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Challenges and Resilience: Environmental Issues in Jharkhand and India

Reading Material

For

State Level Conference on

"Environment, Mines & Mineral Laws" (C - 1)

Published on 16th June, 2024

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Judicial Academy Jharkhand

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MESSAGE

"Nature is not a place to visit. It is home."
-Gary Snyder

In a world where the delicate balance of nature is increasingly under threat, it is imperative that we heed the call to action and strive towards environmental stewardship. I appreciate the commendable effort of the Judicial Academy, Jharkhand, in recognizing the gravity of environmental issues and taking a proactive stance in addressing them.

Environmental issues and climate change have emerged as pivotal topics in contemporary India, as the incessant and unorganized growth of industries continues to degrade and deteriorate our natural wealth with each passing day. This degradation not only threatens our ecosystems but also erodes the profound connection that humans share with their natural surroundings.

This compilation on environmental issues by Judicial Academy, Jharkhand is a testament to their dedication towards spreading awareness and fostering dialogue on critical issues. By shedding light on the environmental challenges facing the state of Jharkhand, particularly in the context of mining activities, the Academy has taken a significant step towards promoting sustainable development and preserving our natural heritage.

I extend my heartfelt congratulations to the Judicial Academy, Jharkhand, for their commendable effort in bringing out this publication. May it serve as a catalyst for informed discourse, inspire positive action, and contribute towards the collective endeavour of safeguarding our planet for generations to come.

(Rongon Mukhopadhyay)

FOREWORD

"In the end, we will conserve only what we love; we will love only what we understand, and we will understand only what we are taught."

- Baba Dioum

In our present era, the gravity of environmental issues looms large, casting a shadow over the delicate balance of our planet's ecosystems. From the deforestation of the Amazon to the melting ice caps of the Arctic, the signs of environmental distress are ubiquitous. The consequences of our actions today reverberate not just across generations but across species, impacting the very web of life that sustains us all.

Amidst this backdrop of urgency, the state of Jharkhand stands as both a witness and a protagonist in the narrative of environmental preservation. Renowned for its mineral wealth, particularly in the realm of mining, Jharkhand grapples with the dual challenge of economic development and environmental conservation. It is within this context that the Judicial Academy of Jharkhand has taken upon itself the noble task of shedding light on the intersection of mining and environmental issues.

This publication is a compilation of scholarly articles which aims to serve as a beacon of knowledge and awareness in the murky waters of environmental discourse. It seeks to unravel the complexities of mining activities and their environmental repercussions, offering insights that are both enlightening and actionable.

As the Judicial Academy of Jharkhand spearheads this initiative, it reaffirms its commitment to not only providing judicial training but also serving as a robust think tank for contemporary challenges such as environmental degradation and climate change. For a judiciary armed with knowledge is not just an instrument of justice but a catalyst for societal change. It is through informed judgments and enlightened perspectives that the lofty goals of sustainable development can be realized.

In presenting this compilation, we extend our heartfelt hope that it serves as a guiding light for policymakers, scholars, and practitioners alike. May its pages illuminate the path towards a future where the harmony between human prosperity and environmental integrity is not just an aspiration but a reality.

Ranchi, June 2024

Sudhanshu Kumar Shashi
Director , Judicial Academy Jharkhand

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ARTICLES

Environmental Sustainability through Green Growth: Climate Responsive Actions and Policies in Jharkhand

Dr. Sanjay Srivastava, IFS[*]

Climate change is a global challenge that demands urgent attention and collective action. Its far-reaching impacts are being felt across the globe, posing significant threats to the environment, economies, and societies. Climate change has put a burden on the existence of the entire biosphere affecting the planet's sustainability. It is no doubt a cocktail of multiple challenges influencing almost every aspect of mankind including human health, agriculture, forestry, weather, and several anthropogenic and natural hazards.

Jharkhand: an overview:

Jharkhand is a resource-rich state with large mineral reserves, forests, agricultural land, and small, medium and large industries. Jharkhand is the most industrialized state in the eastern region of India, with the presence of many heavy industries predominantly reliant on coal for power generation. The state has nearly 90% of its installed power capacity from coal and supplies a significant share to the rest of the country. The state has an industrial hub with some hard-to-abate industries that can contribute and benefit from an energy transition towards low-carbon and sustainable technologies. The state also has some of the key critical minerals vital to the energy transition and can emerge as an enabler of a just energy transition.

The anthropogenic activities associated with these resources not only affect the climate but are also affected by the alteration in the climate. Although climate change is a synoptic or a regional issue, the scale of its impacts and vulnerability is quite localized in Jharkhand due to the spatial variation in economic activities and land use.

Jharkhand the most climate vulnerable State in the country: Nexus between climate change and land degradation

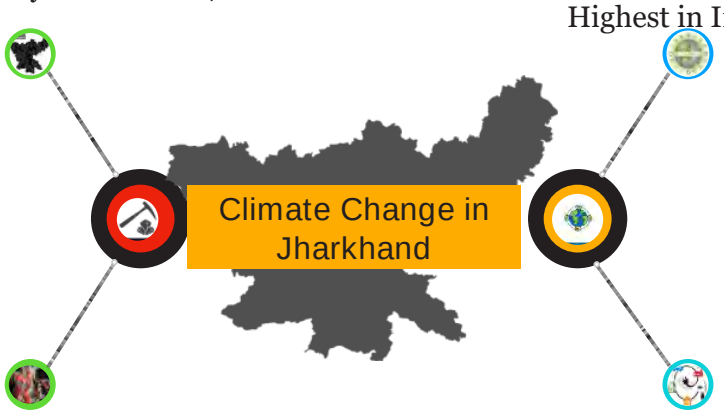
Climate change can have a dramatic impact on our natural resources, economic activities, food security, health and physical infrastructure. The threat is especially severe in places where people's livelihoods depend on natural resources.

The changes in climate in Jharkhand are the proof of natural climate variability prevailing in the State. The state is experiencing rising temperatures, shifting precipitation patterns, and extreme weather events. These changes are resulting in profound consequences on key sectors of the state's economy, including agriculture and natural resources. A comprehensive scientific study conducted by Department of Science and Technology (DST), Government of India has found in the year 2022 that the Jharkhand is the most climate vulnerable State in the country!

* Principal Chief Conservator of Forest, Jharkhand

Climate change Vulnerability
Jharkhand is India's most vulnerable state to climate change, with a vulnerability index of 0.67

Desertification:
69.98% area of Jharkhand is under desertification/ Land degradation which is Highest in India



Heat Waves
Between 2000 and 2014, the State experienced the highest number of heat waves in its history

Water Stress
Increasing water stress in the forest areas due to: altered rainfall patterns and Increased evapo-transpiration

Extended Dry Spells
Palamu and Garhwa in particular, has been suffering from an extended dry spell

The State of Jharkhand, widely recognized as India's mineral powerhouse, has a challenging task ahead of it to achieve sustained economic growth, social development, and environmental sustainability while ensuring consonance with India's long-term low greenhouse gas emission development strategies (LT-LEDS). Effects of climate change and the diminishing resource base have made it important to phase out fossil fuels (such as coal) in favour of implementing climate mitigation strategies like energy transition and carbon neutrality.

Desertification: 69.98% area of Jharkhand is under desertification/ Land degradation which is Highest in IndiaClimate change Vulnerability Jharkhand is India's most vulnerable state to climate change, with a vulnerability index of 0.67Extended Dry SpellsPalamu and Garhwa in particular, has been suffering from an extended dry spellClimate Change in JharkhandHeat WavesBetween 2000 and 2014, the State experienced the highest number of heat waves in its history Water StressIncreasing water stress in the forest areas due to: altered rainfall patterns and Increased evapo-transpiration Challenges of Climate Change in Jharkhand

Development from a climate lens:

Due to unsustainable mining of natural resources, the biodiversity in the State has been badly affected. Due to decreasing forest quality and fragmentation of habitat, the number of elephants, tiger, leopard, sloth bear and other such animals is on the decline. Large scale mining operations have adversely affected ground water table. Damodar, once consider a sacred river by the tribals is a black shrunken sewage canal filled with filth and contaminated with toxic

materials like arsenic, mercury, fluoride and lead. The water of Damodar was once the support system of the local inhabitants, but now it can neither be used for drinking nor for bathing. Similarly, Subarnrekha which means streak of gold was the lifeline of tribal communities, but is now a recipient of domestic, industrial and radioactive pollution. Once home of rich aquatic life and fishery, today has very little to offer to those who live around it. Due to the uranium mining in Jadugora, the people in the area are affected by the radiation and are falling prey to innumerable diseases like fatigue, lack of appetite, thalassemia, downs' syndrome, skeletal deformities and many more.

Mission LiFE: Nudging individual and collective action towards '*Lifestyle for Environment*':

According to the United Nations Environment Programme (UNEP), if 1 out of 8 billion people worldwide adopt environment-friendly behaviours in their daily lives, global carbon emissions could drop upto 20 percent. LiFE (Lifestyle For Environment) was introduced by Prime Minister Narendra Modi at COP-26 in Glasgow in November 2021 as a mass movement for "mindful and deliberate utilization, instead of mindless and destructive consumption" to protect and preserve the environment. It aims to nudge individuals and communities to practice a lifestyle that is synchronous with nature and does not harm it.

In view of Mission LiFE launched in the 75th year of India's independence, a comprehensive and non-exhaustive list of 75 individual LiFE actions are across 7 Themes:

1. Energy saved
2. Water saved
3. Single use plastic reduced
4. Sustainable food systems adopted
5. Save water
6. Healthy Lifestyles Adopted
7. E-Waste reduced

Jharkhand Forest Department launched an ambitious and month-long public campaign on Mission LiFE in the first week of May, 2023, which continued as a run up to the World Environment Day event on 5 June, 2023. The month-long campaign aims to increase awareness among citizens and encourage them to take an active role in preserving the environment.

Everyone including NGOs, members of JFMCs, school children, eco-clubs, corporates and common public are being encouraged to come together and support this campaign towards creating a sustainable future for ourselves and future generations for which approximately 40,000 events on LiFE were implemented in the State. This enormous movement led by the State Forest Department helped secure the 2nd place in the country in terms of number of

public awareness events. So this is the time to take a pledge to make a positive impact on the environment and inspire others to do the same.

Sustainable Land Management - Need of the hour:

Jharkhand experiences extremely higher rates of desertification and land degradation, with 69% of its land reported to be degraded. The land degradation problem has reached alarming propositions due to over exploitation and mismanagement of natural resources; basic socio-economic factors like land shortage, inappropriate land use; and severe economic pressure on farmers, poverty and population growth in the State.

What we can do: Actions we can take to help Governments and businesses must deliver. But each one of us can help to protect and restore the land. Here are some things you can do. Some of the specific actions would be"

- **Raise awareness** about ways to build back better with healthy land in your area: rate your community's harmony with nature and propose solutions.
- **Integrating land and water management** to protect soils from erosion, salinization, and other forms of degradation.
- **Protecting the vegetative cover**, which can be a major instrument for soil conservation against wind and water erosion.
- **Experts** – such as associations of landscapers, land economists and agricultural university student chapters – can help their urban and rural communities to understand and increase the value of their land through better landscaping, restoration and community conservation projects.
- **Be informed about the costs of the pollution** generated by your everyday's consumption.

Jharkhand becomes the first State in the country to launch Forest Soil Health Cards:

Worldwide, one acre of soil is being lost every second which means that only 60 years of soil is left now. On the other hand, around 95% of our food comes from soils and up to 58% more food could be produced through sustainable soil management. Although Soil Health Card for agriculture came into being in 2015 itself which monitors changes in soil health every 3 years, there was no database on nutrient status of soil under different forest areas. There has been therefore, a need to raise awareness about growing challenges in soil management and measures to improve soil health in forests.

Jharkhand now becomes the first State in the country to launch Forest Soil Health Cards. A total of 31 such cards for all Forest Divisions of Jharkhand have been prepared with the help of

Institute of Forest Productivity, Ranchi through the analysis of 16,670 samples collected from 1,311 places from forests in the State. These will be very helpful for the forest department to customize management practices in the forests. Very soon, a Forest Soil Health Card portal is also proposed to be prepared to provide a comprehensive set of parameters to expedite decision making. These forest soil health cards are even more relevant for Jharkhand as the area under land degradation (around 69%) is the highest in the country as per a report published by ISRO.

Jharkhand becomes the first State in the country to constitute "Task Force on Sustainable Just Transition":

The State of Jharkhand is endowed with rich mineral resources, holding 26% of the country's coal reserves. However, with the country committed to achieving 500 GW non-fossil fuel target by 2030 and to become a net-zero carbon emitter by 2070 in the recently held COP-26 in Glasgow in 2021, the state will be hugely impacted. This transition from fossil fuel based economy towards an economy based on greener fuels will be an unsettling process that will greatly affect the lives of the peoples and communities who are presently firmly embedded in the various stages of the fossil fuel ecosystem. It will also have an impact on governance of the state.

The State Government has taken a historical step and become the first state in India to constitute a multi-departmental 'Task Force on Sustainable Just Transition', which is aligned with the national commitments on net-zero and sustainable development goals. Jharkhand is one of the climate-vulnerable states, which makes it imperative to strategically move towards a resource-efficient, climate-resilient and low- carbon economy in the state.

Expressing its resolve to promote development in a sustainable and inclusive manner, its vision document intends to outline the way forward in heralding economic growth, inclusiveness and social advancements in the state.

To support India's net-zero target by 2070, Jharkhand is also looking forward to reducing dependence on fossil fuel-based energy sources and promoting the adoption of alternative sources of energy which is cleaner and sustainable.

Through the task force on sustainable just transition, the state plans to address the ensuing challenges and create a roadmap that combines the target of net-zero, ambitions of climate resilience and sustainable development goals. This will ensure that no one is left behind in the transition towards a more sustainable future.

This requires a holistic approach that encompasses various thematic areas, including energy transition, decarbonization pathways, livelihood transition, fossil-fuel transition, sustainable mobility transition, climate finance, green hydrogen and capacity building.

Building Resilience - a Jharkhand Perspective:

A deeper comprehension of the interactions between the forest, water, and climate is also required since communities are crucial to the restoration of the environment. Programs to eliminate poverty should be integrated with efforts to stop desertification. This can be a more comprehensive vision and strategy for Jharkhand to achieve economic growth and improve livelihood prospects while also guaranteeing environmental sustainability. For the State's forest management, sustainable land use, protection of biodiversity, and natural habitats, and creation of cleaner energy ecosystems, the building of capacities, training, and issue sensitization are crucial.

Need for a cross-sectoral approach:

A cross sectoral approach to discuss and develop strategies for the State's preparedness and adaptation to climate change risks, as well as a roadmap for evolving mitigation measures for Jharkhand's climate change impacts is the need of the hour.

- Climate resilience in the State necessitates sustainable mining practices, less forest degradation, better waste and water management, and resilient infrastructure solutions.
- Protecting and improving sustainable forest-based livelihoods is crucial for laying the groundwork for long-term economic and social development in the State.
- Climate Smart Agriculture, in tandem with the promotion of appropriate traditional knowledge, is the primary climate adaptation strategy for the agricultural sector.
- With the increasing effects of climate change on crop production and other livelihoods, non-timber forest products serve as a safety net for the vulnerable communities.
- Ensuring sustainable harvesting, improved processing, and access to non-timber forest product markets are a must.
- Though the State Climate Action Plan on Climate Change (SAPCC) is almost in the finalization stage, the State also needs to develop a cross- sectoral clear understanding of the climate change status, sensitivity and capacity. This should lead toward designing climate-resilient action's more scientific, accurate, acceptable and resource- efficient.

To create resilient landscapes, Jharkhand strives to create a new, systematic, and inclusive narrative that can link the conservationists, communities, farmers, foresters, miners, and water resource sector's interventions for preserving the hydrological equilibrium in the ecosystem, while ensuring soil conservation for retaining the productivity of forest landscapes, and recovering the mined out sites for developing resilient landscapes, with close inter-sectoral coordination and cooperation.

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Recent Trends and Developments in Environmental Laws (2023)[1]

*Adv. Sanjeev Kapoor**
*Adv. Aakash Bajaj**

Introduction

In the past year, India saw some important and much required changes for tackling the shifting environmental landscape. India is faced with a unique and rather difficult challenge of balancing its commitment to combat climate change and at the same time keeping the wheel of fast-track development running. One of the ways of achieving this is by statutory amendments and policy decisions. Additionally, the courts in India have also played an active role in protection of the environment. Some of the crucial amendments to various environment-related legislations, policy decisions and judicial pronouncements are discussed in this chapter of the guide.

Major Amendments in Environment Laws

Forest Conservation (Amendment) Act, 2023

In August 2023, the Indian Parliament enacted the Forest (Conservation) Amendment Act, 2023 (the "FCA Amendment Act") to amend the Forest (Conservation) Act, 1980 (FCA). The FCA is a significant statute aimed at safeguarding India's forests. According to this legislation, obtaining prior approval from the central government is mandatory for actions such as de-reserving reserved forests, utilising forestland for non-forest purposes, leasing forestland to private entities, and clearing naturally grown trees for re-afforestation purposes.

The amendments to the FCA include the addition of a preamble to enhance the FCA's scope. Further, the FCA's name has been changed to Van (Sanrakshan Evam Samvardhan) Adhiniyam, 1980 to better reflect its provisions. Importantly, the amendments clarify the FCA's applicability on various lands to eliminate uncertainties.

The FCA Amendment Act classifies land into two categories: (i) land officially recognised as a forest under the Indian Forest Act, 1927, or any other law, and (ii) land not falling under the first category but designated as a forest in a government record after 25 October 1980. Further, it grants exemptions to strategic linear projects of "national importance and concerning national security" within 100 km of international borders.

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* Advocates on Record, Supreme Court, Partners in the dispute resolution team at Khaitan & Co.)

1 *https://practiceguides.chambers.com/practice-guides/environmental-law-2023/india/trends-and-developments*

The FCA Amendment Act also encourages activities like silvicultural operations, the establishment of zoos and wildlife safaris, eco-tourism facilities, and other activities specified by the central government.

The most important amendment to the FCA is the exemption of specific types of land from the FCA, such as forestland along a rail line or government-maintained public road providing access to a habitation or a rail, and roadside amenity up to a maximum size of 0.10 hectare. Previously, state governments needed prior approval from the central government to allocate forestland to entities not owned or controlled by the government. The amendment extends this requirement to all entities, including those owned and controlled by the government. It stipulates that prior approval must adhere to terms and conditions set by the central government. The amendment aims to clarify the FCA's application, streamlining decision-making on proposals involving the non-forest use of forestland.

Ultimately, the amendment removes restrictions from the FCA, allowing for the creation of infrastructure to support national security and generate livelihood opportunities for those residing on the outskirts of the forests.

Notably, the Supreme Court of India on 20 October 2023 issued notice in a petition being Ashok Kumar Sharma, IFS (Retd) & Others v Union of India & Others, Writ Petition (Civil) No 1164 of 2023, filed to challenge the constitutionality of the FCA Amendment Act. The petition states that the FCA Amendment Act poses a significant threat to India's established forest governance system. According to the petition, the amendment allows for unchecked diversion of land without a nationwide cumulative limit, leading to the creation of deforested "islands" that could fragment forests and result in substantial ecological damage. It is pertinent to note that, as per the amendments, forestland of up to 10 hectares is exempted from scrutiny under the FCA when proposed for the construction of "security-related infrastructure", with a lack of clarity on the specific inclusions in this category.

Biodiversity (Amendment) Act, 2023

The Parliament has also recently enacted the Biological Diversity (Amendment) Act, 2023 (the "BD Amendment Act") amending the Biological Diversity Act, 2002 (the "BD Act"). The BD Act establishes a framework for the fair and equitable sharing of benefits arising from the use of biological resources, the conservation of biological diversity, and the sustainable use of its components. The BD Amendment Act promotes the use of indigenous medicine, simplifies patent applications for research, and encourages the cultivation of wild medicinal plants.

The National Biodiversity Authority (NBA) oversees access to biological resources and the dissemination of research findings. The BD Amendment Act expands the scope of individuals and organisations required to seek clearance from the NBA before acquiring biological resources or submitting an Intellectual Property Rights (IPR) application. This includes non-citizens, non-resident citizens, organisations not registered in India, and now, "foreign-controlled" companies registered in India under the Companies Act, 2013.

Further, the BD Amendment Act changes the notification process for using biological resources for commercial purposes. Instead of requiring permission from the NBA, entities must now notify the relevant State Biodiversity Board (SBB). SBBs are granted the authority to determine "benefit sharing" during the approval process. The BD Amendment Act also mandates specified entities to provide prior intimation for access to associated knowledge and commercial utilisation. Exemptions from intimation requirements are extended to codified traditional knowledge, cultivated medicinal plants/products, AYUSH practitioners, and more. Notably, the BD Amendment Act also modifies the approval process for IPR, now requiring approval before the grant of IPR rather than before the application. Foreign companies still need the NBA's approval, while domestic companies only need registration. It is also stipulated that state governments must establish Biodiversity Management Committees with seven to 11 members in both rural and urban areas for the conservation of landraces, folk varieties, domesticated stocks, etc.

Most importantly, the BD Amendment Act decriminalises offences under the BD Act, replacing imprisonment with penalties ranging from INR100,000 to INR50 million. Adjudicating officers will determine penalties on a case-to-case basis.

The Union Ministry of Environment, Forest and Climate Change has also notified the Battery Waste Management Rules, 2022 (the "2022 Rules"), which replace the Batteries (Management and Handling) Rules, 2001. The 2022 Rules now extend to various types of batteries, including industrial batteries, electric vehicle batteries, portable batteries, and automotive batteries. Notably, the 2022 Rules introduce the concept of Extended Producer Responsibility (EPR), which places on the "Producer" responsibility for management of the disposal of products once those products are designated as no longer useful by consumers. EPR is a globally recognised way of facilitating a reverse collection mechanism and recycling post-consumer waste. The 2022 Rules prohibit the Producer from disposing of waste batteries in landfills and instead obligate Producers to recycle, refurbish or re-purpose waste batteries. The 2022 Rules also provide for targets which a Producer is required to attain to fulfil its EPR obligations under the rules.

Judicial Pronouncements

Taking note of the perils of mismanaged urban development and in the interest of sustainable development, the Supreme Court in ***Residents Welfare Association & Another v State (Union Territory of Chandigarh) & Others*** **(2023) 8 SCC 643** held that it has now become critical that the Legislature, the Executive, and the policy-makers at the Union as well as at the State levels take note of the damage to the environment on account of haphazard developments and take a call to take necessary measures to ensure that the development does not damage the environment. The court once again batted for a proper balance to be struck between sustainable development and environmental protection. The Legislature, the Executive and the policy-makers were recommended to ensure that there were the necessary provisions for carrying out Environmental Impact Assessments before permitting urban development. At present, Environmental Impact Assessments are required only for certain development projects.

Ensuring conservation of the flora and fauna in Eco Sensitive Zone and Protected Areas from rapid mining, the Supreme Court in Re: ***TN Godavarman v Union of India*** **(2023)**, expanding its earlier direction of prohibiting mining within the National Parks and Wildlife Sanctuaries (ie, Prohibited Areas), directed that mining within an area of 1 km from the boundary of the Protected Area shall not be permissible.

Separately, the National Green Tribunal took suo moto cognisance of the problem regarding submerging islands and ordered the constitution of a committee to frame policies and measures to protect submerging islands due to the rise of sea level and global warming. Interestingly, the suo moto cognisance was taken from the news item published in a national daily which highlighted that islands in India are grossly affected by unseasonal cyclonic storms and new development projects. The Tribunal, in a separate case, had also ordered a factual and action-taken report on the declining snowfall in the colder regions of the country (specifically the state of Himachal Pradesh).

Policy Measures

Indian policy space, too, saw an active year, as the union government proposed multiple measures to advance its efforts of achieving the five nectar elements declared at the COP 21 Glasgow summit.

Very recently, the Ministry of Environment, Forest and Climate Change has introduced two novel initiatives – the Green Credit Programme (GCP) and the Ecomark Scheme – which seek to embolden environmentally friendly practices rooted in tradition and conservation. The CGP introduces the concept of Green Credit, which has been defined as a singular unit of an incentive provided for a specified activity (ie, water conservation and afforestation in the initial phase), delivering a positive impact on the environment. The Green Credit Certificate issued to entities and individuals can be traded on the green credit platform. With the aim of driving manufacturers to opt for environmentally conscious production, the Ecomark Scheme introduces accreditation and labelling of household and consumer products that meet specific environmental criteria while maintaining quality standards as per Indian norms. Products accredited under the Ecomark Scheme will ensure minimal environmental impact.

India saw another milestone, with the union government taking a significant step towards environmental sustainability by kicking into action the establishment of the regulated carbon market. The Carbon Credit Trading Scheme, 2023 was introduced under the Energy Conservation Act, 2001. With the introduction of carbon credits, which are essentially units of measurement that represent the reduction or removal of greenhouse gas emissions (such as CO_2), below a specific benchmark, entities will be able to trade these carbon credits in the Indian Carbon Market. These Carbon credits are earned when entities engage in activities that decrease these emissions or actively remove greenhouse gases from the atmosphere. Each carbon credit will be equivalent to one metric ton of CO_2 or equivalent emissions that have been reduced. Further, under the scheme, entities bound by law are required to limit their emissions. If they fall below the designated level, they acquire carbon credits. Vice versa, if

emissions surpass the designated threshold, they will be able to purchase credits from entities that have been able to reduce their emissions.

Conclusion

India has repeatedly shown its commitment to environmental stewardship, climate action and focus on renewables to decarbonise the way the country operates. The above measures and developments indicate India's proactive approach to climate change, sustainability, and promotion of eco-conscious practices. While much has been done, much remains to be done. The concentrated and well-rounded efforts by the state and various stakeholders paint a positive picture of an environmentally conscious country.

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Photo Courtesy : Dr. V. K. Prajapati, Professor & Head, Department Oral Surgery, R.I.M.S, Ranchi

From Legislation to Implementation: The Role of Indian Judiciary in Advancing Environmental Sustainability

Indrajit Sinha[1]
Utkarsh Singh[1]

Introduction

The urges of development yearned by the citizens of the Republic of India has reached a level of consumerism, wherein, all the pertinent daily essential and its supporting infrastructure as required in the age of internet can only be achieved after constituting certain acts or omissions, which can have the potential to disturb the ecological balance of the area. As of today, there are numerous environmental laws, rules, byelaws, standing orders present and enforceable in public domain. However, the origin of the movement for environmental laws can be traced by the judicial orders of the Hon'ble Constitutional Courts of India. The Framers of the Constitution had the foresight to incorporate Article 19, 21, 51 in the Constitution of India,1950. These articles had wide ranging import, which could not be expressed in straight jacket terms. These articles were further supplanted by insertion of Article 48-A & Part IV-A, Article 51-A (g). The Hon'ble Supreme Court of India along with various Hon'ble High Courts and Tribunals, have paved the for origination of the legislative process which resulted in the Legislations on Environmental Law by the Union Parliament, followed by State Legislatures.

Present Environmental Laws in Operation

Before delving into the contributions of the Union and State Judiciary regarding the development of environmental law jurisprudence in India, it is essential to review the prevailing Union laws governing various components of the environment, along with their indented objectives as reflected in the statements of reasons accompanying these legislations. For ready reference the same are tabulated below: -

S.No	Act	Statement & Reasons
1.	The Indian Forest Act,1927	Colonial legislation that provides for the consolidating the law relating to forests, the transit of forest-produce and the duty leviable on timber and other forestproduce. Enacted to primarily establish administrative control over forests by appointing forest officers and creating reserved and protected forests.

1 Advocate, High Court of Jharkhand.

2.	The Wild Life (Protection) Act, 1972.	Provides for the protection of wild animals, birds, and plants and matters connected therewith or ancillary or incidental thereto. Enacted to combat the declining wildlife population and conserve biodiversity by creating protected areas such as wildlife sanctuaries and national parks.
3.	The Water (Prevention and Control of Pollution) Act, 1974.	Provides for the prevention and control of water pollution and maintaining or restoring wholesomeness of water. Enacted to address increasing water pollution issues due to industrial and domestic effluents and to establish Pollution Control Boards for monitoring and enforcement.
4.	The Forest (Conversation) Act, 1980,	Enacted to address the alarming deforestation and ecological degradation in India. It aimed to halt large-scale deforestation, promote sustainable use of forest resources, and prevent unauthorized conversion of forest land. By requiring prior approval from the Central Government for any diversion of forest land for non-forest purposes, the Act established a centralized, controlled approach to strengthen the legal framework for forest protection.
5.	The Air (Prevention and Control of Pollution) Act, 1981.	Provides for the prevention, control, and abatement of air pollution. Enacted to tackle growing air pollution caused by vehicles, industries, and other sources, ensuring the implementation of air quality standards.
6.	The Environment (Protection) Act, 1986.	Provides for the protection and improvement of the environment and for matters connected therewith. Enacted following the Bhopal Gas Tragedy, to provide a framework for coordinating measures aimed at environmental protection and to empower the central government to take necessary actions to prevent environmental pollution.
7.	The Public Liability Insurance Act, 1991.	Provides for public liability insurance for providing immediate relief to persons affected by an accident occurring while handling any hazardous substance. Enacted to ensure that companies dealing with hazardous substances are financially liable to compensate victims of accidents involving these substances.

8.	The Biological Diversity Act, 2002.	Provides for the conservation of biological diversity, sustainable use of its components, and fair and equitable sharing of the benefits arising from the use of biological resources and associated knowledge. Enacted in accordance with the Convention on Biological Diversity (CBD) to safeguard India's rich biodiversity.
9.	The National Green Tribunal Act, 2010.	Provides for the establishment of a National Green Tribunal for effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources, including enforcement of any legal right relating to the environment. Enacted to create a specialized body for handling environmental disputes efficiently and to provide a forum for protecting environmental rights.
10.	The Compensatory Afforestation Fund Act, 2016.	Provides for establishing a National Compensatory Afforestation Fund and a State Compensatory Afforestation Fund for the improvement and management of forests. Enacted to ensure that funds collected for compensatory afforestation are utilized for afforestation and to promote green cover across Ind

Judicial Observations Concerning Environmental Law

The Hon'ble Supreme Court in the case of "***State of Bihar v. Murad Ali Khan***"[2] had made certain alarming observations regarding the man and nature conflict, which are quoted below as follows:

> *"8. … The policy and object of the wild life laws have a long history and are the result of an increasing awareness of the compelling need to restore the serious ecological imbalances introduced by the depredations inflicted on nature by man. The state to which the ecological imbalances and the consequent environmental damage have reached is so alarming that unless immediate, determined and effective steps were taken, the damage might become irreversible. The preservation of the fauna and flora, some species of which are getting extinct at an alarming rate, has been a great and urgent necessity for the survival of humanity and these laws reflect a last ditch battle for the restoration, in part at least, a grave situation emerging from a long history of callous insensitiveness to the enormity of the risks to mankind that go with the deterioration of environment. The tragedy of the predicament of the civilised man is that "Every source from which man has increased his power on earth has been*

2 (1988) 4 SCC 655

used to diminish the prospects of his successors. All his progress is being made at the expense of damage to the environment which he cannot repair and cannot foresee". In his foreword to International Wild Life Law, H.R.H. Prince Philip, the Duke of Edinburgh said:

> *"Many people seem to think that the conservation of nature is simply a matter of being kind to animals and enjoying walks in the countryside. Sadly, perhaps, it is a great deal more complicated than that....*
>
> *... As usual with all legal systems, the crucial requirement is for the terms of the conventions to be widely accepted and rapidly implemented. Regretfully progress in this direction is proving disastrously slow.... [See International Wild Life Law by Simon Lyster, Cambridge — Grotius Publications Limited, 1985 Edn.] "*

***9.** There have been a series of international conventions for the preservation and protection of the environment. The United Nations General Assembly adopted on 29-10-1982 "The world charter for nature". The Charter declares the Awareness that:*

"(a) Mankind is a part of nature and life depends on the uninterrupted functioning of natural systems which ensure the supply of energy and nutrients.

(b) Civilisation is rooted in nature, which has shaped human culture and influenced all artistic and scientific achievement, and living in harmony with nature gives man the best opportunities for the development of his creativity, and for rest and recreation."

Following from the above, the chronological history of judicial intervention in environmental matters by the Indian Judiciary in addressing environmental concerns, which was further supplanted by the emergence of Public Interest Litigations, that often calls for the Constitutional Courts to step in to fill the gaps in legislative and executive action can be seen from the landmark judgments and principles that have emerged from these judicial intervention which are as follows:

State of Bihar v. Banshi Ram Modi[3]

Facts: Banshi Ram Modi obtained a mining lease to carry out mining operations in the Hazaribagh area, Bihar. During operations, he discovered two additional minerals and applied to the government to include these minerals in his mining lease, which was approved.

Legal Issue: The legality of allowing additional mining of minerals within a Reserved Forest area. **Ratio**: The Hon'ble Supreme Court examined the objectives and reasons behind the

3 AIR 1985 SC 814 *[It has been held to be 'not a good law' by the Apex Court in T.N Godavarman Case (2002) 10 SCC 606 Ref. Para 12.]

Forest Conservation Act, 1980, which was enacted to check large-scale deforestation causing ecological imbalance and environmental deterioration. The Apex Court held that breaking up soil or clearing forest land for mining purposes could only be permitted after considering all relevant factors, including economic benefits, environmental conditions, potential ecological imbalances, and effects on flora and fauna. The Act applies not only to mining leases within reserved forests but to all cases where forest land is sought for non-forest purposes.

Rural Litigation and Entitlement Kendra, Dehradun v. State of Uttar Pradesh[4]

Facts: This case, also known as the Dehradun Quarrying Case, was one of the earliest and most significant environmental litigations brought by RLEK. The organization challenged the unregulated limestone mining operations in the Doon Valley, which were causing severe ecological damage, including **deforestation, soil erosion, and loss of biodiversity.**

Legal Issue: The primary issue was the environmental degradation caused by quarrying activities and whether these activities violated environmental laws and constitutional provisions protecting the environment.

Ratio: The Supreme Court ordered the closure of several quarries and imposed stringent regulations on others. It recognized the need to balance environmental protection with economic development. The Court emphasized that ecological preservation is essential for the survival of humanity and is an integral part of the right to life under Article 21 of the Constitution.

Banwasi Seva Ashram v. State of UP[5]

Facts: Adivasis and other communities used forest land in Mirzapur, UP, while the government planned a Thermal Power Plant in the same area.

Legal Issue: Balancing adivasi rights and forest conservation along with securing national needs & aspiration of national development.

Ratio: The Supreme Court issued various directions to retain forest areas while allowing adivasis to assert their claims and permitting the government to implement its Thermal Power Plant project. The Court emphasized that forests are a national asset, and their depletion disturbs the ecology, climate, and economic conditions. At the same time, it recognized the need for industrial growth and improved living facilities, highlighting the importance of generating electricity for national development.

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4 (1985) 2 SCC 431

5 AIR 1987 SC 374

M.C. Mehta v. Union of India [6]

Facts: This case involved industrial pollution and environmental degradation.

Legal Issue: Balancing public health and industrial activities under the right to life.

Judgment: The Supreme Court established a clear hierarchy, emphasizing that the right to life, public health, and ecological well-being supersede economic considerations. It underscored the importance of environmental protection even in the face of development goals. The Court prioritized environmental protection over economic considerations, emphasizing that the right to life includes the right to a healthy environment.

Subhash Kumar v. State of Bihar [7]

Facts: The case addressed the right to a pollution-free environment as part of the fundamental right to life under Article 21.

Legal Issue: Interpretation of Article 21 to include environmental rights.

Judgment: The Supreme Court interpreted Article 21 to encompass the right to a pollution-free environment, recognizing it as integral to the right to life and personal liberty.

State of HP v. Ganesh Wood Products[8]

Facts: Establishment of wood-based industries versus forest preservation. Katha, an ingredient in pan and pan-masala, is derived from the central portion of khair trees. The deforestation of Khair trees & interplay of Article 19 (1) (g) was central question before the Apex Court.

Legal Issue: Balancing industrial growth with forest conservation.

Ratio: The Hon'ble Supreme Court mandated a proper assessment of forest wealth before allowing the establishment of wood-based industries. It emphasized that sustainable development requires restricting industrial activities based on forest resources and closely monitoring their operations to maintain ecological balance. The Court underscored that there is no absolute or unrestricted right to establish industries that could harm the forest wealth of the nation.

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6 AIR 1987 SC 965

7 AIR 1991 SC 420

8 (1995) 6 SCC 363

Vellore Citizens' Welfare Forum v. Union of India[9] (AIR 1996 SC 2715)

Facts: The case dealt with pollution caused by tanneries.

Legal Issue: Implementation of sustainable development principles in environmental law.

Judgment: The Supreme Court introduced the concept of sustainable development into Indian law, advocating for a balance between environmental protection and economic growth. The Court also established the *Precautionary Principle* and the *Polluter Pays Principle*, aligning India's environmental jurisprudence with international standards Seminally in the case of ***Virender Gaur & Ors. v State of Haryana & Ors[10]*,** while deliberating the scope of Article 21, the Apex Court observed as follows:

> ***"7.*** *….Article 21 protects right to life as a fundamental right. Enjoyment of life and its attainment including their right to life with human dignity encompasses within its ambit, the protection and preservation of environment, ecological balance free from pollution of air and water, sanitation without which life cannot be enjoyed. Any contra acts or actions would cause environmental, ecological, air, water, pollution, etc. should be regarded as amounting to violation of Article 21…"*

The contribution to the development of the pro Environmental Jurisprudence was largely attributable to the Hon'ble Constitutional Courts (Union & State Judiciary), which was recognized in the judgement of ***Karnataka Industrial Areas Development Board v Sri. C. Kenchappa & Ors[11]***, which reads as under:

> ***"98.*** *We see significant developments when we carefully evaluate the entire journey of judicial pilgrimage from the decade of 1960 till this date. In the decade of 1960s, hardly anyone expressed concern about ecology and environment. The statement of Sir Edmund Hillary quoted in the earlier part of the judgment indicates that Mount Everest was littered with junk from the bottom to the top and nobody hardly spoke about it nor was any serious concern shown about environmental degradation. In the decade of 1970s, a serious concern about the degradation of ecology and environment was articulated. The Stockholm Conference of 1972 was a major watershed in the history of the world. It was realised that for a civilised world both development and ecology are essential.*
>
> ***99.*** *In the Rio Conference of 1992 great concern had been shown about sustainable development. "Sustainable development" means "a development which can be sustained by nature with or without mitigation". In other words, it is to maintain delicate balance between industrialisation and ecology. While development of industry is essential for the growth of economy, at the same time, the environment*

9 AIR 1996 SC 2715

10 (1995) 2 SCC 577

11 (2006) 6 SCC 371

and the ecosystem are required to be protected. The pollution created as a consequence of development must not exceed the carrying capacity of the ecosystem. The courts in various judgments have developed the basic and essential features of sustainable development. In order to protect sustainable development, it is necessary to implement and enforce some of its main components and ingredients such as precautionary principle, polluter-pays and public trust doctrine. We can trace the foundation of these ingredients in a number of judgments delivered by this Court and the High Courts after the Rio Conference, 1992.

101. *This has been an interesting judicial pilgrimage for the last four decades. In our opinion, this is a significant contribution of the judiciary in making serious endeavour to preserve and protect ecology and environment, in consonance with the provisions of the Constitution."*

Furthermore, there are numerous judgements of Hon'ble Apex Court, wherein the Court has taken decisive action regarding ecological degradation due to economic activities such as ***Goa Foundation v. Union of India***[12]**,** wherein the Court Suspended all mining activities in Goa due to environmental degradation and emphasized the need for sustainable mining practices. On similar footing in ***Sterlite Industries (India) Ltd. v. Union of India***[13]**,** the Apex Court Upheld the principles of sustainable development, emphasizing that environmental protection must go hand in hand with economic growth. The Court ordered the closure of Sterlite's copper smelting plant for causing environmental harm.

Natural Resource Extraction:

A Necessary Evil

The pathway to national development is undeniably intertwined with activities such as the extraction of minor and major minerals and deforestation. These activities facilitate legal and accountable industrial operations, albeit with resultant ecological changes. Mining, in particular, stands out as both a protagonist in the narrative of economic growth and a potential antagonist in the tale of environmental preservation.

An examination of the jurisprudence of the Hon'ble Supreme Court of India reveals a nuanced approach towards this dichotomy. The Court has shown a pressing and immediate concern for environmental amelioration, yet it has also acknowledged that the development of essential commodities cannot be compromised solely on ecological grounds.

Mining activities are often termed as a 'necessary evil' in the development scenario. Essential minerals and resources required for infrastructure, technology, and energy production depend heavily on mining operations. While these activities are indispensable for the nation's

12 (2014) 6 SCC 590

13 (2013) 4 SCC 575

development goals, they bring along adverse environmental impacts such as deforestation, water pollution, soil erosion and loss of biodiversity.

There are several Judgements of the Hon'ble Apex Court emphasising that there should be coordinate & delicate balance between development & environment, and in general sense, developmental activities cannot per-se be treated as antagonist to the environment.

In addressing this dichotomy, a practical view, was adopted by the Constitutional Courts in interpreting the rights and duties of the State in a manner that balances developmental needs with environmental protection. This harmonious and logical interpretation recognizes that while environmental preservation is crucial, it should not impede the nation's developmental agenda unnaturally.

In the case of "***M.C. Mehta v. Union of India & Ors***[14]", the apex court itself noted that 'Progress & Pollution' can go together as long as the arrangement for the sustainability of the same could be made, the apex court observed as follows:

> ***"21.*** *We have formulated these conditions with a view to ensuring continuous compliance with the recommendations of Manmohan Singh Committee and Nilay Choudhary Committee and strict observance of safety standards and procedures, so that the possibility of hazard or risk to the workmen and the community is almost reduced to nil. We would like to point out that the caustic chlorine plant of Shriram is not the only plant which is carrying on a hazardous industry. There are many other plants in Delhi which are employing hazardous technology or are engaged in manufacture of hazardous goods and if proper and adequate precautions are not taken, they too are likely to endanger the life and health of the community. We would therefore suggest that a High Powered Authority should be set up by the Government of India in consultation with the Central Board for overseeing functioning of hazardous industries with a view to ensuring that there are no defects or deficiencies in the design, structure or quality of their plant and machinery, there is no negligence in maintenance and operation of the plant and equipment and necessary safety devices and instruments are installed and are in operation and proper and adequate safety standards and procedures are strictly followed. This is a question which needs serious attention of the Government of India and we would request the Government of India to take the necessary steps at the earliest, because the problem of danger to the health and well-being of the community on account of chemical and other hazardous industries has become a pressing problem is modern industrial society.* ***It is also necessary to point that when science and technology are increasingly employed in producing goods and services calculated to improve the quality of life, there is a certain element of hazard or risk inherent in the very use of science and technology and it is not possible to totally eliminate such hazard or risk altogether. We cannot possibly adopt a policy of not having any chemical or other hazardous industries merely because they pose hazard or risk to the community.***

14 (1986) 2 SCC 176

> ***If such a policy were adopted, it would mean the end of all progress and development. Such industries, even if hazardous, have to be set up since they are essential for economic development and advancement of wellbeing of the people. We can only hope to reduce the element of hazard or risk to the community by taking all necessary steps for locating such industries in a manner which would pose least risk of danger to the community and maximising safety requirements in such industries.*** *We would therefore like to impress upon the Government of India to evolve a national policy for location of chemical and other hazardous industries in areas where population is scarce and there is little hazard or risk to the community, and when hazardous industries are located in such areas, every care must be taken to see that large human habitation does not grow around them. There should preferably be a green belt of 1 to 5 km width around such hazardous industries."*

In ***Tarun Bharat Sangh v. Union of India***[15], the apex Court considered whether mining in the area popularly known as "Sariska Tiger Park", which was declared as game reserve under the Rajasthan Wild Animals and Birds Protection Act, 1951 as a reserve forest under Sections 29 and 30 of the Rajasthan Forest Act, 1953 and as a sanctuary under Section 35 of the Wildlife (Protection) Act, 1972 should be banned because the same was impairing environment and wildlife. At one stage, the Court thought of imposing total ban on mining activities but, keeping in view some technical difficulties, it was decided to constitute a committee headed by the former Chief Justice of Delhi High Court to ensure enforcement of the notifications issued under various statutes. Simultaneously, the Court passed an interlocutory order and directed that no mining operation of any kind shall be carried on within the protected area.

In ***Indian Council for Enviro-Legal Action v. Union of India***[16]**,** the Apex Court described the principle of sustainable development in the following words:

"31. … While economic development should not be allowed to take place at the cost of ecology or by causing widespread environment destruction and violation; at the same time, the necessity to preserve ecology and environment should not hamper economic and other developments. Both development and environment must go hand in hand, in other words, there should not be development at the cost of environment and vice versa, but there should be development while taking due care and ensuring the protection of environment."

Moreover, in the case of ***T.N. Godavarman Thirumulpad v. Union of India***[17] the Apex Court reaffirmed the principle of progress and pollution existing together. It observed as follows:

> ***"25.*** *Progress and pollution go together. As this Court observed in M.C. Mehta v. Union of India [(1986) 2 SCC 176 : 1986 SCC (Cri) 122 : AIR 1987 SC 965] when science and technology are increasingly employed in producing goods and services calculated to improve the quality of life, there is a certain element of hazard or risk*

15 1992 Supp (2) SCC 448

16 (1996) 5 SCC 281

17 (2002) 10 SCC 606

inherent in the very use of science and technology and it is not possible to totally eliminate such hazard or risk altogether. We can only hope to reduce the element of hazard or risk to the community by taking all necessary steps for locating such industries in a manner which would pose least risk of danger to the community and maximizing safety requirements. As observed in the United Nations Conference held at Stockholm in June 1972, economic and social development was essential for ensuring a favourable living and working environment for man and for creating conditions on earth that were necessary for the improvement of the quality of life."

In ***Essar Oil Ltd. v. Halar Utkarsh Samiti***[18], the Apex Court referred to the Stockholm Declaration and observed:

"27. This, therefore, is the aim, namely, to balance economic and social needs on the one hand with environmental considerations on the other. But in a sense all development is an environmental threat. Indeed, the very existence of humanity and the rapid increase in the population together with consequential demands to sustain the population has resulted in the concreting of open lands, cutting down of forests, the filling up of lakes and pollution of water resources and the very air which we breathe. However, there need not necessarily be a deadlock between development on the one hand and the environment on the other. The objective of all laws on environment should be to create harmony between the two since neither one can be sacrificed at the altar of the other."

Continuing Mandamus & Enforcement of Environmental Law.

A writ of mandamus is an order from a court of superior jurisdiction commanding a lower court, government official, or entity to perform a specific act. However, in cases where a single directive proves insufficient, the concept of Continuing Mandamus becomes crucial. This writ allows courts to issue ongoing directives to ensure the continuous performance of duties. It was formalized in India through the landmark case of ***Vineet Narain v. Union of India***,[19] where the Supreme Court stated the necessity of issuing directions periodically and keeping matters pending to monitor compliance and ensure effective enforcement. The writ of Continuing Mandamus has significantly allowed for much needed Judicial Interventions in the pressing demands of Environmental Degradation, that has deeply impacted the Ecological Balance of the region either due to operations such as illegal mining, deforestation, poaching, destruction of habitat, smuggling of protected flora & fauna or due to sheer administrative apathy, lethargy or connivance. The resultant scenario has led to many directives and guidelines from the Apex Court, which the executive has to adhere to as per the mandate of Article 141 of the Constitution of India.

The judiciary has played a crucial role in delivering environmental justice through procedural and substantive innovations. These include suo moto cognizance of environmental issues,

18 (2004) 2 SCC 392

19 (1998) 1 SCC 226

appointment of amicus curiae from relevant fields, and the establishment of new state bodies for surveillance and enforcement. The writ of Continuing Mandamus has been particularly effective in addressing persistent non-compliance by private and public entities.

In ***Swaraj Abhiyan v. Union of India and Others***,[20] regarding providing guidelines and monitoring the situation of almost 33 Crores citizens in 10 drought declared states, the Apex Court, while deliberating on the feasibility of continuing mandamus observed as follows:

*"**207.** We are firmly of the view that the principle of continuing mandamus is now an integral part of our constitutional jurisprudence. There are any number of public interest petitions in which this Court has continued to monitor the implementation of its orders and on occasion monitor investigations into alleged offences where there has been some apparent stonewalling by the Government of India…."*

The several judgements containing invaluable environmental law jurisprudence arising out of the landmark case of ***T.N. Godavarman Thirumulpad v. Union of India & Ors***[21]**,** which mainly adjudicated on the issue of deforestation and laid down valuable guidelines. Which were later on were used as aiding device in cementing environmental jurisprudence in different cases involving environmental considerations, the most celebrated case being that of ***T.N. Godavarman Thirumulpad v. Union of India & Ors***[22]**.** At the present the environmental jurisprudence developed in various areas through the *Godavarman Cases* runs into more than 90 orders of the Supreme Court, wherein certain guidelines or directions were issued. This has led to a scenario where the Hon'ble Apex Court has now provided more than 2000 hearing in matters related to forest issues, mining in forest land or near national parks. [23]

Furthermore, recently in the case of ***M.C. Mehta v. Union Of India And Others***[24]**,** which raised the pressing issue of Air-Pollution in National Capital Region (NCR) due to vehicle traffic, stubble burning and construction activates amongst other issues, the Apex Court again resorted to the use of "Continuing Mandamus", to ameliorate the Air Quality of NCR and hold erring officials accountable for their inaction.

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20 (2016) 7 SCC 498

21 AIR 1999 SC 2420

22 (2006) 5 SCC 25

23 *https://timesofindia.indiatimes.com/home/environment/flora-fauna/sc-forest-panel-has-heard-2000-cases-till-* date/articleshow/*2882890.cms*

24 2019 SCC ONLINE SC 1692

Judicial Reconditeness & Environmental Justice: Current Conundrums.

The Hon'ble Supreme Court in the case of **"T.N. Godavarman Thirumulpad v. Union of India"[25],** while explain the contours of the word 'forest' as the per The Forest Conservation Act, 1980, had observed as follows:

> ***"3.*** *It has emerged at the hearing, that there is a misconception in certain quarters about the true scope of the Forest Conservation Act, 1980 (for short "the Act") and the meaning of the word "forest" used therein. There is also a resulting misconception about the need of prior approval of the Central Government, as required by Section 2 of the Act, in respect of certain activities in the forest area which are more often of a commercial nature. It is necessary to clarify that position.*
>
> ***4.*** *The Forest Conservation Act, 1980 was enacted with a view to check further deforestation which ultimately results in ecological imbalance; and therefore, 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. The word "forest" must be understood according to its dictionary meaning. This description covers all statutorily recognised forests, whether designated as reserved, protected or otherwise for the purpose of Section 2(i) of the Forest Conservation Act. The term "forest land", occurring in Section 2, will not only include "forest" as understood in the dictionary sense, but also any area recorded as forest in the Government record irrespective of the ownership. This is how it has to be understood for the purpose of Section 2 of the Act. 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. This aspect has been made abundantly clear in the decisions of this Court in Ambica Quarry Works v. State of Gujarat [(1987) 1 SCC 213] , Rural Litigation and Entitlement Kendra v. State of U.P. [1989 Supp (1) SCC 504] and recently in the order dated 29-11-1996 (Supreme Court Monitoring Committee v. Mussoorie Dehradun Development Authority [WP (C) No 749 of 1995 decided on 29-11-1996]). The earlier decision of this Court in State of Bihar v. Banshi Ram Modi [(1985) 3 SCC 643] has, therefore, to be understood in the light of these subsequent decisions. We consider it necessary to reiterate this settled position emerging from the decisions of this Court to dispel the doubt, if any, in the perception of any State Government or authority. This has become necessary also because of the stand taken on behalf of the State of Rajasthan, even at this late stage, relating to permissions granted for mining in such area which is clearly contrary to the decisions of this Court. It is reasonable to assume that any State Government which has failed to appreciate the correct position in law so far, will forthwith correct its stance and take the necessary remedial measures without any further delay."*

25 (1997) 2 SCC 267

The above dictum of the Apex Court, provided a judicial aid to decipher the term 'forest' in strict dictionary terms and while interpreting it as such, the Court enlarged the area of protection of forest or land in such forest. This interpretation of the term 'forest' was followed in series of judgements. However, the Parliament in the year 2023, passed the **Forest Conversation Amendment Act, 2023,**[26] which aimed to narrow the broad interpretation established by the Supreme Court. The amendments sought to **exempt certain forest lands** from the Act's purview and **exclude certain activities** from the definition of non-forest purposes.

This Amendment Act was in direct conflict with the interpretation of the term "Forest" and activities that could be carried out in these sensitive eco zones, the jurisprudence of which had developed through series of judgements spanning decades of judicial work. This Amendment was challenged before the Apex Court and the Apex Court in **"Ashok Kumar Sharma, Indian Forest Service (Retired) and Others v. Union of India & Another"**[27]**,** that vide its order dated 19-02-2024, the Hon'ble Supreme Court though it did not stayed the Forest Conversation Amendment Act, 2023, it unequivocally held that in para 18 as follows:

> *"18.Both in the submissions at the preliminary hearing on 30 November 2023, as well as in the submissions which were urged during the course of the present hearing, it is not the contention of the Union Government that the statutory amendment seeks to bring about any change in the law which was laid down in T N Godavarman (supra). That apart, both the counsel for the petitioners have adverted to the stand of the Government before the Joint Parliamentary Committee which preceded the enactment of the law and the clear elaboration of the Union of India that the proposed coverage in the legislative provision which was under consideration, would accord with the decision of this Court. That being the position,* ***we clarify that pending the completion of the exercise by the Administrations of the State Governments and the Union Territories under Rule 16 and pending these proceedings, the principles which are elucidated in the judgment of this Court in TN Godavarman (supra) must continue to be observed****."*

From the above, it could be gathered that the Apex Court has attempted to balance its previous expansive interpretation of 'forest' with the practical considerations introduced by the 2023 amendments. While the Court has not stayed the amendments, it has reaffirmed the principles established in the Godavarman case, ensuring that these principles continue to guide forest conservation efforts. This approach reflects a judicial attempt to harmonize legal precedents with evolving legislative frameworks, maintaining stringent protection measures while allowing for nuanced modifications under expert guidance.

Another domain of Environmental Law, which is undergoing recurrent transfigurations due to conflicting judicial pronouncements is the grant of **Prospective versus Ex-Post Facto Environmental Clearance**. Environmental Clearance is a critical regulatory mechanism designed to assess and mitigate the potential environmental impacts of proposed projects

26 *https://egazette.gov.in/WriteReadData/2023/247866.pdf*

27 Writ Petition (Civil) No. 1164 of 2023

before they commence. The principle of environmental clearance is fundamentally prospective, ensuring that any environmental concerns are addressed and managed before the initiation of a project.

The concept of ex-post facto environmental clearance[28], which involves granting approval after the project has already begun, is *generally considered impermissible* in environmental law due to its retrospective nature and the potential for significant environmental harm that may go unchecked, but the same can be granted if the rules provide for the same along with analysis of other parameters. However, the study of recent judgements of the Supreme Court on the said issue would indicate a conflicting trend.

In ***Common Cause v. Union of India***[29], the Apex Court on the issue of Ex- Post Facto Environmental Clearance observed as follows:

> **"125.** *We are not in agreement with the learned counsel for the mining leaseholders. There is no doubt that the grant of an EC cannot be taken as a mechanical exercise. It can only be granted after due diligence and reasonable care since damage to the environment can have a long-term impact. EIA 1994 is therefore very clear that if expansion or modernisation of any mining activity exceeds the existing pollution load, a prior EC is necessary and as already held by this Court in M.C. Mehta [M.C. Mehta v. Union of India, (2004) 12 SCC 118] even for the renewal of a mining lease where there is no expansion or modernisation of any activity, a prior EC is necessary.* ***Such importance having been given to an EC, the grant of an ex post facto environmental clearance would be detrimental to the environment and could lead to irreparable degradation of the environment. The concept of an ex post facto or a retrospective EC is completely alien to environmental jurisprudence including EIA 1994 and EIA 2006.*** *We make it clear that an EC will come into force not earlier than the date of its grant."*

In **Alembic Pharmaceuticals Ltd. Rohit Prajapati**[30], the Apex Court largely followed the dictum of Common Cause Judgement, and observed as follows:

> ***"23.*** *The concept of an ex post facto EC is in derogation of the fundamental principles of environmental jurisprudence and is an anathema to the EIA Notification dated 27-1-1994. It is, as the judgment in Common Cause [Common Cause v. Union of India, (2017) 9 SCC 499] holds, detrimental to the environment and could lead to irreparable degradation. The reason why a retrospective EC or an ex post facto clearance is alien to environmental jurisprudence is that before the issuance of an EC, the statutory notification warrants a careful application of mind, besides a study into the likely consequences of a proposed activity on the environment. An EC can be issued only after various stages of the decision-making process have been completed.*

28 See Lafarge Umiam Mining (P) Ltd. v. Union of India, (2011) 7 SCC 338.

29 (2017) 9 SCC 499

30 (2020) 17 SCC 157

Requirements such as conducting a public hearing, screening, scoping and appraisal are components of the decision-making process which ensure that the likely impacts of the industrial activity or the expansion of an existing industrial activity are considered in the decision-making calculus. **Allowing for an ex post facto clearance would essentially condone the operation of industrial activities without the grant of an EC. In the absence of an EC, there would be no conditions that would safeguard the environment. Moreover, if the EC was to be ultimately refused, irreparable harm would have been caused to the environment. In either view of the matter, environment law cannot countenance the notion of an ex post facto clearance. This would be contrary to both the precautionary principle as well as the need for sustainable development**."

However in "***Electrosteel Steels Limited v. Union of India***[31]", the Apex Court, while again deliberating on the feasibility, desirability and legal permissibility of ex-post facto environmental clearance observed as follows:

"73. *The question is whether an establishment contributing to the economy of the country and providing livelihood to hundreds of people should be closed down for the technical irregularity of shifting its site without prior environmental clearance, without opportunity to the establishment to regularise its operation by obtaining the requisite clearances and permissions, even though the establishment may not otherwise be violating pollution laws, or the pollution, if any, can conveniently and effectively be checked. The answer has to be in the negative.*

74. *The Central Government is well within the scope of its powers under Section 3 of the 1986 Act to issue directions to control and/or prevent pollution including directions for prior environmental clearance before a project is commenced. Such prior environmental clearance is necessarily granted upon examining the impact of the project on the environment.* ***Ex post facto environmental clearance should not ordinarily be granted, and certainly not for the asking. At the same time, ex post facto clearances and/or approvals and/or removal of technical irregularities in terms of notifications under the 1986 Act cannot be declined with pedantic rigidity, oblivious of the consequences of stopping the operation of a running steel plant.***

75. The 1986 Act does not prohibit ex post facto environmental clearance. Some relaxations and even grant of ex post facto EC in accordance with law, in strict compliance with rules, regulations notifications and/or applicable orders, in appropriate cases, where the projects are in compliance with, or can be made to comply with environment norms, is in over view not impermissible. *The court cannot be oblivious to the economy or the need to protect the livelihood of hundreds of employees and others employed in the project and others dependent on the project, if such projects comply with environmental norms.*

31 (2023) 6 SCC 615

76. *As held by a three-Judge Bench of this Court in Lafarge Umiam Mining (P) Ltd. v. Union of India [Lafarge Umiam Mining (P) Ltd. v. Union of India, (2011) 7 SCC 338] ("Lafarge") : (SCC p. 380, para 119)*

> *"119. The time has come for us to apply the constitutional "doctrine of proportionality" to the matters concerning environment as a part of the process of judicial review in contradistinction to merit review. It cannot be gainsaid that utilisation of the environment and its natural resources has to be in a way that is consistent with principles of sustainable development and intergenerational equity, but balancing of these equities may entail policy choices. In the circumstances, barring exceptions, decisions relating to utilisation of natural resources have to be tested on the anvil of the wellrecognised principles of judicial review. Have all the relevant factors been taken into account? Have any extraneous factors influenced the decision? Is the decision strictly in accordance with the legislative policy underlying the law (if any) that governs the field? Is the decision consistent with the principles of sustainable development in the sense that has the decision-maker taken into account the said principle and, on the basis of relevant considerations, arrived at a balanced decision? Thus, the Court should review the decision-making process to ensure that the decision of MoEF is fair and fully informed, based on the correct principles, and free from any bias or restraint. Once this is ensured, then the doctrine of "margin of appreciation" in favour of the decision-maker would come into play."*

An Office Memorandum (OM) was issued by the Union Ministry of Environment on 7th July 2021[32] the OM introduced a perpetual amnesty scheme for projects operating without Environmental Clearance (EC), lacking specific start and end dates. Unlike the 2017 scheme, which restricted eligibility to projects operational before 14 March 2017 and had a six-month window, the 2021 OM allows all projects, including those previously ineligible, to apply for EC at any time (ex post facto environmental clearance). This approach effectively endorses past violations and may encourage future non-compliance.

The legal validity of the aforesaid OM is pending challenge in the case of "***Vanashakti v. Union of India & Anr***[33]", wherein the Apex Court vide order dated 02-01-2024, stayed the operation[34] of the Office Memorandum dated 7th of July, 2021 & 28th of January, 2022 issued by the Ministry of Environment, Forest and Climate Change.

The conflicting interpretations by different benches of the Hon'ble Supreme Court regarding ex-post facto environmental clearance indicate judicial uncertainty, which is anathema to the Rule of Law. Consistency in judicial decisions is essential to provide clear guidance for

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32 *https://www.downtoearth.org.in/news/environment/here-s-why-centre-s-new-sop-may-damage-environmentimpact-assessment-regime-77949*

33 Writ Petition (Civil) No. 1394 of 2023

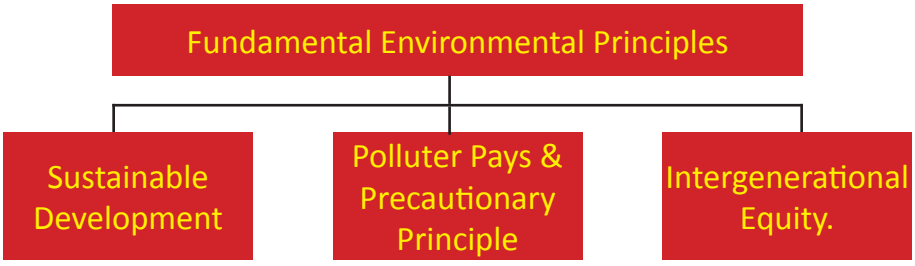
34 *https://www.livelaw.in/top-stories/supreme-court-stay-ministry-of-environment-forest-climate-change-ex-postfacto-environmental-clearance-orders-245972*

High Courts, District Courts, Quasi-Judicial Tribunals, and Administrative Authorities. Such consistency ensures that environmental governance remains robust and prevents actions that could have irreparable consequences for the environment. It is expected that the Supreme Court will strive to maintain coherence in its rulings to protect the environment effectively and uphold the principles of sustainable development and intergenerational equity.

Concluding Remakrs

As discussed above, the Constitutional Courts, through Suo Moto Petitions, Individual Writ Petitions, and Public Interest Litigations, have played an active role in policy-making by appointing expert committees to address the ever-growing environmental issues. The Constitutional Courts have employed the mechanism of Continuing Mandamus to monitor the executive's functions concerning its obligations and duties towards the environment. However, it must be unequivocally stated that the Constitutional Courts are not a panacea for failing environmental governance, which is primarily the duty of the executive, both political and administrative.

In conclusion, it is imperative to recognize that the most effective approach to ensuring sustained environmental protection is rooted in adhering to the three fundamental principles of environmental law jurisprudence. These principles provide a robust framework for balancing ecological preservation with developmental needs.



The judgments rendered by various Constitutional Courts of India largely follow the above three principles and demonstrates that the actual enforcement of environmental laws has largely occurred due to timely judicial intervention by these courts and specialized environmental tribunals like the National Green Tribunal (NGT).

Despite these interventions, there are notable challenges such as resource constraints, lack of expertise, manpower shortages, and logistical issues that impede the Constitutional Courts' capacity to deal effectively with environmental law issues. Thus, while the existing structure of environmental laws in India is generally adequate to address environmental abuses by public and private actors, consistent enforcement remains a significant challenge. This regulatory gap underscores the necessity for a more robust and proactive approach by the executive to fulfil its environmental responsibilities. Until then the Judiciary will have to step in each time to ensure that Environmental Justice is secured for all segments of the society and economic proliferation of environment is kept in check.

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Exploration of Critical and Strategic Minerals - Play a Crucial Role in Cleaner & Sustainable Energy Transition in View of GHG Emission and Environmental Protection

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ABSTRACT

Critical minerals are essential for the overall socio-economic development, while strategic minerals are crucial for enhancing defensive capabilities of a country. Recently, the Indian Government has taken several measures including legislative measures to move from fossil fuelbased energy sources to non-fossil fuel-based or green energy sources. In this context, thrusts are being made to explore and optimize the use of Critical and Strategic Minerals (CSM) such as Lithium (Li) and Rare Earth Elements (REE) as a green energy sources. However, the exploration, extraction and beneficiation techniques of CSM (Li, REE) are at the nascent stage in India. Jharkhand containing ~40% of India's natural mineral resources also has huge potential for CSM such as Graphite, Potash, Ti, V, Li and REE resources particularly occurring in the Granitic Mica-pegmatite, Bauxite and Graphite deposits occurring at several places such as Koderma, Giridih, Lohardaga, Gumla, Palamu, Garhwa and many other districts of Jharkhand. Recently, preliminary exploration works carried out by Directorate of Geology, Jharkhand in and around Koderma-Giridih Mica Belt have given a strong clue for the potentiality of Lithium resources in Jharkhand. Importance and priority must be given to the exploration and resource estimation of critical minerals with an aim to environment sustainability. Hence, further detailed exploration of these CSM in the State will pave the way to establish potential zones of these mineral resources into proved reserve and play a crucial role in cleaner and sustainable energy transition in view of Environmental Protection.

Key Words: *CSM; REE; Energy Transition; Green House Gas Emission; Environmental Protection*

Introduction:

The Climate Action entitled "Take urgent action to combat climate change and its impacts" is one of the 17th agenda of the "Sustainable Development Goal (SDG)-2030" adopted in 2015 by all Member States of the United Nations. Accordingly, India has set its target to achieve Net Zero for carbon emissions by 2070. The Indian Government has taken several measures to enhance the green energy sources in order to minimize the ecosystem's carbon footprint with an aim to cleaner and sustainable energy transition.

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Globally, as per the United State Geological Survey, the largest portion of Li resources is located in three South American countries, namely Argentina, Bolivia, and Chile (Figure 1A) and they are popularly known as "Lithium Triangle". As far as REE resources are concerned, China contains the highest reserves of REE and produces about 70% of total REE quantity in the world (Figure 1B). In stark contrast, India contains only about 6% of the total world's REE reserves and produces about 1% of total global output. Recently, the Geological Survey of India (GSI) has discovered about 5.9 million tons of Li resources in the Salal-Haimana area, Jammu and Kashmir. As far as Li resources are concerned, the exploration, extraction, and beneficiation techniques of lithium from Li-bearing minerals such as Spodumene and Lepidolite are at the nascent stage in India.

Recently, the Government of India published a list of 24 Critical and Strategic Minerals (CSM) under "Part-D" of the "Mines and Minerals (Development and Regulation) Amendment Act, 2023" (Table-1). This act has empowered the Central Government to exclusively auction the blocks CSM under mining leases and composite licenses by inserting a new Clause-11D. Furthermore, the MMDR Amendment Act, 2023 under Section-13 establishes procedures for granting "Exploration Licenses" for CSM through e-Auction. The Ministry of Mines, GoI has also framed schemes for engagement of Notified Private Exploration Agencies in the domain of exploration of CSM so as to optimize the reserve base of these minerals.

Jharkhand with its core value of Jal (Water)-Jungle (Forest)-Jamin (Land) and Khanij (Minerals) contains about 40% of India's natural mineral resources (Figure 2). Abundant resources of Coal, Iron ore (Hematite and Magnetite), Bauxite, Chromite, Manganese, Limestone, Dolomite, Base Metals, Uranium, Mica, China Clay, Quartz, Kyanite, Gold, Diamond and Emerald etc. are the other important mineral commodities available in huge quantities in the State (Figure 2). Besides, the State has also a huge potential for Critical and Strategic Minerals such as Graphite (~2% to ~20.23% fixed carbon), Potash, Ti, V, Li, Cesium and REE resources particularly occurring in the Granitic Mica-pegmatite, Bauxite and Graphite deposits occurring at several places such as Koderma, Giridih, Lohardaga, Gumla, Palamu, Garhwa and many other districts of Jharkhand.

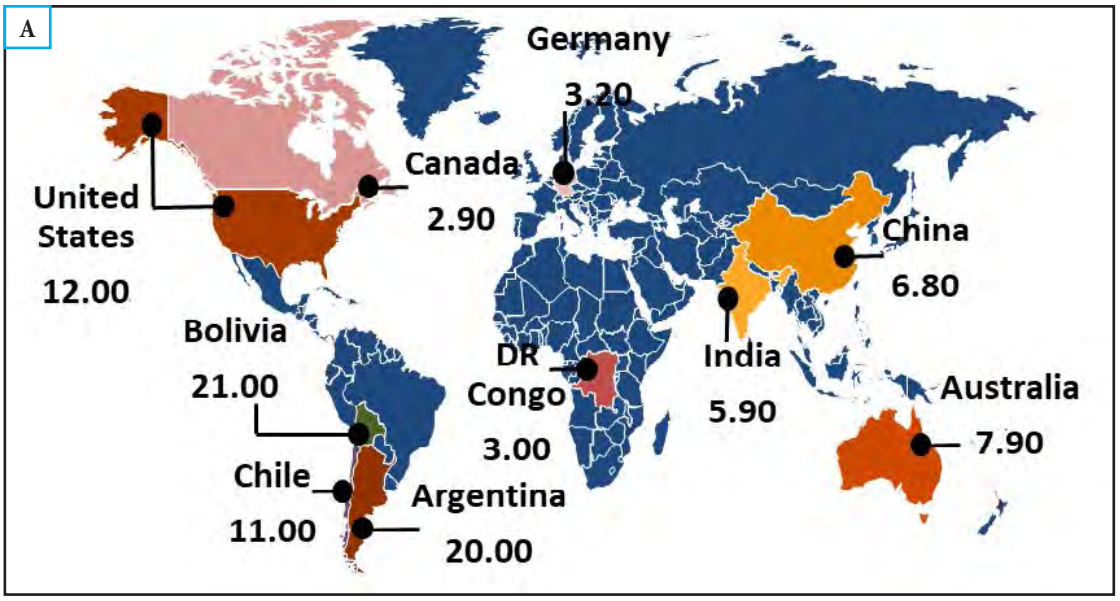


Figure 1: Showing A) Top 10 countries in the world in terms of Li Reserves (in Million Tonnes; Source: Benchmark Mineral Intelligence, IEA); and B) World map (not to scale) showing global distribution of REE-bearing minerals. Note that the Ambadongar Carbonatite Complex, Gujarat is one of the key areas in India containing REE-bearing Carbonatite Deposits (Source: Guo Dongxu and Liu Yan, 2019).

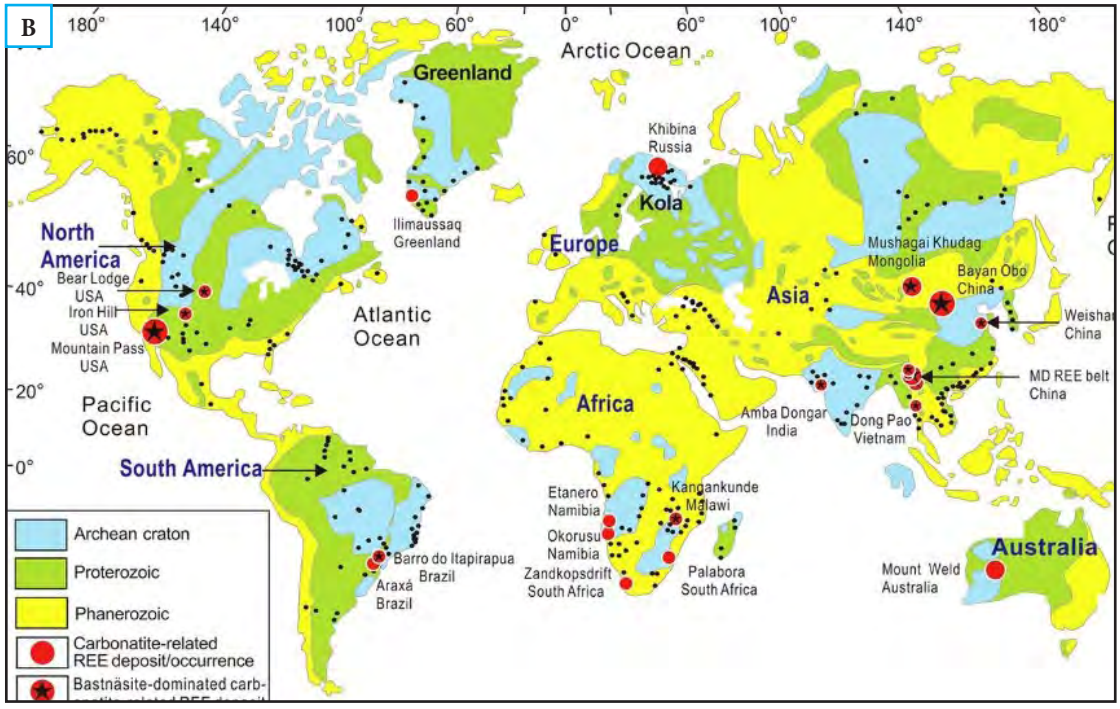


Figure 2: Mineral map of Jharkhand showing distribution of numerous natural mineral resources (Source: Directorate of Geology, DMG; Government of Jharkhand). K. L. Bhola (1968) had studied the Bihar Mica Belt or Giridih-Koderma Mica Belt in view of Atomic and other mineral prospects. Numerous other geoscientists and pioneer workers from Geological Survey of India, MECL, Atomic Mineral Division and the Directorate of Geology,

Department of Mines and Geology, Government of Jharkhand have carried out mineral exploration works across the State like Giridih-Koderma Mica belt for Li/REE, Graphite and Potash deposits in and around Palamu and Garhwa Districts and Ti-V-bearing Bauxite deposits in Gumla, Lohardaga and Latehar Districts. Recently, the Directorate of Geology, Jharkhand has carried preliminary exploration works in Koderma-Giridih Mica Belt in view of Li and REE resources and which gave a clue for the potentiality of Li resources in Jharkhand. However, detailed exploration and feasibility study are yet to carry out regarding prospects of Li, REE and Rare Metal occurrences in the State. Hence, this paper mainly focuses on geological aspects associated with Li and REE-bearing mineral deposits across the world including India with special emphasis on occurrence of these minerals in Jharkhand which will pave the way in establishing and optimizing the reserve base of Critical and Strategic Minerals in the country by formulating strategies/techniques for their exploration and extraction. Also, it will play a key role in achieving India's goal of Net Zero Emission and cleaner & sustainable energy transition leading to environmental protection.

Table-1: A list of 24 Critical and Strategic Minerals as published by the Government of India under "Part-D" of the "Mines and Minerals (Development and Regulation) Amendment Act,

1. Beryl and other beryllium bearing minerals.
2. Cadmium bearing minerals.
3. Cobalt bearing minerals.
4. Gallium bearing minerals.
5. Glauconite.
6. Graphite.
7. Indium bearing minerals.
8. Lithium bearing minerals.
9. Molybdenum bearing minerals.
10. Nickel bearing minerals.
11. Niobium bearing minerals.
12. Phosphate (without uranium).
13. Platinum group of elements bearing minerals.
14. Potash.
15. Minerals of the "rare earths" group not containing Uranium and Thorium
16. Rhenium bearing minerals.
17. Selenium bearing minerals.
18. Tantalum bearing minerals.
19. Tellurium bearing minerals.
20. Tin bearing minerals.
21. Titanium bearing minerals and ores (ilmenite, rutile and leucoxene).
22. Tungsten bearing minerals.
23. Vanadium bearing minerals.
24. Zirconium bearing minerals and ores including zircon.".

Geological Overview:

Lithium (Group 1A element) is a very soft, silvery, alkali metal with white to grey in colour. It does not occur in Free State in nature rather it occurs in association with other minerals. Generally, it is found as trace element in most geological settings. Spodumene, Lepidolite, Petalite etc. are the main Li-bearing Minerals (Table 2). REE, on the other hand, includes a group of 17 Elements (15 Lanthanides along with yttrium and scandium) that exhibit a range of special properties like high density, high melting points and magnetic properties. They are difficult for economical extraction due to its low concentrations (~0.02% of the Earth's Crust by wt.). REEs mainly occur in association with several minerals such as Bastnasite, Monazite, Xenotime and Allanite (Table 2). The recent studies have shown that around 59% of the world's lithium resources are found in brines and 25% in minerals, the remaining such resources are found in clays, geothermal waters, and oil field brines. Lithium is mainly sourced from either

spodumene or brine. Australia is home to most of the spodumene mines, whereas the Li-bearing brine production is dominantly concentrated in South American countries (Bolivia, Chile and Argentina) and China.

Table-2: Showing different types of Lithium-bearing Minerals (Source: Umeshwar Prasad, 2003).

Li-bearing Minerals/Source	Typical Grade	Brief Description
Li-bearing Minerals		
Spodumene	Up to 8% Li	Li-rich pyroxene (LiAl (SiO3)2; yellowish, purple, yellowish-green or emerald-green in colour, prismatic crystals with often of great size (~15m long).
Lepidolite	Up to 5% Li	Li-rich mica $[K(Li,Al)_3(Al,Si,Rb)_4O_{10}(F,OH)_2]$; violet, grey & white in colour; pearly lusture; occurs in pegmatite.
Petalite	Up to 4.9% Li	Li-Al-Phyllosilicate $[LiAlSi_4O_{10}]$, white or greyish in colour, perfect cleavage, streak-uncoloured, lusture-vitreous/pearly.
Amblygonite	Up to 10.2% Li	Phosphate mineral $(Li,Na)AlPO_4(F,OH)$; occurs in pegmatite; white, pale greenish, bluish, yellowish or greenish; prismatic-columnar; mistaken for albite and other feldspars.
Jadarite	1.5 % Li	Nesosilicate $[LiNaSiB_3O_7OH]$; white in colour; streak-white; lusture-dull.
Hectorite clay	0.4 % Li	soft, greasy, white, clay mineral $[Na_{0.3}(Mg,Li)_3Si_4O_{10}(OH)_2]$; occurs with bentonite.
Li-bearing Brines		
Continental	Up to 0.15% Li	Salt pans or salars in enclosed basins with lithium enrichment likely to be from hot springs
Geothermal	Up to 0.035% Li	Steam at geothermal power stations.

In India, REE deposits mainly occur in two kinds of geological domains namely 1) Primary Geologic Domains (PGD); and 2) Secondary Geologic Domains (SGD). The PGD includes various types of rocks- Carbonatites (prominent), per-alkaline felsic rocks, hydrothermal veins and some other sources while the SGD comprises Coastal beach sand deposits (large deposits). REE deposits hosted in secondary geologic domains are under mining for REE and heavy minerals. Beach sand-hosted REE deposits are located along coastal stretches of Odisha, Andhra Pradesh, Tamil Nadu and Kerala. Carbonatite-hosted REE deposits, on the other hand, are mainly located in Ambadongar Carbonatite Complex, Gujarat and Kamthai Carbonatite, Rajasthan. Other minerals such as Bastnaesite and Carbocernaite are the main REE-bearing ore minerals in these Carbonatite-hosted REE deposits (Table-3).

Table-3: Showing different types of REE-bearing Minerals (Source: Umeshwar Prasad, 2003).

Mineral	Formula
	Oxides
Aeschynite	$(Ce,Th,Ca...)[(Ti,Nb,Ta)_2O_6]$
Euxenite	$(Y,Er,Ce,U,Pb,Ca)(Nb,Ta,Ti)_2(O,OH)_6$
Fergusonite	$YnbO_4$
Samarskite	$(Y,Er,Fe,Mn,Ca,U,Th,Zr)(Nb,Ta)_2(O,OH)_6$
	Carbonates
Ancylite	$Sr(Ce,La)(CO_3)_2(OH)\cdot(H_2O)$
Bastnasite	$(Ce, La,Y)CO_3F$
Parisite	$Ca(Ce,La)_2(CO_3)_3F_2$
Synchisite	$Ca(Ce,Nd,Y,La)(CO_3)_2F$
Tengerite	$Y_2(CO_3)_3\cdot n(H_2O)$
	Phosphates
Britholite	$(Na,Ce,Ca)_5(OH)[(P,Si)O_4]_3$
Florencite	$(La,Ce)Al_3(PO_4)_2(OH)_6$
Monazite	$(Ce,La,Th,Nd,Y)PO_4$
Xenotime	YPO_4
	Silicates
Allanite	$Ca(Ce,La,Y,Ca)Al_2(Fe^{2+},Fe^{3+})(SiO_4)(Si_2O_7)O(OH)$
Kainosite	$Ca_2(Ce,Y)_2(SiO_4)_3CO_3\cdot H_2O$
Thalenite	$Y_3[Si_2O_7]$

Mineral Reserve and Production Scenario

As per the United States Geological Survey, US have the world's fourth-largest lithium reserves (~6.8 million tonnes). However, its production activity in the country is minimal. Lithium

resources in the US can be found in continental brines, geothermal brines, hectorite clay, oilfield brines and pegmatites. Bolivia is home to the world's biggest lithium reserves. Chile has favorable conditions for evaporation compared to the more humid regions of Bolivia and Argentina, as well as fewer brine impurities and better export access to the South Pacific Ocean. Australia may only rank 5th on the list of largest overall reserves with ~6.3 million tonnes, but it is by far the world's biggest lithium producer (Figure 3). Lithium extraction in the country comes largely from hard-rock mining of spodumene – an ore that contains high levels of lithium, as well as Al. Argentina has the world's second-largest lithium reserves (~17 million tonnes). As far as REE resources are concerned, total world reserves of rare earth oxides (REO) is about 121 million tonnes (Source: USGS). China is the leading producers (140 thousand tonnes or 90% of the world's REE production) of REO in the world (Figure 4). Other major producers of REE are Australia, USA, Russia, Malaysia and Vietnam.

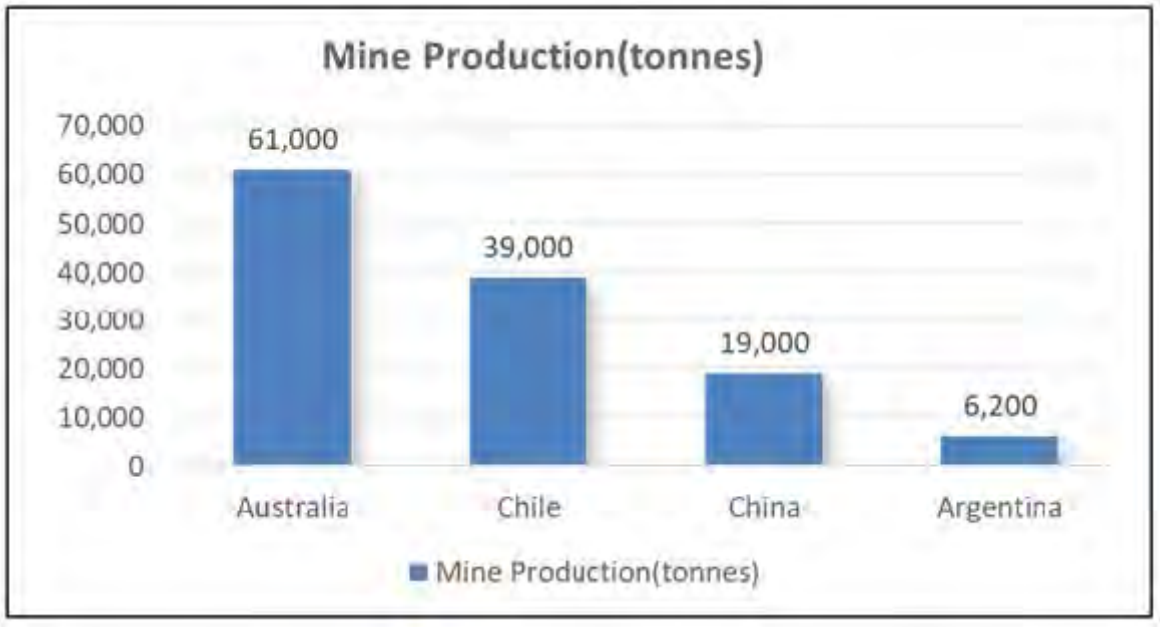


Figure 3: Top 4 Lithium producing countries (metric ton) (Source: Benchmark MineralIntelligence, IEA).

In India, Monazite is the principal source of REE and Thorium. India has the world's 5th largest reserves of REE (Figure 4). Indian Rare Earths Ltd (IREL), a Central PSU & KMML, a Kerala PSU, is actively engaged in mining and processing of beach sand minerals from placer deposits. Moreover, the Central Government recently approved royalty rates for mining of 15 critical and strategic minerals including Lithium, Niobium and Rare Earth Elements (Lithium– 3% of London Metal Exchange price, Niobium–3% of Average Sale Price (both for primary and secondary sources), REE- 1% of Average Sale Price of Rare Earth Oxide.

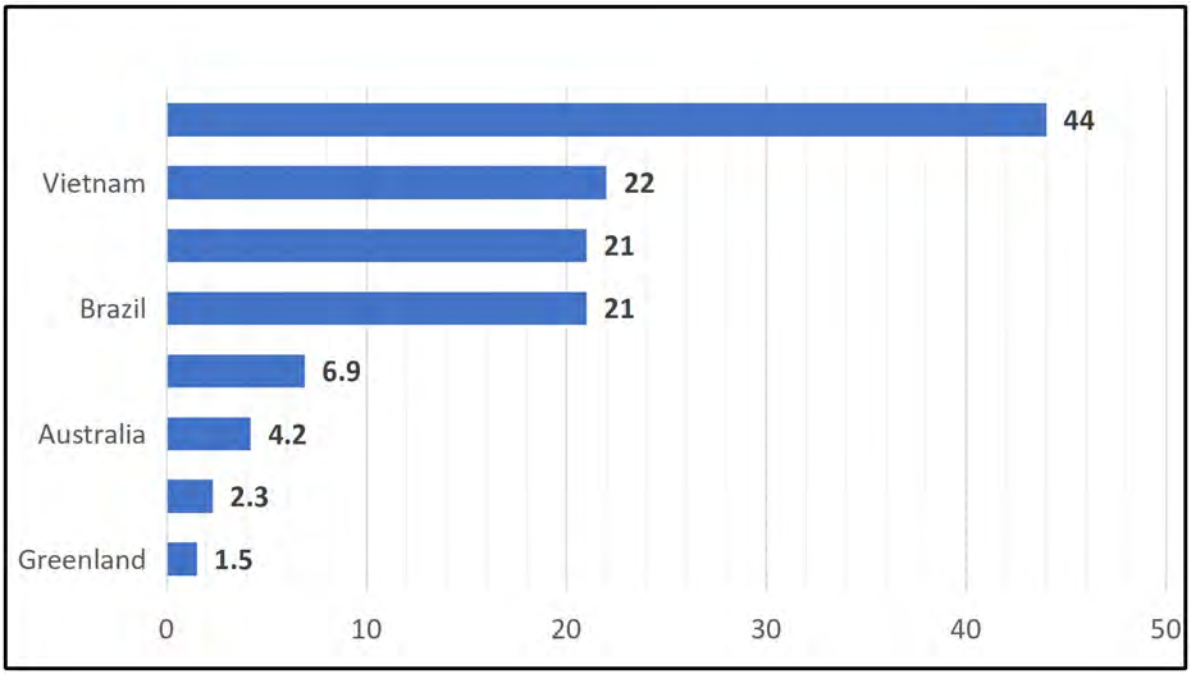


Figure 4: Showing REE Reserves (in Million Tonnes) across the World including India (Source: USGS).

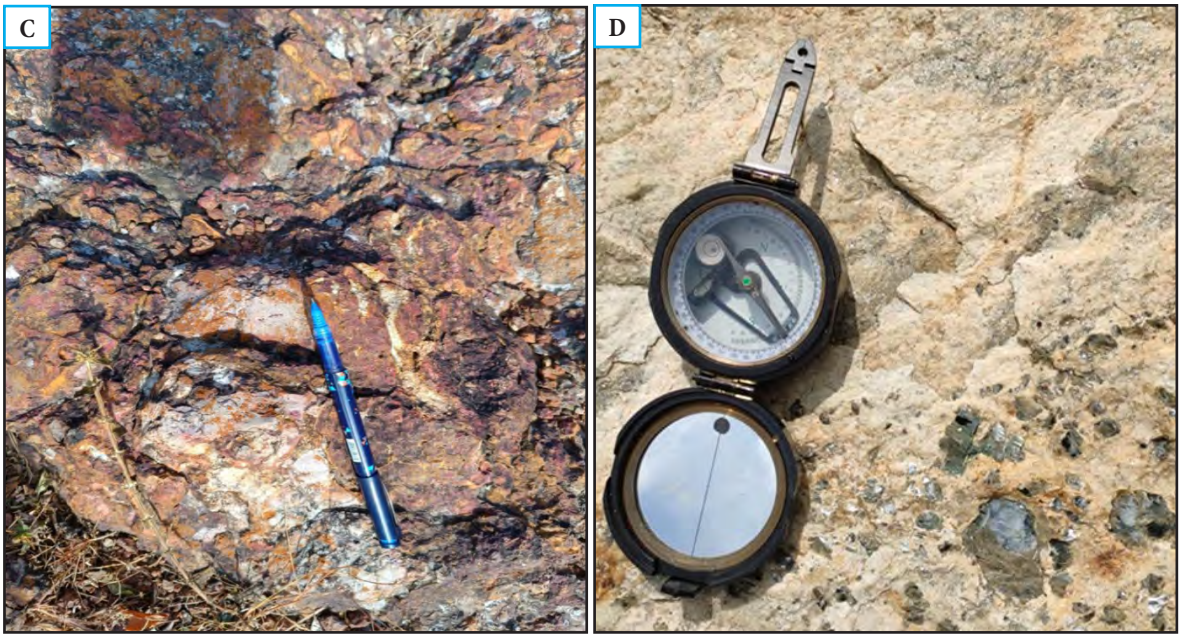
In India, Geological Survey of India (GSI) had carried out 14 projects on lithium and associated minerals in Jharkhand, Bihar, Chhattisgarh, Himachal Pradesh, Jammu & Kashmir, Madhya Pradesh, Meghalaya, Karnataka and Rajasthan during 2016-17 and 2020-21. India identified (explored by GSI) its first lithium deposit (5.9 million tonnes) in Salal-Haimana area of Jammu and Kashmir. During 2021-22, GSI has taken up five projects on lithium and associated minerals in Arunachal Pradesh, Andhra Pradesh, Chhattisgarh, Jammu & Kashmir and Rajasthan. Khanij Bidesh India Ltd (KABIL), a joint venture of three Central PSUs namely, National Aluminium Company Limited (NALCO), Hindustan Copper Limited (HCL) and Mineral Exploration Company Limited (MECL), has been established to identify, acquire, develop and process critical minerals such as Lithium, Cobalt, Copper and Nickel.

Potentiality of Critical and Strategic Minerals in Jharkhand

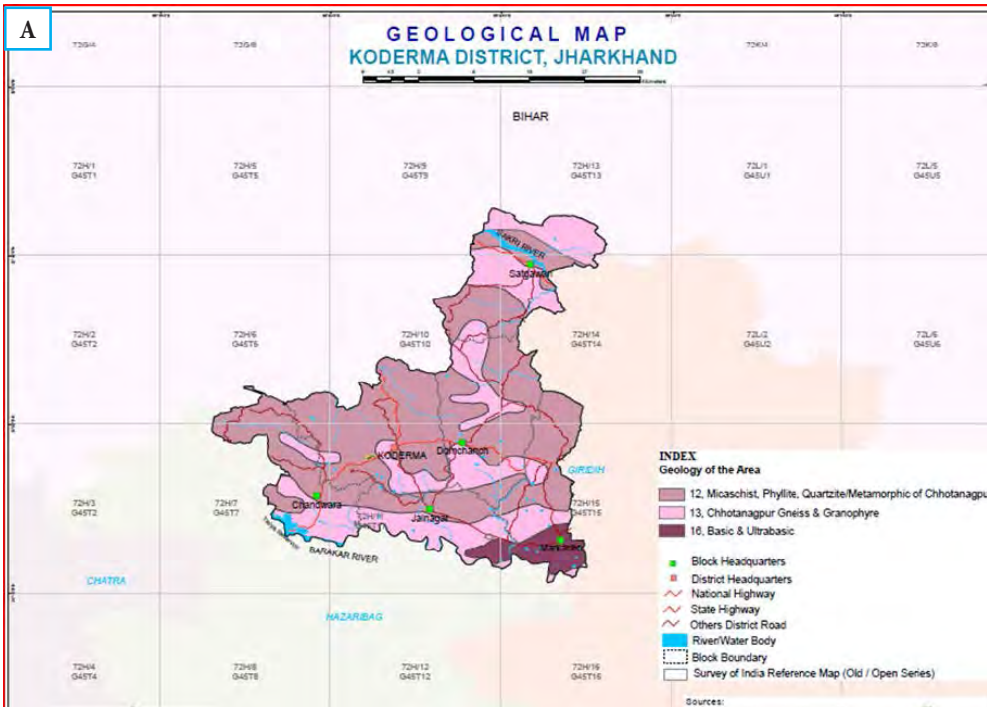
After Karnataka and Jammu and Kashmir, lithium reserves in Jharkhand are being considered very important from the future point of view. Geochemical mapping by GSI in and around Tilaiya block of Koderma districts has revealed high concentrations of Lithium, Cesium and other associated critical minerals. Field investigation studies made by GSI, Directorate of Geology, Jharkhand and various other pioneer geoscientists, confirmed that Lithium, Cs and REE resources in Jharkhand are found in Tilaiya, Dhodhakola-Kusuma and Pihra areas of Koderma District and Gawan block of Giridih District (Figures 5). Recently, Directorate of Geology, Jharkhand has carried preliminary exploration works in Koderma-Giridih Mica Belt in view of Li and REE resources which provided a strong clue for the potentiality of Li resources in Jharkhand. However, detailed exploration and feasibility study are yet to carry out in order to establish proved reserves of these mineral resources.

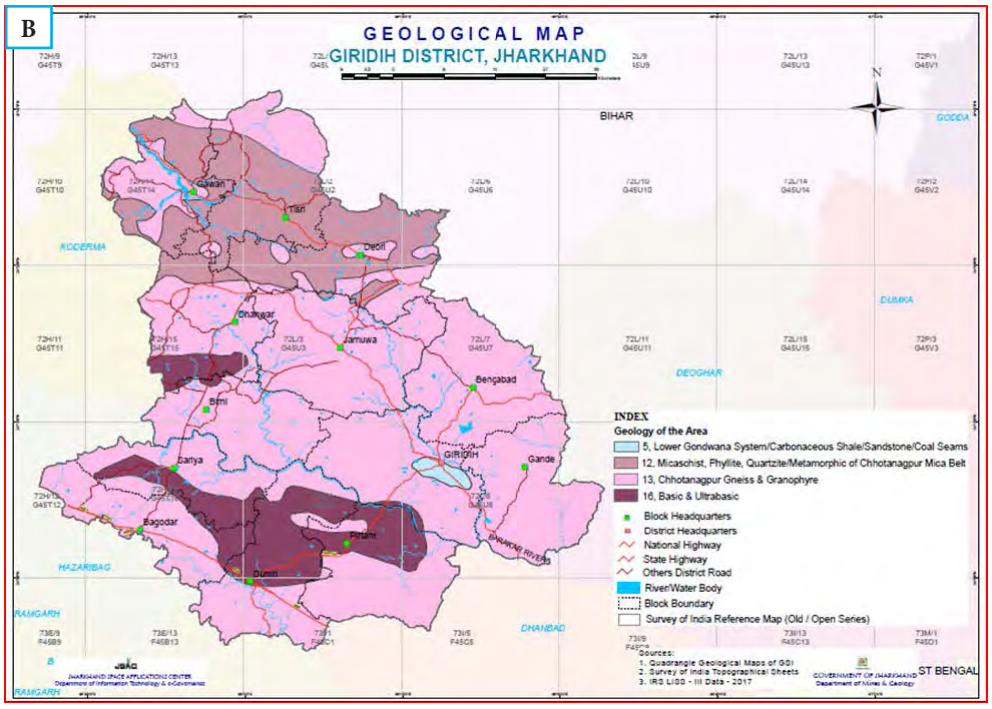
Figures 5: Field photographs showing A); and B) Li/REE-bearing minerals occurring in the Mica- Pegmatite Deposits in and around Koderma-Giridih Mica Belt, Jharkhand.

Besides, the outcome of geochemical studies of Bauxite deposits carried out at Batuatoli, Risahatoli, Pokripattoli and Karmatanr of the Jharkhand State reflect that these Bauxite deposits (Figures 6) are also substantially enriched with some critical minerals such as Titanium (Ti), Vanadium (V) and Gallium (Ga) other than Al. Also, the State has potentiality for numerous other critical minerals such as Graphite, Potash, Silica, Platinum Group of Minerals other than Li/REE (Figures 6, 7 & 8). Recently, 02 Blocks of Graphite and 04 Blocks of Ti/V-bearing Bauxite Deposits have been prepared by the Department of Mines and Geology, Govt. of Jharkhand and submitted to the Central Government for Auction in the light of MMDR Amendment Act, 1957. Several other blocks of such minerals are under exploration as per the Minerals (Evidence of Mineral Contents) Rules, 2015 (as amended) for the preparation of auctionable blocks.



Figures 6: Field photographs showing A) ongoing exploratory drilling for Graphite at Ghutwa area, Palamu district, Jharkhand; B) close-up view of Graphite Deposit (2.00% to 20.23% fixed carbon) occurring in Ponchi & Rewaratu areas of Palamu district, Jharkhand; C) Titanium/Vanadium-bearing Bauxite deposits at Lohardaga District; and D) REE other Critical mineral-bearing Mica-Pegmatite Deposits occurring in and around Koderma-Giridih Districts, Jharkhand.





Figures 7: A); and B) Geological Maps of Koderma and Giridih District respectively showing distribution of Li/ REE-bearing Mica-Pegmatite Deposits (shown at sl. no. 12 in the Map's Index; Source: Directorate of Geology, DMG, Govt. of Jharkhand).

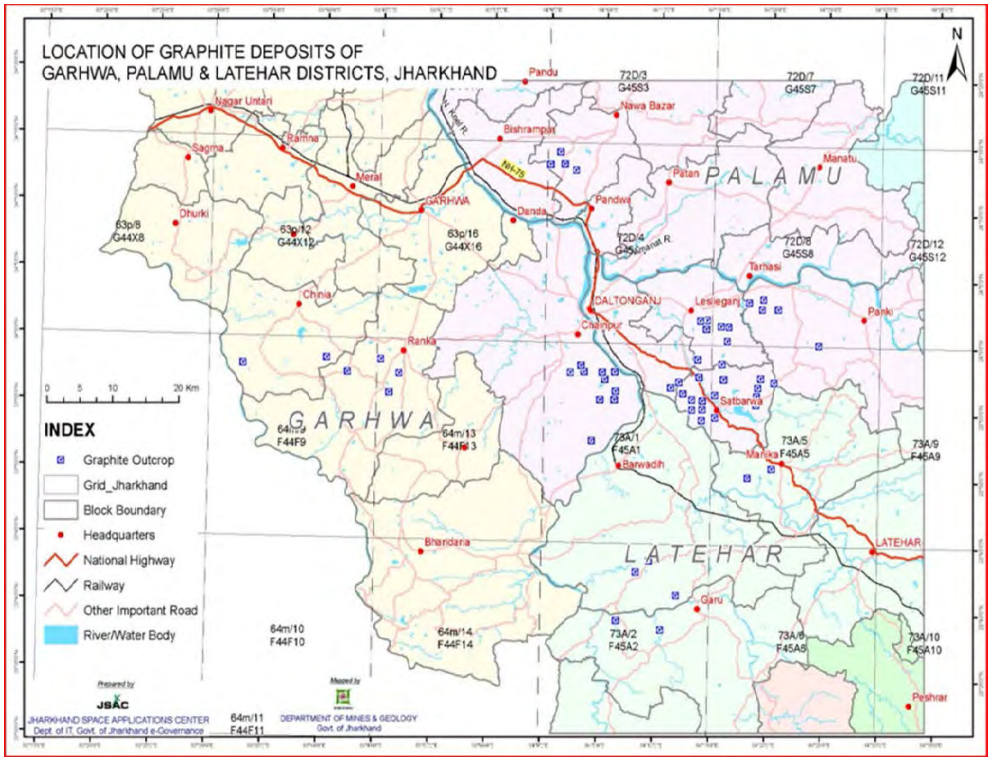


Figure 8: Geological Maps showing key locations of Graphite- a critical mineral deposit occurring in and around Garhwa, Palamu and Latehar Districts, Jharkhand (Source: Directorate of Geology, DMG, Govt. of Jharkhand).

Summary and Conclusion:

In view of "GHG emission, global warming and climate change", thrusts are being made across the world on exploration of "Critical & Strategic Mineral Commodities". These Minerals play a crucial role in Cleaner and more Sustainable Energy Transition leading to the environmental protection. Critical Minerals are used in Clean Energy Technologies, Electrolyser, Hydropower, Solar PV Batteries, Electric Vehicles, Wind Power, Bio Energy, Power Grids, High-tech Electronics & Telecommunications. Thermal power energy using Coal creates air and water pollution and emits greenhouse gases. Hence, thrusts should be given to reduce GHG Emission by using green energy sources like Coal Bed Methane, Biogas Fuel, Wind Energy, Geo-thermal Energy and Critical Minerals (Li/REE etc.)

In India, several measures including those of legislative measures such as amendments in mining acts (MMDR Act, 1957), rules and regulation have been taken to move from fossil fuel-based energy sources to non-fossil fuel-based (green energy) sources. In this context, it is essentially required to give thrust for the exploration/extraction of Multi-mineral commodities rather than doing convention way of exploration/mining for single mineral commodity. Jharkhand has huge potential for Critical and Strategic Minerals (CSM) such as Li and REE particularly occurring in Koderma-Giridih Mica Belt. However, it requires further detailed exploration so as to establish the reserve base of CSM in the State with an aim to minimize the ecosystem's carbon footprint and to achieve net zero emission target leading to environmental protection.

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Environmental Sustainability: Lessons Learnt from the Pandemic

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"Sarvo Vai Tatra Jivate
Gour-Asvah Purusah Pasuh
Yatredam Brahma Kriyate
Paridhir Jivantaya kam."

"Everyone whether a human being or an animal, lives safely, where the purity of atmosphere (Bhahman) is maintained all around for the purpose of life."

Introduction

This shloka from the Atharva Veda beautifully describes the relationship between man and nature, and explains the dependence of life on the purity of the environment. It is a reminder to mankind that there is no planet B and we can only have a peaceful life, if we take efforts to maintain a balanced environmental harmony. It enjoins upon humanity to take care of trees, animals, waterbodies, mountains and all other aspects of nature because all are interconnected. Having survived from the pandemic, our generation is the best to feel the impact of climate change, the intertwining of human health and environmental sustainability, and unfortunately the last generation that can do something about it. The post pandemic world needs to analyse that Covid-19 was only a trailer from the vast canvas of nature and if we do not take emergent steps for environmental sustainability, only the names of the calamities will keep changing. Covid-19 should be seen as a lesson to humanity to indulge in a peaceful synchronization with nature, so that future pandemics can be avoided.

Environmental Sustainability

Natural resources of the earth, including the air, water, land, flora and fauna and specially representative samples of natural ecosystems must be safe guarded for the benefit of present and future generations through careful planning or management, as appropriate.[1] In essence, sustainable development is a process of change in which the exploitation of resources, the direction of investment, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations.[2] The right to development must be fulfilled so as to equitably meet developmental

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1 Report of the United Nations Conference on the Human Environment, Stockholm, 5-16 June 1972, A/CONF.48/14/Rev.1, Chapter I Principle 2, *https://www.un.org>conferences*.

2 Report of the Worlds Commission on Environment and Development, Our Common Future, United Nations 1987, Chapter 2. *https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf*.

and environmental needs of present and future generations.[3] In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it.[4]

After a combined reading of the mandate of the above referred international conventions, environmental sustainability can be defined as the responsibility of human beings to manage the natural resources so as to fulfil the current needs without adversely compromising the abilities of future generations to meet theirs. Thus, the core notion of sustainability is that of futurity, whereby development in the present should not compromise the ability of future generations to meet their needs. The theory of environmental sustainability advocates a process of change in which the exploitation of natural resources is minimised by taking concrete efforts in order to ensure that the development today does not negatively affect future generations. The most important aspect of the theory of sustainability is that it places human beings at the centre of concerns and comprehends their entitlement to a healthy and productive life in harmony with nature.

Pandemic and Nature: The Interface

In 2019, a disease caused by the SARS-CoV 2 (in short known as Covid-19) started from a vet market in Wuhan, China. Though it started in a small scale in Wuhan, it spread like wildfire across the world and the World Health Organisation declared it as a pandemic on March 11th 2020. The post pandemic scientific world is engaged in a series of research which points towards the possible connection between environmental sustainability and pandemics.

For two decades, evidence has been building of the link between how we encroach on, degrade and exploit the natural world and the risk of 'zoonosis'- animal diseases that spill over into humans. The most frequent spill over occurs around homes and fields. For some diseases, we know in some detail how our activity helped it occur. One of the best described stances is the Nipah Virus. Its jump from bats to pigs to people in 1998 followed years of intensification of pig farming and deforestation in Malaysia that intensified the interface between the species. There is still no vaccine for Nipah which kills up to 75% of people it infects. Another example is the Hendra Virus in Australia, where deforestation is linked to bats carrying the virus reaching people and horses.[5]

The Covid-19 is a biological agent from nature and has a major impact on the global world (i.e. the global ecosystem), as well as individual countries (i.e. individual ecosystem units). In principle, the rate of Covid 19 coronavirus infection should be the same in all countries, but

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3 Report of the United Nations Conference on Environment and Development, Rio De Janeiro, 3-14 June 1992, A/CONF.151/26(VOL 1) Principle 3, *https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_CONF.151_26_Vol.I_Declaration.pdf*.

4 ibid, Principle 4.

5 Adam Vaughan, How our abuse of nature makes pandemic like COVID 19 more likely, 3 Mar 2021, *https://www.newscientist.com/article/mg24933240-800-how-our-abuse-of-nature-makes-pandemics-like-covid-19-more-likely/*.

it is not the case. It was hypothesized that the effect of Covid-19 in different countries would depend not only on the virus and its spread but also on ecological, economic, social conditions. Although every country is made up of nature, the economy, and human society, nature is under pressure from our ever increasing production and ever increasing consumption. The outbreak of Covid-19 pandemic is a serious warning to humanity, which can choose from three main directions of development. The world of the future can be economy driven (production based) or society driven (consumption based) or nature driven (co-existence based).[6]

As per the Inter-governmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), there are clear links between pandemic and biodiversity. New pathogens usually emerge from 'a pool' of previously undescribed, potentially zoonotic microbes that have co-evolved over millions of years with there wild life hosts.[7]

There is substantial evidence that the underlying drivers of almost all recent EIDs (emerging infectious disease) are anthropogenic environmental changes, and socio-economic changes, that alter contact rates among natural reservoir hosts, livestock and people, or otherwise cause changes in transmission rates.[8]

Wildlife and microbial diversity, human populations, domestic animals and landscape are strongly interconnected, with complex dynamic feedbacks that can drive or reduce pathogen transmission.[9]

In the past century we have escalated our demands upon nature, such that today, we are losing species at a rate unknown since the dinosaurs along with half of life on earth went extinct 65 million years ago. This rapid dismantling of life on earth owes primarily to habitat losses, which occurs mostly from growing crops and raising livestock for people. With fewer places to live and fewer food sources to feed on, animals find food and shelter where people are, and that can lead to disease spread.[10]

Nature is sending us a message with the coronavirus pandemic and the ongoing climate crisis. Humanity was placing too many pressures on the natural world with damaging consequences, and failing to take care of the planet meant not taking care of ourselves.[11]

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6 Attila Muranayi & Balient Varga, Relationship between the COVID-19 Pandemic and ecological, Economic and Social Conditions, Vol.9 Front. Pub. Health, Jul. 23 2021, *https://doi.org/10.3389/fpubh.2021.694191*.

7 IPBES (2020) Workshop Report on Biodiversity and Pandemics of the Inter-Governmental Platform on Biodiversity and Ecosystem Services, Section 1, p.11, *https://files.ipbes.net/ipbes-web-prod-public-files/IPBESPandemicsReport.pdf*.

8 ibid, p.12.

9 ibid, p.16.

10 10 Dr. Aaron Bernstein, Former Director of Harvard Chan C – CHANGE (Centre for Climate, Health, And The Global Environment), Coronavirus and Climate Change, *http://hsph.harvard.edu/c-change/subtropics/coronavirus-and-climate-change/*.

11 11 Inger Anderson, UN's Environment Chief, The Guardian, Wed 25 Mar 2020, *https://amp.theguardian.com/world/2020/mar/25/coronavirus-nature-is-sending-us-a-message-says-un-environment-chief*.

The Covid-19 pandemic has emerged as climate change continues to influence temperature and precipitation patterns, induce extreme weather events, and force population displacement, leading to compounding public health crisis. Shifting temperatures and precipitation patterns could have a profound effect on the future seasonality and spatial spread of SARS-CoV-2 and other viruses either directly or through effects on reservoir species. A rebalancing of our interactions with the environment with the goals of conservation, pollution reduction, and

healthy equity would mark a powerful step towards reducing the impact of - and possibly preventing – future pandemic diseases.[12]

The links between environmental degradation and the rise of pandemics is undeniable. Let us take the responsibility of creating the monster named Coronavirus by our insane and ruthless treatment of nature. When trees are cut, animals are killed or caged, unknowingly, we are disrupting ecosystems and viruses which were being hosted by them venture out to find new hosts, and what better feast than this huge species of the homo sapiens. Whether we accept it or not, the fact remains that human activities intruded into the ecosystems of the viruses and this ecological interruption led to the global health crisis, namely the Covid-19 pandemic.

Sustainability Lessons learnt from the Covid-19 pandemic

i. **Climate change and global health are interconnected** - As per the United Nations, Climate change refers to long term shifts in temperatures and weather patterns. Such shifts can be natural, due to changes in Sun's activity or large volcanic eruptions. But since the 1800s, human activities have been the main driver of climate change, primarily due to the burning of fossil fuels like coal, oil and gas. The average temperature of the Earth's temperature is 1.2°c warmer than it was in the late 1800s (before the industrial revolution) and warmer than at any time in the last 100,000 years. The last decade (2011-2020) was the warmest on record and each of the last four decades have been warmer than any previous decades since 1850.[13]

   As per the World Health Organisation, climate change presents a fundamental threat to human health. It affects the physical environment as well as all aspects of both natural and human systems – including social and economic conditions and the functioning of health systems. It is therefore a threat multiplier, undermining and potentially reversing decades of health progress. As climate conditions change, more frequent and intensifying weather and climate events are observed, including storms, extreme heat, flood, droughts, and wildfires. These weather and climate hazards affect health both directly and indirectly, increasing the risk of deaths, non-communicable diseases, the

12 A.K. Weaver *et.al* 2022, Environmental Factors Influencing COVID-19 Incidence and Severity, The Annual Review of Public Health, Volume 43: 271-291, *https://doi.org/10.1146/annurev-publhealth-052120-101420*.

13 What is climate change? *https://www.un.org/en/climatechange/what-is-climate-change*.

emergence and spread of infectious diseases, and health emergencies. Climate change is expected to cause approximately 2,50,000 deaths per year between 2030 and 2050.[14]

In a study conducted by Daniel Brooks and his colleagues at the Harold W Manter laboratory of Parasitology at the University of Nebraska State Museum, it has been found that with global heating, pathogens are jumping more frequently from one host to another. He argues that climate will soon be fuelling pandemics and we can expect a succession of unpredictable human, animal and plant disease outbreaks. "We rarely have an idea where the next [pathogen] will pop up. All we know is that they are better at finding us than we have been [at] finding them."[15]

The confluence of climate change with a rising human population and an increasingly degraded environment create conditions propitious for new pandemics. In this regard, global warmings will force changes to human and animal behaviour that can significantly increase the likelihood of zoonotic spillovers and trigger new pandemics. In addition, global warming will force the adaptation of many microbes with human pathogenic potential to survive at higher temperatures, such that these microbes can thrive at human temperatures and defeat our thermal defences. The emergence of candida auris, a fungal pathogen that has now spread globally after simultaneous, independent emergences, has been proposed to be a result of climate change and may be a harbinger of new future infectious disease threats, some of which could have pandemic potential.[16]

Thus it is more than clear that climate change and public health are two sides of the same coin and none can be read in isolation. In fact, research clearly indicates that health and climate are inextricably linked and we are at the verge of a climate crisis. Research also indicates that climate change is no more an environmental issue rather it is a health issue; from the air we breathe, the water we drink, the food we eat, or the temperatures that are rising is miserably linked to human's health. When weather becomes unpredictable and ecosystems change, we are in for emerging infectious diseases (EIDs) assault from the nature, the glimpses of which have been shown in the first 23 years of the 21st Century in from of at least eight major viral outbreaks like West Nile, SARS-CoV, H1N1, MERS-CoV, ZIKA, Ebola, SARS-CoV-2, and Mpox, three of which were new viruses and two of which resulted in pandemics. The pandemic has thus taught us that climate change is a reality which is affecting human health in more than myriad ways and if it is not addressed at the earliest, pandemics will keep coming.

ii. **Biodiversity Conservation: imperative for human existence** - As per the United Nations Environment Programme (UNEP), biological diversity is the variety of life on

14 Climate Change, World Health Organisation (WHO), 12 Oct 2023, *https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health*.

15 John Vidal, Fevered Planet: How a shifting climate is catalysing infectious disease, *https://www.bbc.com/future/article/20231201-fevered-planet-how-climate-change-spreads-infectious-disease*.

16 Arturo Casadevall, Pandemics Past, Present and Future: Progress and persistent risks, 1 April 2024, The Journal of Clinical Investigation 134(7), *https://doi.org/10.1172/JCI179519*.

earth and the natural patterns it forms. The biodiversity seen today is the result of 4.5 billion years of evolution and, increasingly of human influence as well. It forms the web of life, of which humans are integral and upon which people and planet so fully depend.

Loss of biodiversity is proceeding at such rate that we appear to be facing a mass extinction event, and irreversible loss to the planet that also threatens humanity's life support system. Population of many wild species are well under half the size they were in 1970.[17]

When humans cause losses in biodiversity, diseases increase. The researchers have found that level of disease and mortality in environments affected by human-caused biodiversity losses were nearly nine times worse than disease outcomes expected under Earth's natural biodiversity gradient. It is probably because the loss of rarer creatures means pathogens have an easier time finding the more abundant species they have evolved to use as hosts.[18]

During the pandemic, ample scientific evidence was gathered to suggest that healthy ecosystems and a rich biodiversity act as natural protective barrier which in turn helps in the prevention of the emergence as well as propagation of the disease. The pandemic was a wake up call to change our mind set and relationship with the natural world and if emergent steps towards biodiversity conservation are not taken, there are very remote chances of survival of humanity.

iii. **We are all connected –** In the words of Dr. Martin Luther King, "it really boils down to this; that all life is interrelated. We are all caught in an inescapable network of mutuality, tied into a single garment of destiny. Whatever affects one destiny, affects all indirectly." The pandemic period proved the reality of these prophetic words. A world which was divided by continents, nations, races, religions, languages etc was united by one tiny virus. The military might of the strong nations, the financial might of the rich nations, the territorial might of the large nations, all were on their back feet as nature struck back. The virus without passport barged into national boundaries causing devastations across the globe.

Even if one country prepares for the next pandemic, it won't be of any help if the rest of the world is not. Similarly, climate change, loss of biodiversity etc. cannot be stopped if the entire global mindset does not change. Human security is no more dependent on military deterrence, the pandemic taught us and as such the world needs to understand that the entire humanity has to be on the same page to deal with 'common enemies' like the coronavirus. The rapidity with which Covid-19 spread across the globe showed us that we are all interconnected and we are all vulnerable. One very important take away

17 Mark Everard *et.al*, The Rule of Ecosystems in Mitigation and Management of COVID-19 and Other Zoonosis, Environ Sci Policy, Vol. 111, Sep. 2020, 7-17, *https://doi.org/10.1016%2Fj.envsci.2020.05.017*

18 Scott Dance, How climate change is raising the risks of another pandemic, Washington Post, May 8 2024, *https://www.washingtonpost.com/climate-environment/2024/05/08/climate-change-disease-pandemics/*.

from the pandemic is that there have to be global measures to reduce this vulnerability by respecting the call of nature, wherever and wherever possible by putting protections and preventive measures in place – not just for humanity, but also for the sole residential planet, our Earth.

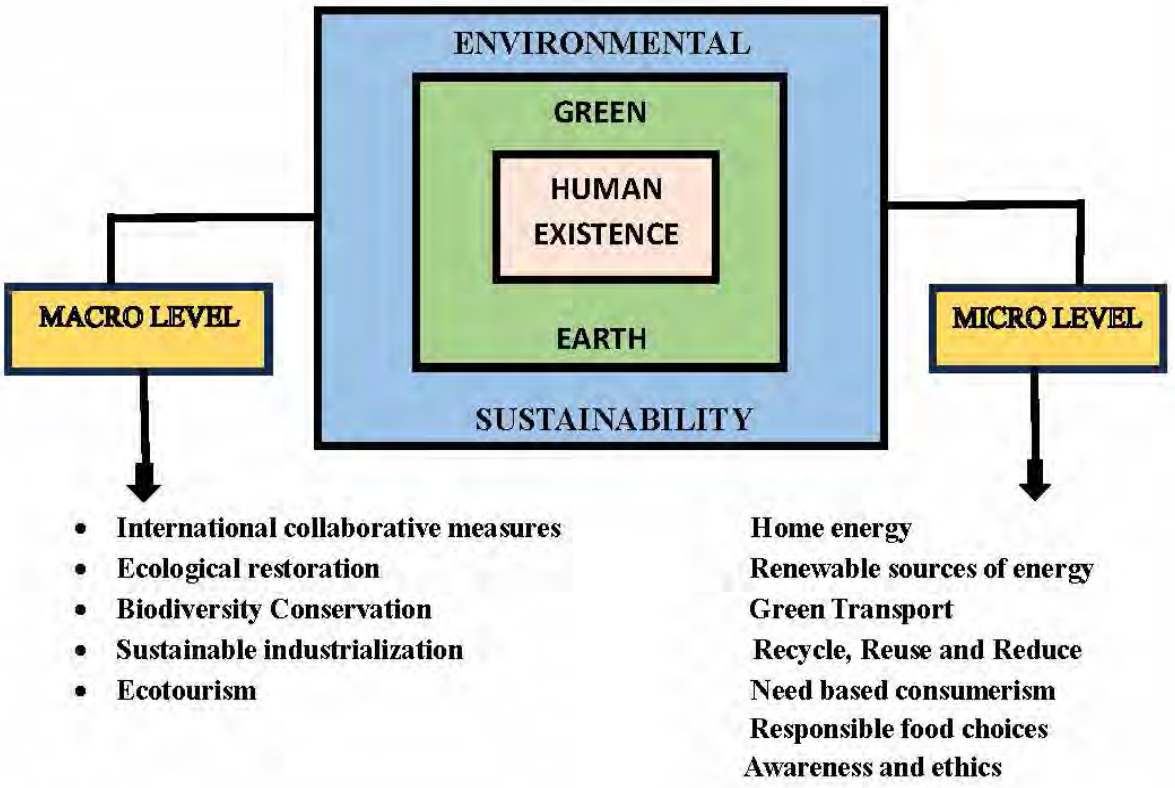
iv. **Sustainable living is possible –** Covid-19 had a disastrous impact on the world in almost all aspects of life, however, nature had a breathing phase, albeit for a brief span of time, when smog-less clear skies were seen, chirping of the birds could be heard, rivers were shining, mountain peaks were visible, dolphins were sited and the entire cosmos was taking a break from human annoyance.

As per the European Environmental Agency (EEA), Covid-19 lockdown led to NO2 emission dropping from 30-60% in many European cities like Barcelona, Madrid, Milan, Rome and Paris. In the Unites States, NO2 declined 25.5% during the COVID-19 period compared to previous years. The level of NO2 and PM2.5 reduced by almost 70% in Delhi. The river Ganaga and Yamuna reached a significant level of purity due to the absence of industrial pollution on the days of lockdown in India. It was found that, among the 36 real-time monitoring stations of River Ganga, water from 27 stations met the permissible limit.[19]

Though the measures taken during the lockdown were drastic, but the temporary environmental ease reflected due to those measures are not to be forgotten. The pandemic taught us that sustainable living was possible; big fat weddings can give way to cozy intimate ceremonies, working from home was not that bad, spending quality time in house had its own social and personal significance, not going to restaurants was good for the gut health and the sooner we adopt sustainable lifestyles, the better.

19 Tanjina Rume *et.al*, Environmental effects of COVID-19 pandemic and potential strategies of sustainability, Heliyon, Vol. 6, Issue 9, Sep. 2020, *https://doi.org/10.1016/j.heliyon.2020.e04965*.

Way Forward



The above figure demonstrates how human existence is dependent on the colour of the earth and how that is dependent on a sustainable environment. In ascertaining the way forward to a sustainable environment, the following steps can be helpful:

Macro Level

- **Strict adherence to international collaborative measures for environmental sustainability**

  The Paris Agreement which was adopted by 196 parties at the UN Climate Change Conference (COP 21) in Paris, France on 12th December 2015 and entered into force on 4th November 2016 was a serious attempt by the United Nations to strengthen the global response to threat of climate change, in the context of sustainable development and efforts to eradicate poverty. The Paris Agreement is a legally binding international treaty which includes commitments from all countries to reduce their emissions and work together to adapt to the impacts of climate change. It marks the beginning of a shift towards a net-zero emission world and works on a five-year cycle of increasingly ambitious climate action carried out by the countries. This agreement mandates that each

country every five years is expected to submit an updated National Climate Action Plan known as Nationally Determined Contribution (NDC). In the NDC, the participating countries communicate endeavours taken by them towards reduction of greenhouse emissions and also the actions taken by them to build resilience to adapt to the impact of rising temperatures.

If the 196 countries signing the Paris Agreement with all honesty and sincerity check out their own climate action plan, speed up the transition away from fossil fuel to renewable energy, build resilience to adapt the impact of rising temperatures, the world will be richer with greener incentives.

- **Ecological restoration**

Ecological restoration calls for assisting in recovery of ecosystems that have been degraded or destroyed by human action as well as conserving the ecosystems that are still intact. When ecosystem is diversified, it is bound to yield greater benefits such as more fertile soils, bigger yield of timber and fish and last but not the least, huge stores of greenhouse gases.

Between now and 2030, the restoration of 350 million hectares of degraded terrestrial and aquatic ecosystems could generate US $ 9 Trillion in ecosystem services. Restoration could also remove 13 to 26 gigatons of greenhouses gases from the atmosphere. The economic benefits of such interventions exceed 9 times the cost of investment, whereas inaction is at least three times more costly than ecosystem restoration.[20]

As per a report of UNESCO, the global urban population facing water scarcity is projected to increase from 933 million to 1.7-2.4 billion people in 2050. Without water, there can be no life as the famous couplet of Rahim indicated, "rahiman paani rakhiye, bin paani sab soon, Paani gaye na ubere Moti, manus, choon..." Translated, it underscores the profound truth that without water, everything else fades into insignificance and the entire existence hinges on the presence of water. The rivers and the other water bodies are slowly diminishing from the earth and we are entering in the most critical era of humanity where wars will be fought for water. Immediate efforts should be taken to preserve the water bodies, and all the stake holders should rise up to protect our rivers from further contamination and disappearing.

Ecosystem restoration is not only cheaper but also help us achieve all the sustainable development goals and as such every effort should be taken to return an ecosystem to its original state.

20 Decade on Ecosystem Restoration, UNEP – UN Environment Programme, *https://www.unep.org/explore-topics/ecosystems-and-biodiversity/what-we-do/decade-ecosystem-restoration*.

- **Sustainable industrialization**

  Industrialization and development are interlinked and so are environmental pollution and human health. Sustainable industrialization ensures the promotion of green industry which balances economic development with environmental protection. Green industry encompasses industrial development without skyrocketing emissions and ecosystem degradation by switching from the traditional high-energy, high-emission needs of an industry by maximizing energy and water efficiency, substantial recycling, and applying improved consumption and production systems. If industries go green, nothing can prevent the world from becoming greener.

- **Ecotourism and biodiversity conservation**

  Ecotourism and biodiversity conservation are closely related. Ecotourism is a form of sustainable tourism which can contribute to the conservation of biological diversity. The concept of ecotourism involves economic development and conservation of biodiversity to ensure sustainable development. It is a nature based tourism approach which serves dual purpose by improving local livelihood and at the same time conserving ecosystem balancing. Ecotourism plays an important role in raising awareness of sustainable forest development, motivating people to conserve forests, and teaching the importance of conserving biodiversity for human livelihood. Government should come forward to promote ecotourism as it leads to sustainable development with local economic benefit.

Micro level

Big changes start with small actions. The micro level efforts are individual–led climate solutions which are low effort, inexpensive and valuable ways to support environmental sustainability. The following are the baby steps which can be taken by all of us in our daily lives to reduce the carbon footprint:

- **Home energy**

  When it comes to reducing the global average individual carbon footprint from 6.3 tons (2020) to 2.1 tons in 2030 as recommended by experts, home energy is a significant area of energy. We can start with the process of heating and cooling mechanisms in our homes. The energy burden can be largely reduced by setting the thermostat to a lower temperature in the winter and to higher temperature in the summer. Instead of central cooling heating systems, homes should concentrate on area specific heating and cooling measures. Switching to LED bulbs, and other energy efficient appliances, hanging things to dry instead of dryer are small measures which can go a long way in helping the planet.

- **Switching to renewable sources of energy**

  By Switching to renewable sources of energy, we can reduce our carbon footprint by upto 2.5 tons annually, indicate scientists. In a country like ours, where there is abundance of sun, tapping of solar energy by industries as well as homes by installing solar panels will not only aid in reducing the carbon emissions but will also drastically reduce the energy bills and lower the pressure on the electric stations.

- **Green transport**

  Transport sector is one of the largest contributors of global carbon emissions, whether its roadways or aviation, they consume a large amount of fossil fuels leading to huge carbon emissions. As per the United Nations Act now initiative, shifting from cars to public transportation can reduce upto 2.2 tons of carbon annually per individual. Shared modes of transportation, electric vehicles with renewable energy sources in the electric grid, cycling and walking to work place can significantly aid in reducing the carbon footprint.

- **The 3 Rs, Recycle, Reuse and Reduce**

  These three Rs can reduce the amount of waste that goes into landfills, conserve natural resources, save energy, and reduce the carbon footprint. Taking a pledge not to use single use plastic, using earthen pitchers, going paperless at work place are small steps which are bound to produce large results. According to a UN report, the world produces about 50 million tons of e-waste annually, reportedly weighing more than all the commercial airlines ever made. Thus electronic gadgets like mobile, laptop, smart watches, air conditioners, refrigerators should be purchased only when needed and not as a gift option. Discarding a laptop or i-pad without any reason is an irresponsible environmental behaviour which is aiding in the accumulation of e-waste on the planet. We need to find out ways to mobilise our colleagues, pool our e-waste and donate to individuals and organisations working to recycle, reuse e-waste sustainably, so that the burden of carbon footprint is reduced.

- **Need based consumerism**

  According to a World Bank Data, the world generates 2.01 billion tons of municipal solid waste every year, which is set to rise by 70% to 3.40 billion tons by 2050. On an individual level, one can contribute in slowing the pace of this rise in solid waste, by only buying the things we need or the things that will last longer. Social media influence, fast fashion and the tendency of shopping online to be in trend leads to mindless consumerism, where goods purchased are used once and thrown and sometimes not even used. This kind of mindset is unknowingly aiding in increasing the carbon footprint and should be immediately shunned. Sustainable consumerism is the need of the hour which can be achieved by adopting a sustainable lifestyle which includes purchasing on the basis

of need, and concentrating on minimal impact of the purchase on environment and society.

- **Responsible food choices**

  Vocal for local is the best mantra in case of the food choices we make. Encouraging local and seasonal produce can reduce greenhouse gas emissions generated by transportation, packaging and retail. Instead of meat based diet, planet based meals should be encouraged and a simple resolution to go vegetarian even one day of the week will help. Reduction of food wastage is another very significant aspect which needs to be taken care of, which we are witnessing on a daily basis in restaurants, marriages and other social gatherings. Non consumed food is not only a shame for humanity as many go to sleep without food, but also because it accounts for 8-10 % of the global greenhouse emissions.

- **Awareness and ethics**

  The greatest hurdle on the road to environmental sustainability is the false belief that the earth's resources are unlimited and it is somebody else's duty to protect the environment. The Covid-19 was an alarm to humanity to wake up from the deep slumber and realise that our choices not only influence our individual self or our nation but also the whole world, so far as environmental consciousness is concerned. Broadening the scope of environmental assessment will have a lower chance of success without a development of society's attitudes, responsibilities and ethics in relation to the theory of environmental sustainability. Conscious efforts to increase society's awareness by increased knowledge of all aspects of the environment covering inter-disciplinary spectrum have to be taken. It has to start from home and school by way of routine and has to be inculcated as a matter of interest and commitment. Educational policies must be framed such that environmental ethics becomes a norm, particularly for the children so that they start treating nature with reverence. If children are made environmentally sensitive, it is bound to escalate the process of environmental sustainability.

Conclusion

Covid-19 was a late lesson from an early warning of the nature, giving us a strong message that respecting planetary health is a pre-condition for human and economic health and that human health and environmental health are intertwined. It is high-time we learn from the 'clear warning shot' in the form of Covid-19 outbreak and stop playing with fire by over exploitation of natural resources and a total non-committal approach towards safeguarding the biodiversity and depleting ecosystems. It is time for a global realisation that the earth is what we all have in common and it is better if we prepare ourselves to fight with the invisible threats hovering around us in the form of deadly viruses, instead of fighting with each other. Humanity's

'promiscuous treatment of nature' needs to change or there will be more deadly pandemics such as Covid-19, warn scientists who have analysed the links between viruses, wildlife and habitat destruction. All we have to do is to wake up and change; instead of only extracting from nature, let us inculcate a reciprocal approach towards the cosmic existence. Let us respect the message hidden in our ancient scriptures and approach nature with tyaga bhav, and take and enjoy from nature only as much we need but not more than that, as no amount can ever satiate our greed.

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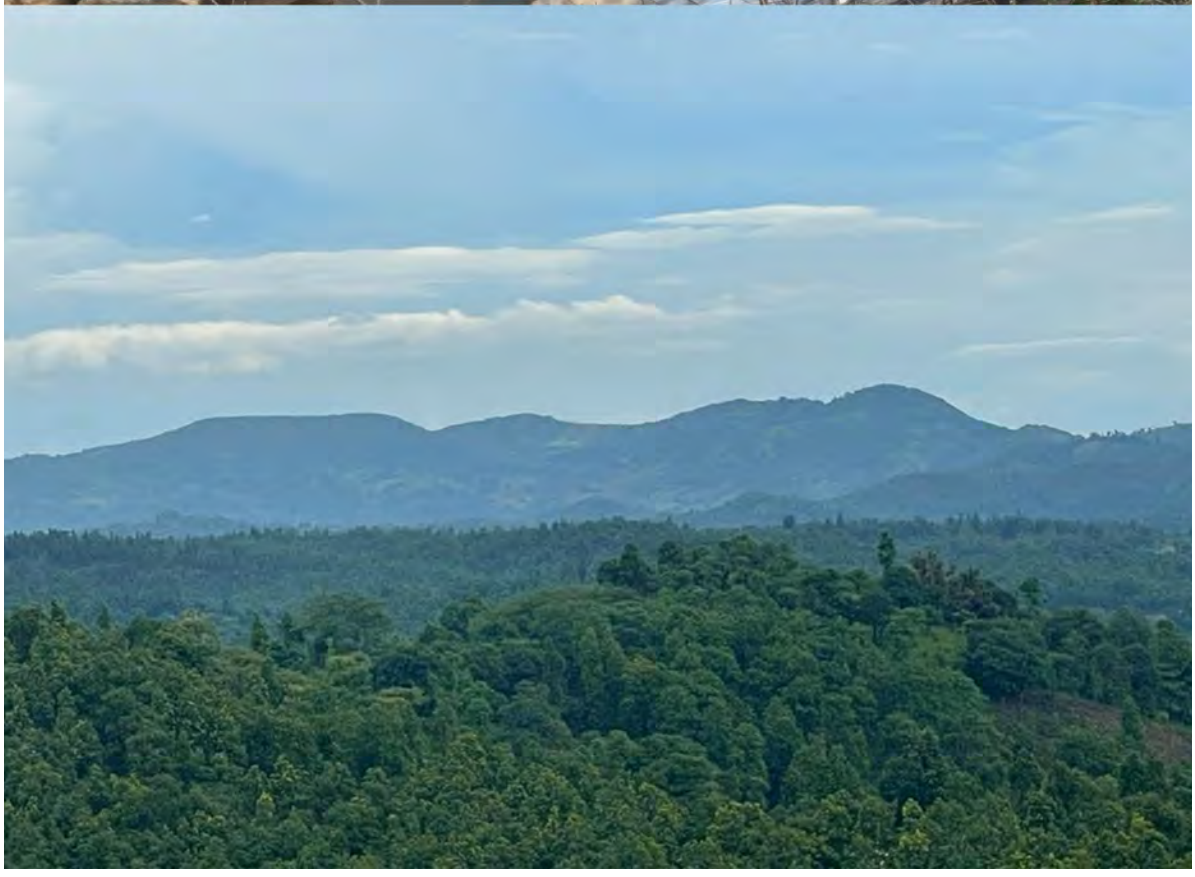

Illuminating the Path to Sustainable Skies: A Study on Light Pollution and Environmental Impacts

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*Mr. Dipendu Das***

Light Pollution: A Brief Overview

Light pollution, a pervasive consequence of urbanisation and industrialisation, result in a significant danger to the human health, environment and biodiversity. Excessive or inappropriate use of outdoor artificial lighting, known as light pollution, disturbs natural wildlife behaviours and contributes to rising CO_2 levels, disrupts human sleep and obscures the beauty of the night sky with four primary forms: glare, skyglow, clutter and light trespass. The misdirected and excessive artificial lighting pollutes the natural darkness which disrupts natural ecosystems and wildlife, causing behavioural changes in the wildlife. It also has profound implications for astronomical observations and energy consumption. Impact involves the change of sleep patterns, loss of sleep, increase of stress and rapid alteration to circadian rhythms resulting in unnatural hormone production. Excessive artificial lighting is rapidly affecting the symbiosis which is essential to plant pollination for germination and further negatively impacting amphibians' reproduction habits and foraging.

According to a published study of Science Magazine from 2023 titled, "Citizen scientists report global rapid reductions in the visibility of stars from 2011 to 2022", written by Christopher C. M. Kyba noted that from 2011 to 2022, there was an annual decrease of 7 to 10% in the number of stars visible in the night sky. This translates to a significant reduction over a decade; for instance, a location witnessing 500 visible stars in 2011 would have experienced a decline to around 200 stars by the end of that period. The International Dark-Sky Association claims that more than four-fifths of the global population resides in areas with light pollution, resulting in the disappearance of the Milky Way from view. In the United States alone, light pollution wastes an estimated $3 billion annually in energy costs and contributes to the emission of millions of tons of CO2 into the atmosphere.[1]

In January 2019, a study was published in *Urban Climate Journal* which noted the steady rise of increasing brightness in various parts of India from 1993 to 2013 where New Delhi, Telangana, Maharashtra, Karnataka and Uttar Pradesh experienced an increase in 'very high light pollution intensity' during this period.[2] In cities such as Bangalore, India's bustling corporate hubs,

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1 Light pollution wastes energy and money and damages the climate, Dark Sky International, *https://dark-sky.org/resources/what-is-light-pollution/effects/energy-climate*.

2 How to dark sky parks tackle the growing problem of light pollution, DownToEarth (Jan. 19, 2024), *https://www.downtoearth.org.in/video/pollution/how-do-dark-sky-parks-tackle-the-growing-problem-of-light-pollution--93999*.

there's been a noticeable surge in nighttime illumination, leading to a concerning issue of light pollution. Data from NASA's Blue Marble Navigator, depicting nighttime light distribution, reveals a consistent escalation in light pollution levels within Bangalore over time.[3] A study conducted in 2021 focusing on light pollution underscores Bangalore's position as the third-most affected city in terms of light pollution coverage nationwide. Additionally, Karnataka, the state in which Bangalore is located, has been flagged for a significant uptick in 'very high light pollution intensity' from 1992 to 2013.[4]

Laws relating to Light Pollution: Cross-Jurisdictional Study

Several European nations such as Italy, Slovenia, Spain, France and Croatia have enacted laws at both regional and national levels to address the issue of light pollution.[5] Other States within the European Union have established regions that enjoy protected status due to their pristine dark skies.[6] In 2002, the Czech Republic made history within the European Union by enacting national legislation aimed at mitigating light pollution. Followed shortly by Slovenia in 2007 with the enactment of the Slovenian Decree on limiting values of light pollution. In 2005, the United Kingdom passed the Clean Neighbourhoods and Environment Act criminalising light pollution. In Scotland, flight light pollution now falls under the Public Health Act (Scotland Act 2008). In Northern Ireland, it is part of the Clean Neighbourhoods and Environment Act 2011. In 2015, the European Union launched its STARS4ALL project with the aim to inform and aware people about light pollution while also promoting approaches to mitigate the problem. Catalonia introduced a series of measures in the early 2000s targeting the issue of light pollution. Similarly, France took a significant step forward on 1st January, 2021 by enacting highly advanced regulations aimed at preserving the natural darkness of the night sky.

In January 2019, the European Union updated the Green Public Procurement Criteria for Road Lighting and Traffic Signals (GPP) with the aim of decreasing light pollution, cutting down on energy usage and enhancing the long-lasting quality of fixtures. At present the GPP employs on the principle of 'As Low As Reasonably Achievable (ALARA)' which aligns with the Low Impact Lighting (LIL) standards of German, Italian and Slovenian member States of the European Environmental Bureau. The appropriate light levels for traffic signals and road lighting are standardised by ALARA.[7] The GPP provides the Ratio for Upward Light Output

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3 Zebulun Mattos, Nature: India by night, Pinterest, *https://in.pinterest.com/pin/608548968427932182*.

4 *Time to turn the lights off*, The Softcopy (Mar. 7, 2024), *https://thesoftcopy.in/2024/03/07/time-to-turn-the-lights-off*.

5 Anthony Di Domenico, European Union Adopts New Guidance to Reduce Light Pollution¸ Environment Protection (Dec. 6, 2019), *https://eponline.com/articles/2019/12/06/european-union-adopts-new-guidance-to-reduce-light-pollution.aspx*.

6 European Protected Sites, European Environment Agency, *https://www.eea.europa.eu/data-and-maps/explore-interactive-maps/european-protected-areas-1*.

7 A.W.K. Yeung, The "As Low As Reasonably Achievable" (ALARA) principle: a brief historical overview and a bibliometric analysis of the most cited publications, Radioprotection (2019), *https://www.radioprotection.org/articles/radiopro/pdf/2019/02/radiopro190010.pdf*.

(RULO), recommending lighting to be rated with a 0.0% RULO. It also discusses constraints on Correlated Colour Temperature due to concerns about environmental and disturbance effects caused by blue light. It requires light sources to have a CCT of 3000K or lower and restricts the G-index, which is linked to blue light emission, to a maximum of 1.5 in environmentally fragile regions and 2.0 within 100km of an astronomical observatory. Additionally, it mandates that installed luminaires must be marked with RULO, G-Index, CCT, input power, flux codes and dimming control details, following the outlined guidelines.

In United States of America, at least 19 states, have laws or regulations relating to 'dark skies' in order to reduce light pollution and provide protection from unnatural artificial lighting. In 2021, there was significant legislative activity across 17 states regarding light pollution and preserving dark skies, with 40 bills introduced for consideration. Many municipalities within these states have also integrated light pollution regulations into their zoning ordinances. These regulations predominantly focus on outdoor lighting fixtures on state property or public roads. Typically, these laws require the installation of shielded fixtures that direct light downwards, aiming to reduce light pollution. Transitioning from unshielded to fully shielded fixtures often allow for the use of lower wattage bulbs, leading to energy savings. Furthermore, some regulations may stipulate the use of low-glare or low-wattage lights, impose restrictions on the duration of light usage and incorporate standards from the Illuminating Engineering Society (IES) into state regulations. Arizona State, known as a worldwide hub for astronomy, enacted light pollution law in 1986.[8] The regulation mandates that all exterior lighting fixtures be either fully or partially shielded, except for emergency, construction and airport navigational lights. Non-compliant fixtures are permitted if they are automatically turned off between midnight and sunrise. In Colorado, new outdoor lighting fixture installation mandates individual accountability for expenses, energy efficiency, reducing glare, limiting light pollution and maintaining the natural night sky.[9] A "full-cutoff fixture" must be used when output is greater than a certain number of lumens.

Several other states have aimed to promote such regulations at the community level. For instance, New Hampshire has prioritised maintaining dark skies to enhance its rural charm. Consequently, state legislation motivates local governments to implement rules and policies that conserve energy and reduce excessive night lighting.[10] Coastal states express worry over how beachfront lights affect birds and sea creatures. In Florida, a comprehensive lighting rule serves as a blueprint for local authorities to develop measures protecting nesting sea turtles.[11] Texas is alone in its focus on reducing light pollution around military bases. Back in 2007, the Texas Legislature updated a law about outdoor lighting, allowing counties to regulate outdoor lighting within a five-mile radius of a military base if the military asks for it.[12] The rule is relevant solely to nations that have a minimum of five military installations and a population

8 Ariz. Rev. State. Ann. Section s 49-1101 et seq.

9 Colo.Rev.Stat. Sections 24-82-901 et seq.

10 N.H.Rev.Stat.Ann Section 9-E:3.

11 Fla.Stat. Section 161.163; Fla.Admin.Code Sections 62B.55.001 et seq.

12 Tex.Local Government Code Ann. Section 240.032.

exceeding one million, or to neighbouring counties within a five-mile radius of a base. County rules should aim to prevent disruptions to military training exercises.[13]

In 2012, South Korea passed the Act on the Prevention of Light Pollution from Artificial Lighting, with its most recent update in 2019. This legislation aims to ensure a healthy and enjoyable living environment for everyone by curbing the negative impacts of excessive artificial light on public health and the environment. It promotes the eco-friendly management of artificial lighting to mitigate such effects. The Act defines light pollution due to artificial lighting, as "*a condition in which excessive light resulted from inappropriate use of artificial lighting or light leaked to the outside of its illumination field disturbs the healthy and pleasant lives of citizens or causes harm to the environment*".[14] Article 3 of the Act outlines the obligations of the State which mandates the State create and enforce comprehensive policies to curb light pollution and develop and promote the necessary technologies. Local governments are also required to devise and execute light pollution prevention strategies tailored to the specific characteristics of their regions, including providing information about light pollution to local residents. Additionally, citizens are expected to contribute to light pollution prevention efforts and cooperate with initiatives implemented by the State or local governments.[15] Chapter V of the Act deals with penalty provisions, where in the range of fines imposed for violation of the various provisions of the Act range between 2 million won to 10 million won.[16]

In 2016, South Korea established a decree aimed at aiding the execution of the law addressing the prevention of light pollution caused by artificial lighting. This decree outlines specific details and responsibilities outlined in the act. It includes eight sections addressing different topics like clarifying intent, setting boundaries for lighting fixtures, organising the structure and function of the Light Pollution Prevention Committee, detailing steps for creating Light Environment Management Plans, defining exemptions to the approved level of light emission, facilitating proxy-led survey and research initiatives and establishing guidelines for imposing administrative penalties.[17]

In 2021, during the National Congress, China's top legislative body, representative Li Dajin put forward the idea of implementing laws across the nation to address light pollution. Shanghai took the lead by being the first to enact regulations specifically targeting light pollution. The Shanghai Environment protection regulation enacted in February 2022, aimed to improve light pollution in the city. Ensuring darkness prevails in the night sky is a priority in the

13 States Shut Out Light Pollution, National Conference of State Legislatures (NCSL) USA, March 25, 2022, *https://www.ncsl.org/environment-and-natural-resources/states-shut-out-light-pollution*

14 Miao Cao, el al., Understanding light pollution: Recent advances on its health threats and regulations, Journal of Environmental Sciences (May, 2023), *https://doi.org/10.1016/j.jes.2022.06.020*.

15 Act on the Prevention of Light Pollution Due to Artificial Lighting, art. 3.

16 Act on the Prevention of Light Pollution Due to Artificial Lighting, Law Viewer, Elaw, *https://elaw.klri.re.kr/eng_mobile/viewer.do?hseq=52771&type=part&key=39*.

17 Enforcement Decree of the Act on the Prevention of Light Pollution Due to Artificial Lighting, Republic of Korea, Food and Agriculture Organization of the United Nations, *https://www.fao.org/faolex/results/details/en/c/LEX-FAOC168213/*

regulation update. The city explicitly forbids placing landscape lights that beam directly into residential windows. There's a strong emphasis on controlling reflective surfaces, like glass walls on buildings, with the environmental department assessing their impact on local light conditions. New lighting setups must adhere to brightness standards, ensuring both road safety and peace for nearby residents. For nighttime construction, lights must be shielded to avoid bothering locals. Those flouting the rules face fines ranging from 5,000 to 50,000 yuan if they don't fix or remove offending lights promptly.[18]

There is no law in India which directly deals with the Light pollution in India. However, the debate and discussion around regulating the light pollution started in India. India is emitting light into its nighttime environment at a rate that exceeds the global average by nearly threefold.[19] On January 11th, 2024, Maharashtra's Pench Tiger Reserve was honoured with the distinguished recognition of being India's first-ever International Dark Sky Park, bestowed upon it by the International Dark-Sky Association. This recognition marks the fifth such park in Asia and underscores its mission to safeguard the nocturnal sky while fostering interest in astronomy.[20] The citizens become aware of the negative effects of light pollution, and incidents of lodging complaints against the institutions and others for having bright lights after 10 PM is increasing.[21]

Constitution of India through judicial review, incorporated right to clean environment and environmental protection as fundamental right under Article 21. The Preamble of the Indian Constitution states every person's dignity is safeguarded, which may encompass ensuring a respectable quality of life and a clean environment free from pollution. Article 51A(g) of the Indian Constitution provides that, "*It shall be duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures.*"

A key aspect of a welfare state is ensuring a clean and healthy environment. In Article 47, Part IV of the Directive Principles of State Policy, it emphasizes that the State must prioritize enhancing nutrition levels, raising living standards, and enhancing public health. This commitment extends to safeguarding and enhancing the environment. Article 48 underscores the State's responsibility to modernize agriculture and animal husbandry practices, including preserving and enhancing animal breeds and prohibiting the slaughter of certain cattle,

18 Shanghai regulation aimed at improving light pollution comes into force, Shanghai (Feb. 8, 2022), *https://www.shanghai.gov.cn/nw48081/20220802/d32c25ab71064438a1f1a9d81cb868f5.html.*

19 Charu Bahri, Light pollution; India losing its night at over 3 times the world average, Busienss Standard (Dec. 3, 2017), *https://www.business-standard.com/article/current-affairs/light-pollution-india-losing-its-night-at-over-3-times-world-average-117120300415_1.html.*

20 How to dark sky parks tackle the growing problem of light pollution, DownToEarth (Jan. 19, 2024), *https://www.downtoearth.org.in/video/pollution/how-do-dark-sky-parks-tackle-the-growing-problem-of-light-pollution--93999.*

21 A complaint was lodged by a resident against a local gym to switch off their lights after 10PM. Badri Chatterjee, South Mumbai Resident files light pollution complaint against Wilson Gymkhana, 28th November 2017, Hindustan Times, *https://www.hindustantimes.com/mumbai-news/south-mumbai-resident-files-light-pollution-complaint-against-wilson-gymkhana/story-TfN1Vv26FXtiRSAgH5E2vL.html*

indicating the State's duty towards the health of both domestic and wild animals. Article 48A further emphasizes the importance of environmental protection, including safeguarding forests and wildlife.[22]

The efforts of the Hon'ble Supreme Court of India against firecrackers[23] and the odd and even number cars permit for regulating the traffic in Delhi can also relate to the light pollution indirectly. In the fire crackers case, the discussion of the court took direction towards light pollution about testing of light emitting firecrackers. In Re: ***Ramlila Maidan Incident v. Home Secretary, Union of India***, the Supreme Court ruled that Article 21 of the Indian Constitution encompasses the right to sleep. The apex court concluded that individuals have the entitlement to leisure time, including the right to sleep undisturbed, the right not to be subjected to noise, and the right to maintain silence. Throughout various instances, the Hon'ble Supreme Court of India has consistently penalized those who disrupt the peace of others by using amplifiers or playing drums during religious ceremonies.

Precautionary Principle of Environmental Law & Light Pollution: Best suitable solution

The concept of the "precautionary principle" advocates for proactive measures to safeguard against potential risks, even in the absence of conclusive scientific evidence. This principle has been integrated into various global environmental agreements, with some asserting its recognition as a fundamental tenet of international environmental law. Particularly in realms like food safety and the protection of plant and animal health, the necessity of pre-emptive action amid scientific ambiguity has been widely acknowledged for quite some time.

The precautionary principle involves four key elements: acting to prevent potential harm when faced with uncertainty, requiring those advocating for an activity to prove its safety, considering a variety of alternative actions that could be less harmful and encouraging greater public involvement in decision-making processes.[24] The UK Dark Skies at Night Partnership, in collaboration with organizations such as the International Dark-Sky Association, the Commission for Dark Skies, the Countryside Charity (CPRE), the Institution of Lighting Professional and the Society of Light and Lighting, has crafted a 'Dark Sky Standard'. This standard is designed to conscientiously apply the precautionary principle in tackling light pollution. This standard, built on four key pillars, emphasises the importance of appropriate lighting: ensuring it's used where needed, in suitable amounts and for the appropriate duration. The term 'right light' encapsulates the concept of providing adequate visibility for humans while

22 India Const. art. 48A.

23 Arjun Gopal and Ors v. Union of India and Ors., 2023 LiveLaw (SC) 816.

24 Science for Environment Policy (2017) The Precautionary Principle decision making under uncertainty. Future brief 18, Produced for the European Commission's DG Environment by the Science Communication Unit, UEW, Bristol, Available at *https://environment.ec.europa.eu/research-and-innovation/science-environment-policy_en*.

also prioritizing environmental and health considerations.[25] Additionally, Clanton devised a method for lessening light pollution that centres on (i) utilizing lights only when essential; (ii) employing the least amount of illumination feasible; and (iii) decreasing the amount of light dispersed into the sky.[26] The national guidelines on light pollution in Australia propose that the foundation of any lighting plan should be the preservation of natural darkness. They recommend that artificial lighting be incorporated only for explicit purposes, in predetermined areas and for the duration necessary for human activities.[27]

7. Conclusion

Light pollution, an outcome commonly associated with the expansion of urban and industrial areas, presents a notable hazard to environmental integrity, human well-being, and biodiversity. Defined as the excessive or improper application of artificial illumination during nocturnal hours, light pollution perturbs wildlife's innate behavioural rhythms, exacerbates atmospheric carbon dioxide levels, interferes with human sleep cycles, and obscures celestial observation of stars within the nighttime sky. This highlights the importance of taking proactive steps to address light pollution. Several nations, including France, Croatia, and the European Union, have implemented comprehensive laws to tackle this issue. These regulations focus on controlling outdoor lighting, establishing brightness standards and enforcing penalties for non-compliance. Importantly, the Precautionary Principle guides environmental legislation, emphasizing the need for preventive measures even in uncertain circumstances, shifting the burden of proof onto activities with potential harm. Organizations like the International Dark-Sky Association and initiatives like the Dark Sky Places program demonstrate how raising public awareness can promote environmental responsibility and combat light pollution effectively. Suggestions

- The Environment Protection Act, 1986 should broaden its scope by considering light-based electromagnetic radiation alongside other forms when defining "environmental pollutant" in Section 2(b).[28]

- India may implement regulations drawing from India's obligation under different international treaties and the Stockholm Declaration of 1972.

- The judicial system could employ a broader understanding of the listed items, extending to encompass the effects of light pollution under both Entry 6 of List II and Entry 17B of List III of the Seventh Schedule.

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25 Dark and Quiet Skies for Science and Society II, United Nations Office for Outer Space Affairs (2021), *https://zenodo.org/records/5874725*.

26 Clanton, N., Opinion: Light Pollution… is it important? Lighting Research & Technology (2014), *https://journals.sagepub.com/doi/10.1177/1477153513519378*.

27 Commonwealth of Australia, 2023, national Pollution Guidelines for Wildlife Version 2.0 (May): 1-198, *https://www.dcceew.gov.au/environment/biodiversity/publications/national-light-pollution-guidelines-wildlife*.

28 The Environment Protection Act, 1986, s. 2(b).

- Through Article 248,[29] Parliament holds the authority to enact laws or regulations as it sees fit and similarly, through entry 97 of List I in the Seventh Schedule, the Union can introduce necessary legislation.

- Nations have the option to outline methods to tackle the problem, such as mandating the acquisition of permits prior to installing specific lighting, forbidding the utilisation of particular lighting fixtures, setting up criteria for shielding outdoor lighting or controlling the hours during which certain types of lighting are permissible.

- Produce and distribute a set amount of lighting based on a comprehensive assessment of the actual lighting needs and requirements.

- Those who use brighter, more energy-consuming lights should face consequences in the form of an additional charge. This charge, which reflects the extent of their excessive energy usage, serves as both a penalty and a model for others to follow.

- After a certain hour, all the fancy lights and flashy billboards outside shops and restaurants should either be switched off or dimmed to the essential ones, following the efforts to minimise noise disturbance. If not, hefty fines will be imposed.

- Excessive lighting contributes to pollution much like burning coal and wood does, releasing greenhouse gases into the atmosphere. Controlling how much light energy we use can indirectly decrease the need for burning coal and wood, thereby lowering carbon emissions.

- Signs and billboards for advertisement should have size restrictions to limit the number of lights used. When the surface area is smaller, it naturally reduces the need for as many lights, which ultimately minimises any negative impact.

- In places where there is a combination of businesses on the ground level and residential spaces above, authorities will assign local managers to ensure compliance with the law.

- Regulation should be implemented for both importing and producing high-intensity laser lights.

- Efforts should be made to raise awareness about the use of outdoor lighting fixtures that obscure the light source, aiming to reduce both glare and light intrusion.

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29 INDIAN CONSTITUTION, art. 248.

Green Innovation, Intellectual Property Rights and Environmental Protection: Ways and Means to Achieve Sustainable Goals

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*Ms. Priya Kumari***

Introduction

Innovation is the creation, development and implementation of a new product, process or service, with the aim of improving efficiency, effectiveness or competitive advantage. Innovation is an inquiry into the nature through the intellectual mind of the human being to create a better future. In its 2030 Agenda for Sustainable Development, WIPO summed up the importance of IP right to green technology and sustainable economy as following: '***A nation's ability to innovate, attract foreign investment, and develop valuable businesses offering products and services that can compete on a global scale is intrinsically linked with Green Innovation and Intellectual Property and its supporting innovation ecosystem***'.[1] Innovation is not a concept limited to industries and technology, it connects the state, market and society, and contributes in developing a conducive ecosystem for the future sustainable development of humankind, which is inclusive and sensitive to the aspirations and needs of the country.

Green innovation is the concept developed in the 21st century, a shift towards a sustainable, environmentally friendly and resource-efficient economy and society. Green innovation leads to sustainable development and eases the transition towards an eco-friendlier economy. Green technologies protect the environment, are less polluting, and implicate sustainable use of renewable resources.

In contemporary times, transitioning to environmentally sustainable practices has transcended mere preference to become an imperative for the preservation of human civilization. Pioneering a path ahead rooted in ecological stewardship is not only advisable but indispensable in the 21st century. The reverberations of climate change have galvanised citizens globally to contemplate and cultivate an ecological milieu capable of thriving in perpetuity. The exigencies of the global climate crisis have presented an imposing challenge to corporations, governmental bodies, and policymakers worldwide, prompting concerted efforts to confront this challenge and engineer progressively viable solutions. This collective endeavour has engendered a fertile ground for innovation. The practical manifestations of novel concepts, coupled with the transfer and dissemination of emerging technologies, are catalyzing global efforts toward sustainability. Consequently, this discourse on green innovations and clean technologies, underscores the emergence of the concept of Green Intellectual Property, herein referred to as

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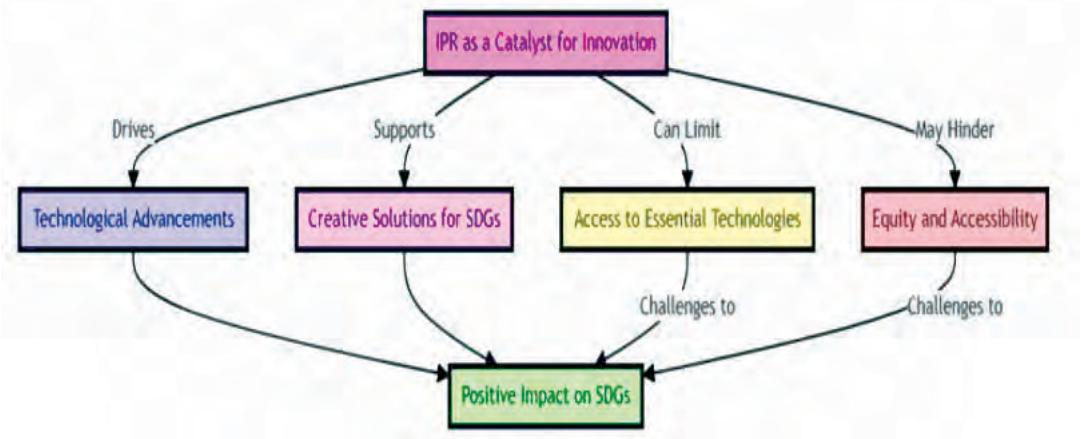
1 Green Innovations call for strong IP Protection, Dennemeyer (July 28, 2021), *https://www.dennemeyer.com/ip-blog/news/green-innovations-call-for-strong-ip-protection/*

'Green IP'. Green IPR legally covers innovations that are beneficial to the preservation of the environment. The green IPRs are initiatives in the field of invention and science that can help mitigate climate crises. Green IP is quite a recent phenomenon, and it helps incentivize an eco-friendly environment, which further helps in the growth of research and development in this field. However, green intellectual property will shape how the resources and the technology will be used judicially to care for environmental concerns.



Source[2]

GREEN INNOVATION

Green innovation was defined by Kemp and Pontoglio as 'a product, production process, service or management or business method that is novel and which results throughout its life cycle, in a reduction of environmental risk, pollution and other negative impacts of resources use compared to the relevant alternatives. Green innovation refers to innovations that focus on preventing pollution, reducing waste, and implementing environmental management systems in organizations[3]. OECD defines green innovations as the "*implementation of new, or significantly improved products (goods and services), processes, marketing methods, organisational structures, and institutional arrangements which – with or without intent – lead to environmental improvements compared to relevant alternatives.*"

The concept of green innovation has been derived from the idea of 'green techno-economic paradigm' proposed by Christopher Freeman, a famous economist. A techno-economic paradigm is defined as a set of 'common-sense guidelines for technological and investment

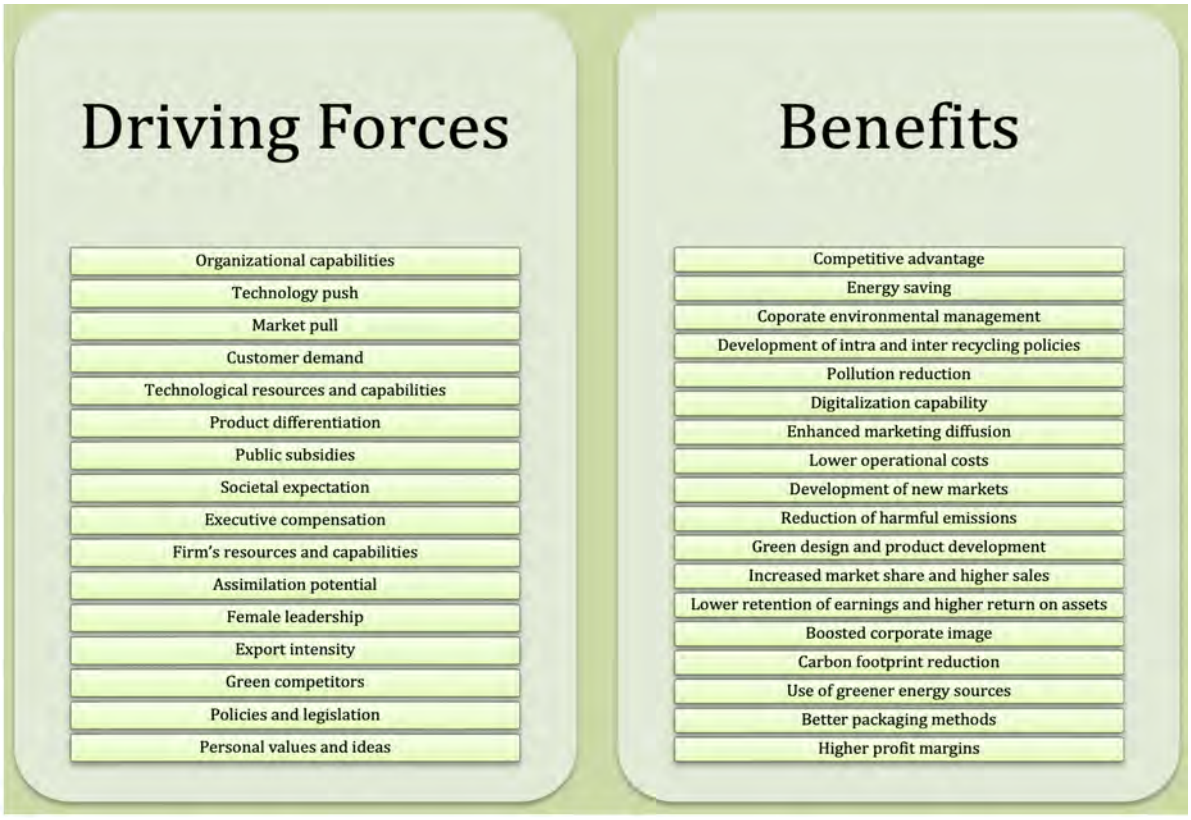
2 Muhammad Hamza Zakir et. al., The Role of Intellectual Property Rights in Achieving Sustainable Development Goals: a Comparative Analysis of Policy frameworks and Their Impact, ResearchGate (Dec. 2023), *https://www.researchgate.net/publication/378852365_The_Role_Of_Intellectual_Property_Rights_In_Achieving_Sustainable_Development_Goals_A_Comparative_Analysis_Of_Policy_Frameworks_And_Their_Impact*

3 Pablo Cisneros Chavira, Ahm Shamsuzzoha, Heidi Kuusniemi, Bojan Jovanovski, Defining green innovation, its impact, and cycle – A literature analysis, Cleaner Engineering and Technology 17 (2023) 100693. *https://www.sciencedirect.com/science/article/pii/S2666790823000988*

decisions as pervasive new technologies mature'. This paradigm involves switching to greener technologies and modes of production.[4] Green innovation is the process of developing and implementing technologies that reduce the environmental impact of human activities. Green innovation can help address the challenges of climate change, pollution, resource depletion, biodiversity loss and social inequality. Green innovation can create new opportunities for economic growth, job creation and social welfare.[5]

Green innovation is not only about those sectors typically labelled as 'green' or 'cleantech', like renewable energy, but is much broader, encompassing a wide diversity of technical, organization and business innovation. Green innovation is anticipated to have impacts on both climate change and global policy initiatives to reduce emissions. Green innovation strategy requires both facilitation of green innovation across the economy, and targeted support for core green technologies.

The following are the driving forces and benefits of green innovation:



Source[6]

4 Technology and Innovation Report 2023, UNCTAD, available at *https://unctad.org/system/files/official-document/tir2023_en.pdf*

5 Green Innovation and Intellectual Property Rights, Surana & Surana International Attorneys, *https://suranaandsurana.com/green-innovation-and-intellectual-property-rights/*

6 supra note 2

GREEN IPR

The term 'Green Intellectual Property' refers to the safeguarding of innovations in the realm of green technology.[7] The UN Rio Declaration on Environment and Development of 1992 stated that Green Technology means "*environmentally sound technologies that protect the environment, are less polluting, use all resources in a more sustainable manner, recycle more of their wastes and products, and handle residual wastes in a more acceptable manner than the technologies for which they were substitutes*".[8]

Green innovation faces many barriers, such as high costs, market failures, regulatory uncertainties and lack of awareness. Green innovation possesses distinctive, differentiating characteristics that imply a requirement for specific governance and policy methods to promote them. One of the key factors that can facilitate or hinder green innovation is the intellectual property rights regime. Intellectual property rights are the legal rights guaranteed to the creators to encourage them for their creations. IP provides incentives for green innovations by playing an important role in the development of green technologies.

Article 7 of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs Agreement) provides as follows: 'the protection and enforcement of intellectual property rights should contribute to the promotion of technological innovation and the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge, and in a manner conducive to social and economic welfare, and to a balance of rights and obligations'. This Article of TRIPS agreement carries the essence of green innovation and promotes green technologies under IPR regime, by promoting the phrase 'Green IPRs'.

Green Patents:

Green patenting refers to the patenting of green technologies. In terms of Sustainable Development, green patenting refers to providing patents to those ideas or technologies which are environment friendly that help combat climate change and foster development along economic, social, and eco-friendly lines. Green patenting is, therefore, patenting of green technologies that promote sustainable human development without compromising the environment. As per the reports by Times of India, between the years 2016 and 2021, every second patent issued in India pertained to green technology, with one-fourth of such patents specifically addressing alternative energy production. This trend aligns with the endeavours of the central authority towards promoting the increased adoption of green technology to

7 V. C. Mathews-Fox and Mandal, GREEN INTELLECTUAL PROPERTY, Lexology (July 6, 2022), *https://www.lexology.com/library/detail.aspx?g=8182bd04-4c4f-4c70-ae09-167c11fe7481*

8 The United Nations Program of Action from Rio, 1992, Agenda 21, Ch. 34

stimulate economic growth and foster consumer preference for products derived from such technology.[9]

Green Trademarks:

The trademarks which are committed to and can demonstrate the products which are sustainable in nature are called green trademarks. A green trademark is a symbol, logo or phrase used to denote the commitment of its owner to environmental responsibility. It signifies that a product or service has been manufactured, sourced, or delivered in a manner that minimizes its impact on the environment. According to the EUIPO, "*a green trademark is a collective term for specific trademarks, service marks, and certification marks that communicate environmentally friendly products, services, or practice*".[10] Brands that convey environmental or sustainability attributes through verbal representations, graphics, symbols, or the utilization of green coloration may be potentially classified under the category of green brands. Green trademarks typically feature words such as "*eco*", "*green*", "s*ustainable*," or "*organic*" and combine the same with visually striking elements such as foliage, flowers and earthy colours. Their primary objective is to differentiate environmentally conscious goods and services within the marketplace, facilitating consumers in making informed purchasing choices predicated upon the ecological ramifications of said product or service. The society we live in today is consumeristic, the population of which scrutinizes labels of all the products before making a purchase and tend to show an inclination towards the one that meets the environmental sustainability ideals. This shift in the nature of purchase has induced the companies, may it be SMEs or the MNCs, to make false or exaggerated claims about being committed to developing models associated with sustainable environment. A significant rise in the concept of 'greenwashing' can be found. This includes claims related to production methods or material composition, such as "*100% recyclable,*" "*compostable*," "*100% natural,*" or "*zero emissions*," use of vague terms like "*natural*," "*green,*" or "*eco-friendly*". It is essential that these trademarks which are claimed to be green must be transparent and meaningful, true and not misleading in their green claims.

Green Copyright:

The concept denoted as 'green copyright' delineates the confluence of copyright jurisprudence and environmental sustainability, encompassing an examination of the interplay between copyright statutes and their effects on environmental preservation. The objective of green copyright is to mitigate the environmental challenges inherent in extant copyright laws, including but not limited to, the environmental ramifications of digital dissemination and the ecological repercussions of copyright enforcement measures. One facet of green copyright entails scrutinizing the impact of copyright regulations on the recycling endeavours of

9 Chetan Kumar, EVERY 2ND PATENT GRANTED SINCE 2016 RELATES TO GREEN TECH; MOST LINKED TO WASTE ALTERNATIVE ENERGY, Times of India (Feb. 8, 2022), *https://timesofindia.indiatimes.com/india/every-2nd-patent-granted-since-2016-relates-to-green-tech-most-linked-to-waste-alternative-energy/articleshow/89420047.cms*

10 Taylor Wessing, GREEN BRANDS: WHAT CAN BE TRADE MARKED?, Lexology (April 25, 2023), *https://www.lexology.com/library/detail.aspx?g=fdb0ac47-ad11-404d-aeaf-eaa922c810a5*

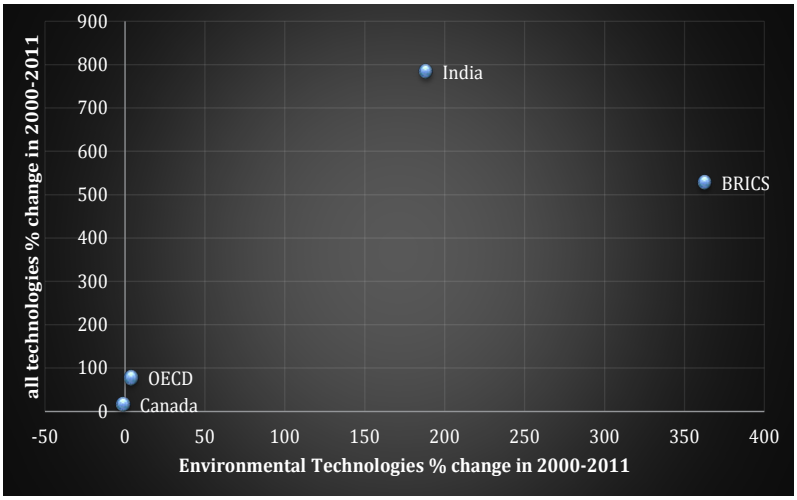
electronic apparatuses, such as computers and mobile phones, aimed at mitigating electronic waste accumulation. Additionally, it encompasses an evaluation of the environmental effects stemming from copyright enforcement actions on consumer behaviour, notably regarding the frequency of technological upgrades, exemplified by instances such as the recurrent demand for updated iterations of smartphones.

The purview of green copyright extends to an analysis of how copyright legislations influence the innovation landscape within environmental technology and processes, with a specific focus on patents of eco-friendly inventions. Furthermore, it delves into the role of copyright in either fostering or impeding environmentally sustainable practices, including the promotion of shared computing resources and network-based services aimed at curtailing the necessity for multiple electronic devices.

Market of Green IPR

In the 21st century, environmental protection, and sustainable development goals (also known as global goals) have taken front seat in the debates relating to green innovation and intellectual property rights. "Going Green" became the success mantra for businesses and trade both domestically and internationally. Green innovation became quintessential to achieve the sustainable development goals i.e., end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity. Green innovation aims to mitigate environmental impact through eco-friendly green goods. In its 2030 Agenda for Sustainable Development, WIPO summed up the importance of IP right to green technology and sustainable economy as following: '***A nation's ability to innovate, attract foreign investment, and develop valuable businesses offering products and services that can compete on a global scale is intrinsically linked with Green innovation and Intellectual Property and its supporting innovation ecosystem***'.[11]

Chart 1: Indicating growth rate in the development of different types of technology.



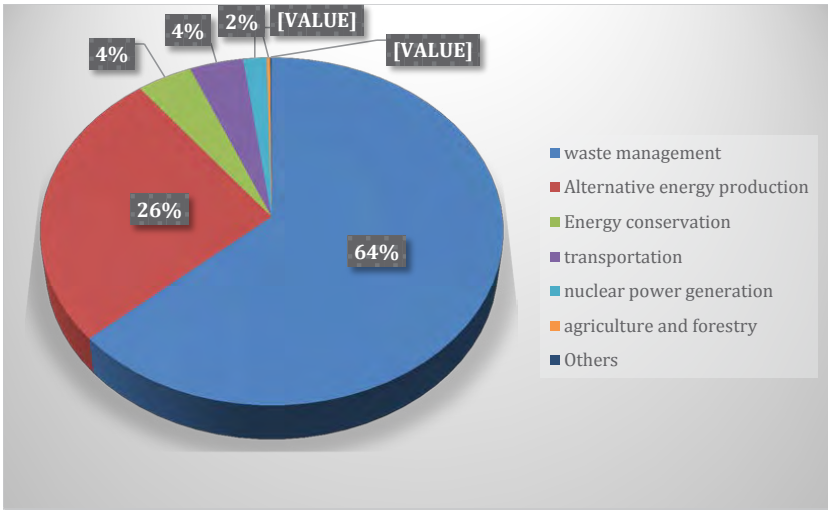
Source: OECD Home

11 *supra* note 1

Between 2006 and 2020, global patent applications for green energy and energy-efficient technologies increased by roughly 120% under the International Patent Cooperation Treaty (PCT). Chart 1 indicates that the growth in environmentally related patents is way faster than the growth in overall innovation worldwide with a substantial increase in such technologies found in the BRICS nation.

When we look into the figures of India, data from the Ministry of Commerce and Industry revealed that more than 91,500 patents were granted between 2016 and 2017 and 2021 and 2022.

Chart 2: Showing the percentage share of different types of patents granted for green technologies in India so far.



In total, 61,186 patents for green technologies were granted within the specified time, and 90% of these are for waste management and alternative energy generation technologies, with 38,837 (63%) linked to waste management and more than 16,000 (26%) related to alternative energy production. The remaining green technology patents cover energy conservation (2,555), transportation technologies (2,481), nuclear power generation (1,079), agriculture and forestry (161), and others (69) [as indicated by Chart 2]. India has always believed that nature and human well-being are inextricably intertwined and that humans and the planet are interdependent.[12]

12 Gopi Trivedi and Jinal Bhavsar, ROLE OF INTELLECTUAL PROPERTIES IN ADVANCEMENT OF GREEN TECHNOLOGY, LiveLaw (March 28, 2024), *https://www.livelaw.in/law-firms/law-firm-articles-/intellectual-property-green-technology-yj-trivedi-co-253609#:~:text=Currently%2C%20the%20data%20from%20India's,management%20and%20alternative%20energy%20production*

Sustainable Goals Vis-A-Vis Green Innovation and Green IPR

SDG 13 focuses on *taking urgent action to combat climate change and its impacts*.[13] It emphasizes the need to strengthen resilience and adaptive capacity to climate-related hazards and natural disasters. Green innovation and green IPR makes an effort towards development and implementation of new products, processes, services, or technologies and encompassing legal protections to such innovations thereby, playing a crucial role in developing climate-friendly solutions and technologies to combat climate-change effectively. For instance, introducing more sustainable and efficient agricultural practices through technologies like soil analysis tools that use DNA sequencing and intelligent computing to optimize farming; advancing sustainable transportation via innovative electric vehicles, public transit systems and urban planning among others. All of these instances fortify SDG 13 in general and Target 13.2 and Target 13.2 in general. Indian startups like Enviro Recyclean Private Limited established by Rahul Poddar in 2020 that lays the innovative idea of a compact integrated system that generates renewable green energy from renewable sources like solar light and wind energy that uses less space for installation of system and helps provide energy in an environment-friendly manner, saving the cost and installation time of the user, provides for increasing awareness among the youth to attain the Global goals for combating climate change.

SDG 8 *promotes sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all*.[14] Innovation drives economic growth and job creation. Moreover, this SDG is in direct line with the issue of IP infringement in the growing digital space and as was also brought out initially in the Puma case, namely, how to ensure that the rights of IPR holders are sustained while also not hampering the growth of the digital economy with over-regulation and scrutiny. The need is, therefore, to find sustainable solutions that maintain this delicate balance and ensure sustainable growth for the intermediaries and IPR holders alike, in accordance with target 8.1 of the SDG. Also, IPRs promote diversification, technological upgrading and innovation, in line with target 8.2 and hence are required to be safeguarded. Notably, IPR infringements may affect not only well-established brands but also growing MSMEs who may not have the technical expertise or resources to deal with such complex and unprecedented technology-based issues, hindering target 8.3 of SDG 8.[15] Counterfeiting and piracy diminish the profits derived from innovation and impede economic progress due to their adverse effects on businesses, consumers, and governmental entities,[16] therefore marring target 8.4 of the SDG i.e. *improving resource efficiency in consumption and production*. Hence, maintaining this balance is crucial to ensure the effective attainment of SDG 8 especially.

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13 THE GLOBAL GOALS, *https://www.globalgoals.org/goals/13-climate-action/*

14 THE GLOBAL GOALS, Goal 8: Decent work and economic growth - The Global Goals

15 Ibid

16 Joint Economic Committee (August 2012), *https://www.jec.senate.gov/public/_cache/files/aa0183d4-8ad9-488f-9e38-7150a3bb62be/intellectual-property-theft-and-the-economy.pdf*

Shooting Three Birds With A Single Stone: The Interplay Between SDGS 8, 12 & 17

For the digital ecosystem to sustain, sustainability and inclusivity are among the key, long-term components to be ensured. Specifically, for IPRs, for innovation to foster and develop in times to come, adopting methods which incorporate SDGs is essential. However, it is important to note that SDGs may not function in silos. They are interrelated and policy interventions aiming for one SDG might as well have implications for other SDGs as well. While SDG 8 may be most important to understand the delicacy between ethics and economic growth, SDGs 12 and 18 bring out the importance of sustainable consumption and partnerships; all of which are pertinent to the discussion herein. While SDG 8 brings out the issue at hand (balancing the economic interests of the e-commerce platforms with the opportunities of growth for IPR holders) from the end of the content creators and IPR holders, SDG 12 brings out the other side of the spectrum i.e. the responsibility of consumers to support IP protection and not hinder their progress and in turn help in fostering an innovative ecosystem. SDG 17 is ultimately important in formulating solutions to the problems encountered i.e. inculcating effective partnerships between the stakeholders in the whole process. Hence, understanding the interplay between some of the most relevant and directly related SDGs for coming up with integrated solutions for IPRs in the digital marketplace is significant.

Further, as desirable as it may be for a judicial tribunal to administer personalized justice in each instance, this aspiration is impractical and lacks coherence within the realm of digital contexts. Therefore, in response to an increase in online sales of pirated and counterfeit products, voluntary cooperation between online platforms and right holders has proven successful, to some extent, but has not been fully effective in stopping online counterfeit sales. These measures are deliberately planned by web and social media platforms themselves (the new janitors), drafted in liaison with right holders, or supported by the executive and administrative officials.[17] Therefore, the importance of partnerships between all possible stakeholders cannot be understated.

Comparative Regulatory Framework

Globally, intellectual property organizations are sanctioning technologies pertaining to climate change, endorsing specific provisions and establishing forums to convene inventors with similar objectives. For instance, the International Patent Classification Committee has established the '**IPC Green Inventor**y', which retains and facilitates convenient user access to data concerning patents and their involvement in green technologies, encompassing alternative energy generation, energy conservation, transportation, waste management, agriculture, forestry, and related design components. The World Intellectual Property Organization (WIPO) has instituted WIPO GREEN, a platform designed to link environmentally sustainable technological solutions with the international innovation ecosystem, thereby fostering

17 THE GLOBAL DIGITAL ENFORCEMENT OF INTELLECTUAL PROPERTY, WIPO Magazine (Sept., 2018), The global digital enforcement of intellectual property (*wipo.int*)

exchange and collaboration through its digital repository. In furtherance of its objectives, the World Intellectual Property Organization (WIPO) had initiated the "*Women in Green*" interview series in the year 2020, with the specific purpose of advancing female engagement and entrepreneurial activities within the green technology innovation sector. Moreover, WIPO Green has instituted a pro bono program designed to provide legal support to entities in developing nations pertaining to green innovation endeavours.[18]

Again, most of the countries across the globe are incorporating measures towards incorporating and accomplishing sustainable economic growth to conform to the global goal of achieving the SDGs. The EU Intellectual Property Office (EUIPO) acknowledges the growing importance of sustainability and has published a report on "Green Trademarks" that analyses the rise of trademarks focused on environment-friendly products and services. This gives a boost to the demand for environment-friendly products thereby, inducing companies and sellers to invest, research and develop this area. An EUIPO study from September 2021 showed a large increase in the number of applications for trademarks covering green goods and services. In 2020, 16,000 such trademarks were applied for at the EUIPO, approximately 14% of all EUIPO trade mark applications.[19] On November 25, 2020, the European Commission adopted an Action Plan that focuses on enhancing a range of current intellectual property measures and adapting them to the digital era. This includes enhancing the supplemental protection certificates (SPC) for patented medical and plant protection goods, as well as modernising EU design protection. Their objective was to enhance the safeguarding of agricultural geographical indications (GIs) and assess the viability of implementing a GI protection framework for non-agricultural products at the European Union level. The Commission initiated an industry discussion to discuss and tackle the effects of emerging technologies, such as artificial intelligence and blockchain, on the intellectual property system.[20] By protecting inventions related to green technologies, the EU aims to stimulate innovation that drives sustainable economic growth. The EUIPO works with international partners on initiatives like "AL-INVEST Verde IPR" to promote the use of IPRs for sustainable development in Latin America and encourage innovation in green technologies and practices, contributing to environmental sustainability. This further foster knowledge sharing and strengthens the global IP framework for green technologies.

In United States, the Patents for Humanity Awards Program by the United States Patent and Trademark Office (USPTO) provides business incentives for patent applicants, holders, and licensees whose inventions rapidly address climate change concerns through green energy technologies like wind, solar, green hydrogen, hydropower, geothermal, and biofuels. It provides startups with a platform of recognition in public and an acceleration certificate to expedite selective matters of patent grant. The Green Technology Pilot Program in 2009 by USPTO aims at expediting the review of patent applications that concern green technology, energy

18 supra note 11

19 Taylor Wessing, GREEN BRANDS: WHAT CAN BE TRADEMARKED?, Lexology (April 25, 2023), *https://www.lexology.com/library/detail.aspx?g=fdb0ac47-ad11-404d-aeaf-eaa922c810a5*

20 Commission (Notified on November 25, 2020)

conservation, environmental protection and reduction in carbon emission.[21] Furthermore, the Climate Change Mitigation Pilot Program initiated by the USPTO in June 2022, expediates the evaluation of patent applications pertaining to innovations addressing climate change through the reduction, elimination, prevention, and/or monitoring of greenhouse gas emissions. Eligible applications are prioritized to receive an expedited initial Office action.

It is not just the nations that are striving at their sovereign standard to make regulations or frameworks promoting development of green technologies against the climate change concerns, but giant corporations too can be seen joining hands in bringing in revolutionary programmes or pledges to address the same. For instance, the Eco-Patent Commons, an initiative established in 2008 by the World Business Council for Sustainable Development (WBCSD), [22] is a form of IP collaboration between firms whereby, participating companies like IBM, Nokia, and Sony among others pledged their patents in the green sector. [23]Such initiatives demonstrate a commitment to fostering innovation, collaboration, and the dissemination of knowledge within green technology. Ultimately, this will contribute to the protection and advancement of green intellectual property on a global scale.

India is swiftly attempting to overhaul the energy industry to achieve zero carbon emissions by 2070. India has implemented several national initiatives to promote green technology and innovations. One such initiative is AGNI, which is sponsored by the Indian government and falls under the Prime Minister's Science, Technology, and Innovation Advisory Council (PM-STAIIC). AGNI serves as a platform to facilitate the commercialization of technological innovations. Additionally, other initiatives, such as Climate Launchpad 17, have been launched, which is recognized as the world's largest competition for green business ideas and is co-founded by the European Union. However, despite a substantial growth in green IPR in India, the nation lacks an IPR regime that effectively addresses innovation and clean technologies. The country must adopt other regulatory practices associated with the relaxation of trade barriers and inclusion of especially fast-track patent prosecution process for environmental-oriented inventions.[24]

Conclusion

It is realistic to realize that the debate on climate change is indeed congruent with the broader development challenge. It becomes a necessity to consider radical actions that remove the fundamental friction that intellectual property places on the dissemination and distribution of technological products and know-how. Intellectual Property Rights play a pivotal role in

21 Anand Barnabas, Green Innovation and IP: Legal Frameworks for Sustainable Technologies in India, MONDAQ (Feb. 5, 2024), *https://www.mondaq.com/india/patent/1419990/green-innovation-and-ip-legal-frameworks-for-sustainable-technologies-in-india*

22 Ibid

23 Pratheeba Vimalnath, Frank Tietze, Akriti Jain, Viola Prifti, IP Strategies for Green Innovations- an Analysis of European Inventor Awards, Centre for Technology Management (Jan. 2020), *https://api.repository.cam.ac.uk/server/api/core/bitstreams/3526d566-ec1a-49c4-bbf2-921613a68935/content*

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the promotion of sustainable development within the jurisdiction of India. Recognizing the critical importance of IPRs in achieving its developmental goals, the nation has instituted various legislative enactments and initiatives aimed at fostering innovation and safeguarding intellectual property. India has devised strategies to mitigate potential impediments posed by IPRs to the accessibility of essential medications and technologies, particularly for socioeconomically disadvantaged and marginalized segments of the population. Despite notable advancements, persistent challenges persist in the realm of IPRs and sustainable development in India. These efforts encompass augmenting the effectiveness of intellectual property statutes and regulations, fortifying enforcement mechanisms, and fostering heightened public awareness and comprehension of IPRs. Ensuring a balanced equilibrium between the protection of intellectual property and the promotion of access to critical goods and services, particularly in domains such as public health and environmental preservation, assumes paramount importance.

Findings:

The principal conclusion drawn from these analyses is that intellectual property rights (IPR) legislation must strike a delicate balance. It should foster incentives for innovation while simultaneously ensuring accessibility to fundamental technologies, especially within the realms of health and environmental preservation. Stringent IPR protection lacking provisions for the utilization of essential medicines and green technologies may detrimentally impact public health (SDG 3) and efforts to combat climate change (SDG 13). IPR frameworks ought to incorporate mechanisms such as compulsory licensing, research exemptions, and safeguards for both traditional knowledge systems and contemporary innovations. Such flexibility serves a pivotal role in addressing the unique challenges of sustainable development, particularly in developing nations, enabling them to access a broader spectrum of knowledge, cultivate indigenous inventions, and preserve biodiversity (SDGs 2, 15). Facilitating effective technology transfer through collaborative IPR arrangements can significantly contribute to the attainment of Sustainable Development Goals (SDGs), notably in the domains of renewable energy (SDG 7) and agricultural productivity (SDG 2). Thoughtfully crafted IPR policies have the potential to catalyze innovation and economic progress, thereby advancing multiple SDGs including SDG 9 (*Industry, Innovation, and Infrastructure*) and SDG 8 (*Decent Work and Economic Growth*). Nonetheless, such policies should be accompanied by reasonable limitations.

Use of compulsory licensing to evade the anti-competitive practices like refusals to license, unreasonable pricing or restrictive licenses; easier and transparent licensing platforms and markets can assist developing countries like India in their goal of adhering to green innovations. Furthermore, entrepreneurs shall be given the benefit of more joint research and development projects, subsidies, insurance and loan guarantees for the development, diffusion and transfer of climate technology; infrastructure for information sharing and licensing platforms, global patent pools, access to publicly funded research and complete use of flexibilities granted by TRIPS. The least developed countries (LDCs) face an urgent requirement for access to products at low prices that will maintain and increase energy access as they have little to zero capacity for production and innovation of complex clean technologies or funds necessary for

the development of the same. This gap can be filled by emerging economies like India that have the potential to become production and distribution centres themselves which is again fortified on the easy accessibility to granting of licenses or patents, as required. The UNFCCC should be empowered to establish an intellectual property exchange dedicated to technologies aimed at mitigating and adapting to climate change. This exchange would facilitate secure, efficient, and transparent transactions for intellectual property licenses, consolidating all relevant processes under the authority of the UNFCCC. The Green Xchange, launched in 2009 through collaboration between Creative Commons and various enterprises, serves as a precedent for such an initiative, applying the patent commons model originally introduced by Creative Commons in the realm of copyright to patents related to environmentally sound technologies.[25]

Suggestions:

- India should explore the option of technology transfer from developed countries to induce domestic innovators or companies to be innovative in their approach, creating in turn a more competitive environment leading to sustainable economic growth. It can work on capacity building like upskilling the existing knowledge and skills of entrepreneurs, innovators, and researchers, raising public awareness.

- The IPR regimes should reflect flexibilities that not only broadens passage to essential technologies and innovations but itself forms a part of the essential innovation ecosystem for SDGs.

- Nations should focus on enhanced international cooperation through cross-border agreements or partnerships to establish a global IPR network. This might significantly contribute to SDG 7 (*Affordable and Clean Energy*) and SDG 13 (*Climate Action*).

- Formulate legal frameworks aimed at safeguarding and advancing traditional knowledge and genetic resources, duly recognizing the invaluable contributions of indigenous peoples and local communities to biodiversity conservation and sustainable development (SDGs 2, 12, 15).

- Encourage stake-holders to invest in capacity-building of knowledge and abilities to work under the IPR framework that promotes sustainable development.

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25 Dalindyebo Bafana Shabala, Climate Change, Technology Transfer, And Intellectual Property: A 'Modest Proposal' For an IP Enforcement Moratorium, Fordham Environmental Law Review 1, 1-36 (2020)

Climate Change Migrants: Issues and Challenges

*Abhishek Kumar**

Introduction

The United Nations Framework Convention on Climate Change, 1992 defines 'Climate Change' as a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.[1] In the current times, the climate change problem has thrown unsurmountable challenges before the humanity ranging from extreme weather conditions to climate change migration. The perturbance of natural phenomena, the loss of biodiversity, food crisis, the loss of cultural identity, and climate change migration are some of the prime challenges emerging out of climate change scenario. In addition to this, its impacts are cross-sectoral that has the potential to affect the socio-economic as well as cultural aspects of life too that have long-term implications.

In this regard, the World Bank's Groundswell report projects that climate change could lead up to 216 million people across six world regions (Sub-Saharan Africa, South Asia, Latin America, East Asia and the Pacific, North Africa, Eastern Europe and Central Asia) to move within their countries by 2050 if no urgent action to reduce global greenhouse gas emissions is taken.[2] Thus, millions of people are bound to be affected by this challenge. They all are, in fact, left with no other option except to migrate to other regions of the world. The defining feature of climate change migration is that it can lead to a state of conflict across the globe putting much stress on natural resources as nature has her own carrying capacity.

If we look at all the Conference of the Parties (COP) to the UNFCCC, it is crystal clear that climate change migration specifically has not been taken into consideration directly, rather attempts have been made by the global community to address the same through different plan of actions. The COP is the supreme decision-making body of the Convention.[3] The COP decisions such as capacity-building in developing countries (non-Annex I Parties)[4], capacity-building in countries with economies in transition[5], development and transfer of technologies[6],

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1 The United Nations Framework Convention on Climate Change, 1992, art. 1.

2 *https://www.migrationdataportal.org/themes/environmental_migration_and_statistics#:~:text=In%20this%20regard%2C%20the%20World,by%202050%20if%20no%20urgent* (last visited on June 6, 2024).

3 *https://unfccc.int/process/bodies/supreme-bodies/conference-of-the-parties-cop* (last visited on June 6, 2024).

4 Decision 10/CP.5 of the Conference of the Parties 5 (COP 5).

5 Decision 11/CP.5 of the Conference of the Parties 5 (COP 5).

6 Decision -/CP.7. of the Conference of the Parties 6 (COP 6).

Least Developed Countries Fund[7], approaches to address loss and damage associated with climate change impacts in developing countries that are substantially vulnerable to the adverse effects of climate change to enhance adaptive capacity[8], Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts[9], national adaptation plans[10], and long-term climate finance[11], and matters relating to the least developed countries[12] are some commendable decisions in the direction of addressing the said issue.

Legal Implications

Even the international legal instruments are silent in defining climate-induced migrants.[13] Many scholarly writings and other instruments termed them with different nomenclature like ecological and environmental refugees, climate refugees, climate change migrants, environmentally-induced forced migrants etc.[14] However, an attempt was made by the United Nation in 2016 under the aegis of the UN Summit for Refugees and Migrants, 2016 to address this issue.

In a matter like this, even the hands of refugee law are also tied that is to say that it doesn't provide legal safeguards to the climate refugees or climate change migrants, which necessitates that the people have a well-founded fear of being persecuted because of their race, religion, nationality, political opinion or membership of a particular social group. The same is clear from Article 1 A (2) of the 1951 UN Convention relating to the Status of Refugees i.e. the Geneva Convention, which categorically states that a 'refugee' is a person who:

"… and owing to well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion, is outside the country of his nationality and is unable or, owing to such fear, is unwilling to avail himself of the protection of that country; or who, not having a nationality and being outside the country of his former habitual residence as a result of such events, is unable or, owing to such fear, is unwilling to return to it."

In legal parlance, if we analyse the issue of climate refugees or climate change migrants putting it into a broad perspective, it is amply clear that they feel threatened not because of persecution, but by virtue of uninhabitable prevailing circumstances arising out of climate change repercussions. With the passage of time, the ever-increasing trajectory of climate refugees would certainly necessitate sound climate action plans across the globe. The untold

7 Decision 5/CP.14. of the Conference of the Parties 14 (COP 14).

8 Decision 3/CP.18. of the Conference of the Parties 18 (COP 18).

9 Decision 2/CP.21. of the Conference of the Parties 21 (COP 21).

10 Decision 4/CP.21. of the Conference of the Parties 21 (COP 21).

11 Decision 5/CP.21. of the Conference of the Parties 21 (COP 21).

12 Decision 10/CP.27. of the Conference of the Parties 27 (COP 27).

13 *https://unfccc.int/files/adaptation/groups_committees/loss_and_damage_executive_committee/application/pdf/briefing_paper_climate_induced_displacement_and_migration.pdf* (last visited on June 6, 2024).

14 Ibid.

miseries of climate refugee seek the intervention of the international community to provide a clear legal framework to tackle the menace in full swing.

Broadly, climate refugees or climate change migrants can be grouped into two categories basing upon their types of displacement i.e. temporarily displaced and permanently displaced. Increasing environmental threats are likely to increase the number of permanently displaced people in the near future. On the one hand, the first category of displacement implies to those people who are internally displaced. The second category, on the other hand, is of those people, who cross the border of the respective state for their survival. Ironically, the 1951 Refugee Convention, recognizes only to the people; who cross the state boundary but not to the people; who are forced due to the internal catastrophic effect of environmental degradation.

Over the years, the number of Internally Displaced Persons (IDPs) in India has increased manifold. Similarly, a vast population especially of developing or least-developed countries are and will be more exposed to high environmental risks. Thus, the number of IDPs would put forth a serious challenge before the international community. In the event of such a critical condition, the international community must re-think to extend the ambit fixed under the 1951 Refugee Convention. All countries must extend their support to pave the way for a sound legal and policy for climate refugees.

Though the United Nations High Commisssioner for Refugees (UNCHR), an agency of the United Nations dealing with refugees' issues is deeply concerned with the problems of Internally Displaced Persons (IDPs), yet its hands are tied in view of its commitment to protect refugees defined under the refugee convention. In other words, it considers respective states' special responsibility to deal with the issues pertaining to IDPs. Interestingly, the UNCHR is garnering all possible support in this regard.

Concluding Remarks

The developing or least-developed countries with huge population and having less resources are highly vulnerable in the climate change scenario. Further, in absence of any legal recognition to their people, the situation is expected to worsen in the years to come. Climate change migration has not been much-talked in the international climate change regime. It is not the core issue of climate change discourse, therefore, it is the high time to consider this potential danger on priority basis. The need of the hour is that the ambit of the term 'Refugee' referred to in Article 1 A (2) of the 1951 UN Convention relating to the Status of Refugees i.e. Geneva Convention must be broadened to include the climate refugee. Until recently, it is a bitter irony that the protective mechanism for refugees, that is, the 1951 Refugee Convention does not address the said gray area in an efficient manner. Henceforth, the future of climate change migrants is a matter of serious concern worldwide. The international community must think about this issue on urgent basis given a thoughtful consideration to the increasing trajectory of climate refugees with a fast pace that has tremendous potential to paralyse the whole world environmentally, economically, socially, and politically.

However, it is immense sense of satisfaction that the Goal 13 of the ambitious 'Sustainable Development Goals (SDGs)'[15] speaks of 'Climate Action'. If this burning issue remains unsolved, the core issues of basic human rights mentioned in the Universal Declaration of Human Rights, 1948 i.e. Article 3[16], Article 6[17], Article 9[18], Article 15[19], Article 28 [20]will remain a distant dream for millions of people.

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15 SDGs comprises of seventeen goals in total, namely, No Poverty, Zero Hunger, Good Health and Well-Being, Quality Education, Gender Equality, Clean Water and Sanitation, Affordable and Clean Energy, Decent Work and Economic Growth, Industry, Innovation and Infrastructure, Reduced Inequalities, Sustainable Cities and Communities, Responsible Consumption and Production, Climate Action, Life Below Water, Life on Land; Peace, Justice and Strong Institutions, and, finally, Partnerships for the Goals.

16 Everyone has the right to life, liberty and the security of person.

17 Everyone has the right to recognition everywhere as a person before the law.

18 No one shall be subjected to arbitrary arrest, detention or exile.

19 1. Everyone has the right to a nationality. 2. No one shall be arbitrarily deprived of his nationality nor denied the right to change his nationality.

20 Everyone is entitled to a social and international order in which the rights and freedoms set forth in this Declaration can be fully realized.

Balancing Environmental Concerns While Ensuring Decent Living for Those Affected by the Closure of Illegal Mines in Jharkhand

Anand Jha[*]

Every year, Jharkhand, known for its mineral wealth, faces the dual challenge of utilising its vast mineral wealth while addressing severe environmental degradation and socio-economic disparities. Imagine a state where nearly one-third of the country's mineral wealth is concentrated. Yes, Jharkhand, with its 66% coal, 32% iron ore, and 26% copper ore reserves, stands as a significant player in India's mining industry. However, the story takes a grim turn when we take into consideration the rampant illegal mining activities that have, on the one hand, turned lush forests into barren wastelands while at the same time foraging the closed mines, often with bare hands, no safety gear, no protection, no one to look after them if they meet with an accident or their health worsens.

Background

The state's mineral wealth has long attracted entrepreneurs and industries. With adequate water, electricity, conveyance, and steadfast manpower, Jharkhand's economic potential seems limitless. But there's a catch. Illegal mining has led to severe environmental degradation. Between 1985 and 2004, over 9,000 hectares of forest land were abused for mining. This was 10% of India's total forest land diverted for mining, excluding the thousands of hectares taken by the coal mining sector. Jharkhand's forest dwellers and tribal communities, comprising the fifth-highest concentration in India, have been hit the hardest.

Consider this: a leading newspaper, "Prabhat Khabar," reported on April 23, 2015, that 38 hills had disappeared from five different districts such as Latehar, Gumla, Lohardaga, Koderma, Sahibganj and Hazaribagh, due to unauthorised mining activities, and if no preventive steps were taken, another 24 hills were likely to vanish soon. The High Court of Jharkhand took suo-moto cognisance of this report, treating it as a public interest litigation. This alarming situation highlighted the urgent need for sustainable mining practices and robust enforcement of environmental laws.

Socio-Economic Impact of Mine Closures

In Jharkhand's mining hubs, survival often takes precedence over legality. According to media reports, impoverished locals resort to stealing coal just to make ends meet. In Jharia, the story is even more harrowing. Here, bonded labourers risk their lives toil under the watchful eyes

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of ruthless coal mafias, highlighting the dire socio-economic conditions. Mining cave-ins have taken lives. Even though the numbers might not be extraordinary, the toll on health is unfathomable. Diseases, such as tuberculosis, are a norm and add to it the financial misery, making living akin to dead man walking.

Take, for instance, the Adivasi group in Rajmahal Hills. As per a widely circulated media report, their lives and rare fossils are threatened by stone mining. Or consider the impact of bauxite mining on soil fertility and people's health. In the mica mining sector, illegal operations continue unabated, causing deaths and diseases. The stories of children scavenging for mica, risking their lives for a meagre income, are a stark reminder of the urgent need for change.

The Way Forward

Even though, the plight of communities affected by illegal mining is heart-wrenching. Yet, there's hope. Various government and NGO initiatives aim to provide alternative livelihoods. Skill development programs and the promotion of agriculture are steps in the right direction. The local resistance, take the case of the villagers fighting to protect Dhajwa Hill in Palamu district in 2022 from stone quarrying, shows the resilience of these communities. But are these enough?

Balancing environmental concerns with socio-economic needs requires an integrated approach. Aligning local initiatives with Sustainable Development Goals (SDGs) related to decent work, economic growth, and environmental sustainability is crucial. Collaboration between government, private sector, and civil society can create sustainable solutions. Continuous monitoring and evaluation of environmental and socio-economic impacts are essential to ensure progress.

The path forward is challenging but not insurmountable. By addressing both environmental and socio-economic issues, Jharkhand can pave the way for a more sustainable and equitable future. It's a call to action for all stakeholders to develop balanced and sustainable policies that leave no one behind.

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National Green Tribunal- Evolution And Constitution

*Anup Kumar Agrawal**

"Natural resources are the assets of the entire nation. It is the obligation of all concerned, including the Union Government and State Governments to conserve and not waste these resources. Article 48-A of the Constitution requires that the State shall endeavour to protect and improve the environment and to safeguard the forest and wildlife of the country. Under Article 51-A, it is the duty of every citizen to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures." - T.N. ***Godavarman Thirumulpad v. Union of India***, (2006) 1 SCC 1. For protecting environment the government has formulated several legislation. However there are numerous instances of violations of these legislations resulting in large number of environmental cases pending in courts and the involvement of multi disciplinary issues in such case, a need of specialized environmental courts was felt resulting in constitution of National Green Tribunal.

Evolution- National Green Tribunal

Hon'ble Supreme Court vide its order dated 1st December, 2000 in ***A.P. Pollution Control Board Vs. M. V. Nayudu***, observed – "since most of the statutes dealing with environment are by Parliament, the Law Commission could kindly consider the question of review of the Environmental Laws and the need for constitution of Environmental Courts with experts in Environmental Law, in addition to judicial members in the light of experience in other countries".

Accordingly, the Law Commission in its 186 Report, recommended inter-alia setting up of environmental courts having both original and appellate jurisdiction related to environmental laws. This Bill is a step in the direction which aims at establishment of the National Green Tribunal for effective and expeditious disposal of civil cases relating to environmental protection and conservation of forests and other natural resources including enforcement of any legal right relating to environment.

Parliamentary Standing Committee Observation On The National Green Tribunal Bill, 2009

In the above background The National Green Tribunal Bill, 2009 was drafted and the same was placed before the Department-Related Parliamentary Standing Committee on Science & Technology, Environment & Forests. The committee after considering the same and after taking opinion from different stakeholders had submitted its 203rd Report on The National Green Tribunal Bill, 2009. Some of the observations/recommendations of the committee are worth to mention here.

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"3. Environment has assumed immense importance during the last few years not only because of significant climatic changes that have started manifesting in various forms, but also because of ever sharpening conflict and contradictions between economic development and conservation and protection of environment. Such conflicts have led to a large number of litigations pending in various courts throughout the country.

4. It is in this background, that the need for courts dedicated exclusively to the cause of environment was being felt for long. The Committee had, in its 192 Report on the Functioning of Central Pollution Control Board observed ……. "It could be very difficult to rein in violators to follow standards and guidelines with the existing judicial and legal setup. Courts are already overburdened with civil and criminal cases. They could not be expected to spend time to expeditiously take up and dispose off environment related cases. The Committee, therefore, recommends that the Government should setup environmental courts in each and every State and Union Territory to deal exclusively with environmental related matters".

The original Bill though its Clause 1(2) has stated that The National Green Tribunal Act shall come into force on such date or dates as the Central Government may by notification, appoint, and *different dates may be appointed for different States*. On this the committee has recommended that "The Committee feels that there is no convincing reason behind such a discretionary provision and, therefore, recommends that this act of far reaching consequences be brought into force in all the Sates/ Union Territories simultaneously" This recommendation was acceded and accordingly the Clause 1(2) was modified.

The committee had further observed that in the definition clause in 2(1)(m) the term "Substantial question relating to environment" has been defined which shall include an instance where there is direct violation of statutory environmental obligation by a person by which the community at large other than an individual or group of individuals is affected. The committee recommended that since the group of individual. It was further added that as per Clause 14 (1) read with Clause 28 of the Bill, the jurisdiction of civil courts to adjudicate and settle disputes pertaining to the implementation of the acts specified in Schedule 1 has been barred in cases where substantial questions relating to environment is involved and it is in this context that the term has been defined with the reasons given by the Ministry. **The Committee feels that there could still be ambiguity in certain cases as to the applicability of concept of substantial question relating to environment which could be decided by the proposed Tribunal and which could also evolve in due course of time by way of judicial interpretation by the higher courts**. This recommendation has not been accepted and the definition of "Substantial question relating to environment" as existed in bill has been introduced ditto in the Act.

On the issue of place of sitting of the Tribunal The Bill has stated that "The Tribunal shall sit at such place or places, as the Central Government may, by notification, specify." On this the committee has stated in its report that "The Committee feels that the National Green Tribunal which claims itself to be a mechanism aimed at effective and expeditious disposal of civil cases relating to environmental protection and conservation of forests does not exude much confidence given its infrastructural framework, particularly in view of the geographical vastness

of our country. The Committee feels that such a limited spread of National Green Tribunal at five places only may lead to serious constraints of accessibility in the long run, especially to the poor and the tribal people who live in far flung areas of our country. This problem has to be viewed in the light of Clause 14(1), read with Clause 28 whereby the tribunal shall have the exclusive jurisdiction over all civil cases where a substantial question relating to environment is involved. Thus, the poor and the tribal people living in remote areas will be deprived of the opportunity to approach civil courts for redressal of their grievances on substantial question relating to environment. The Ministry has clarified that the Tribunal may undertake a circuit approach for the conduct of its work apart from initial 5 primary places of sitting. This will be in the light of situation being responded to, say in a remote area where the disadvantaged group my have suffered from the environmental adverse impact.

8.9 The Committee is satisfied with the explanation given by the Ministry and recommends that the concept of circuit approach should be clarified in the rules."

The committee has discussed one of the important appellate Jurisdiction of the National Green Tribunal as in Clause 16(e) in para 8.15 of its report has stated that "some experts took objections to this provision in the Bill because it will result in defacto dilution of the Forest (Conservation) Act and defeat the very purpose for which the Act was made. They apprised the Committee that presently, when no appeal lies against the rejection of the proposal for diversion of forest land by the Central Government and even the Supreme Court normally does not entertain any appeal against such rejection on the ground that the diversion of forest land is not permissible unless found to be in public interest by the Central Government, why do we need to open a Pandora Box by allowing appeal through this Bill? Some experts strongly argued in favour of this Clause being retained in the Bill as the Supreme Court which has battled with the Forest (Conservation) Act problems, would be happy and relieved to see that this work has been given to the Tribunal. They were of the view that the Tribunal must have all the powers of enforcement of the Forest (Conservation) Act – The Tribunal must have the power to directly entertain complaints of violations of the Forest (Conservation) Act, it must have the powers to review the decisions of the Governments - State and Centre and they must also have the power to hear user agency's complaints if they have been wrongly denied permission to work under the Forest (Conservation) Act.

8.16 The Ministry of Environment & Forests are of the view that empowering the National Green Tribunal with this function will result in a refinement of the orders passed under the Forest (Conservation) Act and it will also provide for a forum for grievance redressal. Moreover, the original jurisdiction of the National Green Tribunal under section 14 of the proposed bill will provide a forum for addressing issues like non-compliance with the stipulations of the forest clearances as also enabling the National Green Tribunal to act as a watchdog for acts of omissions in usage of forest land for such purposes. 8.17 The Committee, after weighing the pros and cons of the views, both of the experts as well as of the Ministry, is of the opinion that the appellate jurisdiction of the Tribunal against the Forest (Conservation) Act as provided in Clause 16(e) may be retained."

Initially in the Bill so introduced it states that "Every order of the Tribunal under this Act shall be final". However the committee recommended that the right to appeal of the citizen should not be taken away and accordingly an enabling provision for appeal to the Supreme Court may be provided. Now in the Act under section 22 there is a provision for appeal to the Supreme Court.

In the Bill there was no provision as it contained in section 20 of the Act which says Tribunal to apply certain principles.- The Tribunal shall, while passing any order or decision or award, apply the principles of sustainable development, the precautionary principle and the polluter pays principle.

The above bill was presented before the Lok Sabha and was passed from there on 30.04.2010 and from Rajya Sabha on 05.05.2010. It received the assent of the President on 2.06.2010 and Published in the Gazette of India on 2-6-2010 and brought into force on 18.10.2010 vide S.O. 2569(E), dated 18.10.2010.

National Green Tribunal Constitution

The Tribunal has a presence in five zones- North, Central, East, South and West, The Principal Bench is situated in the North Zone, headquartered in Delhi. The Central zone bench is situated in Bhopal, East zone in Kolkata, South zone in Chennai and West zone in Pune.

Transfer of Cases

After constitution of an expert body i.e. the National Green Tribunal there were instances that the Hon'ble Supreme Court has transferred several matters for its consideration before the National Green Tribunal. In the matter of T.N. Godavarman Thirumulpad v. Union of India reported in (2016) 13 SCC 586 vide order dated 05.10.2015 it was directed as under "148. There are also several matters pending before this Court relating to compliance with the orders passed by this Court. The action that is taken by all the authorities relatable to the Forest (Conservation) Act, 1980 are appealable under section 16(e) before the National Green Tribunal. 149. Registry is directed to transfer all those matter to NGT for appropriate orders being passed by it."

Hon'ble Supreme Court in the matter of Bhopal Gas Peedith Mahila Udyog Sangathan v. Union of India, (2012) 8 SCC 326 has held that "40. Keeping in view the provisions and scheme of the National Green Tribunal Act, 2010 (For short "The NGT Act") particularly Sections 14, 29, 30 and 38(5), it can safely be concluded that the environmental issues and matters covered under the NGT Act, Schedule I should be instituted and litigated before the National Green Tribunal (For short "NGT"). Such approach may be necessary to avoid likelihood of conflict of orders between the High Courts and NGT. Thus in unambiguous terms, we direct that all the matters instituted after coming into force of the NGT Act and which are covered under the provisions of the NGT Act and/or in Schedule l to the NGT Act shall stand transferred and can

be instituted only before NGT. This will help in rendering expeditious and specialised Justice in the field of environment to all concerned.

41. We find it imperative to place on record a caution for consideration of the courts of competent jurisdiction that the cases filed and pending prior to coming into force of the NGT Act, involving question of environmental laws and/or relating to any of the seven statutes specified in Schedule I of the NGT Act, should also be dealt with by the specialised tribunal, that is, NGT, created under the provisions of NGT Act. The courts may be well advised to direct transfer of such cases to NGT in its discretion, as it will be in the fitness of administration of justice."

Whether NGT Subordinate to High Court

It is held in the matter of State of A.P. v. Raghu Ramakrishna Raju Kanumuru, (2022) 8 SCC 156 that "12. In any case, no law is necessary to state that insofar as the tribunals are concerned, they would be subordinate to the High Court insofar as the territorial jurisdiction of the High Court is concerned. A reference in this respect was also made to the judgment of this Constitution Bench of thei Court in L. Chandra Kumar v. Union of India [(1995)1SCC400] 13. We are, therefore, of the considered view that it was not appropriate on the part of the learned NGT to have continued with the proceeding before it, specifically, when it was pointed that the High Court also in seisin of the matter and has passed an interim order permitting the construction. The conflicting orders passed by the learned NGT and the High Court would lead to an anomalous situation, where the authorities would be faced with a difficulty as to which order they are required to follow. There can be no manner of doubt that in such a situation, it is the Order passed by the constitutional courts, which would be prevailing over the orders passed by the statutory tribunals."

Power And Limitation NGT

Indian Oil Corpn. Ltd. v. V.B.R. Menon, (2023) 7 SCC 368 held that 27. The Jurisdiction and Power of NGT are to be found in section 14 to 20, respectively. A close look at these provisions would show that NGT has both original as well as appellate Jurisdiction. The range of powers that NGT has include:

27.1 The Power to adjudicate upon civil cases where as substantial question relating to environment is involved. [(section 14(1)]

27.2 The power to grant relief and compensation to the victims of pollution. [(section 15(1)(a)]; and

27.3 The power to order restitution of either property damaged or of the environment [(section 15(1)(b)]

28. A person in whose favor NGT passes an award or order is entitled to two type of remedies, if the award or order or the decision of the NGT is not complied with. The first is a right to seek execution of the award under Section 25 and the second is to seek the prosecution of the offenders before a criminal court under Section 26."

The Hon'ble Supreme Court in the case of T.N. Pollution Control Board v. Sterlite Industries (I) Ltd., (2019) 19 SCC 479 has held that "In the present case, it is clear that Section 16 of the NGT Act is cast in erms that are similar to Section 14(b) of the Telecom Regulatory Authority of India Act 1997, in that appeals are against the orders, decisions, directions, or determinations made under the various Acts mentioned in Section 16. It is clear, therefore, that under the NGT Act, the Tribunal exercising appellate jurisdiction cannot strike down rules or regulations made under this Act. Therefore, it would be fallacious to state that the Tribunal has powers of Judicial review akin to that of a high Court exercising constitutional power under Article 226 of the Constitution of India. We must never forget the distinction between a superior court of record and courts of limited jurisdiction."

Power To Exercise Suo Motu Jurisdiction

Hon'ble Supreme Court in the matter of Municipal Corpn. Of Greater Mumbai v. Ankita Sinha reported in [(2022)13SCC401] while dealing with an issue "Whether the National Green Tribunal (for short "NG") has the power to exercise suo motu jurisdiction in discharge of its functions under National Green Tribunal Act, 2010" has observed that "….. from the very inception, the role of the NGT was not simply adjudicatory in the nature of a lis but to perform equally vital roles which are preventive, ameliorative or remedial in nature. The functional capacity of NGT was intended to leverage wide powers to do full justice in its environmental mandate." The court has further observed that "While we see many tribunals functioning within their specified domains, variances do exist in the manner in which they are designed to function. The statutory tribunals were categorized to fall under four sub-heads; Administrative Tribunals under Article 323-A; Tribunal under Article 323-B; specialised sector tribunals and most prominently; tribunal to safeguard rights under Article 21. As already noted, the duties of NGT brings it within the ambit of the fourth category, creating a compelling proposition for wielding much broader powers as delineated by the statute." While giving to the answer to the above issue formulated by the Hon'ble Court the court expressed that "98. When the Registry of NGT does indeed receive a communication or letter, including matters published in media, it may cause to initiate suo motu action by inviting attention of NGT to such matters in the form of office report. Such circumstances would however require a notice to be given to the sender of the communication or author of the news item, as the case may be, to assist NGT in the course of hearing and to substantiate the factual matters. It must also be said that the exercise of suo motu jurisdiction does not mean eschewing with the principles of natural justice and fair play. In other words, the party likely to be affected should be afforded due opportunity to present their side before suffering adverse orders. ……. We must therefore adopt an interpretation which sustains the sprit of public good and not render the environmental watchdog of our country toothless and ineffective. ……. It is accordingly

declared that NGT is vested with suo motu power in discharge of its functions under the NGT Act"

Conclusion

I may conclude this Article by referring a paragraph from the Judgment pronounced by Hon'ble Supreme Court in Municipal Corpn. Of Greater Mumbai v. Ankita Sinha reported in [(2022)13SCC401] wherein it is stated that During the course of its functioning, NGT has been recognized as one of the most progressive tribunal in the world. This jurisprudential leap has allowed our country to enter a rather exclusive group of nations which have set such institution with broad powers.

CASE SUMMARY

Ranjitsinh & ors v. Union of India & ors.
2024 INSC 280

The case concerning conflict between growing demand of renewable energy and protecting the endangered Great Indian Bustard (GIB)

The State of Rajasthan is home to a majority of the current population of *Great Indian Bustard (GIB) bird. With time, the country has seen a rapid and steady decline in the population of the GIB. . The GIB has been classified as a critically endangered species from 2011 until the most recent assessment in 2018. There are significant factors bearing upon the dwindling numbers and low rate of reproduction of the existing population of these species. Pollution, climate change, predators and competition with invasive species are among the many threats that exacerbate the challenges faced by these vulnerable species. The attrition of the existing population of these endangered birds has been partly attributed to overhead transmission lines.*

The question before the Hon'ble Apex Court was the choice between renewable energy and generation and protection of endangered species.

On April 19, 2021, an interim order imposed restrictions on new overhead transmission lines in a 99,000 sq. km area. The Court mandated that future low voltage powerlines in GIB areas be laid underground and existing low and high voltage lines be converted accordingly. Additionally, the installation of bird diverters was required, reflecting the Court's preference for protecting endangered species over facilitating solar power generation.

In its final decision, the Supreme Court considered India's international commitments under the Kyoto Protocol and Paris Agreement, emphasizing the nation's obligation to reduce greenhouse gas emissions and promote renewable energy.

The Court underscored the right to a healthy environment and the right to be free from the adverse effects of climate change as integral to the right to life (Article 21) and the right to equality (Article 14) of the Constitution.

Highlighting the importance of solar energy in combating climate change and promoting social equity, the Court also reviewed international climate change litigation precedents, such as the Urgenda Foundation v. State of the Netherlands, where the Dutch Supreme Court upheld the government's duty to reduce greenhouse gas emissions to protect human rights, and the Juliana v. United States case, where young plaintiffs argued the U.S. government's inaction on climate change violated their constitutional rights.

The judgment emphasized the need for a balanced approach to biodiversity conservation and climate change mitigation. An expert committee was directed to assess the feasibility of underground power lines, evaluate the efficacy of bird diverters, and identify the necessary number of diverters, with a report due by July 31, 2024. This decision reflects the Supreme Court's nuanced approach in balancing renewable energy promotion with endangered species protection, recognizing the complex interplay between biodiversity and climate change mitigation.

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Vellore Citizens Welfare Forum v. Union of India
(1996) 5 SCC 647

A leading case on pollution by tanneries and direction for constititution of green benches.

The debate of environmental protection vis a vis the development is in the core of the present case. In the present case, the Hon'ble Apex Court has delved into analysis of relationship between environment and development. The Vellore Citizens Welfare Forum is the petitioner which filed a petition in the form of a Public Interest Litigation under Article 32 of Indian Constitution against the pollution which is being caused by enormous discharge of untreated effluent by the tanneries and other industries in the State of Tamil Nadu. The water of River Palar is the main source of drinking and bathing water for the surrounding people. The large-scale pollution caused to River Palar due to the discharge of untreated effluents by the tanneries and other industries in the State of Tamil Nadu was the cheif concern raised by the petitoners.

The question before the Apex Court was whether the tanneries should be allowed to continue to operate at the cost of lives of lakhs of people.

The Hon'ble Apex Court emphasized upon the need of balancing the need of development as well as maintaining the sustainability of environment. While agreeing upon the fact that Tanneries in India are the major foreign exchange earner and also provides employment to several thousands of people but one can not have Nelson's eye to the problem that such industries destroy the environment and poses a health hazard to everyone.

It was directed for the the Central Government to constitute an authority under Section 3(3) of the Environment (Protection) Act, 1986 and shall confer on the said authority all the powers necessary to deal with the situation created by the tanneries and other polluting industries in the State of Tamil Nadu.

The authority shall compute the compensation under two heads namely, for reversing the ecology and for payment to individuals. A statement showing the total amount to be recovered, the names of the polluters from who the amount is to be recovered, the amount to be recovered from each polluter, the persons to who the compensation is to be paid and the amount payable to each of them shall be forwarded to the Collector\District Magistrates of the area concerned.

The authority shall direct the closure of the industry owned/managed by a polluter in case he evades or refuses to pay the compensation awarded against him.

The court delivering its judgment in favor of petitioners directed all the Tanneries to deposit a sum of Rs. 10,000 as fine in the office of Collector as fine

Also, directed the State of Tamil Nadu to award Mr. M. C. Mehta with a sum of Rs. 50,000 as appreciation towards his efforts for protection of Environment. The Court in this case also emphasized on the constitution of Green Benches in India dealing specifically with matters relating to environment protection and also for speedy and expeditious disposal of environmental cases.

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Indian Council for Enviro-Legal Action v. Union of India
(1996) 3 SCC 212

A leading case on the application of principle of 'Absolute Liability' against the industries producing Hyaluronic Acid and an environmental audit by specialist bodies created on a permanent basis

In this case, 5 factories which were located near Bichhri village, Udaipur were producing Hyaluronic Acid [H-acid] in. Since the toxic untreated waste waters were allowed to flow out freely and because the untreated toxic sludge was thrown in the open in and around the complex, the toxic substances had been percolating deep into the bowels of the earth polluting the aquifers and the subterranean supply of water. The water in the wells and the streams has turned dark and dirty rendering it unfit for human consumption. It has become unfit for cattle to drink and for irrigating the land. The soil has become polluted rendering it unfit for cultivation, the main stay of the villagers. It spread disease, death and disaster in the village and the surrounding areas. The water in around 60 wells spread over 350 hectares turned red and became unfit for drinking and other household purposes. The entire land of 350 hectares became infertile. Accordingly, a writ petition was filed by the Environmentalist organization-Indian Council for Enviro-legal Action before the Supreme Court to look into the above matter.

The question before the Apex Court was whether there is compliance of environmental regulations to operate chemical producing industries in letter and spirit

The Court ordered closure of factories and also ordered them to pay damages up to the tune of Rs. 4 Crores for reversal of ecology of the area. The court dealt in detail the matters concerned above referred to the cases of Rylands versus Fletcher, Oleum Gas Leakage case, Bhopal Gas Tragedy etc. and applied the principle of absolute liability.

It was directed that all chemical industries, whether big or small, should be allowed to be established only after taking into considerations all the environmental aspects and their functioning should be monitored closely to ensure that they do not pollute the environment around them.

It was also emphasised for the need for creating environment courts which alone should be empowered to deal with all matters, civil and criminal, relating to environment. These courts should be manned by legally trained persons/judicial officers and should be allowed to adopt summary procedures. The Court also suggested setting up of Green Benches in all the State High Courts.

The hon'ble Court also mooted the idea of an environmental audit by specialist bodies created on a permanent basis with power to inspect, check and take necessary action not only against erring industries but also against erring officers may be considered. The idea of an environmental audit conducted periodically and certified annually, by specialists in the field, duly recognised, can also be considered.

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Rural Litigation Entitlement Kendra (RLEK) v. Union of India

AIR 1988 SC 2187

A leading case on how to balance the conflict between development and conservation of environment due to quarrying in the Doon Valley vis-a-vis the problem to address the livelihood issue

This is the first case of its kind in the country involving issues relating to environment and ecological balance and the questions arising for considerations are of grave moment and significance not only to the people residing in the Mussoorie Hill range forming part of the Himalayas but also in their implications to the welfare of the generality of people living in the country. It brings into sharp focus the conflict between development and conservation and serves to emphasise the need for reconciling the two in the larger interest of the country. The present case relates to unauthorized and illegal mining activities carried in the entire stretch of Doon Valley.

The question before Court was how to balance the conflict between development and conservation of environment due to quarrying in the Doon Valley vis-a-vis the problem to address the livelihood issue of those who would be affected due to closure of quarrying industry.

The Apex Court held that most of these mines are either within reserved forests or in forest lands, and to these areas the Forest Conservation Act applies and to allow mining in these areas would not only be violative of the provisions of Forest (Conservation) Act but would be detrimental to restoration of the forest growth in a natural way in this area. In such circumstances the mining in this area has to be totally stopped.

The Supreme Court prohibited the mining operations with a view to determine if the mines were operated with the safety standards. The Hon'ble Apex has stepped in to close down mining operation in the Doon Valley except to a very limited extent and directed to set up a High Powered Committee to look after reafforestation, mining activities and all other aspects necessary to bring about natural normalcy in the Doon Valley.

The Supreme Court appointed the Bhargava Committee- to assess the total effects of the mines in the ecology of the area. On the recommendations of the Bhargava Committee, the court ordered that these operation in such an ecologically sensitive area has to be stopped.

The Hon'ble Apex Court also held that each of the working mines shall have to work with an undertaking given to the Monitoring Committee that all care and attention shall be bestowed to preserve ecological and environmental balance while carrying on mining operations. 25 percent of the gross profits of the mines shall be credited to the Fund In-charge of the Monitoring Committee

A Rehabilitation Committee should be set up to oversee the rehabilitation of the displaced mine owners.

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M. C. Mehta v. Union of India
(1997) 2 SCC 353

Ganga River Pollution Case

Mr. M.C. Mehta, an environmental lawyer filed a petition (PIL), urged state officials to forbid leather tanneries and the Kanpur municipal corporation from discharging residential and industrial waste into the stream. The petitioner alleging that government officials had not taken adequate action to combat environmental contamination of the Ganga stream. Due to a poisonous coating of chemicals manufactured by a pharmaceutical company, a matchstick thrown by a smoker in 1985 in the holy city of Haridwar beside the river Ganga triggered the waterbody to catch fire.

Issues Raised:

(1) Did the authorities start an investigation into the deteriorating state of the holy watercourse after becoming aware of it?

(2) Should funding be provided to smaller firms to repair wastewater treatment plants? If yes what measures should be used to categorise "minor industries"?

The Hon'le Apex Court issued comprehensive directions to the Government of Uttar Pradesh for ensuring construction of sewers, lavatories and public utilities besides compliance of environmental laws to prevent discharge of industrial effluents in the Ganga river

High Courts should not ordinarily grant orders of stay of criminal proceedings in cases of criminal violation of environmental laws and even if such an order of stay is made in any extra-ordinary case the High Courts should dispose of the case within a short period, say about two months, from the date of the institution of such case.

Whenever applications for licences to establish new industries are made in future, such applications shall be refused unless adequate provision has been made for the treatment of trade effuents flowing out of the factories. Immediate action should be taken against the existing industries if they are found responsible for the pollution of water.

The practice of throwing corpses and semi-burnt corpses into the river Ganga should be immediately brought to an end.

The hon'ble Apex Court held that tanneries to build primary treatment facilities, their financial standing should be ignored. Further ruled that the central government will commission textbooks for the aforementioned use and give them gratis to educational institutions. Children should be taught the importance of preserving cleanliness, starting with their own homes' interior and exterior conditions as well as the streets around their homes.

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SAMATHA VS STATE OF ANDHRA PRADESH AND ORS.
1997 (8) SCC 191

A leading case concerning dismissal of grant of mining lease to non tribal persons.

Borra is a reserved forest area in Ananthagiri Mandal of Visakhapatnam District of Andhra Pradesh. It consists of 14 villages and is a notified scheduled area. The State Government granted mining leases in this area to several non-tribal persons. The appellant-Society i.e. Samatha filed a writ petition questioning the power of the Government to grant mining leases in favour of non-tribals in the scheduled area, in violation of the Andhra Pradesh Scheduled Area Land Transfer Regulation (1 of 1959), as amended by Regulation II of 1970 (for short, the 'Regulation') Regulation which prohibits transfer of any land in scheduled area to a non-tribal. The Division Bench of the High Court has, held that the Regulation does not prohibit transfer of the Government land by way of lease to the non-tribals.

The questions before the Hon'ble Apex Court were as follows:

(i) Whether the State Government has the power to transfer tribal scheduled areas to non-tribals?

(ii) Whether the State Government can legally grant mining leases of tribal scheduled lands to non-tribal entities?

(iii) Whether granting mining leases violate the Forest Conservation Act, 1980 and the Environment (Protection) Act, 1986?

The Supreme Court held that the mining leases granted to non-tribal persons by the State Government were void and invalid and held the State liable for giving tribal scheduled lands for mining leases. The Court observed that the Central Government has the authority to manage and administer disputed areas through a statutory receiver, but not adjacent areas acquired through the Act.

The Court interpreted the term 'person' in Section 3(1) of Regulation to not include 'State', making mining leases to non-tribal persons not in contravention of the Regulation.

The Court directed that mining leases must be spent for the upliftment of tribal people and maintenance of ecological balance in scheduled areas and directed the forest department to inspect the area where mining activities were being carried out and determine if it falls under 'forest land'.

The Court upheld the interests and life of tribal people living in scheduled tribal areas and the importance of tribal lands rights in accordance with the Fifth Schedule of the Indian Constitution.

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T.N. Godavarman Thirumulpad v the Union of India and others

I.A. No. 61370 of 2021 [Report No. 06 0f 2021]
Writ Petition (Civil) No. 202 of 1995

The case pertains to the approval granted by the Standing Committee of the National Board for Wildlife (NBWL) for the doubling of an existing railway line from Castlerock (Karnataka) to Kulem (Goa). The project involved using 120.875 hectares of protected area and 113.857 hectares of non-protected reserved forest land, passing through the Bhagwan Mahaveer Wildlife Sanctuary. The petitioners i.e. the Goa Foundation and other concerned parties filed applications against the project, citing environmental concerns.

Issues

(1) Whether the project adheres to the principle of sustainable development as mandated by the Constitution of India?

(2) Whether the precautionary principle, which requires anticipatory action to prevent environmental harm, has been adequately considered.

(3) Environmental Clearance: The legitimacy of the wildlife clearance granted by the NBWL for the railway project, particularly in light of previous court orders.

(4) Impact Assessment: Whether a comprehensive assessment of the project's impact on the environment, including the effects on wildlife, habitat, climate, and human-wildlife interactions, was conducted.

The Court emphasized that sustainable development and the precautionary principle are constitutional requirements. The protection of the environment should take precedence over economic interests when there is doubt.

That the Ministry of Railways or RVNL have failed to provide any substantial basis for the requirement of doubling the railway line by addressing the impact which it would have on the habitat and the damage that it would cause to the environment.

Environmental Impact Assessment: The Court ruled that a thorough assessment of the environmental impact, including secondary effects such as machinery setup, waste disposal, and mitigation measures, must be strictly undertaken before considering project approval. There should be a detailed study and analysis of the impact of the proposed project on the bio-diversity and ecological system of the protected areas under wildlife sanctuary.

Revocation of NBWL Approval: The Supreme Court revoked the NBWL's approval for the railway line doubling project, underscoring the need for a detailed impact assessment in protected areas and wildlife sanctuaries before proceeding with such projects.

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Subhash Kumar v. State of Bihar
1991 (1) SCC 598

"Public interest litigation cannot be invoked by a person or body or person to satisfy his or its personal grudge and enmity"

The petitioner filed a writ petition in this court by way of public interest litigation alleging the respondents, West Bokaro Collieries and Tata Iron and Steel Company (TISCO) were polluting the river Bokaro by discharging surplus waste in the form of sludge/slurry as effluent from their washeries into river making the river water unfit for drinking and irrigation purposes thereby causing risk to the health of the people. The petitioner prayed for directions to the respondents to take immediate steps prohibiting the pollution of the river and to take legal action against TISCO under the Water (Prevention and Control of Pollution)Act, 1974.

The respondents contested the petition denying the petitioner's allegations. Bihar State Pollution Board asserted that directions have been issued to the Bokaro Collieries to take effective steps for improving the quality of the effluent going into the river Bokaro and the TISCO Company has been granted permission to discharge their effluents from their outlets in accordance with sections 25 and 26 of the 1974 Act.

On behalf of TISCO and the Bokaro Collieries it was contended that all effective steps have been taken to prevent the pollution and they have complied with the instructions of the State Pollution Board.

The issue before the Court was for issuance of direction to the Director of collieries in the then state of Bihar and TISCO to stop discharge of slurry in Bokaro river.

It was held by the Apex court that prima facie no good reason were found to accept the petitioner's allegation that the water of the river Bokaro is being polluted by the discharged of sludge or slurry into it from the washeries of the respondent-company. On the other hand it was held that the State Pollution Control Board has taken effective steps to check the pollution.

While dismissing the writ with cost, it was observed by Hon'ble Supreme Court that Present petition does not appear to have been filed in public interest instead the petition has been made by the petitioner in his own interest . It was held that Public interest litigation cannot be invoked by a person or body or person to satisfy his or its personal grudge and enmity, if such petitions under Article 32, are entertained it would amount to abuse of process of the Court, preventing speedy remedy to other genuine petitioner from this Court. Personal interest cannot be enforced through the process of this Court under Art. 32 of the Constitution in

the garb of a public interest litigation. Public interest litigation contemplates legal proceeding for vindication or enforcement of fundamental rights of a group of persons or community which are not able to enforce their fundamental rights on account of their incapacity, poverty or ignorance of law. A person invoking the jurisdiction of this Court under Art. 32 must approach this Court for the vindication of the fundamental rights of affected persons and not for the purpose of vindication of his personal grudge or enmity. It is duty of this Court to discourage such petitions and to ensure that the course of justice is not obstructed or polluted by unscrupulous litigants by invoking the extraordinary jurisdiction of this Court for personal matters.

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Fatehsang Gimba Vasava v. State of Gujarat
AIR 1987 GUJ 9

The case is recognises the rights of Kotwalias and Vansfodias tribes of Gujarat to collect bamboo from reserved forest area at the concessional rate.

The petition has been brought forward by the poor adivasis in the State of Gujarat as they were deprived of the forests rights conferred upon them by the State Government. In the present case two tribal communities named Kotwalias and Vansfodias, residing within the reserved forests (hereinafter RFs), were granted certain privileges vide certain resolutions passed by the Gujarat government, to collect bamboo at the concessional rate of Rs. 7 per 100 bamboos, subject to a maximum of 800 bamboos per family per year. Despite the governmental resolutions granting these tribal groups the privilege to exploit bamboos and make bamboo articles out of them, the forest officers allegedly prevented them from doing so. As a result, the source of income of these tribals was hit which has increased their economic hardship. The forest officers had been preventing the tribals from collecting the economic benefits from bamboos. A writ of mandamus seeking a direction to restrain the forest officers was filed but was rejected. Subsequently a letters patent appeal was filed.

The question before the Court were:

1. Whether the petitioners are Kotwalias and are entitled to the privileges conferred by the government resolutions of availing bamboos at a concessional price?
2. Whether the petitioners have to collect bamboos through a cooperative society?
3. Whether bamboo articles like supdas, palas and toplas fall under the definition of 'forest produce' as per the Indian Forest Act, 1927; and are private traders and dealers required to get permits from forest officials before removing such articles from the forests?

The Hon'ble Court held that the list of 'aboriginal or hill tribes' includes several tribal groups like Bhils, Tadvi Bhils and Vasavas. Though Vasavas have been alleged to be agriculturists by the forest department but the forest manual has included them under the said definition and the list thereto. Thus, they are entitled to the privileges given by the government to collect bamboos at concessional rates.

Further held that they are eligible to collect bamboos at concessional rates by availing the governmental privilege, even if they aren't Kotwalias in particular, because the Forest Manual extends the rights to several other groups including Vasavas. Further, since they are residents of the forest, no special permit needs to be obtained from the forest officials, individually.

The court reasoned that bamboo articles aren't forest-produce under the meaning of section 2(4) of the Act. The definition under the said section makes it clear that "all that has been produced by nature amounts to forest-produce but doesn't include articles made by man, which in this case are the bamboo articles namely palas, supdas and toplas, made from bamboo chips". Bamboo chips shall also fall under the definition of forest-produce but once they get converted into new article due to human effort, they get merged with the new article or product so produced and cease to be 'forest-produce'.The Court directed the State officials to restore the rights of the aadivasis and allow them with the bamboo to earn their livelihood.

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INTERESTING FACTS ABOUT ENVIRONMENT

Interesting Facts about Environment

1. **The World's Largest Biome.**

   - The Taiga, also known as the boreal forest, is the world's largest biome.
   - The Taiga houses 30% of the world's forest cover, 11% of the Earth's landmass and stretches from Scotland to Newfoundland, via Russia and Canada.

2. **Recycling 1 Ton of Paper.**

   - Recycling paper has a significant positive impact on the environment, equivalent to saving: 17 trees, 2 barrels of oil,3.2 cubic yards of landfill, and 60 lbs of air pollution![1]

3. **Most of the World's Water is Salty.**

   - 97% of the earth's water is actually salt water found in the oceans. While about 3% of the earth's water is fresh, less than 1% of fresh water actually usable - 2.5% of the earth's supply of fresh water is unavailable to human beings.[1]

4. **Freshwater**

   - Lakes, rivers and wetlands hold 20–30 per cent of global carbon despite occupying only 5–8 per cent of its land surface.
   - The Nile River is widely regarded as the world's longest waterway. Starting in East Africa, it flows through 11 different countries and stretches 6,695 kilometres.
   - Approximately 1.4 billion livelihoods worldwide are directly reliant on access to fresh water, including jobs related to the food and beverage, energy and water industries.

5. **Fungi Help to Manage the Earth.**

   - Fungi are earth's environmental managers. Without them, all life in the forest would be buried under layers of dead matter. They not only decompose dead matter, but also break down rocks and even help to absorb oil spills and radiation.
   - Soil microorganisms are important in producing antibiotics. Penicillin, for example, comes from a small fungus living in the soil.[2]

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1 Available at: *https://onetreeplanted.org/blogs/stories/environment-fun-facts*

2 Available at: *https://www.worldenvironmentday.global/did-you-know/fun-facts*

- The largest organism on Earth is a fungus in the Blue Mountains of the United States. Covering about 965 hectares of land, the fungus could be as ancient as 8,650 years, which would earn it a place among the oldest living organisms in the world.[2]

6. We Can Get Energy from the Ocean.

- Ocean thermal energy is a new technology that produces energy by harnessing the different temperatures (thermal gradients) between the deep ocean and the ocean surface.

7. Aluminium can be Recycled Indefinitely.

- Recycling just one aluminium can saves enough energy to power a TV for 3 hours.
- Aluminium is the most recyclable materials in the recycling bin, as well as one of the most recycled materials.
- Aluminium can be recycled back to its original form and has a cost-effective recycling process, where it more than pays for its recycling costs and saves 90% more energy than sourcing new aluminium.[1]

8. Saharan Desert Winds Fertilize the Amazon Basin.

- Despite the fact that the Sahara and the Amazon Rainforest are miles apart, they share millions of tons of dust.
- Dust carried from the wind of the Saharan Desert help to fertilize the Amazon Basin, which is the world's most biodiverse ecosystem.
- In reality, it's not actually the dust, but the nutrients that it carries, especially phosphorus - which is a key nutrient for plants to grow and survive.[1]

9. Land is the home for 60% of all species.

- Almost 60 per cent of all species live in soil, making land the planet's most biodiverse habitat.
- Healthy soils store massive amounts of carbon, which, if released, would cause a huge spike to planetary warming.

10. Sahara Desert is Home to Many Species.

- Deserts cover more than one-fifth of the Earth's land area and are found on every continent. The Sahara is the largest hot desert in the world, spanning 9.4 million square kilometers, about the size of Canada.
- Despite its reputation for being lifeless, the Sahara Desert is home to 500 plant species, 70 mammalian species, 100 reptilian species, 90 avian species, and several arthropods, such as spiders and scorpions.[2]
- Many deserts are expanding because of climate change but some countries are fighting back including the 22 countries in Africa that border the Sahara Desert where the Great Green Wall initiative aims to restore 100 million hectares of land through a mosaic of green and productive landscapes.[2]

Human Actions Effecting the Environment

1. Increasing Human Population.

- If all life on Earth was put on a scale, the human population would only make up about one ten-thousandth of the total weight of life on Earth.
- By 2100, the global urban population will produce three times more waste than today.[3]

2. Human Consumption of Natural Resources is Increasing.

- Human consumption of Earth's natural resources more than tripled between 1970 and 2015. Our use of natural resources is expected to continue growing and more than double from 2015 to 2050.
- If current patterns continue, we will have emptied the world's oceans for seafood by 2050.
- 27,000 trees are cut down each day so we can have Toilet Paper.
- Rainforests are cut down at a rate of 100 acres per minute.[3] According to NASA, the world's rainforests will be gone by 2100 if the current rate of destruction continues.[3]
- An estimated 50,000 species inhabiting our tropical forests become extinct annually. That's an average of 137 species a day.[3]

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3 Available at: *https://www.theworldcounts.com/stories/amazing-environmental-facts*

3. Effect of Soil Erosion on Farmlands.

- Every five seconds, the equivalent of one football pitch of soil is eroded. Yet, it takes 1,000 years to generate 3 centimetres of topsoil.
- Every year more than 24 billion tonnes of priceless topsoil are washed or blown away worldwide, as the land is over cultivated and overgrazed and trees and forests are cut down.
- The world will need to raise its food production by 60–70 per cent to feed a projected human population of 9 billion by 2050 even as the current agricultural expansion continues to threaten forests and biodiversity.[2]

4. Air Pollution is a Greater Threat to Life Expectancy than Smoking, HIV, or War.

- A report by the Energy Policy Institute at the University of Chicago disclosed that individuals in India endure an average lifespan reduction of 5.9 years due to poor air quality.
- Additionally, the top five countries with severe air pollution in Asia, Central, and West Africa are also witnessing a concerning rise in this hazard.

5. Green Crimes, Forest Diversions in India.

- In India, while the number of environmental crimes decreased by 18% between 2021 and 2022, courts are disposing of cases at a significantly lower rate than at which new cases are being recorded – leading to pile-ups and delays, per the report.
- In 2022, 94% of the reported environmental crimes occurred in just five states: Tamil Nadu, Rajasthan, Kerala, Maharashtra and Uttar Pradesh.
- The report compiled data from the Ministry of Environment, Forest and Climate Change as of August 7 last year, and found that 17,381 hectares of forestland was diverted for non-forestry purposes in 2022-23, under the Forest (Conservation) Act (FCA), 1980.
- This is a rise of 3.5%, than when compared to 2021-22.
- More than half (65%) of these diversions occurred in the name of road construction, mining activities and transmission line development.[4]

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4 Available at: *https://thewire.in/environment/2023-year-of-extremes-state-of-environment-report*

6. Climate Change and Extreme Weather Events Throughout the Globe.

- Globally, 109 nations suffered losses due to extreme weather events in 2023. Africa, Europe and West Asia reported 84% of the 21,173 deaths caused by extreme events during the year, per the report.
- Climate change has led to a rise in temperatures and the world is facing more frequent and intense heat waves, and glaciers are melting at double the speed than they did twenty years ago.
- As much as half the world's glaciers will be lost by 2100.
- More than half of the world's major drinking water aquifers are depleting faster than they can be replenished; wild species are becoming extinct faster too.
- Even space hasn't been spared: 130 million pieces of satellite debris are circling around in space, and they pose a threat to functioning satellites.[5]

Human Taking Action for Saving the Environment

1. The Ozone Layer will be Fully-Healed by 2069.

- The UN's Environment Agency (UNEP) has declared that the ozone layer, the planet's protective shield of gas, is on track to heal completely in our lifetime.
- The recovery was made possible due to the phase-out of ozone-depleting substances, showing that if humans work together, we can really save the planet.[1]

2. Mangrove Forests are Sequestering Carbon Dioxide at Incredible Rates.

- Mangrove forests, suck up carbon dioxide from the air to store in their roots and branches, as well as the sediment that collects around them. They do this so well that they can store up to 10 times more carbon than forests.

3. Rewilding Just 9 Species could Contribute over 95% to Extracting 500bn Metric Tons of CO2.

- While many climate change solutions focus primarily on protecting and restoring ecosystems like forests and grasslands, animals could play a huge role in helping us extract CO2 from the atmosphere too.
- Through their movement and behavior, animals distribute seeds and nutrients and disturb the soil through digging, trampling, and nest building. All this action helps plants grow and store more carbon.

5 Available at: *https://weather.com/en-IN/india/news/news/2018-12-17-positive-environment-stories-india*

- In Africa's Serengeti, for instance, almost half a century of wildebeest population recovery has resulted in the sequestration of as much carbon yearly to offset all of East Africa's fossil fuel emissions.
- In fact, a report published in March 2023, suggested that rewilding just nine wildlife species or species groups (African forest elephants, American bison, fish, grey wolves, musk oxen, sea otters, sharks, whales, and wildebeest) would contribute more than 95% towards the global target of extracting 500 billion metric tons of carbon dioxide from the atmosphere by 2100.[2]

4. In 2018, Indians Planted Over 50 Million Trees in 24 Hours.

- Worldwide environmental efforts inspired people in India to rally together for a Guinness World Record in honour of Earth Day.
- According to Indian officials, 800,000 people banded together to plant 49.3 million trees in 24 hours on July 11, 2018, nabbing the title for the most trees planted in a single day.[5]

5. Sikkim Became the First Completely Organic State in the World.

- Sikkim beat over 25 countries to receive the prestigious UN Future Policy Award in 2018 for becoming the world's first 100 percent organic state.
- By bolstering efforts towards sustainable living, the north-eastern state has been able to convert over 75,000 hectares of land into certified organic farms.
- Starting 2003, Sikkim started reducing the subsidy on chemical fertilisers and pesticides by 10 percent every year and completely banned them in 2014.
- The state's organic farming policy didn't just benefit over 66,000 farming families; it also led to a 50% growth in agro-ecology and boosted incoming tourism as well.

6. In 2018 Mumbai Saw the World's Largest Beach Clean-Up.

- The volunteer-driven Versova Beach cleanup led by lawyer Afroz Shah started in 2015, but 2018 was when we were truly able to see the impact of the amazing volunteer work. Versova beach is now so clean that turtles have started breeding here again after more than 20 years.
- Over 80 Olive Ridley turtles were seen climbing out of their nests on Versova beach as they stumbled their way towards the water.

- The big moment came after 127 weeks of continuous cleanup drives by Shah and his team of 1200 volunteers who helped clean over 9 million tonnes of garbage from Versova beach, making this one of the biggest beach cleanup drives in the world. The volunteers also planted over 300 coconut trees around the beach to restore the area.[6]

7. 55 Tonnes of Waste Removed from The Ganga.

- In 2018, Bachendri Pal, the first Indian woman to climb Mount Everest, took on another uphill mission: to clean the Ganga.
- Pal and a 40-member team, including Everest climbers Premlata Agarwal (first Indian woman to climb all the seven summits of the world), Binita Soren, Hemant Gupta, and employees of Tata Steel, kick-started the volunteer initiative, 'Mission Gange'.
- In 2018, the team travelled 1500 km from Haridwar to Patna on a month-long expedition, and was able to clean up over 55 tonnes of waste from the sacred river. While that may not seem a lot, given the amount of pollution in the Ganga, it is nothing less than astonishing, considering that it was accomplished by a volunteer team in just a month.[6]
- 'Mission Gange' is now a family of 83145 people and has collected 55000 kg of total garbage till June, 2024.

8. India set ambitious targets to combat climate change at COP26, 2021.

- That is, the country has promised to balance all the carbon it emits by sequestering, or capturing, an equal amount.

9. India is Now Home to The Largest Network of Ramsar Sites in South Asia

- With the environment ministry designating five wetlands – Haiderpur in Uttar Pradesh and two each in Haryana and Gujarat – as 'Ramsar sites' in the last six months, India is now home to the largest network of Ramsar sites in South Asia.
- Ramsar sites are wetlands of international importance under the Ramsar Convention on Wetlands, an intergovernmental treaty that India is signatory to and which provides the framework for international cooperation to conserve and use wetlands in sustainable fashion. To enable this, Ramsar sites have strict management plans.

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6 Available at: *http://missiongange.org/*

- India is currently home to 47 Ramsar sites.[7]

Fun Facts About the Wildlife

1. A tiger's roar can be heard up to 2 miles away. [8]

2. When separated elephants are reunited, they trumpet their trunks in delight.[5]

3. Wolves can go more than a week without eating.[5]

4. Octopuses have three hearts. One pumps blood around the body, while the other two pump it to the gills. Oh, and that blood is blue, thanks to high copper levels!

5. Owls don't have eyeballs. They have eye tubes.[6]

6. Polar bears have black skin, which helps them absorb heat from the sun to stay warm in an Arctic climate, and it likely protects the bears from harmful UV rays.[6]

7. A human brain operates on about 15 watts.[6]

8. Butterflies can taste with their feet, using something called chemoreceptors to help them identify plants.6

9. Animals with smaller bodies and faster metabolism see in slow motion.[6]

10. Dogs' sense of smell is about 100,000 times stronger than humans', but they have just one-sixth our number of taste buds.[6]

11. Reindeer eyeballs turn blue in winter to help them see at lower light levels. (They're golden-colored in summer.) No other mammals are known to have this ability.[6]

12. A single strand of spider silk is thinner than a human hair but also five times stronger than steel of the same width. A rope just 2 inches thick could reportedly stop a Boeing 747.6

13. The claws of a mantis shrimp can accelerate as quickly as a .22-caliber bullet. Scientists must keep them in thick plastic tanks because their punches can break glass.[6]

14. A sea lion is the first nonhuman mammal with a proven ability to keep a beat.[6]

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7 Available at: *https://www.treehugger.com/random-animal-facts-that-may-surprise-you-4868818*

8 Available at: *https://www.globalgiving.org/learn/wildlife-facts*

15. Squirrels can't burp or vomit, nor can any other rodent, which is why rat poison is so effective; other mammals tend to expel any toxic substance they ingest.[6]

16. The extinct colossus penguin stood as tall as LeBron James.[6]

17. Honeybees can flap their wings 200 times every second.[6]

18. A type of "immortal" jellyfish can cheat death indefinitely.[6]

19. Cats and horses are highly susceptible to black widow venom, but dogs are relatively resistant. Sheep and rabbits are apparently immune.[6]

20. Sharks kill fewer than 10 people per year. Humans kill about 100 million sharks per year. They should be much more scared of us than we are of them.[6]

21. Wild dolphins call each other by name. They let out a unique whistle to identify each other and will respond if they hear their call played back.[6]

22. Young goats pick up accents from each other, joining humans, bats, and whales as mammals known to adjust their vocal sounds to fit into a new social group.[6]

23. Humpback whale songs spread like "cultural ripples from one population to another."[6]

24. Elephants have a specific alarm call that means "human."[6]

25. Horses use facial expressions to communicate with each other. Researchers have identified 17 discrete facial movements in horses.[6]

26. Azara's owl monkeys are more monogamous than humans. They live together as families, with two parents and offspring, for up to nine years or when one of the parents dies. Fathers are highly involved in caring for their young.[6]

27. Male gentoo and Adélie penguins "propose" to females by giving them a pebble. These are precious because the penguins use them to build their nests, and they can be hard to find along the barren Antarctic shoreline. If the female accepts the pebble, the pair bonds and mates for life.[6]

28. Barn owls are generally monogamous, but about 25% of mated pairs "divorce." They do so if breeding is unsuccessful.

29. If a honeybee keeps waggle-dancing in favour of an unpopular nesting site, other workers head-butt her to help the colony reach a consensus.[6]

30. The bone-house wasp stuffs the walls of its nest with dead ants.[6]

31. Less time separates the existence of humans and the Tyrannosaurus rex than the T-rex and the Stegosaurus.[6]

32. Animals have some unusual group names. For instance, a group of parrots is known as a pandemonium. Buffalo form an "obstinacy" and rhinoceroses a "crash." You may have heard of a "murder" of crows, but what about an "exaltation" of larks?[6]

33. Warmer weather causes more turtles to be born female than male.[6]

34. Bats save the U.S. agriculture industry an estimated $3.7 to $53 billion annually by eating pest insects.[6]

35. Fourteen new species of dancing frogs were discovered in 2014, bringing the global number of known dancing frog species to 24.[6]

36. Nearly 30% of all identified species are under the threat of extinction.[5]

37. The global population of wildlife went down more than 50 percent between 1970 and 2010.[5]

38. Habitat destruction is the number one cause of the decline in global wildlife diversity.[5]

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