. Efforts such as fencing, noise deterrents, and compensation schemes for losses are mostly reactive measures.

"Our parks are often right next to human settlements, they have temples in them, there are pilgrims coming in and out, there's loud music playing. The fact is, that given we have over a billion people, it's amazing we don't have **more** conflict." **Dr. Ravi Chellam,** Conservation Biologist

Types of fencing: bamboo fencing (credit; motherearthnews.com; blogspot. com)

Japanese fencing (pinterest.com)

Jumbo ele-fence Kenya (Gulf News)

Electric fencing (Stock Photos)

A Solar powered fence (yukkampus.net)

Beehives strategically placed along the length of fences keep elephants out. Photo credit: Elephants and Bees Project

Other initiatives include community guarding, setting up community-based solar power fences that deter elephants with non-lethal shocks, growing lemon trees, avoided by elephants due to thorns around paddy fields and bee-hive fencing. An initiative called *Haati Mitra* (friends of elephants), near Guwahati, where volunteers monitor elephant

It's not whether animals will survive, it's whether man has the will to save them ~**Anthony Douglas Williams**

movements to alert the railways, has proved effective.

**Human-Elephant Conflicts in India-Some Facts**

- 222 elephants were killed by electrocution across the country between 2018-19 and 2020-21, 45 deaths caused by trains, 29 by poachers and 11 by poisoning.
- Among the number of elephants died due to electrocution, Odisha accounted for 41, followed by Tamil Nadu and Assam for 34 and 33 respectively.
  - Odisha also tops the list of highest number of elephant deaths caused by trains which is (12 out of 45), followed by West Bengal (11) and Assam (9).
- Elephant deaths by Poaching were highest in Meghalaya (12 out of 29) while poisoning deaths were highest in Assam.
- 1,579 humans are killed by elephants in three years that is 585 in 2019-20, 461 in 2020-21, and 533 in 2021-22.
  - Odisha accounted for the highest number of these deaths at 322, followed by Jharkhand at 291 (including 133 in 2021-22 alone), West Bengal at 240, Assam at 229, Chhattisgarh at 183, and Tamil Nadu at 152(Ref: bujus.com)

**A Hospital for Elephants**

- The Elephant Conservation Care Centre (ECCC) set up an exclusive elephant hospital Garhi village in Churmura village in Mathura district of UP -off the NH2 between Agra and Mathura, by the river Yamuna. It has been functioning as an advanced medical care center for pachyderms. Since 2010, the center has rescued 60 elephants, treated 120 and attended to 200-plus on-site injuries. The 40 elephants are under rehab care at ECCC. Six years in, India's first elephant hospital continues to give abused and exploited elephants a second chance at freedom and safety.
- The Ambani group, industrialists, launched the second elephant hospital in India at Vantara elephantin Jamnagar, Gujarat, earlier this year. (Ref: article in Hindu magazine dated 11-8-2024)

## Human-Tiger Conflict

India also hosts over 75% of the world's tiger population. While human-tiger conflicts are less frequent in northeastern states, they are reported in regions like Kerala.

According to byju's.com, in India, 29 tigers were killed by poaching between 2019 and 2021, while 197 tiger deaths are under scrutiny. Tigers killed 125 humans in reserves between 2019 and 2021. Maharashtra accounted for nearly half these deaths, at 61.

> We only wake up to conflicts when humans are attacked or killed-**Unknown**

## Human-Bear Conflict (HBC)

humanbearconflict.org

In India, all the four species of bears are in direct conflict with human beings. Habitat loss, poaching, and retaliatory killings threaten bear populations. The black and sun bear is also hunted for consumption in some parts of north-east India.

## Other Wildlife Conflicts

Conflicts with species such as deer, nilgai, wild boar, and blackbuck are reported from various Indian states, leading to crop damage and economic losses for farmers.

## India's Efforts in Wildlife Protection

India has made significant strides in wildlife conservation, including:

- Expanding protected areas to over 1,000 national parks/sanctuaries, and 50 tiger reserves
- Celebrating 50 years of 'Project Tiger' and 30 years of 'Project Elephant'
- Establishing the International Big Cat Alliance for global collaboration in big cat conservation
- Ensuring that 5% of India's land is protected, covering most eco-regions
- Enacting strong conservation laws

## Marine Ecosystems

Conflicts extend beyond terrestrial ecosystems. Human activities like overfishing, habitat destruction, and pollution contribute to conflicts in marine environments. Coastal development and climate change exacerbate the pressure on marine wildlife. Protecting marine ecosystems through measures like Marine Protected Areas (MPAs) is critical, yet only 2.7% of the ocean is highly protected today.

## Global Impacts

Human-wildlife conflicts have far-reaching consequences. Communities facing conflicts often bear disproportionate financial losses and health risks. The global supply chain is also affected by the loss of agricultural goods due to wildlife conflicts.

> "Only the government knows why the government is saving the tiger" -- **Govind Singh**, a farmer who lives near the Corbett National Park

**Challenges**_Several challenges hamper efforts to address human-wildlife conflicts:

- The current strategies and solutions do not match the scale of the problem
- Fragmented and piecemeal approaches to conflict management
- With only conservation in focus, there is lack of integrated land-use planning and buffer zones
- The lack of political will
- Lack of adequate preparedness by forest administration
- Poor coordination among organizations and local communities

## The Way Forward

Preservation of rare forms of wildlife, wise use of numerically abundant wildlife, and mitigation of wildlife damage constitute the three facets of wildlife conservation. The first of these is met by setting up national parks. The other two facets depend on how effective are the management strategies that can create opportunities and benefits not only for biodiversity and impacted communities, but also for society and the global economy at large.

A more holistic, long-term strategy is necessary. This includes:

- Proper land-use planning and wildlife management
- Engaging local communities in conservation discussions
- Developing technology for conflict prevention, such as drones and early warning system

**Ref: www.worldwildlife.org; the hindu.com; byju.com; www.ifaw.org; Researchgate.net; howtoconserve.org; conservationindia.org; Science direct**

---

All good things are wild and free-**Henry David Thoreau**

# ECONOMICS: WEALTH FROM THE WILD

***Harnessing Nature's Bounty for Sustainable Development***


## Introduction

The concept of "wealth from the wild" revolves around the sustainable use of natural resources to generate economic value, while preserving biodiversity and ecosystem services. This approach is becoming increasingly critical in a world where environmental degradation and resource depletion threaten both ecological balance and human well-being and more ominously, climate change and natural disasters. *By sustainably tapping into the wealth provided by forests, wildlife, and other natural systems, societies can achieve economic development, without compromising the health of the planet.*
This write-up explores the various dimensions of wealth from the wild, including its economic significance, ecological benefits, and the challenges associated with its sustainable management.

## Economic Significance of Natural Resources

Natural resources, particularly those from forests and other wild ecosystems, play a crucial role in the global economy. According to the World Bank, approximately 1.6 billion people globally depend on forests for their livelihoods, including food, medicine, fuel, and income. Forest ecosystems alone contribute an estimated $130 billion annually to the global economy through the provision of timber, non-timber forest products (NTFPs), and ecosystem services.

- **Forestry and Timber:** The global forestry industry, including timber production, is a significant economic sector. As of 2021, the global timber market was valued at approximately $528 billion, with projections suggesting continued growth. Countries like Canada, the United States, Russia, and Brazil are major players in the timber industry, exporting billions of dollars' worth of timber annually.

> The environmental problems of developing countries are not the side effects of excessive industrialisation but reflect the inadequacies of development"-**Indira Gandhi**

- **Non-Timber Forest Products (NTFPs):** NTFPs, which include goods like medicinal

Resources from forests (timberlineforestryx.com)


Credit: slide share

- plants, fruits, nuts, resins, and honey, also contribute significantly to rural economies. In India, for example, the NTFP sector is estimated to generate around $3 billion annually, providing income for millions of rural households, particularly indigenous communities.
- **Eco-tourism:** Wildlife and nature-based tourism is another vital source of income, especially for developing countries. In Africa, wildlife tourism contributes over $29 billion to the continent's economy and supports millions of jobs. Countries like Kenya, Tanzania, and South Africa derive significant revenue from tourists attracted by their rich biodiversity.

**Ecological Benefits and Ecosystem Services**

Forests have a net carbon absorption of around 7.6 billion tons of CO2e per year, 1.5 times more CO2 than the US emits annually

The wealth from the wild is not just about direct economic gains; it also encompasses the immense value of ecosystem services provided by natural systems. These services are often categorized into provisioning, regulating, supporting, and cultural services.

- **Provisioning Services:** These include the direct benefits humans obtain from ecosystems, such as food, water, fuel, and fiber, apart from timber. For instance, forests contribute to 75% of the world's accessible freshwater, highlighting their crucial role in water supply.
- **Regulating Services:** Forests and wildlands act as natural regulators of the environment.
- **Supporting Services:** These are the foundational processes that make other ecosystem services possible, such as soil formation, nutrient cycling, and pollination. The global economic value of pollination services alone is estimated to be between $235 billion and $577 billion annually, underscoring their importance in global agriculture.

"Forest Economy"—not necessarily two words you're used to seeing side by side, but a powerful combination—climatelinks.org

- **Cultural Services:** Wildlands offer cultural, spiritual, and recreational benefits that,
- while difficult to quantify economically, are invaluable to human societies. The cultural significance of forests to indigenous communities, for instance, is profound, the ambitious goal of forest restoration in Kalimantan, Indonesia, extends beyond as these ecosystems are integral to their identity and way of life. Forests remain places of mystery that continue to surprise.

## Investing in Forests: Challenges and Opportunities

- Forests hold vast economic potential, yet they face significant challenges such as climate change, biodiversity loss, and over-exploitation. Economic incentives to destroy forests are immense, with land conversion for palm oil, beef, and soy driving deforestation in Latin America and Asia, while timber extraction and forest fires plague boreal forests. The production of crops like cacao, peanuts, and coffee has also led to extensive deforestation. Raw materials for weaving baskets, medicinal plants and

Deforestation for palm oil in Borneo (WWF)

wood for fuel are vital resources for the millions who depend on forests for their livelihoods.

- The World Economic Forum estimates that over half of global GDP is potentially threatened by nature loss, highlighting the urgent need for restoration. The annual cost of deforestation, in terms of lost ecosystem services, is estimated at $300 billion. The economic impacts are profound: more than $44 trillion—over half of global GDP—is at risk due to environmental degradation. Financial institutions have been linked to deforestation, with $249 billion in loans and $37 billion in equity investments tied to companies associated with forest destruction between 2013 and 2020. The Forest Declaration Assessment Report indicates that financing for forest preservation must increase by up to 200 times to halt or reverse deforestation by 2030.

> "Economy without ecology means managing the human nature relationship without knowing the delicate balance between humankind and the natural world."— **Satish Kumar**

## Why Invest in Forests?

- Forests provide substantial economic value. The combined worth of intact forests and their ecosystem services is estimated at $150 trillion, roughly double the value of global stock markets. Investing in forests can generate $230 billion in business opportunities and create 16 million jobs by 2030. Additionally, nature-based solutions could contribute to 37% of the climate change mitigation needed by 2030, offering significant co-benefits for biodiversity and job creation.

> When describing a country's wealth, the first statistics used to describe it are the gross domestic product, disposable income and corporate profits. However, the wealth of forests, or the value of a country's natural resources, is often overlooked.

- Sustainably managed forests play a vital role in alleviating poverty, especially in tropical regions where forest-adjacent communities derive a quarter of their income from forest resources. Investments in forest conservation can support livelihoods, enhance food security, and improve resilience to environmental risks.
- Moreover, preserving forests reduces the risk of zoonotic diseases—over 30% of new diseases since 1960 have been linked to land-use changes, including deforestation.

## Business Benefits of Forest Investment

As governments increasingly adopt regulations to combat nature loss and climate change, investing in forests offers businesses a competitive advantage. Forest conservation can enhance

## Dimensions of Sustainable Forestry


(Credit: forrest-india.org)

profitability by reducing capital costs and improving customer loyalty through sustainable practices. Moreover, the sale of sustainable forest products provides direct environmental and commercial returns.

> "Nature is not a drag on growth. Its protection is an unavoidable prerequisite for sustaining economic development."— **Tony Juniper**

## Financing Forest Investments

- Green Bonds: These fixed-income instruments raise funds for projects delivering environmental benefits. With over $200 billion in green bonds issued globally in 2021, market interest is growing (www.spglobal.com).
- Sustainable Fund Investments: Environmental criteria are central to these portfolios, which are becoming competitive with conventional funds.
- Innovative Insurance Products: These solutions facilitate risk management for sustainable agriculture and resilient land management.
- Sustainability-Linked Loans: Loan terms are tied to the borrower's sustainability
- performance, offering lower interest rates or higher premiums based on results.

## Global Initiatives

The World Economic Forum's 1t.org initiative aims to conserve, restore, and grow 1 trillion trees by 2030. The UN's Decade on Ecosystem Restoration seeks to prevent, halt, and reverse global environmental degradation. Leading companies have pledged to plant and protect billions of trees worldwide. In addition, the UNDP has helped countries like Brazil and Indonesia access $320 million in forest-sector climate finance through the REDD+ program.

**Forests and Supply Chains** Deforestation in supply chains poses material, reputational, and financial risks. More than 250 U.S. companies report financial risks from deforestation, estimated between $80 billion and $115 billion. Despite corporate pledges to end deforestation by 2020, no company has fully achieved this goal. Major firms like Mars and Nestlé have made progress in mapping and monitoring supply chains, but challenges remain due to complex sourcing networks.

**India's Forest-Based Economy** In India, forests contribute significantly to the economy. The timber and wood industry, Ayurvedic medicine, and non-timber products such as honey and bamboo sustain many communities. Indian businesses increasingly recognize the link between forest sustainability and long-term economic growth. Companies across sectors are adopting ESG strategies and participating in tree-planting and restoration initiatives.

**Conclusion** The wealth from the wild lies at the intersection of economic development and environmental sustainability. To realize this potential, we must address the challenges of overexploitation, biodiversity loss, and climate change through sustainable management. With supportive policies by governments, easy ways of financing, creating awareness, education, community engagement, and global cooperation, forests can continue to drive economic prosperity and ecological resilience for future generations.

---

**Ref: ww.weforum.org; www.unep.org; www.un.org :nature.org; www.forbes.com; (www. green. Earth); www.nytimes.com**

Economy and environment are the same thing. That is the rule of nature-quoteslyfe.com

## PERSONALITY: JOHN MUIR- A PIONEER IN CONSERVATION

***"The battle for conservation must go on endlessly. It is part of the universal warfare between right and wrong." - John Muir***

John Muir, portrait c. May 29, 1912.

Today, the world is confronted with two pressing challenges: climate change and environmental protection. A century ago, few recognized the dire consequences of neglecting nature and natural resources. Visionaries like Henry Thoreau (1817-1862), John Muir (1838-1914), and Rachel Carson (1907-1964) were among the first to advocate for conservation. Of these pioneers, John Muir stands out for his remarkable foresight and dedication.

John Muir (1838 –1914), often hailed as the "Father of National Parks," was a pioneering naturalist, conservationist, and writer, whose tireless efforts played a crucial role in the preservation of some of the United States' most iconic wilderness areas. His work laid the foundation for the modern environmental movement, and his philosophy continues to inspire conservation efforts worldwide.

### Early Life and Education

John Muir was born on April 21, 1838, in Dunbar, Scotland, to Daniel Muir and Ann Gilrye. Growing up in a strict and religious household, Muir's early education was heavily influenced by his father's deep faith and rigorous discipline. At the age of 11, Muir and his family immigrated to the United States, settling in Wisconsin. Here, Muir's curiosity about the natural world began to flourish as he explored the surrounding wilderness.

Muir's formal education was sporadic, though he briefly attended the University of Wisconsin-Madison. During his time there, he studied botany, geology, and other sciences, which deepened his interest in the natural world. However, Muir was largely self-taught, learning through direct experience in nature and extensive reading.

### The Turning Point: A Journey of Discovery

A significant turning point in Muir's life came in 1867 when he suffered a severe eye injury while working in a factory. The temporary blindness caused him to re-evaluate his life's direction. Following his recovery, Muir embarked on a 1,000-mile walk from

> Everybody needs beauty as well as bread, places to play in and pray in, where nature may heal and give strength to body and soul"---**John Muir**

Indiana to Florida, chronicling his observations of nature along the way. This journey solidified his desire to dedicate his life to exploring, studying, and preserving the natural environment.

## Muir and the Sierra Nevada

As Smithsonian magazine wrote “The father of the conservation movement found his calling on a visit to the California wilderness”

In 1868, Muir arrived in California, where he encountered the Sierra Nevada, a mountain range that would become central to his life’s work. Muir was captivated by the beauty of the Yosemite Valley, where he spent several years living in a cabin, immersing himself in the wilderness. He meticulously studied the geology, flora, and fauna of the region, forming the basis for his later scientific and conservation efforts.

Images of Yosemite National Park (Credit: Pixabay)

Muir’s writings, particularly his essays and articles, captured the imagination of the public and brought attention to the need for preserving wild places.

His work also challenged prevailing scientific beliefs of the time, particularly regarding the formation of Yosemite. Muir’s assertion that glaciers had carved the valley was eventually confirmed and added to his reputation as a knowledgeable naturalist.

**Advocacy and the Founding of the Sierra Club**

John Muir’s influence as an environmental advocate grew as he began to engage in public campaigns to preserve wilderness areas. His persuasive writings and lectures caught the attention of influential figures, including President Theodore Roosevelt, who became an ally in the conservation movement. In fact, President Roosevelt spent some time with him in Yosemite Valley.

> "Climb the mountains and get their good tidings. Nature's peace will flow into you as sunshine flows into trees"—**John Muir**

Theodore Roosevelt and John Muir, Glacier Point, Yosemite Valley

In 1892, Muir co-founded the Sierra Club, an organization dedicated to promoting environmental stewardship and advocating for the protection of wilderness areas. As its first president, Muir led campaigns that successfully protected vast tracts of land, including the establishment of Yosemite National Park. The Sierra Club remains a leading environmental organization to this day, continuing Muir's legacy of conservation.

**Major Works and Philosophy**

**1. John Muir (Wikipedia) 2. John Muir standing by a tree in Muir Woods National Monument, California, U.S. (c. 1902)** ***Credit: H20557/Library of Congress, Washington, D.C.***

Muir was not only a naturalist but also a prolific writer whose works remain celebrated for their eloquence and spiritual depth. His books, essays, and journals convey his belief in the intrinsic value of nature and the importance of preserving it for future generations.

Some of Muir's most significant works include:

- **"The Mountains of California" (1894)**: This book is a classic account of Muir's experiences in the Sierra Nevada, filled with vivid descriptions of the region's landscapes, plants, and wildlife.
- **"Our National Parks" (1901)**: This collection of essays helped raise public awareness about the need for national parks,

> "In every walk with nature one receives far more than he seeks"—**John Muir**

influencing the establishment of the National Park Service in 1916.

- **"My First Summer in the Sierra" (1911)**: This memoir recounts Muir's transformative experience during the summer of 1869, when he first explored the Sierra Nevada.

Muir's philosophy, often described as "biocentric," emphasized the inter-connectedness of all living things and the spiritual value of wild places. "When we try to pick out anything by itself, we find it hitched to everything else in the Universe." - wrote Muir.

He saw nature as a source of inspiration, solace, and wisdom, urging people to experience it, not just for its beauty, but also for the deeper connection it provides to the universe.

**Legacy and Lasting Impact** John Muir's legacy is profound. His efforts were instrumental in the creation of several national parks, including Yosemite, Sequoia, and the Grand Canyon. The establishment of these parks was a monumental achievement in the early conservation movement and set the precedent for the preservation of natural areas worldwide.

Muir's vision also influenced environmental legislation, such as the establishment of the National Park Service and the passing of the Antiquities Act, which allowed presidents to designate national monuments. His ideas have resonated through generations, inspiring countless environmentalists, from Rachel Carson to modern-day advocates fighting for the protection of the planet.

Muir's legacy has been critically re-evaluated in recent years. Although he is revered as a pioneer in environmental conservation, his prejudiced views toward the Black and Indigenous peoples have left a lasting imprint on the Sierra Club and the wider conservation movement. This has prompted debates on how to assess historical figures in light of both their achievements and shortcomings. Some suggest that his views and writings were simply products of the racial and cultural biases prevalent in his time.

**Conclusion**

John Muir's life and works stand as a testament to the power of passion, perseverance, and dedication to a cause. In an era of escalating environmental challenges, his message is more relevant than ever.

---

**Ref: en.wikipedia.org; www.britannica.com;www.pbs.org; www.neh.gov; www.smithsonianmag.com/ChatGPT**

God never made an ugly landscape. All that sun shines on is beautiful, so long as it is wild-*John Muir*

# ART: FOREST ART

----------***The Interplay of Nature, Culture, and Creativity***

**(Credit: Pixabay)**

Not many people have heard of Forest Art.  What indeed is then Forest Art?

Forest Art, (also known as Land Art/ Nature Art/ Environmental Art), a unique fusion of nature and creativity, represents an artistic movement that draws inspiration from forests and natural landscapes.

This form of art is not just a representation of nature but an active dialogue with it, where artists use natural materials, engage with ecological themes, and create works that both reflect and impact the environment.

Forest Art encompasses a broad range of practices, from land art installations and sculpture to environmental art and eco-activism, each contributing to a deeper understanding of humanity's relationship with the natural world.

## Historical Context

The roots of Forest Art can be traced back to the Land Art movement of the 1960s and 1970s, primarily in the United States and Europe. Artists like Robert Smithson, with his famous work "Spiral Jetty," and Andy Goldsworthy, known for his ephemeral sculptures

**Credit: worldpress.com  Spiral Jetty-Built on the northeastern shore of the Great Salt Lake near Rozel Point in Utah entirely of mud, salt crystals, and basalt rocks, *Spiral Jetty* forms a 1,500-foot-long (460 m), 15-foot-wide (4.6 m) counterclockwise coil jutting from the shore of the lake.**

made from natural materials, were pioneers in using the landscape as both canvas and material. These early works challenged traditional

> "Creativity is contagious, pass it on." – **Albert Einstein**

notions of art as something separate from nature, instead emphasizing the transient, evolving, and interconnected nature of life.

As environmental awareness grew in the latter half of the 20th century, Forest Art emerged as a distinct subset of Land Art. It focused more specifically on forests as sites of artistic intervention and reflection. The movement gained momentum in Europe, particularly in Germany, where the International Forest Art Path in Darmstadt became a hub for artists exploring the intersections of art, nature, and ecology.

**Vincent van Gogh--- Undergrowth with Two Figures" is considered to be one of van Gogh's most expressive and emotional works. The painting's swirling brushstrokes and intense colours convey a sense of movement and energy that suggest the dynamic interplay between humans and nature. The painting has become a beloved work of art and is regarded as a masterpiece of Post-Impressionism. It is currently held in the collection of the Cincinnati Art Museum Credit: www.artst.org**

## Materials and Techniques

Forest Art is characterized by its use of natural materials, including wood, leaves, stones, and soil, often sourced directly from the environment where the art is created. These materials are chosen for their inherent connection to the forest, emphasizing the impermanence and cyclical nature of life. Artists may create sculptures, installations, or even performances that integrate seamlessly into their surroundings, gradually decaying or being reclaimed by the environment over time.

**Techniques** in Forest Art vary widely, from the meticulous arrangement of stones or leaves into intricate patterns, as seen in Goldsworthy's work, to the carving of tree trunks or the planting of new vegetation to create living sculptures. Some artists incorporate technology, using light, sound, or digital media to enhance the sensory experience of the forest and draw attention to its hidden dynamics.

**Themes and Concepts** Forest Art often explores themes related to the environment, ecology, and the human-nature relationship. Common themes include:

> "Crafting is not a hobby; it's a way of life." – **Unknown**

**Ephemerality and Change:** Many Forest Artworks are designed to change over time, reflecting the natural cycles of growth, decay, and renewal. This theme emphasizes the transient nature of life and the importance of embracing impermanence.

**Ecological Awareness:** Forest Art frequently addresses environmental issues, such as deforestation, climate change, and biodiversity loss. By creating art that highlights the beauty and fragility of forests, artists seek to inspire greater ecological consciousness and action.

**Spirituality and Connection:** For many cultures, forests are sacred spaces, and Forest Art often explores the spiritual connections between people and the natural world. This aspect of the art can be seen in works that evoke a sense of reverence, contemplation, and unity with nature.

**Interactivity and Participation**: Some Forest Art installations invite interaction, encouraging viewers to engage directly with the artwork and the environment. This participatory aspect reflects a belief in the power of art to foster deeper connections between people and nature. International Forest Art Path, Darmstadt: This annual event in Germany brings together artists from around the world to create temporary installations along a forest trail, each exploring different aspects of the forest and our relationship with it.

## Notable Examples and Artists

**Andy Goldsworthy**: A British artist known for his site-specific installations using natural

pinterest.com

materials. His works, such as "Rowan Leaves & Hole," highlight the beauty and transience of nature (Pl see box below)

> Crafting is the art of turning ordinary objects into extraordinary things.” – Unknown

**Andy Goldsworthy**, the British sculptor, is known for his art and sculpture and photography and not only his work with nature but also his work in nature as he believes that nature is not separate from us, in fact, we are nature ourselves.

source: ignant

Source: creativityfuse

**Movement, change, decay, and light are an integral part of nature and Andy Goldsworthy tries to concentrate on these elements in his art.**

**Andy Goldsworthy showcases the delicate beauty of nature's artistry with a circular arrangement of intertwined bracken that resembles bird nests. Source: fengshuidana (Ref: liveenhanced.com)**

We often forget that WE ARE NATURE. Nature is not something separate from us. So, when we say that we have lost our connection to nature, we've lost our connection to ourselves.

**Nils-Udo:** A German (Bavarian) artist who creates large-scale installations in forests, using

materials like flowers, berries, and tree trunks. His work often blurs the line between art and nature, creating spaces that feel both natural and otherworldly.

**Nils-udo.com**

**Pinterest.co.uk**

**blogspot.com**

**"In the realm of contemporary environmental art, Nils-Udo emerges as a true visionary, crafting masterpieces that bridge the gap between humanity and the natural world. With a deep reverence for Earth's beauty and an unwavering dedication to preserving it, Nils-Udo's art showcases the profound harmony that exists in our ecosystem" (magzoid.com)**

"A basic idea is to achieve absolute purity. Nature performs a demonstration of itself. Every non-natural element is ruled out as impure--**Nils Udo**

**Patrick Dougherty**: An American artist who builds monumental sculptures from saplings

and branches, creating whimsical structures that seem to grow organically from the landscape.

## Beautiful Impermanence

Photo: flowermag.com

Credit: qintessenceblog.com

Credit: amusingplanet.com

Credit: highlike.org

Dougherty has crisscrossed the world weaving sticks into marvelous architectures. Each structure is unique, an improvised response to its surroundings----- part of the adventure of the art-making sends him scouring over the forgotten corners of land where plants grow wild and full of possibility americanart.si.edu

"There is a longing in most of us to cross the forest curtain, unencumbered by worldly possession, and spend a day in the Garden of Eden--**Patrick Dougherty**

## Impact and Significance

Forest Art has had a profound impact on both the art world and environmental discourse. It challenges conventional ideas about art, emphasizing process over permanence, and inviting collaboration with nature rather than domination over it. This approach has influenced a wide range of contemporary art practices, from environmental and eco-art to community-based and participatory art.

Moreover, Forest Art plays a vital role in raising awareness about environmental issues. By situating art within natural landscapes, artists can engage audiences in ways that traditional gallery spaces cannot. The immersive, sensory experience of Forest Art can inspire a deeper appreciation for the natural world and a greater commitment to its preservation.

**Conclusion** Forest Art represents a powerful intersection of art, nature, and ecology, offering a unique lens through which to explore and understand our relationship with the environment. Through its use of natural materials, exploration of ecological themes, and emphasis on ephemerality and change, Forest Art challenges us to rethink our place in the world and our responsibility to the planet. As environmental challenges continue to mount, the messages and experiences offered by Forest Art are more relevant than ever, serving as both a call to action and a reminder of the beauty and resilience of the natural world.

**Ref: en.wikipedia.org; landartgallery.com; www.stickwork.net; orionmagazine.org; www.nilsvido.com; art-planet.org**

---

"My work, like every good flowerbed, has a moment of glory but ultimately returns to the soil," **Patrick Dougherty**

## POEM: A WALK IN THE FOREST

**-Sudha Shrortria**

**A Walk in the Forest**

What is it about the forest I love;

The sun streaking through the leaves above?

Casting shadows on the rustic trail;

Or the thick green veil

Walking down the meandering track

Tea and snack in my back-pack

Lost in thought I wander on;

Oblivious that the sun has since gone;

I march on in the evening light;

Through dense woods I sight

A patch of blue pristine

Calm and serene;

Nature in its unfettered form

Trees standing strong

Undeterred by rain or storm

Home to the tweeting birds carefree;

Fluttering from tree to tree,

Wild animals on a fearless spree

Short-lived is their cheer I fear;

For in the distance

Signs of some movement appear

The slushy earth after the rain

Bears marks of a crane

Trees lying around

Others marked to cut down,

By the hand of greed insane.

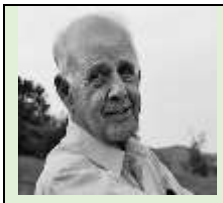
---

**Pxhere.com**

*(Ms. Sudha Shrortria is a former civil servant and a prize -winning poet. She is also the Associate Editor of Life stream)*

"Trees are poems that the earth writes upon the sky." – **Kahlil Gibran**

## POEMS: SONGS OF THE FOREST



### I Go Among Trees and Sit Still

**-----by Wendell Berry**

*I go among trees and sit still.*
*All my stirring becomes quiet*
*around me like circles on water.*
*My tasks lie in their places*
*where I left them, asleep like cattle.*

*Then what is afraid of me comes*
*and lives a while in my sight.*
*What it fears in me leaves me,*
*and the fear of me leaves it.*
*It sings, and I hear its song.*

*Then what I am afraid of comes.*
*I live for a while in its sight.*
*What I fear in it leaves it,*
*and the fear of it leaves me.*
*It sings, and I hear its song.*

*After days of labor,*
*mute in my consternations,*
*I hear my song at last,*
*and I sing it. As we sing,*
*the day turns, the trees move.*
(Credit: mypastoralponderings.com)

### Sleeping In the Forest

**-----by Mary Oliver**

*I thought the earth remembered me,*
*she took me back so tenderly,*
*arranging her dark skirts, her pockets*
*full of lichens and seeds.*
*I slept as never before, a stone on the river bed,*
*nothing between me and the white fire of the stars*
*but my thoughts, and they floated light as moths*
*among the branches of the perfect trees.*
*All night I heard the small kingdoms*
*breathing around me, the insects,*
*and the birds who do their work in the darkness.*
*All night I rose and fell, as if in water,*
*grappling with a luminous doom. By morning*
*I had vanished at least a dozen times*
*into something better.* (Credit: www.bestpoems.net)

**Wendell Erdman Berry** (born August 5, 1934) is an American novelist, poet, essayist, environmental activist, cultural critic, and farmer. Berry's lyric poetry often appears as a contemporary eclogue, pastoral, or elegy. Wendell Berry's poem "I Go Among Trees and Sit Still" is a reflection on the calming and transformative power of nature. This poem beautifully captures the essence of finding peace and clarity through nature, making it a timeless piece that resonates with many who seek solace in the natural world.

**Mary Oliver**

Mary Jane Oliver (1935 – 2019) was one of the most celebrated contemporary American poets who won the National Book Award and the Pulitzer Prize. 'Sleeping in the Forest' by Mary Oliver is a beautiful poem about her connection to nature.

"There is a serene and settled majesty to woodland scenery that enters into the soul and delights and elevates it, and fills it with noble inclinations." - **Washington Irving**

# FOODS: FOOD FROM THE WILD

***"To walk in the forest is to step into a living kitchen, where every leaf and berry holds a story of survival and symbiosis."*** *– Unknown*

**Karonda (Carandas Cherry) Credit: thebetterindia.com**

Most of us living in towns and cities have heard of forest foods, but are only familiar with a few, such as wild honey or berries. Surprisingly, there is growing global recognition of the diversity and nutrient richness of these foods, which offer a unique blend of flavours and health benefits. International conferences are being held to raise awareness about the benefits of wild foods, and the practice of cultivating food forests is gaining popularity. In this write-up, we explore various aspects of forest foods, focusing on plant-based options due to space limitations.

## The importance of Forest Food

For centuries, forests have been integral to our cultural and economic life. Forest foods are often regarded as "superfoods" due to their high nutritional content. For example, the amla fruit is celebrated for its immunity-boosting properties, while wild mushrooms are valued for their protein content and medicinal qualities. These foods are typically organic and free from chemical pesticides, making them healthier options compared to commercially farmed produce.

Many forest foods also have unique medicinal properties. The bael fruit (Aegle marmelos), for instance, is used to treat digestive disorders, while neem (Azadirachta indica) leaves are

> "The forest is not just a source of wood, but also a pantry of nature, offering a diverse array of foods that nourish both body and soul." – Unknown

known for their antibacterial and antifungal properties. Incorporating these foods into daily diets can significantly enhance overall health and well-being.

Economically, forest foods are a vital source of income for many forest-dependent communities. A significant portion of the population, especially among tribal communities, relies on these resources for their survival. The collection and sale of products like wild honey, nuts, and medicinal plants are essential to the livelihoods of these communities, helping sustain their traditional way of life.

## Forest Foods in India

India's forests are incredibly diverse, hosting a wide array of edible plants, fruits, nuts, seeds, roots, and tubers. About 150 plant species in India, Malaysia, and Thailand have been identified as sources of food, including bark, kernels, and tubers. Some of the most commonly consumed forest foods in India include:

**1.Wild Fruits**: Forests are home to numerous wild fruits like jamun (Indian blackberry), amla (Indian gooseberry), ber (Indian jujube), and wild mangoes. These fruits are rich in vitamins, particularly Vitamin C, antioxidants, and other

Carambola (Star Fruit)

*Kodukkapuli* (Camachile)

Mangosteen Credit: thebetterindia.com

essential nutrients. Amla, for instance, is a potent source of Vitamin C and is widely used in traditional Indian medicine. Other examples include bananas, a staple in tropical rainforests, and jackfruit, known for its large size and sweet tastes.

2. **Nuts and Seeds**: Forests provide a variety of nuts and seeds, such as the highly prized chilgoza pine nuts, Sal seeds, and Mahua seeds. These are not only consumed as food, but are also used in traditional medicine. They are rich in essential fatty acids, proteins, and minerals.
3. **Roots and Tubers**: Various roots and tubers such as elephant foot yam, taro, and wild yams are staples in the diets of many tribal communities. These are rich in carbohydrates, fiber, and essential vitamins and are often foraged from the wild and consumed directly or processed into dishes.

> "Forests are the original grocery stores, providing an abundance of food and medicine that have sustained humans for millennia." – **E.O. Wilson**

4. **Leafy Vegetables**: Edible leafy greens such as moringa, amaranth, and colocasia leaves are foraged from the wild. These greens are rich in iron, calcium, and other vital nutrients, forming an integral part of the diets of forest-dwelling communities. Wild leaves, whether fresh or dried, are widely consumed, as they add flavor to otherwise bland staples like rice or maize.
5. **Mushrooms and Fungi**: Indian forests are rich in edible mushrooms,

1. Gucci mushroom *Morchella esculenta*. At Rs 30,000/kilogram is the most expensive mushroom in the world. Credit: Indiatimes 2. Morel mushroom (*Morchella importuna*) Credit: pintrest.com

including the sought-after morels (Morchella spp.), considered a delicacy. Gucci, a wild mushroom found in the Himalayas, is highly prized and can fetch around ₹30,000 per kilo. Mushrooms are a good source of protein, fibre, and various vitamins.

6. **Bamboo Shoots**: Edible bamboo shoots are often used in traditional dishes

7. **Flowers:** Mahua (Madhuca longifolia) is a versatile tree, and its flowers are used in various traditional preparations, especially among tribal communities in India. Mahua is considered a sacred ingredient of their food preparations by some of the tribes.

> "Forest foods are the gifts of the Earth, untouched by human intervention, pure and potent in their natural form." – **Robin Wall Kimmerer**

Mahua flowers: Indiatimes.com


alamy.com

8. **Honey**: Wild honey, collected by indigenous tribes from forest beehives, is highly nutritious and valuable. It is used as a sweetener and for its medicinal properties, being rich in antioxidants and possessing antibacterial qualities.

Moringa pods, flowers and seeds. Credit: Alamy Stock Photo

## Challenges and Conservation Efforts

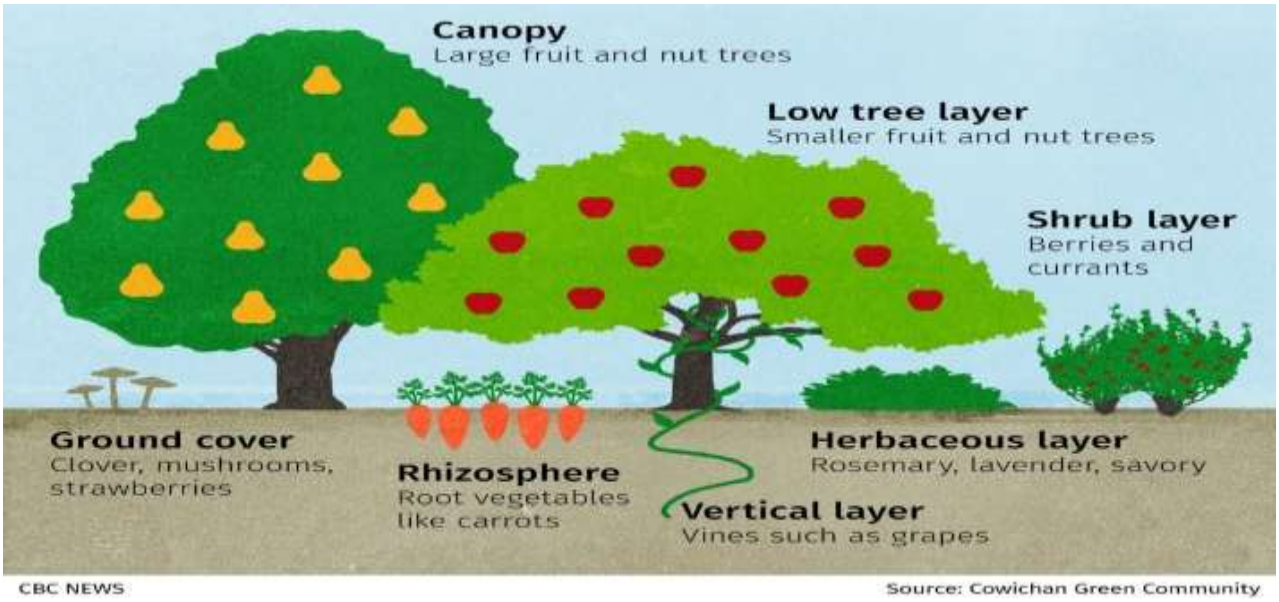
Despite their immense value, forest foods face numerous challenges. Deforestation, industrialization, and the expansion of agriculture have led to the depletion of many forest areas, threatening the availability of these resources. Tribes are increasingly facing challenges to access, consume, and manage wild edible nutritious forest food. Additionally, the loss of traditional knowledge as younger generations move away from forest-based lifestyles endangers the continued use and preservation of these foods. Sustainable harvesting practices are crucial to ensuring that forest foods remain available for future generations. Initiatives like community-based forest management, sustainable harvesting practices, and agro-forestry promotion are vital for protecting forest ecosystems, while ensuring that forest foods remain accessible to those who depend on them.

## What are Food Forests?

"Food forests," also known as "forest gardens" or "edible forests," mimic natural ecosystems by incorporating diverse, layered plant life. Typically, these gardens consist of seven layers: the overstory, understory, shrub layer, herbaceous layer, root layer, ground

> "The forest feeds us with more than just food; it offers us a connection to the Earth, to our roots, and to the cycles of life." – **Winona LaDuke**

cover layer, and vine layer. Sometimes, an additional mycelial layer (mushrooms) is included. As in a natural forest, the plants, animals, and fungi in a food forest work in harmony with one another.




**Credit: CBC.ca**

**forestabundance.com**

## The Way Forward

As the world grapples with issues of food security, healthy foods and environmental sustainability, there is growing recognition of the value of traditional food sources. In an era where modern agriculture often overshadows these traditional foods, the importance of forest foods cannot be overstated. They remind us of the deep connection between nature and humanity, offering a sustainable and nutritious alternative rooted in ancient wisdom.

All gardeners live in beautiful places because they make them so---**Joseph Joubert**

## Flavors from the forests

Here are two simple recipes: -

### Mahua Flower Ladoo

**Ingredients:**

Mahua flowers
Jaggery
Ghee
Cardamom powder
Nuts (optional)

**Instructions:**

1. Dry the mahua flowers and grind them into a coarse powder.
2. Melt jaggery in a pan with a little water to make a syrup.
3. Add the mahua flower powder to the syrup and mix well.
4. Add ghee and cardamom powder, mix until it forms a dough.

Shape the mixture into small balls (ladoo) and allow them to cool.

**Ref: en.wikipedia.org; www.sciencedirect.com; static.pib.gov.in; projectfoodforest.org; ourwildgarden.com**

### Wild Mushroom Stir-fry

**Ingredients:**

- Wild mushrooms
- Olive oil
- Garlic, onions
- Salt, pepper
- Fresh herbs (like parsley or cilantro)

**Instructions:**

1. Clean and slice the wild mushrooms.
2. Heat olive oil in a pan, add chopped garlic and onions, sauté until soft.
1. Add the mushrooms, salt, and pepper.
2. Cook until the mushrooms are tender and slightly crispy.
3. Garnish with fresh herbs before serving.

*Optional: Add Celery, vegetables, Bell Pepper*

---

Gardening is civil and social, but it wants the vigour and freedom of the forest and the outlaw---**Henry David Thoreau**

## JOURNEY: GANGA CALLING

***"I ask that I may leave this body on your banks,***
***Drinking your water, rolling in your waves,***
***Remembering your name, bestowing my gaze upon you"—Gangashtakam***

**Satellite image of River Ganga (Credit: Fine Art America)**

The Ganga, known as the Ganges in English, is the lifeblood of millions in India. Revered as *Ganga Maiya*, the nurturing mother, and as Ganga Devi, the divine goddess, she embodies forgiveness and acceptance in the hearts of the Indian people. The greater part of the Indo-Gangetic Plain, across which the river flows, has been the cradle of Indian civilization.

**The Magnificence of the Ganga**

According to Brittanica, the Ganges-Yamuna area was once densely forested. Historical writings indicate that in the 16th and 17th centuries wild elephants, buffalo, bison, rhinoceroses, lions, and tigers were hunted there. Most of the original natural vegetation has disappeared from the Ganges basin, and the land is now intensely cultivated to meet the needs of an ever-growing population.

Stretching over 2,525 kilometres (1,569 miles), the Ganga rises in the western Himalayas in Uttarakhand. The river's journey begins at Devprayag, where the Alaknanda and Bhagirathi rivers converge. The Ganga's six headstreams—Alaknanda, Dhauliganga, Nandakini, Pindar, Mandakini, and Bhagirathi—merge at five sacred confluences known as Panch Prayag, culminating in Devprayag where the Ganges is traditionally considered born.

After flowing through a narrow Himalayan valley for 256.9 kilometres (159.6 miles), the

> The Ganga to me is the symbol of India's memorable past which has been flowing into the present and continues to flow towards the ocean of the future-**Jawaharlal Nehru**

Ganga emerges at Rishikesh and enters the vast Gangetic Plain at Haridwar, continuing its journey southeast through northern India. The river is home to around 140 species of fish, 90 species of amphibians, and numerous reptiles and mammals, including critically endangered species like the gharial and the South Asian River dolphin. Serving nearly 40% of India's population across 11 states, the Ganga sustains an estimated 500 million people—more than any other river system in the world.


The Ganga River System (Credit: civilspedia.com)

## The Call of the River

In 2014, during his election campaign in Varanasi, Prime Minister Narendra Modi declared, "Ganga Maiya is calling me." This sentiment resonates deeply with every Indian, particularly Hindus, who yearn for a ‘darshan’ of the Ganga at least once in their lifetime.

As a child, growing up without the luxury of TV or mobile phones, my only glimpses of the Ganga were through fleeting moments in Hindi films. Yet, I harboured a secret longing to see the river in person, a dream that finally came true in 1975.

While training at a national academy nestled in the Himalayas, we embarked on a trek to Badrinath and Kedarnath, two of the *Char Dhams*, the sacred pilgrimage sites in the Himalayas. As our bus journeyed through Haridwar, Rishikesh, and the mountainous terrain beyond, the Ganga flowed alongside us, twisting and turning with the landscape.

A view of Badrinath temple

River Alaknanda in Badrinath (en.wikipedia.org)

> Dharma like the Ganges is ever pure. The impurity is only man-made-**Sadguru**

Badrinath, located on the banks of the Alaknanda River in Chamoli district, Uttarakhand, is 243 kilometers from Kedarnath. Though my memories of the trek to Badrinath have faded, I vividly recall the 16-kilometer trek from Gauri Kund to Kedarnath, where the Mandakini River, a tributary of the Alaknanda, flows through rugged terrain. The stunning landscapes of meadows, forests, and streams made the journey unforgettable.

A year or two later, I visited Bihar for a wedding and crossed the Ganga on a raft—bridges were yet to span the river then. The river seemed vast and boundless, dwarfing the rivers of my native Kerala, which appeared puny in comparison.

Kedarnath Temple (en.wikipedia.com)

A view of Mandakini River (euttaranchal.com)

When I started working in Bihar in 1980, I was disheartened to see the Ganga's waters reduced to a trickle, with enterprising villagers growing banana plantations on the dry riverbed. The situation improved slightly with the inauguration of the Mahatma Gandhi Setu bridge in 1982, which allowed me to cross the river many times to visit districts in North Bihar.

**The Chhath Puja Festival** Chhath Puja, a folk festival celebrated throughout Bihar in early winter, honours the rising and setting sun with offerings (Arghya). Before the festival, homes, streets, and riverbanks are meticulously cleaned and decorated. The most enchanting part of the festival is the sight of thousands of lit *diyas* (earthen oil lamps) floating on the river, creating a mesmerizing reflection of the star-lit sky on the water—a sight that remains etched in my memory.

Devotees performing Puja during Chhath festival in Patna (Credit: Getty Images)

> Chhath Puja is a reminder that our roots are intertwined with nature, and our survival depends on its well-being----@mindsquotes.com

## Visits to the Ganga in Uttar Pradesh

I have visited Uttar Pradesh many times, but three visits stand out for their connection to the Ganga.

In 1989, after my mother's passing, we travelled to Allahabad to immerse her ashes in the Sangam, where the Ganga, Yamuna, and the mythical Saraswati meet. It was a poignant moment, as we felt the river cradling our mother's remains, offering a sense of peace and solace.

In 1995, I accompanied my eldest sister to Varanasi to perform religious rites in memory of her daughter. We ventured mid-stream by boat, where she conducted the rituals as prescribed by Hindu scriptures. As we rowed back, I saw the pyres burning at Manikarnika and Harichandra Ghats, where bodies are cremated—a powerful reminder of life's impermanence.

View of the ceremony of the cremation at Manikarnika Ghat front the Ganges River in Varanasi

The spectacular Ganga Aarti at Dashashwamedh Ghat, Varanasi (Credit: Creative Commons)

The third visit was a happier occasion—a simple visit to Benares. The most moving experience was witnessing the Ganga Aarti at Dashashwamedh Ghat, a grand and

> I am convinced that everything has come down to us from the banks of the Ganga – astronomy, astrology, spiritualism, etc. It is very important to note that some 2500 years ago at the least Pythagoras went from Samos to the Ganga to learn geometry. **Francis M. Voltaire**

mesmerizing ceremony performed every evening, leaving us in awe of the river's spiritual significance.

## The Journey to Gomukh

In 2011, inspired by a Discovery Channel program on the Ganges, I embarked on a journey to Gomukh (means shaped like cow's mouth), the river's source. Accompanied by my sister and cousins, we travelled to Gangotri, stopping en- route at Badrinath, Haridwar, and Rishikesh. At Devprayag, we paused to witness the confluence of the Alaknanda and Bhagirathi rivers. In Rudraprayag, we stayed at a guest house with a view of the Sangam, lulled to sleep by the roar of the Alaknanda.

One of the most popular legends in Hinduism involves King Bhagiratha, who performed intense penance to bring the Ganga from the heavens to Earth to purify the ashes of his

Gomukh, Gangotri Photo credit: Alamy

River Bhagirathi-Gomukh (rishikeshdaytour.com)

ancestors. The river's descent was so powerful that Lord Shiva had to capture her in his matted locks to control her flow and prevent destruction.

The Ganga begins at the Gangotri Glacier, located in the Uttarkashi district of Uttarakhand, India, situated at an elevation of about 7,010 meters (23,000 feet). The meltwater from the Gangotri Glacier forms the Bhagirathi River. This river is considered the primary source stream of the Ganga. As the Bhagirathi River flows down the Himalayas, it joins the Alaknanda River, at Dev Prayag, officially forming the Ganges River.

Compared to my visit to the Himalayas in 1975, this journey was different. There was huge rush of people towards the *Char Dhams*- lot more people were travelling. There were many small and big landslides on the way now, when there were hardly any, earlier. We were forced to make unscheduled halts at least at two places delaying our journey. New buildings, hotels, resorts, and places of amusements had all mushroomed. Lot of illegal constructions on riverfronts could be noticed.

Our journey continued to Gangotri, where the Ganga flows beside the Ganga Devi temple, her waters seemingly breaking free from the temple confines to flow freely along.

We began our trek to Gomukh on pony backs, taking breaks at

> "Rivers are places that renew our spirit, connect us with our past, and link us directly with the flow and rhythm of the natural world." – **Ted Turner**

Chirbasa and Bhojbasa.

From Bhojbasa, the final 4 kilometers to Gomukh required a challenging trek over precarious stones under the hot sun. Though I could not complete the trek, I glimpsed Gomukh from a distance, witnessing the Ganga emerging from the glacier and flowing down the slope, with snow-covered mountains standing as silent sentinels.

The return journey in pitch darkness was a testament to the instinctive sure-footedness of our ponies, crossing narrow mountain paths and streams with an uncanny sixth sense.

## Man vs. Development

Today, the entire Himalayan ecology is under threat due to deforestation, climate change, melting glaciers, landslides, and land subsidence. The devastating floods in Kedarnath in 2013, which claimed many lives, are a stark reminder of the dangers we face. This year, the Uttarakhand government advised travellers to avoid non-essential trips, due to numerous landslides and sinking zones along the Rishikesh-Badrinath Highway.

The unchecked construction of roads, buildings, and resorts to cater to tourists and drive economic development is leading to ecological disasters, as seen in Wayanad, Kerala, where reckless human activities have caused the loss of over 400 lives.

## The Ganga Today & Tomorrow


Pollution along the riverbank of Ganga

globaljournalist.org

The Ganga today is severely polluted, with stretches over 600 kilometres (370 miles) considered ecologically dead zones. The river, once a symbol of purity, is now one of the most polluted in the world, posing a threat to both humans and wildlife.

Despite the launch of the Ganga Action Plan and the Namami Ganga project in 2014, the desired results still remain elusive. By 2016, an estimated Rs 30 billion (US$460 million) had been spent with little to show for it.

> “Rivers flow not past, but through us; tingling, vibrating, exciting every cell and fiber in our bodies, making them sing and glide “ – **John Muir**

**Sunset over Ganges (Credit: Fine Art America)**

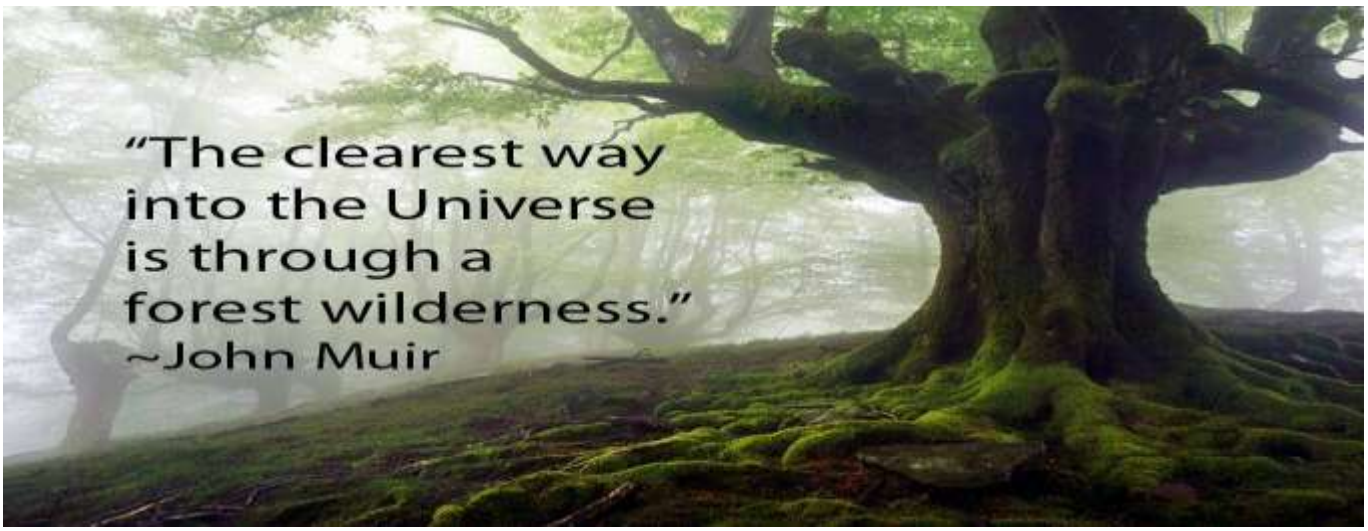
As Jawaharlal Nehru, India's first Prime Minister, famously wrote, "The Ganga, especially, is the river of India, beloved of her people, round which are intertwined her memories, her hopes, her fears, her songs of triumph, her victories and her defeats. She has been a symbol of India's age-long culture and civilization, ever-changing, ever-flowing, and yet ever the same Ganga." If the Ganga perishes, it is not just a river that is lost, but the soul of India itself.

---

"The land where the Ganges does not flow is likened in a hymn to the sky without the sun, a home without a lamp, a Brahmin without the Veda." – **Jean Tavernier, Travels in India**

## UNIVERSE: FORESTS AND THE UNIVERSE

***This write-up explores the intriguing parallels between forests and the universe, emphasizing how monitoring forests from outer space has become vital for environmental conservation and management***




*(Credit: clearlanding.com)*

### 1. A Reflection on Cosmic Harmony

#### (I) Forests and the Universe

At first glance, the relationship between forests and the universe may seem tenuous, particularly to those not versed in science or poetry. The universe, with its vast expanse of galaxies, stars, and planets, operates on an immense scale, yet it mirrors the intricate balance and inter-connectedness found in forests. This concept, where the microcosm reflects the macrocosm, is evident as both systems function through cycles and interdependencies. In the universe, galaxies and stars are born, live, die, and their matter forms new stars—just as in forests, where trees grow, decay, and their nutrients fuel new life. Both operate under principles of constant transformation, where everything contributes to regeneration.

#### (ii) Forests as Earth's Cosmic Guardians

Forests play a crucial role in regulating Earth's atmosphere, akin to how cosmic forces like gravity maintain 'order' in the universe. The balance maintained by forests is essential for climate regulation, biodiversity, and the carbon cycle, making them guardians of Earth's delicate ecological equilibrium. Similarly, the stability of planets and stars in the universe depends on maintaining intricate and ever-shifting balance. Disturbances, whether through deforestation on Earth or cosmic events like galaxy collisions, can have profound and far-reaching consequences.

> "We are all stardust, born of the stars and part of this infinite cosmos." — **Carl Sagan**

### (iii) Biodiversity in Forests and the Diversity of the Universe

Diversity is the driving force behind resilience and evolution in both forests and the universe. Forests teem with life, from towering trees to microscopic fungi, just as the universe is filled with a variety of celestial bodies. Each species in a forest and each star or

Seeing the Universe Above the Forest Reprised (flickr.com)

planet in space plays a unique role in maintaining the system's balance. The loss of a single species can disrupt an entire ecosystem, just as the disappearance of a star can destabilize a galactic or solar system.

### (iv) Cycles and Energy Flow

Energy flows through both forests and the universe, sustaining life and driving movement. In forests, energy begins with photosynthesis and is passed through trophic levels, eventually returning to the soil through decomposition. In the universe, stars generate energy through nuclear fusion, influencing planetary formation and life conditions. Both systems rely on continuous energy transformation, ensuring the perpetuity.

### (v) Cosmic Inspirations from Forests: Myth, Science, and Philosophy

Forests have inspired awe and wonder throughout history, much like the cosmos. Many ancient cultures viewed forests as sacred, connecting them to cosmic mysteries. In Hindu cosmology, forests symbolized the universe's cycles of creation, destruction, and rebirth. Modern science also draws parallels between forest ecosystems and potential extraterrestrial life, using forests as models for understanding how life might evolve on other planets. (ref: **"Astrobiology: The Study of Life Beyond Earth"** by Charles S. Cockell) Philosophically, forests and the night sky evoke similar reflections on interconnectedness and the delicate balance that sustains life.

### (vi) The Future of Forests and the Universe

Both forests and the universe are dynamic and ever-changing, yet face significant threats. Deforestation, climate change, and environmental

> "Look deep into nature, and then you will understand everything better." – **Albert Einstein**

degradation endanger forest ecosystems, just as cosmic disruptions like supernovae can destroy entire star systems.

Protecting the ever-shifting balance in both realms is crucial for ensuring the survival of life. Forests and the universe alike remind us of the fragility of balance and the importance of maintaining it for the future.

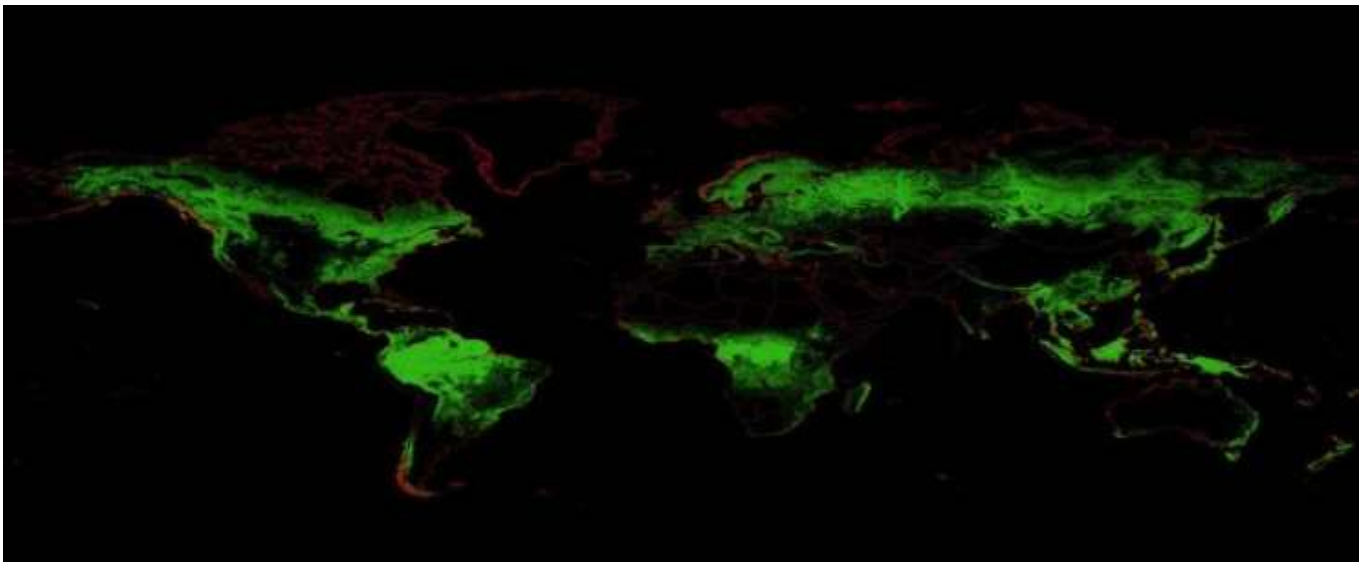
## Tracking Forest Health from Outer Space

Earth from Space: Amazon rainforest (esa.int)

NASA's perspective is that the reasons to explore the universe are as vast and varied as those for exploring forests, mountains, or seas. As human activities threaten Earth's forests, data from satellites are enhancing global conservation efforts.

NASA's Global Ecosystem Dynamics Investigation Mission (GEDI) released its first publicly available data in January 2020, offering researchers global forest measurements. The

European Space Agency (ESA) has also been instrumental in tracking forests, with missions like the European Remote Sensing satellite (ERS) Programme and Envisat, which provided detailed analyses of forest dynamics. ESA's Biomass satellite, equipped with a P-band SAR sensor, represents a significant advancement, enabling the mapping of forest biomass from space, even through dense cloud cover and canopy layers.



World's Forests as Seen from Space (Credit: izismile.com)

these map forest

> Not just beautiful, though, the stars are like the trees in the forest, alive and breathing. And they're watching me-
> **Haruki Murakami**

Instruments on satellites help cover, detect

deforestation, estimate biomass and carbon storage, and track the impacts of forest changes. Scientists are also using laser technology to gauge forest biomass globally. Satellites have become indispensable for detecting forest fires, including very small ones, with NASA reportedly detecting over a million large fires annually through satellite monitoring.

Monitoring forests from outer space has thus become a crucial tool for environmental conservation and management, providing the data needed to protect these vital ecosystems for the future.

**Ref: www.nasa.gov; earth.esa.int; www.fao.org; www.nationalgeographic.com; timesofindia.indiatimes.com; researchgate.com; www.bbc.co.uk**

---

**Shou's portfolio-A Japanese Forest painting (credit: Pintrest.com)**

Life, forever dying to be born afresh, forever young and eager, will presently stand upon this Earth as upon a footstool, and stretch out its realm amidst the stars-**H. G. Wells**

# LIFE STREAM


| | |
|---|---|
| **EXECUTIVE EDITOR** | S. JALAJA |
| **CONSULTING EDITOR** | ANP SINHA |
| **ASSOCIATE EDITOR** | SUDHA SHROTRIA |
| **EDITORIAL COMMITTEE** | S. JALAJA, ANP SINHA, SUDHA SHROTRIA |
| **CONTACT** | sjalaja@hotmail.com |
| **WEB SITE** | http://www.lifesciencefoundation.in/ |


## LIFE SCIENCE FOUNDATION

## Service in Trusteeship

**ABOUT US**

**The Life Science Foundation is a Not- for- Profit Public Charitable Trust registered on 30th December, 2009. It is a unique initiative by two officers belonging to the Indian Administrative Service (Bihar cadre) namely S. Jalaja and A.N.P. Sinha (IAS-1974) who have retired as Secretaries to Government of India. Their long experience with Governments at the National and State levels have instilled in them the will to continue to serve people, although from a different platform. Service through the medium of a public charitable Trust is in keeping with the Gandhi's ideal of Trusteeship.**

**OUR VISION**

**The term Life science encompasses all aspects of life from Right to life- an inalienable right of every human being- to the interconnectedness of the entire web of life. Our vision, therefore, is to promote holistic understanding of life and its purpose, and improvement of quality of life of all.**

**OUR MISSION**

**Our mission is to improve quality of life through policy formulation, applied research and real-life action. The Gandhian ideals of Sarvodaya and Trusteeship will be the guiding spirit.**

**OUR AIMS AND OBJECTIVES**

**To accomplish the above vision and mission, the Foundation will initially have the following aims and objectives. In course of time, more could be included:**

**1. To promote strategic thinking and suggest policy interventions on holistic and sustainable development.**

**2. To promote holistic health care system based on simple living, preventive healthcare, and both modern and traditional health systems.**

**3. To undertake studies, research and action-oriented projects pertaining to holistic life**

**4. To undertake pilot projects of good governance including e-governance and eventually support the governments in adopting and up scaling successful pilots.**

**5. To work towards promoting quality of life of vulnerable sections of population, including women and children.**

**6. To promote all- round human resource development.**

**7. To design self- sustaining livelihood projects which minimize subsidies and donor- dependency.**

**8. To undertake other activities which are conducive to pursuit and fulfilment of the vision, Mission and Objectives of the Foundation.**